

DRAFT BASIC ASSESSMENT REPORT FOR CLEARING VEGETATION ON ERF 1 & ERF 971, PRIESKA

PREPARED FOR

MARTELLE TRUST

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This report has been prepared exclusively for Martelle Trust and for submission to the Competent Authority. It may not be used for any other purpose without written consent.



agriculture, environmental affairs,
rural development and land reform

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Basic Assessment Report in terms of the Environmental Impact Assessment Regulations, 2014, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2014 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
2. This report format is current as of07 April 2017. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority
3. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
4. Where applicable **tick** the boxes that are applicable in the report.
5. An incomplete report may be returned to the applicant for revision.
6. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
7. This report must be handed in at offices of the relevant competent authority as determined by each authority.
8. No faxed or e-mailed reports will be accepted.
9. The signature of the EAP on the report must be an original signature.
10. The report must be compiled by an independent environmental assessment practitioner.
11. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
12. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.
13. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?	**YES**	~~NO~~

If YES, please complete the form entitled "Details of specialist and declaration of interest" for the specialist appointed and attach in Appendix I.

1. ACTIVITY DESCRIPTION

a) Describe the project associated with the listed activities applied for

The proposed project entails the clearing of 8 Ha on Erf 971 and 10Ha on Erf 1 in Prieska to establish a crops.
For Erf 1, two potential areas were considered for the establishment of the proposed 10 ha pivot. This approach was necessary due to a portion of the site being located within a Critical Biodiversity Area (CBA 1) as identified on the Northern Cape Biodiversity Map (2024), while practical considerations relating to connectivity with existing irrigation infrastructure also influenced the positioning of the pivot area.

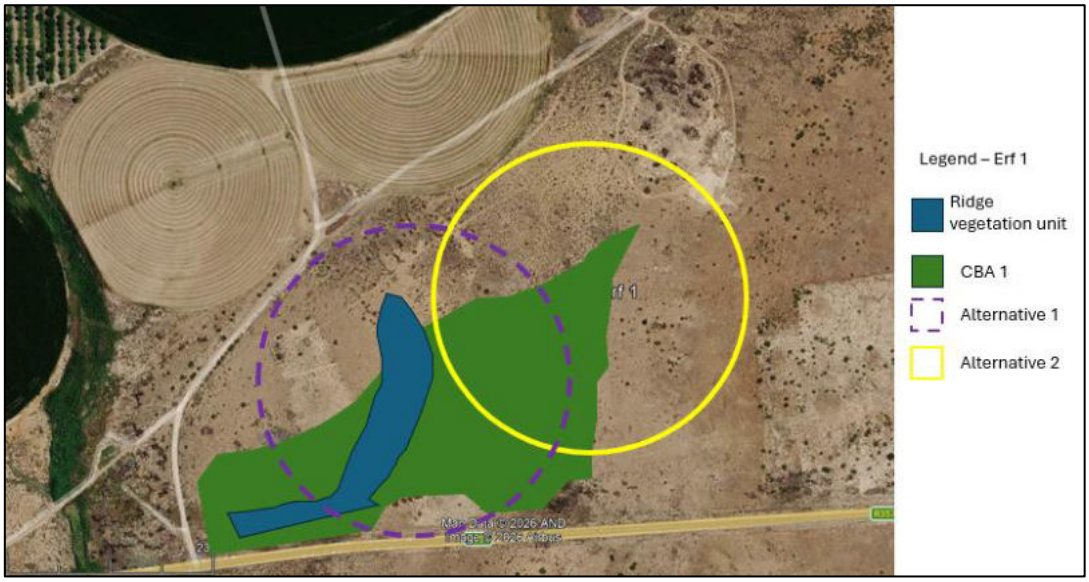


Figure 1: Alternative sites for positioning Erf 1 10Ha central pivot.

A terrestrial fauna specialist assessment was undertaken for the site. The specialist found that Alternative 1 (Figure 1) remains largely in a near-natural condition and retains a moderate to high ecological value, although ecological sensitivity varies across the property. The majority of the site comprises the Shrubland Vegetation Unit, which was assigned a medium conservation priority. This vegetation unit contains intact indigenous shrubland, several protected succulent species, and protected *Boscia albitrunca* (Shepherd's Tree). However, the specialist also noted that the area has already been influenced by existing disturbances associated with the R357 road, adjacent cultivated lands, and the presence of some alien invasive species.

The specialist specifically identified the Shrubland Vegetation Unit as having a medium ecological sensitivity and indicated that low-density development could potentially be considered within lower sensitivity portions of the site, particularly where fragmentation from surrounding land uses has already occurred. In contrast, the smaller Ridge Vegetation Unit, covering approximately 1.63 ha, was assessed as having a high conservation priority and high ecological sensitivity. This assessment was based on the presence of several protected species, including *Aloe claviflora*, protected bulb species, and notably *Ceropegia cf. gordonii (Hoodia cf. gordonii*), which is regarded as a protected Red Data species with a declining conservation status. The specialist therefore clearly distinguished between the two vegetation units, concluding that while portions of Erf 1 may accommodate carefully managed development subject to avoidance and mitigation measures, the ridge area is ecologically important and should preferably be conserved and treated as a no-go area.

Furthermore, the Northern Cape Biodiversity Map further indicates that a substantial portion of Erf 1 falls within a CBA 1 area. Under Alternative Site 1, the proposed pivot footprint overlaps with the Ridge Vegetation Unit, with approximately 5.6 ha of the proposed 10 ha development area falling within the mapped CBA 1.

In response to these constraints, it was proposed that the 10Ha pivot area be shifted further to the north-east. This adjustment would maintain accessibility for irrigation infrastructure integration while excluding the Ridge Vegetation Unit from the development footprint. The revised layout would therefore be limited to the Shrubland Vegetation Unit only, which was assessed as having a medium sensitivity, and would reduce the extent of CBA 1 affected by the proposed pivot area from approximately 5.6 ha to 3 ha.

For Erf 971 the specialist report concludes that the site has already been substantially disturbed and degraded prior to the specialist assessment, with vegetation having been uprooted and in places burned before the field survey was undertaken. The Applicant indicated that the site was severely or densely invaded with *Neltume glandulosa (Prosopis glandulosa)* commonly known as Suidwesdoring or Honey mesquite tree and that they were aggressively removed. After removal the trees were burnt and the site left to be re-established. The 8Ha on Erf 971 also does not fall within any CBA.

As a result, the specialist repeatedly states that the vegetation at Erf 971 can no longer be regarded as natural. Most of the site (approximately 6.6 ha) were classified as a Disturbed Vegetation Unit with a low conservation priority and low ecological sensitivity, characterised mainly by bare ground, pioneer species, annuals, alien invasive plants, and evidence of severe disturbance.

Although some protected plant species were still recorded within the disturbed areas, the ecological functioning and habitat integrity of much of the site were considered poor. The site does, however, still contain smaller environmentally sensitive features, namely drainage lines and a wetland area, both of which were assigned a medium conservation value because of their ecological function and hydrological linkage to the Orange River system. The drainage lines also still contain some protected species and remnant indigenous vegetation. The specialist therefore does not describe the entire site as ecologically insignificant, but rather concludes that the majority of Erf 971 is already transformed and degraded, while the wetland and drainage features retain ecological importance and would require protection, buffering, and careful management if development proceeds. That said, it was also indicated that the wetland could have originated because of the surrounding irrigation.

Overall, compared to Erf 1, Erf 971 is considered substantially more degraded and generally more suitable for development, provided that the remaining sensitive drainage and wetland features are avoided or appropriately managed.

The Applicant, Martelle Trust, who is also the landowner of Erf 971, while the Siyathemba Municipality is the landowner of Erf 1. Martelle Trust is an active farmer and currently cultivates maize, wheat and lucerne under irrigation on abutting areas to the proposed sites. The proposed development forms part of a transition in agricultural land use and they would like to establish annual crop production on both Erf 1 and Erf 971 to long-term pecan nut cultivation.

The proposed activities will include the clearing of vegetation within the identified sites (Erf 1 and Erf 971), preparation of the land for cultivation, and the integration of the additional areas into the existing irrigation and farming infrastructure associated with the current pivot systems.

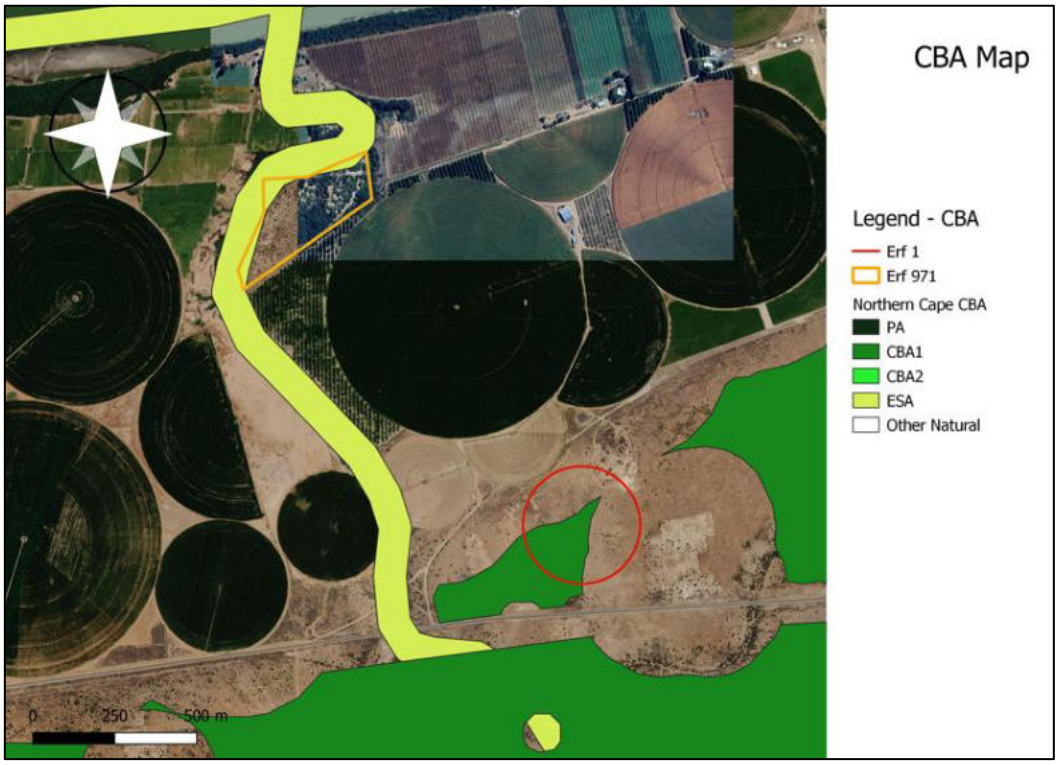


Figure 2: The proposed site indicating the 10 Ha pivot area proposed on Erf 1 and the 8Ha area proposed on Erf 971 between the established crop areas.

b) Provide a detailed description of the listed activities associated with the project as applied for

Listed activity as described in GN 327, 325 and 324	Description of project activity
GNR 324 Activity 12 (g) (ii): The clearance of an area of 300m^2 or more of indigenous vegetation in the Northern Cape within critical biodiversity areas identified in bioregional plans.	A portion of the 10Ha on Erf 1 have been classified as CBA 1 areas according to the Northern Cape Biodiversity Map.
GNR 327 Activity 27: The clearance of an area of 1 Ha or more, but less than 20Ha of indigenous vegetation.	8Ha on Erf 971 and 10Ha on Erf 1 will be cleared to establish crops.

2. FEASIBLE AND REASONABLE ALTERNATIVES

"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

Describe alternatives that are considered in this application as required by Appendix 1 (3)(h), Regulation 2014.Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity (NOT PROJECT) could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

The determination of whether site or activity (including different processes, etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the, competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees, minutes and seconds. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

a) Site alternatives

Alternative 1		
Description	Lat (DDMMSS)	Long (DDMMSS)
Clearing of 8Ha of vegetation on Erf 971 and 10Ha of vegetation on Erf 1	**Erf 971:** 29° 41' 03.02" **Erf 1:** 29° 41' 36.89"	 23° 49' 37.77" 22° 50' 02.18"
Alternative 2 (Preferred Alternative) – No alternative site to establish crops for the 8Ha on Erf 971, but an alternative site was investigated for the 10Ha pivot area on Erf 1		
Description	Lat (DDMMSS)	Long (DDMMSS)
Clearing of 8Ha of vegetation on Erf 971 and 10Ha of vegetation on Erf 1	**Erf 971:** 29° 41' 03.02" **Erf 1:** 29° 41' 34.37"	 23° 49' 37.77" 22° 50' 08.82"

See **Figure 1**.

For Erf 1, two alternative locations were considered for the proposed 10 ha centre pivot. The original alternative (Alternative 1) was located further west, adjacent to the existing irrigated lands, while the preferred alternative (Alternative 2) was shifted towards the north-east of the Erf 1 property. The assessment of alternative sites was informed by the findings of the terrestrial flora, fauna and soil investigations, together with practical considerations relating to integration with the existing irrigation infrastructure and farming operations.

The soil investigation found that the proposed development areas on Oranje-Oos are predominantly underlain by deep, well-drained Oakleaf soils with favourable physical and chemical characteristics for irrigation agriculture

and pecan production. The soils within both alternative locations on Erf 1 were found to be suitable for cultivation and irrigation, with no significant soil-related constraints that would favour one alternative over the other. As such, soil suitability was not the determining factor in selecting the preferred site.

The terrestrial flora assessment identified two vegetation units on Erf 1, namely the Shrubland Vegetation Unit and the Ridge Vegetation Unit. The Shrubland Vegetation Unit was assigned a medium ecological sensitivity and medium conservation priority, while the Ridge Vegetation Unit was assessed as having high ecological sensitivity and high conservation priority due to the presence of protected and conservation-important plant species, including *Aloe claviflora*, protected bulb species and *Ceropegia cf. gordonii* (*Hoodia cf. gordonii*). The Ridge Vegetation Unit also coincides with a mapped Critical Biodiversity Area (CBA 1).

The original western alternative (Alternative 1) would result in direct disturbance of a substantial portion of the Ridge Vegetation Unit and would affect approximately 5.6 ha of the mapped CBA 1 area. The flora specialist identified this ridge habitat as the most sensitive portion of the property and recommended that it should preferably be conserved. In contrast, the preferred north-eastern alternative (Alternative 2) avoids the Ridge Vegetation Unit entirely, confines development to the Shrubland Vegetation Unit, and reduces the extent of CBA 1 affected from approximately 5.6 ha to approximately 3 ha.

The fauna assessment similarly found that Erf 1 remains largely in a natural condition and provides habitat for a range of fauna species associated with the Upper Gariep Alluvial Vegetation. However, the assessment confirmed that ecological sensitivity is not uniform across the property and that the ridge habitat represents the most ecologically significant feature. By relocating the pivot towards the north-east, the development footprint is concentrated within the less sensitive shrubland habitat and avoids the ridge habitat that provides greater ecological value and habitat heterogeneity.

Based on the combined findings of the flora, fauna and soil investigations, Alternative 2 was selected as the preferred site for the 10 ha pivot on Erf 1. This alternative remains agriculturally viable, allows integration with the existing irrigation infrastructure, avoids the highly sensitive Ridge Vegetation Unit, reduces impacts on the mapped CBA 1 area, and represents the environmentally preferred option.

No feasible alternative site exists for the proposed 8 ha development area on Erf 971. The proposed area is situated between existing irrigated agricultural lands and forms part of the Applicant's existing farming operation. The flora and fauna assessments found that the majority of Erf 971 has already been substantially disturbed through historic invasion by *Neltuma glandulosa* (Prosopis), subsequent clearing activities and associated disturbance. Most of the site was classified as disturbed vegetation with low ecological sensitivity and low conservation priority, while the remaining sensitive drainage and wetland features will be avoided and managed through the implementation of mitigation measures. Furthermore, the soil assessment confirmed that the area is suitable for irrigation agriculture. Given the location of the site within the existing farming unit, the absence of equivalent land under the Applicant's control, and the degraded nature of the proposed development area, no reasonable or practicable alternative site was identified for the 8 ha component of the project.

In conclusion, based on the findings of the specialist assessments and the environmental constraints identified on Erf 1, Alternative 2 was selected as the preferred site for the proposed 10 ha pivot development. Alternative 2 avoids the highly sensitive Ridge Vegetation Unit, reduces the extent of impact on the mapped CBA 1 area, and remains suitable for agricultural production and integration with the existing irrigation infrastructure. Consequently, Alternative 1 was not considered a reasonable or environmentally preferred alternative and was therefore discarded from further assessment.

The impact assessment contained in this Basic Assessment Report focuses on Alternative 2 only, as it represents the Applicant's preferred and most environmentally acceptable development option.

In the case of linear activities: **N/A**

Alternative:	**Latitude (S):**	**Longitude (E):**
Alternative S1 (preferred) • Starting point of the activity		

- Middle/Additional point of the activity
- End point of the

activity Alternative S2
(if any)

- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity

Alternative S3 (if any) – There is no third alternative for the pre-negotiated routes

- Starting point of the activity
- Middle/Additional point of the activity
- End point of the activity

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

In the case of an area being under application, please provide the co-ordinates of the corners of the site as indicated on the lay-out map provided in Appendix A of this form.

b) Lay-out alternatives – No layout alternatives are applicable to this project

Alternative 1 (preferred alternative)		
Description	Lat (DDMMSS)	Long (DDMMSS)
Alternative 2		
Description	Lat (DDMMSS)	Long (DDMMSS)
Alternative 3		
Description	Lat (DDMMSS)	Long (DDMMSS)

c) Technology alternatives – No technology alternatives are applicable to this project

Alternative 1 (preferred alternative)
Alternative 2
Alternative 3

d) Other alternatives (e.g. scheduling, demand, input, scale and design alternatives) – No other alternatives are applicable to this project

Alternative 1 (preferred alternative)		
Alternative 2		
Alternative 3		

e) No-go alternative

The No-Go Alternative entails that the proposed clearing of vegetation and establishment of the 10 ha pivot on Erf 1 and the 8 ha cultivation area on Erf 971 would not proceed. Under this alternative, the sites would remain in their current condition and no additional agricultural land would be developed.

From a biodiversity perspective, the "No-Go" alternative would result in the continued protection of all remaining natural vegetation on Erf 1. Habitat available to flora and fauna species would remain intact and no vegetation

clearance, habitat loss or habitat fragmentation associated with the proposed development would occur. The approximately 3 ha of Critical Biodiversity Area (CBA 1) that overlaps with the preferred development footprint on Erf 1 would also remain undisturbed.

On Erf 971, the "No-Go" Alternative would retain the current condition of the site, including the disturbed vegetation areas, drainage lines and wetland features. However, it should be noted that the majority of the site has already been substantially transformed through historical invasion by *Neltuma glandulosa* (Prosopis), subsequent clearing activities and associated disturbance. The ecological benefits of the "No-Go" Alternative on Erf 971 are therefore considered limited when compared to Erf 1.

From an agricultural perspective, the "No-Go" Alternative would prevent the expansion of the Applicant's existing irrigation enterprise and would preclude the establishment of additional pecan orchards. The opportunity to utilise soils that have been assessed as suitable for irrigated agriculture and long-term pecan production would be lost. The anticipated economic benefits associated with increased agricultural production, capital investment and employment opportunities would similarly not be realised.

While the "No-Go" Alternative would avoid all direct environmental impacts associated with vegetation clearance and cultivation, it would not contribute towards the optimisation of the existing agricultural operation or the transition to higher-value perennial crop production. Furthermore, the preferred layout on Erf 1 was specifically selected to avoid the most sensitive ridge habitat and minimise impacts on the mapped CBA 1 area.

The "No-Go" Alternative is therefore considered environmentally preferable in that it would avoid all development-related impacts. However, it would also forgo the agricultural and socio-economic benefits associated with the proposed development. Taking into account the findings of the specialist studies, the degraded nature of Erf 971, the suitability of the soils for irrigation, and the avoidance of the most sensitive ecological features through the preferred layout on Erf 1, the proposed development of Alternative 2 is considered acceptable subject to the implementation of the recommended mitigation measures.

Paragraphs 3 – 13 below should be completed for each alternative. – Please note all alternatives have the same start and end point coordinates.

3. PHYSICAL SIZE OF THE ACTIVITY

a) Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	**Size of the activity:**
Alternative A1[1]	180 000 m²
Alternative A2 (preferred activity alternative)	180 000 m²
Alternative A3 (if any)	m²

or, for linear activities:

Alternative: N/A	**Length of the activity:**
Alternative A1 (preferred activity alternative)	m
Alternative A2 (if any)	m
Alternative A3 (if any)	m

b) Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:	**Size of the site/servitude:**
Alternative A1	18 ha
Alternative A2 (preferred activity alternative)	18 ha
Alternative A3 (if any)	m²

4. SITE ACCESS

Does ready access to the site exist?	**YES**	~~NO~~
If NO, what is the distance over which a new access road will be built		m

Describe the type of access road planned:

Access to the proposed development areas can be directly obtained from the R357 onto the farm dirt road and farm roads between crop areas.

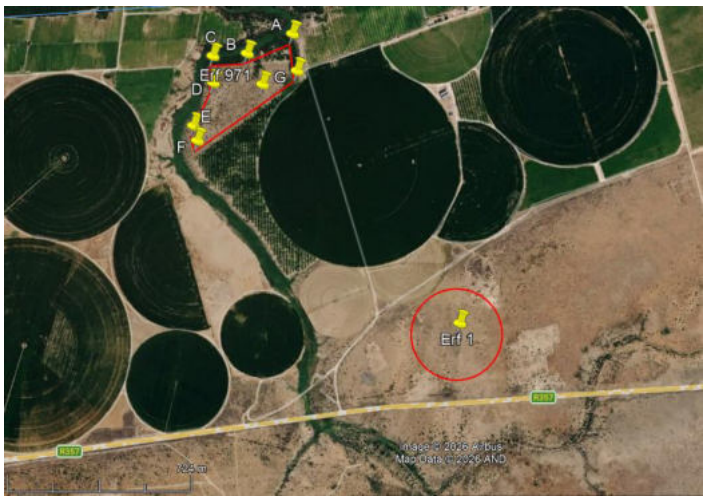


Figure 3: Sites are access via farm roads leading from the R357 tar road.

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

5. LOCALITY MAP

An A3 locality map must be attached to the back of this document, as Appendix A. The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.). The map must indicate the following:

- an accurate indication of the project site position as well as the positions of the alternative sites, if any;
- indication of all the alternatives identified;
- closest town(s;)
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection).

[1] "Alternative A.." refer to activity, process, technology or other alternatives.

6. LAYOUT/ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

- the property boundaries and numbers of all the properties within 50 metres of the site;
- the current land use as well as the land use zoning of the site;
- the current land use as well as the land use zoning each of the properties adjoining the site or sites;
- the exact position of each listed activity applied for (including alternatives);
- servitude(s) indicating the purpose of the servitude;
- a legend; and
- a north arrow.

7. SENSITIVITY MAP

The layout/route plan as indicated above must be overlain with a sensitivity map that indicates all the sensitive areas associated with the site, including, but not limited to:

- watercourses;
- the 1:100 year flood line (where available or where it is required by DWS);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or infested with alien species); and
- critical biodiversity areas.

The sensitivity map must also cover areas within 100m of the site and must be attached in Appendix A.

8. SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this report. It must be supplemented with additional photographs of relevant features on the site, if applicable.

9. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of at least 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

10. ACTIVITY MOTIVATION

Motivate and explain the need and desirability of the activity (including demand for the activity):

1. Is the activity permitted in terms of the property's existing land use rights?	**YES**	~~NO~~	**Please explain**
The proposed development area is currently zoned as Agricultural Zone and is currently being used for grazing farm activities and the proposed development will be a continuation of agricultural activities in the form of crop production.			

2. Will the activity be in line with the following?			
(a) Provincial Spatial Development Framework (PSDF)	**YES**	~~NO~~	**Please explain**
The proposed development is considered to be generally consistent with the objectives of the Northern Cape Provincial Spatial Development Framework (PSDF) (2020). The PSDF promotes sustainable economic development, agricultural expansion within suitable areas, rural development, job creation, and the efficient utilisation of existing infrastructure and natural resources. The proposed project entails the establishment of approximately 18 hectares of additional cultivated land on Erf 1 and Erf 971, Prieska, through the integration of these areas into the existing agricultural operation and irrigation infrastructure already present on the surrounding properties. The proposed development supports the agricultural sector, which is recognised by the PSDF as an important contributor to economic growth, food production, and employment opportunities within the Northern Cape. The project will utilise existing agricultural infrastructure and water supply systems, thereby limiting the need for significant new infrastructure investment and promoting efficient land use. The preferred layout on Erf 1 was selected specifically to reduce impacts on environmentally sensitive areas by avoiding the Ridge Vegetation Unit and reducing the extent of Critical Biodiversity Area (CBA 1) affected by the development footprint. The revised layout reduces the overlap with CBA 1 from approximately 5.6 hectares to approximately 3 hectares and excludes the more sensitive ridge habitat from development. Furthermore, the specialist assessment concluded that the majority of the proposed 8-hectare development area on Erf 971 consists of previously disturbed and degraded vegetation with low ecological sensitivity, making it generally more suitable for agricultural expansion provided that identified drainage lines and wetland features are appropriately protected and managed. The proposed development is therefore considered to align with the broader spatial and economic objectives of the Northern Cape PSDF, subject to the implementation of the mitigation measures and environmental management actions identified through the Basic Assessment process.			
(b) Urban edge / Edge of Built environment for the area	**YES**	~~NO~~	**Please explain**
The proposed activity is considered to be consistent with the Urban Edge / Edge of the Built Environment for the area, since the proposed development does not involve urban expansion, residential development, commercial development, or the extension of the built environment into undeveloped areas. Instead, the proposal entails the expansion of agricultural activities through the cultivation of approximately 18 hectares on Erf 1 and Erf 971, Prieska, adjacent to existing cultivated lands and irrigation infrastructure. The activity is therefore agricultural in nature and does not require the extension of municipal services, roads, or urban infrastructure. The proposed cultivation areas will remain part of the agricultural landscape surrounding Prieska and will not result in urban sprawl or the outward expansion of the town's built footprint. The development is accordingly regarded as compatible with the intent of the Urban Edge, which seeks to contain urban growth, promote efficient land use, and protect agricultural and rural areas from inappropriate urban development.			
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	~~YES~~	**NO**	**Please explain**

The approval of the proposed activity is not expected to compromise the integrity of the existing approved and credible Siyathemba Local Municipality Integrated Development Plan (IDP) or Spatial Development Framework (SDF).

The proposed activity is agricultural in nature and entails the establishment of approximately 18 ha of cultivated land on Erf 1 and Erf 971, Prieska. It does not constitute urban expansion, township development, residential sprawl, or industrial development, and will not require the outward expansion of the built environment or significant new municipal infrastructure.

The activity is generally consistent with the rural and agricultural character of the area and supports local economic development, agricultural production, and employment creation, which are consistent with the broader developmental objectives of the municipal IDP.

The SDF functions as a spatial guide for land development, land use management, investment, and the appropriate location of future development. The proposed activity does not conflict with these objectives, as it represents agricultural land use within an existing agricultural context rather than an incompatible urban or industrial land use.

However, the proposed activity does occur in an environmentally sensitive context, particularly in relation to mapped Critical Biodiversity Area features on Erf 1 and drainage/wetland features on Erf 971. These sensitivities have been addressed through the consideration of alternatives, with the preferred Erf 1 layout avoiding the more sensitive Ridge Vegetation Unit and reducing the extent of CBA 1 affected. The remaining sensitive drainage and wetland features on Erf 971 must be avoided, buffered, and managed through the EMPr.

On this basis, and subject to implementation of the specialist recommendations, avoidance measures, and environmental management requirements, the proposed activity is not expected to undermine or compromise the integrity of the approved municipal IDP or SDF.

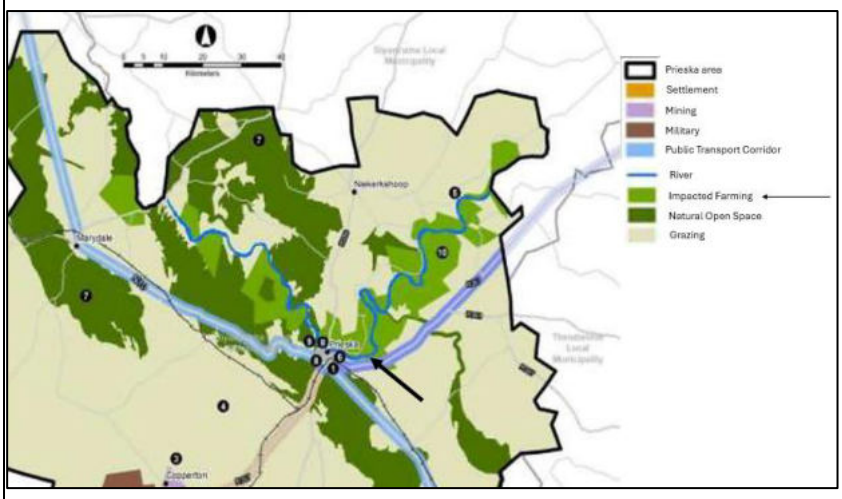


Figure 4: Siyathemba Spatial Framework (IDP 2025/26). The site is allocated by the black arrow which is considered impacted farming area.

(d) Approved Structure Plan of the Municipality	YES	~~NO~~	~~Please explain~~

No separate approved Structure Plan applicable to the site could be identified. Spatial planning and land use management within the Siyathemba Local Municipality are currently guided by the Siyathemba Spatial Development Framework (SDF 2030) and the Siyathemba Land Use Scheme (2022), which have effectively replaced the function historically performed by Structure Plans.

The proposed agricultural development has therefore been assessed against the applicable SDF and municipal planning policies. As the proposed activity comprises agricultural cultivation within a

predominantly agricultural landscape and does not constitute urban expansion or an incompatible land use, it is not expected to conflict with the spatial planning objectives of the municipality.			
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	~~YES~~	**NO**	**Please explain**
No formally adopted Environmental Management Framework (EMF) specifically applicable to the proposed site could be identified. The environmental management priorities for the area have therefore been considered with reference to the applicable municipal SDF, the Northern Cape Biodiversity Map, the specialist assessments, and the site-specific sensitivities identified during the Basic Assessment process. The proposed activity will affect indigenous vegetation and a portion of mapped CBA 1, particularly on Erf 1. However, the preferred layout was selected to reduce biodiversity impacts by avoiding the more sensitive Ridge Vegetation Unit and limiting the development footprint to the lower-sensitivity Shrubland Vegetation Unit. On Erf 971, the majority of the site has already been disturbed and degraded, although the drainage and wetland features must be protected and managed. The approval of the application is therefore not expected to compromise the integrity of the environmental management priorities for the area, provided that the avoidance measures, buffers, specialist recommendations and EMPr requirements are strictly implemented. The development can be justified from a sustainability perspective as it supports agricultural production and local employment while avoiding the most sensitive ecological features identified on site.			

(f) Any other Plans (e.g. Guide Plan)	YES	NO	Please explain
No approved Guide Plan applicable to the site could be identified. The area is currently guided by the Siyathemba SDF, Land Use Scheme and IDP, which have effectively replaced the role historically performed by Guide Plans			

3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?	YES	~~NO~~	~~Please explain~~

The proposed activity is considered to be consistent with the land use intentions and development objectives contained within the Siyathemba Local Municipality Spatial Development Framework (SDF) and Integrated Development Plan (IDP). Although the proposed agricultural development is not specifically identified as a municipal project or programme, it supports a number of the broader development priorities contained within these planning instruments.

The proposed activity entails the establishment of approximately 18 hectares of cultivated land on Erf 1 (10Ha) and Erf 971 (8Ha) through the expansion of agricultural production within an existing farming area. The development supports agricultural development, local economic growth, food production, investment in the agricultural sector, and employment creation, all of which are consistent with the municipality's rural development and local economic development objectives.

The proposed activity does not involve urban expansion, residential development, industrial development, or the establishment of land uses that would be incompatible with the surrounding agricultural landscape. Furthermore, the development will utilise existing agricultural infrastructure and farming operations, thereby promoting the efficient use of existing resources.

The proposed land use is therefore considered to fall within the development trajectory envisaged by the municipality and is aligned with the broader projects, programmes, and strategic objectives contained in the approved SDF and IDP. Subject to the implementation of the specialist recommendations and environmental management measures, the proposed activity is not expected to undermine the spatial planning objectives of the municipality.

4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	YES	~~NO~~	~~Please explain~~

The proposed activity is considered to address a societal need at both a strategic and local level. Agriculture is a key economic sector within the Northern Cape and the Siyathemba Local Municipality, contributing to food production, economic growth, rural livelihoods, and employment opportunities. The proposed development will increase the productive agricultural area through the cultivation of approximately 18 hectares on Erf 1 and Erf 971 and forms part of an existing farming enterprise within a predominantly agricultural landscape.

At a strategic level, the development supports national, provincial, and municipal objectives relating to agricultural development, food security, rural development, local economic development, and job creation. The application indicates that the project is expected to create both skilled and unskilled employment opportunities during the construction and operational phases, while also contributing to the local agricultural economy.

At a local level, the activity is proposed adjacent to existing cultivated lands and irrigation infrastructure and therefore represents an expansion of an established agricultural land use rather than the introduction of a new or incompatible activity. The development will make use of existing farming knowledge, infrastructure, and operational systems already present in the area.

It is recognised that portions of the site contain environmental sensitivities, including Critical Biodiversity Areas and drainage-related features. These constraints have been considered through the assessment of

alternatives and specialist studies, resulting in the selection of a preferred layout that avoids the most sensitive ecological features and reduces biodiversity impacts where reasonably possible.

Considering the agricultural character of the area, the contribution to local economic activity and employment, and the implementation of avoidance and mitigation measures, the proposed activity is regarded as a societal priority that is appropriate within the local context and is therefore considered both needed and desirable.

5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? (Confirmation by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix J.)	**YES**	~~NO~~	**Please explain**

The necessary services and infrastructure required for the proposed development are already available, therefore no confirmation is required from the Siyathemba Municipality. The proposed activity comprises the expansion of agricultural cultivation and will be integrated into the existing farming operation and irrigation infrastructure currently utilised on the surrounding agricultural land.

The development does not require the provision of additional municipal services such as water reticulation, sewerage infrastructure, electricity distribution networks, waste management facilities, public transport infrastructure, schools, healthcare facilities, or housing. The proposed activity is agricultural in nature and will make use of existing agricultural infrastructure, equipment, access routes, and operational systems already established on the property and adjoining farming areas.

Based on the information currently available, no significant additional service capacity is required to accommodate the proposed development. Should any minor infrastructure upgrades be required as part of the farming operation, these would be undertaken within the existing agricultural enterprise and would not place a material burden on municipal infrastructure or service delivery systems.

The proposed development can therefore be accommodated within the existing service and infrastructure capacity available to the farming operation.

6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? (Comment by the relevant Municipality in this regard must be attached to the final Basic Assessment Report as Appendix E.)	~~YES~~	~~NO~~	**Please explain**

The proposed development is not specifically identified as a municipal infrastructure project within the Siyathemba Local Municipality's infrastructure planning. However, this does not constitute a conflict with the municipality's infrastructure objectives or planning frameworks.

As previously discussed, the proposed activity comprises the cultivation of approximately 18 hectares on Erf 1 and Erf 971 and will be integrated into an existing agricultural operation making use of existing farming and irrigation infrastructure.

As a result, the proposed development is not expected to place additional demand on municipal infrastructure capacity or require the reprioritisation of municipal capital expenditure programmes. The activity can be accommodated largely through existing agricultural infrastructure and operational systems already present within the area.

The approval of the application is therefore not expected to have negative implications for the municipality's infrastructure planning, service delivery priorities, placement of services, or opportunity costs. Rather, the proposed development is expected to contribute positively to local economic activity and agricultural production without creating a material burden on municipal infrastructure resources.

7. Is this project part of a national programme to address an issue of national concern or importance?	~~YES~~	**NO**	**Please explain**

The proposed development does not form part of a specific national programme, Strategic Infrastructure Project (SIP), or government initiative established to address a particular issue of national concern or importance.

However, the proposed activity is aligned with a number of broader national development objectives relating to agricultural production, food security, rural development, economic growth, and job creation.

8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	YES	~~NO~~	Please explain

The proposed development is situated within an established agricultural landscape in the vicinity of Prieska, where irrigated crop production already occurs on adjoining properties. The proposed cultivation areas are located adjacent to existing agricultural lands and will be incorporated into an existing farming enterprise and irrigation system. The development therefore represents an expansion of an established land use rather than the introduction of a new or incompatible activity.

The site benefits from existing agricultural infrastructure, farming knowledge, access routes, and operational systems already present within the area. The location is therefore well suited to agricultural production and does not require the establishment of extensive new supporting infrastructure.

The site selection process also considered environmental constraints. On Erf 1, alternative sites were assessed and the preferred site was selected to avoid the highly sensitive Ridge Vegetation Unit and reduce impacts on mapped Critical Biodiversity Areas. On Erf 971, the majority of the proposed development area occurs within previously disturbed and degraded vegetation, which was assessed as having relatively low ecological sensitivity compared to the surrounding natural habitats.

Although environmental sensitivities occur on portions of the properties, these have been identified through specialist studies and can largely be avoided or managed through the implementation of the recommended mitigation measures and environmental management actions.

The location is therefore considered favourable for the proposed agricultural land use, as it is compatible with the existing land use pattern, utilises existing agricultural infrastructure, supports agricultural production, and avoids the most sensitive environmental features where reasonably possible.

9. Will the benefits of the proposed land use/development outweigh the negative impacts of it?	YES	~~NO~~	Please explain

Yes, provided that the recommended mitigation measures and avoidance actions are implemented.

The proposed development will result in the loss of indigenous vegetation and the transformation of approximately 18 hectares of land for agricultural purposes. The development will also result in impacts on biodiversity, particularly on Erf 1 where portions of the site occur within a mapped Critical Biodiversity Area (CBA 1). In addition, drainage and wetland-related features identified on Erf 971 require protection and careful management. These impacts are recognised and have been assessed through specialist studies.

However, the assessment process has demonstrated that the impacts can be reduced through the selection of the preferred site (Alternative 2), which avoids the highly sensitive Ridge Vegetation Unit on Erf 1 and reduces the extent of CBA 1 affected by the proposed development. Furthermore, the majority of the proposed development area on Erf 971 was found to be substantially disturbed and degraded, with relatively low ecological sensitivity compared to surrounding natural habitats.

The proposed activity will contribute to agricultural production, support local economic activity, utilise existing farming and irrigation infrastructure, and create both skilled and unskilled employment opportunities during the construction and operational phases. The project forms part of an existing agricultural enterprise and represents an expansion of an established agricultural land use within a predominantly agricultural landscape.

Taking into consideration the nature and extent of the anticipated environmental impacts, the avoidance of the most sensitive ecological features, the implementation of mitigation measures, and the socio-economic benefits associated with the development, it is considered that the benefits of the proposed land use are likely to outweigh the residual negative impacts. The proposed development is therefore regarded as both needed and desirable within the local context.

10. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	~~YES~~	NO	Please explain

The proposed development is not expected to set an undesirable precedent for similar activities within the Siyathemba Local Municipality.

Environmental authorisation decisions are required to be based on the merits, sensitivities, constraints, and opportunities associated with each individual site. The proposed development has been informed by site-specific specialist investigations, the consideration of alternatives, and the identification of environmentally sensitive features requiring avoidance and mitigation.

In particular, the preferred layout on Erf 1 was selected to avoid the sensitive Ridge Vegetation Unit and to reduce impacts on the mapped Critical Biodiversity Area, while the proposed development area on Erf 971 was found to consist predominantly of previously disturbed and degraded vegetation. The conclusions reached for this application are therefore specific to the ecological condition, land use context, and environmental characteristics of these properties.

Should future applications for similar activities be submitted elsewhere within the municipality, they would be required to undergo their own environmental assessment processes and would be evaluated based on the site-specific environmental sensitivities, planning considerations, specialist findings, and legislative requirements applicable at that time.

The approval of this application would therefore not create an automatic entitlement for similar developments elsewhere, nor would it undermine the ability of the competent authority to assess future applications on their individual merits.

11. Will any person's rights be negatively affected by the proposed activity/ies?	~~YES~~	**NO**	**Please explain**
All landowners affected by the proposed development have consented to the use of the properties upon which the development is proposed.			

12. Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	~~YES~~	**NO**	**Please explain**
The proposed activity will not compromise the urban edge as defined by the Siyathemba Local Municipality, as it comprises agricultural cultivation within an existing agricultural landscape and does not constitute urban expansion or the extension of the built environment.			

13. Any other need and desirability considerations related to the proposed activity?	**Please explain**
An additional need and desirability consideration is that the proposed development represents the expansion of an existing agricultural enterprise within a well-established farming area, thereby making use of existing agricultural infrastructure, irrigation systems, and operational capacity. The project supports agricultural productivity, local economic development, and employment creation, while the assessment of alternatives and specialist studies have ensured that the most environmentally sensitive areas are avoided where reasonably possible. The proposed activity is therefore considered an appropriate and sustainable land use within its local context.	

14. How does the project fit into the National Development Plan for 2030?	**Please explain**
The proposed development aligns with the National Development Plan (NDP) 2030, particularly Chapter 6: An Integrated and Inclusive Rural Economy, which identifies agriculture as a key sector for stimulating rural economic growth, creating employment opportunities, and enhancing food security. The proposed expansion of agricultural production on Erf 1 and Erf 971 will contribute to productive land use, local economic activity, and employment creation within the Siyathemba Local Municipality. The project further supports the NDP's objective of promoting sustainable rural development through investment in agricultural production while balancing environmental considerations through the implementation of specialist recommendations and mitigation measures.	

11. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
Constitution of the Republic of South Africa, 1996 (Act 108 of 1996)	Provides the constitutional right to an environment that is not harmful to health or well-being and forms the basis for environmental management in South Africa.	Government of South Africa	1996
National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)	The application for Environmental Authorisation is being undertaken in terms of NEMA and the EIA Regulations.	Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR).	1998
Environmental Impact Assessment Regulations, 2014 (as amended)	Regulates the environmental authorisation process applicable to the proposed vegetation clearance.	Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR).	2014, as amended
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA)	Relevant to biodiversity conservation, threatened ecosystems, protected species and invasive species management	DAEARDLR	2004
Alien and Invasive Species Regulations	Applicable to the management and control of alien invasive species identified on site.	DAEARDLR	2014 (as amended)
National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003)	Provides for the protection and management of protected areas and conservation priorities.	DAEARDLR	2003
National Water Act, 1998 (Act 36 of 1998)	Relevant to drainage features, wetland-related features and any potential water uses associated with the development.	Department of Water and Sanitation (DWS)	1998
Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983) (CARA)	Applicable to the conservation of soil resources, veld management and control of invasive species.	Department of Agriculture	1983
National Heritage Resources Act, 1999 (Act 25 of 1999)	Applicable due to the extent of the proposed development and heritage screening requirements.	South African Heritage Resources Agency (SAHRA)	1999
Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013) (SPLUMA)	Provides the framework for spatial planning and land use management.	Department of Land Reform and Rural Development	2013

National Development Plan (NDP) 2030	Provides strategic national development objectives relating to agriculture, employment creation and rural development.	The Presidency	2012
Northern Cape Provincial Spatial Development Framework (PSDF	Provides the provincial spatial planning framework applicable to development within the Northern Cape.	Northern Cape Office of the Premier	2020
Northern Cape Biodiversity Spatial Plan (NCBSP) / Northern Cape Biodiversity Sector Plan	Identifies Critical Biodiversity Areas and Ecological Support Areas applicable to the site.	Northern Cape Department of Environment and Nature Conservation / SANBI	2024
Northern Cape Critical Biodiversity Area (CBA) Map	Used to assess biodiversity sensitivities associated with the proposed development footprint.	SANBI / Northern Cape Government	2024
Siyathemba Local Municipality Integrated Development Plan (IDP)	Provides the municipality's strategic development priorities and objectives.	Siyathemba Local Municipality	2025/2026
Siyathemba Spatial Development Framework (SDF 2030)	Guides spatial planning, land use management and future development within the municipality.	Siyathemba Local Municipality	2030 Planning Framework
Siyathemba Land Use Scheme	Regulates land use rights and zoning within the municipal area.	Siyathemba Local Municipality	2022
Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	Required for the terrestrial biodiversity assessment undertaken for the application	DFFE	2020
Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Plant Species	Required for the plant species assessment undertaken for the application.	DFFE	2020
Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Animal Species	Required for the animal species assessment undertaken for the application.	DFFE	2020
Environmental Screening Tool and Environmental Assessment Protocols	Used to determine environmental sensitivities and specialist assessment requirements	DFFE	2020

12. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?
If YES, what estimated quantity will be produced per month?

YES	~~NO~~
Currently the quantity of construction waste is unknown.	

How will the construction solid waste be disposed of (describe)?

The proposed activity will require limited site preparation and the installation of irrigation infrastructure associated with the new pivot and cultivation areas. Consequently, small quantities of solid waste may be generated during the construction phase, including packaging materials, plastic pipe off-cuts, scrap metal, wooden pallets, empty containers and general domestic waste generated by construction personnel. As no significant buildings or permanent structures are proposed, the volume of construction waste is expected to be low and temporary.

All waste generated during construction will be managed in accordance with good housekeeping practices. Waste will be collected in designated receptacles and temporarily stored in a demarcated area on site. Recyclable materials will be separated where practical and removed by appropriate recycling contractors, while non-recyclable waste will be transported to a licensed municipal landfill or authorised waste disposal facility. No waste will be buried, burned or disposed of on site.

Where will the construction solid waste be disposed of (describe)?

Construction-related solid waste will not be disposed of on site. Waste generated during the construction phase will be collected and temporarily stored in designated waste receptacles before being transported by the contractor or an approved waste service provider to the nearest licensed municipal landfill site or authorised waste disposal facility serving the Prieska area.

Recyclable materials, where feasible, will be separated and taken to an appropriate recycling facility. All disposal will be undertaken in accordance with applicable waste management legislation and municipal requirements.

Will the activity produce solid waste during its operational phase?
If YES, what estimated quantity will be produced per month?

~~YES~~	**NO**
Currently the quantity of operational waste is unknown.	

How will the solid waste be disposed of (describe)?

No significant solid waste is expected to be generated during the operational phase of the proposed development. The activity involves the cultivation of crops under irrigation and will not include any industrial or manufacturing processes. Limited waste may be generated from routine agricultural operations, such as empty fertiliser bags, chemical containers, irrigation equipment components, and general domestic waste associated with farm workers. Such waste will be collected, stored appropriately, and disposed of at a licensed waste disposal facility or recycled where feasible, in accordance with applicable waste management requirements.

If the solid waste will be disposed of into a municipal waste stream, indicate which registered landfill site will be used.

Construction and operational waste that cannot be reused or recycled will be transported to the existing permitted municipal landfill site serving Prieska, operated by the Siyathemba Local Municipality.

Where will the solid waste be disposed of if it does not feed into a municipal waste stream (describe)?

Not applicable to this site.

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the NEM:WA?	~~YES~~	**NO**

If YES, inform the competent authority and request a change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

Is the activity that is being applied for a solid waste handling or treatment facility?	~~YES~~	**NO**

If YES, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA. An application for a waste permit in terms of the NEM:WA must also be submitted with this application.

b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	~~YES~~	**NO**
If YES, what estimated quantity will be produced per month?		m^3
Will the activity produce any effluent that will be treated and/or disposed of on site?	~~YES~~	**NO**

If YES, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?	~~YES~~	**NO**

If YES, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		**Cell:**	
E-mail:		**Fax:**	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

This is not applicable to the proposed development.

c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere other that exhaust emissions and dust associated with construction phase activities?	~~YES~~	**NO**
If YES, is it controlled by any legislation of any sphere of government?	~~YES~~	~~NO~~

If YES, the applicant must consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If NO, describe the emissions in terms of type and concentration:

During the construction phase, emissions will consist mainly of dust (particulate matter) generated by vegetation clearing, soil preparation, vehicle movement on unpaved surfaces, and the installation of irrigation infrastructure. Minor exhaust emissions from construction vehicles and machinery, including carbon dioxide (CO_2), carbon monoxide (CO), nitrogen oxides (NO_x), sulphur dioxide (SO_2), and particulate matter, may also occur. These emissions will be temporary, localised, and of low concentration due to the small scale and short duration of the construction activities.

There are no close receptors to the site, with the closest neighbour being 1km east from Erf 971.

During the operational phase, emissions are expected to be negligible and will be limited to occasional dust generation from farm vehicles travelling on existing access roads and exhaust emissions from agricultural machinery used during routine farming activities. No industrial processes, combustion facilities, or significant point-source emissions are proposed. Consequently, emission concentrations

are expected to remain low, localised, and well within typical levels associated with agricultural activities in the area.

d) Waste permit

Will any aspect of the activity produce waste that will require a waste permit in terms of the NEM:WA?	~~YES~~	**NO**

If YES, please submit evidence that an application for a waste permit has been submitted to the competent authority

e) Generation of noise

Will the activity generate noise?	**YES**	~~NO~~
If YES, is it controlled by any legislation of any sphere of government?	~~YES~~	**NO**

Describe the noise in terms of type and level:

Noise will be limited to typical agricultural and construction-related noise.

During the construction/initiation phase, noise will mainly result from vegetation clearing, soil preparation, vehicle movements, and the installation of irrigation infrastructure. The noise will be intermittent and temporary, and will likely include engine noise from tractors, trucks, excavators or similar machinery. Noise levels are expected to be comparable to normal agricultural machinery and are not expected to be significant at the closest neighbouring receptor, located approximately 1 km east of Erf 971.

During the operational phase, noise will be limited to routine farming activities, including tractors, farm vehicles, pumps and maintenance of the irrigation system. Erf 1 is located approximately 75 m north of the R357, and existing traffic noise from this road already forms part of the receiving environment. No continuous high-noise industrial activity is proposed, and operational noise is expected to remain low, localised and consistent with the surrounding agricultural setting.

13. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es):

~~Municipal~~	~~Water board~~	~~Groundwater~~	**River, stream, dam or lake**	~~Other~~	~~The activity will not use water~~

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:	**216 000 m³/ annum**	
Does the activity require a water use authorisation (general authorisation or water use license) from the Department of Water Affairs? If YES, please provide proof that the application has been submitted to the Department of Water Affairs.	**YES**	~~NO~~

The Applicant already has Water Use License.

14. ENERGY EFFICIENCY

Describe the design measures, if any, which have been taken to ensure that the activity is energy efficient:

The proposed development is agricultural in nature and does not involve energy-intensive industrial processes. Energy efficiency will be promoted through the use of modern irrigation infrastructure designed to optimise water and energy use.

Irrigation scheduling will be undertaken to minimise unnecessary pumping and water losses, while routine maintenance of pumps, pipelines and associated equipment will ensure efficient operation and reduce energy wastage. In addition, the proposed development will utilise existing farming infrastructure where possible, thereby

limiting the need for additional energy-consuming facilities. Overall, the energy demand of the project is expected to be low and consistent with normal agricultural operations.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

The proposed development will utilise electricity supplied by Eskom through the existing agricultural electricity network serving the farm.

The use of alternative energy technologies, such as solar-powered irrigation pumps or supplementary photovoltaic systems, may be considered in the future should they become economically and operationally feasible. The proposed development does not preclude the future integration of renewable energy technologies.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section B and indicate the area, which is covered by each copy No. on the Site Plan.

Section B Copy No. (e.g. A): **B1 – Erf 1**

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section? **YES** ~~NO~~

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed and attach it in Appendix I. All specialist reports must be contained in Appendix D.

Property description/physical address:

Province	Northern Cape
District Municipality	Pixley Ka Seme District Municipality
Local Municipality	Siyathemba Municipality
Ward Number(s)	5
Farm name and number	Erf 1
Portion number	
SG Code	C06000300000000100000

Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application including the same information as indicated above.

Current land-use zoning as per local municipality IDP/records: Agriculture Zone 1

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required? ~~YES~~ **NO**

Section B Copy No. (e.g. A): **B2 – Erf 971**

1. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section? **YES** ~~NO~~

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed and attach it in Appendix I. All specialist reports must be contained in Appendix D.

Property description/physical address:

Province	Northern Cape
District Municipality	Pixley Ka Seme District Municipality
Local Municipality	Siyathemba Municipality
Ward Number(s)	5
Farm name and number	Erf 971
Portion number	
SG Code	C06000030000097100000

Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application including the same information as indicated above.

Current land-use zoning as per local municipality IDP/records: Agriculture Zone 1

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to, to this application.

Is a change of land-use or a consent use application required? ~~YES~~ **NO**

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1 (Erf 971):

Flat	~~1:50 – 1:20~~	~~1:20 – 1:15~~	~~1:15 – 1:10~~	~~1:10 – 1:7,5~~	~~1:7,5 – 1:5~~	~~Steeper than 1:5~~

Alternative S2 (Erf 1 - preferred):

Flat	~~1:50 – 1:20~~	~~1:20 – 1:15~~	~~1:15 – 1:10~~	~~1:10 – 1:7,5~~	~~1:7,5 – 1:5~~	~~Steeper than 1:5~~

Alternative S3 (if any): N/A

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline		2.4 Closed valley		2.7 Undulating plain / low hills	
2.2 Plateau		2.5 Open valley		2.8 Dune	
2.3 Side slope of hill/mountain		**2.6 Plain**	**X**	2.9 Seafront	
2.10 At sea					

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following?

	Erf 971:		**Erf 1:**		~~**Alternative S3 (if any):**~~	
Shallow water table (less than 1.5m deep)	~~YES~~	**NO**	~~YES~~	**NO**	~~YES~~	~~NO~~
Dolomite, sinkhole or doline areas	~~YES~~	**NO**	~~YES~~	**NO**	~~YES~~	~~NO~~
Seasonally wet soils (often close to water bodies)	~~YES~~	**NO**	~~YES~~	**NO**	~~YES~~	~~NO~~
Unstable rocky slopes or steep slopes with loose soil	~~YES~~	**NO**	~~YES~~	**NO**	~~YES~~	~~NO~~
Dispersive soils (soils that dissolve in water)	~~YES~~	**NO**	~~YES~~	**NO**	~~YES~~	~~NO~~
Soils with high clay content (clay fraction more than 40%)	~~YES~~	**NO**	~~YES~~	**NO**	~~YES~~	~~NO~~
Any other unstable soil or geological feature	~~YES~~	**NO**	~~YES~~	**NO**	~~YES~~	~~NO~~
An area sensitive to erosion	**YES**	~~NO~~	**YES**	~~NO~~	~~YES~~	~~NO~~

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted.

4. GROUNDCOVER

Indicate the types of groundcover present on the site. The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Erf 971:

~~Natural veld - good condition~~[E]	~~Natural veld with scattered aliens~~[E]	~~Natural veld with heavy alien infestation~~[E]	**Veld dominated by alien species**[E]	~~Gardens~~
~~Sport field~~	~~Cultivated land~~	~~Paved surface~~	~~Building or other structure~~	**Bare soil**

Erf 1 :

~~Natural veld - good condition~~[E]	**Natural veld with scattered aliens**[E]	~~Natural veld with heavy alien infestation~~[E]	~~Veld dominated by alien species~~[E]	~~Gardens~~
~~Sport field~~	~~Cultivated land~~	~~Paved surface~~	~~Building or other structure~~	~~Bare soil~~

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

Dr. van Aardt from Sparaxis Environmental Pty (Ltd) was appointed as a SACNASP registered scientist who conducted the botanical and ecological survey.

5. SURFACE WATER

Indicate the surface water present on and or adjacent to the site and alternative sites?

Perennial River - Erf 971	**YES**	~~NO~~	~~UNSURE~~
Non-Perennial River	~~YES~~	**NO**	~~UNSURE~~
Permanent Wetland	~~YES~~	**NO**	~~UNSURE~~
Seasonal Wetland	~~YES~~	**NO**	~~UNSURE~~
Artificial Wetland – Erf 971	**YES**	NO	~~UNSURE~~
Estuarine / Lagoonal wetland	~~YES~~	**NO**	~~UNSURE~~

There are no surface water features near or on Erf 1

If any of the boxes marked YES or UNSURE is ticked, please provide a description of the relevant watercourse.

The proposed development consists of the establishment of irrigated crop production areas and associated irrigation infrastructure.

No direct infilling, excavation, diversion or modification of the identified watercourses, drainage features or wetland areas is proposed. The development footprint on Erf 1 is located outside any identified watercourse or wetland feature and is therefore unlikely to result in direct impacts on surface water resources. The Orange river is about 1.5km north of Erf 1, with Karabeeloop River about 450m west from Erf 1.

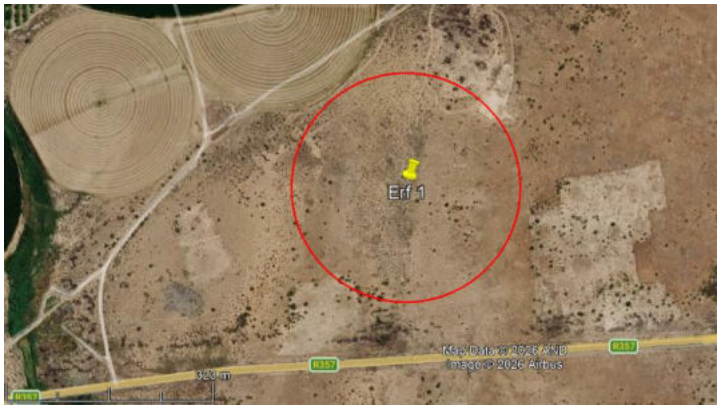


Figure 5: Erf 1 in relation to water features

On Erf 971, the proposed cultivation area occurs about 400m south from the Orange River and about 30-20m to the Karabeeloop River, which flanks the site to the north and west. There is also associated drainage features and the artificial wetland.



Figure 6: Erf 971 in relation to water features

Potential impacts on these surface water features may include increased sedimentation from soil disturbance during site preparation, as well as the potential transport of fertilisers or other agricultural inputs through surface runoff during operation. Given the relatively small scale of the proposed development and the fact that the surrounding area is already extensively utilised for irrigated agriculture, the proposed activity is not expected to significantly alter existing hydrological processes within the broader landscape.

Furthermore, the proposed development does not require the abstraction, impoundment, diversion or modification of any natural watercourse. Surface water runoff patterns are expected to remain largely unchanged, and no significant

impacts on the functioning of the Karabeeloop River, the identified drainage features, the artificial wetland or the Orange River system are anticipated.

Good agricultural management practices will nevertheless be implemented to minimise erosion, sedimentation and the accidental release of pollutants into nearby surface water features.

6. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

Natural area	~~Dam or reservoir~~	~~Polo fields~~
~~Low density residential~~	~~Hospital/medical centre~~	~~Filling station~~ [H]
~~Medium density residential~~	~~School~~	~~Landfill or waste treatment site~~
~~High density residential~~	~~Tertiary education facility~~	~~Plantation~~
~~Informal residential~~	~~Church~~	**Agriculture**
~~Retail commercial & warehousing~~	~~Old age home~~	**River, stream or wetland**
~~Light industrial~~	~~Sewage treatment plant*~~	~~Nature conservation area~~
~~Medium industrial~~ [AN]	~~Train station or shunting yard~~ [N]	~~Mountain, Koppie or ridge~~
~~Heavy industrial~~ [AN]	~~Railway line~~ [N]	~~Museum~~
~~Power station~~	~~Major road (4 lanes or more)~~ [N]	~~Historical building~~
~~Office/consulting room~~	~~Airport~~ [N]	~~Protected Area~~
~~Military or police base/station/compound~~	~~Harbour~~	~~Graveyard~~
~~Spoil heap or slimes dam*~~	~~Sport facilities~~	~~Archaeological site~~
~~Quarry, sand or borrow pit~~	~~Golf course~~	~~Other land uses (describe)~~

If any of the boxes marked with an "[N] "are ticked, how this impact will / be impacted upon by the proposed activity? Specify and explain:

N/A

If any of the boxes marked with an "[An]" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

N/A

If any of the boxes marked with an "[H]" are ticked, how will this impact / be impacted upon by the proposed activity? Specify and explain:

N/A

Does the proposed site (including any alternative sites) fall within any of the following:

Critical Biodiversity Area (as per provincial conservation plan)	**YES**	~~NO~~
Core area of a protected area?	~~YES~~	**NO**
Buffer area of a protected area?	~~YES~~	**NO**
Planned expansion area of an existing protected area?	~~YES~~	**NO**
Existing offset area associated with a previous Environmental Authorisation?	~~YES~~	**NO**
Buffer area of the SKA?	~~YES~~	**NO**

If the answer to any of these questions was YES, a map indicating the affected area must be included in Appendix A.

7. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or paleontological sites, on or close (within 20m) to the site? If YES, explain:	~~YES~~	**NO**
	Uncertain	

Although there are no cultural or historical features near the proposed site, Dr. Lloyd was the appointed specialist that conducted the heritage and palaeontology study.

If uncertain, conduct a specialist investigation by a recognised specialist in the field (archaeology or palaeontology) to establish whether there is such a feature(s) present on or close to the site. Briefly explain the findings of the specialist:

A Phase 1 Palaeontological and Heritage Impact Assessment (PIA/HIA) was undertaken for the proposed establishment of a 10 ha centre-pivot irrigation area on Erf 1 and an 8 ha cultivation area on Erf 971 near Prieska. The assessment found that the palaeontological sensitivity of both sites is low. Although regional geological mapping indicates the presence of Dwyka Group lithologies, field investigations confirmed that Erf 1 is underlain by relict Orange River terrace gravels and calcretised hardpan, while Erf 971 occurs on unconsolidated alluvial sediments associated with the Orange River floodplain. No fossil material or fossil-bearing geological exposures were identified within the proposed development areas.

From an archaeological perspective, low-density and dispersed Stone Age artefact scatters were recorded on Erf 1. These artefacts occur as reworked surface material within terrace gravels, lack stratigraphic integrity, and are considered to be of low archaeological significance. No archaeological material was identified on Erf 971. Furthermore, no graves, burial grounds, historical structures older than 60 years, or other heritage resources of significance were identified within either development footprint.

The specialist concluded that the proposed development will not result in significant impacts on palaeontological or heritage resources and assigned both properties a Generally Protected C (low significance) field rating in terms of the National Heritage Resources Act (Act 25 of 1999). No further heritage or palaeontological studies, mitigation measures or monitoring are required. However, a standard Chance Find Procedure must be implemented during construction to address the unlikely discovery of archaeological material, human remains or fossil heritage resources.

Will any building or structure older than 60 years be affected in any way?	~~YES~~	**NO**
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	~~YES~~	**NO**

If YES, please provide proof that this permit application has been submitted to SAHRA or the relevant provincial authority.

8. SOCIO-ECONOMIC CHARACTER

a) Local Municipality

Please provide details on the socio-economic character of the local municipality in which the proposed site(s) are situated. Level of unemployment:

The proposed development is located within the Siyathemba Local Municipality, which forms part of the Pixley ka Seme District Municipality in the Northern Cape Province. The municipality is centred on the town of Prieska and had a population of approximately 27,102 people according to Census 2022. The municipality is characterised by a predominantly rural economy, with agriculture being one of the primary economic sectors, together with mining, manufacturing, trade, transport, finance and community services. Agriculture remains an important source of employment and economic activity within the municipal area.

Siyathemba Local Municipality continues to face socio-economic challenges associated with unemployment, poverty and limited economic opportunities, particularly within its smaller settlements. According to municipal and regional socio-economic data, the official unemployment rate for Siyathemba Local Municipality was approximately 24.3%**,** indicating a continued need for employment creation and investment within the local economy.

Given the agricultural nature of the proposed development, the project has the potential to contribute positively to the local economy through capital investment, the creation of temporary and permanent employment opportunities, and the strengthening of the agricultural sector, which is a key economic driver within the municipality. The application form indicates that the project is expected to create approximately 5 skilled and 15 unskilled employment opportunities during both the construction and operational phases.

Economic profile of local municipality:

The economy of Siyathemba Local Municipality is predominantly rural in nature and is strongly dependent on the agricultural sector. Agriculture remains one of the municipality's primary economic drivers and is supported by extensive irrigation farming along the Orange River. Key agricultural activities within the municipality include the cultivation of maize, wheat, lucerne, grapes, pecan nuts and other irrigated crops, together with livestock farming. Other important economic sectors include mining, manufacturing, wholesale and retail trade, transport, finance and community services. In recent years, renewable energy developments and mining-related activities have also contributed to economic growth within the broader municipal area.

The proposed project entails the clearing of approximately 18 hectares of vegetation on Erf 1 and Erf 971 for the expansion of irrigated agricultural production, forming part of the applicant's existing farming enterprise. The development is therefore directly aligned with the dominant agricultural character of the municipality and supports a sector identified by both the Siyathemba Local Municipality and the Pixley ka Seme District Municipality as a key economic driver. The project will contribute to agricultural production, strengthen the local agricultural economy and create employment opportunities during both the establishment and operational phases.

The proposed development is expected to generate approximately five skilled and fifteen unskilled employment opportunities during the construction phase, as well as five skilled and fifteen unskilled employment opportunities during the operational phase. The project is anticipated to have a capital investment value of approximately R4.5 million and generate an annual income of approximately R3.5 million. These benefits will contribute positively to the local economy and support employment creation within an area where job opportunities remain limited.

Level of education:

According to the Siyathemba Municipality IDP (2025/2026) the area experiences relatively low skills levels within its labour force, with only approximately 10.3% of workers classified as highly skilled and more than 52% regarded as semi-skilled or unskilled. The municipality has identified skills development as an important priority and has highlighted the need for educational and training initiatives, including the establishment of an agricultural training institution, to support local economic development and employment creation.

b) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	About R4.5 million	
What is the expected yearly income that will be generated by or as a result of the activity?	About R3.5 million	
Will the activity contribute to service infrastructure?	~~YES~~	**NO**
Is the activity a public amenity?	~~YES~~	**NO**
How many new employment opportunities will be created in the development and construction phase of the activity/ies?	20	
What is the expected value of the employment opportunities during the development and construction phase?	R120 000 – R300 000	

What percentage of this will accrue to previously disadvantaged individuals?	100%
How many permanent new employment opportunities will be created during the operational phase of the activity?	20
What is the expected current value of the employment opportunities during the first 10 years?	R4.5 million
What percentage of this will accrue to previously disadvantaged individuals?	100%

9. BIODIVERSITY

Please note: The Department may request specialist input/studies depending on the nature of the biodiversity occurring on the site and potential impact(s) of the proposed activity/ies. To assist with the identification of the biodiversity occurring on site and the ecosystem status consult http://bgis.sanbi.org or BGIShelp@sanbi.org. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used. A map of the relevant biodiversity information (including an indication of the habitat conditions as per (b) below) and must be provided as an overlay map to the property/site plan as Appendix A4 to this report.

a) Indicate the applicable biodiversity planning categories of all areas on site and indicate the reason(s) provided in the biodiversity plan for the selection of the specific area as part of the specific category)

Systematic Biodiversity Planning Category				If CBA or ESA, indicate the reason(s) for its selection in biodiversity plan
Critical Biodiversity Area (CBA)	**Ecological Support Area (ESA)**	**Other Natural Area (ONA)**	~~No Natural Area Remaining (NNR)~~	A portion of the proposed 10 ha development area on Erf 1 overlaps with a mapped Critical Biodiversity Area (CBA 1), while a small portion of Erf 971 falls within an Ecological Support Area (ESA). The Northern Cape Biodiversity Plan identifies these areas due to their contribution to maintaining biodiversity patterns and ecological processes at a landscape scale. The CBA 1 area on Erf 1 is associated with the presence of relatively intact indigenous vegetation and forms part of a broader ecological network that supports the persistence of biodiversity features within the region. The terrestrial specialist assessment confirmed that the site contains the Shrubland Vegetation Unit, as well as a smaller Ridge Vegetation Unit that supports several protected plant species, including *Aloe claviflora, Boscia albitrunca* (Shepherd's Tree), protected bulb species and *Ceropegia cf. gordonii (Hoodia cf. gordonii)*, a protected species of conservation concern. The Ridge Vegetation Unit was assigned a high ecological sensitivity and conservation priority, which is consistent with the CBA designation. Consequently, the original alternative was amended and the preferred layout shifted north-east to avoid the Ridge Vegetation Unit and reduce the extent of CBA 1 affected from approximately 5.6 ha to approximately 3 ha.

				The ESA associated with Erf 971 is linked to the Orange River corridor and associated drainage features. Ecological Support Areas are identified in the biodiversity plan because they support the ecological functioning and long-term viability of CBAs and other biodiversity features. The terrestrial assessment found that the majority of Erf 971 has been substantially transformed and degraded through historical disturbance and the removal of invasive *Prosopis glandulosa*. However, smaller drainage lines and a wetland feature remain present on the property and retain ecological and hydrological functionality. These features contribute to ecological connectivity and water-related ecosystem processes, which explains the ESA designation in this area. The specialist therefore recommended that these drainage and wetland features be retained and appropriately buffered. Although the terrestrial specialist identified drainage lines and a wetland feature on Erf 971 as environmentally sensitive components that contribute to ecological functioning and maintain hydrological linkages to the Orange River system, the assessment also concluded that the majority of the site (approximately 6.6 ha) has been substantially transformed and degraded through historical disturbance, extensive *Prosopis* invasion and subsequent clearing activities of this alien. The site was consequently classified largely as a Disturbed Vegetation Unit of low ecological sensitivity and low conservation priority, with poor habitat integrity and limited ecological functioning. Furthermore, the specialist indicated that the wetland feature may have originated as a result of surrounding irrigation activities. Given the highly modified agricultural landscape, the absence of any Critical Biodiversity Areas on Erf 971, and the location of the proposed development between existing irrigated agricultural areas, it is considered appropriate to adopt a site-specific management approach that focuses on maintaining the ecological functioning of the drainage and wetland features while avoiding the unnecessary sterilisation of already transformed agricultural land through establishing buffer zones. The proposed development therefore seeks to maximise the utilisation of disturbed areas

				while implementing appropriate management measures to minimise impacts on the remaining ecological features. Therefore, considering all, the preferred development layout was selected specifically to minimise impacts on biodiversity-sensitive areas by avoiding the high-sensitivity Ridge Vegetation Unit on Erf 1 and focusing development within already disturbed or lower sensitivity areas where possible. The remaining ESA-associated drainage and wetland features on Erf 971 will be managed.

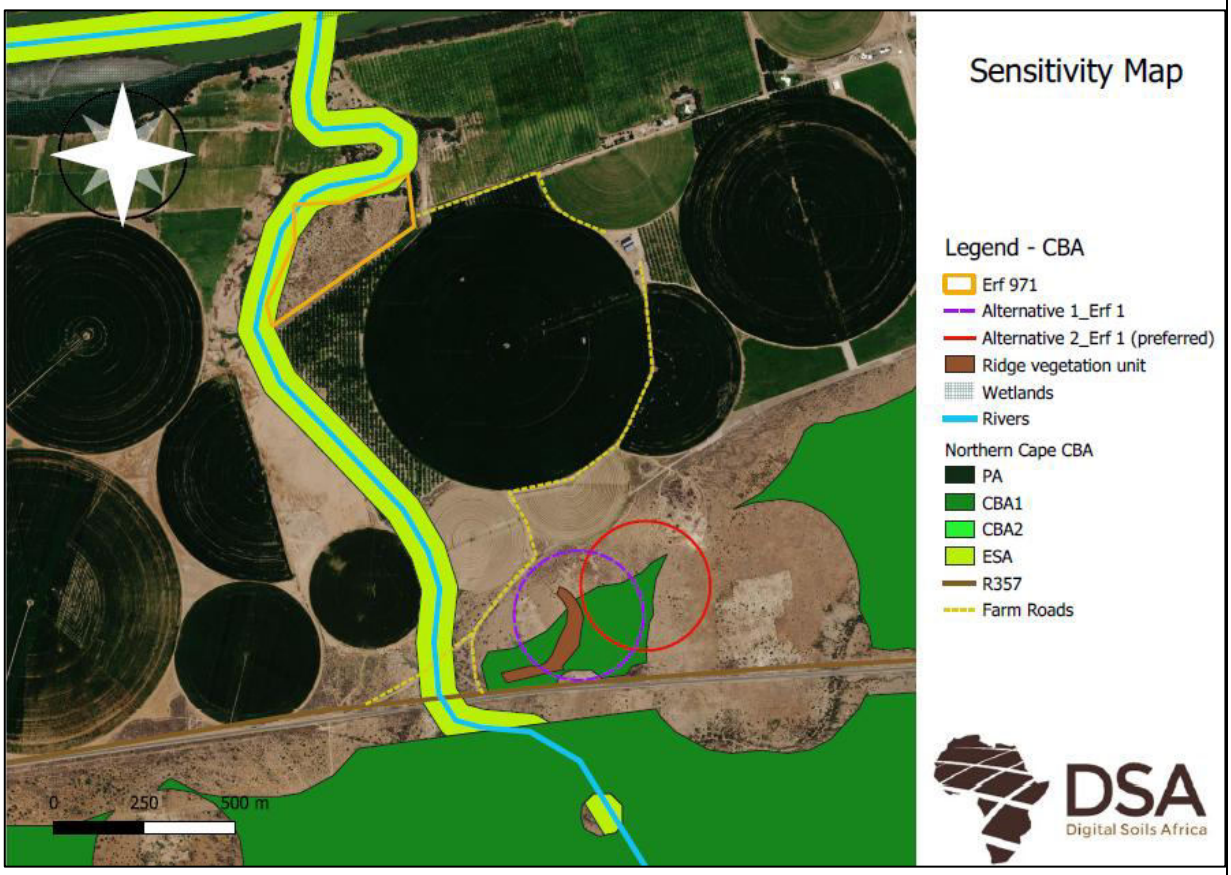


Figure 7: Site Sensitivity Map

b) Indicate and describe the habitat condition on site

Habitat Condition	Percentage of habitat condition class (adding up to 100%)	Description and additional Comments and Observations (including additional insight into condition, e.g. poor land management practises, presence of quarries, grazing, harvesting regimes etc).
Natural	0%	No areas were identified as pristine or completely natural.
Near Natural (includes areas with low to moderate levels of alien invasive plants)	63%	Approximately 11.4 ha of the combined development area comprises the Shrubland Vegetation Unit on Erf 1 together with the drainage and wetland features on Erf 971. These areas retain indigenous vegetation and ecological functioning, although varying levels of disturbance and alien plant presence occur. The Shrubland Vegetation Unit on Erf 1 was assessed as having a medium ecological sensitivity

		and conservation priority and contains intact indigenous shrubland with several protected plant species. The preferred Alternative 2 site location was specifically selected to avoid the high-sensitivity Ridge Vegetation Unit identified on Erf 1. The drainage lines and wetland features on Erf 971 retain ecological and hydrological functionality associated with the Orange River system and were assigned a medium conservation value by the specialist.
Degraded (includes areas heavily invaded by alien plants)	37%	Approximately 6.6 ha of Erf 971 was classified as a Disturbed Vegetation Unit with low conservation priority and low ecological sensitivity. The area was historically heavily invaded by *Prosopis glandulosa* (Honey Mesquite), which was subsequently cleared and burnt. The site is characterised by bare ground, pioneer species, annuals, alien invasive plants and evidence of severe historical disturbance, resulting in poor habitat integrity and ecological functioning.
Transformed (includes cultivation, dams, urban, plantations, roads, etc.)	0%	Although the proposed development areas are surrounded by existing irrigated agricultural lands and associated farming infrastructure, the preferred development footprints themselves are not currently cultivated and were therefore not classified as transformed by the specialist

c) Complete the table to indicate:

(i) the type of vegetation, including its ecosystem status, present on the site; and

(ii) whether an aquatic ecosystem is present on site.

Terrestrial Ecosystems		**Aquatic Ecosystems**						
Ecosystem threat status as per the National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	~~Critical~~	Wetland (including rivers, depressions, channelled and unchanneled wetlands, flats, seeps pans, and artificial wetlands)			Estuary		Coastline	
	~~Endangered~~							
	~~Vulnerable~~							
	Least Threatened	**YES**	~~NO~~	~~UNSURE~~	~~YES~~	**NO**	~~YES~~	**NO**

Provide reasons:

The terrestrial report identifies the vegetation as Nama-Karoo shrubland and disturbed vegetation units. Neither the application form nor the ecological assessment identifies the affected vegetation types as Critically Endangered, Endangered or Vulnerable ecosystems listed under the National List of Threatened Ecosystems. The affected vegetation is therefore best classified as Least Threatened. The biodiversity concerns relate primarily to the presence of a CBA on part of Erf 1, the Ridge Vegetation Unit (avoided under Alternative 2) and protected plant species.

Erf 971 contains a wetland feature and associated drainage lines identified by the terrestrial specialist. While these features retain ecological and hydrological functionality, the assessment also concluded that the majority of the site has been substantially transformed and degraded and that the wetland may have originated as a result of surrounding irrigation activities. Accordingly, the proposed development seeks to balance the protection of ecological processes with the productive use of already disturbed land by maintaining the ecological functioning of the drainage and wetland features through site-specific management measures, rather than excluding extensive areas of transformed agricultural land from future cultivation.

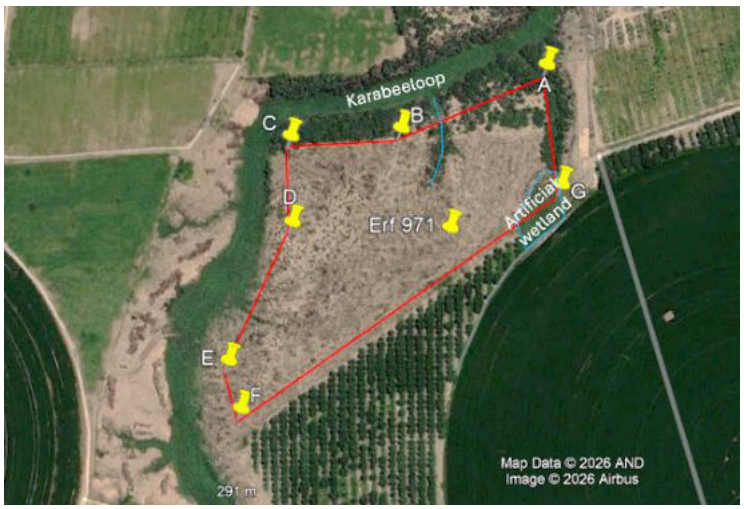


Figure 8: Positioning of the drainage line and the artificial wetland on Erf 971.

d) Please provide a description of the vegetation type and/or aquatic ecosystem present on site, including any important biodiversity features/information identified on site (e.g. threatened species and special habitats)

The proposed development areas are located on Erf 1 and Erf 971 on the farm Oranje-Oos, near Prieska in the Northern Cape Province. The terrestrial flora assessment indicates that both sites fall within the Inland Azonal Vegetation group, specifically Upper Gariep Alluvial Vegetation (AZa 4). This vegetation type is associated with the Orange River system and alluvial environments within the semi-arid Griqualand West / Nama-Karoo landscape. The flora specialist notes that the Orange River plays an important ecological role in the creation, maintenance and development of specialised habitats along flowing and stagnant freshwater bodies, where seasonal or permanent inundation may occur.

Upper Gariep Alluvial Vegetation is described as the dominant regional vegetation type for both Erf 1 and Erf 971. Important taxa associated with this vegetation type include small trees such as *Vachellia karroo, Celtis africana* and *Salix mucronata* subsp. *mucronata*; tall shrubs such as *Diospyros lycioides, Melianthus comosus* and *Searsia pyroides*; low shrubs such as *Asparagus setaceus* and *Asparagus suaveolens*; woody climbers such as *Clematis brachiata*; succulent shrubs such as *Lycium arenicola* and *Lycium hirsutum*; herbs such as *Rubia cordifolia, Cineraria dregeana* and *Cineraria lobata*; and graminoids such as *Melica decumbens*. The flora report notes that only a small proportion of this vegetation type is statutorily conserved and that more than 20% has already been transformed for cultivation and dam infrastructure.

Although both properties occur within the same broad vegetation type, the specialist reports confirm that the ecological condition and vegetation structure differ notably between Erf 1 and Erf 971. Erf 1 was found to retain natural to near-natural vegetation, although plant cover is sparse in places. The flora specialist divided Erf 1 into two vegetation units, namely the Shrubland Vegetation Unit and the Ridge Vegetation Unit.

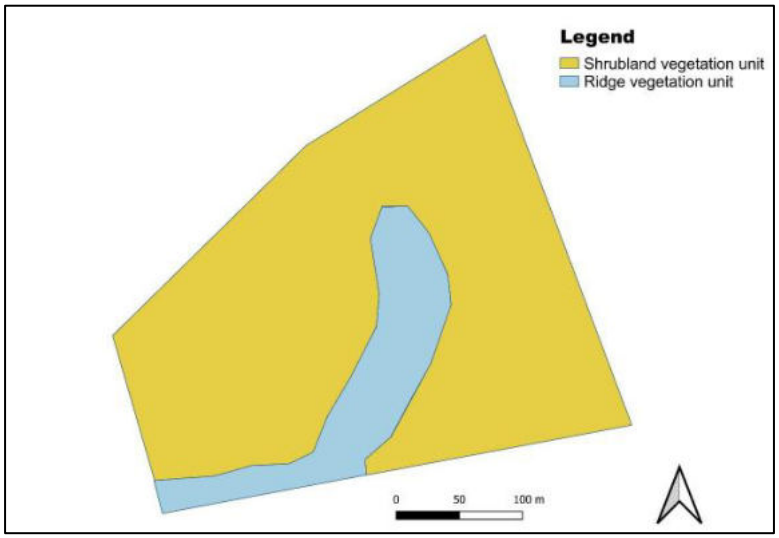


Figure 9: Different vegetation units identified on Erf 1 (Dr. van Aardt, 2026).

The Shrubland Vegetation Unit forms the largest part of Erf 1 and was classified as near-natural. It is characterised by a dominant shrub layer, scattered trees and a less prominent ground layer of grasses and herbs, with open rocky areas occurring throughout the unit. The vegetation is dominated by succulent shrubs including *Mesembryanthemum coriarium, Roepera pubescens* and *Tetraena microcarpa*, with *Rhigozum trichotomum* also present. Scattered trees include *Senegalia mellifera* and *Neltuma glandulosa / Prosopis glandulosa*, while grasses such as *Enneapogon desvauxii, Enneapogon cenchroides, Cenchrus ciliaris* and *Stipagrostis ciliata* were recorded.

The Shrubland Vegetation Unit on Erf 1 was assigned a medium conservation priority and medium ecological sensitivity. The specialist recorded several protected plant species within this unit, including *Mesembryanthemum junceum, Mesembryanthemum tetragonum, Mesembryanthemum coriarium, Mesembryanthemum guerichianum* and *Mesembryanthemum noctiflorum*, all of which are protected under the Northern Cape Nature Conservation Ordinance due to the family in which they occur. *Boscia albitrunca*, which is protected under the Northern Cape Nature Conservation Ordinance and the National Forests Act, was also recorded within this vegetation unit. Although the unit retains indigenous vegetation and ecological functioning, the specialist also recorded alien invasive species, including *Salsola kali, Erigeron bonariensis, Lactuca serriola, Sonchus oleraceus, Medicago sativa, Neltuma glandulosa / Prosopis glandulosa* and *Boerhavia cordobensis*. The ecological sensitivity of the Shrubland Vegetation Unit is therefore linked to its indigenous vegetation structure, protected plant species and its association with the adjacent Ridge Vegetation Unit, but it is also influenced by surrounding disturbance, including the R357 road and nearby agricultural fields.

The Ridge Vegetation Unit on Erf 1 is a smaller but more sensitive vegetation unit. It is mostly composed of trees, particularly *Senegalia mellifera*, with a shrub layer containing *Pentzia incana, Pentzia sphaerocephala, Eriocephalus ericoides, Eriocephalus spinescens, Aizoon plinthoides, Senegalia mellifera* and *Rhigozum trichotomum*. Grasses and herbs are not abundant in this unit. The flora specialist assigned this vegetation unit a high conservation value and high ecological sensitivity due to the presence of the protected and data-deficient species *Ceropegia cf. gordonii / Hoodia cf. gordonii*. Other protected species recorded in this unit include *Mesembryanthemum tetragonum, Mesembryanthemum guerichianum, Mesembryanthemum noctiflorum, Nerine sp., Ammocharis sp*. and *Aloe claviflora*. Alien invasive species were also recorded within the Ridge Vegetation Unit, including *Coreopsis lanceolata, Erigeron bonariensis, Sonchus oleraceus, Medicago sativa, Neltuma glandulosa / Prosopis glandulosa, Boerhavia cordobensis* and *Tamarix ramosissima*. The Ridge Vegetation Unit is therefore the most important botanical sensitivity on Erf 1.

For this reason, the 10Ha pivot area was moved on Erf 1 further north-east to exclude the Ridge Vegetation Unit, to reduce the extend of CBA 1 affected from approximately 5.6 Ha to 3 Ha, and confine the development to the Shrubland Vegetation Unit, which was assessed as having a lower ecological sensitivity and conservation value.

Importantly, the revised layout remains directly adjacent to existing irrigated agricultural areas and maintains accessibility for integration with existing irrigation infrastructure and farming operations. The preferred alternative

therefore achieves a balance between agricultural viability and biodiversity impact avoidance by utilising a less sensitive area while retaining practical access to existing agricultural infrastructure.

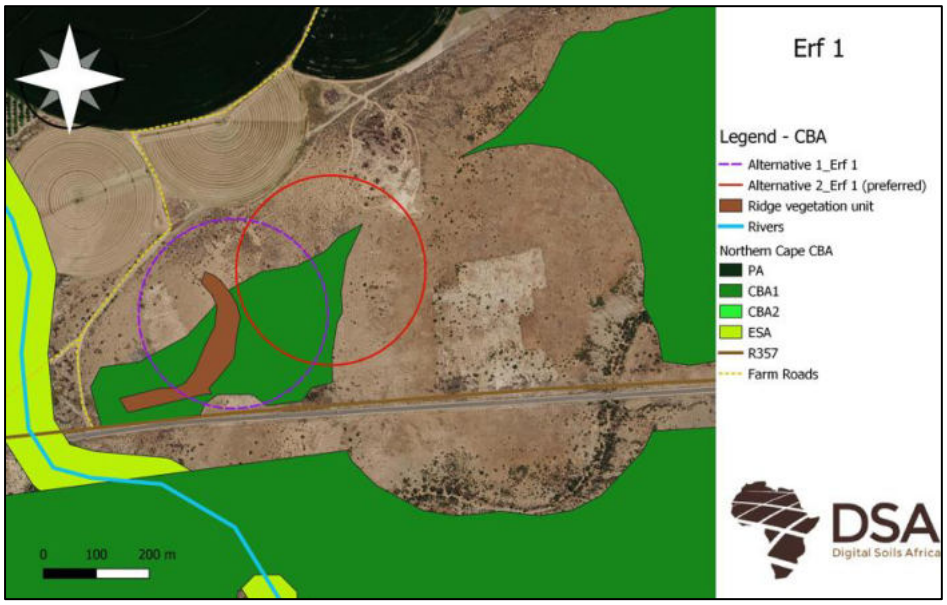


Figure 10: Site sensitive areas on Erf 1 and Alternative 2 site as the preferred site.

Erf 971 differs substantially from Erf 1. The terrestrial flora report states that Erf 971 had been cleared of the invasive weed *Neltuma sp. / Prosopis sp*. and that the brush was burned. This significantly altered the habitat, and pioneer vegetation was observed sprouting at the time of assessment. The specialist therefore could not fully determine the original natural state of the vegetation across much of Erf 971.

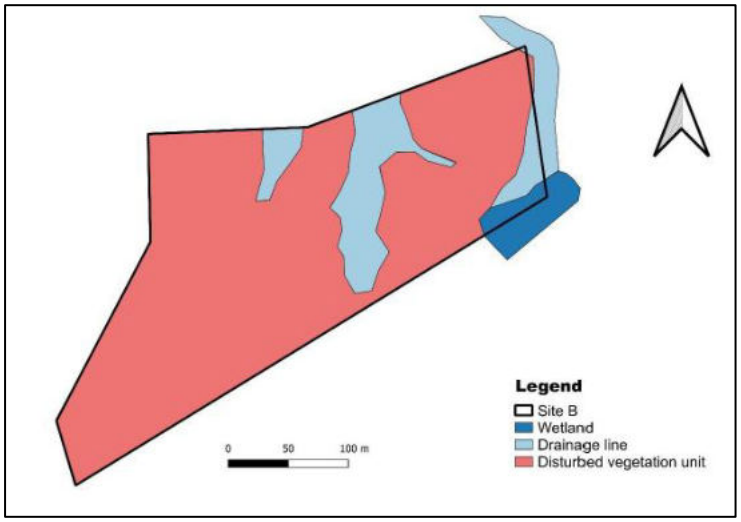


Figure 11: The vegetation unit identified on Erf 971 (Dr. van Aardt, 2026).

Three vegetation units were identified on Erf 971, namely a Wetland Vegetation Unit, a Drainage Line Vegetation Unit and a Degraded Vegetation Unit. The Wetland Vegetation Unit occurs in the south-western corner of the site and is dominated by *Phragmites australis*. No protected plant species were recorded within this wetland unit, although the alien invasive species *Chenopodium album* was present. The specialist assigned this unit a medium conservation value because it is a wetland that may form part of the broader drainage line system. The specialist also noted that the wetland may have originated as a result of surrounding irrigation activities. However, the continued presence of water may result in the development of wetland soil characteristics, which may influence the conservation value of the feature.

The Drainage Line Vegetation Unit on Erf 971 occurs as three areas situated mainly along the northern boundary of the site towards the Orange River. These drainage lines are considered likely to be natural drainage features towards the nearby Orange River. The vegetation is dominated by *Vachellia karroo* trees and shrubs such as *Lycium cinereum* and *Lycium horridum*. Protected plant species recorded within the drainage line unit include *Mesembryanthemum coriarium* and *Mesembryanthemum guerichianum*. Alien invasive species recorded in this unit include *Atriplex lindleyi, Erigeron bonariensis, Sonchus oleraceus, Medicago sativa, Neltuma glandulosa / Prosopis glandulosa* and *Tamarix ramosissima*. The flora specialist specifically notes that these drainage lines are important from an ecological perspective because they provide corridors for the movement of species associated with riverine environments.

The Degraded Vegetation Unit forms the largest portion of Erf 971. This unit has been severely impacted by anthropogenic activities, particularly vegetation clearing and burning. The specialist states that the natural state of this vegetation unit can no longer be determined and that there is no dominant species in this unit. This unit was therefore assigned a very low conservation value. The degraded condition of this unit is an important consideration in assessing the ecological sensitivity of Erf 971, as most of the site no longer supports intact natural vegetation, while the remaining wetland and drainage line features retain ecological importance.

From an aquatic ecosystem perspective, no formal aquatic specialist assessment was provided; however, the terrestrial flora report identified aquatic or water-associated features on Erf 971. These include a wetland feature and drainage lines associated with the Orange River system. The wetland is dominated by *Phragmites australis* and was assigned medium conservation value. The drainage lines are considered important because of their likely natural drainage function towards the Orange River and because they provide ecological corridors for riverine-associated species. The aquatic features on Erf 971 should therefore be understood as locally important hydrological and ecological features within an otherwise transformed agricultural landscape. The flora report also recognises the possibility that the wetland may be irrigation-induced, but nevertheless assigns it ecological value due to the continued presence of water and potential development of wetland soil characteristics.

The terrestrial fauna assessment identified the broader study area as having high animal species sensitivity. The animal species assessment was undertaken for terrestrial fauna, including birds, mammals, reptiles and amphibians. The DFFE Screening Tool identified the animal species theme as High sensitivity due to the possible occurrence of Species of Conservation Concern, including Ludwig's Bustard, Lanner Falcon and Tawny Eagle. The faunal specialist assessment further identified fourteen Species of Conservation Concern as either confirmed present, likely present or possibly present within the broader study area.

Bird sensitivity is one of the most important faunal considerations. The fauna report identifies three Endangered bird species with high legislative conservation importance, namely Tawny Eagle, Martial Eagle and Ludwig's Bustard. Ludwig's Bustard is associated with arid and semi-arid Karoo shrubland, flat open gravel plains and sparse low shrubland, and is sensitive to transformed habitats and disturbance at nesting sites. The fauna report also records the confirmed presence of Lanner Falcon and Kori Bustard in the immediate area and notes the neighbouring-farmer-confirmed occurrence of Verreaux's Eagle. The presence or likely presence of these raptor and large terrestrial bird species increases the faunal sensitivity of the landscape, especially where open shrubland, riverine corridors and surrounding natural habitats remain available.

Mammal Species of Conservation Concern identified as potentially or likely occurring include Black-footed Cat, Brown Hyaena and Southern African Hedgehog. These species are of conservation importance and are associated with open shrubland, semi-arid environments, grassland, rocky areas, dense vegetation, burrows or other suitable sheltering and foraging habitats. The Southern African Hedgehog is associated with open savanna, semi-arid shrubland, grassland with sparse bush and mixed bushveld, and requires loose soil for foraging and sheltering areas such as dense vegetation or rocky outcrops. The potential occurrence of these species indicates that even where vegetation appears sparse, the habitat may still support important faunal ecological functions.

The reptile assessment identified the Northern Tent Tortoise as an important reptile Species of Conservation Concern likely to occur within the study area. Although the Northern Tent Tortoise is listed as Least Concern at subspecies level, the fauna specialist notes that the broader Tent Tortoise group is of conservation importance and that the impact of orchard development on this group may be high. This is because Tent Tortoises are associated with arid Nama-Karoo succulent shrubland, open Karoo flats and specific soil and vegetation conditions. They are dependent on low-growing succulent plants, especially members of the Aizoaceae, Crassulaceae and Asteraceae families, for food and moisture.

The conversion of succulent shrubland to cultivated orchard areas would therefore result in the loss of substrate, food plants and foraging habitat for this species group.

With regard to amphibians, the faunal assessment indicates that no frog species were listed as Species of Conservation Concern by the DFFE Screening Tool. The desktop assessment indicated that several frog species may occur in the broader study area, but all were listed as Least Concern, and no frogs were encountered during the field assessment. The potential occurrence of amphibians is nevertheless relevant to the wetland and drainage line features on Erf 971, which represent the most water-associated habitats on the site.

In summary, the main biodiversity features identified on site are: the Upper Gariep Alluvial Vegetation vegetation type; the near-natural Shrubland Vegetation Unit on Erf 1; the high-sensitivity Ridge Vegetation Unit on Erf 1 with protected and data-deficient plant species; the wetland and drainage line features on Erf 971; protected plant species, including *Boscia albitrunca* and several *Mesembryanthemum* species; alien invasive species including *Prosopis / Neltuma* and *Tamarix;* and a range of faunal Species of Conservation Concern, particularly large birds, raptors, carnivorous mammals and the Northern Tent Tortoise. Erf 1 retains the greater botanical sensitivity due to the near-natural shrubland and ridge habitat, while Erf 971 is largely degraded but contains important wetland and drainage features that retain ecological and hydrological functionality within the Orange River-associated landscape.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT AND NOTICE

Publication name	Noordwes Karoo Nuusblad	
Date published	5 August 2026	
Site notice position	**Latitude**	**Longitude**
	29°41'44.10"S	22° 49'52.13"E
Date placed	5 August 2026	

Include proof of the placement of the relevant advertisements and notices in Appendix E1.

2. DETERMINATION OF APPROPRIATE MEASURES

Provide details of the measures taken to include all potential I&APs as required by Regulation 41(2)(e) and 41(6) of GN 733. Key

stakeholders (other than organs of state) identified in terms of Regulation 41(2)(b) of GN 733:

Potential Interested and Affected Parties (I&APs) were identified through a review of the property ownership records, surrounding land uses, municipal information, specialist inputs and regulatory requirements.

The application was registered on 23 July 2026 with the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform.

A notice board was erected at the site and a notice will be placed in The Noordwes Karoo Nuusblad newspaper on 5 August 2026 to notify potential I&AP's to register and/or comment on the proposed project on or before 7 September 2026. If any person expresses their desire to be registered as an Interested and/or Affected Party (I&AP), their name and contact details will be recorded in the I&AP register and they will be allowed to comment until the end of this 30day public participation process.

Written notices will be sent via email to the registered I&AP's:

- A written notice with a background information document will be sent via email to the municipal councillor of Ward 3 (which is the ward in which the site is situated), the Siyathemba Local Municipality, the Pixley Ka Seme District

Municipality, and the organs of the state that have jurisdiction in respect of any activity on the site, Mr. G. Visagie who is a lessee of Erf 1 and all directly abutting neighbours.

- All I&AP's will be provided the mandatory 30 Day comment period on the Draft BAR.
- The DBAR will be made available via Digital Soils Africa Website for download.
- All comments received will be submitted in the Public Participation Report and if required, amendments to the BAR will be made.
- Recording and consideration of all comments received during the public participation process;
- Ongoing notification of registered I&APs regarding the availability of reports and opportunities to comment.
- These measures were undertaken to ensure compliance with the public participation requirements contained in Regulations 41(2)(e) and 41(6) of the Environmental Impact Assessment Regulations, 2014 (as amended).
- The Draft BAR was placed on the Digital Soils Africa website for public access. It will remain on the website for the duration of the commenting period.
- No public meeting will be held, unless requested.

Once the public participation is completed, a public participation report will be completed and submitted with the Final BAR to the DEDEAT.

Include proof that the key stakeholder received written notification of the proposed activities as Appendix E2. This proof may include any of the following:

- e-mail delivery reports;
- registered mail receipts;
- courier waybills;
- signed acknowledgements of receipt; and/or
- or any other proof as agreed upon by the competent authority.

3. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of main issues raised by I&APs	Summary of response from EAP
This will be completed upon conclusion of the PPP for the project.	

4. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments received from I&APs and respond to each comment before the Draft BAR is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to the Final BAR as Appendix E3.

5. AUTHORITY PARTICIPATION

Authorities and organs of state identified as key stakeholders:

Title, Name and Surname	Affiliation/ key stakeholder status	Contact details (tel number or e-mail address)
Mr. B. Fisher	The Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform	Bfisher@ncpg.gov.za
Mr. D. Khakhane		dkakhane@ncpg.gov.za
Ms. Madisa		Madisa.agriculture@gmail.com
Ms A Hlengani	Department of Water and Sanitation	hlengania@dws.gov.za
Mr. D. Moleko	Northern Cape Department of Agriculture	dmoleko@ncpg.gov.za

Ms. N. Higgitt	South African Heritage Resources Agency	nhiggitt@sahra.org.za
Ms. R.A. Timothy	Northern Cape Heritage Resources Authority (NCHRA)	rtimothy@nbkb.org.za
Mr. K. Nogwili	Northern Cape Department of Roads and Public Works	ncorns@ncpg.gov.za
Ms. C Robertson		CRobertson@ncpg.gov.za
Ms. N. Abrahams	South African National Roads Agency (SANRAL)	abrahamsn@nra.co.za
Environmental Division	Ms Civil Aviation Authority	environment@caa.co.za
Lt. Col. Zondi	Military Integrated Environmental Management	kebasenosi@yahoo.com
Mr. Thomas van Staden	Siyathemba Local Municipality	mmvstaden@siyathemba.gov.za
Mr. I. Visser	Pixley Ka Seme District Municipality	mm@pksdm.gov.za
Mr. W. Pieterse	Ward Councillor – Ward 3	willonpieterse@gmail.com debbielottering28@gmail.com

Include proof that the Authorities and Organs of State received written notification of the proposed activities as appendix E4. In the case of renewable energy projects, Eskom and the SKA Project Office must be included in the list of Organs of State.

6. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for any activities (linear or other) where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that sub-regulation to the extent and in the manner as may be agreed to by the competent authority.

Proof of any such agreement must be provided, where applicable. Application for any deviation from the regulations relating to the public participation process must be submitted prior to the commencement of the public participation process.

A list of registered I&APs must be included as appendix E5.

Copies of any correspondence and minutes of any meetings held must be included in Appendix E6.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

Provide a summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed. This impact assessment must be applied to all the identified alternatives to the activities identified in Section A(2) of this report.

Below is the methodology to be used in determining and ranking the nature, significance, consequences, extent, duration of the potential environmental impacts and risks associated with the proposed activity or development and alternatives, the degree to which the impact or risk can be reversed and the degree to which the impact and risk may cause irreplaceable loss of resources.
These criteria are drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989. The criteria are noted below:

Nature of the impact
This is the appraisal of the type of effect the construction, operation and maintenance of a development would have on the affected environment. This description should include what is to be affected and how.
Extent of the impact
Describe whether the impact will be: Site Specific - local extending only as far as the development site area; or limited to the site and its immediate surroundings; or will have an impact on the region or will have an impact on a national scale or across international borders.
Duration of the impact
The specialist / EAP should indicate whether the lifespan of the impact would be short term (0-5 years), medium term (5-15 years), long term (16-30 years) or permanent.
Intensity
The specialist / EAP should establish whether the impact is destructive or benign and should be qualified as low, medium or high. The study must attempt to quantify the magnitude of the impacts and outline the rationale used.
Probability of occurrence
The specialist / EAP should describe the probability of the impact actually occurring and should be described as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

The impacts should also be assessed in terms of the following aspects:
Legal requirements
The specialist / EAP should identify and list the relevant South African legislation and permit requirements pertaining to the development proposals. He / she should provide reference to the procedures required to obtain permits and describe whether the development proposals contravene the applicable legislation.
Status of the impact
The specialist / EAP should determine whether the impacts are negative, positive or neutral ("cost — benefit" analysis). The impacts are to be assessed in terms of their effect on the project and the environment. For example, an impact that is positive for the proposed development may be negative for the environment. It is important that this distinction is made in the analysis.
Accumulative impact

Consideration must be given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts must be evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

Degree of confidence in predictions

The specialist / EAP should state what degree of confidence (low, medium or high) is there in the predictions based on the available information and level of knowledge and expertise.

Based on a synthesis of the information contained in the above-described procedure, you are required to assess the potential impacts in terms of the following significance criteria:

No significance: the impacts do not influence the proposed development and/or environment in any way.
Low significance: the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
Moderate significance: the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
High significance: the impacts will have a major influence on the proposed development and/or environment and will result in the "no-go" option on the development or portions of the development regardless of any mitigation measures that could be implemented. This level of significance must be well motivated.

Assessment of each impact and risk identified for each alternative

Below is the table representing the summary of the significant impact ratings, after mitigation, which is discussed in Appendix F.

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go**
PLANNING, DESIGN AND DEVELOPMENT PHASE			
Failure to obtain and comply with all applicable statutory approvals and associated conditions could lead to delays in project implementation, increased financial costs and potential legal consequences arising from regulatory non-compliance.	Low (+)	Low (+)	N/A
CONSTRUCTION PHASE			
Loss of indigenous vegetation due to vegetation clearing and site preparation	Medium (-)	Low (-)	N/A
Loss of protected plant species during vegetation clearing and cultivation establishment	High (-)	Low (-)	N/A
Loss of fauna habitat and distribution of fauna resulting from vegetation clearing, machinery movement and human activity.	Medium (-)	Low (-)	N/A
Impacts on drainage lines and wetland – associated features on	Low (-)	Low (-)	**Low (+)**

Erf 971 due to vegetation removal, earthworks and increased sedimentation risk.			
Soil erosion and soil degradation associated with vegetation clearing, soil disturbance and earthworks	Low (-)	Low (-)	N/A
Dust generation from agricultural operations and vehicle movement	Low (-)	Low (-)	N/A
Heritage chance finds resulting from ground disturbance during site preparation and cultivation establishment.	Low (-)	Low (-)	N/A
Socio-economic benefits through temporary employment and local expenditure during the establishment phase.	**Medium (+)**	**Medium (+)**	Low (-)
Cumulative biodiversity transformation associated with the conservation of natural habitat to agricultural land.	Medium (-)	Low (-)	N/A
OPERATIONAL PHASE			
Disturbance of fauna resulting from ongoing agricultural activities	Medium (-)	Low (-)	N/A
Impacts on drainage lines and wetland-associated features on Erf 971 due to irrigation practices, runoff and ongoing agricultural activities	Low (-)	Low (-)	**Low (+)**
Soil erosion and soil degradation associated with long-term cultivation and irrigation activities.	Low (-)	Low (-)	N/A
Soil salination associated with long-term irrigation	Low (-)	Low (-)	N/A
Soil degradation due to inappropriate irrigation management.	Low (-)	Low (-)	N/A
Soil contamination from agrochemicals	Low (-)	Low (-)	N/A
Loss of soil productivity if irrigation and fertilization are not appropriately managed.	Low (-)	Low (-)	N/A
Water quality impacts from irrigation and agrochemicals through nutrient enrichment, pesticide use and agricultural runoff.	Low (-)	Low (-)	**Low (+)**
Socio-economic benefits through sustained agricultural production, employment opportunities and contribution to the local economy.	**High (+)**	**High (+)**	Medium (-)
Creation of employment	**Medium (+)**	**Medium (+)**	Low (-)

opportunities during establishment and operation.			
Improved utilization of highly suitable agricultural soils	**Medium (+)**	**Medium (+)**	Low (-)
Contribution to local and regional agricultural development	**High (+)**	**High (+)**	Medium (-)
Cumulative biodiversity transformation through the permanent loss of natural habitat and ongoing agricultural intensification within the broader landscape.	Medium (-)	Low (-)	N/A
DECOMMISSIONING AND CLOSURE PHASE			
Not assessed at this stage.			

2. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

Alternative 2 (preferred alternative site)

Based on the specialist findings, the preferred Alternative Site 2 on Erf 1 was specifically selected to avoid the highly sensitive Ridge Vegetation Unit and to reduce the extent of Critical Biodiversity Area (CBA 1) affected, while the proposed 8 ha area on Erf 971 is largely situated within previously disturbed and transformed vegetation.

The environmental impact assessment indicates that the most significant potential impacts associated with the development relate to the loss of indigenous vegetation, the removal of protected plant species, habitat loss and disturbance to fauna, and potential impacts on drainage line and wetland-associated features on Erf 971. However, the implementation of the recommended mitigation measures, including the avoidance of sensitive wetland and drainage line features, protection and rescue of protected plant species where feasible, erosion control measures, and adherence to the Environmental Management Programme (EMPr), will reduce these impacts to low or low-medium significance levels.

The loss of indigenous vegetation on Erf 1 will be limited to the Shrubland Vegetation Unit, which was assessed as having medium ecological sensitivity, while the highly sensitive Ridge Vegetation Unit and associated protected Red Data species will be avoided entirely through the selection of Alternative Site 2. On Erf 971, the majority of the proposed development area occurs within previously disturbed and degraded vegetation of low conservation value. Although some residual loss of indigenous vegetation and habitat will occur, these impacts are localised, permanent within the development footprint, and are not expected to result in significant ecological fragmentation or the loss of irreplaceable biodiversity resources.

Potential impacts on fauna are expected to be largely limited to temporary disturbance and displacement during site preparation and establishment activities. The affected habitats are either already disturbed (Erf 971) or occur adjacent to existing agricultural activities and infrastructure (Erf 1). The availability of similar habitat in the surrounding landscape, together with the avoidance of the most sensitive ecological features, reduces the likelihood of significant impacts on faunal populations. Residual impacts on fauna are therefore expected to be of low significance following mitigation.

Drainage lines and the artificial wetland feature identified on Erf 971 represent the most environmentally sensitive features associated with the preferred alternative. These features retain ecological and hydrological value despite the transformed nature of the broader site. Provided that cultivation activities are excluded from these areas, these features maintained, and irrigation and agricultural practices are managed in accordance with the EMPr, impacts on aquatic functioning, water movement, and associated vegetation are expected to remain low and localised. The likelihood of significant downstream effects on the Orange River system is considered low.

Potential soil impacts, including erosion, compaction, degradation and localised salinisation associated with irrigation agriculture, are considered manageable through the implementation of appropriate agricultural management practices, maintenance of ground cover where feasible, proper irrigation scheduling, and ongoing soil monitoring. These impacts are expected to remain of low significance during both construction and operational phases.

The heritage and palaeontological assessment concluded that both Erf 1 and Erf 971 have low heritage sensitivity and that no significant archaeological, palaeontological, burial or built heritage resources were identified within the development footprints. The likelihood of significant heritage impacts is therefore low, provided that a Chance Finds Procedure is implemented during earthworks.

The proposed development will provide positive socio-economic benefits through the expansion of agricultural production, improved long-term agricultural viability, support for employment opportunities, and contribution to the local agricultural economy. These positive impacts are expected to be long-term and of moderate positive significance.

Following the implementation of all recommended mitigation and management measures, the overall residual environmental impact associated with Alternative Site 2 is assessed as low to low-medium. The majority of impacts are localised in extent, largely confined to the development footprint, and unlikely to result in significant cumulative effects on biodiversity, ecosystem functioning, heritage resources or water resources.

The preferred alternative is therefore considered environmentally acceptable and represents the most suitable development option when compared to the alternative layouts assessed.

No-go alternative (compulsory)

Under the No-Go Alternative, the proposed 10 ha pivot on Erf 1 and the 8 ha agricultural expansion area on Erf 971 would not be developed and no additional vegetation clearing or agricultural transformation would occur. Existing indigenous vegetation, protected plant species, fauna habitat, drainage lines, and wetland-associated features would remain intact within the proposed development footprints. The remaining ecological functioning and biodiversity value of the sites would therefore be retained, and no direct impacts on soils, water resources, heritage resources or ecological processes would occur.

The No-Go Alternative would represent the most environmentally conservative option, particularly in relation to the protection of biodiversity and ecological processes. However, it would also prevent the expansion of agricultural production and the associated socio-economic benefits anticipated from the establishment of additional pecan orchard areas. The opportunity to utilise existing agricultural infrastructure and irrigation systems more efficiently would be lost, and the long-term agricultural development objectives of the landowner would not be achieved.

While the No-Go Alternative would avoid all development-related environmental impacts, it would not contribute to agricultural growth, employment opportunities or local economic development. Given that the preferred Alternative Site 2 avoids the highly sensitive Ridge Vegetation Unit, reduces impacts on CBA 1 areas, and is capable of being developed with impacts reduced to acceptable levels through mitigation, the No-Go Alternative is not considered the preferred option from a balanced environmental and socio-economic perspective.

SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?	**YES**	~~NO~~

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment).

N/A

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application.

Should Environmental Authorisation be granted for the proposed development on Erf 1 and Erf 971, the following conditions should be included in the Authorisation:

GENERAL CONDITIONS

1.1. The development shall be undertaken strictly in accordance with the approved layout plan assessed as Alternative Site 2.
1.2. The Environmental Management Programme (EMPr) shall form part of the Environmental Authorisation and shall be implemented for the duration of the project.
1.3. All relevant permits, licences and approvals required by applicable legislation shall be obtained prior to commencement of any activities.
1.4. The Applicant shall ensure that all contractors and employees receive environmental awareness training before commencing work on site.

2. BIODIVERSITY AND VEGETATION MANAGEMENT

2.1. Development shall be restricted to the approved development footprints on Erf 1 and Erf 971.
2.2. The Ridge Vegetation Unit identified on Erf 1 shall be regarded as a no-go area and shall not be cleared, disturbed, cultivated or utilised for any project-related activities.
2.3. No clearing, stockpiling, vehicle movement or infrastructure placement shall occur outside the approved development footprints.
2.4. Protected plant species occurring within the development areas shall be identified prior to vegetation clearing. Where feasible, protected specimens shall be avoided or rescued and relocated by a suitably qualified specialist, subject to the necessary permits.
2.5. Any protected tree species, including *Boscia albitrunca* (Shepherd's Tree), located outside the approved footprint shall be retained and protected from disturbance.
2.6. The removal and control of alien invasive plant species shall be undertaken in accordance with the National Environmental Management: Biodiversity Act (Act 10 of 2004) Alien and Invasive Species Regulations.
2.7. Disturbed areas not required for operational purposes shall be rehabilitated as soon as reasonably possible following construction activities.

3. DRAINAGE LINE AND WETLAND PROTECTION

3.1. The identified drainage lines and wetland-associated features on Erf 971 shall be demarcated prior to commencement of site preparation activities.
3.2. No cultivation, infrastructure, stockpiling of materials, waste disposal, vehicle parking or maintenance activities shall occur within the delineated drainage lines or wetland area.
3.3. The drainage lines and wetland features must be maintained.
3.4. Natural drainage patterns shall be maintained and shall not be obstructed.

3.5. Irrigation runoff shall be managed to prevent erosion, sedimentation and concentration of flows into sensitive areas.
3.6. Any accidental pollution incidents affecting drainage lines or wetland features shall be reported immediately and remediated.

4. FAUNA PROTECTION

4.1. Vegetation clearing shall be undertaken in a phased manner to allow fauna to disperse naturally from the development area.
4.2. No hunting, trapping, poisoning, collection or intentional disturbance of fauna shall be permitted by project personnel.
4.3. Any fauna encountered during site preparation shall be allowed to move away unharmed or, where necessary, relocated by a suitably qualified specialist.
4.4. Open trenches or excavations shall be inspected daily and any trapped animals safely removed.
4.5.The unnecessary destruction of animal burrows, nests or shelter sites outside the approved footprint shall be prohibited.

5. SOIL MANAGEMENT

5.1. Topsoil shall be conserved and utilised during rehabilitation activities where practical.
5.2. Soil erosion prevention measures shall be implemented where required, particularly along disturbed areas and near drainage features.
5.3. Machinery shall remain within designated work areas to minimise unnecessary soil compaction.
5.4. Irrigation scheduling and water application rates shall be managed to minimise soil erosion, waterlogging and salinisation.
5.5.Regular monitoring of soil conditions shall be undertaken to identify any signs of degradation or salinity build-up.

6. WATER RESOURCE PROTECTION

6.1. Fertilisers, herbicides, pesticides and other agrochemicals shall be applied in accordance with manufacturer specifications and accepted agricultural best practice.
6.2. Agrochemical application shall be managed to prevent runoff into drainage lines, wetland areas or the Orange River system.
6.3. Equipment maintenance and refuelling shall be undertaken in designated areas away from drainage features.
6.4. Spill kits shall be available on site at all times and all spills shall be cleaned up immediately.

7. HERITAGE AND PALAEONTOLOGICAL RESOURCES

7.1. A Chance Finds Procedure shall be implemented during all earthworks.
7.2. Should any archaeological material, fossils, graves, human remains or heritage resources be discovered during construction, all work within the immediate vicinity shall cease immediately.
7.3. The South African Heritage Resources Agency (SAHRA) and a suitably qualified heritage specialist shall be notified immediately and work may only recommence once written clearance has been obtained.
7.4. No heritage resources identified during construction may be disturbed without the necessary approvals in terms of the National Heritage Resources Act (Act 25 of 1999).

8. OPERATIONAL PHASE MANAGEMENT

8.1. Agricultural activities shall remain within the authorised development footprint.
8.2. The drainage lines, wetland area shall be maintained and protected for the operational lifespan of the project.
8.3. Ongoing alien invasive plant control shall be undertaken throughout the operational phase.
8.4. Irrigation infrastructure shall be maintained to prevent leaks, excessive runoff and inefficient water use.

8.5. Agricultural best management practices shall be implemented to minimise environmental degradation and maintain soil and water quality.

9 ENVIRONMENTAL MONITORING

9.1. The holder of the Environmental Authorisation shall ensure compliance with all conditions contained in the Environmental Authorisation and EMPr.
9.2. Environmental audits shall be undertaken at intervals required by the competent authority.
9.3. Records of environmental incidents, corrective actions and monitoring activities shall be maintained and made available to the competent authority upon request.

Is an EMPr attached? The EMPr must be attached as Appendix G	**YES**	~~NO~~

The details of the EAP who compiled the BAR and the expertise of the EAP to perform the Basic Assessment process must be included as Appendix H.

If any specialist reports were used during the compilation of this BAR, please attach the declaration of interest for each specialist in Appendix I.

Any other information relevant to this application and not previously included must be attached in Appendix J.

Natalie Sharp

NAME OF EAP



SIGNATURE OF EAP

27/07/2026

DATE

SECTION F: APPENDIXES

Appendix A: Maps

Appendix A1: Locality Map

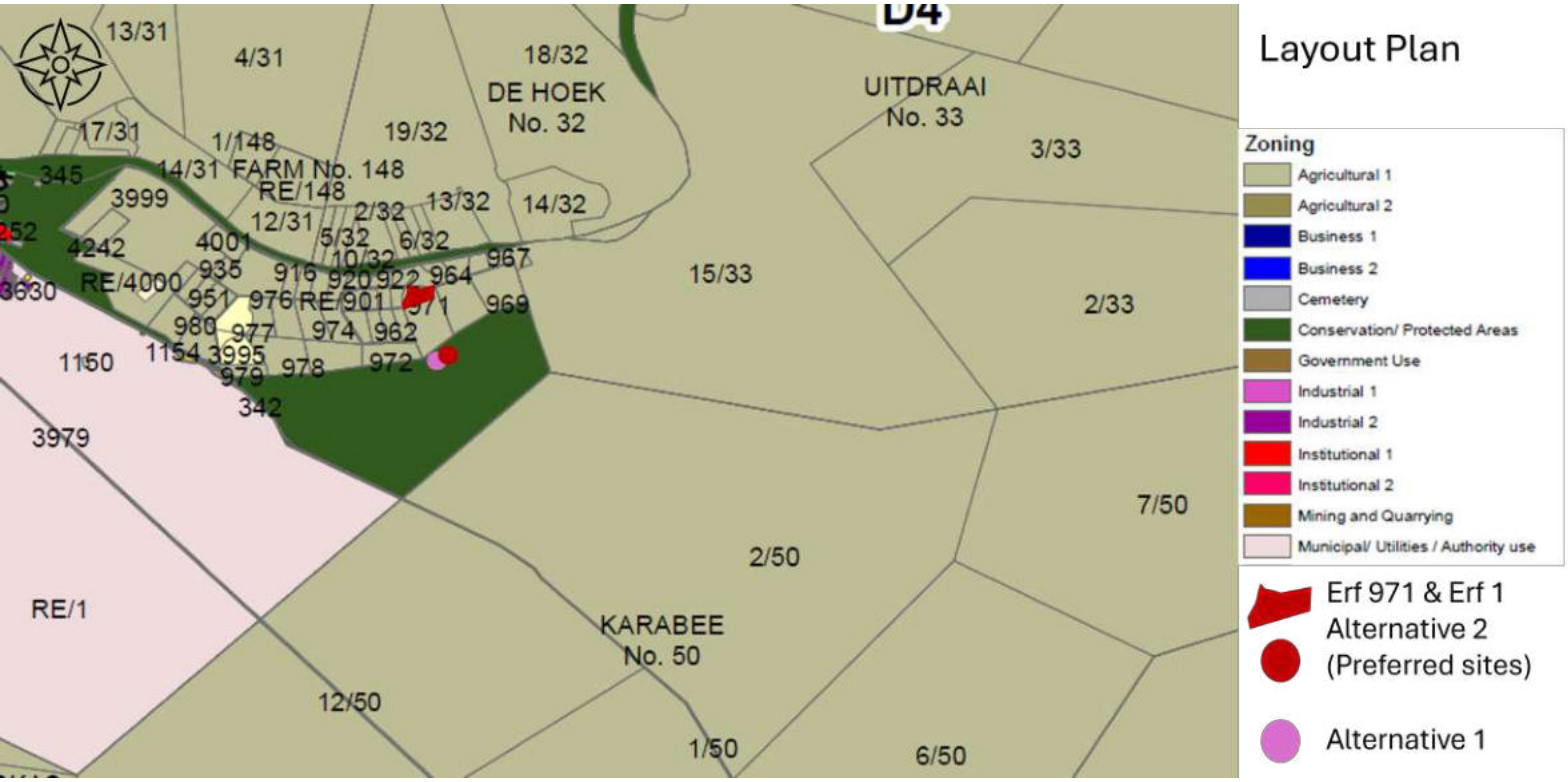
Locality Map

Legend

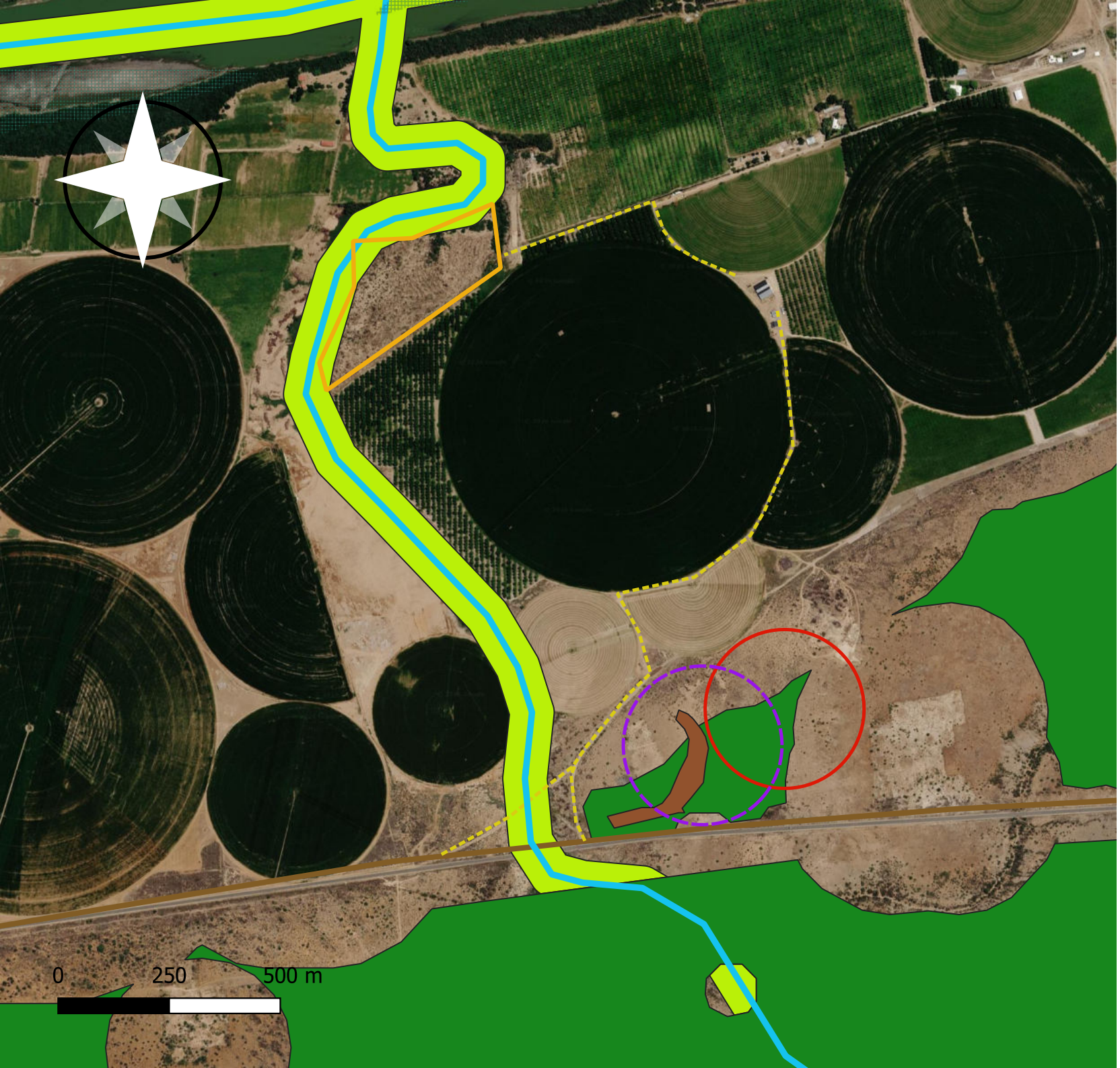
- Erf 1: Alternative 1
- Erf 1: Prefered Alterntive (2)
- Erf 971
- Farm Roads
- R357

0 1 2 km




D4
13/31
4/31
18/32
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No. 32
UITDRAAI
No. 33
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FARM No. 148
RE/148
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KARABEE
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12/50
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Layout Plan
Zoning
Agricultural 1
Agricultural 2
Business 1
Business 2
Cemetery
Conservation/ Protected Areas
Government Use
Industrial 1
Industrial 2
Institutional 1
Institutional 2
Mining and Quarrying
Municipal/ Utilities / Authority use
Erf 971 & Erf 1
Alternative 2
(Preferred sites)
Alternative 1

Sensitivity Map



Legend - CBA

- Erf 971
- Alternative 1_Erf 1
- Alternative 2_Erf 1 (preferred)
- Ridge vegetation unit
- Wetlands
- Rivers

Northern Cape CBA

- PA
- CBA1
- CBA2
- ESA
- R357
- Farm Roads

DSA
Digital Soils Africa

Appendix B: Photographs

Erf 971







Erf 1







The proposed development does not include the construction of any buildings, permanent structures, or infrastructure requiring architectural elevations or scaled visual illustrations. The application relates to the clearing of vegetation and establishment of irrigated agricultural land for pecan cultivation within the identified 8 ha and 10 ha areas. The activity will utilise existing agricultural infrastructure and centre pivot irrigation systems associated with the existing farming operation.

Consequently, no detailed structural illustrations are applicable to the proposed development. The location, extent and layout of the proposed cultivation areas are adequately depicted on the locality, layout and sensitivity maps included in this report.

Appendix D1: Palaeontology and Heritage Impact Assessment

Terms of Reference

The purpose of the Palaeontological Impact Assessment (PIA) and Archaeological Impact Assessment (AIA) was to identify and assess any palaeontological and archaeological heritage resources that may be affected by the proposed clearing of approximately 10 ha on Erf 1 and 8 ha on Erf 971, Prieska, for the establishment of irrigated agricultural land. The assessment was undertaken in accordance with the requirements of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), the 2007 SAHRA Minimum Standards for Archaeological and Palaeontological Impact Assessments, and Section 38(3) of the NHRA.

The assessment specifically aimed to:

- Undertake a desktop review of available archaeological, palaeontological and heritage information relevant to the study area, including geological maps, SAHRIS palaeosensitivity mapping, previous heritage records, aerial imagery and published literature.
- Conduct a field survey of the proposed development footprint to identify, record and map any archaeological, palaeontological or other heritage resources that may occur within the study area.
- Assess the significance and sensitivity of any identified heritage resources in accordance with the grading system prescribed by Section 7 of the National Heritage Resources Act.
- Evaluate the potential direct, indirect and cumulative impacts of the proposed development on identified heritage resources during the construction and operational phases.
- Determine whether any heritage resources require avoidance, protection, mitigation, rescue excavation, permitting or further specialist investigation prior to development.
- Assess the significance of the anticipated impacts after the implementation of reasonable avoidance and mitigation measures.
- Provide practical recommendations and mitigation measures, where necessary, to minimise or avoid impacts on heritage resources.
- Recommend an appropriate Heritage Field Rating for the affected sites and determine whether the proposed development may proceed from a heritage perspective.
- Develop a Chance Find Procedure to be implemented during construction should previously unknown archaeological material, palaeontological resources or human remains be uncovered during earthworks.
- Provide the Competent Authority with sufficient specialist information to inform the environmental authorisation process and ensure compliance with the requirements of the National Heritage Resources Act.

PALAEONTOLOGICAL AND HERITAGE IMPACT ASSESSMENT FOR A NEW 10HA PIVOT (ERF 1) AND 8HA AREA (ERF 971) FOR A PECAN NUT ORCHARD, PRIESKA, SIYATHEMBA LM, NORTHERN CAPE PROVINCE.



Report prepared for
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Specialist Info

Lloyd Rossouw previously led the Archaeology and Florisbad Quaternary Research Departments at the National Museum in Bloemfontein and has more than 30 years of fieldwork experience in South African archaeology and Quaternary palaeontology. He earned a BA degree in Archaeology, completed an Honours programme in Stone Age Archaeology at the University of Stellenbosch, and received training in osteology and Quaternary palaeontology for his MSc at the Bernard Price Institute of Palaeontology (Wits). He also undertook instruction in human anatomy at Duke University in Durham, North Carolina, USA. For his PhD at the University of the Free State, he developed a palaeobotanical method that uses plant silica remains to reconstruct past environmental conditions. His fieldwork includes participation in various excavations and surveys, such as historical built environments and farmsteads (including Keerweder, Zomerlust, Boekenhoutskloof, Bien Donne, Sterhuis, Fredericksberg, Aurora), rock art surveys (Ceres, Vanrhynsdorp, Clanwilliam, Piketberg), industrial projects (coastal section for Mossgas Pipeline Project, Molenaars River crossing for Du Toitskloof Pass Tunnel Project), Stone Age sites (Hoedjiespunt, Klasies River Mouth, Erfkroon, Damvlei, Thyspunt, Sunnyside, Baden Baden, Florisbad, Cornelia), and palaeontological localities (Langebaanweg, Zwartklip, Besaansklip, Boesmansfontein, Spitskop, Cango Valley, Braamhoek, Gladysvale, Taung). He has surveyed and mapped multiple open sites in the central interior region, including the northern Karoo, lower Orange, Vaal, Modder, Vet and Sand River basins as well as the central Makgadikgadi basin.

Declaration of Independence

Paleo Field Services remains financially independent, with no vested interest in project activities or outcomes except for professional fees. Its sole remuneration comes from agreed-upon services for each project. Paleo Field Services accepts client-provided information as accurate.

Yours truly,



April 2026

SUMMARY

A Phase 1 Palaeontological and Archaeological Impact Assessment (PIA/HIA) was undertaken for the proposed establishment of a new 10 ha centre-pivot irrigation area on Erf 1 and an 8 ha development area on Erf 971, intended for pecan nut orchard development east–southeast of Prieska, Northern Cape. From a palaeontological perspective, the assessment confirms that although the regional geological map indicates underlying Dwyka Group lithologies, field observations demonstrate that Erf 1 is capped by indurated, relict Orange River terrace gravels and calcretised hardpan, while Erf 971 is situated on geologically young, unconsolidated alluvial sands associated with a floodplain margin of the Orange River. No fossil material or fossil-bearing bedrock exposures were identified at surface or in accessible sections at either site. The sedimentary contexts present are considered to have low fossil preservation potential, and the proposed development is not expected to result in direct or cumulative impacts on fossil heritage. Both sites are therefore assigned a Generally Protected C (low) palaeontological field rating, subject only to the implementation of a standard Chance Find Protocol during ground-disturbing activities at Erf 1. From an archaeological perspective, Erf 1 preserves low-density, discontinuous Stone Age artefact scatters occurring as surface lags within a calcretised terrace gravel context. These artefacts are interpreted as lacking stratigraphic integrity or in situ features and are characteristic of reworked open sites common in the broader Orange River landscape. No graves, burial grounds, or historical structures older than 60 years were identified within the footprint. The archaeological significance of Erf 1 is assessed as low, with impacts limited to potential disturbance of already displaced surface material. In contrast, Erf 971 yielded no archaeological material at surface, and no built or burial heritage was identified within the development footprint. While floodplain environments are recognised as having a moderate theoretical potential for buried graves, particularly where episodic flooding may seal older surfaces, no evidence of such remains was encountered during the field survey. The archaeological significance of Erf 971 is therefore assessed as low to negligible, with only a remote residual risk associated with subsurface discovery. Overall, the proposed agricultural developments will not result in no-go impacts on palaeontological or archaeological heritage resources. Both properties are assigned a Generally Protected C field rating in terms of the NHRA. No further specialist investigation, mitigation, or monitoring, is required, provided that development remains within the assessed footprints. A standard Chance Find Protocol must be implemented to address the unlikely discovery of subsurface archaeological material, human remains, or fossil heritage during construction. Subject to this condition, the proposed development is considered acceptable from both a palaeontological and archaeological perspective.

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INTRODUCTION

A Phase 1 Palaeontological and Heritage Impact Assessment (PIA/HIA) was undertaken for the proposed establishment of a new 10Ha pivot (Erf 1) and 8Ha area (Erf 971) for pecan nut orchard located on a small left bank tributary of the Orange River, about 7 km directly east-southeast of Prieska (**Fig. 1 & 2**).

Map Reference: 1:50 000 scale topographic map 2922DB Prieska Oos and 1:250 000 scale geological map 2922 Prieska

Farm Reference: Erf 1 & Erf 971, Prieska

Centroid Coordinates

Erf 1: 29°31'51.61"S 22°57'50.88"E

Erf 971: 29°32'7.86"S 22°55'54.19"E

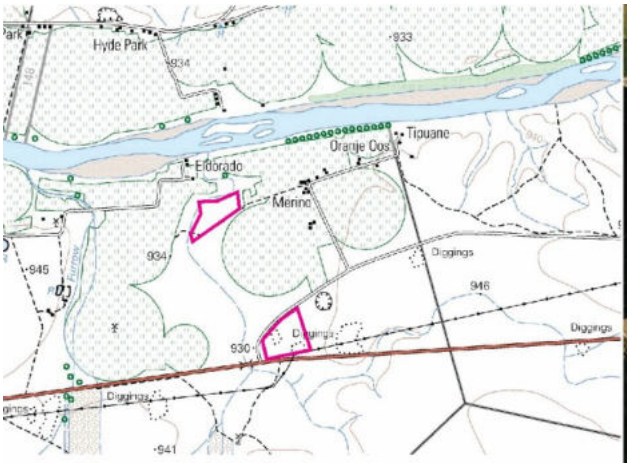




Figure 1. Erf 1 and Erf 971 marked on portion of 1:50 000 scale topographic map 2922DB Prieska Oos.

LEGAL FRAMEWORK

The assessment is required as a prerequisite for new development in terms of the National Heritage Resources Act (NHRA) 25 of 1999. The NHRA identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. The NHRA prescribes a system of grading of places/objects via Section 7 and makes provision for the general protection of heritage resources via Sections 34, 35, 36, and 37 (in respect of the built environment, archaeology/ palaeontology, burial grounds/graves and monuments/memorials, respectively), while Section 38 sets out guidelines under which heritage impact assessments are required when new developments may impact upon heritage resources.

Section 38(1) applies when a development triggers heritage assessment requirements but does not require an environmental authorisation from another regulatory authority, including:

1. Construction of a road, powerline or pipeline, canal or other similar form of linear development or barrier longer than 300m.
2. Construction of a bridge or similar structure exceeding 50 m.
3. Development exceeding 5,000 m².
4. Rezoning of land exceeding 10,000 m², or
5. Any development that may impact recognized heritage resources (e.g., archaeological sites, graves, buildings older than 60 years).

Section 38(3) of the NHRA sets the minimum information requirements for a Heritage Impact Assessment report: the responsible heritage resources authority must ensure that any report submitted includes, at least, the core elements listed in Section 38(3)(a)–(g), namely identification and mapping of heritage resources, significance assessment, impact assessment, evaluation against socio-economic benefits, consultation outcomes, consideration of alternatives (where impacts occur), and mitigation planning.

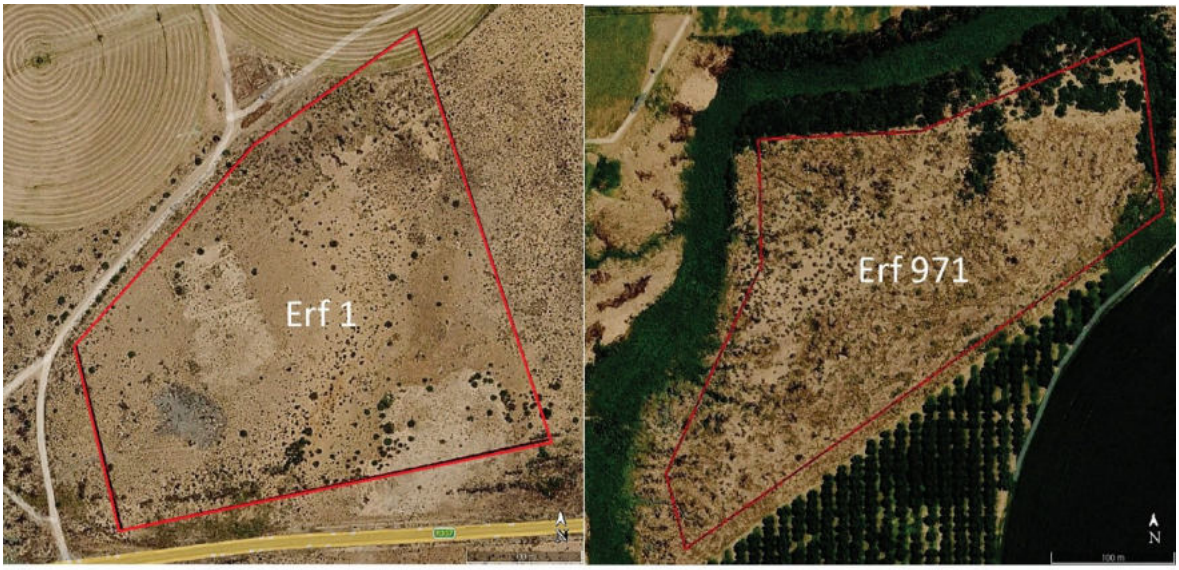


Figure 2. Aerial view of the sites.

DISCLAIMER, ASSUMPTIONS AND LIMITATIONS

Information provided by the Client and/or Environmental Assessment Practitioner (EAP) was assumed to be accurate and complete for the purposes of this assessment. Observations presented in this report are based solely on aboveground visibility of features and outcrops as encountered during field survey. The reliability and completeness of these observations are subject to several inherent limitations:

- Fossiliferous outcrops are often limited to exposed lithologies and may be obscured by colluvium, vegetation, or soil mantling; the degree of weathering affects the preservation and visibility of fossil material, with heavily weathered surfaces potentially masking fossil content or fragmenting specimens; stratigraphic context is inferred from visible lithologies only; subsurface fossil-bearing horizons may remain

undetected without trenching or coring; access limitations may restrict inspection of key geological exposures, particularly in rugged terrain or areas with restricted land access.

- The surface visibility of archaeological remains is variable and may be significantly reduced by vegetation cover, soil accumulation, or recent land disturbance (e.g., ploughing, erosion, construction); subsurface archaeological remains (e.g., buried structures, features, or artefact scatters) may not be detectable without excavation or remote sensing; weathering and exposure can obscure diagnostic features such as stone alignments, midden deposits, or low-relief structures, especially in areas with high sedimentation or seasonal vegetation growth; accessibility constraints (e.g., fenced properties, steep terrain, or dense bush) may prevent systematic coverage, resulting in partial or biased spatial data.

METHODOLOGY

The site assessment was carried out in line with the National Heritage Resources Act (Act No. 25 of 1999) and the 2007 SAHRA Minimum Standards for Archaeological and Palaeontological Impact Assessments. Initial site ratings were based on existing field data, relevant databases, and published literature. Topographic, aerial and geological maps were used for illustrative purposes and to identify potential fossil-bearing formations. Fieldwork involved direct observation through foot surveys, with vehicle access where possible. A Garmin Etrex Vista handheld GPS (set to the WGS 84 datum) and a digital camera were used to record spatial and visual data throughout the survey. GPS coordinates are presented in *Degrees, Minutes, Seconds* format in the report.

TERMS OF REFERENCE

The Terms of Reference outlines the scope and objectives for assessing potential impacts on heritage resources—both tangible and intangible—arising from the proposed development, in accordance with relevant legislative standards.

1. Conduct site investigation for a Heritage *Impact Assessment (HIA)* to identify and map heritage sites and occurrences in the affected area(s) and provide an assessment of their significance. This must be done regardless of the sensitivity indicated on the *DESTEA National Web Based Environmental Screening Tool,* as the Department of Environmental Affairs and its entities make no warranty—express or implied—regarding the accuracy, reliability, usefulness, or completeness of the *archaeological and cultural heritage theme layer.*

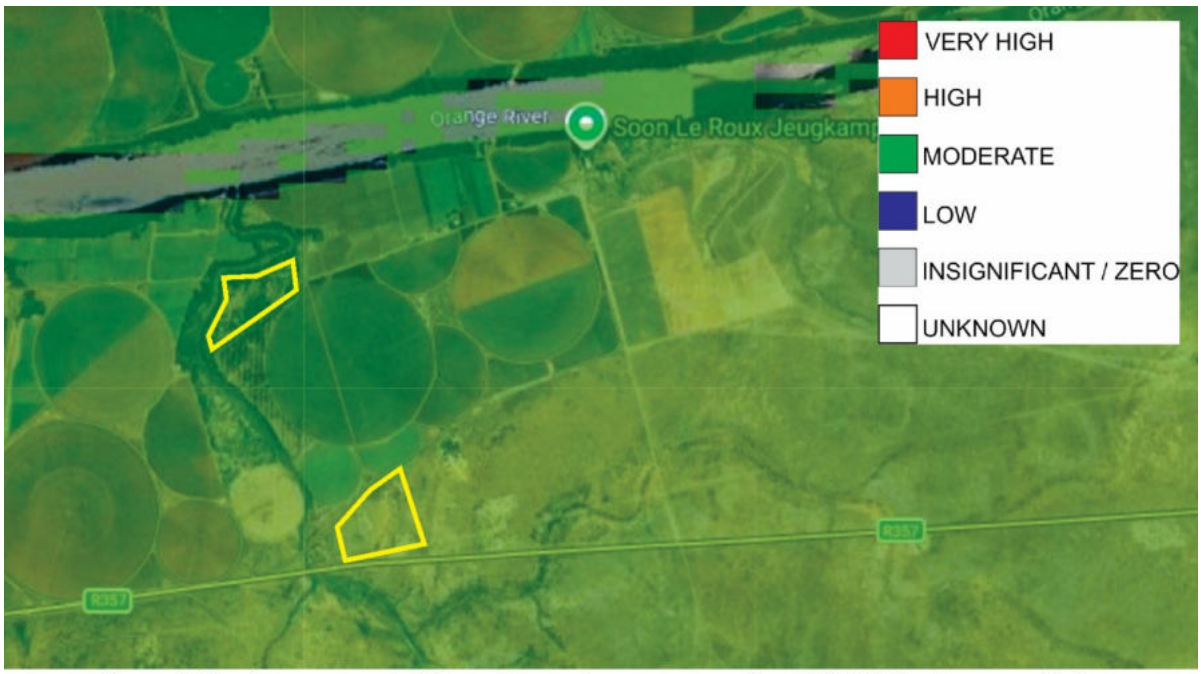


Figure 3. Study areas marked by yellow polygons on portion of SAHRIS palaeosensitivity map.

2. Conduct a site investigation for a Palaeontological Impact Assessment (PIA) using the SAHRIS PalaeoSensitivity Map (**Fig. 3**), regardless of the sensitivity indicated on the *DESTEA National Web Based Environmental Screening Tool*. Identify and map fossils or exposures in the area and assess their significance. This is required as the Department of Environmental Affairs does not guarantee the accuracy or completeness of the *palaeontology theme layer*.
3. Assess impacts of the proposed development on heritage resources relative to the sustainable social and economic benefits to be derived from the development *if planned impacts will result in the loss of any resources*.

4. Provide a system of grading of places and objects which form part of the national estate, and which distinguishes between at least the categories as prescribed under Section 7 of the NHRA (**Table 1**).

Table 1. Description of Field Rating categories as prescribed in Section 7(1) of the NHRA where SAHRA must by regulation establish a system of grading of places and objects which form part of the national estate, and which distinguishes between at least the categories— (a) Grade 1: Heritage resources with qualities so exceptional that they are of special national significance; (b) Grade 2: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; (c) Grade 3: Heritage resources which can be considered to have special qualities which make them locally significant; and Generally Protected: Other heritage resources which may require mitigation before destruction.

Field Rating	**Grade (NHRA No. 25 of 1999, Section 7)**	**Significance**	**Mitigation**
National Significance (NS)	Grade 1	-	Conservation: national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation: provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation: mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A	-	High/medium significance	Mitigation before destruction
Generally Protected B	-	Medium significance	Recording before destruction
Generally Protected C	-	Low significance	Destruction

PALAEONTOLOGICAL BACKGROUND

From oldest to youngest, the Prieska area is underlain by Transvaal Supergroup lithologies dominated by banded ironstone / banded iron formation (BIF) units, localised Early Permian Dwyka sediments (C-Pd), widespread Late Tertiary to Quaternary calcretes (T-Qc), aeolian sand (Qs) and other superficial deposits (**Fig. 4**).

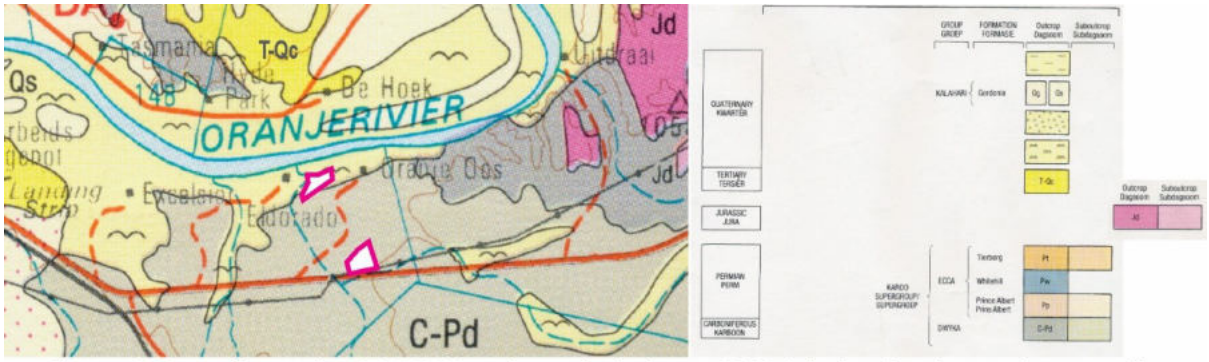


Figure 4. According to the 1:250 000 scale geological map 2922 Prieska, the sites and surrounding areas are underlain by Early Permian Dwyka sediments (C-Pd), Jurassic volcanic rocks (Jd) and widespread Late Tertiary to Quaternary calcretes (T-Qc), aeolian sands (Qs) and other superficial deposits.

The BIF component is specifically linked to the Kuruman Formation (Asbestos Hills Subgroup) in the wider Prieska region where palaeontological significance is expressed mainly through preservation of microbially induced sedimentary structures (MISS) and related sedimentary textures rather than conventional body fossils. Older strata lower in the regional facies (e.g., Campbell Rand Subgroup) are exposed along the Orange River north–northwest of Prieska and include stromatolite- and microfossil-bearing dolomite, dolomitic limestone and chert members formed in shallow marine environments. Localised Dwyka-aged palaeovalleys preserve evidence of glaciation, including glaciated pavements with polished, striated basement surfaces, tillites and Dwyka mudrocks are noted as having yielded trace fossils (including fish and invertebrate trackways), microfossil remains (foraminifera, bryozoans, sponge spicules and radiolaria), and fossil plant material including lycopods, Glossopterids, fossilised wood and plant micro-remains (spores and pollen). In younger deposits, Late Cenozoic duricrusts and eluvium include calcretes (T–Qc), surface gravels and reworked calcretes, aeolian sand. Rare Florisian-type vertebrate fossil remains are known from old calcrete quarries in the area.

FIELD ASSESSMENT – PALAEONTOLOGY

ERF 1

Although the 1:250 000 geological map 2922 Prieska depicts Erf 1 as being underlain by Dwyka Group mudrocks and tillites (C-Pd), field inspection confirmed that the surface geology within the study area appears to be dominated by a calcretised, relict terrace gravel deposit associated with the nearby Orange River (T-Qc), with the mapped Dwyka lithologies remaining subsurface and not exposed. A clast-rich surface lag left behind a coarse gravel veneer (**Fig. 5**).

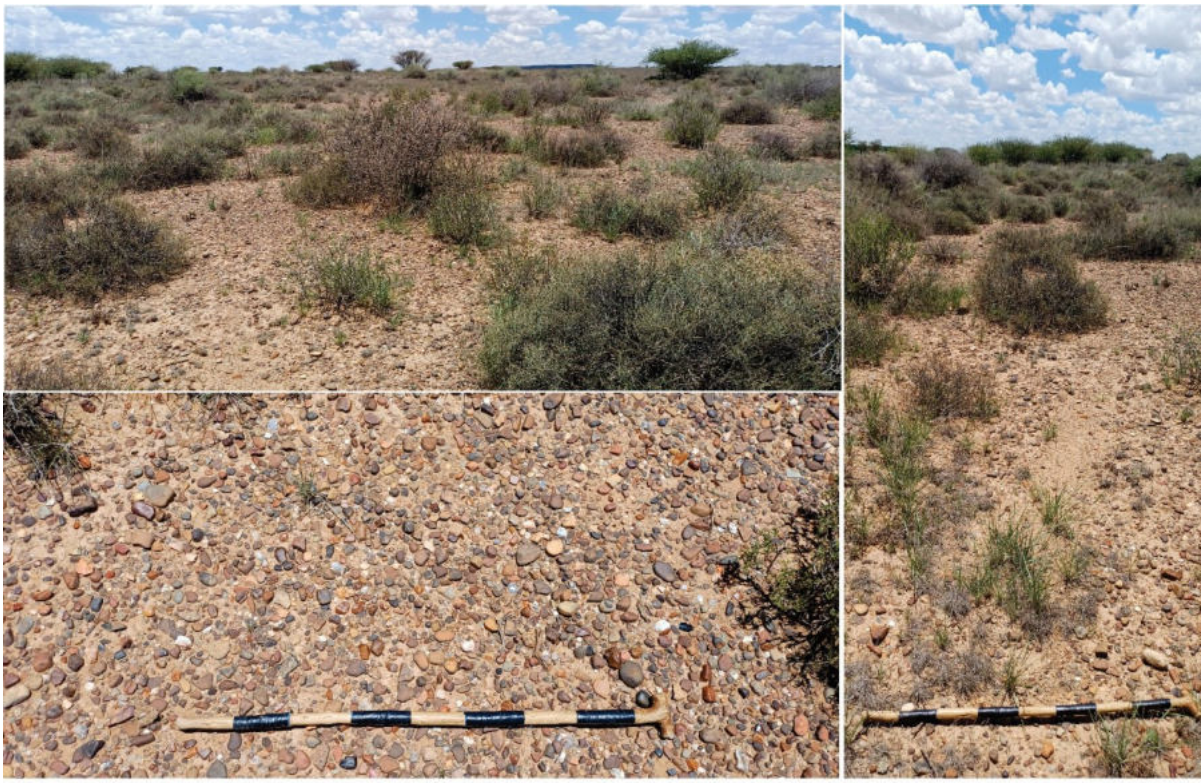


Figure 5. Erf 1 is capped by dense gravel veneer producing a clast-rich surface lag.

ERF 971

The site is situated on a floodplain margin along the left bank of the Orange River and is underlain by unconsolidated sandy sediments characterised by a gently undulating to near-level sandy plain **(Fig. 6)**. The loose, fine- to medium-grained sandy overburden is typical of fluvial overbank deposits and reworked alluvium, and the absence of visible stratification or cementation at surface level suggests young, weakly developed sediments, likely of Holocene

age. No bedrock or consolidated geological units were observed, implying that the site lies entirely within a mantle of alluvial sand, probably overlying older terrace gravels or bedrock at depth.



Figure 6. Unconsolidated alluvial sand associated with a floodplain margin of the nearby Orange River at Erf 971.

CONCLUSION

Erf 1 is underlain by indurated, relict river terrace gravels, while Erf 971 is mantled by geologically young, unconsolidated alluvial sand associated with a floodplain margin of the Orange River. In both cases, field inspection confirmed the absence of fossil material at surface level or cuttings. As a result, the proposed development is not expected to result in

direct or cumulative impacts on fossil heritage, and the palaeontological significance of both sites is assessed as low conditional on adherence to a standard Chance Find Protocol for Erf 1. Both Erf 1 and Erf 971 are assigned a Generally Protected C (low) palaeontological field rating). Subject to these conditions, the proposed development is considered acceptable from a palaeontological perspective.

PALAEONTOLOGICAL IMPACT AND RECOMMENDATIONS (NHRA SECTION 38(3))

a) Identification and mapping of heritage resources in the area affected

A desktop and field-based palaeontological assessment was undertaken using geological mapping (1:250 000 scale), regional palaeontological literature, the SAHRIS PalaeoSensitivity Map, aerial imagery, and on-site inspection.

Erf 1: The site was assessed as occurring on a No palaeontological resources were observed in surface exposures or accessible sections.

Erf 971: The site was assessed on a floodplain margin along the left bank of the Orange River, underlain by unconsolidated fine- to medium-grained alluvial sand consistent with overbank deposits and reworked alluvium, likely Holocene in age. No bedrock units were observed at surface; older gravels/bedrock may occur at depth but were not exposed. No palaeontological resources were identified within the footprint during the field assessment.

b) Assessment of the significance of heritage resources

Erf 1: Significance is assessed as low to negligible because the older calcrete/hardpan and terrace gravels observed are highly indurated/pedogenically modified and showed no fossil occurrence. The area is assigned a Generally Protected C (low) palaeontological field rating, conditional on activities remaining within the defined footprint and adherence to chance-find procedures (see (g)).

Erf 971: Significance is assessed as low because the observed sediment package is a geologically young, structureless alluvial sand with very limited potential for fossil preservation at surface and no fossil occurrences recorded.

c) Assessment of the impact of the development on such heritage resources

Erf 1: As no fossils were identified, and no ground disturbance beyond site boundaries is anticipated, the development is not expected to cause direct or cumulative impacts on fossil heritage; palaeontological significance: LOW.

Erf 971: With no fossil heritage identified and a sedimentary environment that is unlikely to preserve fossils, the development is expected to have no direct, indirect, or cumulative fossil-heritage impacts under the current development conditions. The site is assigned a Generally Protected C (low) palaeontological field rating, conditional on adherence to chance-find procedures (see (g)).

d) Evaluation of impacts relative to social and economic benefits

Erf 1: The proposed land use (agricultural activity) presents no conflict with palaeontological conservation. Therefore, the socio-economic benefit is not offset by heritage loss.

Erf 971: No fossil heritage is expected to be lost, so there is no fossil-heritage trade-off to weigh against the socio-economic benefits of the proposed development. The development is therefore appropriate from a palaeontological perspective.

e) Consultation outcomes with interested and affected parties

Erf 1 and Erf 971: No stakeholder concerns specific to fossil heritage were recorded and no information was provided by stakeholders indicating fossil occurrences within the footprint.

f) Consideration of alternatives where heritage resources are affected

Erf 1 and Erf 971: Because no palaeontological resources were identified with low expectations for possible finds, layout alternatives are not required from a fossil-heritage perspective.

g) Mitigation measures and management recommendations

Erf 1 and Erf 971: No mitigation or monitoring is required under the current scope due to low sensitivity and no finds. However, a Chance Find Protocol must be implemented: if fossil material is exposed during excavations, work must stop in the immediate area, the find must be secured, and a qualified palaeontologist and the relevant heritage authority must be notified for guidance and permitting (if required).

ARCHAEOLOGICAL BACKGROUND

The wider Prieska region preserves a well-defined Stone Age footprint together with historical period remains, with Early, Middle and Later Stone Age sites recorded particularly in association with pan and mountain plateau environments, while open plains are generally characterised by low-density surface scatters.

Isolated ESA and MSA artefact scatters are also recorded within Orange River overbank sediments between Douglas and Prieska, with named occurrences including Marksdrift, Kliphuis, Elswater, Brakfontein, Holsloot and Nuwejaarskraal, and stone tool surface scatters have been recorded in the Prieska Townlands to the southwest. Rock art occurs along the steep slopes of the Asbes and Doringberge to the north and south of Prieska, with noted examples including Wonderdraai, Omdraaisvlei and Sandfontein, and rock engravings have been recorded in younger valley fills along steeper slopes at Sandfontein north of Prieska.

Archaeological and historical accounts describe precolonial occupation by Bushman hunter-gatherers and Khoi pastoralists, with early travellers encountering Koranna, Griqua and Bushman groups in the region, and the place-name “Prieska” is derived from a Koranna term meaning “place of the lost she-goat”; the Middle Orange River context is further described in terms of Khoikhoi group distributions and later movements of Xhosa-speaking groups into the Pramberg and Karreeberg regions south of Prieska.

Historical-period heritage includes remnants dating to the Anglo-Boer War and its aftermath, including a stone fort on top of the Prieska Koppie overlooking the town, and other listed historical buildings and burial places in Prieska (including the Dutch Reformed Church in Church Street and an old graveyard near the Prieska Golf Club). The regional historical landscape also includes ruins and graveyards linked to the early 20th-century asbestos mining industry at multiple localities north and south of Prieska, including occurrences associated with Karabee and Keikams Poort, as well as Kliphuis on the Orange River northwest of Prieska, and wider distributions of stone-walled ruins on farms in the surrounding district.

FIELD ASSESSMENT - ARCHAEOLOGY

ERF 1

The site lies on a calcretized, relict river terrace gravel deposit, located about 1.5 km and 180 m above modern active alluvial zones respectively. Low-density stone tools occur as a discontinuous but clearly visible surface scatters (**Fig. 7, Table 2**). The indurated, erosion-resistant substrate restricts burial and vertical movement, promoting long-term surface exposure and local accumulation among the gravels. It appears that deflation of finer sediments produced residual lags. A moderate to strong polish and weathering of stone tools and gravels suggest prolonged exposure and repeated reworking. The artefacts are variably sized—predominantly small to medium flakes with occasional larger pieces—and is composed mainly of fine-grained, locally available raw materials, especially banded ironstone. The scatters are discontinuous and spatially diffuse, with artefacts interspersed among quartz pebbles and gravel lag. These scatters are interpreted as a time-averaged palimpsest rather than an intact open site, and no *in situ* features or discrete concentrations were recorded. Other than the presence of derived stone tool scatters, no surface evidence of graves or burial grounds, nor any historical structures or infrastructure exceeding 60 years in age, were identified within the designated development footprint.

ERF 971

The site is situated on a floodplain margin along the left bank of the Orange River and is underlain predominantly by unconsolidated sandy sediments (alluvium). No heritage resources were identified within the project footprint during the Phase 1 field survey. The field survey reports no Stone Age artefacts or scatters, no aboveground signs of graves/burial grounds, and no historical structures or infrastructure older than 60 years within the demarcated development footprint. This geomorphological setting is nevertheless regarded as having moderate potential for buried graves, particularly in floodplain contexts where episodic flooding and sediment accretion can seal older land surfaces beneath younger alluvial sand units. This assessment is informed by previous documented discoveries of



Figure 7. Low-density stone tool scatters recorded at Erf 1 are discontinuous surface occurences, comprising variably sized artefacts, dominated by small- to medium-sized flakes with occasional larger pieces. Raw materials are mainly fine-grained and locally available, particularly banded ironstone. The scatters are spatially diffuse, with artefacts dispersed among quartz pebbles and gravel lag.

protohistoric graves and associated grave goods preserved within alluvial sediments in comparable fluvial settings, including occurrences recorded relatively close to the Vaal River at the Orange-Vaal confluence near Douglas, which demonstrate that ancient burials may be concealed beneath later flood deposits.

CONCLUSION

The archaeological assessment of Erf 1 and Erf 971 indicates that the proposed development will not result in unacceptable impacts on archaeological heritage resources. On this basis, the archaeological significance of Erf 1 is assessed as low, and that of Erf 971 as low to negligible. The anticipated impacts associated with the proposed land use are correspondingly low and do not warrant alterations to the project layout or additional mitigation. Both sites are assigned a Generally Protected C field rating in terms of the NHRA. No further archaeological investigation, monitoring, or permitting is required, provided that development activities remain within the defined footprint. A standard Chance Find Protocol must, however, be implemented to address a remote likelihood of discovery of subsurface archaeological material or human remains during construction (**Appendix 1**). Subject to this condition, the proposed development is considered acceptable from an archaeological perspective.

ARCHAEOLOGICAL IMPACT & RECOMMENDATIONS (NHRA S38(3))

The results of the site investigation are presented under the minimum information requirements set out in Section 38(3)(a)–(g) of the National Heritage Resources Act (NHRA):

a) Identification and mapping of heritage resources in the area affected

A desktop and field-based palaeontological assessment was undertaken using geological mapping (1:250 000 scale), regional archaeological literature, aerial imagery, and on-site inspection. Assessment of the significance of identified heritage resources.

Erf 1: The site occurs on a partially calcretised relict Orange River terrace gravel deposit, respectively located ~ 1.5 km and ~180 m from modern active alluvial zones. Low-density Stone Age stone tools were recorded as discontinuous but clearly visible surface scatters

across the gravel lag. The scatter was mapped, documented, and photographed, and its distribution was recorded in relation to the development footprint. No surface evidence of graves/burials, or historical structures/infrastructure older than 60 years was identified within the footprint.

Erf 971: The footprint was walked and assessed in the context of a floodplain-margin sandy alluvial setting. The field survey recorded no Stone Age artefacts or scatters, and no historical structures/infrastructure older than 60 years. It is noted that this geomorphological setting can have moderate potential for buried graves where flooding and sand accretion may seal older surfaces; however, no evidence was identified at surface and no graves were observed.

b) Assessment of the significance of heritage resources

Erf 1: The artefact scatter is interpreted as a residual lag rather than an intact occupation horizon; no in situ features or discrete concentrations were recorded. Overall archaeological significance of the scatter is therefore low due to secondary context and lack of stratified integrity, despite being clearly identifiable. While the broader site is assigned a Generally Protected C field rating; the recorded artefacts are treated as Generally Protected B (**Table 1**) and have been adequately recorded and mapped.

Erf 971: With no archaeological resources identified, the current significance of the footprint is low. However, due to a low residual risk of buried graves in young alluvial sand, the area should be managed with a chance-find readiness, even though recorded significance remains low. The site is therefore assigned a Generally Protected C field rating (low), conditional on chance-find compliance.

c) Assessment of the impact of the development on heritage resource

Erf 1: Expected potential impact is disturbance/displacement of surface artefacts during site preparation (surface clearing, earthworks). Because the assemblage is already reworked with no stratified context, the impact on archaeological information value is limited. Significance of the impact is considered Low, provided development remains within the demarcated footprint.

Erf 971: No direct impacts to known archaeological sites are anticipated. Nevertheless, there remains a minimal possibility of incidental exposure to previously unmarked buried graves covered as a result of earlier flooding and sand accumulation.

d) Evaluation of impacts relative to social and economic benefits

Erf 1 and Erf 971: The development is considered acceptable, with no disproportionate heritage cost.

e) Consultation outcomes with interested and affected parties

Erf 1 and Erf 971: The landowner supports the proposed development as per the EAP stakeholder engagement.

f) Consideration of alternatives where heritage resources are affected

Erf 1 and Erf 971: Because significance is low and the scatter is secondary, alternative layouts are not required from an archaeological perspective.

g) Mitigation measures and management recommendations

Erf 1: No additional mitigation is required, because the artefacts have been thoroughly mapped, documented, and photographed, and no intact deposits/features were identified. A Chance Find Protocol is advised for unexpected archaeological deposits or burial remains below surface.

Erf 971: No additional mitigation is required, but Chance Find Protocol is required, with emphasis on unexpected human burial finds**.**

Table 2. Position of artefacts (numbered on map in **Fig. 7).**

#	Coordinates	#	Coordinates
1	29°41'38.25"S 22°49'52.72"E	5	29°41'40.65"S 22°49'58.13"E
2	29°41'38.21"S 22°49'58.98"E	6	29°41'39.86"S 22°50'0.29"E

3	29°41'35.67"S 22°49'59.55"E	7	29°41'39.11"S 22°50'0.65"E
4	29°41'39.82"S 22°50'1.80"E	8	29°41'38.26"S 22°50'1.45"E

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APPENDIX 1 – CHANCE FIND PROTOCOL

PALAEONTOLOGY

Identification of anomalous / irregular shapes or forms within exposed, sediments at Erf 1 is a first step in recognizing potential fossil remains in the field. Fossil remnants to look out for when orchard development occurs are may resemble modern-looking long bones, horn cores, and teeth (**Fig. 8**).



Figure 8. Fossil remnants to look out for may resemble cylindrical and elongated, stone-like objects with odd-looking patterns, shapes and surfaces.

BURIALS/GRAVES

Identification of anomalous / irregular shapes or forms within exposed sediments at Erf 971 is a first step in recognizing potential burial remains in the field (**Fig. 9**). Remnants to look out when pivot development occurs may resemble the following:

- Subtle disturbances within overbank deposits, including truncation or stone-capped infillings.
- Discrete stone packing, calcrete fragments, or imported clasts contrasting with fine-grained alluvial matrix.
- Discrete bone fragments or clusters distinguishable from surrounding sediments, potentially displaying colour contrast, cortical bone texture, or rounded long-bone shafts.
- Presence of cultural items (e.g. beads, metal fragments, pottery) within the same sedimentary context.



Figure 9. Grave markers to look out for may resemble stone packing, bone fragments or clusters distinguishable from surrounding sediments and the presence of cultural items within the same sedimentary context.

PROCEDURAL STEPS

- If potential fossil material is encountered, halt all activity in the immediate area.
- The Environmental Control Officer (ECO) should photograph the remains, note GPS coordinates, and leave it undisturbed if possible.
- If material is significant, a palaeontologist must be able to confirm the finds as soon as possible.

- Newly excavated fossil remains must be stored in a safe place if it is portable. The material should not be washed or cleaned in any way.
- Intact remains must be kept in place and protected from further damage by covering it with a light but rigid object like a box, bucket, or metal sheet if possible and the area must be avoided by implementing a no-go buffer zone until further confirmation by a palaeontologist.
- Await Specialist Confirmation
- If material proves significant, a Phase 2 rescue operation may be required under SAHRA permit.
- If material proves to be significant, a Phase 2 rescue operation may be required subject to permits issued by SAHRA. In this case it is advised that the developer should, subject to SAHRA permit approval, appoint a professional palaeontologist to remove and transport the fossil material.

Terms of Reference

The purpose of the Fauna Specialist Assessment was to identify and assess the terrestrial faunal resources that may be affected by the proposed establishment of a 10 ha centre-pivot irrigation area on Erf 1 and an 8 ha pecan orchard on Erf 971, Oranje-Oos Farm, Prieska. The assessment was undertaken in accordance with the National Environmental Management Act (Act 107 of 1998), the Environmental Impact Assessment Regulations, 2014 (as amended), and the Protocols for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (Government Notice 320 of 2020, as amended by Government Notice 3717 of 2023).

The objectives of the assessment were to:

- Undertake a desktop assessment of the study area using available biodiversity databases, the DFFE Screening Tool, published literature and conservation datasets to identify Species of Conservation Concern (SCC) that may occur within or adjacent to the proposed development area.
- Conduct a site verification and field survey to determine the presence, abundance, habitat suitability and likelihood of occurrence of terrestrial fauna, including mammals, birds, reptiles and amphibians.
- Verify the environmental sensitivity assigned by the DFFE Screening Tool and determine whether the mapped sensitivities accurately reflect on-site conditions.
- Identify and assess habitat features of ecological importance, including breeding, nesting, roosting, foraging and movement habitats that may support Species of Conservation Concern.
- Assess the conservation importance of any confirmed or potentially occurring Species of Conservation Concern within the study area, taking into consideration their conservation status, habitat requirements and ecological role.
- Assess the potential direct, indirect and cumulative impacts of the proposed development on terrestrial fauna and faunal habitats during both the construction and operational phases.
- Evaluate the potential impacts of the proposed development on habitat connectivity and broader ecological processes that support the long-term persistence of faunal populations.
- Identify practical avoidance, mitigation and management measures to minimise impacts on terrestrial fauna and ensure compliance with relevant environmental legislation and biodiversity conservation objectives.
- Evaluate whether alternative development footprints within the study area could reduce impacts on faunal biodiversity where applicable.
- Provide a professional opinion on the overall ecological acceptability of the proposed development from a faunal perspective and make recommendations regarding environmental authorisation and the implementation of mitigation measures within the Environmental Management Programme (EMPr).

BioBase Environmental Pty Ltd

Reg. No: K2024104397

ANIMAL SPECIES SPECIALIST ASSESSMENT REPORT:

Erf 1 & Erf 971on the farm Oranje-Oos (Martelle Trust), Siyathemba Local Municipality

Commissioned by Digital Soils Africa

Compiled by:

HJB Butler (PhD, Zoology)

E. Netherlands (PhD, Biology)

BioBase Environmental (Pty) Ltd

14 Eddie de Beer Street

Dan Pienaar

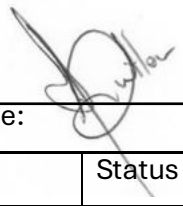
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DECLARATION OF SPECIALIST INDEPENDENCE

We, Dr Hennie JB Butler and Prof. Edward Netherlands hereby declare that:

- we are acting as independent specialists regarding this application;
- we do not have any interest, hidden or otherwise, in the outcome of this application, apart from financial compensation for the work done to survey the proposed development area and compile this report;
- surveying the site for this faunal compliance statement was done objectively, and that this report and the facts therein contained (regardless of its impact on the application approval process) will not be affected by any outside factors;
- we have the required expertise to perform surveys and produce compliance statements as it pertains to the faunal aspect of this proposed development;
- we will comply with the relevant Acts, regulations and legislation;
- we have not, and will not, engage in conflicting interests while performing our duties for this activity, and have no influence over the decision-making authorities regarding their accepting or rejecting of this proposed development;
- we undertake to disclose to the applicant and competent authority all material and information within my possession that may influence the decision-making process regarding the proposed development;
- all particulars furnished by us in this form are true and correct, and that it is an offense to present a false declaration, and that such a false declaration is punishable in terms of Section 24F of the Act; and that
- this document is to be viewed as a whole and not misquoted out of context.



Date:

09 June 2026

Date:

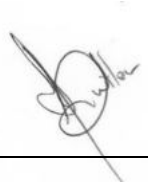
Date	Status	Prepared by	Checked and approved by
09 June 2026	Approved for submission	Dr HJB Butler 	Prof. E Netherlands (SACNASP Registration Nr. 126419) 

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DETAILS OF THE SPECIALISTS

Both specialists that compiled this document have experience in faunal species identification, and the identification of suitable habitats for terrestrial animals including birds, mammals, reptiles and frogs. Their details are in the table below.

Table 1. *The details and experience of the specialists involved with this report.*

Specialist and contact details	Qualifications	SACNASP Registration	Experience
Dr Hennie JB Butler **E mail:** hennie.butler@gmail.com **Mobile**: 0827718101	PhD (Zoology) UFS	Not registered	25 Years' experience in faunal ecology and behaviour in both the private and tertiary education sector. Current position: Lecturer in the Department Zoology & Entomology, University of the Free State
Prof. Edward C Netherlands **E mail:** ec.netherlands@gmail.com **Mobile**: 0791922833	PhD (Biology) KU Leuven & NWU	126419	More than 10 years' experience in reptiles and amphibians in both the private and tertiary education sector. Current position: Associate professor in the Department Zoology & Entomology, University of the Free State

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Table A 2. Mammal species (Class Mammalia) as listed by iNaturalist, GBIF, the Global and Regional Red Data Book Assessment of each species, as well as species observed during the field survey. **EN,** Endangered; **VU,** Vulnerable; **NT,** Near Threatened; **LC**, Least Concern. 54

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1. INTRODUCTION

BioBase Environmental was appointed by Digital Soils Africa to provide Terrestrial Animal Specialist inputs for continued and formalisation for the establishment of a new 10Ha pivot (Erf 1) and 8Ha area (Erf 971) for pecan nut orchards close to the town Prieska on the farm Oranje-Oos (Martelle Trust), (Siyathemba Local Municipality) in the Pixley ka Seme District Municipality. Existing central pivot irrigation systems on the farm were installed before 2006. The newly proposed development zones as mentioned above, entails the clearing of previously undisturbed land.

1.1 Site location

The study area is located approximately 9 km west of the town Prieska (Siyathemba Local Municipality) in the Pixley ka Seme District of the Northern Cape, South Africa. The proposed 10Ha pivot (Erf No 1) is located next to the road (R 357) towards the town Douglas while the 8Ha area for pecan nut production is situated to the north and next to the Orange River (Fig. 1). According to Mucina and Rutherford (2006), the study area falls within the Upper Gariep Alluvial Vegetation (Aza 4) (Fig. 2).

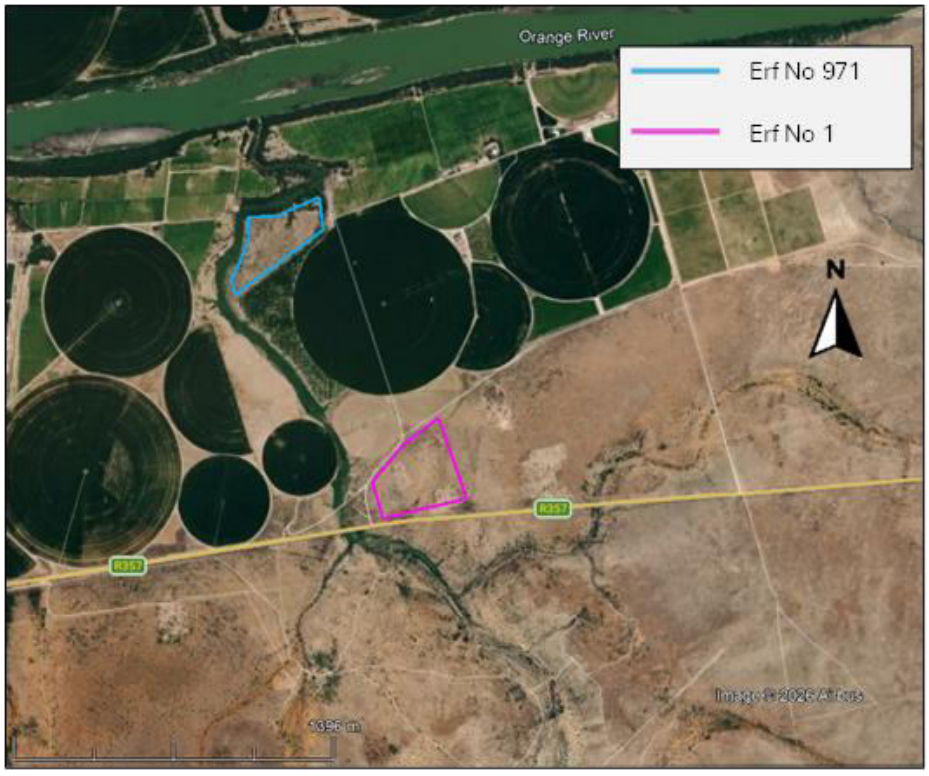


***Figure 1**. Locality of the study area south of the Orange River in the Northern Cape Province of South Africa. (Modified from Google Earth).*



***Figure 2**. Locality of the study area within the Upper Gariep Alluvial Vegetation according to Mucina & Rutherford (2006).*

1.2 Development Layout

According to the DFFE Screening Tool, the study area is located on the farm Oranje-Oos (Erf No. 1 and Erf No. 971) as listed in Table 2.

***Table 2**. Cadastral details of Erf No. 1 and Erf No. 971 of the farm Oranje-Oos in the Prieska district (Northern Cape Province, South Africa) according to the DFFE screening tool.*

No	Farm Name	Farm/Erf No	Portion	Latitude	Longitude	Property Type
1	ORANJE-OOS	1	0	29°42'5.87S	22°50'4.16E	Farm
2	ORANJE-OOS	971	0	29°41'20.58S	22°49'40.49E	Erven

Although both study sites fall within the Upper Gariep Alluvial Vegetation, the plant communities between these two sites differ in comparison. Prior to the assessment of the study site Erf No. 971 was cleared of the invasive weed *Neltuma* sp (previously *Prosopis* sp) (Mr D Potgieter, pers.comm) and the brush was burned. That altered the habitat to a large extend and sprouting of pioneer vegetation was evident (Fig. 3 A). Although sparse in plant coverage, the vegetation at Erf No. 1 was in a natural state (Fig. 3 B).

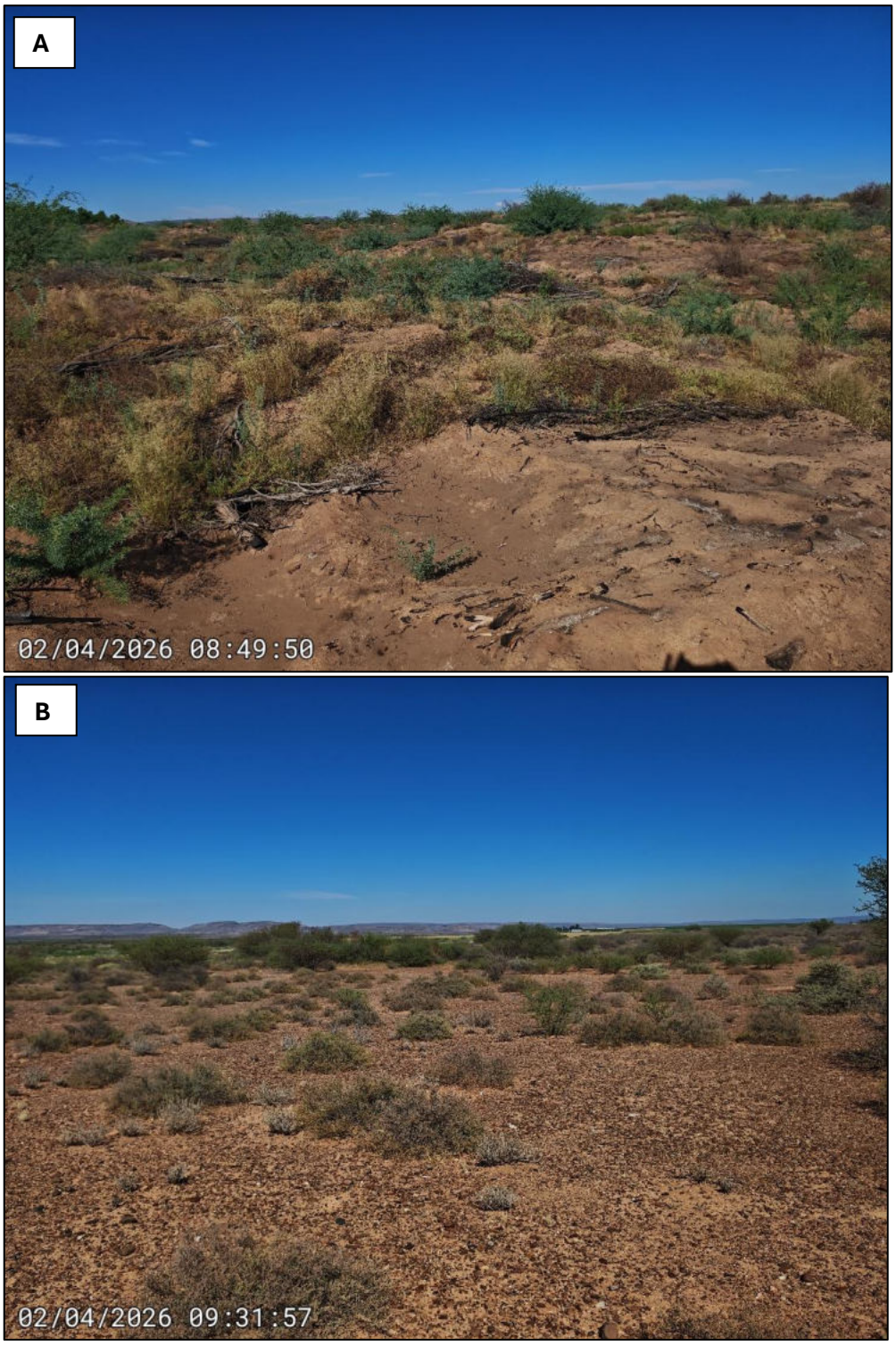


Figure 3. *Disturbed vegetation at Erf No. 971 (A) and natural vegetation at Erf No. 1 (B) in the study area on the farm Oranje-Oos, Prieska.*

2 TERMS OF REFERENCE

The objective of this report is to provide ecological information regarding the terrestrial fauna that may be present in the study area on the farm Oranje-Oos near Prieska in the Northern Cape Province, South Africa (hereafter referred to as the study area). As per the "Protocols for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes" (hereafter called "the Protocols"), as promulgated in Government Gazette Notice 320 (Government Gazette 43110, 20 March 2020), and amended in Government Gazette Notice 3717 (Government Gazette 49028, 28 July 2023), the Protocols must be adhered to for all new applications for Environmental Authorisation.

As per the Protocols, the objectives of this study were to:

a) identify the SCC which were found, observed or are likely to occur within the study area;

b) provide evidence (photographs or sound recordings) of each SCC found or observed within the study area;

c) identify the distribution, location, viability and provide a detailed description of the population size of the SCC identified within the study area;

d) identify the nature and extent of the potential impact of the development on the population of the SCC located within the study area;

e) determine the importance of the conservation of the population of the SCC identified within the study area, based on the information available in national and international databases;

f) determine the potential impact of the proposed development on the habitat of the SCC located within the study area;

g) include a literature review of the SCC population sizes, the conservation interventions, and any national or provincial management plans for the SCC. This should also indicate whether the development is compliant with the applicable species management plans;

h) identify dynamic ecological processes (e.g. fire in fire-prone ecosystems) occurring within the broader landscape that might be disrupted by the development and result in negative impacts on the identified SCC;

i) identify any potential impact of ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long-term viability;

j) determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC;

k) discuss the presence (or likely occurrence) of additional SCC not identified by the screening tool, as well as undescribed species, or roosting and breeding and foraging areas used by migratory species (where these species show significant congregations) occurring in the vicinity; and

l) identify any alternative development footprints within the preferred site that would be of "low" or "medium" sensitivity as identified by the screening tool and verified through site sensitivity verification.

m) A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.

2.1 Screening Tool

Based on the screening tool (performed on 02 February 2026) of The Department of Forestry, Fisheries and the Environment (DFFE), the study sites were identified as having a **High sensitivity** in terms of the animal species theme (Fig. 4). This is due to the possible occurrence of three species of conservation concern (SCC). These SCC (and their associated sensitivities) are listed in Table 3. It must be pointed out that the DFFE Screening tool listed the Ludwig's Bustard as both **High** and **Medium** for Erf No.1.

Table 3. *Species of Conservation Concern (SCC) as listed by the DFFE Screening Tool.*

Class	Common name	Genus & species	Sensitivity	
			Erf. 1	**Erf. 971**
Aves	Ludwig's Bustard	*Neotis ludwigii*	High/Medium	High
	Lanner Falcon	*Falco biarmicus*	High	-
	Tawny Eagle	*Aquila rapax*	Medium	Medium



***Figure 4**. Sensitivity map for relative animal species theme of Erf No. 971 (A) and Erf No. 1 (B) according to the DFFE screening tool.*

3 ASSESSMENT OF STUDY AREA

The findings of this report are based on:

1) a desktop study to determine the potential presence of the SCC identified by the DFFE screening tool report and any SCC not identified in the report at the study site; and

2) a site visit to the study area to determine the presence of, and habitat suitability for the SCC highlighted by the DFFE screening tool report, and any SCC not flagged by the screening tool report.

3.1 Methodology

3.1.1 Desktop assessment

A desktop study was undertaken to confirm and/or identify any species of conservation concern (SCC) near the study area. Information of such SCC was extracted from the Global Biodiversity Information Framework (GBIF) and iNaturalist. Bird species recorded in the pentad 2940_2245 (Erf. 971) as well as 2940_2245 and 2940_2250 (Erf. 1), where the study area is located, was obtained from the Southern African Bird Atlas Project 2 (SABAP2) and BirdLife International (The IUCN Red List of Threatened Species 2025). Possible mammal species and the conservation status thereof was obtained from the EWT Regional Mammal Red List (2025). The conservation status of Reptiles was obtained from the Conservation status of the reptiles of South Africa, Eswatini and Lesotho, Suricata 10 (Tolley et al. 2023). The conservation status of frog species was listed according to the assessment of SANBI as well as the South African Frog Re-Assessment Group (SA-FRoG).

3.1.2 Field assessment

A field assessment of both study sites was done on 4 February 2026. On the day, temperatures were hot without any clouds in the sky. The visibility for observations of terrestrial vertebrates was good on both study sites. During the site visits, a walk through the study sites was done. A large area of both study sites was covered during these assessments. Any live vertebrate observed, sounds of animals, signs including tracks, burrows and even nests of birds were logged onto Fulcrum, a field all-in-one data collection platform to collect accurate, real-time data on mobile devices. Transects that were walked in both study sites as well as the localities of observed vertebrate species are shown in Figure 5. Data recorded on Fulcrum was downloaded and captured in an Excel spreadsheet. Farm animals were not included in the data sheet. In addition to the walk throughs, road kills of vertebrates that were encountered on the R357 road between Douglas and Prieska was also documented. Only road kills that were observed 30 km from the study area in both directions were considered.

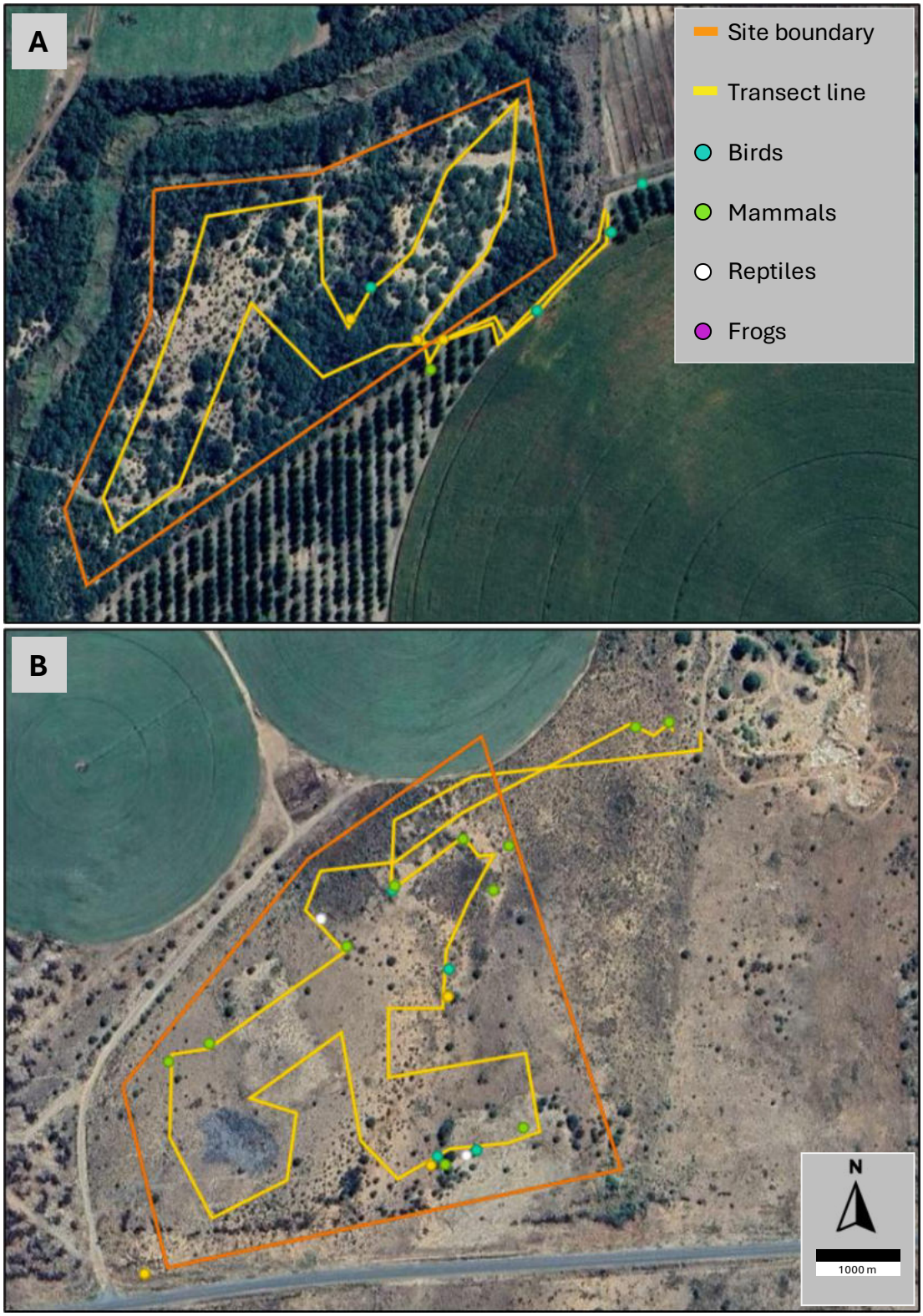


Figure 5. *Transects walked (yellow line) on Erf No. 971 (A) and Erf No. 1 on the farm Oranje-Oos during the site assessment.*

3.2 Assumptions and Limitations

Although public platforms like GBIF, iNaturalist and even SABAP2 can be regarded as reliable platforms of species distribution, these platforms include sightings of vagrant or passing animals upon which an assessment cannot reasonably be based. For example, Erf No. 1 falls between two adjacent pentads (2940_2245 and 2940_2250). However, the recorded bird species for these two pentads differ in composition with only 112 bird species that were recorded in both pentads while 44 species were only recorded for pentad 2940_2245 and 15 additional bird species that were recorded only in pentad 2940_2250. Expert interpretation is therefore applied to the full list of SCC identified by the various public platforms and some species are then excluded from further assessment due to the project area clearly lacking suitable habitat or the species clearly representing a vagrant or transient animal outside its normal range. Another limitation to the study is the outdated evaluation of some species. The SCC assessed in this report therefore represent those which may reasonably occur on site. However, some animal species are elusive and difficult to detect even with modern technology while other species have large Areas Of Occupancy (AOO), home ranges or are seasonal migrants and do not occupy such areas constantly. Although active field sampling was done on foot at both Erf No. 1 and Erf No. 971, and additional data from nine days of camera trapping at a site less than 2 km away from the study area, there is always the possibility that some SCC are overlooked in this process.

3.3 Results

3.3.1 Class Aves

A combined list of bird species that might occur as listed by GBIF, iNaturalist and SABAP2 for pentad 2940_2245 and 2940_2250, as well as the Regional Red Data Book Assessment of each species and species that were observed during the field survey is summarised in Appendix 1, Table A1. Of the 173 bird species that might occur in the study area, a total of only 33 species, 10 in Erf No. 1 and 23 species in Erf No 971, were observed. The Cape Sparrow was the only bird species that was observed in both these areas. None of the three SCC bird species that were listed by the DFFE screening tool, was observed during the assessment of the study area. However, the presence of two bird species of conservation concern was confirmed to be present in the study area. The Lanner Falcon and the Kori Bustard (both listed as **Near Threatened**) was observed during another field assessment in the same area. No photographic record of the Lanner Falcon could be obtained as the bird was viewed from a distance with the aid of binoculars. In addition, a Kori Bustard was observed during another field assessment in the same area and was also captured on one deployed camera trap in the area (Fig. 6) close to the study

sites. The record of this species was reported on the iNaturalist website (https://www.inaturalist.org/observations/351691276). In addition, a neighbouring farmer (Mr David Muller) did confirm a recent siting of Verreaux's Eagle, listed as **Vulnerable**, in the area (pers.comm). The regional Red List status, habitat requirements as well as breeding and feeding behaviour of the seven identified SCC (three from the screening tool plus four additional species) is summarised in Table 4. The Regional Red list status of SCC of the class Aves that occurred or might likely occur in the study area, suitability of habitat, likelihood of occurrence as well as reasons for occurrence are listed in Table 5. The habitat of the study area is suitable for all the listed species except for the Caspian Tern (Table 5). No Critically Endangered species were recorded in this pentad.

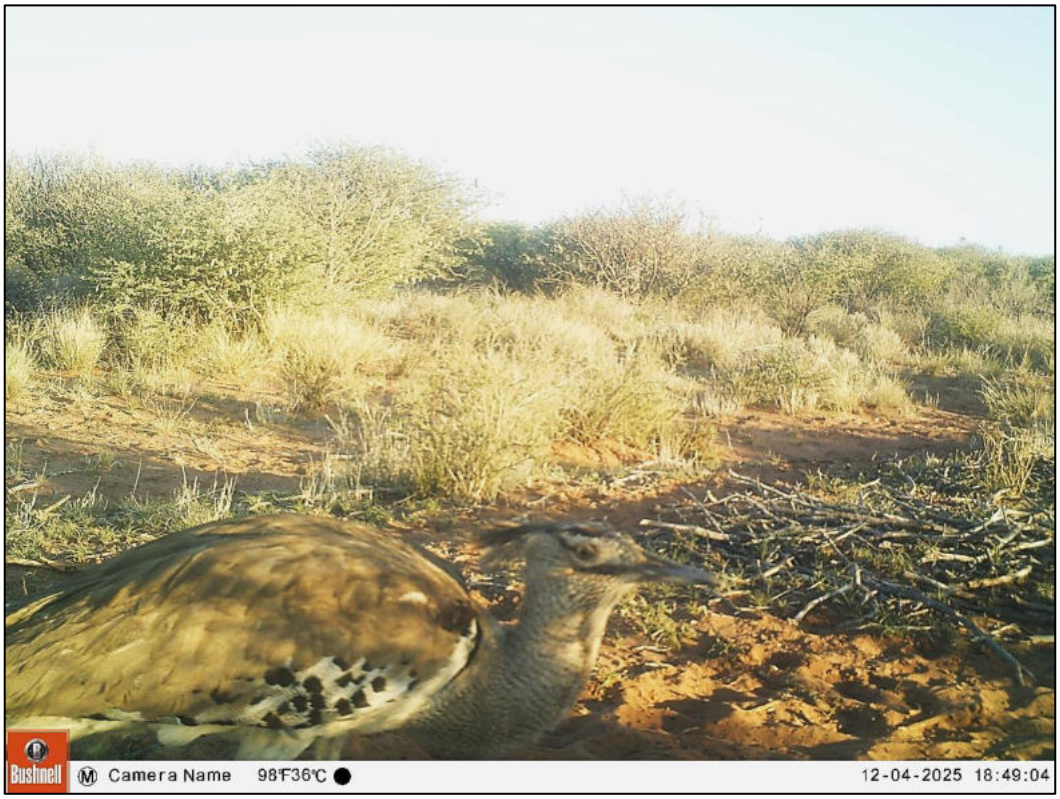


***Figure 6**. A Kori Bustard (Ardeotis kori) captured on a camera trap in natural veld on the farm Muis Hoek. (https://www.inaturalist.org/observations/351691276)*

The status of the seven SCC that were identified as listed by SANBI, BirdLife South Africa (2025), IUCN, TOPS (Threatened or Protected Species under NEMBA Act 10 of 2004 (GN R151 of 2008, as amended 2023), CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) as well as their migratory status are listed in Table 6. Only five species, the Tawny Eagle, Martial Eagle, Verreaux's Eagle, Lanner Falcon and Kori Bustard are listed under Appendix II (international trade regulated by permit) of CITES. All seven species are resident to the area (Table 6).

***Table 4**. The regional Red List status, habitat requirements as well as breeding and feeding behaviour of SCC of the class Aves in the study area.*

***EN,** Endangered; **VU,** Vulnerable; **NT,** Near Threatened.*

Species	Regional Red list status	Habitat	Breeding	Feeding
Tawny Eagle (*Aquila rapax)*	**EN**	Occupies open and semi-open habitats including woodland savanna, grassland, bushveld, and arid shrubland. Avoids dense forest and heavily transformed agricultural land. In southern Africa favours the dry interior, including the Karoo and Kalahari biomes. Requires large, undisturbed tracts of natural veld with tall trees or rocky outcrops for nesting.	Monogamous and territorial; pairs maintain large home ranges year-round. Breeds from April to September in southern Africa. Constructs a large stick nest (eyrie) in the canopy of a tall tree, occasionally on a power-line pylon. Clutch size is typically 1–2 eggs; incubation lasts approximately 42–44 days. Usually only one chick survives (Cainism). The fledgling period lasts around 70–80 days.	An opportunistic, generalist predator and scavenger. Prey includes small to medium-sized mammals (hares, mongooses, ground squirrels), birds up to the size of francolins, reptiles, and carrion. Known to engage in kleptoparasitism, stealing food from other raptors and vultures. Hunts from a perch or by quartering low over open ground.
Martial Eagle *(Polemaetus bellicosus)*	**EN**	Inhabits open and semi-open woodland, bushveld, savanna, and thornveld. Avoids dense forest and very open, treeless habitats. Requires large trees for nesting and extensive undisturbed territories. Found across sub-Saharan Africa, with southern African populations concentrated in the Kruger National Park area, Limpopo, and parts of the Kalahari.	Monogamous and highly territorial; pairs occupy enormous home ranges (up to several hundred km^2). Breeds every 2 years at most, as raising one chick takes approximately 20 months from egg to independence. Nests are very large stick platforms, usually in the crown of a large tree, and are reused annually. Lays a single egg; incubation lasts approximately 49 days. Fledging occurs at around 99–	A powerful apex predator targeting medium-to-large birds and mammals. Primary prey includes guineafowl, francolins, bustards, monitor lizards, and small to medium mammals such as mongooses, hares, and small antelopes (e.g., steenbok, young impala). Hunts by fast aerial stoops from a soaring height or by perch-hunting. Capable of taking prey heavier than itself.

			104 days, but the juvenile remains dependent on parents for up to 12 months after fledging.	
Ludwig's Bustard (*Neotis ludwigii)*	**EN**	Near-endemic to southern Africa; restricted to arid and semi-arid Karoo shrubland, Namib desert fringes, and Bushmanland. Strongly associated with flat, open gravel plains and sparse low shrubland. Avoids mountainous terrain, dense vegetation, and transformed habitats. Core distribution in the Northern Cape, Namibia, and marginally into the Western Cape and Free State.	Polygynous display system similar to other bustards. Females raise chicks alone. Nests are minimal or absent; eggs are laid directly in a shallow scrape on open ground, often in sparse vegetation. Lays 1–2 eggs. Incubation approximately 24 days. Chicks are precocial. Breeding season spans August to December. Highly sensitive to disturbance at nesting sites.	Omnivorous. Diet consists primarily of large invertebrates (beetles, locusts, termites, caterpillars) and plant material (seeds, berries, flowers). Also takes small lizards, rodents, and other vertebrates opportunistically. Forages by walking through open scrubland. Does not need free water if food moisture is adequate.
Verreaux's Eagle (*Aquila verreauxii)*	**VU**	Restricted to mountainous and rocky terrain, particularly kopjes, cliff faces, and rocky gorges with escarpments. Found from sea level to high-altitude ranges. Strongly associated with areas where Rock Hyrax (Procavia capensis) is abundant. Occurs in the Cape Fold Mountains, Drakensberg, and the arid rocky hills of the Karoo and Namaqualand.	Monogamous, with long-term pair bonds. Breeds from April to September. Nests are large stick structures (eyries) built on cliff ledges or in large trees on rocky hillsides; the same nest may be used for many years, growing very large over time. Lays 1–2 eggs (usually 2); incubation takes approximately 45 days. The second chick is almost always killed by the first (Cainism). Fledging occurs at approximately 95–99 days.	Highly specialised predator; Rock Hyrax typically comprises 90% or more of the diet. Will occasionally take other prey including small antelopes (e.g., young klipspringer), hares, dassies, birds, and monitor lizards. Hunts by fast, contour-hugging flight over rocky terrain, surprising hyrax in the open.

Caspian Tern (*Hydroprogne caspia)*	**VU**	Associated with large inland water bodies, estuaries, coastal lagoons, and large rivers. Favours open water with exposed sandbars, beaches, or rocky islets for roosting and nesting. In southern Africa found along the coast and at major inland dams and river systems. Largely non-breeding visitor to the interior, including the Northern Cape.	Colonial ground-nester on low-lying islands, sandbanks, and coastal beaches with minimal vegetation and no terrestrial predator access. Breeds in small to large colonies, sometimes mixed with other terns or skimmers. Lays 1–3 eggs in a shallow scrape. Incubation lasts approximately 26–28 days. Chicks are semi-precocial and fledge at approximately 35–45 days. Highly sensitive to disturbance at breeding colonies.	Exclusively piscivorous (fish-eating). Dives from height into open water to catch fish near the surface. Prey fish typically 10–25 cm in length. Will also steal fish from other terns and birds (kleptoparasitism). Forages over open water, often flying with bill angled downward scanning for fish.
Lanner Falcon (*Falco biarmicus*)	**NT**	Occupies open to semi-open habitats including arid and semi-arid shrubland, grassland, savanna, farmland, and rocky escarpments. Avoids dense forest. Common across the Karoo, Bushmanland, and Kalahari biomes. Often nests on cliff faces but also uses old stick nests of other large birds on pylons or tall trees. Highly adaptable to a range of arid environments.	Monogamous. Does not build its own nest; uses cliff ledges, old stick nests of other species (eagles, crows), or cavities in rock faces and buildings. Breeds from July to November. Lays 2–5 eggs; incubation lasts approximately 32–35 days. Both sexes incubate and provision chicks. Fledging occurs at approximately 35–40 days. May raise 1–2 broods per season under good conditions.	An agile aerial predator. Prey consists mainly of medium-sized birds (up to the size of doves and francolins), large insects (especially termite alates and beetles), and small mammals and lizards. Hunts by high-speed pursuit in open airspace, often cooperating in pairs to flush and catch prey. Also stoops at prey from height. Foraging activity peaks at dawn and dusk.

Kori Bustard (*Ardeotis kori)*	**NT**	Inhabits open arid and semi-arid grassland, Karoo shrubland, open savanna, and lightly wooded areas. Strongly avoids tall, dense vegetation and heavily cultivated land. Favours areas with short to medium grass cover interspersed with bare patches. Common in the Kalahari, Karoo, and dry open savanna of southern and East Africa. Requires large, unfragmented open landscapes.	Polygynous; males display at traditional lekking grounds during the breeding season (August–November). Females perform all parental duties alone. Nests are shallow scrapes in open ground, often with minimal cover. Lays 1–2 eggs; incubation approximately 23–24 days. Chicks are precocial and follow the female shortly after hatching. Juveniles remain with the female for several months.	Omnivorous and opportunistic. Diet includes insects (especially locusts, beetles, grasshoppers, and termite alates), small vertebrates (lizards, snakes, small rodents), plant matter (seeds, berries, flowers, and roots), and carrion. Takes advantage of invertebrate prey flushed by grass fires. Forages by walking slowly and deliberately through open habitat.

***Table 5**. Habitat suitability and likelihood of occurrence of Species of Conservation Concern of the class Aves that occurred or might likely occur in the study area. **EN,** Endangered; **VU,** Vulnerable; **NT,** Near Threatened.*

Species	Regional Red list status	Observed	Suitable habitat	Likelihood of occurrence	Reason
Tawny Eagle (*Aquila rapax)*	EN	No	Yes	Medium	In southern Africa, it is largely concentrated in protected areas in the north-east and central parts of the region, which is confirmed by more recent SABAP2 data. Although present in the arid areas, the species seems to have disappeared from large parts of the Northern Cape, Free State and Limpopo provinces. A small, sparsely distributed population persists in the grassy Karoo where they have capitalised on powerlines, using pylons as nest structures.
Martial Eagle *(Polemaetus bellicosus)*	EN	No	Yes	Medium	Martial Eagles use many habitats, favouring dry and mesic savannahs, and are also seen along forest margins and in open shrubland. The species inhabits many environments where sufficient tall trees or pylons are available for breeding and perching and seldom seen in hilly regions.
Ludwig's Bustard (*Neotis ludwigii)*	EN	No	Yes	High	Ludwig's Bustards are likely to be seen in transformed habitats with the preference of these birds to feed on pastures but they also utilise crops, stubbles or ploughed/fallow fields.
Verreaux's Eagle (*Aquila verreauxii)*	VU	Yes	Yes	Confirmed	This SCC is confirmed to be present by a neighbouring farmer.
Caspian Tern (*Hydroprogne caspia)*	VU	No	No	Low	Although, close to a river, Erf No. 971 is heavily disturbed. Erf No. 1 is too far away from water to be utilised by this species. This SCC has not been reported to be present in the area between 2007 and 2023.
Lanner Falcon (*Falco biarmicus*)	NT	Yes	Yes	Confirmed	This SCC is confirmed to be present on a neighbouring farm close to the study area.
Kori Bustard (*Ardeotis kori)*	NT	Yes	Yes	Confirmed	This SCC is confirmed to be present via camera trap data on a neighbouring farm.

Table 6. *Conservation status summary of bird SCC in pentad 2940_2245 and 2940_2250 (Prieska, Northern Cape Province, South Africa).* ***EN****, Endangered****; VU****, Vulnerable;* ***NT****, Near Threatened;* ***LC****, Least Concern;* ***—****, Not listed.*

Common Name / Scientific Name	SANBI Status	BirdLife SA Status (2025)	IUCN Status	TOPS (NEMBA)	CITES	Migratory Status
Tawny Eagle *Aquila rapax*	**EN**	**EN**	**VU**	EN	App. II	Resident (breeding)
Martial Eagle *Polemaetus bellicosus*	**EN**	**EN**	**EN**	EN	App. II	Resident (breeding)
Ludwig's Bustard *Neotis ludwigii*	**EN**	**EN**	**EN**	EN	—	Resident / nomadic
Verreaux's Eagle *Aquila verreauxii*	**VU**	**VU**	**LC**	VU	App. II	Resident (breeding)
Caspian Tern *Hydroprogne caspia*	**VU**	**VU**	**LC**	VU	—	Resident / migrant
Lanner Falcon *Falco biarmicus*	**VU**	**NT**	**LC**	VU	App. II	Resident (breeding)
Kori Bustard *Ardeotis kori*	**NT**	**NT**	**NT**	Protected	App. II	Resident (breeding)

Notes: SANBI status reflects the most recent regional Red List assessment from speciesstatus.sanbi.org. BirdLife SA status reflects the 2025 Red Data Book of Birds of South Africa, Lesotho and Eswatini (birdlife.org.za/red-list). IUCN status is the current global assessment (iucnredlist.org); where regional and global statuses differ, the more severe regional status is operative for this assessment. TOPS = Threatened or Protected Species under NEMBA Act 10 of 2004 (GN R151 of 2008, as amended 2023): EN = Endangered; VU = Vulnerable; Protected = Schedule 3 Protected Species. CITES App. II = international trade regulated by permit.

3.3.2 Class Mammalia

No mammal species was listed as a SCC by the DFFE screening tool. However, results from the desktop study revealed the possibility of 64 mammal species that might occur in or on the study area (Appendix 2, Table A2). This includes species from the Order Cetartiodactyla belonging to the families Bovidae and Giraffidae which are "game" species that are not regarded as part of the survey. The Common duiker and Steenbok were however included in the survey. Of 64 possible mammal species, only the Cape Porcupine, Cape Hare, Cape Ground Squirrel and Yellow Mongoose, were observed on Erf No. 1. The only mammal species that was observed on Erf No. 971 was the Slender Mongoose. However, during the same week as the assessment of these study sites, the presence of Aardvark, Bat-eared Fox, Black-backed Jackal, Striped Polecat/Zorilla, Southern Small-spotted Genet and Vervet Monkey were confirmed to be in the vicinity of the study area.

Of the listed mammal species that might occur in the study area, only six species are of conservational concern. This includes the Black-footed Cat (*Felis nigripes*), Brown Hyaena (*Parahyaena brunnea*), African Striped Weasel (*Poecilogale albinucha*), Damara Horseshoe Bat (*Rhinolophus damarensis*), Southern African Hedgehog (*Atelerix frontalis*), and Aardvark (*Orycteropus afer*). The regional Red list Status, habitat requirements, as well as the breeding and feeding behaviours of these species are listed in Table 7.

The habitat suitability and likelihood of occurrence for SCC is listed in Table 8. Even though Erf No. 971 is disturbed, it still provides suitable habitat for any of the SCC to be present. Although not in the study area itself, only the Aardvark was confirmed to be present in the area. The only other mammal species that has a high probability of occurrence to be present in the study area is the Southern African Hedgehog which was recorded between the year 2013 and 2024 (Smith & Da Silva, 2025).

***Table 7**. The regional Red List status, habitat requirements as well as breeding and feeding requirements of SCC of the class Mammalia in the study area.* ***VU,** Vulnerable;* ***NT,** Near Threatened.*

Species	Regional Red list status	Habitat	Breeding	Feeding
Black-footed Cat (*Felis nigripes)*	**VU**	Restricted to arid and semi-arid open habitats in southern Africa, including Karoo shrubland, dry savanna, open grassland with sparse shrub cover, and dry riverbeds. Strongly avoids dense bush and transformed agricultural land. Closely associated with open, flat terrain with short vegetation cover. Found mainly in the Karoo, Kalahari, and adjacent areas of South Africa and Botswana.	Solitary and nocturnal. Females raise kittens alone. Does not construct its own den; uses burrows of aardvark, springhare, or porcupine, and termite mounds. Breeds year-round with peaks in summer. Litter size 1–3 kittens (typically 1–2). Gestation approximately 63–68 days. Kittens begin accompanying their mother on hunts at about 6 weeks; independent at approximately 5–6 months.	The most lethal hunter relative to body size of all wild cats. Diet comprises predominantly small mammals (gerbils, mice, shrews), small birds, reptiles (lizards, skinks), insects, and arachnids. Has been documented killing prey heavier than itself, including Cape Hare. Hunts almost exclusively at night using acute hearing to locate prey in darkness. Requires no free water — all moisture obtained from prey.
Damara Horseshoe Bat (*Rhinolophus damarensis)*	**VU**	Restricted to arid and semi-arid environments in northern Namibia and adjacent north-western South Africa (Northern Cape). Found in rocky terrain with caves, mine shafts, and rocky overhangs which serve as roost sites. Associated with sparse dry bushveld and desert-adjacent shrubland. A near-endemic of the arid western subregion.	Colonial rooster; maternity colonies form in caves or abandoned mining tunnels. Gives birth to a single pup once per year, typically in spring or early summer (October–December). Pups are born naked and altricial and cling to the mother until capable of independent flight.	Insectivorous; forages by low, slow flight close to vegetation and rock surfaces, using high-frequency echolocation to detect insects. Prey includes moths, beetles, flies, and other flying and resting invertebrates. Often hunts from a perch (perch-hunting), sallying out to

			Sexual maturity reached at approximately 1–2 years.	catch prey and returning to the same spot.
Brown Hyaena (*Parahyaena brunnea)*	**NT**	Occupies a wide range of arid and semi-arid habitats including open Karoo shrubland, desert fringes, dry savanna, grassland, and open woodland. Found throughout much of southern Africa, including the Karoo, Kalahari, and coastal zones. More tolerant of arid conditions than the Spotted Hyaena. Requires access to rocky areas or dense thickets for denning. Avoids densely forested areas.	Solitary or in small family groups (clan sizes much smaller than Spotted Hyaena). Dens typically located in rock crevices, aardvark holes, or dense thicket. Litters of 1–3 cubs born after a gestation of approximately 90–92 days. Cubs remain at or near the den for several months and are nursed for up to 12–16 months. Both parents (in pair-bonded groups) contribute to cub provisioning.	Primarily a scavenger; forages over very large home ranges (up to 1,000 km^2) in search of carcasses. Diet includes carrion of all sizes, supplemented by invertebrates (dung beetles, moths, locusts), wild fruits (especially tsamma melons for moisture), eggs, small vertebrates, and refuse near human habitation. Capable of crushing and digesting bones. Rarely kills large prey but will take small livestock, eggs, and injured animals.
African Striped Weasel (*Poecilogale albinucha)*	**NT**	Inhabits grassland, moist savanna, open woodland, and forest edges across eastern and southern Africa. Associated with areas of rank grass cover, reed beds, or dense ground vegetation near water. In South Africa found mainly in KwaZulu-Natal, Mpumalanga, Limpopo, and parts of the Northern Cape. Requires dense ground cover for foraging and shelter. Rarely encountered in open arid environments.	Solitary. Dens in grass clumps, dense vegetation, burrows, or beneath rocks and logs. Litter size 1–3 young, born after a gestation of approximately 32–33 days. Young are altricial (helpless at birth). Eyes open at approximately 6 weeks. Independence reached at about 10–12 weeks. Breeding may occur year-round but peaks in spring and summer.	Almost exclusively a predator of snakes, including venomous species (e.g., mambas, cobras) — one of the very few mammals specialised for this. Also takes lizards, small rodents, frogs, and invertebrates. Kills snakes by delivering a precise bite to the back of the skull. Has some immunity to snake venom. A relentless and ferocious hunter relative to its small body size.

Southern African Hedgehog (*Atelerix frontalis)*	**NT**	Occupies a range of habitats including open savanna, semi-arid shrubland, grassland with sparse bush, and mixed bushveld. Avoids dense forest and very arid desert. In South Africa found across the Northern Cape, Northwest, Gauteng, and Limpopo provinces. Requires areas with loose soil for foraging, and access to dense vegetation or rocky outcrops for shelter and hibernation sites.	Solitary; males and females associate only during the brief mating season. Breeds from August to March. Litter size typically 2–6 young after a gestation of approximately 35–40 days. Young are born blind and helpless; the first set of spines (soft, white) emerges within hours of birth beneath a membrane. Eyes open at approximately 18 days. Weaning occurs at 4–6 weeks. Enters torpor or hibernation during cold, dry months.	Omnivorous and opportunistic. Diet includes beetles, termites, crickets, millipedes, worms, caterpillars, small vertebrates (lizards, frogs, small rodents), bird eggs, fungi, and plant material such as seeds and berries. Has limited immunity to some toxins. Forages nocturnally by rooting through leaf litter and soil. Uses a highly developed sense of smell to detect prey.
Aardvark (*Orycteropus afer)*	**NT**	Occurs in a wide range of habitats including grassland, savanna, open woodland, bushveld, Karoo shrubland, and semi-arid environments. Avoids dense forest and very rocky terrain that prevents burrowing. Requires areas with suitable sandy or loamy soil for digging burrows and abundant termites and ants as food. Widespread across sub-Saharan Africa wherever suitable soil and ant/termite colonies exist.	Solitary and nocturnal. Breeds year-round, with a peak in spring and summer. Gives birth to a single young (rarely twins) after a gestation of approximately 7 months. The calf is born in the burrow and remains underground for the first few weeks. At approximately 2 weeks it begins to follow the mother on foraging trips. Weaning at 3–4 months; independent at 6 months. The young may share the burrow for up to 6 months after weaning.	Highly specialised ant and termite eater (myrmecophage). Diet consists almost exclusively of ants and termites, particularly harvester ants (*Messor* spp.) and termites (*Trinervitermes*, *Macrotermes*). Uses powerful foreclaws to excavate termite mounds and ant nests, and a long, sticky tongue (up to 30 cm) to extract insects. May consume up to 50,000 ants and termites in a single night. Also eats the wild Aardvark Cucumber (*Cucumis humifructus*) for water.

***Table 8**. Habitat suitability and likelihood of occurrence of Species of Conservation Concern of the class Mammalia that occurred or might likely occur in the study area.* ***VU,** Vulnerable;* ***NT,** Near Threatened.*

Species	Regional Red list status	Observed	Suitable habitat	Likelihood of occurrence	Reason
Black-footed Cat (*Felis nigripes)*	**VU**	No	Yes	Low	The Black-footed Cat is a semi-arid specialist inhabiting Nama Karoo, open savannah, and grassland habitats with sparse shrub and tree cover. The last recorded observation of this species in the study area was between 2000 and 2012.
Damara Horseshoe Bat (*Rhinolophus damarensis)*	**VU**	No	Yes	Low	The study area falls on the periphery of the Area Of Occupation (AOO) of this species. This species was last recorded in the area before 2000.
Brown Hyaena (*Parahyaena brunnea)*	**NT**	No	Yes	Low	Persecution of these animals by stock farmers as well as game farmers, almost exterminated the brown Hyaena from this area.
African Striped Weasel (*Poecilogale albinucha)*	**NT**	No	Yes	Low	Although the study area is located on the edge of the distribution of this species, no African Striped Weasel was recently recorded in this area. The Orange River riparian zone adjacent to the study area provides rank grass cover and dense ground vegetation near water, which constitutes suitable habitat for this species.
Southern African Hedgehog (*Atelerix frontalis)*	**NT**	No	Yes	High	Records of this species were documented in the area between 2013 and 2024.
Aardvark (*Orycteropus afer)*	**NT**	Yes	Yes	Confirmed	This SCC is confirmed to be present in adjacent areas.

A summary of the regional conservation status of mammal SCC in the study area is listed in Table 9. Only the Black-footed Cat, Brown Hyaena and Southern African Hedgehog is listed under the Threatened or Protected Species (TOPS) Regulations (Government Notice R. 151 of 2007, as revised in Government Gazette No. 47984 of 3 February 2023) promulgated under NEMBA (Act 10 of 2004). All three species are listed as **Protected** under **Schedule 3** (Indigenous species facing a high risk of extinction in the wild in the medium-term future).

Of the six mammal SCC, only the Black-footed Cat (Appendix I) and Damara Horseshoe Bat (Appendix II) are listed by cites (Table 9). Appendix I prohibits the commercial trade of species while Appendix II permits the commercial trade of species only with valid permits.

***Table 9**. Summary of the regional conservation status of mammal SCC in the study area (Prieska, Northern Cape Province, South Africa). **VU**, Vulnerable; **NT**, Near Threatened; **LC**, Least Concern.*

Common Name / Scientific Name	EWT SA Status (2025)	SANBI Status (2016)	IUCN Status	TOPS (NEMBA)	CITES
Black-footed Cat (*Felis nigripes*)	**VU**	**VU**	**VU**	Protected (Sch 3)	App I
Damara Horseshoe Bat (*Rhinolophus damarensis*)	**VU**	**LC**	**LC**	—	App II
Brown Hyaena (*Parahyaena brunnea*)	**NT**	**NT**	**NT**	Protected (Sch 3)	—
African Striped Weasel (*Poecilogale albinucha*)	**NT**	**LC**	**LC**	—	—
Southern African Hedgehog (*Atelerix frontalis*)	**NT**	**NT**	**LC**	Protected (Sch 3)	—
Aardvark (*Orycteropus afer*)	**NT**	**LC**	**LC**	—	—

Notes: SANBI status reflects speciesstatus.sanbi.org (2016 Regional Red List of Mammals of South Africa — the most recent SANBI mammal assessment prior to the 2025 revision). EWT SA 2025 status reflects the 2025 Regional Mammal Red List coordinated by the Endangered Wildlife Trust and SANBI (ewt.org/2025-red-mammal-list/); '(uplisted)' denotes species whose status worsened in the 2025 revision. IUCN status is the current global assessment. TOPS = Threatened or Protected Species under NEMBA GN R151 of 2007 (as amended 2023); Schedule 3 = Protected Species. CITES listings: *Felis nigripes* = Appendix I (trade prohibited); *Rhinolophus damarensis* = Appendix II (trade regulated through a permit system); '—' = not listed under CITES or TOPS.

3.3.3 Class Reptilia

No reptile species was listed as a SCC by the DFFE screening tool. However, results from the desktop study revealed the possibility of 43 reptile species that might occur in or on the study area (Appendix 3, Table A3). Only two species, the Spotted Sandveld Lizard and Kalahari Tree Skink were observed and only in Erf No. 1 study site. No reptiles were encountered during the walk-through at Erf No. 971. Two additional reptiles, a Puff Adder and a Cape cobra were however observed as road kills approximately 20 km before the study area on the R357. These snakes were less than 3 m apart and it is speculated that the Cape Cobra was hunting the Puff Adder when both were killed.

Of the 43 reptile species as listed in Table A3, only the Tent Tortoise (*Psammobates tentorius*) is listed as a SCC. Restricted to South Africa and Namibia, three subspecies are recognised, though their distribution ranges overlap and there remains some uncertainty about their exact limits and therefore, the boundary zones should be treated with some caution in formal assessments. The sub species that is listed is probably *P. t. verroxii* (Northern Tent Tortoise) which has a wide distribution throughout the Nama Karoo in the Northern Cape and penetrates the Western Cape and possibly the Eastern Cape peripherally (Hofmeyr et al. 2023). Its range extends across the Orange River into Namibia, as far north as Mariental. The other two subspecies are unlikely to occur near Prieska: *P. t. tentorius* (Southern Tent Tortoise) occurs considerably further south, ranging through the Eastern Cape and southern Western Cape, well away from Prieska. *P. t. trimeni* (Western Tent Tortoise) is restricted to the Namaqualand Sandveld and Richtersveld to the west (Hofmeyr et al. 2023), a distinctly different habitat and bioregion to the Nama Karoo around Prieska.

P. t. verroxii is currently assessed as **Least Concern** by both SANBI and the IUCN, making it the lowest-priority taxon in the table. However, it occurs within a population that is part of the broader *P. tentorius* **Near Threatened** species-level assessment, meaning ongoing habitat degradation, overgrazing, road mortality, livestock fence electrocution, and Pied Crow predation in the Prieska area are all relevant threat factors to consider. The species' naturally sparse occurrence and low population densities across the Nama Karoo mean that even localised habitat loss carries proportionate significance.

The habitat requirements as well as breeding and feeding behaviour of the Tent Tortoise is listed in Table 10 and the habitat suitability and likelihood of occurrence as well as a summary of the regional conservation status of the sub-species *Psammobates tentorius verroxii* that occur in the area is listed in Table 11 and Table 12 respectively.

***Table 10**. The regional Red List status, habitat requirements as well as breeding and feeding behaviour of reptile SCC in the study area.*

NT, Near Threatened

Species	Regional Red list status	Habitat	Breeding	Feeding
Tent Tortoise (*Psammobates tentorius)*	**NT (species)**	Restricted to the arid and semi-arid succulent Karoo and Nama Karoo of South Africa (Northern Cape, Western Cape, Eastern Cape) and marginally into southern Namibia. Inhabits low succulent shrubland, quartz gravel plains, and open Karoo flats. Requires areas with abundant low-growing succulents. Three subspecies recognised, each occupying slightly different habitat facies within the broader Karoo biome.	Oviparous. Mating occurs in late summer to autumn (February–April). Females lay small clutches of typically 1–3 eggs in shallow nests scraped in soft soil, concealed beneath shrubs. Incubation period approximately 150–200 days (dependent on temperature). Hatchlings emerge in late summer of the following year (December–February). Sexual maturity reached at approximately 5–8 years.	Strictly herbivorous. Diet consists almost entirely of succulent plant material including leaves and flowers of Karoo succulents (especially members of the families Aizoaceae, Crassulaceae, and Asteraceae). Also consumes dry plant material and occasionally fungi. Obtains water entirely from food. Forages during cooler parts of the day (morning and late afternoon) and becomes inactive during extreme heat.

Table 11. *Habitat suitability and likelihood of occurrence of Species of Conservation Concern of the class Reptilia that occurred or might likely occur in the study area.* ***LC****, Least Concern.*

Species	Regional Red list status	Observed	Suitable habitat	Likelihood of occurrence	Reason
Northern Tent Tortoise (*Psammobates tentorius verroxii*)	**LC**	No	Yes	**High**	The study area is situated on the Orange River in the central Northern Cape, within the Nama Karoo biome which is the core range of this species.

Table 12*. Summary of the regional conservation status of reptile SCC in the study area (Prieska, Northern Cape Province, South Africa).*

VU*, Vulnerable;* ***LC****, Least Concern.*

Common Name / Scientific Name	SANBI Status (2016)	IUCN Status	TOPS (NEMBA)	CITES
Northern Tent Tortoise (*Psammobates tentorius verroxii*)	**LC**	**VU (species)**	Protected under provincial nature conservation ordinances and biodiversity legislation in South Africa.	App II

3.3.4 Class Amphibia

No frog species was listed as a SCC by the DFFE screening tool. However, results from the desktop study revealed the possibility of 14 frog species that might occur in or on the study area (Appendix 4, Table A4). All identified frog species that might occur in the study area, are listed as Least Concern. No frogs were encountered in any of the two study sites.

4 SITE SENSITIVITY VERIFICATION

The DFFE screening tool identified the study area as having a **High sensitivity** (*vide* Fig. 4) for the animal species theme, due to the potential presence of three Species of Conservation Concern (SCC) as listed in Table 3. The site visit, and site sensitivity verification report, confirmed that this property as a whole has a **High sensitivity**, due to:

- The confirmed presence of two SCC namely the Lanner Falcon (*Falco biarmicus*) and Verreaux's Eagle (*Aquila verreauxii*).
- The confirmed presence of other SCC which was not listed by the DFFE screening tool namely the Kori Bustard (*Ardeotis kori*) and Aardvark (*Orycteropus afer*).
- The likely presence of Tawny Eagle (*Aquila rapax*), Ludwig's Bustard (*Neotis ludwigii*), Caspian Tern (*Hydroprogne caspia*), Black-footed Cat (*Felis nigripes*), Brown Hyaena (*Parahyaena brunnea*), African Striped Weasel (*Poecilogale albinucha*), Damara Horseshoe Bat (*Rhinolophus damarensis*), Southern African Hedgehog (*Atelerix frontalis*) and the Tent Tortoise (*Psammobates tentorius*).

5 IMPACT BY THE DEVELOPMENT

Although any development where natural vegetation is removed will have an impact on the environment, some animal species might take advantage of the establishment of agricultural crop production. For example, according to Shaw et al. (2016) Ludwig's Bustards are likely to be seen in transformed habitats with the preference of these birds to feed on pastures but they also utilise crops, stubbles or ploughed/fallow fields. The impact of the development of orchards on animal species include habitat loss by the removal of natural vegetation, fencing or fragmentation of habitats. This will lead to the diminishing of food sources or the prey basis for carnivorous or insectivorous feeders. Once the orchard is operational, the use of pesticides, rodenticides or herbicides will continue to have an effect on such food sources.

5.1 Class Aves

The impact of orchards relating to habitat loss or transformation of land, foraging or food sources and the use of pesticides or insecticides on bird Species of Conservation Concern is listed in Table 13. Bird species that are highly impacted in the study area are Tawny Eagles, Martial Eagles, Ludwig's Bustards and Kori Bustards. The impact on Verreaux's Eagle is considered to be moderately high based on their preference to feed on Rock Hyraxes which occurs in rocky terrains. The impact of orchards on both Lanner Falcons and Caspian Terns is considered to be moderate.

Table 13. *Impact of orchard development on bird Species of Conservation Concern. (Impact Rating Key:* ***HIGH*** *— Significant, mitigation and permit conditions required;* ***MODERATE–HIGH*** *— Notable, targeted mitigation essential;* ***MODERATE*** *— Manageable with good-practice mitigation).* ***EN****, Endangered;* ***VU****, Vulnerable;* ***NT****, Near Threatened.*

Species	Regional Status	Habitat Loss / Transformation	Food Source / Foraging	Pesticide / Insecticide	Overall Significance
Tawny Eagle *(Aquila rapax)*	**EN**	HIGH — open savanna and Karoo shrubland converted; requires large undisturbed tracts	HIGH — carrion, small mammals and prey diversity all reduced in intensively managed orchards; scavenging opportunities near farm infrastructure reduced	HIGH — secondary poisoning from rodenticide-killed carcasses and pesticide-affected prey; primary driver of raptor declines across Africa	**HIGH**
Martial Eagle (*Polemaetus bellicosus)*	**EN**	HIGH — requires enormous undisturbed home ranges (hundreds of km^2); orchard footprint fragments territory directly	HIGH — guineafowl, monitor lizards and small antelope prey all reduced in intensively farmed areas; foraging range compromised	HIGH — secondary poisoning well-documented; highly susceptible to organochlorine accumulation through prey chain	**HIGH**
Ludwig's Bustard	**EN**	HIGH — flat open Karoo gravel plains and sparse shrubland	MODERATE — omnivorous; some invertebrate foraging	MODERATE — insecticides reduce large invertebrate prey	**HIGH**

Species	Regional Status	Habitat Loss / Transformation	Food Source / Foraging	Pesticide / Insecticide	Overall Significance
(Neotis ludwigii)		converted; near-endemic with no capacity to use cultivated land	possible near unsprayed orchard margins on open ground	(beetles, locusts, termites) in surrounding landscape	
Kori Bustard (*Ardeotis kori*)	**NT**	HIGH — requires large open dry savannahs and Karoo shrubland; cannot use orchard habitat; ground-nesting species sensitive to human disturbance	MODERATE — omnivorous; may exploit invertebrates near unsprayed orchard margins; will forage in open areas adjacent to development	MODERATE — insecticides reduce large invertebrate prey availability in the surrounding landscape	**HIGH**
Verreaux's Eagle *(Aquila verreauxii)*	**VU**	MODERATE — rocky terrain specialist; surrounding landscape conversion reduces hyrax prey base although cliff habitat not directly threatened	HIGH — extreme prey specialisation on Rock Hyrax; any hyrax population reduction through habitat change directly reduces eagle food availability	MODERATE — lower exposure than ground-foraging raptors; secondary poisoning risk present but reduced relative to diet	**MODERATE–HIGH**

Species	Regional Status	Habitat Loss / Transformation	Food Source / Foraging	Pesticide / Insecticide	Overall Significance
Lanner Falcon (*Falco biarmicus)*	**NT**	LOW to MODERATE — highly adaptable; has colonised agricultural landscapes; corvid nests on irrigation pylons provide nesting opportunities	LOW to MODERATE — adaptable diet; small birds and insects associated with agricultural margins can be exploited	MODERATE — pesticide accumulation through prey documented; bioaccumulation in food chain a long-term risk	**MODERATE**
Caspian Tern *Hydroprogne caspia*	**VU**	LOW — associated with large water bodies; orchard footprint does not directly affect aquatic habitat along the Orange River	LOW to MODERATE — piscivorous; fish populations in the Orange River may be indirectly affected by agricultural chemical runoff and irrigation abstraction	MODERATE — pesticide and herbicide runoff into water bodies accumulates in fish and passes to piscivorous birds through biomagnification	**MODERATE**

5.2 Class Mammalia

The impact of orchards relating to habitat loss or transformation of land, food sources or prey and the use of pesticides or rodenticides on mammal Species of Conservation Concern is listed in Table 14. Mammal species that are highly impacted in the study area are the Black-footed Cat, African Striped Weasel and Aardvark as all three listed categories have a high significant impact on these species. The Southern African Hedge Hog will experience only a moderate -high impact. Based on the three listed categories the Damara Horseshoe Bat will be affected moderately while the effect on the Brown Hyaena will be low-moderate.

***Table 14**. Impact of orchard development on mammal Species of Conservation Concern. (Impact Rating Key: **HIGH** — Significant, mitigation and permit conditions required; **MODERATE–HIGH** — Notable, targeted mitigation essential; **MODERATE** — Manageable with good-practice mitigation). **VU**, Vulnerable; **NT**, Near Threatened.*

Species	Regional Status	Habitat Loss / Transformation	Food Source / Prey	Pesticide / Rodenticide	Overall Significance
Black-footed Cat (*Felis nigripes*)	**VU**	HIGH — open Karoo short-grass habitat converted; strict short-grass specialist with no capacity to use orchard habitat; loss of open structure eliminates hunting ability	HIGH — rodenticides deployed in orchards eliminate the small mammal prey base entirely; no prey-switching capacity in this dietary specialist	HIGH — direct secondary poisoning from rodenticide-killed prey; bioaccumulation of organochlorines documented in small felids globally	**HIGH**
African Striped Weasel (*Poecilogale albinucha*)	**NT**	HIGH — grassland and rank grass habitat replaced; requires structurally complex ground cover that orchards completely remove; only 7 138 km^2 of natural habitat remains regionally	HIGH — rodenticides eliminate the rodent and snake prey base; obligate specialist predator with no alternative prey; high metabolic rate means prey depletion is rapidly fatal	HIGH — highest secondary poisoning risk of all species assessed; colonial burrowing rodents (primary prey) are direct targets of orchard rodenticide programmes	**HIGH**

Species	Regional Status	Habitat Loss / Transformation	Food Source / Prey	Pesticide / Rodenticide	Overall Significance
Aardvark (*Orycteropus afer*)	**NT**	HIGH — natural Karoo shrubland converted; soil preparation destroys burrow systems; compaction by heavy machinery renders soil unburrrowable	HIGH — insecticides applied to orchard soils eliminate ant and termite colonies that are the sole food source; cannot survive without sufficient colony availability	HIGH — insecticide application directly destroys the entire food base; no alternative diet exists; Karoo densities of ~8 animals per 10 km^2 make local losses significant	**HIGH**
Southern African Hedgehog (*Atelerix frontalis*)	**NT**	MODERATE — some tolerance of garden-like environments; orchard margins with leaf litter and mulch may provide partial substitute habitat adjacent to natural veld	MODERATE — insecticides reduce invertebrate prey (beetles, worms, crickets); reduction in prey abundance rather than total elimination given broader diet	HIGH — direct poisoning from insect-control schemes well-documented; orchard and vegetable farmers in the Free State specifically report severe hedgehog declines linked to insecticide use	**MODERATE–HIGH**

Species	Regional Status	Habitat Loss / Transformation	Food Source / Prey	Pesticide / Rodenticide	Overall Significance
Damara Horseshoe Bat (*Rhinolophus damarensis*)	**NT**	LOW — roosts in rocky caves and mine shafts well away from orchard footprint; direct land transformation does not affect roost sites	MODERATE — insecticides reduce aerial insect biomass over irrigated areas, reducing foraging productivity in the surrounding landscape	MODERATE — organochlorine and systemic insecticides reduce flying insect prey; bioaccumulation documented globally; horseshoe bats are among the most insecticide-sensitive bat families	**MODERATE**
Brown Hyaena (*Parahyaena brunnea*)	**NT**	LOW — wide habitat tolerance; very large home range (up to 1 000 km^2) means orchard footprint represents a small fraction of total territory	LOW — primary scavenger with extremely broad diet; carrion, wild fruits, insects and small vertebrates remain available well beyond the orchard footprint	LOW to MODERATE — not a primary target of rodenticide programmes; risk of secondary poisoning through scavenging poisoned carcasses exists but is low relative to body mass	**LOW–MODERATE**

5.3 Class Reptilia

The impact of orchards relating to habitat loss or transformation of land, food sources or foraging and the use of pesticides or herbicides on reptile Species of Conservation Concern is listed in Table 15. The transformation of land and ultimately loss of habitat will ultimately have an effect on food source and foraging. Although the Northern Tent Tortoise (*Psammobates tentorius verroxii*) is listed as Least Concern, the impact of orchards on the collective group of the Tent Tortoise (*Psammobates tentorius*) sub-species is **High**.

***Table 15**. Impact of orchard development on reptile Species of Conservation Concern. (Impact Rating Key: **HIGH** — Significant, mitigation and permit conditions required). **NT**, Near Threatened.*

Species	Regional Status	Habitat Loss / Transformation	Food Source / Foraging	Pesticide / Herbicide	Overall Significance
Tent Tortoise (*Psammobates tentorius)*	**NT**	HIGH — strictly confined to arid Nama Karoo succulent shrubland on specific soil types; soil preparation, ripping and irrigation destroy both substrate and food plants simultaneously; no capacity to use cultivated land	HIGH — entirely dependent on Karoo succulent plants (Aizoaceae, Crassulaceae, Asteraceae) for food and moisture; conversion of shrubland eliminates the food source completely; all water obtained from succulent food items	MODERATE — not a direct target of rodenticide programmes; herbicide use to control orchard understory eliminates the succulent plant food base; systemic pesticide uptake through plant consumption possible	**HIGH**

6 RECOMMENDATIONS AND CONCLUSION

The proposed establishment of pecan nut orchards on two previously undisturbed parcels, a 10 ha pivot area on Erf No. 1 and an 8 ha area on Erf No. 971 on the farm Oranje-Oos near Prieska in the Northern Cape, falls within a landscape of noticeably **High faunal sensitivity**. This assessment has identified fourteen Species of Conservation Concern (SCC) either confirmed present, likely present, or possible within the study area, spanning four taxonomic classes.

6.1 Overall Assessment

Three Endangered bird species, the Tawny Eagle (*Aquila rapax*), Martial Eagle (*Polemaetus bellicosus*), and Ludwig's Bustard (*Neotis ludwigii*), carry the highest level of legislative protection under TOPS/NEMBA and are all classified as **Endangered** at both regional and global level. The confirmed presence of the Lanner Falcon and Kori Bustard in the immediate area, and the neighbouring-farmer-confirmed occurrence of Verreaux's Eagle, elevates the bird sensitivity of the site further. Among mammals, three TOPS-listed Protected Species are assessed as potentially or likely occurring: the Black-footed Cat (*Felis nigripes*, VU), the Brown Hyaena (*Parahyaena brunnea*, NT), and the Southern African Hedgehog (*Atelerix frontalis*, NT). The Aardvark (*Orycteropus afer*), while not TOPS-listed, is confirmed present in the vicinity and functions as a keystone ecosystem engineer whose burrow systems underpin the survival of at least 23 other vertebrate species in the Karoo. The African Striped Weasel represents the species at greatest overall risk from orchard development given its dependence on structurally complex grassland habitat and its extreme vulnerability to secondary rodenticide poisoning. The Northern Tent Tortoise (*Psammobates tentorius verroxii*) is assessed as High likelihood of occurrence across Erf No. 1, which falls within its core Nama Karoo range.

The existing pivot infrastructure installed before 2006 constitutes already-transformed habitat. The primary ecological concern of this assessment is the proposed clearing of 18 ha of previously undisturbed or recently regenerating natural vegetation across the two new development footprints. The overall site sensitivity is confirmed as High, consistent with the DFFE Screening

Tool assessment, and the development is considered permissible subject to the full implementation of the recommendations detailed below.

Of all the species in this ecological report, the African Striped Weasel is arguably the most sensitive to orchard development because of its absolute dependence on prey-rich, structurally complex grassland habitat and its extreme vulnerability to rodenticide secondary poisoning. Any orchard development on the farm should include an explicit rodenticide management protocol that prohibits or strictly controls anticoagulant and acute rodenticide use in the vicinity of known or potential weasel habitat.

The Black-footed Cat's possible presence in the study area is highly significant. The Northern Cape Karoo is the global stronghold of this species. The IUCN Red List categorises the Black-footed Cat as Vulnerable to extinction with fewer than 10,000 individuals remaining. Any development that converts open Karoo shrubland to intensively managed orchard habitat should explicitly assess the potential impact on this species, and a rodenticide management protocol and habitat buffer strategy should be mandatory components of any environmental authorisation conditions.

It is recommended that an Aardvark burrow survey must be done prior to soil preparation. A study in the Karoo estimated the density of Aardvark to be approximately eight animals per 10 km^2 — meaning the farm likely supports several individuals within its boundaries. Any orchard expansion should include an explicit no-insecticide buffer zone around known burrow sites, and farm infrastructure design should account for aardvark movement to minimise the conflict that typically drives persecution.

6.2 Environmental Awareness Training

Environmental awareness training is a regulatory requirement under the Protocols (GG 43110, 20 March 2020) and is the single most cost-effective conservation measure available to the developer. The following minimum standard is required:

- Training must be conducted before construction begins, repeated annually, and documented with a signed attendance register.
- Training content must cover: identification of all SCC listed in this report; legal protection status and penalties under NEMBA; the prohibition of rodenticides and gin traps; Aardvark burrow avoidance; tortoise pre-clearance obligations; and the dead-animal reporting protocol.
- Laminated SCC identification cards with photographs must be produced and posted at the farm office, workshop, and worker accommodation.

6.3 Conclusion

The existing pivot infrastructure installed before 2006 constitutes already-transformed habitat. The primary ecological concern of this assessment is the proposed clearing of 18 ha of previously undisturbed or recently regenerating natural vegetation across the two new development footprints. The overall site sensitivity is confirmed as High, consistent with the DFFE Screening Tool assessment, and the **development is considered permissible** subject to the full implementation of the recommendations detailed above.

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APPENDIX 1

Table A1. *Bird species (Class Aves) as listed by SABAP2 for pentad 2940_2245 and 2940_2250 combined, the Global and Regional Red Data Book Assessment of each species, as well as species observed during the field survey. (Source; GBIF, iNaturalist, SABAP2, SANBI).* ***EN,*** *Endangered;* ***VU,*** *Vulnerable;* ***NT,*** *Near Threatened;* ***LC****, Least Concern.*

Order / Family	**Genus & Species**	**Common Name**	**Red Data Book Assessment**		**Observed**
			Global	**Regional**	
Accipitriformes					
Accipitridae	*Aquila rapax*	Tawny Eagle	VU	EN	
	Aquila verreauxii	Verreaux's Eagle	LC	VU	
	Buteo buteo	Common Buzzard	LC	LC	
	Buteo rufofuscus	Jackal Buzzard	LC	LC	**Erf No. 971**
	Elanus caeruleus	Black-winged Kite	LC	LC	
	Haliaeetus vocifer	African Fish Eagle	LC	LC	
	Hieraaetus pennatus	Booted Eagle	LC	LC	
	Melierax canorus	Pale Chanting Goshawk	LC	LC	
	Milvus aegyptius	Yellow-billed Kite	LC	LC	
Anseriformes					
Anatidae	*Alopochen aegyptiaca*	Egyptian Goose	LC	LC	
	Anas capensis	Cape Teal	LC	LC	
	Anas erythrorhyncha	Red-billed Teal	LC	LC	
	Anas smithii	Cape Shoveler	LC	LC	
	Anas sparsa	African Black Duck	LC	LC	
	Anas undulata	Yellow-billed Duck	LC	LC	

	Dendrocygna viduata	White-faced Whistling Duck	LC	LC	
	Netta erythrophthalma	Southern Pochard	LC	LC	
	Plectropterus gambensis	Spur-winged Goose	LC	LC	
	Tadorna cana	South African Shelduck	LC	LC	
Bucerotiformes					
Upupidae	*Upupa africana*	African Hoopoe	LC	LC	**Erf No. 971**
Caprimulgiformes					
Apodidae	*Apus affinis*	Little Swift	LC	LC	
	Apus caffer	White-rumped Swift	LC	LC	
	Cypsiurus parvus	African Palm Swift	LC	LC	
	Tachymarptis melba	Alpine Swift	LC	LC	
Charadriiformes					
Burhinidae	*Burhinus capensis*	Spotted Thick-knee	LC	LC	**Erf No. 971**
Charadriidae	*Charadrius tricollaris*	African Three-banded Plover	LC	LC	
	Vanellus armatus	Blacksmith Lapwing	LC	LC	**Erf No. 971**
	Vanellus coronatus	Crowned Lapwing	LC	LC	
Glareolidae	*Rhinoptilus africanus*	Double-banded Courser	LC	LC	
Pteroclidae	*Pterocles namaqua*	Namaqua Sandgrouse	LC	LC	
Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	LC	LC	
Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	LC	LC	
Turnicidae	*Turnix sylvaticus*	Common Buttonquail	LC	LC	
Ciconiiformes					
Ciconiidae	*Ciconia abdimii*	Abdim's Stork	LC	LC	
Scopidae	*Scopus umbretta*	Hamerkop	LC	LC	**Erf No. 971**
Threskiornithidae	*Bostrychia hagedash*	Hadada Ibis	LC	LC	**Erf No. 971**
	Plegadis falcinellus	Glossy Ibis	LC	LC	
	Threskiornis aethiopicus	African Sacred Ibis	LC	LC	
Coliiformes					

Coliidae	*Colius colius*	White-backed Mousebird	LC	LC	
	Urocolius indicus	Red-faced Mousebird	LC	LC	**Erf No. 971**
Columbiformes					
Columbidae	*Columba guinea*	Speckled Pigeon	LC	LC	**Erf No. 971**
	Columba livia	Rock Dove	LC	LC	
	Oena capensis	Namaqua Dove	LC	LC	**Erf No. 971**
	Spilopelia senegalensis	Laughing Dove	LC	LC	**Erf No. 971**
	Streptopelia capicola	Ring-necked Dove	LC	LC	**Erf No. 971**
	Streptopelia semitorquata	Red-eyed Dove	LC	LC	**Erf No. 971**
Coraciiformes					
Alcedinidae	*Corythornis cristatus*	Malachite Kingfisher	LC	LC	
Cerylidae	*Ceryle rudis*	Pied Kingfisher	LC	LC	
Dacelonidae	*Halcyon albiventris*	Brown-hooded Kingfisher	LC	LC	**Erf No. 971**
	Megaceryle maxima	Giant Kingfisher	LC	LC	
Meropidae	*Merops apiaster*	European Bee-eater	LC	LC	
	Merops bullockoides	White-fronted Bee-eater	LC	LC	
	Merops hirundineus	Swallow-tailed Bee-eater	LC	LC	
Cuculiformes					
Centropodidae	*Centropus burchellii*	Burchell's Coucal	LC	LC	
Cuculidae	*Chrysococcyx caprius*	Diederik Cuckoo	LC	LC	
Falconiformes					
Falconidae	*Falco biarmicus*	Lanner Falcon	LC	NT	
	Falco chicquera	Red-necked Falcon	LC	LC	
	Falco rupicolus	Rock Kestrel	LC	LC	
	Polihierax semitorquatus	Pygmy Falcon	LC	LC	
Galliformes					
Numididae	*Numida meleagris*	Helmeted Guineafowl	LC	LC	**Erf No. 971**
Phasianidae	*Coturnix coturnix*	Common Quail	LC	LC	

Gruiformes					
Rallidae	*Fulica cristata*	Red-knobbed Coot	LC	LC	
Otidiformes					
Otididae	*Afrotis afraoides*	Northern Black Korhaan	LC	LC	**Erf No. 1**
	Ardeotis kori	Kori Bustard	NT	NT	
	Eupodotis vigorsii	Karoo Korhaan	LC	LC	
	Lophotis ruficrista	Red-crested Korhaan	LC	LC	
	Neotis ludwigii	Ludwig's Bustard	EN	EN	
Passeriformes					
Acrocephalidae	*Acrocephalus baeticatus*	African Reed-warbler	LC	LC	
	Acrocephalus palustris	Marsh Warbler	LC	LC	
	Acrocephalus scirpaceus	Common Reed Warbler	LC	LC	
Alaudidae	*Calandrella cinerea*	Red-capped Lark	LC	LC	
	Calendulauda africanoides	Fawn-colored Lark	LC	LC	
	Calendulauda sabota	Sabota Lark	LC	LC	
	Certhilauda subcoronata	Karoo Long-billed Lark	LC	LC	
	Chersomanes albofasciata	Spike-heeled Lark	LC	LC	
	Mirafra fasciolata	Eastern Clapper Lark	LC	LC	
Cisticolidae	*Cisticola aridulus*	Desert Cisticola	LC	LC	
	Cisticola fulvicapilla	Neddicky	LC	LC	
	Cisticola juncidis	Zitting Cisticola	LC	LC	
	Cisticola subruficapilla	Grey-backed Cisticola	LC	LC	
	Cisticola tinniens	Levaillant's Cisticola	LC	LC	
	Malcorus pectoralis	Rufous-eared Warbler	LC	LC	
	Phragmacia substriata	Namaqua Warbler	LC	LC	
	Prinia flavicans	Black-chested Prinia	LC	LC	
	Prinia maculosa	Karoo Prinia	LC	LC	

Corvidae	*Corvus albus*	Pied Crow	LC	LC	**Erf No. 1**
Dicruridae	*Dicrurus adsimilis*	Fork-tailed Drongo	LC	LC	
Estrildidae	*Amadina erythrocephala*	Red-headed Finch	LC	LC	
	Brunhilda erythronotos	Black-faced Waxbill	LC	LC	
	Estrilda astrild	Common Waxbill	LC	LC	
	Lagonosticta senegala	Red-billed Firefinch	LC	LC	
	Ortygospiza atricollis	Quailfinch	LC	LC	
Fringillidae	*Crithagra albogularis*	White-throated Canary	LC	LC	
	Crithagra atrogularis	Black-throated Canary	LC	LC	
	Crithagra flaviventris	Yellow Canary	LC	LC	**Erf No. 1**
	Emberiza impetuani	Lark-like bunting	LC	LC	
Hirundinidae	*Cecropis cucullata*	Greater Striped Swallow	LC	LC	
	Delichon urbicum	Common House Martin	LC	LC	
	Hirundo albigularis	White-throated Swallow	LC	LC	
	Hirundo dimidiata	Pearl-breasted Swallow	LC	LC	
	Hirundo rustica	Barn Swallow	LC	LC	
	Neophedina cincta	Banded Martin	LC	LC	
	Ptyonoprogne fuligula	Large rock martin	LC	LC	**Erf No. 1**
	Riparia paludicola	Brown-throated Martin	LC	LC	
	Riparia riparia	Sand Martin	LC	LC	
Laniidae	*Lanius collaris*	Southern Fiscal	LC	LC	**Erf No. 1**
	Lanius collurio	Red-backed Shrike	LC	LC	
	Lanius minor	Lesser Grey Shrike	LC	LC	
Macrosphenidae	*Sylvietta rufescens*	Long-billed Crombec	LC	LC	
Malaconotidae	*Batis pririt*	Pririt Batis	LC	LC	
	Nilaus afer	Brubru	LC	LC	
	Tchagra australis	Brown-crowned Tchagra	LC	LC	
	Telophorus zeylonus	Bokmakierie	LC	LC	

Motacillidae	*Anthus cinnamomeus*	African Pipit	LC	LC	
	Motacilla capensis	Cape Wagtail	LC	LC	
Muscicapidae	*Cercotrichas coryphoeus*	Karoo Scrub Robin	LC	LC	**Erf No. 1**
	Cercotrichas paena	Kalahari Scrub Robin	LC	LC	
	Cossypha caffra	Cape Robin-Chat	LC	LC	
	Emarginata sinuata	Sickle-winged Chat	LC	LC	
	Melaenornis infuscatus	Chat Flycatcher	LC	LC	
	Melaenornis silens	Fiscal Flycatcher	LC	LC	
	Monticola brevipes	Short-toed Pied Thrush	LC	LC	
	Muscicapa striata	Spotted Flycatcher	LC	LC	
	Myrmecocichla formicivora	Ant-eating Chat	LC	LC	**Erf No. 1**
	Myrmecocichla monticola	Mountain Wheatear	LC	LC	
	Oenanthe familiaris	Familiar Chat	LC	LC	
	Saxicola torquatus	African Stonechat	LC	LC	
	Turdus smithi	Karoo Thrush	LC	LC	
Nectariniidae	*Cinnyris fuscus*	Dusky Sunbird	LC	LC	
	Cinnyris mariquensis	Marico Sunbird	LC	LC	
Paridae	*Melaniparus cinerascens*	Ashy Tit	LC	LC	
Passeridae	*Passer diffusus*	Southern Grey-headed Sparrow	LC	LC	
	Passer domesticus	House Sparrow	LC	LC	**Erf No. 971**
	Passer melanurus	Cape Sparrow	LC	LC	**Erf No. 1 & 971**
Ploceidae	*Euplectes orix*	Southern Red Bishop	LC	LC	**Erf No. 971**
	Philetairus socius	Sociable Weaver	LC	LC	
	Plocepasser mahali	White-browed Sparrow-Weaver	LC	LC	
	Ploceus capensis	Cape Weaver	LC	LC	
	Ploceus velatus	Southern Masked Weaver	LC	LC	**Erf No. 971**
	Quelea quelea	Red-billed Quelea	LC	LC	**Erf No. 971**

	Sporopipes squamifrons	Scaly-feathered Weaver	LC	LC	
Pycnonotidae	*Pycnonotus nigricans*	African Red-eyed Bulbul	LC	LC	**Erf No. 971**
Sturnidae	*Acridotheres tristis*	Common Myna	LC	LC	
	Creatophora cinerea	Wattled Starling	LC	LC	
	Lamprotornis bicolor	Pied Starling	LC	LC	
	Lamprotornis nitens	Cape Glossy Starling	LC	LC	
	Onychognathus nabouroup	Pale-winged Starling	LC	LC	**Erf No. 971**
	Sturnus vulgaris	Common Starling	LC	LC	**Erf No. 1**
Sylviidae	*Acrocephalus gracilirostris*	African Reed Warbler	LC	LC	
	Curruca subcoerulea	Chestnut-vented Warbler	LC	LC	
	Eremomela icteropygialis	Yellow-bellied Eremomela	LC	LC	
Viduidae	*Vidua macroura*	Pin-tailed Whydah	LC	LC	
Zosteropidae	*Zosterops pallidus*	Orange River White-eye	LC	LC	**Erf No. 1**
	Zosterops virens	Cape White-eye	LC	LC	
Pelecaniformes					
Ardeidae	*Ardea cinerea*	Grey Heron	LC	LC	**Erf No. 971**
	Ardea goliath	Goliath Heron	LC	LC	
	Ardea melanocephala	Black-headed Heron	LC	LC	
	Bubulcus ibis	Western Cattle Egret	LC	LC	
	Butorides striata	Striated Heron	LC	LC	
	Egretta garzetta	Little Egret	LC	LC	
Piciformes					
Indicatoridae	*Indicator minor*	Lesser Honeyguide	LC	LC	
Lybiidae	*Trachyphonus vaillantii*	Crested Barbet	LC	LC	
	Tricholaema leucomelas	Acacia Pied Barbet	LC	LC	
Picidae	*Campethera abingoni*	Golden-tailed Woodpecker	LC	LC	
	Dendropicos fuscescens	Cardinal Woodpecker	LC	LC	
Podicipediformes					

Podicipedidae	*Tachybaptus ruficollis*	Little Grebe	LC	LC	
Strigiformes					
Strigidae	*Bubo africanus*	Spotted Eagle-Owl	LC	LC	
	Glaucidium perlatum	Pearl-spotted Owlet	LC	LC	
Tytonidae	*Tyto alba*	Western (Common) Barn Owl	LC	LC	
Suliformes					
Anhingidae	*Anhinga rufa*	African Darter	LC	LC	
Phalacrocoracidae	*Microcarbo africanus*	Reed Cormorant	LC	LC	**Erf No. 971**
	Phalacrocorax lucidus	White-breasted Cormorant	LC	LC	
Upupiformes					
Rhinopomastidae	*Rhinopomastus cyanomelas*	Common Scimitarbill	LC	LC	

APPENDIX 2

Table A 2. *Mammal species (Class Mammalia) as listed by iNaturalist, GBIF, the Global and Regional Red Data Book Assessment of each species, as well as species observed during the field survey.* ***EN,*** *Endangered;* ***VU,*** *Vulnerable;* ***NT,*** *Near Threatened;* ***LC****, Least Concern.*

Order/Family	Genus & Species	Common Name	Red Data Book Assessment		Observed
			Global	Regional	
Carnivora					
Canidae	*Lupulella mesomelas*	Black-backed Jackal	LC	LC	**Camera trap**
	Otocyon megalotis	Bat-eared Fox	LC	LC	**Road kill**
	Vulpes chama	Cape Fox	LC	LC	
Felidae	*Caracal caracal*	Caracal	LC	LC	
	Felis lybica cafra	Southern African Wildcat	LC	LC	
	Felis nigripes	Black-footed Cat	VU	VU	
Herpestidae	*Atilax paludinosus*	Water/Marsh Mongoose	LC	LC	
	Cynictis penicillata	Yellow mongoose	LC	LC	**Erf No. 1**
	Herpestes pulverulentus	Cape Grey Mongoose	LC	LC	
	Herpestes sanguineus	Slender Mongoose	LC	LC	**Erf No. 971**
	Suricata suricatta	Suricate/Meerkat	LC	LC	
Hyaenidae	*Parahyaena brunnea*	Brown Hyaena	NT	NT	
	Proteles cristatus	Aardwolf	LC	LC	
Mustelidae	*Ictonyx striatus*	Striped polecat/Zorilla	LC	LC	**Road kill**
	Mellivora capensis	Honey Badger	LC	LC	
	Poecilogale albinucha	African Striped Weasel	LC	NT	
Viverridae	*Genetta genetta*	Southern Small-spotted Genet	LC	LC	**Road kill**

Cetartiodactyla					
Bovidae	*Alcelaphus buselaphus caama*	Red Hartebeest	LC	LC	
	Antidorcas marsupialis	Springbok	LC	LC	
	Connochaetes taurinus	Blue Wildebeest	LC	LC	
	Connochaetes gnou	Black Wildebeest	LC	LC	
	Kobus ellipsiprymnus	Common Waterbuck	LC	LC	
	Oreotragus oreotragus	Klipspringer	LC	LC	
	Oryx gazella	Gemsbok	LC	LC	
	Raphicerus campestris	Steenbok	LC	LC	**Camera trap**
	Sylvicapra grimmia	Common duiker	LC	LC	**Camera trap**
	Tragelaphus oryx	Eland	LC	LC	
	Tragelaphus strepsiceros	Greater Kudu	LC	LC	
Giraffidae	*Giraffa camelopardalis*	Southern Giraffe	VU	LC	
Chiroptera					
Molossidae	*Tadarida aegyptiaca*	Egyptian Free-tailed Bat	LC	LC	
Nycteridae	*Nycteris thebaica*	Egyptian Slit-faced Bat	LC	LC	
Rhinolophidae	*Rhinolophus clivosus*	Geoffroy's Horseshoe Bat	LC	LC	
	Rhinolophus damarensis	Damara Horseshoe Bat	LC	VU	
Vespertilionidae	*Cnephaeus hottentotus*	Long-tailed Serotine Bat	LC	LC	
	Laephotis capensis	Cape Roof Bat	LC	LC	
Eulipotyphla					
Erinaceidae	*Atelerix frontalis*	Southern African Hedgehog	LC	NT	
Soricidae	*Suncus varilla*	Lesser Dwarf Shrew	LC	LC	
Hyracoidea					
Procaviidae	*Procavia capensis*	Rock Hyrax	LC	LC	
Lagomorpha					

Leporidae	*Lepus capensis*	Cape Hare	LC	LC	**Erf No. 1**
	Pronolagus rupestris	Smith's Red Rock Rabbit	LC	LC	
Macroscelidea					
Macroscelididae	*Macroscelides proboscideus*	Karoo Round-eared Sengi	LC	LC	
	Macroscelides rupestris	Western Rock Sengi	LC	LC	
Primates					
Cercopithecidae	*Chlorocebus pygerythrus*	Vervet Monkey	LC	LC	**Road obs.**
	Papio ursinus	Chacma Baboon	LC	LC	
Rodentia					
Sciuridae	*Xerus inauris*	Cape ground squirrel	LC	LC	**Erf No. 1**
Bathyergidae	*Cryptomys hottentostus*	Common Mole-rat	LC	LC	
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	LC	LC	**Erf No. 1**
Muridae	*Aethomys chrysophilus*	Red Veld Rat	LC	LC	
	Desmodillus auricularis	Cape Short-eared Gerbil	LC	LC	
	Gerbilliscus brantsii	Brants's Gerbil	LC	LC	
	Gerbilliscus leucogaster	Bushveld Gerbil	LC	LC	
	Mastomys coucha	Southern Multimammate Mouse	LC	LC	
	Micaelamys namaquensis	Namaqua Rock Rat	LC	LC	
	Mus minutoides	Pygmy Mouse	LC	LC	
	Otomys unisulcatus	Karoo Bush Rat	LC	LC	
	Parotomys brantsii	Brants' Whistling Rat	LC	LC	
	Rhabdomys bechuanae	West-Central Four-striped Grass Rat	LC	LC	
Nesomyidae	*Malacothrix typica*	Large-eared Mouse	LC	LC	
Pedetidae	*Pedetes capensis*	Springhare	LC	LC	
Tubulidentata					
Orycteropodidae	*Orycteropus afer*	Aardvark	LC	NT	**Camera trap**

APPENDIX 3

Table A 3. *Reptile species (Class Reptilia) as listed by iNaturalist, GBIF, the Global and Regional Red Data Book Assessment of each species, as well as species observed during the field survey.* ***EN,*** *Endangered;* ***VU,*** *Vulnerable;* ***NT,*** *Near Threatened;* ***LC****, Least Concern.*

Order/Family	**Genus & Species**	**Common Name**	**Red Data Book Assessment**		**Observed**
			Global	**Regional**	
Order Squamata					
Agamidae	*Agama aculeata*	Ground Agama	LC	LC	
	Agama atra	Southern Rock Agama	LC	LC	
Amphisbaenidae	*Monopeltis infuscata*	Dusky Worm Lizard	LC	LC	
	Zygaspis quadrifrons	Kalahari Dwarf Worm Lizard	LC	LC	
Colubridae	*Dasypeltis scabra*	Common Egg Eater	LC	LC	
	Telescopus beetzii	Karoo Tiger Snake	LC	LC	
Cordylidae	*Karusasaurus polyzonus*	Karoo Girdled Lizard	LC	LC	
Elapidae	*Naja nivea*	Cape cobra	LC	LC	**Road kill**
	Elapsoidea sundevallii	Sundevall's Garter Snake	LC	LC	
	Naja nigricincta	Western Barred Spitting Cobra	LC	LC	
Gekkonidae	*Chondrodactylus bibronii*	Bibron's Thick-toed Gecko	LC	LC	
	Lygodactylus capensis	Common Dwarf Gecko	LC	LC	
	Ptenopus garrulus	Common Barking Gecko	LC	LC	
Lacertidae	*Meroles suborbitalis*	Spotted Desert Lizard	LC	LC	
	Heliobolus lugubris	Bushveld Lizard	LC	LC	
	Nucras intertexta	Spotted Sandveld Lizard	LC	LC	**Erf No. 1**
	Nucras tessellata	Western Sandveld Lizard	LC	LC	
	Pedioplanis lineoocellata	Spotted Sand Lizard	LC	LC	

	Pedioplanis namaquensis	Namaqua Sand Lizard	LC	LC	
Lamprophiidae	*Boaedon capensis*	Cape House Snake	LC	LC	
	Pseudaspis cana	Mole Snake	LC	LC	
Leptotyphlopidae	*Leptotyphlops scutifrons*	Peter's Thread Snake	LC	LC	
Prosymnidae	*Prosymna sundevallii*	Sundevall's Shovel-snout	LC	LC	
Psammophiidae	*Psammophis leightoni*	Cape Whip Snake	LC	LC	
	Psammophis notostictus	Karoo Sand Snake	LC	LC	
	Psammophis trinasalis	Fork-marked Sand Snake	LC	LC	
Scincidae	*Acontias lineatus*	Striped Legless Skink	LC	LC	
	Acontias occidentalis	Western Legless Skink	LC	LC	
	Trachylepis capensis	Cape skink	LC	LC	
	Trachylepis spilogaster	Kalahari Tree Skink	LC	LC	**Erf No. 1**
	Trachylepis sulcata	Western Rock Skink	LC	LC	
	Trachylepis variegata	Variegated Skink	LC	LC	
Typhlopidae	*Rhinotyphlops lalandei*	Delalande's Beaked Blind Snake	LC	LC	
Varanidae	*Varanus albigularis*	Rock Monitor	LC	LC	
	Varanus niloticus	Water Monitor	LC	LC	
Viperidae	*Bitis arietans*	Puff adder	LC	LC	**Road kill**
	Bitis caudalis	Horned Adder	LC	LC	
Order Testudines					
Testudinidae	*Stigmochelys pardalis*	Leopard Tortoise	LC	LC	
	Psammobates tentorius	Tent Tortoise	NT	NT	
Pelomedusidae	*Pelomedusa galeata*	South African Helmeted Terrapin	LC	LC	

APPENDIX 4

Table A 4*. Frog species (Class Amphibia, Order Anura) as listed by iNaturalist, GBIF, the Global and Regional Red Data Book Assessment of each species, as well as species observed during the field survey.* ***EN,*** *Endangered;* ***VU,*** *Vulnerable;* ***NT,*** *Near Threatened;* ***LC****, Least Concern.*

Family	Genus & Species	Common Name	Red Data Book Assessment		Observed
			Global	Regional	
Brevicipitidae	*Breviceps a. adspersus*	Common Rain Frog	LC	LC	
Bufonidae	*Poyntonophrynus vertebralis*	Southern Pygmy Toad	LC	LC	
	Sclerophrys capensis	Raucous/Ranger's Toad	LC	LC	
	Sclerophrys gutturalis	Guttural Toad	LC	LC	
	Sclerophrys poweri	Western Olive Toad	LC	LC	
	Vandijkophrynus gariepensis	Karoo Toad	LC	LC	
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	LC	LC	
Pipidae	*Xenopus leavis*	Common Platanna	LC	LC	
Pyxicephalidae	*Amietia delalandii*	Common River Frog	LC	LC	
	Amietia poyntoni	Poynton's River Frog	LC	LC	
	Cacosternum boettgeri	Boettger's Caco	LC	LC	
	Pyxicephalus adspersus	Giant Bullfrog	LC	LC	
	Tomopterna adiastola	Tremolo Sand Frog	LC	LC	
	Tomopterna tandyi	Tandy's Sand frog	LC	LC	

Terms of Reference

The purpose of the Flora Specialist Assessment was to identify, describe and assess the botanical resources that may be affected by the proposed establishment of a 10 ha centre-pivot irrigation area on Erf 1 and an 8 ha pecan orchard on Erf 971, Oranje-Oos Farm, near Prieska in the Northern Cape. The assessment was undertaken in accordance with the National Environmental Management Act (Act 107 of 1998), the Environmental Impact Assessment Regulations, 2014 (as amended), and the Protocols for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes (Government Notice 320 of 2020, as amended).

The objectives of the assessment were to:

- Undertake a desktop assessment of the study area using available botanical information, the DFFE Screening Tool, SANBI biodiversity databases, conservation planning products and published literature to identify vegetation types, ecological sensitivities and plant Species of Conservation Concern that may occur within the study area.
- Conduct a detailed field survey to identify, describe and map the vegetation communities and vegetation units occurring within the proposed development footprint and surrounding areas.
- Verify the environmental sensitivity assigned by the DFFE Screening Tool and determine whether the mapped sensitivities accurately reflect on-site conditions.
- Assess the ecological condition, conservation importance and sensitivity of the vegetation units present within the study area, taking into consideration vegetation structure, species composition, habitat condition, ecosystem functioning and degree of disturbance.
- Identify and record the presence of protected plant species, threatened or endemic species, Species of Conservation Concern, and suitable habitat for such species, and assess the potential significance of these botanical resources.
- Identify and map the occurrence of alien and invasive plant species and evaluate their influence on the ecological condition of the site.
- Assess the significance of the vegetation types present, including their conservation status, ecosystem classification and contribution to regional biodiversity conservation objectives.
- Determine the relationship between the proposed development footprint and Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and other recognised biodiversity features.
- Assess the potential direct, indirect and cumulative impacts of the proposed development on vegetation, protected plant species and ecological processes during both the construction and operational phases.
- Identify practical avoidance, mitigation and management measures to minimise impacts on flora, including recommendations for the protection of sensitive vegetation, protected plant species and rehabilitation of disturbed areas.
- Evaluate whether alternative development footprints or layouts could reduce impacts on botanical resources where applicable.
- Provide a professional opinion on the ecological acceptability of the proposed development from a botanical perspective and make recommendations regarding environmental authorisation and the incorporation of mitigation measures into the Environmental Management Programme (EMPr).

January 2026

AN ECOLOGICAL REPORT ON THE FLORA: ON THE FARMS ERF 1 AND ERF 971 PRIESKA IN THE NORTHERN CAPE

A report commissioned by Digital Soils Africa

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CONDITIONS RELATING TO THIS REPORT

Declaration of interest

Sparaxis Environmental PTY (Ltd) and its members/co-workers:

- Have no vested interest in the property studied, nor is it affiliated with any other person/body involved with the property and/or proposed development.

- Is not a subsidiary, legally or financially, of the proponent.

- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA).

- Declare that remuneration for services provided by Sparaxis Environmental PTY (Ltd) and its members/co-workers are not subjected to or based on approval of the proposed project by the relevant authorities responsible for authorising this proposed project.

- 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 in terms of the NEMA.

- Reserve the right to modify aspects pertaining to the present investigation should additional information become available through ongoing research and/or further work in this field.

- Is committed to biodiversity conservation but concomitantly recognise the need for economic development. We reserve the right to form and hold our own opinions within the constraints of our specialities and experience and, therefore, will not submit willingly to the interests of other parties or change our statements to appease them

The study was undertaken by Dr AC van Aardt (PhD UFS) who is registered as a Professional Natural Scientist (Reg. No. 131584 Ecological Sciences and Botanical Sciences) and Mr M Muller (MSc Botany).

She has the following qualifications

SPECIALIST	**QUALIFICATION**
Dr A.C. van Aardt	PhD – Botany MSc – Botany BSc Hons (Botany) BSc (Botany & Zoology)
M Muller	MSc – Botany BSc Hons Environmental Science BSc (Geography and Environmental Sciences)

Indemnity

Although Sparaxis Environmental Pty (Ltd) exercises due care and diligence in rendering services and preparing documents, the client takes full responsibility for this report and its implementation in terms of the National Environmental Management Act of 1998, and exempts Sparaxis Environmental Pty (Ltd) and its associates and their sub-contractors from any legal responsibility based on the timing of the assessment, the result and the duration thereof, which has an influence on the credibility and accuracy of this report. Sparaxis Environmental Pty (Ltd) accepts no liability, and the client, by receiving this document, indemnifies Sparaxis Environmental Pty (Ltd) and its directors, managers, agents and employees all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by Sparaxis Environmental Pty (Ltd) and by the use of the information contained in this report

Factors limiting the quality of this report

The formal site visit was undertaken on 17 December 2025. This was during the rainy season which also permits the flowering and growth of plants. Although some plants had flowers, inflorescences and seeds it was not the case for all. Grass identification was particularly challenging since most did not have inflorescences or leaves sufficient for identification. Plants that had flowers or had remnants of flowers at the time of the visit could be identified. Some of the more rare and cryptic species may have been overlooked due to their inconspicuous growth forms. Many of the rare and endangered succulent species can only be distinguished (in the veld) from their very similar relatives on the basis of their reproductive parts. These plants flower during different times of the year. Multiple visits to any site during the different seasons of the year could, therefore, increase the chances to record a larger portion of the total species complex associated with the area. The survey of the study site is, however, considered as successful with a correct identification of the vegetation units and their ecological sensitivity.

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- Recommendations delivered to the Client.

Approach

Conclusions reached, and recommendations made are based not only on the occurrence of individual species, but more appropriately on habitats and ecosystem processes. Planning must, therefore, allow for the maintenance of species, habitats and ecosystem processes, even if Red Data or endemic plant or animal species are absent.



Dr A.C. van Aardt
Sparaxis Environmental Pty (Ltd)

INTRODUCTION

The Karoo and Karoo-like environments, such as Griqualand West, are harsh and unpredictable environments, with indigenous plants and animals that were selected over hundreds of thousands of years. This area occurs in the north-central parts of South Africa, mainly in the Northern Cape, although it also includes parts of the North-West and the Free State Provinces. The Griqualand West area is semi-arid with a few perennial rivers; however, the most prominent is the Orange River. The Orange River is an area associated with water and processes that are linked to the control of creation, maintenance and development of peculiar habitats. These habitats normally form along flowing and stagnant freshwater bodies where they can be experiencing seasonal or permanent inundation and/or flooding that either occur regularly, irregularly or result in catastrophic events. Furthermore, the Griqualand West area, which the study area falls within, has a lack of knowledge in terms of its vegetation, although it was known since the mid-20th century that this area has a high floristic diversity. Knowledge of this extradentary ecosystem will enable better management and decision-making about sustainable development.

Vegetation forms the most obvious external feature that ecosystems are classified and defined on. Uncontrolled and ill-planned development is one of the biggest threats to naturally evolved life on earth. Development worldwide in the past and at present is responsible for the destruction of various plant and animal species, as well as the habitats in which they occur. The lack of knowledge about the vegetation of the Griqualand West area, therefore, makes it vulnerable to uninformed development. Therefore, a balance needs to be developed between the needs of humans and the conservation of natural habitats or resources. This balance is one of the biggest challenges faced by decision-makers in the country.

Preventing the destruction of any ecosystem requires a need for systematic planning and coordination of human activities, and development should be prioritised. The planning should include studies of the natural environment, which include soil, water, vegetation, animals and cultural as well as historical aspects.

The plant community is seen as an important unit in any ecosystem and, therefore, forms the basis for environmental planning and the compilation of environmental management plans. Plant species assemblages are an indication of the habitat, ecosystem health, and rarity of the ecosystem, and are an important part of an Environmental Impact Assessment.

AIMS OF THE STUDY

This report aims to present ecological information on the flora that could have been present on the farms Erf 971, where vegetation was cleared and removed, and Erf 1 where natural vegetation is still intact in the Prieska area of the Northern Cape, South Africa (hereafter referred to as the study area).

The objectives of this study were to:

- Identify, describe, and delineate the different vegetation units present on the property
- Compile a map of the vegetation units present in the area
- Indicate the presence of protected plant species or suitable habitat
- Identify alien invasive plant species
- Provide a sensitivity map of the study area (where applicable).

STUDY AREA

Location

The study sites are located east approximately 11 km from Prieska on the R357 towards Douglas. Site A, also known as Erf 1, is located next to the R357 and is composed of natural vegetation surrounded by the R379 on the south, natural vegetation on the east and west, with planted agricultural fields in the form of pivots borderig the northern side. Site B, also known as Erf 971, is located closer to the bank of the Orange River towards the northwest of site A. Site B is surrounded by a tributary of the Orange River on the western and northern sides, with pecan plantations on the south and vegetables to the east (Figure 1).

The study sites fall within the Inland Azonal Vegetation and more specifically the Upper Gariep Alluvial Vegetation (Aza 4), which is regarded as vulnerable (Mucina and

Rutherford, 2006). Site A is approximately 10.4 ha in size, and Site B is approximately 7.65 ha in size.



Figure 1: Locality of the study area represented by Site A in yellow, next to the R357 and Site B in red, next to the Orange River (Source: Google Maps)

<u>Existing impacts on the study site include:</u>

Upon arrival at site B, we discovered that vegetation clearance had already taken place. Vegetation was uprooted (Figure 2), and it seems as if it has burned as well (Figure 3). We could thus only survey the existing vegetation.



Figure 2: Site B where vegetation was uprooted upon arrival at the site.



Figure 3: Burnt damage on the stumps of trees found at site B.

To get a better understanding of what was supposed to be the natural vegetation, Mucina and Rutherford (2006) were consulted, and the dominant species in the vegetation type is listed: Upper Gariep Alluvial Vegetation (Aza4), which is the dominant vegetation type in both study sites are: *Acacia karroo [Vachellia karroo], Celtis africana, Salix mucronata subsp. mucronata, Royenea lycioides [Diospyros lycioides], Melianthus comosus and Melica decumbens*.

METHODS

VEGETATION

Principles of the Braun-Blanquet survey technique were used to do the survey and describe plant communities as ecological units. Relevant literature was used to obtain an overview of the vegetation of the site. The ecological sensitivity of the plant communities was assessed and categorised according to the habitat and plant species assemblages. Aerial photographs were used to study the site, and a preliminary delineation of the possible different vegetation units was done. These vegetation units were verified on foot at the site, and vegetation sample plots were placed in each.

Data recorded included:

Data gathered included the physiognomy and floristic composition (species richness and canopy cover of each species) of each species. A list of plant species present, including trees, shrubs, grasses, forbs, geophytes and succulents, was compiled. All identifiable plant species were listed. Additional notes were made of any features that might be of ecological significance.

Red data and protected species

An investigation was carried out on rare and protected plants that might possibly occur in the region. The National Red List of Threatened Plants of South Africa, Lesotho and Swaziland, compiled by the Threatened Species Programme, South African National Biodiversity Institute (SANBI), was used. The Northern Cape Nature Conservation Act (No. 9 of 2009) was also consulted, as well as The Red List of South African Plants compiled by SANBI (2020). The New Plants of South Africa (SANBI 2016) was also used.

The presence of rare and protected species or suitable habitat was recorded during the field visit.

Data processing

Vegetation data were classified to identify, describe, and map vegetation units. Description of the vegetation units includes tree, shrub, and herbaceous layers. Conservation priority for each vegetation unit was assessed by evaluating plant

species composition in terms of the present knowledge of the vegetation of the Nama Karoo Biome and Inland Azonal Vegetation of South Africa. Four conservation priority categories were used for the different vegetation units:

High	Area with natural vegetation with a high species richness and habitat diversity; presence of viable populations of red data plant species OR suitable habitat for such species; presence of unique habitats; less than 5% pioneer/alien plant species present. These areas are ecologically valuable and important for ecosystem functioning. This land should be conserved and managed and is not suitable for development purposes.
Medium-high	Natural area with a relatively high species richness and diversity; not a threatened or unique ecosystem; moderate habitat diversity; between 5-10% pioneer/alien plant species present; that would need low financial input and management to improve its current condition; and where low density development could be considered with limited impact on the vegetation / ecosystem. It is recommended that larger sections of the vegetation are maintained**.**
Medium	An area with a relatively natural species composition; not a threatened or unique ecosystem; moderate species diversity; between 11-20% pioneer/alien plant species present; that would need moderate to major financial input to rehabilitate to an improved condition; and where medium density development could be considered with limited impact on the vegetation / ecosystem. Where possible certain sections of the vegetation could be maintained**.**
Low-medium	Area with relatively natural vegetation, though a common vegetation type; moderate to low species and habitat diversity; previously or currently degraded or in secondary successional phase; between 20-40% pioneer and/or alien plant species; low ecosystem functioning; low rehabilitation potential.

Low	A totally degraded and transformed area with a low habitat diversity and ecosystem functioning; no viable populations of natural plants; >40% pioneer and/or alien plant species present; very low habitat uniqueness; whose recovery potential is extremely low; and on which development could be supported with little to no impact on the natural vegetation / ecosystem.

RESULTS OF THE VEGETATION SURVEY

Vegetation units found at site A (Erf 1)

Site A composed of the natural vegetation, can be divided into two different vegetation units (Figure 4).

1. Shrubland vegetation unit
2. Ridge vegetation unit

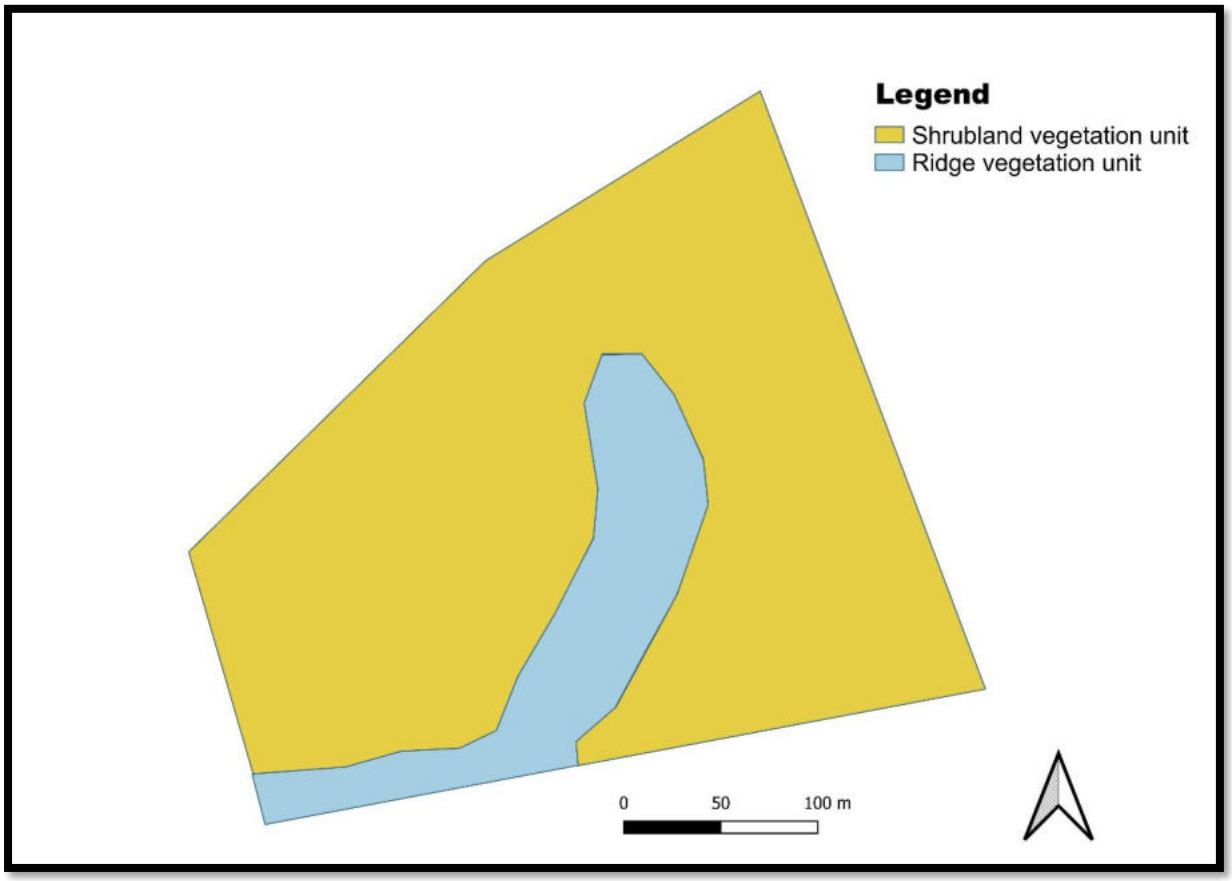


Figure 4: Different vegetation units identified at site A in the study area.

1. Shrubland vegetation unit

Status	Near natural
Vegetation structure	The vegetation is composed of a dominant shrub layer with scattered trees and a ground layer composed of grasses and herbs. The ground layer is, however, not prominent and various open spaces do exist.

Topography	Sloping in a westerly direction towards a side stream of the Orange River.
Rock cover	Rocky cover of various sizes occurs in this area. There are also large open areas that do not contain any vegetation cover but have rocky cover.
Conservation priority	Medium

This vegetation unit comprises the largest part of the study area, covering approximately 8.76 ha. The slope of this unit is westerly towards a stream that connects with the Orang River. Protected species of *Mesembryanthemum junceum, M. tetragonum, M. coriarium, M. guerichianum* and *M. noctiflorum* were found. These species are listed as protected species by the Northern Cape Ordinance, Schedule 2, because of the family in which they occur. *Boscia albitrunca,* the tree protected under the Northern Cape Ordinance, Schedule 2 and the National Forest Act of 1998 is also present in this vegetation unit.

The vegetation unit is mostly dominated by the succulent shrubs *Mesembryanthemum coriarium, Roepera pubescens* and *Tetraena microcarpa,* while the woody shrub *Rhigozum trichotomum* is also present. These four dominant shrubs differ in their dominance throughout the study area. In some instances, *Mesembryanthemum coriarium* will be dominating (Figure 5). In other areas, *Roepera pubescens* and *Tetraena microcarpa* will be dominating (Figure 6), while in other areas, *Rhigozum trichotomum* will be dominating (Figure 7). Other than the dominating shrubs in this vegetation unit, there are also scattered trees, mostly *Senegallia mellifera* and **Neltuma glandulosa [*Prosopis glandulosa]*, present throughout this vegetation unit. With regards to the grasses *Enneapogon desvauxii, E. cenchroides, Cenchrus ciliaris,* and *Stipagrostis ciliata* were prominent, although not dominant.



Figure 5: The *Mesembryanthemum coriarium* dominated section of the shrubland vegetation unit.



Figure 6: The *Roepera pubescens* and *Tetraena microcarpa* dominated section of the shrubland vegetation unit.



Figure 7: The *Rhigozum trichotomum* dominated section of the shrubland vegetation unit.

Protected species:

Family	Species	Growth form
Aizoaceae	*Mesembryanthemum cf. tetragonum*	Succulent
Aizoaceae	*Mesembryanthemum coriarium*	Succulent
Aizoaceae	*Mesembryanthemum guerichianum*	Succulent
Aizoaceae	*Mesembryanthemum junceum*	Succulent
Aizoaceae	*Mesembryanthemum noctiflorum*	Succulent
Capparaceae	*Boscia albitrunca*	Tree/shrub

Invasive Alien plant species

Family	Species	Growth form
Amaranthaceae	*Salsola kali*	Herb
Asteraceae	*Erigeron *bonariensis*	Herb
Asteraceae	*Erigeron *bonariensis*	Herb
Asteraceae	*Lactuca *serriola*	Herb
Asteraceae	*Sonchus *oleraceus*	Herb
Fabaceae	**Medicago sativa*	Herb
Fabaceae	**Neltuma glandulosa*	Tree/shrub
Nyctaginaceae	*Boerhavia *cordobensis*	Herb

List of species found during the study:

The following is a list of plant species identified during the survey, where * indicates alien invasive species:

Family	Species	Growth form
Acanthaceae	*Barleria rigida*	Dwarf shrub
Acanthaceae	*Pogonospermum incanum*	Shrub
Aizoaceae	*Mesembryanthemum* cf. *tetragonum*	Succulent
Aizoaceae	*Mesembryanthemum coriarium*	Succulent
Aizoaceae	*Mesembryanthemum guerichianum*	Succulent
Aizoaceae	*Mesembryanthemum junceum*	Succulent
Aizoaceae	*Mesembryanthemum noctiflorum*	Succulent
Aizoaceae	*Aizoon plinthioides*	Dwarf shrub
Amaranthaceae	*Atriplex lindleyi*	Herb
Amaranthaceae	*Atriplex semibaccata*	Dwarf shrub
Amaranthaceae	*Exomis microphylla*	Succulent
Amaranthaceae	*Salsola kali*	Herb
Amaranthaceae	*Salsola tuberculata*	Dwarf shrub
Amaranthaceae	*Suaeda fruticosa*	Dwarf shrub
Asparagaceae	*Asparagus burchellii*	Shrub
Asparagaceae	*Asparagus laricinus*	Shrub
Asteraceae	*Berkheya pinnatifida*	Herb
Asteraceae	*Dicoma capensis*	Herb
Asteraceae	*Erigeron *bonariensis*	Herb
Asteraceae	*Eriocephalus ericoides*	Shrub
Asteraceae	*Eriocephalus spinescens*	Shrub
Asteraceae	*Felicia mucronata*	Shrub
Asteraceae	*Geigeria ornativa*	Herb
Asteraceae	*Lactuca *serriola*	Herb
Asteraceae	*Nidorella resedifolia*	Herb
Asteraceae	*Pentzia incana*	Shrub
Asteraceae	*Pentzia sphaerocephala*	Shrub
Asteraceae	*Pteronia glauca*	Shrub
Asteraceae	*Oedera humilis*	Shrub
Asteraceae	*Sonchus *oleraceus*	Herb
Bigoniaceae	*Rhigozum trichotomum*	Shrub
Brassicaceae	*Lepidium africanum*	Herb
Brassicaceae	*Lepidium englerianum*	Herb
Capparaceae	*Boscia albitrunca*	Tree/shrub
Fabaceae	**Medicago sativa*	Herb
Fabaceae	**Neltuma glandulosa*	Tree/shrub
Fabaceae	*Senegalia mellifera*	Tree/shrub
Fabaceae	*Indigofera alternans*	Herb
Hyacinthaceae	*Dipcadi sp*	Bulb
Limeaceae	*Limeum argute-carinatum*	Dwarf shrub
Loranthaceae	*Tapinanthus oleifolius*	Parasite

Family	Species	Growth form
Malvaceae	*Hermannia abrotanoides*	Herb
Malvaceae	*Hermannia coccocarpa*	Herb
Molluginaceae	*Kewa salsoloides*	Dwarf shrub
Nyctaginaceae	*Boerhavia *cordobensis*	Herb
Poaceae	*Cenchrus ciliaris*	Graminoid
Poaceae	*Enneapogon cenchroides*	Graminoid
Poaceae	*Enneapogon desvauxii*	Graminoid
Poaceae	*Eragrostis echinochloidea*	Graminoid
Poaceae	*Eragrostis trichophora*	Graminoid
Poaceae	*Fingerhuthia afticana*	Graminoid
Poaceae	*Panicum maximum*	Graminoid
Poaceae	*Schmidtia pappophoroides*	Graminoid
Poaceae	*Sporobolus ioclados*	Graminoid
Poaceae	*Stipagrostis ciliata*	Graminoid
Poaceae	*Stipagrostis obtusa*	Graminoid
Portulacaceae	*Portulaca quadrifida*	Succulent
Santalaceae	*Lacomucinaea lineata*	Parasite
Scrophulariaceae	*Aptosimum spinescnes*	Dwarf shrub
Scrophulariaceae	*Peliostomum leucorrhizum*	Dwarf shrub
Solanaceae	*Lycium cinereum*	Shrub
Solanaceae	*Lycium horridum*	Shrub
Thymelaeaceae	*Lasiosiphon polycephalus*	Dwarf shrub
Zygophyllaceae	*Roepera pubescens*	Shrub
Zygophyllaceae	*Tetraena microcarpa*	Dwarf shrub
Zygophyllaceae	*Tribilus cristatus*	Dwarf shrub

2. Ridge vegetation unit



Figure 8: Ridge vegetation unit.

Status	Near natural
Vegetation structure	Vegetation is mostly dominated by scattered trees with a shrub layer. Grasses and forbs are limited in this vegetation unit.
Topography	Sloping in a westerly direction towards a side stream of the Orange River.
Rock cover	The area is covered by various sizes of rock.
Conservation priority	High

This vegetation unit is located on an area that is slightly elevated from the surrounding areas and were called the ridge (Figure 8) within the study area. This is located on the southern side of the study area and also slopes in a westerly direction towards the side stream of the Orange River. The area covers approximately 1.63 ha of the study area.

The vegetation is mostly dominated by scattered trees and shrubs. The prominent tree species in this vegetation type is *Senegalia mellifera. S. mellifera* is also prominent in the shrub layer. Furthermore, other dominant species in the shrub layer include *Pentzia incana, P. sphaerocephala, Eriocephalus ericoides, E. spinescens, Aizoon plinthoides* and *Rhigozum trichotomum* to a lesser extent. Although grasses and herbs are present, they do not occur with high abundance.

Various protected species were found within this vegetation unit. *Mesembryanthemum tetragonum, M. guerichianum* and *M. noctiflorum* are all protected under the Northern Cape Ordinance, Schedule 2, because of the family in which they occur. The bulbous plants *Ammocharis* (Figure 9A) and *Nerine* (Figure 9B) which could not be identified with certainty due to a lack of flowers, are also protected under the Northern Cape Ordinance, Schedule 2, because of the family in which they occur. *Aloe claviflora* is also regarded as a protected species under the Northern Cape Ordinance, Schedule 2, because of the family in which it occurs.

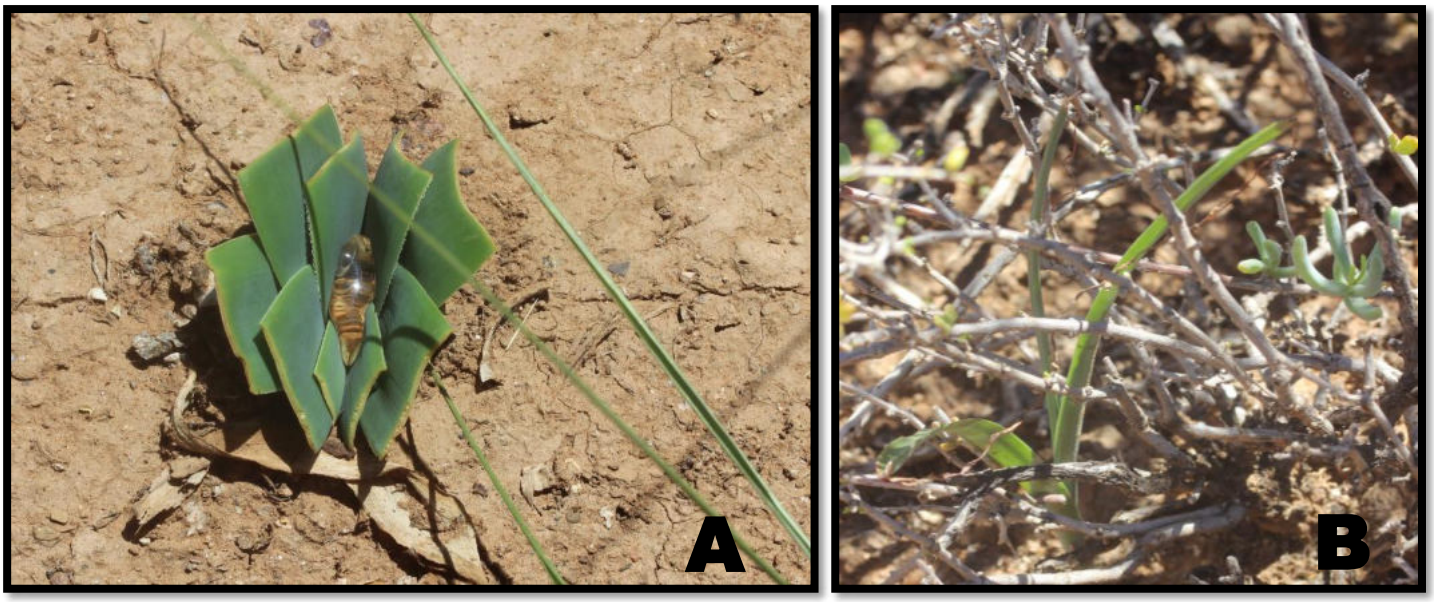


Figure 9: The different protected bulb species found in this vegetation unit. A) possibly *Ammocharis* and B) possibly *Nerine.*

The last species that is protected is *Ceropegia* cf. *gordonii [Hoodia* cf. *gordonii]* (Figure 10). The uncertainty in the identification of this species results from the lack of flowers. This species is protected under the Northern Cape Ordinance, Schedule 1. This species is furthermore known as a Red Data species with a declining status.



Figure 10: *Ceropegia* cf. *gordonii [Hoodia* cf. *gordonii]* found in the ridge vegetation unit.

Protected species:

Family	Species	Growth form
Aizoaceae	*Mesembryanthemum* cf, *tetragonum*	*Succulent*
Aizoaceae	*Mesembryanthemum guerichianum*	*Succulent*
Aizoaceae	*Mesembryanthemum noctiflorum*	*Succulent*
Amaryllidaceae	*Ammocharis* sp.	*Bulb*
Amaryllidaceae	*Nerine* sp.	*Bulb*
Apocynaceae	*Ceropegia* cf. *gordonii*	*Succulent shrub*
Asphodelaceae	*Aloe claviflora*	*Succulent*

Invasive Alien plant species

Family	Species	Growth form
Asteraceae	**Coreopsis lanceolata*	Herb
Asteraceae	*Erigeron *bonariensis*	Herb
Asteraceae	*Sonchus *oleraceus*	Herb
Fabaceae	**Medicago sativa*	Herb
Fabaceae	**Neltuma glandulosa*	Tree/shrub
Nyctaginaceae	*Boerhavia *cordobensis*	Herb
Tamaricaceae	*Tamarix *ramosissima*	Tree/shrub

List of species found during the study:

The following is a list of plant species identified during the survey where * indicates alien invasive species.

Family	Species	Growth form
Acanthaceae	*Barleria rigida*	Dwarf shrub
Aizoaceae	*Aizoon sarcophyllum*	Dwarf shrub
Aizoaceae	*Aizoon plinthoides*	Dwarf shrub
Aizoaceae	*Mesembryanthemum cf tetragonum*	Succulent
Aizoaceae	*Mesembryanthemum guerichianum*	Succulent
Aizoaceae	*Mesembryanthemum noctiflorum*	Succulent
Amaranthaceae	*Exomis microphylla*	Succulent
Amaranthaceae	*Salsola aphyla*	Shrub
Amaryllidaceae	*cf Ammocharis*	Bulb
Amaryllidaceae	*cf Nerine*	Bulb
Apocynaceae	*Ceropegia* cf *gordonii*	Succulent shrub
Asparagaceae	*Asparagus burchellii*	Shrub
Asparagaceae	*Asparagus retrofractus*	Scrambler
Asphodelaceae	*Aloe claviflora*	Succulent
Asteraceae	**Coreopsis lanceolata*	Herb
Asteraceae	*Berkheya pinnatifida*	Herb
Asteraceae	*Dicoma capensis*	Herb
Asteraceae	*Erigeron *bonariensis*	Herb
Asteraceae	*Eriocephalus ericoides*	Shrub

Family	Species	Growth form
Asteraceae	*Eriocephalus spinescens*	Shrub
Asteraceae	*Felicia muricata*	Shrub
Asteraceae	*Kleinia longiflora*	Succulent shrub
Asteraceae	*Nidorella resedifolia*	Herb
Asteraceae	*Pentzia incana*	Shrub
Asteraceae	*Pentzia sphaerocephala*	Shrub
Asteraceae	*Oedera humilis*	Shrub
Asteraceae	*Sonchus *oleraceus*	Herb
Bigoniaceae	*Rhigozum trichotomum*	Shrub
Fabaceae	**Medicago sativa*	Herb
Fabaceae	**Neltuma glandulosa*	Tree/shrub
Fabaceae	*Senegalia mellifera*	Tree/shrub
Limeaceae	*Limeum argute-carinatum*	Dwarf shrub
Malvaceae	*Hermannia coccocarpa*	Herb
Nyctaginaceae	*Boerhavia *cordobensis*	Herb
Poacaeae	*Enneapogon cenchroides*	Graminoid
Poacaeae	*Enneapogon desvauxii*	Graminoid
Poacaeae	*Eragrostis echinochloidea*	Graminoid
Poaceae	*Fingerhutia africana*	Graminoid
Poaceae	*Paicum maximum*	Graminoid
Poaceae	*Stipagrostis ciliata*	Graminoid
Poaceae	*Stipagrostis obtusa*	Graminoid
Portulaca	*Portulaca quadrifida*	Herb
Scrophulariaceae	*Aptosimum albomarginatum*	Dwarf shrub
Scrophulariaceae	*Aptosimum spinescens*	Dwarf shrub
Scrophulariaceae	*Peliostomum leucorrhizum*	Dwarf shrub
Solanaceae	*Lycium cinereum*	Shrub
Solanaceae	*Lycium horridum*	Shrub
Tamaricaceae	*Tamarix *ramosissima*	Tree/shrub
Thymelaeaceae	*Lasiosiphon polycephalus*	Dwarf shrub
Zygophyllaceae	*Tetraena microcarpa*	Dwarf shrub
Zygophyllaceae	*Tribulus zeyheri*	Herb

Vegetation units found at site B (Erf 971)

Site B is mostly composed of uprooted vegetation upon arrival at the site (see section on **Existing impacts on the study site**, page 10). The vegetation found at Site B can thus not be considered natural and covers an area of approximately 8 ha. Due to the disturbance at the site, the mapping of vegetation units was compromised, however, three possible vegetation units were identified.

1. Wetland
2. Drainage line

3. Disturbed vegetation unit

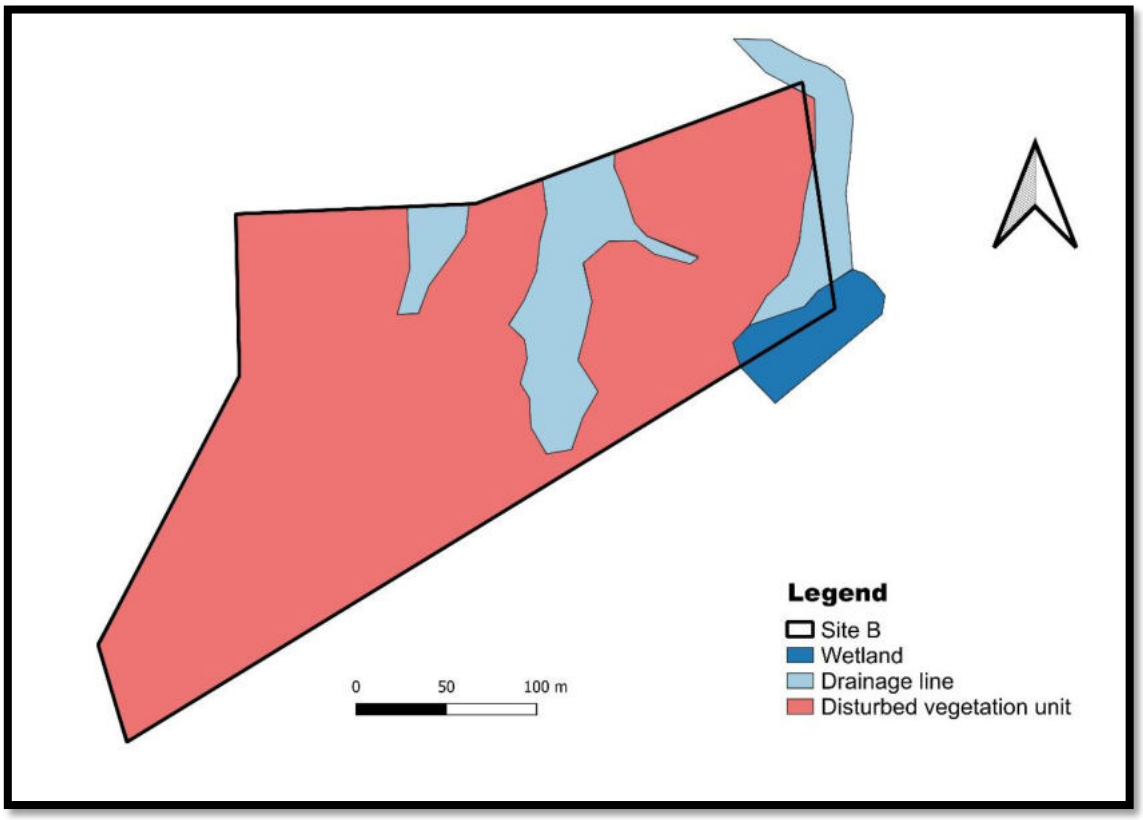


Figure 11: Different vegetation units identified at study Site B in the study area.

1. Wetland



Figure 12: The wetland found in the south-eastern corner of study Site B.

Status	Degraded
Vegetation structure	Vegetation is dominated by grasses.
Topography	Sloping northwards towards the Orange River.
Rock cover	Rocks of various sizes were found at the site.
Conservation priority	Medium

This vegetation unit (Figure 12) is located in the south-western corner of study site B and covers approximately 0.34 ha. Topographically, this unit slopes northwards towards the Orange River. There is not a lot of diversity in this vegetation unit, which is mostly dominated by the presence of *Phragmites australis*.

Protected species:

No protected species were found in this vegetation unit.

Invasive Alien plant species

Family	**Species**	**Growth form**
Amaranthaceae	*Chenopodium *album*	Herb

List of species found during the study:

The following is a list of plant species identified during the survey, where * indicates alien invasive species.

Family	**Species**	**Growth form**
Poaceae	*Phragmites australis*	Grass
Amaranthaceae	*Chenopodium *album*	Herb
Amaranthaceae	*Amaranthus hybridus* subsp. *cruentus*	Herb

2. Drainage line



Figure 13: Vegetation representing the drainage lines found in study Site B.

Status	Degraded
Vegetation structure	Mostly dominated by trees with some shrubs. Herbs also occur as ground cover.
Topography	Sloping northwards towards the Orange River.
Rock cover	Very limited, if any rocks were present
Conservation priority	Medium

Three possible drainage lines (Figure 13) were identified at Site B. These drainage lines slope northwards toward the Orange River and cover approximately 1,28 ha of study site B. They are mostly concentrated on the northern side of the study site. The vegetation is mostly dominated by the presence of *Vachellia karroo,* with some shrubs such as *Lycium cinereum* and *L. horridum* also prominent. The grasses *Cenchrus cilliaris* and *Setaria verticillata* make up the ground cover together with some annual herbs.

Protected species include *Mesembryanthemum coriarium* and *M. guerichianum* which are listed as protected by the Northern Cape Ordinance, Schedule 2, because of the family in which they occur. The drainage line also contains alien invasive species in the form of **Neltuma glandulosa [*Prosopis glandulosa]* and *Tamarix *ramosissima*.

Protected species:

Family	**Species**	**Growth form**
Aizoaceae	*Mesembryanthemum coriarium*	Succulent
Aizoaceae	*Mesembryanthemum guerichianum*	Succulent

Invasive Alien plant species

Family	**Species**	**Growth form**
Amaranthaceae	*Atriplex *lindleyi*	Herb
Asteraceae	*Erigeron *bonariensis*	Herb
Asteraceae	*Sonchus *oleraceus*	Herb
Fabaceae	**Medicago sativa*	Herb
Fabaceae	**Neltuma glandulosa*	Tree/shrub
Tamaricaceae	*Tamarix *ramosissima*	Tree/shrub

List of species found during the study:

The following is a list of plant species identified during the survey, where * indicates alien invasive species:

Family	**Species**	**Growth form**
Aizoaceae	*Mesembryanthemum coriarium*	Succulent
Aizoaceae	*Mesembryanthemum guerichianum*	Succulent
Amaranthaceae	*Atriplex *lindleyi*	Herb
Asparagaceae	*Asparagus laricinus*	Shrub
Asteraceae	*Erigeron *bonariensis*	Herb
Asteraceae	*Nidorella resedifolia*	Herb
Asteraceae	*Sonchus *oleraceus*	Herb
Fabaceae	**Medicago sativa*	Herb
Fabaceae	**Neltuma glandulosa*	Tree/shrub
Fabaceae	*Vachellia karroo*	Tree
Poaceae	*Cenchrus ciliaris*	Graminoid
Poaceae	*Phragmites australis*	Graminoid
Poaceae	*Setaria verticillata*	Graminoid
Solanaceae	*Lycium cinereum*	Shrub
Solanaceae	*Lycium horridum*	Shrub
Tamaricaceae	*Tamarix *ramosissima*	Tree/shrub

3. Disturbed vegetation unit



Figure 14: Vegetation representing the disturbed vegetation unit found at study Site B.

Status	Degraded
Vegetation structure	There is no indication of dominant vegetation. The vegetation found at the site was mostly annuals or pioneers.
Topography	Sloping northwards towards the Orange River or westwards towards the side stream of the Orange river located to the west of the study site.
Rock cover	No rocks, mostly sandy soils
Conservation priority	Low

The largest part of study Site B is dominated by this disturbed vegetation unit. This vegetation unit covers approximately 6,6 ha of study Site B. There is a lot of bare soil present in this vegetation unit. It is also clear that fire was used as a mechanism to clear the vegetation in this unit. The topography of this unit slopes towards the north, where the Orange River flows and towards the west, where there is a tributary of the Orange River.

There is no species that defines this vegetation unit; however, *Eragrostis lehmanniana* is a prominent plant covering certain areas. Vegetation here is mostly annuals, however there are also some perennials. We did find various protected species in this vegetation unit. *Mesembryanthemum coriarium, M. guerichianum, M, junceum* and *M. tetragonum* are listed as protected by the Northern Cape Ordinance, Schedule 2, because of the family in which they occur. *Euphorbia inaequilatera* is listed as protected by the Northern Cape Ordinance, Schedule 2, because of the genus in which it occurs. *Pelargonium minimum* is also protected by the Northern Cape Ordinance, Schedule 1, because of the genus in which it occurs.

Protected species:

Family	**Species**	**Growth form**
Euphorbiaceae	*Euphorbia inaequilatera*	Herb
Aizoaceae	*Mesembryanthemum coriarium*	Succulent
Aizoaceae	*Mesembryanthemum guerichianum*	Succulent
Aizoaceae	*Mesembryanthemum junceum*	Succulent
Aizoaceae	*Mesembryanthemum tetragonum*	Succulent
Geraniaceae	*Pelargonium minimum*	Herb

Invasive Alien plant species

Family	**Species**	**Growth form**
Papaveraceae	**Argemone ochroleuca*	Herb
Solanaceae	**Datura ferox*	Shrub
Fabaceae	**Neltuma glandulosa*	Tree/Shrub
Nyctaginaceae	*Boerhavia *cordobensis*	Herb
Amaranthaceae	*Chenopodium *album*	Herb
Asteraceae	*Erigeron *bonariensis*	Herb
Asteraceae	*Lactuca *serriola*	Herb
Portulacaceae	*Portulaca *oleracea*	Herb
Amaranthaceae	*Salsola kali*	Herb
Tamaricaceae	*Tamarix *ramosissima*	Tree/Shrub

List of species found during the study:

The following is a list of plant species identified during the survey, where * indicates alien invasive species:

Family	**Species**	**Growth form**
Aizoaceae	*Mesembryanthemum coriarium*	Succulent
Aizoaceae	*Mesembryanthemum guerichianum*	Succulent
Aizoaceae	*Mesembryanthemum junceum*	Succulent

Family	Species	Growth form
Aizoaceae	*Mesembryanthemum tetragonum*	Succulent
Amaranthaceae	*Atriplex semibaccata*	Shrub
Amaranthaceae	*Chenopodium *album*	Herb
Amaranthaceae	*Exomis microphylla*	Succulent
Amaranthaceae	*Salsola kali*	Herb
Asparagaceae	*Asparagus laricinus*	Shrub
Asteraceae	*Erigeron *bonariensis*	Herb
Asteraceae	*Gazania jurineifolia*	Herb
Asteraceae	*Lactuca *serriola*	Herb
Caryophyllaceae	*Pollichia campestrus*	Herb
Cucurbitaceae	*Cucumis africanus*	Herb
Ebenaceae	*Royena lycioides*	Shrub
Euphorbiaceae	*Euphorbia inaequilatera*	Herb
Fabaceae	**Neltuma glandulosa*	Tree/Shrub
Fabaceae	*Vachellia karroo*	Tree
Fabaceae	*Lotononis tenella*	Herb
Geraniaceae	*Pelargonium minimum*	Herb
Molluginaceae	*Kewa salsoloides*	Dwarf shrub
Nyctaginaceae	*Boerhavia *cordobensis*	Herb
Papaveraceae	**Argemone ochroleuca*	Herb
Poaceae	*Enneapogon desvauxii*	Grass
Poaceae	*Eragrostis echinochloidea*	Grass
Poaceae	*Eragrostis lehmanniana*	Grass
Poaceae	*Tragus berteronianus*	Grass
Portulacaceae	*Portulaca *oleracea*	Herb
Rhamnaceae	*Ziziphus mucronanta*	Tree
Scrophulariaceae	*Peliostomum leucorrhizum*	Shrub
Solanaceae	**Datura ferox*	Shrub
Solanaceae	*Lycium cinereum*	Shrub
Solanaceae	*Lycium hirsutum*	Shrub
Tamaricaceae	*Tamarix *ramosissima*	Tree/Shrub
Zygophyllaceae	*Tetraena microcarpa*	Shrub
Zygophyllaceae	*Tribulus terrestris*	Herb

DISCUSSION

VEGETATION

Vegetation types

The vegetation type present at both study site A and B falls within the Inland Azonal Vegetation known as the Upper Gariep Alluvial Vegetation type (Aza 4) (Figure 15 and 16) (Mucina and Rutherford, 2006).



Figure 15: Study Site A located within the Upper Gariep Alluvial Vegetation (AZa 4) after Mucina and Rutherford (2006).



Figure 16: Study Site B located within the Upper Gariep Alluvial Vegetation (AZa 4) after Mucina and Rutherford (2006).

Only 3% of the Upper Gariep Alluvial Vegetation (Aza 4) is statutorily conserved in Tussen Die Riviere, Gariep Dam and Oviston Nature Reserves. More than 20% has already been transformed for cultivation and the building of dams.

Important taxa according to Mucina and Rutherford (2006), include Small trees: *Vachellia karroo, Celtis africana, Salix mucronata* subsp. *mucronata*. Tall shrubs: *Royenea lycioides* [*Diospyros lycioides], Melianthus comosus, Searsia pyroides*. Low Shrubs: *Asparagus setaceus, Asparagus suaveolens*. Woody climber: *Clematis brachiata*. Succulent shrubs: *Lycium arenicola, L. hirsutum*. Herbs: *Rubia cordifolia Cineraria dregeana, C. lobata*. Graminoids: *Melica decumbens*.

Vegetation units of Site A

Vegetation unit 1 (Shrubland vegetation unit) has a well-developed shrub layer that is mostly, dominated by succulent shrubs *Mesembryanthemum coriarium, Roepera pubescens* and *Tetraena microcarpa,* while the woody shrub *Rhigozum trichotomum* can also be prominent. Scattered individuals of *Senegallia mellifera* and **Neltuma*

*glandulosa [*Prosopis glandulosa]* form the tree layer. Prominent grasses in this vegetation unit include *Enneapogon desvauxii, E. cenchroides, Cenchrus ciliaris* and *Stipagrostis ciliata*. From an ecological perspective, the area has a medium conservation value with a medium sensitivity because of its association with vegetation unit two that contains the protected and data-deficient *Ceropegia* cf. *gordonii [Hoodia* cf. *gordonii].* Furthermore, the area is already bordered by disturbed areas in the form of the R357 between Prieska and Douglas on the southern boundary and agricultural fields on the northern boundary. Various alien invasive species were also found in this vegetation unit that include: *Salsola kali, Erigeron *bonariensis, Lactuca serriola, Sonchus *oleraceus, *Medicago sativa, *Neltuma glandulosa [*Prosopis glandulosa]* and *Boerhavia *cordobensis.*

Vegetation unit 2 (Ridge vegetation unit) is mostly composed of trees, *Senegalia mellifera,* with a shrub layer containing *Pentzia incana, P. sphaerocephala, Eriocephalus ericoides, E. spinescens, Aizoon plinthoides, Senegalia mellifera* and *Rhigozum trichotomum* to a lesser extent. Grasses and herbs are not present in abundance. From an ecological perspective, this vegetation unit has a high conservation value and a high sensitivity due to the presence of the protected species *Ceropegia* cf. *gordonii [Hoodia* cf. *gordonii]* which is also indicated as data deficient. Together with this species, there are also other protected species such as *Mesembryanthemum tetragonum, M. guerichianum* and *M. noctiflorum, Nerine* sp, *Ammocharis* sp and *Aloe claviflora.* Contrary to the protected species, there are also various alien invasive species found in this vegetation unit. These include: **Coreopsis lancoelata, Erigeron *bonariensis, Sonchus *oleraceus, *Medicago sativa, *Neltuma glandulosa [*Prosopis glandulosa], Boerhavia *cordobensis* and *Tamarix *ramosissima.*

Vegetation units of Site B

All vegetation units at this site have been disturbed by the uprooting and burning of the vegetation.

Vegetation unit 1 (Wetland) located in the south-western corner of study Site B is dominated by *Phragmites australis.* There are no protected species, with only

*Chenopodium *album,* an alien invasive species. From an ecological perspective, this area has a medium conservation value due to it being a wetland that might be part of the drainage lines. However, there is also a possibility that the wetland could have originated because of the surrounding irrigation. The continues presence of water in the wetland can result in the development of wetland properties in terms of its soil, which might have an influence on the conservation value thereof.

Vegetation unit 2 (Drainage line) occurs as three areas located mostly on the northern border of study site B towards the Orange River at the study area. These drainage lines are most probably natural drainage towards the nearby Orange River. The vegetation is dominated by the presence of *Vachellia karroo* trees and shrubs such as *Lycium cinereum* and *L. horridum.* There are protected species in terms of *Mesembryanthemum coriarium* and *M. guerichianum* also present in this vegetation unit. The alien invasives include *Atriplex *lindleyi, Erigeron *bonariensis, Sonchus *oleraceus, *Medicago sativa, *Neltuma glandulosa [*Prosopis glandulosa],* and *Tamarix *ramossisima* which are also present in this vegetation unit. These drainage lines are important from an ecological perspective as they provide corridors for the movement of species that are associated with riverine environments.

Vegetation unit 3 (Degraded vegetation unit) forms the largest portion of study Site B. This area has been severely impacted by anthropogenic activities in the form of vegetation clearing and burning. One can thus not determine the natural state of this vegetation unit. There is also no dominating species in this vegetation unit. This unit therefore have a very low conservation value.

Declared Invasive Alien Plant species (AIP's)

			Site A		Site B		
Family	**Species**	**NEMBA**	**Unit 1**	**Unit 2**	**Unit 1**	**Unit 2**	**Unit 3**
Amaranthaceae	*Salsola kali*	1b	x				x
Asteraceae	**Coreopsis lanceolata*	1b		x			
Fabaceae	**Neltuma glandulosa*	3	x	x		x	x
Papaveraceae	**Argemone ochroleuca*	1b					x
Solanaceae	**Datura ferox*	1b					x
Tamaricaceae	*Tamarix *ramosissima*	1b		x		x	x

Alien species pose a risk to the natural environment, locally as well as in the surrounding areas. These species are indicative of degraded conditions in the areas where they occur. Alien plant species outperform the indigenous plant species in terms of reproduction and establishment; furthermore, they also cause deterioration of the habitat in terms of soil water content, soil pH and erosion. Various species from NEMBA's category 1b were found in the study area. According to section 70(1)(a) of the Act, these species must be controlled or irradiated where possible. There is also species from NEMBA's category 3 present. These species are proven invaders and must be controlled (Henderson, 2020).

Protected, Specially protected and Red data species

A list of possible protected species that were recorded in the larger region is listed below

(Please note that the list is confidential and may not be made available for public perusal)

Species	Conservation status	Comments
Mesembryanthemum tetragonum	Aizoaceae family is protected	Found
Mesembryanthemum coriarium	Aizoaceae family is protected	Found
Mesembryanthemum guerichianum	Aizoaceae family is protected	Found
Mesembryanthemum junceum	Aizoaceae family is protected	Found
Mesembryanthemum noctiflorum	Aizoaceae family is protected	Found
Boscia albitrunca	Least concern	Found
Ammocharis sp.	Amaryllidaceae family is protected	Found
Nerine sp.	Amaryllidaceae family is protected	Found
Ceropegia gordonii	Declining - Red data; Specially protected	Found
Aloe claviflora	Asphodelaceae family is protected	Found
Euphorbia inaequilatera	Euphorbia genus is protected	Found
Pelargonium minimum	Pelargonium genus is specially protected	Found

Ecosystem classification

The study area falls within the greater Griqualand West Centre of Endemism (Frisby, 2016; Frisby *et al*., 2019; van Staden *et al*., 2020). The focus areas of the centre of endemism are the core areas with higher numbers of endemic and restricted flora. The core areas include the Northern Ghaap Plateau and Kuruman Hills sub-centre, the Southern Kalahari and the Langeberg sub-centre and the Southern Ghaap Plateau and the Kimberley-Prieska valley sub-centre. The area of study does not fall within either of these regions (Frisby, 2016; Frisby *et al*., 2019; van Staden *et al*., 2020).

Critical Biodiversity Areas

Both study areas (Site A and Site B) fall within Critical Biodiversity Areas One identified by the Northern Cape (Figure 17) during their 2016 analysis. These areas are required to meet biodiversity targets for species, ecosystems or ecological processes and infrastructure and must be maintained in a natural or near-natural state with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate. When overlaying the areas identified in the 2024 analysis, Site A still partially fall within the Critical Biodiversity Area 1, while sections of Site B falls within Ecological Support Areas (Figure 18).

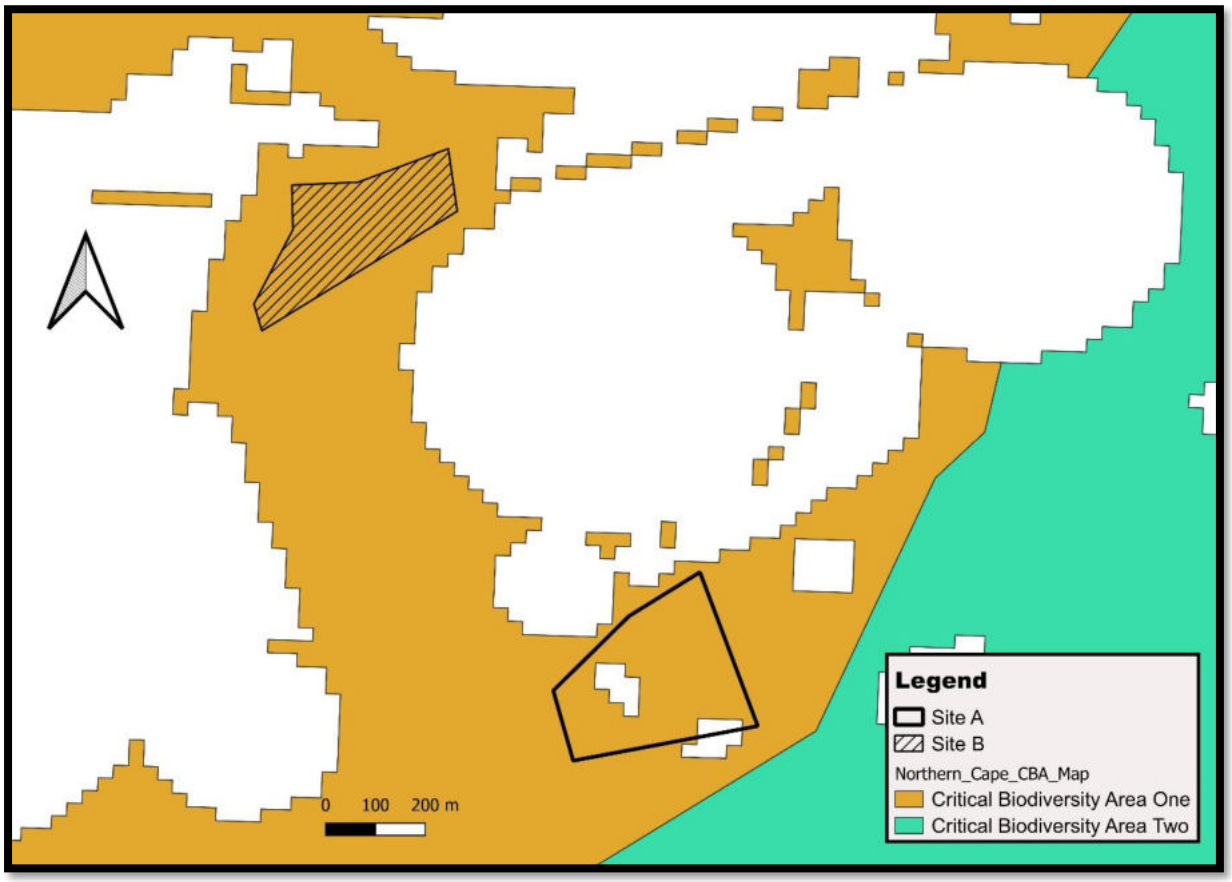


Figure 17: Study Site A and B falling within Critical Biodiversity Area One of the Northen Cape from 2016.

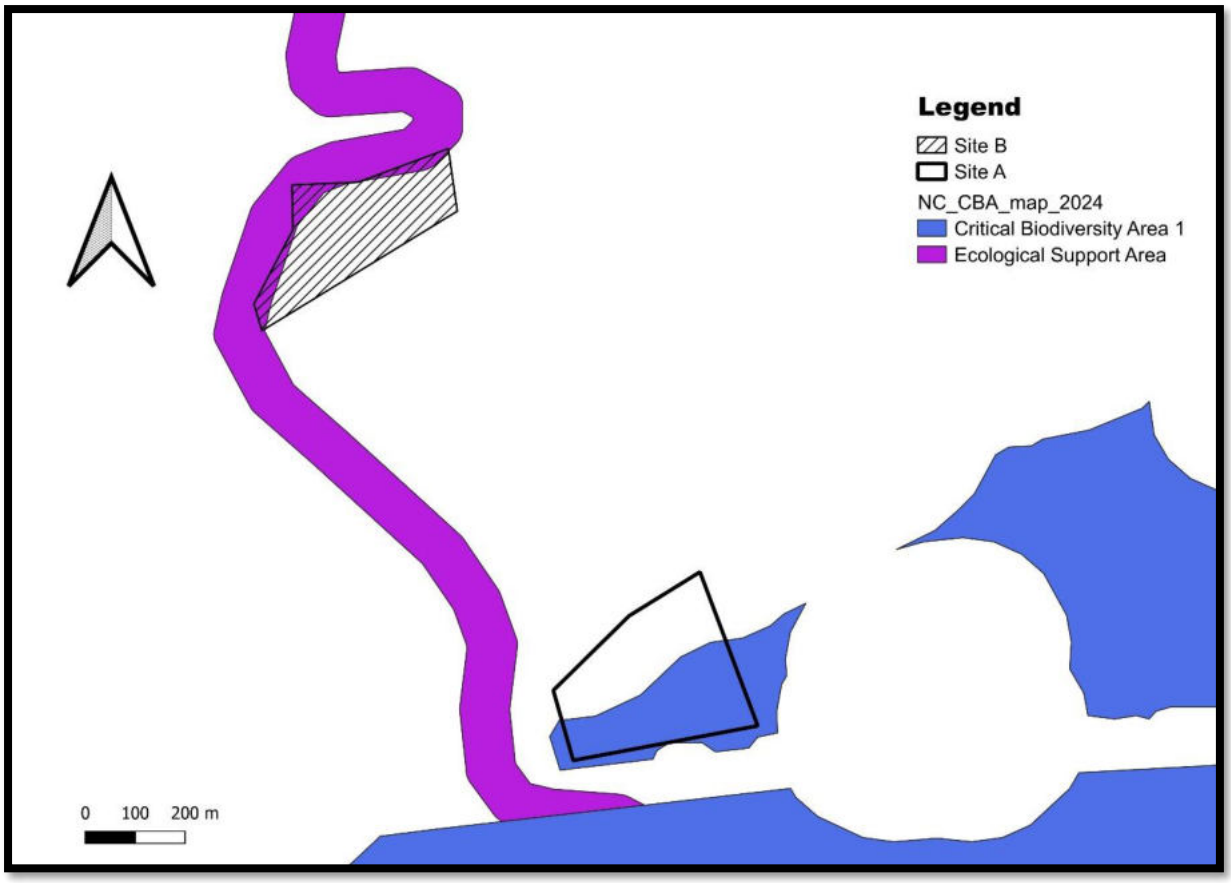


Figure 18: Study Site A partially falling within Critical Biodiversity Area and site B partially falling within the Ecological Support Areas of the Northen Cape from 2024.

CONCLUSION AND RECOMMENDATIONS

The study is located north of the R357 between Prieska and Douglas, approximately 11 kilometres from Prieska. The Orange River forms the northern border of the two study sites. Site A is located next to the R357, while Site B is located closer to the Orange River in a northerly direction. Site A is bordered by the R357 on the southern side and pivots where cultivation takes place on the northern side. The western border contains natural vegetation as a side stream of the Orange River, while the eastern border is also composed of natural vegetation. Site B is bordered by agricultural fields on the southern and eastern sides with a tributary of the Orange River on the west and the Orange River to the north.

The study area can be divided into two study sites, Site A and Site B, which are composed of two and three vegetation units, respectively, as discussed in this report. Site A can be seen as near natural with limited anthropogenic impact except for the

road to the south and agricultural activities to the north. Within this site, there are alien invasive trees from category 1b and 3 which need to be controlled under the National Environmental Biodiversity Act. There are also various protected species from Schedule 1 and 2, as well as Red Data species present at this site. The vegetation found at this site is in a near-natural state and corresponds with the bordering Northern Upper Karoo (NKu3) vegetation type rather than with the vegetation from the Upper Gariep Alluvial Vegetation (Aza4). With the above mentioned in mind this site has a medium conservation value and can be regarded as medium-high in terms of sensitivity as well because of the data deficient *Ceropegia gordonii [Hoodia gordonnii]* occurring at the site.

Site B was found to be severely impacted by anthropogenic actions. The impact was to such an extent that limited natural vegetation was present. Although the drainage lines (vegetation unit 2) are ecologically important, they are already in a degraded state. There is uncertainty about the origin of the wetland, which leaves its ecological importance in question; however, if the wetland keeps on developing, it might result in more changes in the vegetation composition and later result in an area that has an important ecological role. The degraded vegetation unit (vegetation unit 3) is severely impacted, with vegetation that is uprooted and burnt. One can thus not make any assumptions about the state of the natural vegetation. The conservation value of site B is low-medium with a low-medium sensitivity because of the destruction that has already taken place.

When looking at the study area (Site A and Site B), various alien invasive species that need management actions according to the National Environmental Biodiversity Act were found. Other than the aliens, various specially protected, protected and red data species were found for which permits will be required if they were to be removed. Some of the protected species, such as *Mesembryanthemum tetragonum, M. coriarium, M. guerichianu, M. junceum, M. noctiflorum, Boscia albitrunca, Ammocharis* sp., *Nerine* sp., *Aloe claviflora, Euphorbia inaequilatera* and *Pelargonium minimum* might be present in the surrounding natural vegetation. The concern would be the presence of *Ceropegia gordonii [Hoodia gordonii],* which is regarded as a Red Data species.

The Northern Cape Biodiversity Plan classify both study site A and B as occurring within Critical Biodiversity Area 1 (CBA 1). Site A can be divided into two vegetation units. Vegetation unit 1 is in a near natural state with climax and secondary successional species as well as a moderate species richness. This vegetation unit is therefore regarded as having a medium biodiversity importance. The invasive **Neltuma glandulosa* [**Prosopis glandulosa]* species should be removed as a high priority to prevent encroachment into the area and the displacement of native vegetation. Vegetation unit 2's vegetation is also considered as near natural with a high conservation priority since it is suitable habitat for the presence of *Ceropegia gordonii [Hoodia gordonii]*, found at the site. This unit has a medium biodiversity importance, since most vegetation is still natural. The strong presence of *Senegalia mellifera* in the tree and shrub layer might be indicative of encroachment due to previous overgrazing. However, a total of ten (10) different protected and specially protected and red data species were found at this study site. Removal of these plants from the different vegetation units will require permits. These plants should also be replanted in suitable habitat outside the study site, under the supervision of a qualified plant ecologist. The near natural state, moderate species richness and connectivity to the surrounding natural vegetation thus do classify study site A as a CBA 1.

Study site B is composed of 3 different vegetation units which all have been severely impacted by anthropogenic disturbances. Vegetation units 1 and 2 have a medium to high conservation value from an ecological point of view. Although these areas have been severely degraded, when looking at the vegetation, these areas at as water courses (vegetation unit 2) and associated wetlands (vegetation unit 1). This result in these areas having a high biodiversity importance and a medium to high ecological sensitivity. Vegetation unit 3 is degraded due to anthropogenic interventions and therefore have a low conservation priority. Furthermore, the vegetation unit contains various category 1 and 3 alien invasive species which is indicative of transformed vegetation. This vegetation unit thus have a low conservation value and species richness. From a biodiversity importance perspective, the value is also low. Furthermore, this study site is surrounded agricultural fields, with only the Orange River tributary to the west and north left as connectivity to natural vegetation. Six (6) protected species were found in vegetation units 2 and 3. Permits must be obtained

for the removal of these species from the different vegetation units. Plants should be replanted in suitable habitat outside of the study area under the supervision of a qualified plant ecologist.

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Terms of Reference

The purpose of the Soil Suitability Assessment was to determine the suitability of the proposed development areas on Erf 1 and Erf 971, Oranje-Oos Farm, near Prieska, for the establishment of irrigated agricultural land. The assessment evaluated the physical and chemical characteristics of the soils, their capability to support sustainable irrigation, and their suitability for long-term agricultural production. The assessment was undertaken in accordance with accepted soil science principles, the South African Soil Classification System (2018), and the Northern Cape Department of Agriculture's guidelines for the cultivation of virgin land and irrigation suitability.

The objectives of the assessment were to:

- Undertake a detailed field investigation to identify, describe and classify the soil forms occurring within the proposed development areas.
- Determine the distribution, extent and spatial variability of the different soil forms through field observations and soil mapping.
- Assess key soil characteristics, including soil depth, freely drained depth, drainable depth, limiting layers, texture, structure and drainage characteristics.
- Evaluate the chemical properties of representative soil profiles, including soil pH, electrical conductivity (EC), exchangeable sodium percentage (ESP), sodium adsorption ratio (SAR), cation exchange capacity (CEC) and selected macro- and micro-nutrients.
- Assess the potential limitations to sustainable irrigation, including salinity, sodicity, poor drainage, shallow soils, restrictive horizons and other soil constraints that may influence agricultural productivity.
- Determine the suitability of the soils for irrigation and cultivation in accordance with the Northern Cape Department of Agriculture's criteria and accepted agricultural land evaluation standards.
- Produce soil distribution, soil depth and irrigation suitability maps to support development planning and decision-making.
- Evaluate the potential risks associated with irrigation, including waterlogging, soil degradation and salinisation, and identify appropriate management measures to minimise these risks.
- Assess the suitability of the proposed soils for the intended agricultural land use and provide recommendations for sustainable soil and irrigation management.
- Provide a professional opinion on the overall suitability of the proposed development areas for irrigated agriculture and identify any management requirements necessary to ensure the long-term productive capability of the soil resource.



Cultivation and Irrigation suitability of the Farm Oranje-Oos, near Prieska, Northern Cape

Prepared for

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EXECUTIVE SUMMARY

A soil assessment was carried out on the Oranje-Oos farm, located near Prieska in the Northern Cape, on behalf of Martelle Trust. The investigation covered four land parcels measuring 29 ha in total. The objective was to evaluate the suitability of the land for centre pivot irrigation and establishing pecan nut orchards.

Findings from the survey indicate that the area is predominantly underlain by well-drained Oakleaf soils, which are considered highly favourable for both irrigation and cultivation. These soils offer adequate depth, efficient drainage, and favourable chemical characteristics. The southern parcel is covered by deep Prieska soils where the hard carbonate is at approximately 1.8 m below the surface. In general, the land is deemed fit for irrigation use, assuming that salinity is managed through sound irrigation and agricultural practices. The suitability is depicted in Figure A.

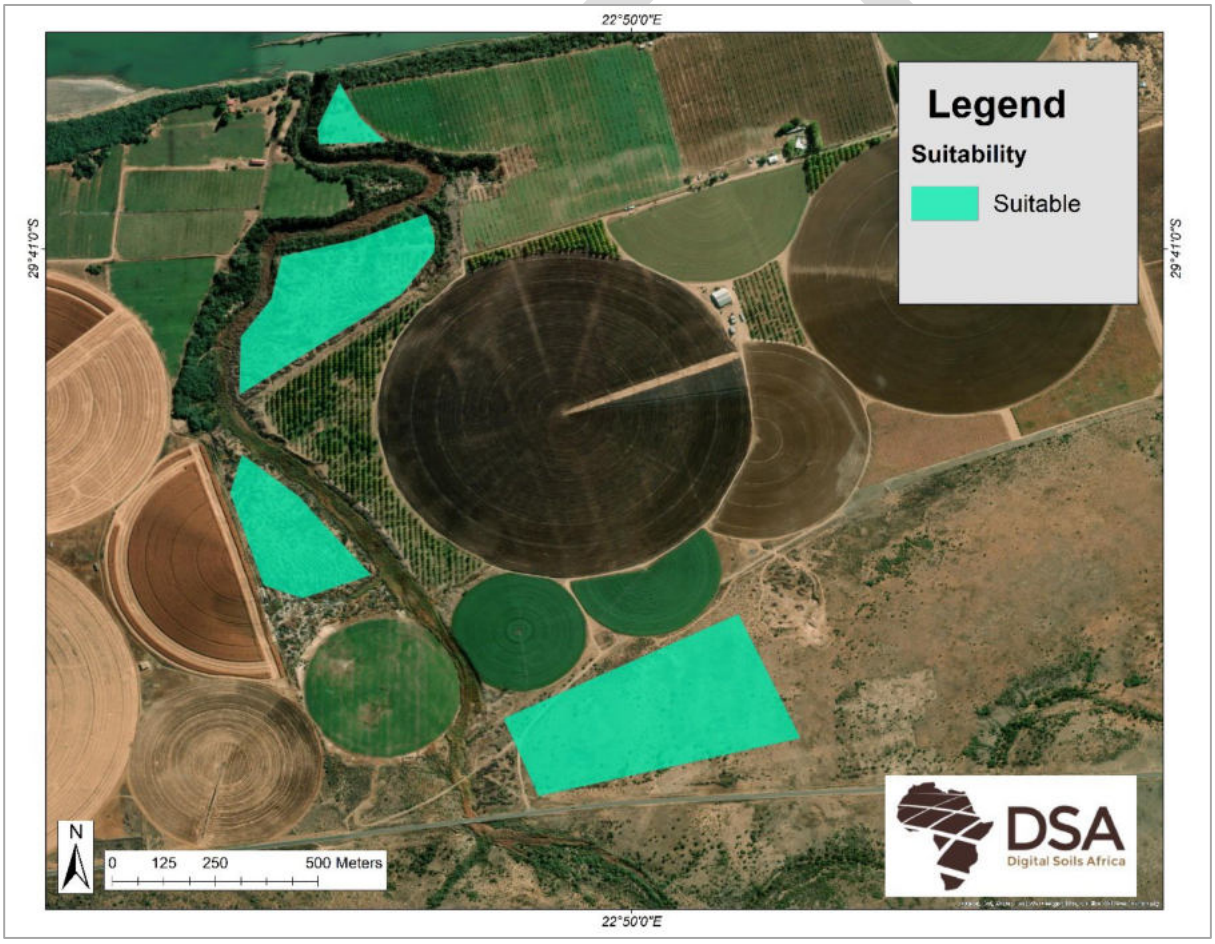


Figure A: Suitability classes for irrigation on portions of the farm Oranje-Oos near Prieska.

1. INTRODUCTION

Digital Soils Africa (Pty) LTD (DSA) were tasked by Martelle Trust to conduct a soil survey of four portions of land of approximately 29 ha near Prieska in the Northern Cape. The land is on the farm Oranje-Oos (the site or study area from this point forward). The purpose of the survey is for obtaining a ploughing certificate for the mentioned area. The survey should meet the standards of the Northern Cape Department of Agriculture's guidelines for ploughing virgin soil.

The aim of the survey was therefore to determine the suitability of the soils for these practices. For sustainable irrigation of land, the risk of water logging and salinization need to be established. When irrigation water is applied, dissolved salts are applied with the water, but plants mainly remove water through transpiration resulting in the accumulation of salts in the soils, which may result in yield decreases and crop losses. In extreme cases, salinization will reach the extent that the soil cannot be vegetated anymore. These effects can be negated with proper management on soils with certain properties. For this reason, the Department of Agriculture, Northern Cape, has provided guidelines to which soil properties must adhere before a ploughing licence can be granted. These properties are related to the water infiltration of the soil, as well as salt and sodium built up. On these sites the properties of the soils and the distribution thereof were investigated and areas where irrigation can be managed sustainably identified.

2. LOCATION

There are four areas on the farm Oranje-Oos which were surveyed (Figure 1). From the north to south the areas are 1, 8, 5 and 15 ha in size. The site is located on the banks of the Orange River approximately 5 km east of Prieska (Figure 1). The coordinates of the focus areas are presented in Table 1.

Table 1: Coordinates of selected points on the perimeter of the studied area

Site 1 - 1ha			Site 3 - 5 ha		
No	X	Y	FID	X	Y
0	22.82696	-29.6797	21	22.82483	-29.6878
1	22.82648	-29.6807	22	22.82458	-29.6886
2	22.82651	-29.681	23	22.82495	-29.6897
3	22.8272	-29.681	24	22.82531	-29.6907
4	22.82797	-29.681	25	22.82615	-29.6909
5	22.82741	-29.6805	26	22.82766	-29.6904
Site 2 - 8 ha			27	22.82665	-29.6894
FID	X	Y	28	22.82609	-29.6887
6	22.8257	-29.6835	29	22.82542	-29.6882
7	22.82548	-29.6844	Site 4 - 15 ha		
8	22.8248	-29.6853	FID	X	Y
9	22.82477	-29.6865	30	22.83054	-29.6936
10	22.82549	-29.6861	31	22.83133	-29.6932
11	22.82626	-29.6856	32	22.83288	-29.6925

12	22.82673	-29.6853	33	22.83426	-29.6919
13	22.82745	-29.6849	34	22.83567	-29.6913
14	22.82834	-29.6843	35	22.83622	-29.6924
15	22.82896	-29.6835	36	22.83679	-29.6935
16	22.82904	-29.6831	37	22.83703	-29.694
17	22.82887	-29.6826	38	22.83594	-29.6942
18	22.828	-29.6829	39	22.83471	-29.6945
19	22.82733	-29.6831	40	22.83372	-29.6947
20	22.82661	-29.6833	41	22.83272	-29.695
			42	22.83187	-29.6951
			43	22.83131	-29.6953
			44	22.83097	-29.6945

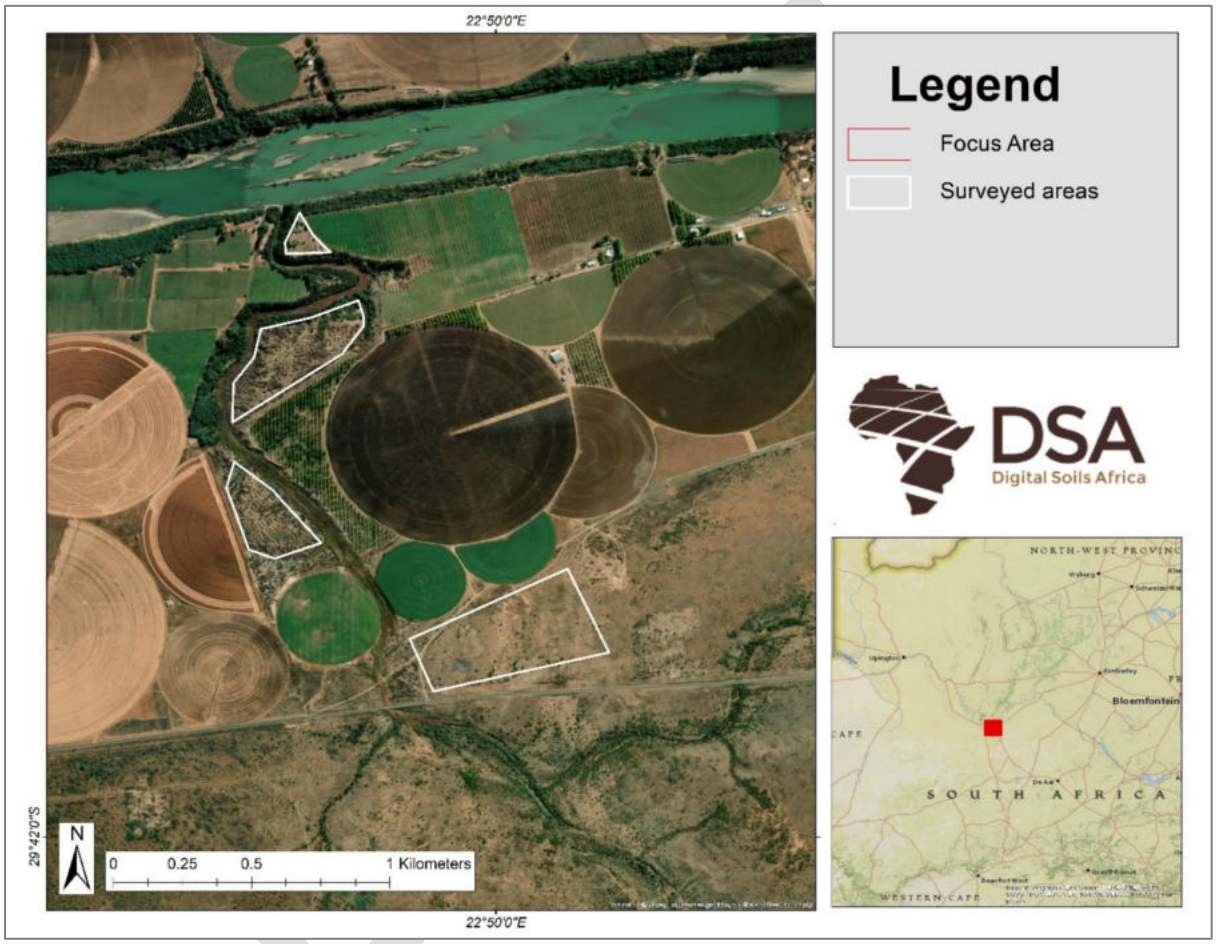


Figure 1: The location of the focus area of this study on the banks of the Orange River.

3. METHODOLOGY

A field visit was conducted on the 17th of September 2025. Ten soil observations were made using a combination of profile pits and hand augers. The location of these observations is presented in Figure 2 with their coordinates in Table 2. The profiles were opened to approximately 2000 mm. Soils were classified according to Soil Classification: A Natural and Anthropogenic System for South Africa (2018) which is now the officially recognised classification system for South African soils. Soil depth, freely drainable depth and limiting material were noted and mapped. Samples of two representative profiles were taken for

chemical and physical analysis. A total of four samples were analysed which included two topsoil samples (0 – 300 mm) and two subsoil samples (300 – 600 mm). Texture was measured with the pipette method, basic cations from a 1:10 NH_4OAc extract (White 2006) and soil pH in a 1:2.5 KCl extract. Phosphorus was measured with Bray I method and selected micro-nutrients with the DTPA method.

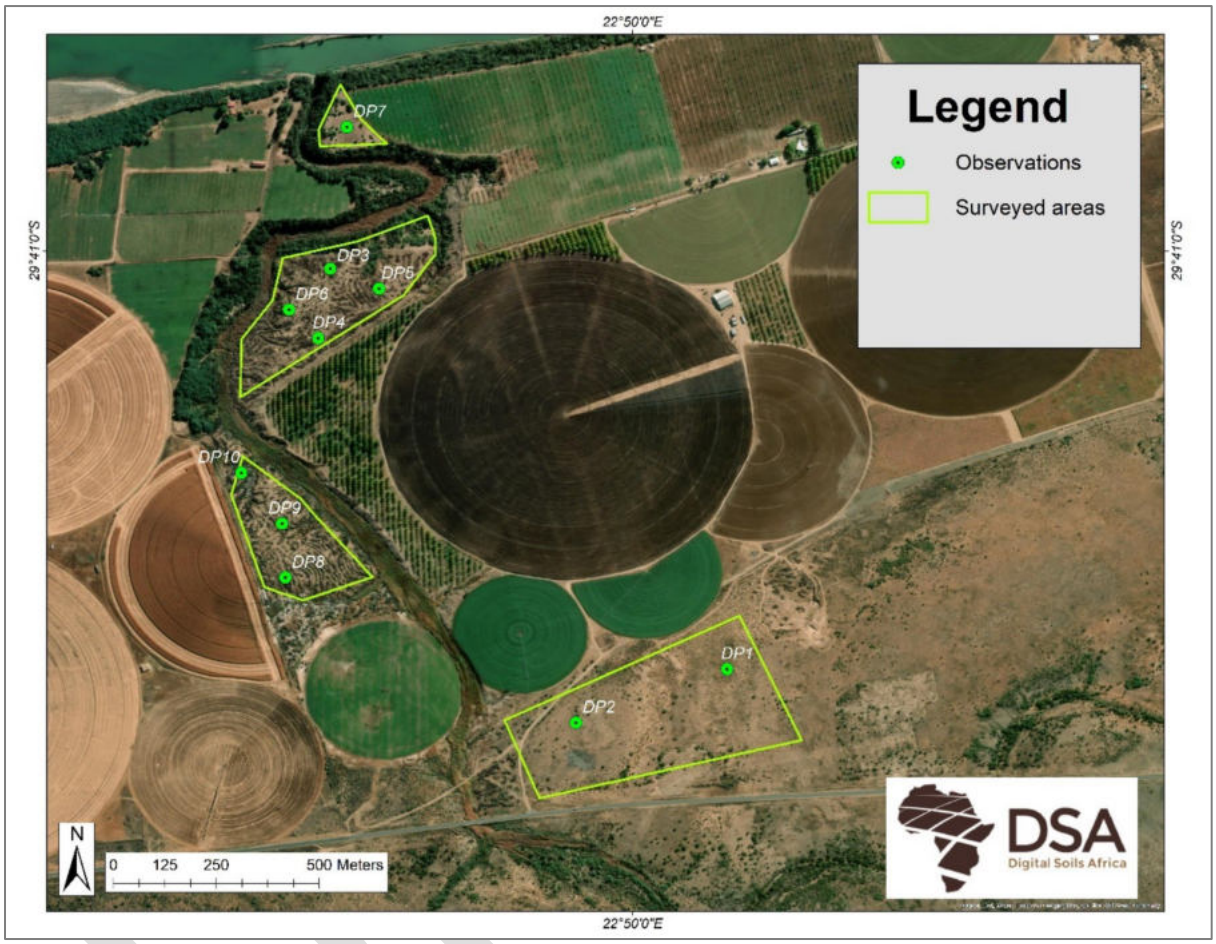


Figure 2: Surveyed areas and soil observation locations for the site.

Table 2: Observation locations in study area

Obs	X	Y	Obs	X	Y
DP1	22.8354	-29.6925	DP6	22.82584	-29.6846
DP2*	22.8321	-29.6936	DP7	22.8271	-29.6806
DP3	22.82674	-29.6837	DP8	22.82576	-29.6905
DP4	22.82648	-29.6852	DP9	22.82569	-29.6893
DP5*	22.82781	-29.6842	DP10	22.8248	-29.6882

(observation numbers followed by * were sampled)

4. RESULTS

4.1 SOILS FORM

The site was very uniform and only one soil form, Oakleaf, on the three northern survey areas and Prieska in the southern site.

PRIESKA

Prieska soils consist of an orthic topsoil horizon overlying a neocarbonate subsoil on a hard carbonate horizon (Figure 3). The hard carbonate horizon occurred deeper than 1 500 mm from the surface and the neocarbonate horizon contained lime nodules. Due to the depth at which the hard carbonate horizon occur we do not expect any drainage problems although the soils will be naturally alkaline.

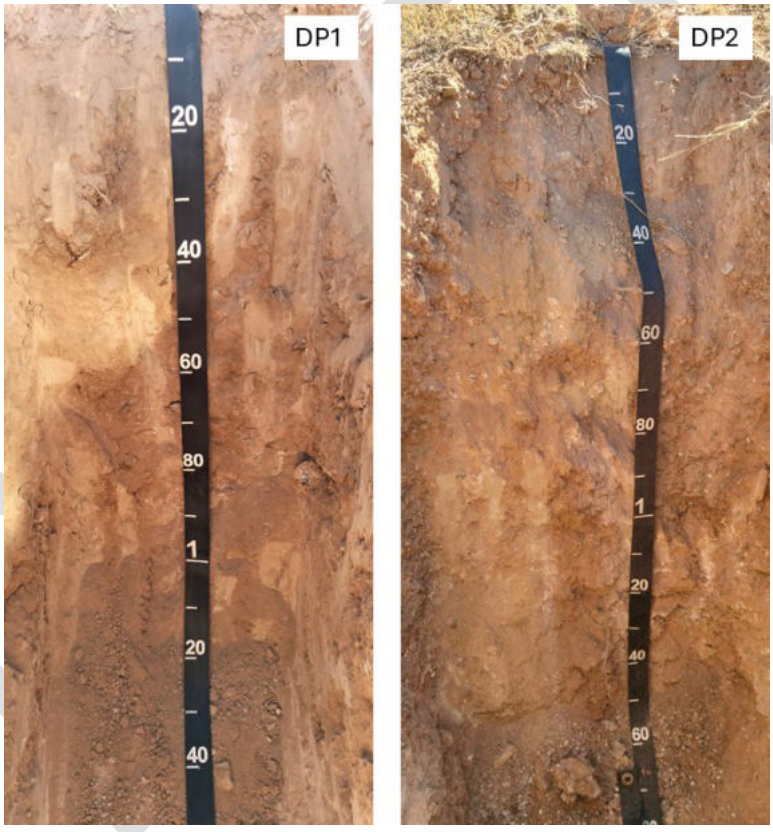


Figure 3: Prieska soils represented by DP1 and DP2, respectively.

OAKLEAF

The Oakleaf soil form consists of an orthic horizon on a deep neocutanic horizon (Figure 4). The soils are very deep and mostly more than 2500 mm. developed from alluvial deposits The morphology suggests that the soils are freely drained and highly suitable for irrigation.

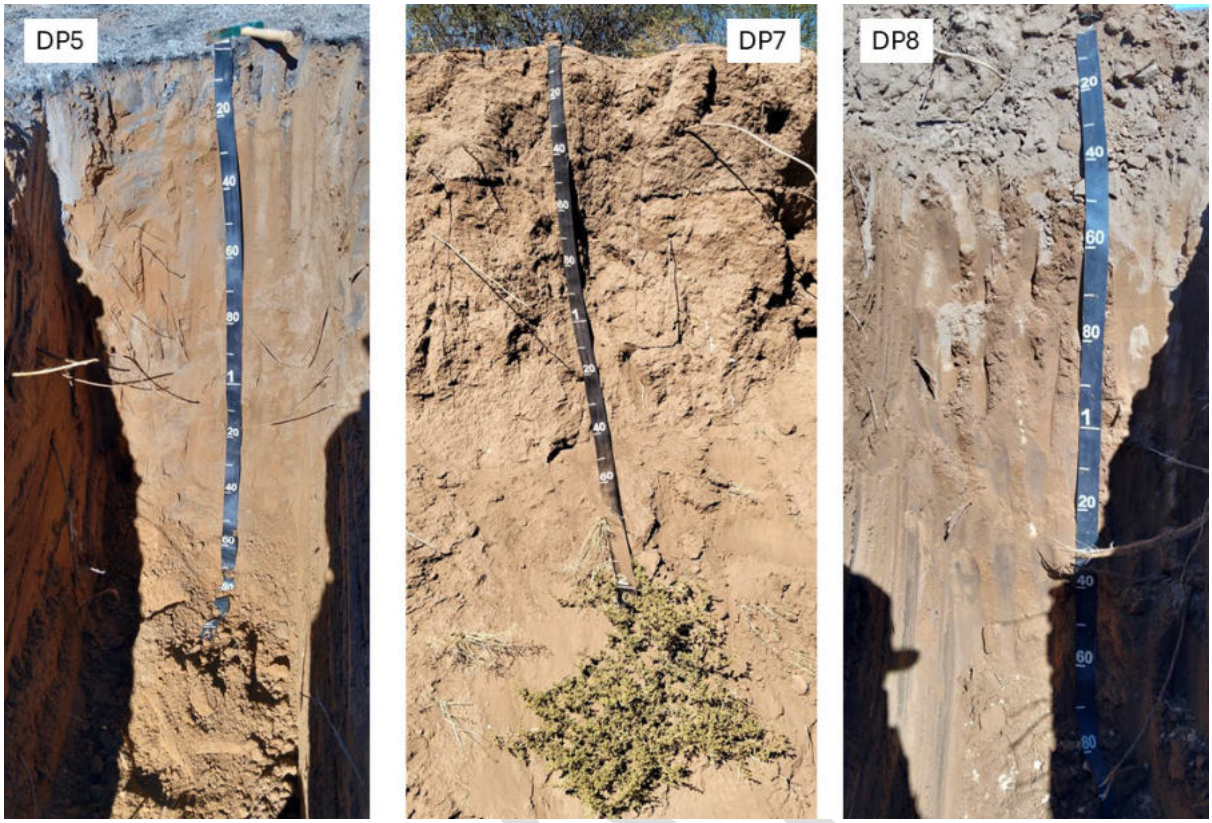


Figure 4: Oakleaf soils represented by DP5, DP7 and DP8, respectively.

4.2 SOIL AND SOIL DEPTH MAPS

The northern survey areas are covered by uniform Oakleaf soils and the southern part with Prieska soils (Figure 5). The lower boundary of the soils was not reached in the Oakleaf soils but were around 1 800 mm in the Prieska soils. Based on this, the soil depth was classified in the 2.51–3.00 m for the Oakleaf and 1.51-2.00 m category for the Prieska soils, respectively, in accordance with the Departmental Guidelines (Figure 6).

The freely drained depth was assumed to be equal to the total soil depth (Figure 7). In all cases, the underlying material could be broken relatively easily; therefore, the drainable depth was also considered equal to the total soil depth, although in practice it may be even deeper (Figure 8). No depth-limiting layers were encountered in the Prieska soils whereas the hard carbonate horizon could potentially restrict deep drainage in the Prieska soils (Figure 9).

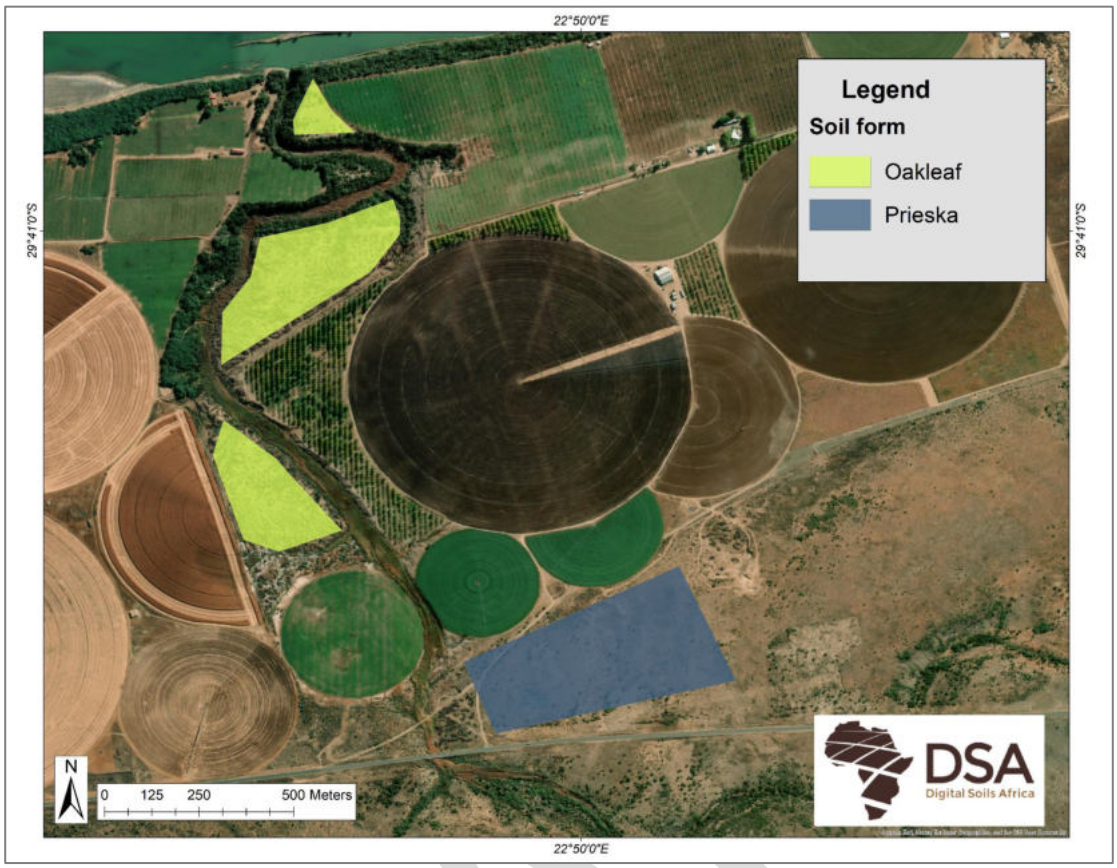


Figure 5: Soil map of the surveyed areas.

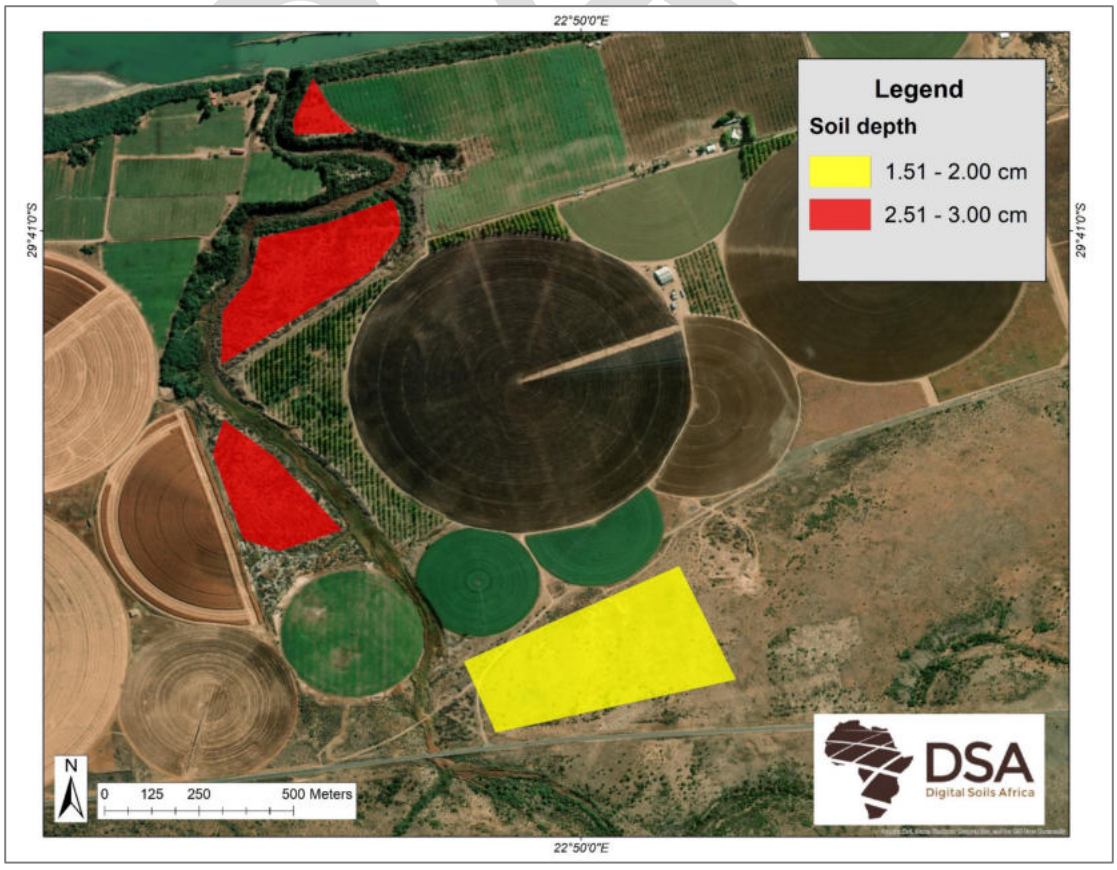


Figure 6: Total soil depth of the surveyed areas.

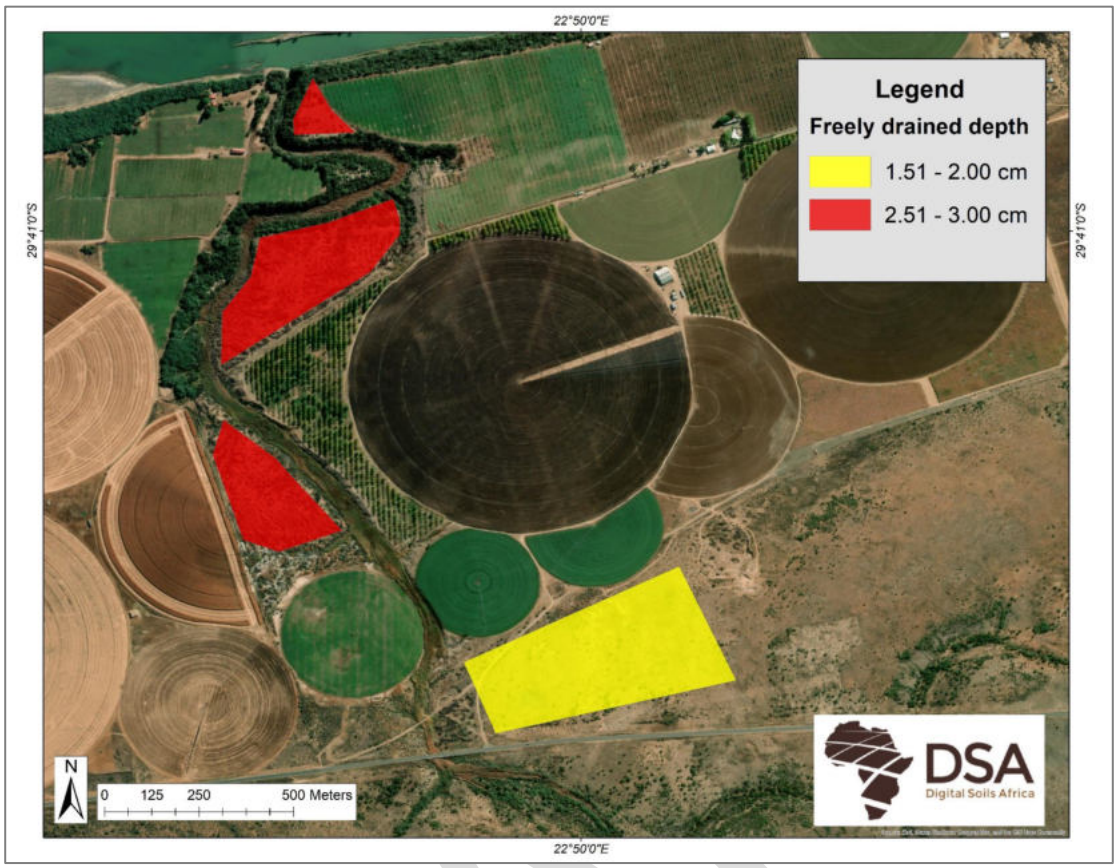


Figure 7: Freely drained depth of the surveyed areas.

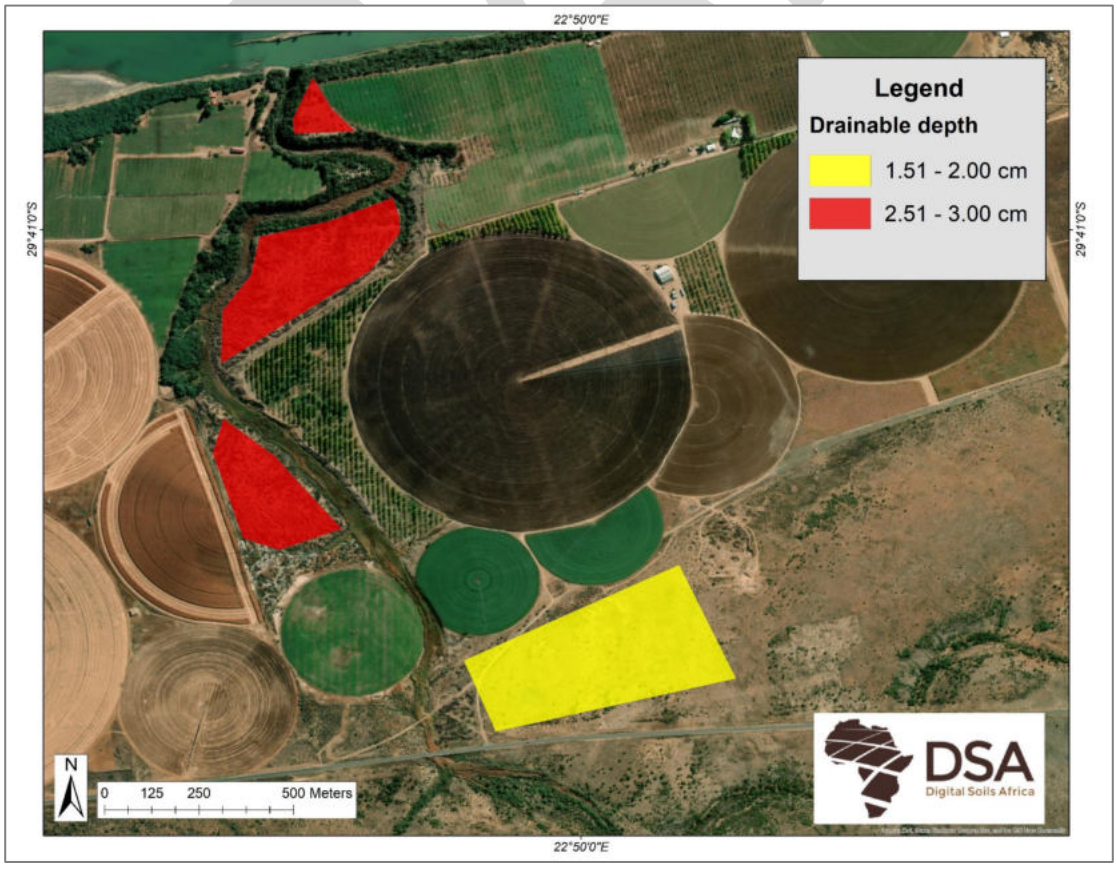


Figure 8: Drainable depth of the surveyed areas.

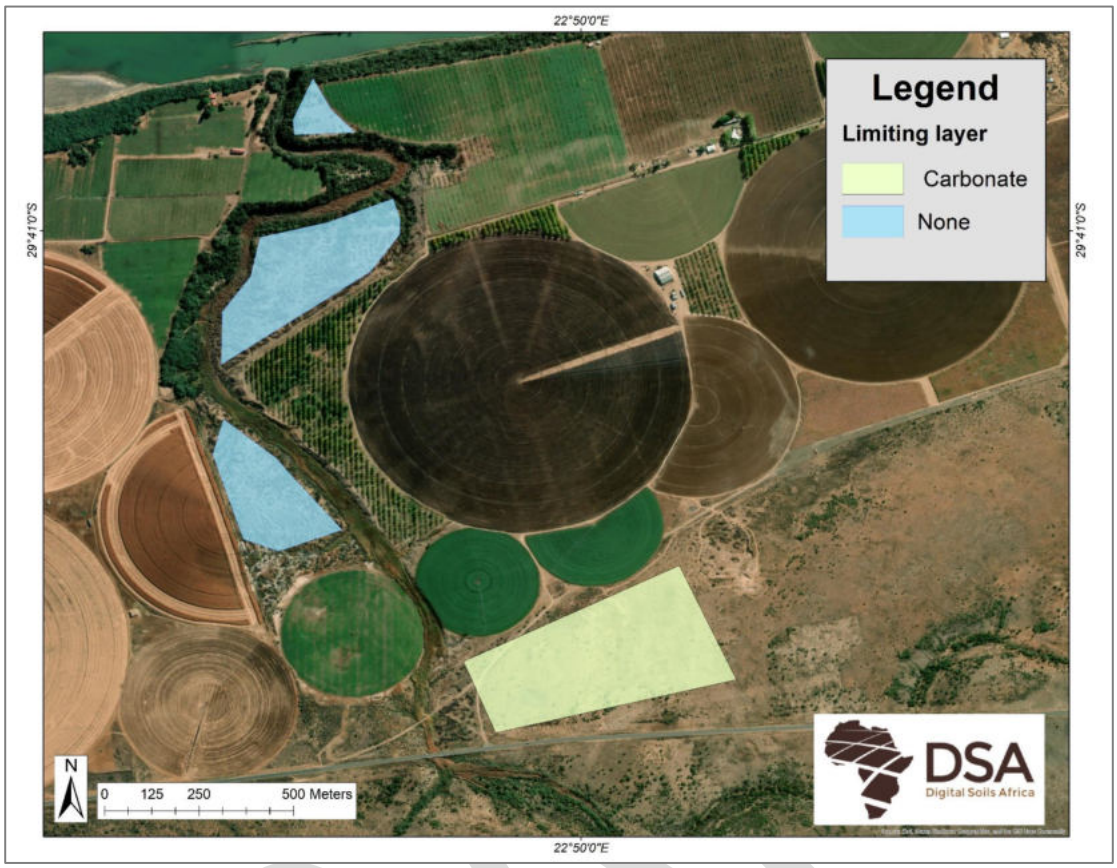


Figure 9: Depth limiting layer of the surveyed areas.

4.3 CHEMICAL AND SOIL TEXTURE ANALYSIS

Table 3 (chemical) and Table 4 (texture) present selected soil properties of samples taken from modal profiles.

Based on the chemical analysis, none of the soils exceed the norms in terms of any of the chemical norms for irrigatable soil. Since the soils are freely drained and excessive Na is not a problem leaching with excessive water will maintain EC levels within acceptable norms. Exchangeable Sodium Percentage (ESP) and the Sodium Adsorption Ratio (SAR) are all within the norms for soils to be irrigated. The P content is low but will be elevated when fertiliser is applied.

The clay percentage of the subsoil horizon is on the border of the Departments threshold value (35%). Despite the high clay, the soils had weakly developed structure and root and water penetration will not be restricted.

Table 3: Selected chemical properties for soil profile observations

Observation	Soil form	Horizon	pH (KCl)	EC	Ca	Mg	Na	K	CEC	ESP	SAR*	S	P
				mS/m	cmol(+)/kg					%		mg/kg	
DP-2A	Prieska	orthic	7.22	31.30	33.22	1.28	0.33	0.26	35.09	0.93	0.08	77.74	0.27
DP-2B		neocarbonate	7.25	84.20	33.39	3.07	1.32	0.31	38.09	3.47	0.31	87.29	0.27
DP-5A	Oakleaf	orthic	7.18	65.50	15.99	3.13	0.34	0.15	19.60	1.71	0.11	39.82	4.44
DP-5B		neocutanic	6.96	59.00	14.79	3.52	0.42	0.19	18.91	2.19	0.14	33.18	5.43

* SAR – approximated from 1:10 NH_4OA_c extract

Table 4: Particle size distribution of soil observations

Observation	Soil form	Horizon	Sand	Silt	Clay
			%		
DP-2A	Prieska	orthic	56.1	19.2	24.8
DP-2B		neocarbonate	63.7	15.0	21.8
DP-5A	Oakleaf	orthic	63.5	15.4	21.2
DP-5B		neocutanic	38.0	26.8	35.7

DRAFT

4.4SUITABILITY MAPS

Based on soil morphology and laboratory analysis, the entire surveyed areas are suitable for cultivation and irrigation in accordance with the guidelines of the Northern Cape Department of Agriculture (Figure 10). The Oakleaf soils all very deep (>2 m) and show no signs of saturation. The Prieska soils are also deep and the limiting layer only at 1.8 m. The perimeter coordinates of the final suitability classes for both areas are the same as the surveyed area presented in Table 1.

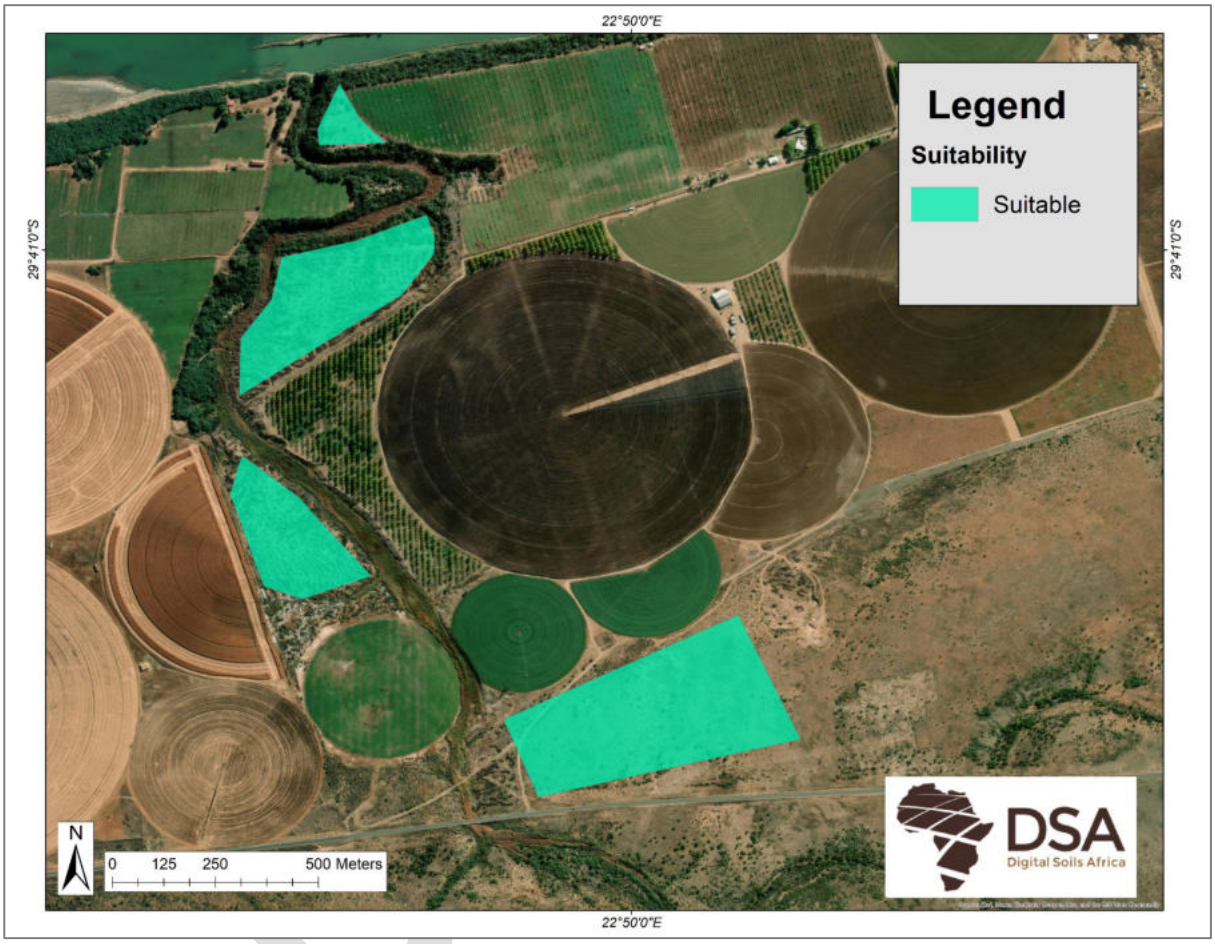


Figure 10: Suitability for cultivation and irrigation of focus area.

5. CONCLUSION

The soil survey conducted on portions of the Oranje-Oos farm confirms that the area is mostly covered by freely drained Oakleaf soils well-suited for irrigation and cultivation. The area in the south covered by Prieska soils is also suitable. All four surveyed portions have soils exhibiting sufficient depth, good drainage characteristics, and favourable chemical properties. Overall, the land is suitable for irrigation, provided that appropriate management practices are implemented to mitigate potential salinity risks.

6. REFERENCES

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7. DISCLAIMER

Digital Soils Africa cannot be held responsible for any advice given based on incorrect laboratory analysis given by our providers. Although all care is taken to ensure that the results reported are correct, we are dependent on services from other companies.

DRAFT

8. APPENDICES

APPENDIX 1: MODAL SOIL PROFILE DESCRIPTION

General Information						
Site:	Oranje-Oos DP1				Soil form:	Prieska
Map/Photo example:	Figure 3				Soil family:	2110
GPS Position:	22,8321; -29,6936				Colour	Chromic
Surface stones:	20%				Occurrence of flooding:	None
Altitude:	938 masl				Wind erosion potential:	Moderate
Terrain unit:	Footslope				Water erosion potential:	Low
Slope:	1%				Vegetation/Land use:	Natural veld
Slope shape:	Planform	Straight	Profile	Straight	Water table:	None
Aspect:	None					
Micro-relief:	None				Described by:	JJ van Tol
Parent material solum:	Carbonitic Rock				Date described:	2025-09-17
Geological group:	Dwyka Formation				Weathering of underlying material:	

Profile Information						
Horizon Depth (mm)	*Diagnostic Horizon*	*Colour*	*Structure*	*Redoximorphic features*	*Lime*	*Transition*
A 300	Orthic A	Red	Weak- Moderate, medium, SANBL	None	Absent	Gradual
B1 1800	Neocarbonate	Brown	Weak-moderate, medium, SANBL	None	Present	Clear
B2 1800+	Hard carbonate	White		None	Present	Not reached

General Information

Site:	Oranje-Oos DP5			Soil form:	Oakleaf
Map/Photo example:	Figure 4			Soil family:	2120
GPS Position:	22,82781; -29,6842			Colour	Chromic
Surface stones:	0%			Occurrence of flooding:	None
Altitude:	951 masl			Wind erosion potential:	Moderate
Terrain unit:	Footslope			Water erosion potential:	Low
Slope:	1%			Vegetation/Land use:	Cultivated Land
Slope shape:	Planform	Straight	Profile Straight	Water table:	None
Aspect:	None				
Micro-relief:	None			Described by:	JJ van Tol
Parent material solum:	Alluvial deposits			Date described:	2025-09-17
Geological group:	Dwyka Formation			Weathering of underlying material:	

Profile Information

Horizon Depth (mm)	*Diagnostic Horizon*	*Colour*	*Structure*	*Redoximorphic features*	*Lime*	*Transition*
A 300	Orthic A	Brown	Weak- Moderate, medium, SANBL	None	Absent	Gradual
B1 2200	Neocutanic	Brown	Weak-moderate, medium, SANBL	None	Absent	Not reached

APPENDIX 2: AGRONOMICAL REPORT

Compiled by Prof. G.M. van Zijl

Pr.Sci.Nat – Agricultural Science 400065/15

Pr.Sci.Nat – Soil Science

PhD (Soil Science – UFS)

M.Sc. Agric (Soil Science – SU)

B.Sc. Agric (Agronomy – SU)

Contact: +27 72 386 8632; george@dsafrica.co.za

1. General soil requirements for Maize

The suitability of the farm of Oranje-Oos described in this report for maize production is based on the physical and chemical soil properties presented in this report. Maize requires a well-drained and well aerated loamy soil that retains water and which fertility levels optimal and well balanced. Maize roots can extend, if root growth is not restricted, laterally approximately 1.5 m and downward to a depth of 2 to 3 m if not restricted. Maize will grow in a variety of soil textures, but the optimal clay content lies between 10% and 30%, due to water-air regimes. Lower clay percentages will require better management of irrigation, but can still produce very good yields. The optimal pH(KCl) range for maize is 5-7.5, but it can be grown in ranges between 4 and 7.5. Maize is moderately sensitive to salinity and starts to have crop losses ECe values of 170 $mS.m^{-1}$.

2. Specific to Oranje-Oos

a. Soil depth

The freely drainable depth is sufficient for maize roots to develop, and the entire site is suitable for maize production.

b. Soil texture

The clay percentage is slightly high, ranging between 21 and 35% the soils. The structure is however weaker than moderate and do not pose problems for root penetration. Maize could grow very well in such a medium, provided that the water management regime is adequate, which will require irrigation scheduling.

Wind erosion, surface encrustation after planting and soil compaction might however occur. These factors can and has to be managed by the producer in accordance with the selected tillage system.

c. pH

The pH(KCl) of the soil samples is between 6.96 and 7.22, which is generally within optimal ranges. It is anticipated that the pH will lower with proper salt management, and therefore regular soil sampling, to determine the liming requirements is necessary for sustainable management.

d. Salinity and sodicity

The Electrical Conductivity (EC) in the majority of the samples were well below the threshold of 170 $mS.m^{-1}$ at which maize crop losses start to occur. ESP and SAR values are within acceptable ranges and in general the area is conducive to maize production.

e. Other fertility requirements

Maize requires optimal levels of other plant nutrients, including P, K and S. Based on these results the current values are quite low in terms of the K and P and this should be addressed before crop establishment. Fertilizer requirements should be based on soil analysis of soil samples which should preferably be taken in May – June on established crops or prior to establishment.

3. Conclusion

The soils of the portion of Oranje-Oos farm described in this report are suitable for maize production. Available nutrients are low and should be managed with a specific fertilization plan. Fertility management must be done and should be based on soil samples taken throughout the site prior to establishment and managed yearly thereafter.

APPENDIX 3 – SPECIALIST CV - JOHAN VAN TOL

Jacobus Johannes van Tol

EDUCATION

Certificate in Environmental Law	University of Pretoria	2017
PhD Soil Science	University of the Free State	2011
M.Sc. Agric Soil Science	University of the Free State	2008
B.Sc. Agric (Hon)	University of the Free State	2007
B.Sc. Agric	University of the Free State	2006

PROFESSIONAL AFFILIATIONS

- SACNASP- Pri Nat Sci 400274/13
- Past-President of the Soil Science Society of South Africa
- Member of the Soil Classification Work Group
- Member of South African Soil Surveyors Organisation

WORK EXPERIENCE

- University of the Free State / Professor (full): current
- Digital Soils Africa / Soil Scientist: 2015 – Present
- University of Fort Hare / Senior Lecturer: 2011 - 2016
- University of the Free State / Researcher: 2007 - 2011

RECENT PUBLICATIONS

Total peer reviewed publications: 97 full list

Total consultancy and research projects: > 120

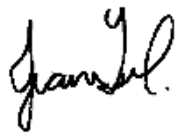
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SPECIALIST DECLARATION

I, Johan van Tol, declare that –

- I act as the independent specialist in this application;
- I regard the information contained in this report to be true and correct;
- I do not have a conflict of interest in this project;
- I will conduct the work relating to the project in an objective manner.



Prof. Johan van Tol
PhD Soil Science
Pri Nat Sci 400274/13

As this is the Draft Basic Assessment Report, proof of the distribution of notification emails, the newspaper advertisement and the placement of the site notice board will only be available for inclusion in the Final Basic Assessment Report (FBAR).

Cover letter and BID to I&AP's

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5 August 2026

Dear Interested and Affected Party **Ref: NC/BA/28/PIX/SIY/PRI1/2026**

ENVIRONMENTAL IMPACT APPLICATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, FOR THE CLEARING OF VEGETATION ON ERF 1 AND ERF 971, PRIESKA. APPLICANT: MARTELLE TRUST. Public Participation Phase.

Martelle Trust appointed Digital Soils Africa (Pty) Ltd (DSA) to conduct the necessary environmental impact assessment and public participation for the above-mentioned project.

In terms of Section 41 of NEMA Regulations, you have been identified as an Interested and Affected Party and are invited to participate in the public participation. All written comments will be responded to and forwarded to the relevant departments, in the form of a Public Participation Report.

The purpose of this letter and attached document is therefore to:

- Inform you of the locality of the proposed environmental authorization application.
- Allow you the opportunity to raise concerns or comments in respect of the proposed project detailed in the attached Background Information Document.

Public Participation Process

The purpose of the Background Information Document is to provide you with *basic information* regarding the proposed project and provide the opportunity to register as interested and affected parties and grant you the opportunity to raise any comments you might have on the proposed project.

If you would like to participate in the process, please register as an interested and affected party (I&AP), in writing. Comments/registration must be received **on or before 7 September 2026** no later than 5pm. If no comments are received from you, it will then be regarded that you do not have any comments.

Way Forward

- The outcome of this consultation process will be submitted to the Department of Agriculture, Environmental Affairs, Rural Development and Land Reform as part of the Final Basic Assessment Report.
- The Draft BAR & EMP document and required specialist reports will be subjected to review by all registered I&AP's and relative governmental departments, following the time frames as stipulated in Section 3 (1) & (8) of the NEMA regulations (30 days).
- All information received will form part of the public record and may be made available to the public. By submitting comments, you consent to the inclusion of your personal information in public participation

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records, in accordance with POPIA. Correspondence throughout the remainder of the environmental process will be distributed to registered I&APs only.

- The outcome of that consultation process will be submitted to the Department of Agriculture, Environmental Affairs, Rural Development and Land Reform as part of the final BAR & EMP.
- The documents will be made available on the DSA website, www.dsafrica.co.za. Please follow the link to Environmental, Documents and choose the Martelle link.
- All required documents will be submitted to the relevant department for decision-making.
- If the application is accepted, the relevant department will either issue or reject the Environmental Authorisation.
- As an I&AP's, you will be notified of the final decision of the relevant departments.

Yours sincerely



Natalie Sharp
Pri.Sci.Nat (Reg nr. 123443)
Reg. EAP (EAPASA)(2020/230)
Member of IAIAsa (7237)



BACKGROUND INFORMATION REGARDING CLEARING OF VEGETATION ON ERF 1 AND ERF 971, PRIESKA

MARTELLE TRUST

5 AUGUST 2026

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Directors:
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Prof Johan Van Tol
Prof George Van Zijl

45 Church Street
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6070

PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide all I&AP's with information about the intent of Martelle Trust to apply for environmental authorisation to create a 10Ha centre pivot irrigation on Erf 1, Prieska and 8Ha of pecan nut orchard on Erf 971, Prieksa.
As an identified I&AP, you are invited to register and comment on any aspect related to the proposed development between the 5th of August 2026 and 7th of September 2026.

BRIEF PROJECT DESCRIPTION

The site is situated about 8km southeast of Prieska in the Northern Cape. Erf 971 (29° 41' 0.03"S; 23° 49' 37.77"E most centre point of the site on Erf 971) and Erf 1 (29° 41' 34.37"S; 22° 50' 08.82"E most centre point of the site on Erf 1), within the Siyathemba Municipal area.



Figure 1: Site location

NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998) AS AMENDED

Environmental Assessment

DSA was appointed by Martelle Trust as the independent environmental assessment practitioner (EAP) to undertake the Environmental Application and apply for GNR 325 listed activities and the submission of a Scoping Report and Environmental Impact Assessment.
According to the latest Government Notice No. 324; 325 & 327, the following Listed Activities were triggered:

GNR 327 (27): The clearance of an area of more than 1Ha but less than 20Ha of indigenous vegetation.	*An area of 8 Ha on Erf 971 and 10Ha on Erf 1 host natural veldt and will be cleared to establish crops and pecan nut trees.*
GNR 324 (12)(g)(ii): The clearance of an area of 300m^2 or more of indigenous vegetation in the Northern Cape within critical biodiversity areas identified in bioregional plans.	*About 3Ha of the 10Ha on Erf 1 falls within the Northern Cape CBA area that will be cleared for the establishment of crops.*

POTENTIAL ENVIRONMENTAL ISSUES

The full impact on all environmental parameters will be concluded in the Basic Assessment Report and EMP. For background information, the most important potential environmental issues that will be addressed in the assessment include, but are not limited to:

- The loss of indigenous vegetation associated with the clearing of approximately 18 hectares of land on Erf 1 and Erf 971.
- The potential impact on terrestrial biodiversity, including indigenous flora and fauna, habitat loss and ecosystem functioning.
- The potential impact on Critical Biodiversity Areas (CBAs), particularly the portion of the proposed development on Erf 1 that overlaps with a mapped CBA. Alternative layouts have already been investigated to minimise impacts on these sensitive areas.
- The potential impact on protected plant species, including the requirement for avoidance measures, permits where applicable, and the rescue or relocation of protected species before vegetation clearing.
- The potential impact on drainage lines, artificial wetland features and associated aquatic ecosystems on Erf 971, including the protection of these features through appropriate management measures.
- The potential impact on soil resources, including erosion, soil degradation, salinisation and the long-term suitability of soils for sustainable irrigated agriculture.
- The potential impact on surface water resources and water quality resulting from construction activities, irrigation practices and agricultural operations.
- The management of alien invasive plant species and measures to prevent further infestation during and after the development.
- The potential impact on heritage resources, archaeology and palaeontological resources, including the implementation of a Chance Find Procedure should heritage material be encountered during earthworks.
- The socio-economic benefits of the proposed development, including the contribution to agricultural production, local economic development and employment opportunities.
- Programme (EMPr) to avoid, minimise and manage potential environmental impacts throughout the life of the project.

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PUBLIC PARTICIPATION

In terms of the NEMA, public participation forms an integral part of the environmental assessment process. The public participation process provides people who may be affected by the proposed development with an opportunity to provide comments and raise issues of concern about the project or make suggestions that may result in enhanced benefits for the project.

During the public participation *potential* interested and affected parties (I&APs) are given notice via a notice board and local newspaper advertisement informing the public of the application. The *registered* I&APs are considered directly abutting neighbours and organs of state that have jurisdiction over the area, e.g. the Municipality, Ward counsellor, etc. and would be provided with a Background Information Document and given access to a digital copy of the DBAR on Digital Soils website for comment.

Comments and issues raised during the public participation process will be captured, evaluated, and included in a Public Participation Report. These issues will be addressed and included in the final BAR, which will be submitted to the Department of Agriculture, Environmental Affairs, Rural Development, and Land Reform.

To register and/or submit a comment as an Interested and Affected Party, please respond in writing to the following email: natalie@dsafrica.co.za on or before 7 September 2026 no later than 5pm.

Alternatively, a copy of the Draft BAR is also available on the DSA website at www.dsafrica.co.za. Please follow the link to Services, Environmental Services, Documents and choose the Martelle link.

If you have any other questions or inquiries, please do not hesitate the contact the office at 067 622 5687. If no comments are received from you, it will then be regarded that you do not have any comments.

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0824140472
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5 August 2026

Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
Directorate Environmental Quality/Assessment Management
Private Bag X6102
Kimberley
8300
Attention: Ms. M. Madisa **Ref: NC/BA/28/PIX/SIY/PRI1/2026**

SUBMISSION OF DRAFT BAR IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, FOR THE CLEARING OF VEGETATION ON ERF 1 AND ERF 971, PRIESKA. APPLICANT: MARTELLE TRUST. Public Participation Phase.

Martelle Trust appointed Digital Soils Africa (Pty) Ltd (DSA) to conduct the necessary environmental impact assessment and public participation for the above-mentioned project.

In terms of Section 41 of NEMA Regulations, you have been identified as an Interested and Affected Party and are invited to participate in the public participation. All written comments will be responded to and forwarded to your Department, in the form of a Public Participation Report within the Final BAR once the public participation has been completed.

The purpose of this letter and attached draft BAR is therefore to:

- Inform you of the locality of the proposed environmental authorization application.
- Allow you the opportunity to raise concerns or comments in respect of the proposed project detailed in the Draft BAR.

Public Participation Process

If you would like to participate in the process, please submit comments in writing **on or before 7 September 2026** until 5pm. If no comments are received from you, it will then be regarded that you do not have any comments. This is done in accordance with GNR 326, chapter 2, Regulation 3, of the Environmental Impact Assessment Regulations (2014), as amended on 7 April 2017, of the National Environmental Management Act of 1998.

Where we are in the process

- Please note that in an attempt to follow a more 'green friendly' approach, a hard copy of the Draft BAR will not be placed in a public place as a hard copy for the public, rather a digital copy will be made available on the DSA website.
- A Background Information Document and link to the digital copy of the Draft BAR have been submitted for Public Participation to other Departments, the Municipality (Local and District), the ward councillor, and I&AP's (general public) for the comment period.

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Way Forward

- The Draft BAR and required specialist reports will be subjected to review by all registered I&AP's and relative governmental departments, following the time frames as stipulated in Section 3 (1) & (8) of the NEMA regulations (30 days).
- The documents will be made available on the DSA website, www.dsafrica.co.za. Please follow the link to Environmental, Documents, and choose the Martelle link. In addition, a hard copy of the Draft BAR was sent to the DAEARDLR via couriers.
- All comments received and responses written during the 30 days will be captured in the Public Participation Report and submitted to the Department of Agriculture, Environmental Affairs, Rural Development and Land Reform in the Final Scoping Report.
- The final decision is with the Department.

Yours sincerely



Natalie Sharp
Pri.Sci.Nat (Reg nr. 123443)
Reg. EAP (EAPASA)(2020/230)
Member of IAIAsa (7237)

Appendix F: Impact Assessment

The impact assessment was undertaken in accordance with the methodology contained in the Basic Assessment Report and is informed by the findings and recommendations of the specialist studies conducted for the proposed development. The assessment considers the potential environmental and socio-economic impacts associated with the Planning, Design and Development Phase, Construction Phase and Operational Phase of the proposed activity.

Each identified impact was assessed for Alternative 1, Alternative 2 (preferred alternative) and the No-Go Alternative, where applicable. The assessment considered the extent and duration of the impact, probability of occurrence, reversibility, potential for irreplaceable loss of resources, cumulative impacts and overall significance both before and after mitigation.

The specialist investigations identified biodiversity, fauna habitat, drainage line and wetland-associated features, soil resources and heritage resources as the primary environmental considerations relevant to the proposed development. Alternative 2 was identified as the preferred alternative as it avoids the sensitive Ridge Vegetation Unit (RVU) on Erf 1, reduces impacts on mapped Critical Biodiversity Areas (CBAs), and is therefore associated with lower overall ecological impacts when compared to Alternative 1. The No-Go Alternative would avoid the direct impacts associated with the proposed development but would also result in the loss of the anticipated socio-economic and agricultural benefits associated with the project.

Mitigation measures included in this assessment are summarised in the tables below and are further detailed in the Environmental Management Programme (EMPr) in Appendix G. The significance ratings presented after mitigation assume that all recommended mitigation and management measures are effectively implemented throughout the life cycle of the project.

PLANNING, DESIGN AND DEVELOPMENT PHASE			
	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Failure to obtain and comply with all applicable statutory approvals and associated conditions could lead to delays in project implementation, increased financial costs and potential legal consequences arising from regulatory non-compliance.**		No impact.
Extent and duration of impact:	Site Specific and Short Term	Site Specific and Short Term	
Consequence of impact or risk:	Delays in implementation, increased project costs, potential legal penalties, reputational damage, and possible environmental impacts resulting from non-compliance with specialist recommendations and regulatory conditions.		
Probability of occurrence:	Probable	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	
Degree to which the impact can be reversed:	High	High	
Indirect impacts:	Potential disturbance to sensitive vegetation,		

	protected species, drainage features, heritage resources or soil resources through failure to implement specialist recommendations and permit conditions.		
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium-High	Medium-High	
Degree to which the impact can be avoided:	High	High	
Degree to which the impact can be managed:	High	High	
Degree to which the impact can be mitigated:	High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Obtain all applicable approvals prior to commencement; • Maintain a compliance register; • Ensure all permit and authorisation conditions are incorporated into project planning and EMPr implementation; • Appoint a responsible person to monitor compliance; • Undertake environmental awareness training; • Maintain records of approvals and compliance audits.		
Residual impacts:	Minor administrative burden associated with ongoing compliance monitoring and reporting.		
Cumulative impact post mitigation:	Low	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (+)	Low (+)	

CONSTRUCTION PHASE			
	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Loss of indigenous vegetation due to vegetation clearing and site preparation.**		No impact as no vegetation will be cleared.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Permanent loss of the sensitive Ridge Vegetation Unit (RVU) and about 5.6ha of mapped CBA within the development	Permanent loss of Least Threatened Shurbland vegetation unit, but avoid the Ridge Vegetation Unit (RVU), however about	

	footprint.	3 Ha of mapped CBA within the development footprint.	
Probability of occurrence:	High Probability	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Medium-High	Medium	
Degree to which the impact can be reversed:	Low	Low	
Indirect impacts:	Habitat fragmentation and reduced ecological connectivity.	Habitat fragmentation and reduced ecological connectivity.	
Cumulative impact prior to mitigation:	High	Medium-High	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High	Medium-High	
Degree to which the impact can be avoided:	Medium	Medium	
Degree to which the impact can be managed:	Medium	Medium	
Degree to which the impact can be mitigated:	Medium	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Restrict vegetation clearing to the approved development footprint. • Clearly demarcate no-go areas prior to construction. • Avoid disturbance of retained natural vegetation. • Rehabilitate all temporarily disturbed areas.		
Residual impacts:	Permanent loss of more sensitive indigenous vegetation, but remains within the authorised cultivation footprint.	Permanent loss of indigenous vegetation remains within the authorised cultivation footprint.	
Cumulative impact post mitigation:	Low-Medium	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium (-)	Low (-)	

Potential impact and risk:			
Nature of impact:	**Loss of protected plant species during vegetation clearing and cultivation establishment.**		No impact as no protected plant species will be cleared.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	

Consequence of impact or risk:	Loss or disturbance of protected and conservation-important plant species.	Reduced possibility of loss or disturbance of protected and conservation-important plant species, due to the exclusion of the RVU and reduced CBA area.	
Probability of occurrence:	High Probability	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Medium-High	Medium	
Degree to which the impact can be reversed:	Low-Medium	Low	
Indirect impacts:	Reduction in more significant local plant diversity and ecosystem resilience.	Reduction in local plant diversity and ecosystem resilience.	
Cumulative impact prior to mitigation:	High	Medium-High	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High	Medium-High	
Degree to which the impact can be avoided:	Medium	Medium	
Degree to which the impact can be managed:	Medium	High	
Degree to which the impact can be mitigated:	Medium	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Conduct a pre-construction walk-through by a suitably qualified botanist if required. • Implement search-and-rescue or relocation of protected species where feasible. • Avoid protected species outside the approved footprint. • Comply with all permit requirements applicable to protected species.		
Residual impacts:	Localised loss of individual protected plants may remain within approved development areas.	Localised loss of individual protected plants may remain within approved development areas.	
Cumulative impact post mitigation:	Low-Medium	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High (-)	Low (-)	

Potential impact and risk:			

Nature of impact:	**Loss of fauna habitat and disturbance of fauna resulting from vegetation clearing, machinery movement and human activity.**		No impact. Habitats will remain in place as no vegetation clearing will take place.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Reduction in available sensitive habitat and displacement of fauna species.	Reduction in available habitat and displacement of fauna species.	
Probability of occurrence:	High Probability	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Medium	Medium	
Degree to which the impact can be reversed:	Low	Low	
Indirect impacts:	Altered movement patterns and reduced habitat connectivity.	Altered movement patterns and reduced habitat connectivity.	
Cumulative impact prior to mitigation:	High	Medium-High	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High	Medium-High	
Degree to which the impact can be avoided:	Medium-Low	Medium	
Degree to which the impact can be managed:	Medium	High	
Degree to which the impact can be mitigated:	Medium-High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Restrict activities to the approved footprint. • Prohibit hunting, trapping or collection of fauna. • Limit unnecessary vehicle movement. • Undertake environmental awareness training for all personnel.		
Residual impacts:	Reduced more sensitive habitat availability within cultivated areas remains for the life of the project.	Reduced habitat availability within cultivated areas remains for the life of the project.	
Cumulative impact post mitigation:	Low-Medium	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium (-)	Low (-)	

Potential impact and risk:			

Nature of impact:	**Impacts on drainage lines and wetland-associated features on Erf 971 due to vegetation removal, earthworks and increased sedimentation risk.**		**Existing site conditions and associated impacts would remain unchanged. The artificial wetland, which has formed as a result of existing irrigation activities, would continue to receive and convey irrigation return flows before these ultimately drain towards the Orange River.**
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	Region and Long Term
Consequence of impact or risk:	Disturbance of drainage features, increased sedimentation and loss of wetland-associated vegetation.	Disturbance of drainage features, increased sedimentation and loss of wetland-associated vegetation.	Continued receptor of sedimentation but no loss of wetland-associated vegetation.
Probability of occurrence:	Probable	Probable	Definite
Degree to which the impact may cause irreplaceable loss of resources:	Medium	Medium	Low
Degree to which the impact can be reversed:	Low	Low	Medium
Indirect impacts:	Reduced ecological functioning and downstream habitat degradation.	Reduced ecological functioning and downstream habitat degradation.	Continuation of ecological functioning and prevention of downstream habitat degradation.
Cumulative impact prior to mitigation:	Medium	Medium	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Medium	N/A
Degree to which the impact can be avoided:	Medium	Medium	N/A
Degree to which the impact can be managed:	High	High	N/A
Degree to which the impact can be mitigated:	High	High	N/A
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Maintain the drainage lines and wetland features. • Prohibit cultivation and stockpiling within sensitive areas. • Implement erosion and sediment control measures.		N/A

	• Maintain natural vegetation within buffer areas.		
Residual impacts:	Minor residual disturbance may remain despite the implementation of buffers and management measures.	Minor residual disturbance may remain despite the implementation of buffers and management measures.	No residual impact
Cumulative impact post mitigation:	Low	Low	Low (+)
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (-)	Low (-)	**Low (+)**

Potential impact and risk:			
Nature of impact:	**Soil erosion and soil degradation associated with vegetation clearing, soil disturbance and earthworks**		No impact, as soil will not be disturbed.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Loss of topsoil and reduction in soil stability and productivity.	Loss of topsoil and reduction in soil stability and productivity.	
Probability of occurrence:	Low Likelihood	Low Likelihood	
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	
Degree to which the impact can be reversed:	High	High	
Indirect impacts:	Increased sediment runoff to adjacent natural areas.	Increased sediment runoff to adjacent natural areas.	
Cumulative impact prior to mitigation:	Low	Low	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Medium	
Degree to which the impact can be avoided:	High	High	
Degree to which the impact can be managed:	High	High	
Degree to which the impact can be mitigated:	High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Minimise exposed soil surfaces. • Implement stormwater and erosion control measures. • Rehabilitate disturbed areas as soon as practicable.		

	• Avoid unnecessary soil disturbance during wet conditions.		
Residual impacts:	Localised soil disturbance may persist until disturbed areas are fully stabilised.	Localised soil disturbance may persist until disturbed areas are fully stabilised.	
Cumulative impact post mitigation:	Low	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (-)	Low (-)	

Potential impact and risk:			
Nature of impact:	**Dust generation from agricultural operations and vehicle movement.**		No impact, since soil will not be disturbed.
Extent and duration of impact:	Site Specific and Short Term	Site Specific and Short Term	
Consequence of impact or risk:	Temporary reduction in air quality and nuisance to surrounding land users.	Temporary reduction in air quality and nuisance to surrounding land users.	
Probability of occurrence:	Probable	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Medium	Medium	
Degree to which the impact can be reversed:	Low	Low	
Indirect impacts:	Dust deposition on nearby vegetation and infrastructure.	Dust deposition on nearby vegetation and infrastructure.	
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Medium	
Degree to which the impact can be avoided:	Low	Low	
Degree to which the impact can be managed:	High	High	
Degree to which the impact can be mitigated:	High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Limit vehicle speeds on access routes. • Suppress dust where necessary. • Maintain vehicles and equipment in good working condition. • Restrict unnecessary vehicle movements.		
Residual impacts:	Minor temporary dust generation may occur during periods of	Minor temporary dust generation may occur during periods	

	activity.	of activity.	
Cumulative impact post mitigation:	Low	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (-)	Low (-)	

Potential impact and risk:			
Nature of impact:	**Heritage chance finds resulting from ground disturbance during site preparation and cultivation establishment.**		No impact, as no ground disturbance will take place.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Low potential disturbance or destruction of previously unidentified heritage resources.	Low potential disturbance or destruction of previously unidentified heritage resources.	
Probability of occurrence:	Low Likelihood	Low Likelihood	
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	
Degree to which the impact can be reversed:	Low	Low	
Indirect impacts:	Loss of scientific and cultural information.	Loss of scientific and cultural information.	
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Medium	
Degree to which the impact can be avoided:	Medium	Medium	
Degree to which the impact can be managed:	High	High	
Degree to which the impact can be mitigated:	High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Implement the Chance Finds Procedure. • Cease work immediately if heritage resources are encountered. • Notify the relevant heritage authority and specialist. • Resume work only after authorisation has been obtained.		
Residual impacts:	Low residual impact is anticipated following implementation of the Chance Finds Procedure.	Low residual impact is anticipated following implementation of the Chance Finds Procedure.	
Cumulative impact post	Low	Low	

mitigation:			
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (-)	Low (-)	

Potential impact and risk:			
Nature of impact:	**Socio-economic benefits through temporary employment and local expenditure during the establishment phase.**		**No socio-economic benefit as no additional agricultural land will be developed.**
Extent and duration of impact:	Region and Long Term	Region and Long Term	N/A
Consequence of impact or risk:	Temporary employment opportunities and local economic stimulation.	Temporary employment opportunities and local economic stimulation.	No temporary employment opportunities and no local economic stimulation.
Probability of occurrence:	Probable	Probable	Probable
Degree to which the impact may cause irreplaceable loss of resources:	N/A	N/A	Medium
Degree to which the impact can be reversed:	N/A	N/A	Medium
Indirect impacts:	Increased demand for local goods and increased economic stimulation of the region.	Increased demand for local goods and increased economic stimulation of the region.	Decrease demand for local goods and reduced economic stimulation of the region.
Cumulative impact prior to mitigation:	Low	Low	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (+)	Low (+)	Medium (-)
Degree to which the impact can be avoided:	Low – the applicant does not want to avoid a positive impact	Low – the applicant does not want to avoid a positive impact	High
Degree to which the impact can be managed:	High	High	Low
Degree to which the impact can be mitigated:	High	High	Low
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Prioritise local employment where possible. • Utilise local suppliers and service providers where feasible. • Ensure fair labour practices and safe working conditions.		N/A
Residual impacts:	Positive benefits remain through temporary employment and local expenditure	Positive benefits remain through temporary employment and local expenditure.	Negative impact remain since no job creation and economic stimulation.

Cumulative impact post mitigation:	Medium (+)	Medium (+)	Low (-)
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Medium (+)**	**Medium (+)**	Medium (-)

Potential impact and risk:			
Nature of impact:	**Cumulative biodiversity transformation associated with the conversion of natural habitat to agricultural land**		No cumulative biodiversity transformation as the site will not be developed.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Incremental loss of more sensitive natural habitat within the broader landscape.	Incremental loss of natural habitat within the broader landscape.	
Probability of occurrence:	High Probability	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	High	Medium	
Degree to which the impact can be reversed:	Low	Low	
Indirect impacts:	Increased more sensitive habitat fragmentation and ecological degradation.	Increased habitat fragmentation and ecological degradation.	
Cumulative impact prior to mitigation:	High	Medium-High	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High	Medium-High	
Degree to which the impact can be avoided:	Medium	Medium	
Degree to which the impact can be managed:	Medium	Medium	
Degree to which the impact can be mitigated:	Medium	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Implement all flora and fauna specialist recommendations. • Retain remaining natural vegetation outside development areas. • Avoid sensitive habitats and ecological corridors. • Prevent unnecessary expansion beyond the authorised footprint.		
Residual impacts:	A permanent reduction in more sensitive natural	A permanent reduction in natural habitat remains	

	habitat remains within the authorised development footprint.	within the authorised development footprint.	
Cumulative impact post mitigation:	Medium	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium (-)	Low (-)	

OPERATIONAL PHASE			
	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Disturbance of fauna resulting from ongoing agricultural activities.**		No impact as the site will not be disturbed.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Permanent modification of more sensitive habitat/resources within the development footprint.	Permanent modification of habitat/resources within the development footprint.	
Probability of occurrence:	Probable	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Medium	Medium	
Degree to which the impact can be reversed:	Low	Low	
Indirect impacts:	Long-term alteration of more sensitive species movement and habitat use.	Long-term alteration of species movement and habitat use.	
Cumulative impact prior to mitigation:	High	Medium-High	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High	Medium-High	
Degree to which the impact can be avoided:	Medium-Low	Medium	
Degree to which the impact can be managed:	Medium	High	
Degree to which the impact can be mitigated:	Medium	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Retain natural vegetation outside cultivated areas. • Restrict unnecessary disturbance in sensitive areas. • Control waste to prevent attraction of problem animals.		

	• Continue environmental awareness programmes.		
Residual impacts:	Residual loss confined to authorized footprint.	Residual loss confined to authorized footprint.	
Cumulative impact post mitigation:	Medium	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium (-)	Low (-)	

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Impacts on drainage lines and wetland-associated features on Erf 971 due to irrigation practices, runoff and ongoing agricultural activities.**		Existing site conditions and associated impacts would remain unchanged.
Extent and duration of impact:	Region and Long Term	Region and Long Term	Region and Long Term
Consequence of impact or risk:	Modification of habitat/resources within the development footprint.	Modification of habitat/resources within the development footprint.	Continued receptor of sedimentation but no modification of habitat/resources.
Probability of occurrence:	Definite	Definite	Definite
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	Low
Degree to which the impact can be reversed:	Medium	Medium	Medium
Indirect impacts:	Reduced water quality and ecological functioning downstream.	Reduced water quality and ecological functioning downstream.	Reduced water quality and ecological functioning downstream.
Cumulative impact prior to mitigation:	Medium	Medium	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Medium	N/A
Degree to which the impact can be avoided:	Medium	Medium	N/A
Degree to which the impact can be managed:	High	High	N/A
Degree to which the impact can be mitigated:	High	High	N/A
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Maintain the drainage line and wetland area. • Prevent irrigation runoff into sensitive features.		

	• Regularly inspect drainage areas for erosion. • Maintain natural vegetation adjacent to drainage features.		
Residual impacts:	Low residual risk remains from irrigation-related activities despite management measures.	Low residual risk remains from irrigation-related activities despite management measures.	No residual impact.
Cumulative impact post mitigation:	Low (-)	Low (-)	Low (+)
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (-)	Low (-)	**Low (+)**

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Soil erosion and soil degradation associated with long-term cultivation and irrigation activities.**		No impact, as soil will not be disturbed.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Decline in soil quality due to long-term cultivation practices.	Decline in soil quality due to long-term cultivation practices.	
Probability of occurrence:	Low Likelihood	Low Likelihood	
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	
Degree to which the impact can be reversed:	High	High	
Indirect impacts:	Increased sediment movement and reduced agricultural sustainability.	Increased sediment movement and reduced agricultural sustainability.	
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High	High	
Degree to which the impact can be avoided:	High	High	
Degree to which the impact can be managed:	High	High	
Degree to which the impact can be mitigated:	High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Apply good agricultural practices. • Maintain ground cover where practical. • Implement erosion control structures where required.		

	• Monitor soil condition regularly.		
Residual impacts:	Low levels of soil degradation may occur if management measures are not consistently maintained.	Low levels of soil degradation may occur if management measures are not consistently maintained.	
Cumulative impact post mitigation:	Low	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (-)	Low (-)	

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Soil salinisation associated with long-term irrigation.**		No impact as no additional area will be irrigated.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Accumulation of salts resulting in reduced soil productivity.	Accumulation of salts resulting in reduced soil productivity.	
Probability of occurrence:	Low Likelihood	Low Likelihood	
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	
Degree to which the impact can be reversed:	Medium	Medium	
Indirect impacts:	Reduced crop yields and long-term soil degradation.	Reduced crop yields and long-term soil degradation.	
Cumulative impact prior to mitigation:	Low	Low	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low-Medium	Low-Medium	
Degree to which the impact can be avoided:	High	High	
Degree to which the impact can be managed:	High	High	
Degree to which the impact can be mitigated:	High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Apply irrigation according to soil and crop requirements. • Monitor soil salinity periodically. • Prevent over-irrigation. • Implement appropriate leaching practices where necessary.		
Residual impacts:	A low residual risk of	A low residual risk of	

	salt accumulation remains over the long term.	salt accumulation remains over the long term.	
Cumulative impact post mitigation:	Low	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (-)	Low (-)	
	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Soil degradation due to inappropriate irrigation management.**		No impact, as no additional areas will be irrigated.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Waterlogging, compaction and deterioration of soil structure.	Waterlogging, compaction and deterioration of soil structure.	
Probability of occurrence:	Low Likelihood	Low Likelihood	
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	
Degree to which the impact can be reversed:	High	High	
Indirect impacts:	Reduced agricultural productivity and increased erosion risk	Reduced agricultural productivity and increased erosion risk	
Cumulative impact prior to mitigation:	Low	Low	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low-Medium	Low-Medium	
Degree to which the impact can be avoided:	High	High	
Degree to which the impact can be managed:	High	High	
Degree to which the impact can be mitigated:	High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Implement efficient irrigation scheduling. • Regularly monitor soil moisture levels. • Avoid waterlogging and over-irrigation. • Maintain irrigation infrastructure.		
Residual impacts:	Low residual risk remains if irrigation practices are not optimally managed.	Low residual risk remains if irrigation practices are not optimally managed.	
Cumulative impact post mitigation:	Low	Low	
Significance rating of impact	Low (-)	Low (-)	

after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)			

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Soil contamination from agrochemicals.**		No impact, as no additional areas will be treated with agrochemicals.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Contamination of soil through inappropriate application of chemicals.	Contamination of soil through inappropriate application of chemicals.	
Probability of occurrence:	Probable	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	
Degree to which the impact can be reversed:	Medium	Medium	
Indirect impacts:	Potential impacts on groundwater and non-target organisms.	Potential impacts on groundwater and non-target organisms.	
Cumulative impact prior to mitigation:	Low-Medium	Low-Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium	Medium	
Degree to which the impact can be avoided:	High	High	
Degree to which the impact can be managed:	High	High	
Degree to which the impact can be mitigated:	High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Store chemicals in designated areas. • Apply fertilisers and pesticides according to manufacturer specifications. • Train personnel in chemical handling procedures. • Immediately contain and clean up spills.		
Residual impacts:	A low residual risk of localised contamination remains despite controls	A low residual risk of localised contamination remains despite controls	
Cumulative impact post mitigation:	Low	Low	
Significance rating of impact after mitigation	Low (-)	Low (-)	

(e.g. Low, Medium, Medium-High, High, or Very-High)			

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Loss of soil productivity if irrigation and fertilisation are not appropriately managed.**		No loss will occur in soil productivity as no new areas will be developed.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Reduction in long-term agricultural potential of the soil resource.	Reduction in long-term agricultural potential of the soil resource.	
Probability of occurrence:	Low Likelihood	Low Likelihood	
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low	
Degree to which the impact can be reversed:	High	High	
Indirect impacts:	Increased reliance on fertilisers and management interventions.	Increased reliance on fertilisers and management interventions.	
Cumulative impact prior to mitigation:	Medium	Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low-Medium	Low-Medium	
Degree to which the impact can be avoided:	High	High	
Degree to which the impact can be managed:	High	High	
Degree to which the impact can be mitigated:	High	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Implement soil fertility monitoring. • Apply fertilisers based on soil analyses. • Maintain appropriate irrigation management. • Implement crop and soil management best practices.		
Residual impacts:	Minor reductions in soil productivity may occur over time if management practices decline.	Minor reductions in soil productivity may occur over time if management practices decline.	
Cumulative impact post mitigation:	Low	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (-)	Low (-)	

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Water quality impacts from irrigation and agrochemicals through nutrient enrichment, pesticide use and agricultural runoff.**		Existing site conditions and associated impacts would remain unchanged
Extent and duration of impact:	Region and Long Term	Region and Long Term	Region and Long Term
Consequence of impact or risk:	Deterioration of water quality due to nutrient and chemical runoff.	Deterioration of water quality due to nutrient and chemical runoff.	Deterioration of water quality due to nutrient and chemical runoff – however at lower level as the total irrigated area has not increased.
Probability of occurrence:	Probable	Probable	Probable
Degree to which the impact may cause irreplaceable loss of resources:	Medium	Medium	Low
Degree to which the impact can be reversed:	Medium	Medium	Medium
Indirect impacts:	Impacts on downstream aquatic and riparian ecosystems.	Impacts on downstream aquatic and riparian ecosystems.	Impacts on downstream aquatic and riparian ecosystems, however at lower level as the total irrigated area has not increased.
Cumulative impact prior to mitigation:	Medium	Medium	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium-High	Medium-High	N/A
Degree to which the impact can be avoided:	Medium	Medium	N/A
Degree to which the impact can be managed:	High	High	N/A
Degree to which the impact can be mitigated:	High	High	N/A
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Prevent runoff into drainage lines and direct it into the artificial wetland area. • Optimise fertiliser and pesticide application rates. • Monitor irrigation practices to minimise leaching.		N/A
Residual impacts:	Low residual risk of nutrient or chemical runoff remains.	Low residual risk of nutrient or chemical runoff remains.	No additional residual impact.
Cumulative impact post	Low	Low	Low (+)

mitigation:			
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (-)	Low (-)	**Low (+)**

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Socio-economic benefits through sustained agricultural production, employment opportunities and contribution to the local economy.**		**No socio-economic increase as no additional agricultural land will be operational.**
Extent and duration of impact:	Region and Long Term	Region and Long Term	N/A
Consequence of impact or risk:	Long-term agricultural production and economic benefits.	Long-term agricultural production and economic benefits.	No additional agricultural production and no additional economic benefits.
Probability of occurrence:	High Probability	High Probability	N/A
Degree to which the impact may cause irreplaceable loss of resources:	N/A	N/A	Medium
Degree to which the impact can be reversed:	N/A	N/A	Medium
Indirect impacts:	Sustained support for local employment and agricultural value chains	Sustained support for local employment and agricultural value chains	No additional employment and agricultural produce
Cumulative impact prior to mitigation:	Low	Low	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (+)	Low (+)	Medium (-)
Degree to which the impact can be avoided:	Low – the applicant does not want to avoid a positive impact	Low – the applicant does not want to avoid a positive impact	High
Degree to which the impact can be managed:	High	High	Low
Degree to which the impact can be mitigated:	High	High	Low
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Maintain long-term agricultural operations. • Continue local employment initiatives. • Support local procurement where feasible. • Implement skills development opportunities for employees.		N/A
Residual impacts:	Long-term positive economic and employment benefits remain.	Long-term positive economic and employment benefits remain.	No growth in economic development and employment benefits.

Cumulative impact post mitigation:	Medium-High (+)	Medium-High (+)	Low (-)
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High (+)	High (+)	Medium (-)

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Creation of employment opportunities during establishment and operation.**		**No additional creation of opportunities**
Extent and duration of impact:	Region and Long Term	Region and Long Term	N/A
Consequence of impact or risk:	Long-term agricultural production and employment opportunities.	Long-term agricultural production and employment opportunities.	No additional employment opportunities created.
Probability of occurrence:	Probable	Probable	N/A
Degree to which the impact may cause irreplaceable loss of resources:	N/A	N/A	Low
Degree to which the impact can be reversed:	N/A	N/A	High
Indirect impacts:	Improved household income and local economic activity.	Improved household income and local economic activity.	No additional household income to boost local economy.
Cumulative impact prior to mitigation:	Low	Low	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (+)	Low (+)	Medium (-)
Degree to which the impact can be avoided:	Low – the applicant does not want to avoid a positive impact	Low – the applicant does not want to avoid a positive impact	High
Degree to which the impact can be managed:	High	High	Low
Degree to which the impact can be mitigated:	High	High	Low
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Prioritise employment of local residents where possible. • Provide training and skills development opportunities. • Maintain fair labour practices.		N/A
Residual impacts:	Positive residual impacts remain through continued employment opportunities.	Positive residual impacts remain through continued employment opportunities.	Negative residual impacts remain since no employment opportunities were created.
Cumulative impact post mitigation:	Medium-High (+)	Medium-High (+)	Low (-)

Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Medium (+)**	**Medium (+)**	Low (-)

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Improved utilisation of highly suitable agricultural soils.**		**Lost opportunity to utilize highly suitable agricultural soils.**
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	N/A
Consequence of impact or risk:	Productive use of soils identified as suitable for irrigation agriculture.	Productive use of soils identified as suitable for irrigation agriculture.	Unproduction on suitable soil.
Probability of occurrence:	High Probability	High Probability	Definite
Degree to which the impact may cause irreplaceable loss of resources:	N/A	N/A	Medium
Degree to which the impact can be reversed:	N/A	N/A	Medium
Indirect impacts:	Improved land-use efficiency and agricultural sustainability.	Improved land-use efficiency and agricultural sustainability.	None, the area can be used for grazing but will not be highly productive site compared to crop development.
Cumulative impact prior to mitigation:	Low	Low	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (+)	Low (+)	Low (-)
Degree to which the impact can be avoided:	Low – the applicant does not want to avoid a positive impact	Low – the applicant does not want to avoid a positive impact	High
Degree to which the impact can be managed:	High	High	Low
Degree to which the impact can be mitigated:	High	High	Low
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Manage soils according to specialist recommendations. • Monitor soil condition and productivity. • Prevent degradation through responsible irrigation management.		N/A
Residual impacts:	Positive utilisation of suitable agricultural land remains.	Positive utilisation of suitable agricultural land remains.	Negative utilization of suitable agricultural land.
Cumulative impact post mitigation:	Medium (+)	Medium (+)	Low (-)
Significance rating of impact	**Medium (+)**	**Medium (+)**	Low (-)

after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)			

	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Contribution to local and regional agricultural development.**		**No contribution to local and regional agricultural development**
Extent and duration of impact:	Region and Long Term	Region and Long Term	N/A
Consequence of impact or risk:	Strengthened agricultural sector and food production capacity	Strengthened agricultural sector and food production capacity	No additional contribution to agricultural sector and food production capacity
Probability of occurrence:	High Probability	High Probability	Definite
Degree to which the impact may cause irreplaceable loss of resources:	N/A	N/A	Low
Degree to which the impact can be reversed:	N/A	N/A	Medium
Indirect impacts:	Support for broader regional economic growth.	Support for broader regional economic growth.	No additional support for broader regional economic growth.
Cumulative impact prior to mitigation:	Low	Low	N/A
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Low (+)	Low (+)	Low (-)
Degree to which the impact can be avoided:	Low – the applicant does not want to avoid a positive impact	Low – the applicant does not want to avoid a positive impact	High
Degree to which the impact can be managed:	High	High	Low
Degree to which the impact can be mitigated:	High	High	Low
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Maintain sustainable agricultural production. • Support local economic participation. • Implement environmentally responsible farming practices.		N/A
Residual impacts:	Positive contribution to the local and regional agricultural economy remains.	Positive contribution to the local and regional agricultural economy remains.	No additional contribution to the local and regional agricultural economy remains.
Cumulative impact post mitigation:	Medium-High (+)	Medium-High (+)	Low (-)
Significance rating of impact	**High (+)**	**High (+)**	Medium (-)

after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)			
	Alternative 1:	**Alternative 2 (preferred site)**	**No-Go Option**
Nature of impact:	**Cumulative biodiversity transformation through the permanent loss of natural habitat and ongoing agricultural intensification within the broader landscape.**		No cumulative biodiversity transformation.
Extent and duration of impact:	Site Specific and Long Term	Site Specific and Long Term	
Consequence of impact or risk:	Continued reduction of more sensitive natural habitat within the agricultural landscape.	Continued reduction of natural habitat within the agricultural landscape.	
Probability of occurrence:	High Probability	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Medium-High	Medium	
Degree to which the impact can be reversed:	Low	Low	
Indirect impacts:	Long-term loss of larger biodiversity area, sensitive vegetation (RVU) and ecological processes.	Long-term loss of biodiversity and ecological processes.	
Cumulative impact prior to mitigation:	High	Medium-High	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	High	Medium-High	
Degree to which the impact can be avoided:	Medium	Medium	
Degree to which the impact can be managed:	Medium	Medium	
Degree to which the impact can be mitigated:	Medium	High	
Proposed mitigation: *Refer to EMP for full list of mitigation*	• Retain all remaining natural habitat outside cultivation areas. • Maintain drainage line and wetland buffers. • Prevent further expansion into natural vegetation. • Implement ongoing environmental monitoring and EMPr requirements.		
Residual impacts:	Permanent transformation of cultivated areas contributes to cumulative habitat	Permanent transformation of cultivated areas contributes to cumulative habitat	No transformation to cumulative habitat loss.

	loss within the broader landscape.	loss within the broader landscape.	
Cumulative impact post mitigation:	Low-Medium	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	Medium (-)	Low (-)	

DECOMMISIONING AND CLOSURE PHASE

Should the activity be authorized, it is highly unlikely that the proposed development will be decommissioned in the next 30 years. Therefore, a decommissioning Phase for the impact assessment is not included.

In the unlikely case of decommissioning, a closure plan is submitted and approved by the relevant authority/ties before closure commences. The relevant State Departments, applicable at the time of decommissioning, and the relevant environmental legislation should be consulted before decommissioning.



APPENDIX G

ENVIRONMENTAL MANAGEMENT PLAN

For the

Application for Environmental Authorisation for the clearing of 8 Ha of vegetation on Erf 971 and 10Ha of vegetation on Erf 1, Prieska

Prepared for

MARTELLE TRUST

Reference: **NC/BA/28/PIX/SIY/PRI1/2026**

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BACKGROUND

Digital Soils Africa (Pty) LTD (DSA) was tasked by Martelle Trust to conduct environmental investigations and complete the Environmental Authorisation Application for the authorisation of clearing 18Ha of vegetation on Erf 971 (8Ha) and Erf 1 (10Ha), Prieska in the Northern Cape.

In terms of the National Environmental Management Act 107 of 1998 ("NEMA"), environmental authorisation must be obtained before any person can conduct activities that cause damage to the environment.

DSA was appointed by Martelle Trust (also referred to as the Applicant) as the independent environmental assessment practitioner (EAP) to undertake the Environmental Authorisation Application for the commencement of a listed activity in terms of the Environmental Impact Assessment Regulations 2014, as amended in 2017.

The Applicant would like to develop 18 of which 8Ha of vegetation will be cleared to establish pecan nut orchard and a 10Ha central pivot for irrigating maize, wheat crops, and lucerne.

An application to cultivate virgin soil (or commonly known as a plough certificate) was applied for at the Department of Agriculture and was granted/issued.

The Applicant has existing water use rights and therefore does not require additional applications for a Water Use Right. In the future, they might apply for an increase in usage, however, at this stage, it is not required.

DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

Environmental Assessment Practitioner (EAP): Natalia Sharp
Postal address: 45 Church Street, Walmer, 6070
Cell Phone: 082 414 0472
Email: natalie@dsafrica.co.za
EAP qualifications: B.Sc (Botany and Zoology) (UFS); B.Sc. (Hons) Limnology (UFS); Masters in Environmental Management: Evaluation of Phytoplankton as an indicator in a biomonitoring program, with special reference to the Modder River.
EAP Registrations/Associations: SACNASP (123443) & Reg. EAP (2020/230)

Natalie Sharp is the project manager and senior Environmental Assessment Practitioner leading this project and is registered as an Environmental Assessment Practitioner (EAP) with the Certification Board for Environmental Assessment Practitioners of South Africa (EAPSA) (Registration Number: 2020/230) and as a Professional Natural Scientist (Pri.Sci.Nat) with the South African Council for Natural

Scientific Professions (SACNASP) (Registration Number: 123443) (see Appendix A for detailed CV and qualifications). Natalie Sharp has worked in the environmental industry for over seventeen years.

PURPOSE OF THE DOCUMENT

This document serves as a programme to manage the environmental impacts during the pre-construction, construction, and operational phases of the proposed development. This document will provide mitigation measures to prevent, reduce, avoid, or rehabilitate and mitigation measures must be implemented during all the phases of the development. The objective will be to limit the negative impacts and increase positive impacts.

The Environmental Management Plan (EMP) will also:

- Provide applicable legislative framework;
- Provide management objectives, and actions to achieve such objectives;
- List roles and responsibilities;
- Provide record-keeping methods, auditing or review, and report writing;

SITE LOCALITY

The site is situated about 8km southeast of Prieska in the Northern Cape. Erf 971 (29° 41' 0.03"S; 23° 49' 37.77"E most centre point of the site on Erf 971) and Erf 1 (29° 41' 34.37"S; 22° 50' 08.82"E most centre point of the site on Erf 1), within the Siyathemba Municipal area. The farm can be reached by travelling along the R357 for about 8.2km onto the farm road. Erf 1 site is about 300m east from the farm road and the site on Erf 971 is about 900m north of the farm road. All sites are accessible via private roads.

45 Church Street
Walmer
6070

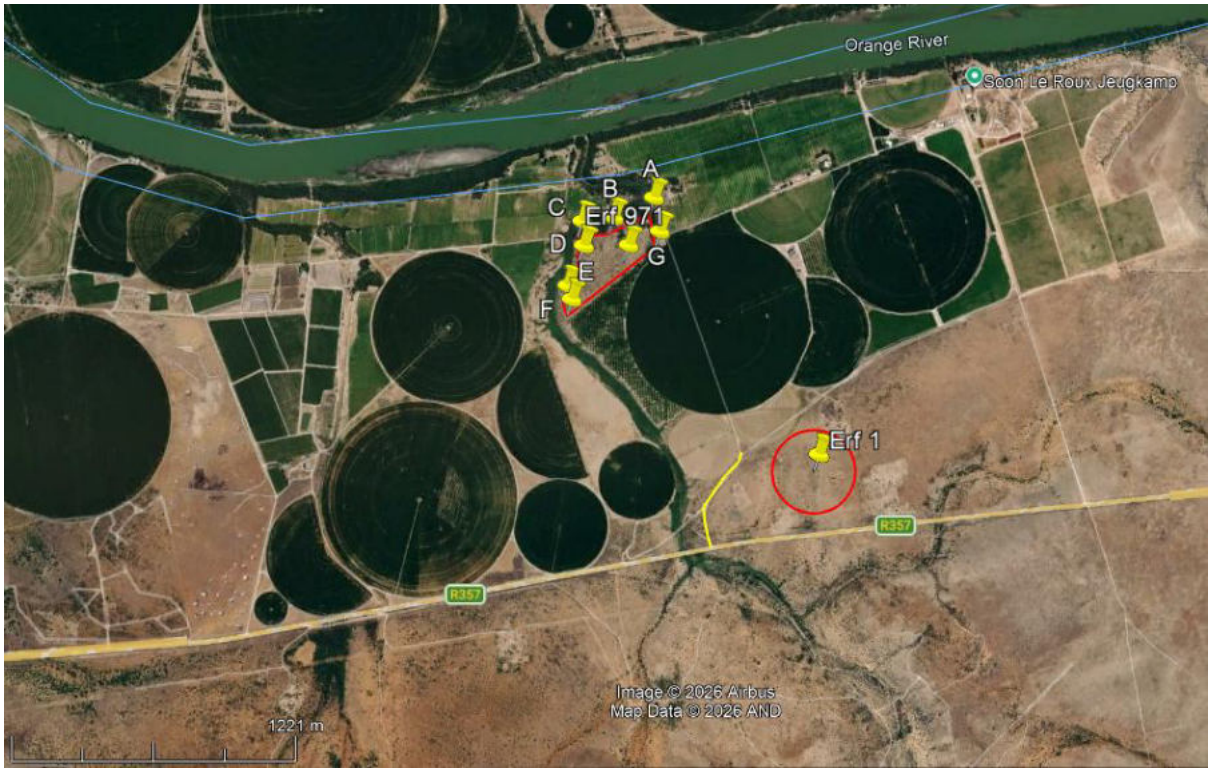


FIGURE 1: SITE LOCATIONS OF THE 10HA CENTRAL PIVOT SITE ON ERF 1 AND THE 8HA SITE ON ERF 971. THE FARM ROAD IS THE YELLOW LINE, AND THE PROPOSED SITES ARE REPRESENTED BY THE RED AND YELLOW POLYGONS.

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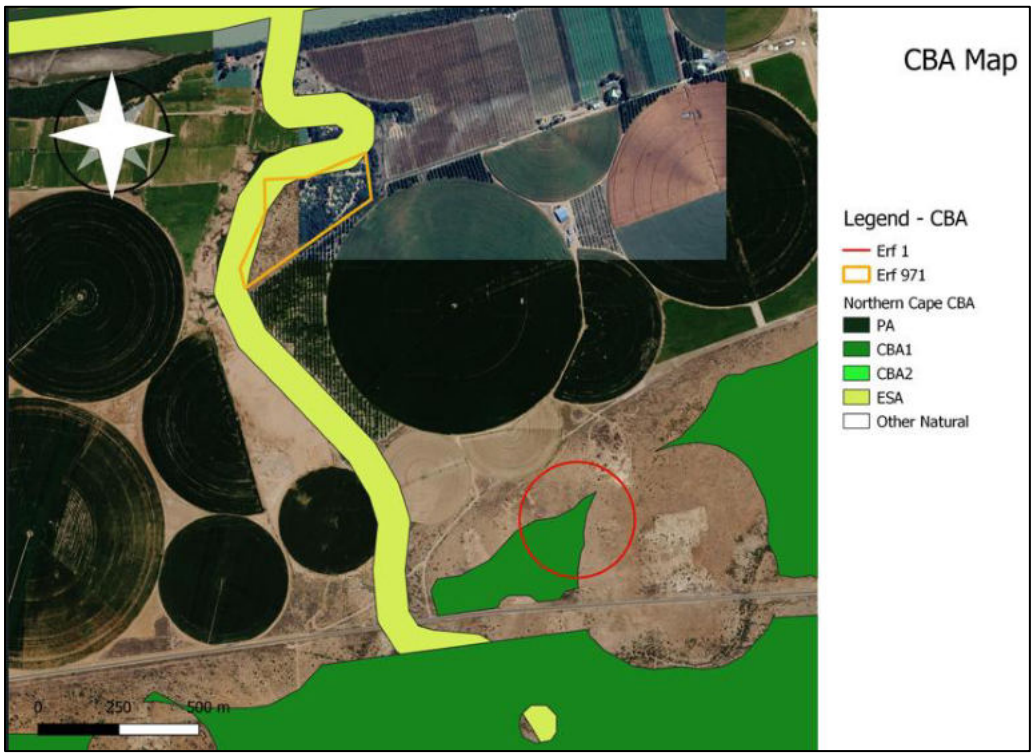


FIGURE 2: A PORTION OF THE PROPOSED 10HA PIVOT SITE ON ERF 1 FALLS WITHIN CBA ACCORDING TO THE BGIS OF THE NORTHERN CAPE BIODIVERSITY CONSERVATION PLAN.

DESCRIPTION OF THE PROPOSED LISTED ACTIVITIES

TABLE 1: EIA LISTED ACTIVITIES

Listings	Describe the portion of the proposed project to which the applicable listed activity relates.	Coordinates of listed activities (centre point coordinates of the listed activity location)
GNR 324 Activity 12 (g) (ii): The clearance of an area of 300m^2 or more of indigenous vegetation in the Northern Cape within critical biodiversity areas identified in bioregional plans.	A portion of the 10Ha on Erf 1 have been classified as CBA 1 areas according to the Northern Cape Biodiversity Map.	**Erf 971:** 29°41'03.02"S 23°49'37.77"E **Erf 1:** 29°41'34.37"S 22°50'08.82"E

GNR 327 Activity 27: The clearance of an area of 1 Ha or more, but less than 20Ha of indigenous vegetation.	8Ha on Erf 971 and 10Ha on Erf 1 will be cleared to establish crops.	**Erf 971:** 29°41'03.02"S 23°49'37.77"E **Erf 1:** 29°41'34.37"S 22°50'08.82"E

The proposed activities will include the clearing of 18Ha of vegetation within the identified sites (Erf 1 and Erf 971), preparation of the land for cultivation, and the integration of the additional areas into the existing irrigation and farming infrastructure associated with the current pivot systems.

LEGISLATIVE REVIEW

ENVIRONMENTAL ASSESSMENTS UNDERTAKEN FOR THE DEVELOPMENT

In terms of the National Environmental Management Act 107 of 1998 ("NEMA"), environmental authorization must be obtained before any person can conduct activities that cause damage to the environment. Environmental legislation intends to regulate the interaction of human life with the natural environment. The purpose of environmental legislation is to protect and preserve the environment for current and future generations. The following Acts and Regulations apply to the proposed project:

LEGISLATION

1. Section 24 of the **Constitution of the Republic of South Africa Act (No 108 of 1996)** states that everyone has the right:

   (ii) to an environment that is not harmful to their health or well-being;

   (iii) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources, while promoting justifiable economic and social development.

2. The **National Environmental Management Act (Act No 107 of 1998).** NEMA is based on the concept of sustainable development and the objective is to provide for cooperative

environmental governance, by providing the legal framework for environmental planning and development.

NEMA has basic principles that state:

- That all the principles throughout the Republic apply to the actions of all organs of state that may significantly affect the environment;
- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- Development must be socially, environmentally and economically sustainable.
- Sustainable development requires consideration of all relevant factors.
- Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.
- There should be equal access to environmental resources, benefits and services to meet basic human needs and the Government should promote public participation when making decisions about the environment;
- Decisions must be taken openly and transparently and there must be access to information;
- Communities must be given environmental education;
- Workers have the right to refuse to do work that is harmful to their health or the environment;
- The role of youth and women in environmental management must be recognized;
- The person or company who pollutes the environment must pay to clean it up;
- The environment is held in trust by the state for the benefit of all South Africans; and
- The utmost caution should be taken when permission for new developments is granted.

3. The Environmental Impact Assessment Regulations: 324, 325, 326 & 327 of 7 April 2017. The purpose of these Regulations is to regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing, and consideration of, and decision on, applications for environmental authorizations for the commencements of listed activities, subjected to environmental impact assessment, to avoid or mitigate detrimental impacts on the environment, and to optimize positive environmental impacts, and for matters pertaining thereto.

Duty of Care

Chapter 7 of the NEMA prescribed a general 'duty of care' and the requirement to remediate environmental damage. Section 28(1) of NEMA states:

Every person who causes, has caused, or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or insofar as such harm to the environment is authorized by law or cannot reasonably be avoided or stopped, to minimize and rectify such pollution or degradation of the environment.

The Duty of Care can, inter alia, be enforced through directives issued by the competent authority.

In terms of 2014 NEMA EIA Regulations, as amended, the activities listed in Table 1 is triggered by this proposed development, thereby requiring an EA from the Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR).

4. The National Water Act (No. 36 of 1998). The major objectives of the National Water Act are to:

- Aid in providing basic human needs;
- Meet the growing demand for water sustainably;
- Ensure equal access to water and use of water resources
- Protect the quality of water of natural resources;
- Foster social and economic development; and
- Conserve aquatic and related ecosystems.

On Erf 971, the proposed cultivation area occurs about 400m south from the Orange River and about 30-20m to the Karabeeloop River, which flanks the site to the north and west. There is also associated drainage features and the artificial wetland.

The Department of Water and Sanitation will be consulted and if an application for a water use license must be applied for, then the necessary applications must be carried out.

5. The National Environmental Management: Biodiversity Act:

The act provides the framework for: i) the management and conservation of biological diversity within the Republic and the components of such biological diversity; ii) the use of indigenous biological resources in a sustainable manner; and iii) the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources.

The act also provides for co-operative governance in biodiversity management and by establishing a South African National Biodiversity Institute, the objectives of the Act can be achieved.

Three Regulations are applicable: 1) Threatened and Endangered Ecosystems, 2) ToPs (2008) (Threatened or Protected species), and 3) AIS (Alien and Invasive Species).

6. The **National Environmental Management: Protected Areas Act:**

The Protected Areas Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. It provides for the establishment of a national register of all national, provincial and local protected areas and the management of those areas. The Act also provides for the governance and functions of South African National Parks and matters in connection therewith.

7. **The National Forests Act No. 84 of 1998 (NFA) & List of Protected Tree Species under the National Forest Act, 1998 (Act No. 84 of 1998).**

The purposes of this Act are to promote the sustainable management and development of forests for the benefit of all. The Act also provides special measures for the protection of certain forests and trees and promotes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes.

According to the Act, a natural forest is defined as a group of indigenous trees whose crowns are largely contiguous or which have been declared by the Minister to be a natural forest under section 7(2). No person may cut, disturb, damage or destroy any indigenous tree in a natural forest; or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any tree, or any forest product derived from a tree within a natural forest.

The principals of the Act indicate that:

a) Natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, proposed new land use is preferable in terms of its economic, social or environmental benefits;

b) A minimum area of each woodland type should be conserved; and

c) Forests must be developed and managed so as to-

   (i) conserve biological diversity, ecosystems and habitats;

   (ii) sustain the potential yield of their economic, social and environmental benefits;

   (iii) promote the fair distribution of their economic, social, health and environmental benefits;

(iv) promote their health and vitality;

(v) conserve natural resources, especially soil and water;

(vi) conserve heritage resources and promote aesthetic, cultural and spiritual values; and

(vii) advance persons or categories of persons disadvantaged by unfair discrimination. Page 15 of 82 (4) The Minister must determine the minimum area of each woodland type to be conserved in terms of subsection (3)(b) based on scientific advice.

Only one protected tree species were identified: *Boscia albitrunca* (Shepherd's Tree / Witgatboom), which will require a permit to be removed.

8. Conservation of Agricultural Resources Act (Act 43 of 1983):

The objectives of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) are to provide for the conservation of the natural agricultural resources of South Africa by the:

a. Maintenance of the production potential of land;
b. Combating and prevention of erosion and weakening or destruction of the water sources; and
c. Protection of the vegetation and the combating of weeds and invader plants.

The CARA states that no land user shall utilise the vegetation of wetlands (a watercourse or pans) in a manner that will cause its deterioration or damage. This includes cultivation, overgrazing, diverting water run-off and other developments that damage the water resource.

The CARA includes regulations on alien invasive plants. According to the amended regulations (GN R280 of March 2001), declared weeds and invader plants are divided into three categories:

- Category 1 may not be grown and must be eradicated and controlled,
- Category 2 may only be grown in an area demarcated for commercial cultivation purposes and for which a permit has been issued, and must be controlled, and
- Category 3 plants may no longer be planted and existing plants may remain as long as their spread is prevented, except within the flood line of watercourses and wetlands.

It is the legal duty of the land user or landowner to control invasive alien plants occurring on the land under their control. Should alien plant species occur within the study area; this will be managed in line with the EMPr.

9. Bio-regional Plans:

In terms of the provincial and local protected areas, the area under application is situated within an area that has been identified as other natural areas according to the BGIS of the Northern Cape Biodiversity Conservation Plan and does fall within a critically biodiversity area 1&2. The Siyathemba Municipality Spatial Development Framework (SDF) identified areas within the Municipality

The purpose of the SDF is:

- To guide spatial planning, land development, and land use management in the local municipal area. More specifically, to geographically detail land use.
- To give strategic direction in terms of investment in the local Municipal area to the private sector and community investors concerning the levels, locations, types, and forms of investment that need to be made and that will be supported by the Local Municipality.
- The SDF identified impacts associated with mixed farming (crops and livestock) as:
    - The destruction of biodiversity;
    - Indigenous flora being substituted with exotic species;
    - The loss of herbaceous annuals;
    - Exposure of bare soil and subsequent erosion;
    - Areas are homogenized and ecosystem functioning on cultivated land is essentially simplified to the production of bio-mass;
    - Depletion and degradation of soils may lead to unproductive soils.

  The Siyathemba Municipality has mapped the areas in which the proposed two sites fall as 'Impacted Farming' areas.

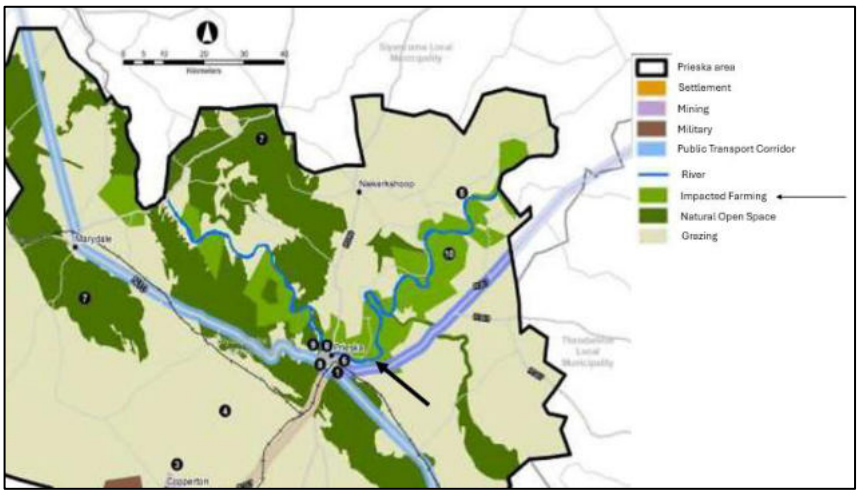


FIGURE 3: SIYATHEMBA SPATIAL FRAMEWORK (IDP 2025/26). THE SITE IS ALLOCATED BY THE BLACK ARROW WHICH IS CONSIDERED IMPACTED FARMING AREA.

The vegetation survey that will be conducted will verify the sensitivity of the site from a botanical and ecological point of view.

10. Northern Cape Nature Conservation (Act 09 of 2009):

The objective of the Act is to provide for the sustainable utilisation of wild animals, aquatic biota, and plants, to provide for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, to provide for offences and penalties for contravention of the Act, to provide for the appointment of nature conservators to implement the provisions of the Act, to provide for the issuing of permits and other authorisations, and to provide for matters connected therewith.

This Act aims at improving sustainability in terms of balancing natural resource usage and protection or conservation thereof. It includes six schedules, as follows:

(viii) Schedule 1 - Specially Protected species;
(ix) Schedule 2 - Protected species;
(x) Schedule 3 - Common indigenous species;
(xi) Schedule 4 - Damage causing animal species;
(xii) Schedule 5 - Pet species; and
(xiii) Schedule 6 - Invasive Species.

With regards to protected flora, the Northern Cape Nature Conservation Act includes a list of protected flora. The other protected species identified on the site that were not trees, but protected succulents in the family Aizoaceae:

- *Mesembryanthemum cf. tetragonum*
- *Mesembryanthemum coriarium*
- *Mesembryanthemum guerichianum*
- *Mesembryanthemum junceum*
- *Mesembryanthemum noctiflorum*

It will be recommended that relevant permits be obtained and that a detailed plant search and rescue operation be conducted before the clearance of vegetation, as part of the EMPr.

11. The Provincial Spatial Development Framework for the Northern Cape (Office of the Premier of the Northern Cape, 2012):

On 22 August 2012, the Northern Cape Provincial Spatial Development Framework (PSDF) was approved in accordance with the Northern Cape Planning and Development Act, 1998. However, the Spatial and Land Use Management Act (SPLUMA) was approved in 2013 and now requires the review of the Northern Cape PSFD 2012, which commences in 2018.

The PSDF needs to address spatial inefficiencies and inequalities, identify areas of opportunity and ensure proactive management of natural resources and ecosystems in the Province. The PSDF will focus on transforming spatial development whilst SPLUMA provides the tool for that transformation.

The approval of the PSDF in terms of the Northern Cape Planning and Development Act 7 of 1998 means that the PSDF has statutory status as the common spatial vision and strategy around which to align the future development and management of the province.

In terms of Land Use Management, there are 6 (six) Spatial Planning Categories, which are, 1) Category A (Nature Conservation Area); 2) Category B (Natural Buffer Areas) 3) Category C (Agricultural Areas); 4) Category D (Urban Related Areas); Category E (Industrial Areas); Category F (Surface Infrastructure Areas).

The SPCs are not a blueprint for land-use classification, or a zoning scheme, however, the SPCs provide a framework to guide decision-making regarding land use at all levels of planning, and they have been articulated in a spirit of creating and fostering an organised process that enables people to work together to achieve sustainable development in a coherent manner. The designation of SPCs does not change existing zoning or land-use regulations or legislation. SPCs merely help to clarify and facilitate coherent decision-making that can lead to better zoning, laws and regulations. The SPCs, furthermore, provide a framework in terms of which land-use decisions can be standardised throughout the province.

The land-use classification has further adopted a bioregional planning approach which provides for three broad land-use categories, i.e. a core conservation area (SPC A), a conservation focussed buffer area (SPC B), and a transition area (SPC C-F).

In terms of this application, the proposed development will fall within the Land Use Management Category C, since the Applicant would like to clear vegetation to establish intensive agricultural crop production. The plan is to establish a maize/wheat/lucern/vineyard/nut trees.

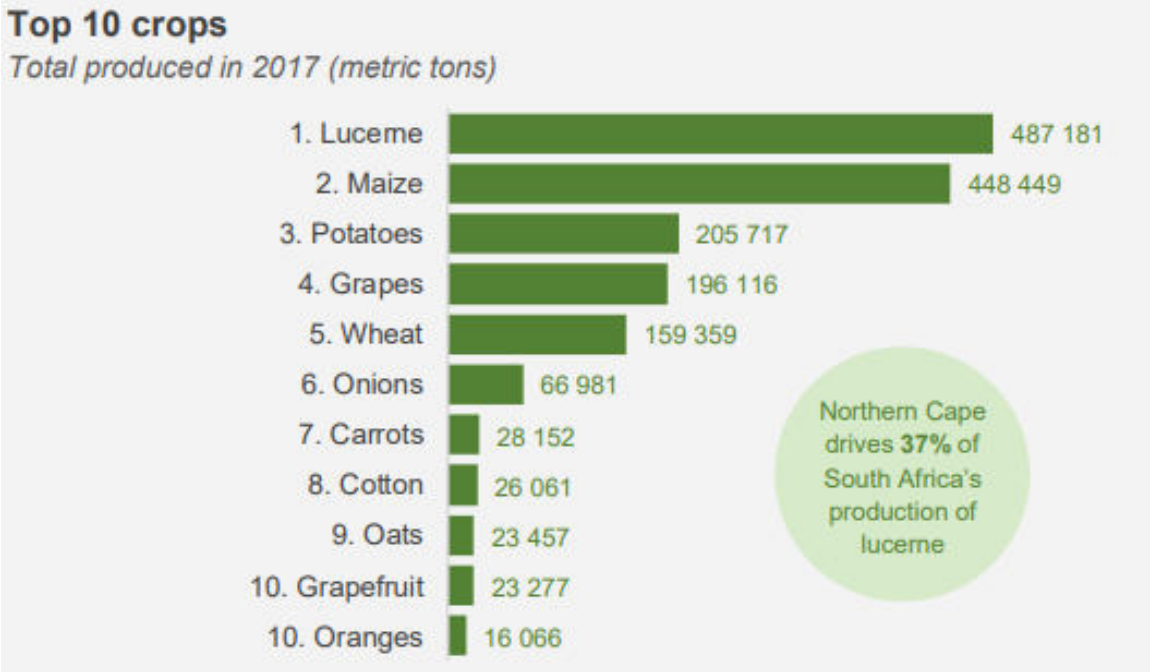


FIGURE 4: TOP 10 CROPS PRODUCED IN NORTHERN CAPE (SOURCE STATS SA, 2020).

The Northern Cape produces about 37% of South Africa lucerne (STATS SA, 2020) and about 9% of South Africa's total maize production (Department of Agriculture, Forestry and Fisheries, 2017), therefore the proposed production is in line with the achievement of the agricultural sector in the Northern Cape.

In terms of the Agricultural Areas in Spatial Planning, the key strategies and intervention are:

- Giver effect to the ideas of the sustainable Development Goals pertaining to the promotion of sustainable agriculture and rural development.
- Development of an Agricultural Master Plan for the Province to identify and protect the most fertile land for cultivation and food security purposes.
- Consider the rezoning of low-potential agricultural land as a mechanism to promote sustainable economic development by unlocking the latent capital vested in non-agricultural uses through the Sustainable Development Initiative (SDI) approach.

- Encourage bona fide game farms to combine their landholdings to create an extensive Spacial Planning Buffer Area (SPC B), that would support biodiversity conservation in a meaningful manner. Such areas should be managed as Special Management Areas.
- Encourage local processing of farm products and the provision of local farm services to enhance the total economy, increase the viability of agricultural production and reduce rural poverty.

12. The **National Heritage Resources Act (No 25 of 1999)**:

The basic objectives of the National Heritage Resources Act are to set norms and maintain essential national standards and general principles for the governing and management of heritage resources in the Republic and to protect heritage resources of national significance.

The South African Heritage Resources Agency (SAHRA) has been established to coordinate and promote the management of heritage resources at the national level.

The proposed site is situated on agricultural land currently used for grazing, however, a heritage assessment was completed and will be submitted to SAHRA.

13. **Occupational Health and Safety Act (No 85 of 1993):**

The act provides for the health and safety of persons at work and the health and safety of persons in connection with the use of machinery, the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work. The EMPs should provide measures to ensure that the objectives of the Act are met on this site.

14. **Alien and Invasive Species Regulations, 1 August 2014**

Regulations regarding alien and invasive species.

15. **National Road Traffic Act, 1996 (Act 93 of 1996):**

Regulations relating to the transport of goods and substances by road.

PROJECT DESCRIPTION

The proposed project entails the clearing of approximately 10 ha on Erf 1 for a central pivot area and 8 ha on Erf 971 near Prieska to facilitate the establishment of irrigated crop production as part of the applicant's long-term agricultural expansion strategy. The proposed cultivation areas will be integrated into the existing farming and irrigation infrastructure currently used for maize, wheat and lucerne production, with the long-term objective of transitioning to pecan nut cultivation.

This is a permanent change from natural grazing to crop production. Should the activity be authorized, it is highly unlikely that the proposed development will be decommissioned. However, should crop production cease, the site will be used for pasture. Should the Applicant elect to decommission the crops and pasture land at any point in the future, the necessary authorization must be obtained and the correct decommissioning protocol must be followed. The relevant Government Departments (those applicable at the time of decommissioning) should be consulted before decommissioning.

Following the decommissioning, the site should be rehabilitated back to a predetermined state, e.g. sufficient for grazing or a near-natural state with natural vegetation cover. A qualified botanical specialist should be contacted for more information on rehabilitation techniques.

Ownership

The proposed sites and two properties are owned by Martelle Trust for Erf 971 and the Siyathemba Municipality for Erf 1.

Zoning

The sites are zoned Agriculture and the proposed development is not an application for a change of land used. The project will simply entail the change of grazing land to crop production. Therefore, *no* application in terms of the Subdivision of Agricultural Land Act (SALA) Act 70 of 1970 for sub-division and rezoning, is necessary.

Water source

The development footprint on Erf 1 is located outside any identified watercourse or wetland feature and is therefore unlikely to result in direct impacts on surface water resources. The Orange river is about 1.5km north of Erf 1, with Karabeeloop River about 450m west from Erf 1.



FIGURE 5: ERF 1 IN RELATION TO WATER FEATURES

On Erf 971, the proposed cultivation area occurs about 400m south from the Orange River and about 30-20m to the Karabeeloop River, which flanks the site to the north and west. There is also associated drainage features and the artificial wetland.



Figure 6: Erf 971 in relation to water features

The proposed clearing of vegetation and establishment of irrigated crop production do not, in themselves, constitute a water use in terms of Section 21 of the National Water Act, 1998. However, existing or proposed irrigation abstraction may fall under Section 21(a). Since the landowner already has a water use licence which is in process of renewal, Section 21(a) would not be triggered.

While any activities undertaken within or affecting drainage lines or wetland features on Erf 971 could potentially trigger Sections 21(c) and 21(i). These sensitive features will be avoided and managed to prevent the need for additional water use authorisations.

DWS will however be consulted during the public participation process.

In terms of NEMA, the clearing of vegetation will take place within 32m from the drainage line, but will not trigger any additional listed activity, since the clearing of vegetation and establishment of crops will not lead to infrastructure development with a physical footprint of $10m^2$ or more.

Irrigation

Yield losses are the consequence of over- or under-irrigation and the problem can be greatly overcome by scheduling water use. It involves the planned replacement of water in the soil profile that has been drawn off by the crop. The soil scientist must decide and design the irrigation scheduling to prevent soil degradation and protect the water resource.

Drainage

According to the soil assessment the proposed development areas are characterised by deep, freely drained soils with favourable drainage properties for irrigation and cultivation. The Oakleaf soils, which dominate the northern parcels (including Erf 971), are more than 2.5 m deep, exhibit no signs of saturation, and are considered highly suitable for irrigation. The Prieska soils on the southern parcel (Erf 1) are approximately 1.8 m deep, with the hard carbonate layer occurring at sufficient depth to avoid drainage constraints. Overall, no significant drainage problems or risks of waterlogging were identified, provided that sound irrigation and salinity management practices are implemented.

METHOD STATEMENT & ACTIVITY SPECIFIC MANAGEMENT PLAN

The Method Statements set out the materials, labour, and method that the contractor proposes using to carry out an activity, identified by the Environmental Officer and/or Project Manager/Farm Manager. The Method Statements contain sufficient detail such that the Environmental Officer and Project/Farm Manager can assess whether the Contractor's proposal is following the requirements of the Environmental Management Plan. The contractor must sign each Method Statement along with the Environmental Officer and Project/Farm Manager to formalize the approved Method Statement. Method Statements and/or Management Plans must be submitted by the Contractor to the Project/Farm Manager and Environmental Officer for approval before the commencement of the activity.

The Method Statements for this project, as a minimum, must include:

- Soil Management and Erosion;
- Stormwater control/drainage;
- Flora & Fauna Management;
- Water Quality & Aquatic Health;

- Fires
- Waste

Method Statements must address the following aspects:

- What – a brief description of the work to be undertaken;
- How – a detailed description of the process of work, methods, and materials;
- Where – a description of the location of the work (if applicable); and
- When – the sequencing of actions with commencement and completion date estimates.

Since this is a farm project it is unlikely that an Environmental Control Officer will be appointed. Therefore, such responsibilities and duties will be transferred to the Project/Farm Manager and/or Applicant, who must monitor the implementation of the Method Statements and activity-specific management plans during the operation phase of the project.

PLANNING, DESIGN PHASE MANAGEMENT & PRE-CONSTRUCTION PHASE

During the planning and design phase, all statutory approvals, permits and authorisations required for the proposed agricultural development shall be obtained and their conditions incorporated into the final project design prior to the commencement of any clearing or cultivation activities.

The preferred layout (Alternative 2) for Erf 1 shall be retained to avoid the high-sensitivity Ridge Vegetation Unit and minimise impacts on the mapped CBA 1 area, while the drainage lines and wetland-associated features on Erf 971 shall be clearly demarcated and excluded from cultivation and associated infrastructure.

Existing farm roads and irrigation infrastructure shall be utilised wherever possible to limit additional disturbance and avoid unnecessary fragmentation of natural habitat.

The Environmental Management Programme (EMPr) shall be communicated to all contractors and personnel prior to construction, and environmental awareness training shall be undertaken to ensure that all activities proceed in accordance with the approved environmental authorisation and associated management requirements.

Soil management measures shall be incorporated into the design to maintain the integrity of the well-drained Oakleaf and Prieska soils, including provisions for appropriate irrigation

scheduling, salinity management and erosion prevention to ensure sustainable long-term agricultural production.

No development shall occur outside the approved footprints without further environmental assessment.

Furthermore, a Heritage Chance Find Procedure shall be incorporated into the EMPr to address the unlikely discovery of archaeological material, fossil resources or human remains during future ground-disturbing activities.

CONSTRUCTION PHASE MANAGEMENT

Should the activity be authorized, the overall goal for the construction phase is to manage the activities associated with the construction of the site in such a way that:

- The receiving environment is protected from degradation and harm;
- There is timeous detection of, and responses to, environmental change due to monitoring;
- The activity complies with all relevant legislation, permits, and authorizations.

The Applicant is responsible for the ongoing management of the site. All measures and conditions described by the soil scientist, botanist, zoologist, and heritage specialist, in this EMP, the Environmental Authorisation, and any other relevant documents/legislation, should be strictly adhered to during the construction and operational phase.

Project activities in the Construction phase may include:

- Plant and animal search and rescue;
- Cut, destroy and/or transplant protected tree species – considering that no removal may take place without appropriate permits from the Department of Forestry;
- Alien vegetation control measurements;
- Environmental awareness training;
- Erosion control mechanisms and soil management; and
- Waste management.

OPERATION PHASE MANAGEMENT

The overall goal for the operational phase is to manage the activities associated with the operation and maintenance of the site in such a way that:

- The development maintains its positive socio-economic impact;
- Management of soil is kept in good condition through:
    - Monitoring the drainage,
    - Irrigation scheduling,
    - Monitor drainage so that accumulation does not impact abutting crops,
    - Monitoring efficiency of crop rotation, and
    - Fertilization.
- Management of alien vegetation is sufficient to prevent spreading or causing fire hazards;
- Managing crop health;
- The activity complies with all relevant legislation, permits, and authorizations.

The Applicant is responsible for ongoing management of the site until the farm is sold or an application for closure is submitted. All measures and conditions described in this EMP, the Environmental Authorisation, and any other relevant documents/legislation, should be strictly adhered to during the operational phase.

ORGANIZATIONAL REQUIREMENTS

The Applicant should be familiar with the requirements of the EMP and should execute all maintenance activities in an environmentally responsible manner.

This overview offers a perspective of the proposed organization of the EMP and the recommended responsibilities of key members of the project team. The ultimate responsibility and public accountability for the EMP and general environmental management reside with the Applicant.

The workers will be responsible for implementing the instructions from the farm manager (or Applicant), and it is recommended that the farm manager appoints a responsible worker to report back on a daily/weekly/monthly basis, ensuring compliance with the conditions of the EMP. If needed, to provide a basic level of environmental training to the responsible worker/s.

If needed, an independent and external Environmental Control Officer (ECO) can be appointed by the Applicant to assist and advise on the implementation of the EMP and to conduct environmental audits no less than once every five (5) years unless otherwise instructed by the DAEARDLR.

ROLES AND RESPONSIBILITIES

AUTHORITIES

The issuing of the necessary permits/licences/certificates and authorizations is the responsibility of the authorities, in this case, the Department of Agriculture (*for the approval of cultivating virgin land*), Environmental Affairs (*for environmental authorisation approval*), Rural Development and Land Reform (DAEARDLR) and the Department of Forestry (*for the permits for removal of protected tree species*). The authorities will also ensure that the Applicant complies with the conditions of the Environmental Authorisation and other permits/licenses/approvals.

Authorities are entitled to perform site inspections to ensure compliance with the conditions and of non-compliance, the authorities may provide instructions to ensure an action plan with corrective measures is carried out or to cease with the project, especially in the case of long-term non-compliance.

APPLICANT

The Applicant, in this case, Martelle Trust, has the responsibility for environmental management during the pre-construction, construction and operational phase until the property is sold or an application for closure is made. Thereafter it will be the responsibility of the landowner or new tenants.

The EMP becomes legally binding to the Applicant and everyone acting on behalf of the Applicant during the construction and operation activities. The activities are regarded as permanent therefore there is no provision made for decommissioning activities.

In summary, the Applicant is responsible for:

- Reviewing the environmental monitoring programme in the EMP or as recommended by the Environmental Control Officer (ECO) if one is appointed;
- Ensuring that the required environmental audits are undertaken on a timely basis and that the results of the audits are communicated to all personnel that are responsible;
- Implementing an environmental monitoring programme approved by the authorities and providing such results to the authorities;
- Conducting regular site inspections and monitoring to ensure compliance with the EMP;
- Advising on actions to be taken in the event of incidents or public complaints;
- Keeping a complaint register on-site/on the farm.

FARM MANAGER

The Farm Manager's responsibility is to monitor staff, crops, purchasing supplies, and maintain a professional network of communication between the staff and the Applicant and other duties the Applicant would require.

The Applicant can appoint a Farm Manager to also be responsible for the environmental management during the operational phase and must report to the Applicant regularly.

RESPONSIBLE CONTRACTORS

It is the responsibility of Contractors (clearing of the vegetation, construction of irrigation system, drainage systems, etc.) to ensure that there is compliance with the environmental specifications contained in the Environmental Impact Assessment (EIA), the Environmental Management Programme (EMP), and the Environmental Authorisation (EA). This implies that Contractors must familiarise themselves with the documentation and understand the restrictions and conditions. If any infringements are noted, the ECO (if one is appointed) or/and the Applicant must be notified before further action is taken.

Contractors will also be responsible for the workforce on-site and could appoint a suitable Farm Manager who must report to the Contractors.

SUB-CONTRACTORS

Sub-contractors must operate under the supervision of the Contractors and are liable for issues associated with their actions.

ENVIRONMENTAL CONTROL OFFICER

An Environmental Control Officer (ECO) can be appointed by the Applicant to advise and assist where necessary and to monitor the implementation of the EMP, as an external function. The ECO must have previous experience in environmental management and compliance monitoring.

The ECO should conduct an independent evaluation of compliance with the EMP, but is not responsible for enforcing the conditions of the EMP.

Specific responsibilities include:

- Undertake environmental site audits as determined by the responsible authority;
- Recommend environmentally appropriate solutions to environmental problems;
- Recommend additional environmental management measures, if applicable;
- To assist in environmental training for the staff;
- Help raise awareness for environmental sensitive issues and help foster an appropriate environmental attitude towards the environment;
- Respond to non-compliance and provide corrective actions and procedures;
- Assist the Applicant if liaising with authorities is required.

MITIGATION MEASURES & MONITORING

The following maintenance and mitigation measures are recommended for implementation by the Applicant for the construction phase and the duration of the operational phase.

Below is the table representing the summary of the significant impact ratings, after mitigation, which is discussed in Appendix F.

	Alternative 1:	Alternative 2 (preferred site)	No-Go
PLANNING, DESIGN AND DEVELOPMENT PHASE			
Failure to obtain and comply with all applicable statutory approvals and associated conditions could lead to delays in project implementation, increased financial costs and potential legal consequences arising from regulatory non-compliance.	Low (+)	Low (+)	N/A
CONSTRUCTION PHASE			
Loss of indigenous vegetation due to vegetation clearing and site preparation	Medium (-)	Low (-)	N/A
Loss of protected plant species during vegetation clearing and cultivation establishment	High (-)	Low (-)	N/A
Loss of fauna habitat and distribution of fauna resulting	Medium (-)	Low (-)	N/A

from vegetation clearing, machinery movement and human activity.			
Impacts on drainage lines and wetland – associated features on Erf 971 due to vegetation removal, earthworks and increased sedimentation risk.	Low (-)	Low (-)	**Low (+)**
Soil erosion and soil degradation associated with vegetation clearing, soil disturbance and earthworks	Low (-)	Low (-)	N/A
Dust generation from agricultural operations and vehicle movement	Low (-)	Low (-)	N/A
Heritage chance finds resulting from ground disturbance during site preparation and cultivation establishment.	Low (-)	Low (-)	N/A
Socio-economic benefits through temporary employment and local expenditure during the establishment phase.	**Medium (+)**	**Medium (+)**	Low (-)
Cumulative biodiversity transformation associated with the conservation of natural habitat to agricultural land.	Medium (-)	Low (-)	N/A
OPERATIONAL PHASE			
Disturbance of fauna resulting from ongoing agricultural activities	Medium (-)	Low (-)	N/A
Impacts on drainage lines and wetland-associated features on Erf 971 due to irrigation practices, runoff and ongoing agricultural activities	Low (-)	Low (-)	**Low (+)**
Soil erosion and soil degradation associated with long-term cultivation and irrigation activities.	Low (-)	Low (-)	N/A
Soil salination associated with long-term irrigation	Low (-)	Low (-)	N/A
Soil degradation due to inappropriate irrigation management.	Low (-)	Low (-)	N/A

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6070

Soil contamination from agrochemicals	Low (-)	Low (-)	N/A
Loss of soil productivity if irrigation and fertilization are not appropriately managed.	Low (-)	Low (-)	N/A
Water quality impacts from irrigation and agrochemicals through nutrient enrichment, pesticide use and agricultural runoff.	Low (-)	Low (-)	**Low (+)**
Socio-economic benefits through sustained agricultural production, employment opportunities and contribution to the local economy.	**High (+)**	**High (+)**	Medium (-)
Creation of employment opportunities during establishment and operation.	**Medium (+)**	**Medium (+)**	Low (-)
Improved utilization of highly suitable agricultural soils	**Medium (+)**	**Medium (+)**	Low (-)
Contribution to local and regional agricultural development	**High (+)**	**High (+)**	Medium (-)
Cumulative biodiversity transformation through the permanent loss of natural habitat and ongoing agricultural intensification within the broader landscape.	Medium (-)	Low (-)	N/A
DECOMMISSIONING AND CLOSURE PHASE			
Not assessed at this stage.			

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GENERAL ADMINISTRATIVE RESPONSIBILITIES FOR PRE-CONSTRUCTION

Pre-Construction Actions				
Item	Actions/Management Measures	Responsible Person & Time Frame	Monitoring Methods	Indicators
Authorisation	• Ensure that the required authorisation and permits have been obtained before the start of construction.	The Applicant must ensure all documentation is correct and in place before construction commence. The Applicant must ensure all conditions of the EA are adhere to before construction commence.	• Keep record of correspondence and proof of submission. • Keep record of authorisation.	• Authorisation and contracts on file.
Environmental Compliance	• Appoint a suitably qualified Environmental Control Officer (ECO) or suitably qualified Farm Manager to oversee construction activities. • Include the EMPr in all tender documents to ensure that sufficient resources are allocated	The Applicant and Engineering & Building contractors, before the call for tenders.	• Applicant to check tender documents, permits, and contracts.	• Incorporated in tender documents.

	to environmental management by the Contractor. • Plan and make adequate financial provision for rehabilitation and restoration activities and clearly allocate timing and responsibility for environmental rehabilitation. • Permits from the relevant authorities must be obtained for the destruction or removal of plant species protected in terms of the National Forests Act, NEMBA ToPs Regulations, or the Nature & Environmental Conservation Ordinance. • Permits for the removal and translocation of plant SCCs must be obtained from the appropriate authorities.			
Employment	• Set targets for the use of local labour based on the needs of the proponent and the availability of existing skills and people who are willing to undergo training. • Ensure that Contractors from outside the local area that tenders for work meet the required targets for how many locals are given employment.	The Applicant, before the call for tenders.	• Applicant to check tender documents and contracts. • Keep record of how targets were determined. • Keep record of staff by origin.	• Incorporated in tender documents. • Percentage of local staff. • Percentage of Previously Disadvantaged Individual (PDI) staff.

	• Consider implementing labour-intensive rather than capital-intensive work methods wherever possible. • Consider purchasing resources from local sources wherever possible.		• Keep record of training provided.	• Number of incidents. • Time activities stopped. • Number of recurring incidents.

GENERAL ADMINISTRATIVE RESPONSIBILITIES FOR CONSTRUCTION

Construction Phase Actions				
Item	**Actions/Management Measures**	**Responsible Person & Time Frame**	**Monitoring Methods**	**Indicators**
Site area Ensure the site blends well with the surrounding farming area.	• Demarcate the 8Ha on Erf 791 as per co-ordinates in the BAR and EMP, and the 10Ha central pivot areas in accordance with the preferred alternative site. • Clearing of vegetation must follow the same incline as the natural environment as far as possible.	• During the clearing of vegetation or harvesting, site inspections should be conducted by the Applicant and the Contractor (daily), or the responsible Farm Manager to ensure	• Visual inspections. • Method statement. • Completing monitoring report.	• Accepted method statement. • Site boundaries demarcated. • Monitoring Reports on file to be used for environmental auditing as per EA.

		the site layout is followed.		
Soil Management: • Prevent erosion and sedimentation in the riparian areas. • Prevent soil pollution and degradation.	• No additional land should be cleared. *Erosion control:* • If possible, apply cropping techniques that leave large clods on the soil surface or ridges perpendicular to the direction of the prevailing wind (although the ridges must not be more than 40cm high, or the wind will lop off their tops and enhance erosion. • Alternatively, leave crop residue in the fields, as it increases roughness and protects the soil, and also can trap a large amount of dust. • If erosion occurs within the cleared area, then any erosion gullies on the study area that might develop over time must be filled in and compacted and an erosion-monitoring programme will be implemented as a cradle to grave process.	• Site inspections should be conducted by the Applicant (monthly) and or the responsible Farm Manager to detect signs of erosion or drainage problems. • It must be ensured that the erosion minimization measures installed, are effective. • The Applicant, or the responsible Farm Manager must inspect the site and downstream (or receiving end in the environment, which would be the closest drainage lines outside	• Visual inspections. • Maintain register of pollution events and response. • Following resumption of activities, frequently inspect repaired equipment to ensure proper functioning. • Completing monitoring report.	• Incidence of Erosion. • Number of pollution incidents. • Time activities stopped. • Number of recurring incidents • Availability and completeness of register and records. • Monitoring Reports on file to be used for environmental auditing as per EA.

	• Should erosion become problematic: 1. Any erosion rills or gullies that develop will be filled in with subsoil, compacted but upper layer to be scarified to bind with topsoil, top dressed with soil, fertilized and seeded. 2. Such areas will be provided with a mulch/manure layer of at least 5cm thick. 3. Trunks/branches of trees removed (non seed-bearing alien trees) will be placed in rows along the contour 5m apart and pegged to the ground to reduce water speed and curb erosion. 4. In the worst-case scenario, geofabric or Soil Saver (natural organic sheet material with seeds) will be pegged onto the slopes after the spreading of topsoil and seeding was affected. A soil conservation officer or expert will	of the irrigated areas) area every term, to ensure stormwater management systems are effective and no downstream sedimentation is occurring. • Visual inspection must be conducted by the Applicant, or the responsible Farm Manager to detect any source of drainage issues, erosion or soil pollution regularly. • The Applicant is ultimately responsible for the transformation of grazing land into a crop area without resulting in sediment loss and/or erosion.		

	be appointed to oversee the process. • Disturbance of the soil and vegetation zones around the study area will be prohibited. *Pollution control:* • No fuel, oil and lubricants will be stored onsite. • Emergency repairs will be done over drip pans. • Maintenance of vehicles will be done at the offsite workshop in a leak-free condition. • Hydrocarbons shall not be drained into the soils nor shall used filters and hydrocarbon-contaminated parts be buried at the site, but will be removed to an approved waste site or recycling facility. • Making use of bio-remediation facilitated by a specialist company will negate larger spills whilst smaller spills could be treated with fertilizer to break			

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	it down or be scooped up by a front-end loader to a hazardous waste site. • Peatsorb or sawdust will be used to contain larger spills and some of this material must be on site as a contingency measure. • No other hazardous chemicals will be used at the site. • The chemical toilet will be maintained according to Municipal bylaws or specifications issued by a local Health Inspector. One toilet should be provided for every 10 people onsite working (this is especially applicable during harvest time). • In case of emergencies used oils and lubricants will be siphoned in receptacles with proper lids and be disposed of at a registered recycling facility immediately. • For emergency cases, a receptacle will be provided for used filters and oil-contaminated vehicle parts and will be respectively disposed of at a registered			

	waste facility and scrap yard immediately. • The application of pesticide must be preferably applied on days where the wind is in a consistent direction and between 3-15km/h (windspeeds below 3km/h can suspend droplets in the air, which can then evaporate or drift. Windspeeds stronger than 15km/h will result in a high loss of spray from the target area and droplets will drift). • No application of pesticides should take place on days during northerlies or easterlies. • Follow the instruction on pesticide use: o Using the spraying equipment correctly to ensure that the best possible coverage is obtained with the minimum amount of pesticides and that applications are not repeated to reduce the risk of pollution and pest resistance or pest resurgence; o Check the weather before spraying to reduce the risk of suspended			

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	droplets or drift and missing the target canopy. o Choose the right pesticide based on the disease and pest susceptibility and the required product mode of action. • Occupational health and safety guidelines to be applied when pesticides are handled.			
Land Use and Land Capabilities: • Ensure the site blends well with the surrounding area.	• The development will be restricted to the approved area. • In circumstances where species cannot be transferred, the offset area identified should be seeded with similar species.	• Site inspections should be conducted by the Applicant and Contractor, or the responsible Farm Manager regularly to ensure the development is restricted to the approved area. • The Applicant is responsible for the application for cultivating virgin land.	• Visual inspections. • Completing monitoring report.	• Number of incidents and response. • Monitoring Reports on file to be used for environmental auditing as per EA.

Ecologically Sensitive and Flora Management: • To minimize damage to indigenous flora and fauna utilizing the surrounding areas. • To control and prevent alien vegetation growth.	• The development would be restricted to the demarcated area as provided by the site plan and no vegetation outside the demarcated boundaries will be removed. • Permits for the removal and translocation of plant SCCs must be obtained from the appropriate authorities. As per the Specialist recommendations: • Avoid development within the high-sensitivity Ridge Vegetation Unit (Erf 1). • Protect and retain protected plant species. The following protected species recorded on site must be avoided or appropriately managed: *Mesembryanthemum tetragonum* *M. coriarium* *M. guerichianum* *M. junceum* *M. noctiflorum*	• A list of plants that are relocated must be kept by the Applicant, the Contractor, or the Farm Manager. • The Applicant, the Contractor, or representative Farm Manager must check for alien invasive vegetation and removal thereof as the development progress. • The Contractor is responsible for the behavior of his staff with specific reference to environmental management until the construction is completed.	• Visual inspection. • Appointment of vegetation specialist. • Search and Rescue Report. • Check evidence of alien vegetation. • Alien Control Report.	• Reports on file. • Permits on file. • Floral species established at conservation area. • Size of area cleared relative to the development footprint. • Size of area disturbed outside of construction site boundary. • Construction footprint and road reserve clear of alien vegetation.

	Boscia albitrunca (Shepherd's Tree), which is protected under both the Northern Cape Ordinance and the National Forests Act. • Where avoidance is not possible, the relevant permits must be obtained prior to disturbance. • Maintain the ecological functioning of the wetland and drainage lines on Erf 971. The artificial wetland and associated drainage lines should remain functional and should not be directly cultivated or altered. • Natural vegetation associated with these features should be retained as far as practicable to maintain hydrological processes and habitat connectivity with the Orange River system. • Implement an Alien Invasive Plant Control Programme The specialist identified several invasive species, including: *Neltuma (Prosopis) glandulosa* *Erigeron bonariensis* *Lactuca serriola* *Sonchus oleraceus* *Medicago sativa* *Boerhavia cordobensis*			

	These species should be monitored and removed in accordance with NEM:BA requirements. • Retain larger sections of natural vegetation where possible. • Prioritise development within already transformed or disturbed areas. Site B (Erf 971) had already undergone extensive vegetation clearing before the survey was undertaken. The report therefore supports directing development towards previously disturbed land rather than intact natural habitats.			
Faunal Management • To minimize damage to indigenous fauna utilizing the	As per the Specialist recommendations: • Environmental Awareness Training o Training must occur before construction commences and be repeated annually. o Attendance registers must be maintained. o Training must include:	• A list of animals that are relocated must be kept by the Applicant, the Contractor, or the Farm Manager. • The Applicant, the Contractor, or representative Farm Manager must check	Visual inspection	• Number of animals harmed/ incidents. • Monitoring records.

surrounding areas.	▪ Identification of all Species of Conservation Concern (SCC). ▪ Legal obligations under NEMBA and TOPS. ▪ Prohibition of rodenticides and gin traps. • Dead-animal reporting protocols. • Laminated identification guides for SCC must be displayed at the farm office, workshop and worker accommodation. • Aardvark Protection Measures o Conducting an Aardvark burrow survey prior to any soil preparation or ripping activities. o Establishing no-insecticide buffer zones around known burrows. o Designing farm infrastructure to accommodate Aardvark movement corridors. o Avoiding persecution arising from conflicts with farming operations. • Rodenticide Management. Because of the potential impacts on raptors and small carnivores, the report requires:	for snaring devices, traces of poison, and removal thereof every week. • The Applicant or Farm Manager is responsible to identify/allocate appropriate areas in the surrounding area to be used for the relocation of species where possible, before the removal of such an animal. • The Contractor is responsible for the behaviour of his staff with specific reference to environmental management for the duration of construction.		

	○ A formal rodenticide management protocol. ○ Avoidance of secondary poisoning of: Lanner Falcons, Tawny Eagles, Martial Eagles, Black-footed Cats, Brown Hyaenas, other predatory species. ○ The use of gin traps and indiscriminate poisoning methods must be prohibited. • Habitat Buffer Areas.The report recommends maintaining habitat buffers to protect faunal species and ecological functioning: ○ Retaining natural vegetation patches where feasible. ○ Providing habitat buffers around important faunal features such as burrows and movement areas. ○ Avoiding unnecessary disturbance outside approved development footprints. • Tortoise Protection Measures.For the Northern Tent Tortoise, which may be significantly impacted by orchard	• The Contractor or representative Farm Manager must report all animal mortalities to the Applicant on the same day as mortality has been identified. Such mortalities should be recorded. • If any carcasses are collected for monitoring purposes, a permit is needed in terms of the Provincial Nature and Conservation Ordinance. The Applicant is responsible for obtaining such a permit. • A list of animals that are relocated must be		

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	development, the specialist recommends: ○ Undertaking pre-clearance searches before vegetation removal. ○ Relocating individuals encountered during clearing activities to suitable nearby habitat. ○ Minimising herbicide use that would eliminate indigenous succulent food plants. ○ Avoiding unnecessary destruction of natural shrubland beyond the approved footprint. • Faunal Rescue During Clearing.The following good-practice measures should be implemented: ○ Clear vegetation progressively so that animals can disperse naturally. ○ No hunting, trapping, poisoning, or collecting of wildlife. ○ Any animals encountered must be relocated by a suitably qualified specialist where necessary.	kept by the Applicant, or Farm Manager. • The Applicant or Farm Manager is responsible for good farming practices which include responsibilities to control pests/bacterial infections/fungus/parasitic plants on crops, that will not negatively impact neighbouring farms.		

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	○ Open excavations and trenches must be inspected daily and trapped animals safely removed. ○ Animal burrows, nests and shelter sites outside the approved footprint must be protected. • Permit Requirements for Species of Conservation Concern. For species where impacts are rated as High, the report notes that: ○ Targeted mitigation is essential. ○ Permit conditions may be required under TOPS and NEMBA legislation. ○ Development activities must comply with all applicable biodiversity legislation. General mitigation includes: • The clearing and disturbance activities must be conducted in a progressive linear manner, from one side of the area to the other and over several days, to provide an easy escape route for all small mammals and herpetofauna.			

	• All construction and maintenance motor vehicle operators must undergo an environmental induction that includes instruction on the need to comply with speed limits, and to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion are limited. A signed register of attendance must be kept for proof. • Vehicles will not display fuel, oil or lubricant leaks and will be maintained to an acceptable standard. • Any fuel spills will be cleaned up immediately and contaminated soil or used spill-absorbing material will be removed to an approved waste facility. • Handling of hydrocarbons will be done in accordance with all applicable legislation to prevent pollution incidents. • The movement of vehicles will be restricted to the authorized development area and farm roads.			

	• Attention must be given to reptiles and slow-moving animals (tortoises) that might occur in the study area. • Before the topsoil and vegetation are removed in a certain phase someone must walk through the site to ensure that there are no animals that could be harmed by the excavator. • Reptiles that occur in the proposed study area should be chased away and tortoises should be appropriately captured and relocated to abutting areas. • No animals entering or settling in the study area will be trapped or killed and this requirement will be included in the environmental awareness programme, which has to be discussed with workers on an annual basis and presented by the applicant or any competent ECO/FM. • No hunting or snaring would be allowed outside or inside the study area and the applicant should implement a severe			

	penalty system for people transgressing this requirement. • The applicant will implement a proper supervision mechanism to ensure that poaching is not taking place. • No person may carry out a restricted activity in terms of the List of Threatened or Protected Species (TOPS) regulations i.e. killing, catching, hunting by any method or device including searching, injuring with intent to hunt, catch or kill any such specimen involving a TOPS specimen without a TOPS permit. The applicant will take full responsibility for any animals that are proven to be killed by a member of the construction staff. The applicant will implement an environmental awareness programme and ensure all employees are coherent in the above regard. • Veldt fires will not be allowed. The applicant will take full responsibility for			

	any financial losses which prove to be the result of negligence in this regard. • Informal cooking fires by farm personnel will not be allowed on-site. • No burning of waste will be allowed at the site. • Proper housekeeping with an emphasis on waste management should be applied. Plastic and wire could be lethal to cattle and other animals and should therefore be controlled. Household waste disposal will be through depositing waste in strategically positioned containers fitted with scavenger proof lids. • Some bird species might build a nest of grass and twigs on the ground or construct a nest between grass tufts. Some of these nests may contain chicks or eggs, therefore care must be taken to carefully relocate the nests to areas outside the study area before vegetation clearing commences or if			

	possible, relocate chicks or eggs to bird sanctuaries. • Some animals take shelter and live in burrows. Burrowing animals can detect prey items using seismic cues and therefore these animals would be able to use the vibrations of vehicles and excavators to realize their potential vulnerability. Care must be taken not to injure these burrowing animals when the excavator is used in the proposed study area. • An expert who holds a Competency Certificate to handle dangerous and venomous reptiles should be contracted to remove any animals that may cause harm to employees at the study site. A declaration/ testimonial must be provided to prove prior experience in this regard. Appropriate permits are required to move animals. • The Applicant should remove any of the staff caught interfering with wildlife from the site immediately.			

	• Control of pests/fungus/diseases must be conducted without impacting surrounding fauna, other farmers and crops, and within the restrictions of the law. o As far as possible use resistant crops o Apply pesticides and fungicides according to the labelling instructions o Ensure good air circulation at the pecan nut orchard o Sanitize pruning and cutting equipment after use o Remove infected plant debris from the site and do not use it for compost o Maintain healthy crops and prune the parasitic plants.			
Stormwater control • Prevent silt transport into drainage lines. • Prevent pollution into	• All mitigation measures as listed under the heading 'Soil' must be implemented. • Clearing of vegetation should be restricted to the proposed footprint and site layout plan. • Drinking water will be brought to site on a daily basis.	• The Contractor, Applicant or the responsible Farm Manager must inspect the site and downstream area to ensure drainage management systems	• Visual inspection of drainage structures and downstream respective areas. • Review layout plans.	• Incidence of stormwater contamination. • Visible leaks/ water wastage. • Visible surface erosion.

the Orange River system.	• Water for establishing the crops will be obtained as per the Water Use Right. • No foreign or unapproved material/substance should be dumped or stored within the footprint of the study area. • Refuelling of vehicles (such as the bulldozer) will be done by fuel browser and all vehicles/equipment shall be maintained to a high standard off-site and shall not display any major leaks. Vehicle/machinery inspection should be done regularly, and emphasis should be on checking hydraulic hoses and couplings. • In case of an emergency, repairs on site must be done over a drip pan and at least 100m away from the drainage lines. • In case of large, critical spills the Departments of Water Affairs and the Department of Environmental Affairs in the Northern Cape will be informed immediately for assistance and advice	are effective and no downstream sedimentation and vegetation die-out is occurring every month. • Visual inspection must be conducted by the Contractor, Applicant or the responsible Farm Manager to detect any source of degradation regularly. • The Applicant is ultimately responsible for any action that will lead to the destruction of riparian vegetation or neighbouring crops due to this development.		

	and a competent company conversant with bio-remediation will be appointed immediately to address the possible impacts of such spill. All costs would be for the account of the applicant. • The applicant accepts the principle of 'polluter pays'.			
Noise Management • Prevent excessive noise generation within the site and surrounding area.	• All equipment and activities to comply with noise regulations. • All vehicles will be fitted with standard exhaust systems and will be serviced regularly. • Silencer units in vehicles and equipment to be maintained in good working order. • Unnecessary hooting, shouting, flapping of tailgates, and excessive use of exhaust brakes will be discouraged. • Unnecessary idling of vehicles will be discouraged during the construction phase. • Travelling speed onsite will be reduced to 20-30 km/h.	• The Contractor (daily), Applicant, or representative Farm Manager must monitor and manage the noise generated during the construction phase. • The Applicant or Farm Manager must log and record complaints received from abutting residents due to noise. • The Farm Manager must communicate	• Monitor noise along closest boundary of the site relative to the active construction area on times during activities. • Completing monitoring report.	• Number of registered complaints. • Monitoring Reports on file to be used for environmental auditing as per EA.

	• Moving parts of vehicles will be regularly lubricated, replaced, and serviced. • Repair work that involves using grinders and hammers on steel or any other steel-on-steel activity will not be performed early morning or early evening. • The workforce and contractors will be managed correctly in terms of noise generation and be sensitized to dignified human behaviour. • All Health and Safety guidelines must be complied with. • Workers working in areas where the 8-hour ambient noise levels exceed 85dB must have the appropriate Personal Protective Equipment (PPE).	with the Applicant and Contractor immediately once a complaint is received and attempt to resolve the issue within a week after the complaint. • The DAEARDLR is responsible for compliance monitoring.		
Air Quality Management • Prevent excessive dust generation and	• All mitigation measures as listed under the heading 'Soil' must be implemented. • Vehicles to be maintained properly and fitted with standard exhaust systems and will not be left idling unnecessarily.	• The Contractor (daily), Applicant (monthly), or representative Farm Manager must monitor and manage	• Visual inspections and assessment of dust plumes. • Visual assessment of dust control measures. • Completing monitoring report.	• Complaints Receive and Response Report on file. • Visibility of dust coming off clearance site.

emissions within the site and surrounding area. • Prevent incorrect use of pesticides.	• Vehicle trips must be restricted to what is essential. • No burring of waste will be allowed on the property. • No cooking fires will be allowed. • No burning of waste will be allowed at the site, except for the occasional burning of alien vegetation within a cleared area and during wind still days. • Cigarette butts might not be disposed of in the veldt, but must be put out and disposed of in the waste bins provided in vehicles. • If dust levels in the process area necessitate, 3m high shade cloth windbreaks could be established along the site boundary, opposite from prevailing wind direction. • Farming activities shall not impose dust counts of more than 80 mg/m^2/per day at any residence or more than 40 mg/m^2/per day during normal operations.	the dust generation during the construction phase or harvest seasons. • The Farm Manager must communicate with the Applicant and Contractor immediately once a complaint regarding dust is received and attempt to resolve the issue within a week after the complaint. • The DAEARDLR is responsible for compliance monitoring. • Visual inspection must be conducted by the Contractor, Engineer, Applicant or representative Farm	• Keep a register of complaints received and response. • If needed contract a dust measuring company to formally monitor dust counts.	• Dust mitigation measures in place. • Number of days that dust plumes are visible. • Number of registered complaints. • Size of disturbed areas. • Monitoring Reports on file to be used for environmental auditing as per EA.

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	• Speed of vehicles will be restricted to 20-30km/h, especially when travelling along the farm road. • This potential impact should be addressed in an environmental awareness programme.	Manager to detect any source of dust pollution regularly. • The Applicant and Farm Manager must research the correct pesticides to be used, and consult with Soil Scientists about the use of pesticides. • The Applicant and Farm Manager must log and record the use of pesticides (dates, climate conditions, volumes applied, areas applied, etc.). • The Applicant, and Farm Manager must log and record complaints received from abutting residents or workers		

		when pesticides are applied. • The Farm Manager must communicate with the Applicant and Contractor immediately once a complaint regarding the use of pesticides, is received and attempt to resolve the issue within a week after the complaint. • The Applicant is ultimately responsible for any action that will lead to the destruction of crops on the neighbouring farm or the occupational health of workers, due to		

		negligent application of pesticides.		
Visual Impact Management • To ensure that appropriate management strategies are adhered to minimize the visual impact. • To receive no complaints regarding impacts on visual quality.	• No vegetation clearing should take place outside the proposed study area in accordance with the site layout plan and the visual impact will be reduced through the establishment of crops and an alien control programme. • To reduce the visual impact caused by dust plumes, the clearing of vegetation and ploughing should, as far as possible, not take place on windy days. • The proposed area and surroundings must be kept clean and free of litter continuously. A weekly cleanup of the entire site must be done. • No dumping of waste in unauthorized areas around the site must be permitted. • Dust plumes on haul road will be reduced by reducing vehicle speed. • No erosion that could lead to head-cuts, gullies or slumping will be allowed on the site and disturbed areas would be made stable as soon as possible.	• The Contractor (daily), Applicant (monthly), or representative Farm Manager must monitor and manage the personal onsite and maintain ongoing housekeeping to keep the construction site tidy. • The Applicant and Farm Manager must keep a complaint register and log any complaints received regarding visual impacts. • The Farm Manager must communicate with the Applicant and Contractor	• Visual inspections. • Completing monitoring report.	• Number of complaints • Monitoring Reports on file to be used for environmental auditing as per EA.

		immediately once a complaint is received and attempt to resolve the issue within a week after the complaint. • The DAEARDLR is responsible for compliance monitoring. • The Contractor or Applicant must implement management actions.		
Waste Management To ensure that appropriate waste management strategies are adhered to at all times.	• Staff would be trained to distinguish between various types of waste (domestic and system structure, etc.). • Residue in the form of oversize stones should be removed from the site or used to control erosion gullies on the farm. • Vegetation that will not be transplanted can be ploughed into the topsoil to increase the humus content of the soil. Likewise with crop residue.	• The Contractor, Applicant or representative Farm Manager must ensure that chemical toilets are provided, one toilet for every 10 people, and can be removed from the site	• Visual inspection of waste materials, the handling and storage areas.	• Number of incidents of non-compliance with safety procedures concerning waste materials. • Contamination of water and soil. • Number of spills of waste materials.

	• Trimmed and pruned vegetation infested with a plant disease will be disposed of or burnt and must not be used as compost. • Waste will not be burnt or buried on site. • The odd tyre casings and dysfunctional equipment that could be generated will be disposed of immediately at the nearest registered waste facility. • Any waste produced will be removed from the development area continuously to the Prieska waste facility with specific emphasis on household waste, plastics, unusable scrap metal, and tire casings, if any. The activity should not contribute to any surrounding windblown litter. • A skip with a proper cover will be positioned in areas easily accessible for use. Large refuse bins fitted with a proper lid will be positioned at the various work stations in the development area, and be emptied regularly in the skip.	once the harvest season is over. • The Contractor and the Applicant or representative Farm Manager must ensure that receptacles with scavenger-proof lids are provided and placed at easily accessible points and must be emptied regularly and removed from the site. • The Contractor, Applicant or representative Farm Manager must ensure that the bins shall be emptied regularly and the accumulated waste disposed of at an appropriately		• Cost of cleaning up spills. • Evidence of contamination and leaks. • Visible litter / waste on site.

	• Earthmoving vehicles may not leak any fuel, oil, or lubricants and will be maintained to an acceptable standard. • Any fuel spills will be cleaned up immediately and the soil from spill areas to be removed to a registered waste disposal site. • The salvage yard will be neat and all usable material will be placed in rows and separated into applicable categories. • Unusable scrap metal or dysfunctional machinery will be positioned on one side and removed every month to a recycling facility. • No day-to-day repairs or servicing of vehicles or equipment will take place on-site. • No washing of vehicles will take place on the property. • None of these wastes will be buried/drained into the soil. • The chemical toilets (one per every 10 people on site) will be maintained according to Municipal specifications	permitted disposal site. • The Contractor, Applicant or representative Farm Manager must ensure that the site is to be checked for litter daily. All litter should be collected regularly and deposited in the waste bins.		

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	and as discussed under the heading "Water". If it produces foul odours, it shall be remedied according to available guidelines. Where necessary components of it will be regularly disinfected. • Proper care will be taken that the surroundings are not used for ablutions and the necessary penalty system will be imposed for such offences. • Domestic waste generated ancillary to the development process will be deposited in containers with scavenger-proof lids placed at the site. It will be regularly removed from the site to the nearest waste site and not dumped in the veld nor burnt nor buried on site. Containers will be marked to ensure that they are used for the right purpose. Management will provide clear management guidelines and this aspect will be included in the environmental awareness programme. • Any foul smells will be treated with the necessary disinfectants or lime can be			

	introduced to the bottom of the receptacle.			
Traffic Management • The ensure that appropriate management strategies are adhere to minimize the impact on traffic. • To ensure that there is no transporting overload material and no speeding.	• All vehicles visiting the site shall be roadworthy and will be included in the agreement with contractors. • All drivers must dispose of applicable driver's licenses. • All vehicles and earthmoving machinery would be properly maintained. • Traffic should be observed and necessary road etiquette enforced and this aspect will be included in the environmental awareness programme. • Vehicles entering any other public road will come to a complete stop before entering the road and any transgressions in this regard will be heavily penalized. • The farm road to the site must be maintained and kept in good working condition. • Overloading will not be permitted. Speeding will be prohibited and drivers	• The Contractor, Applicant or representative Farm Manager must monitor and ensure that the correct signage is displayed, at the correct place, and are visible on a monthly basis. • The Contractor must ensure that all vehicles operating on the clearance site are properly maintained and serviced and road-worthy on a daily basis. • The Applicant and Farm Manager must keep a complaint register and log any	• Visual inspection of vehicles and machinery, for: o Leaks. o Overloading. • Keep record of vehicles entering the site and time they enter. • Keep record of incidents and complaints. • Completing monitoring report.	• Number of incidents on non-compliance. • Number of leaks and spills. • Cost of cleaning up spills. • Number of complaints. • Number of vehicles traveling to the site each day. • Condition of vehicles. • Monitoring Reports on file to be used for environmental auditing as per EA.

	will be penalized should it be proved that this requirement is contravened. • Driving speed on the farm will be reduced to 30-20km/h for safety reasons and to reduce dust generation. • During harvest time, the hauling of heavy vehicles will mostly commence at 07:00 to 17:00 during the week (winter) and 6:00 to 19:00 (summer) but may result in the need to cart crops on Saturday mornings and should avoid at all costs transporting harvest material at night. • The applicant must appoint a traffic marshal/s or flagman for situations where harvest trucks may impede normal traffic flows or in poor visibility events along the farm road at the entrances to the R357. • A breathalyzer can be used to ensure that no member of the workforce is permitted to work or drive a vehicle under the influence of alcohol. This also includes the use of narcotic substances.	complaints received regarding trucks and earthmoving machinery. • The Farm Manager must communicate with the Applicant and Contractor immediately once a complaint is received and attempt to resolve the issue within a week after the complaint. • The DAEARDLR is responsible for compliance monitoring. • The Contractor or Applicant must implement management actions.		

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Socio-Economic • To ensure that abutting neighbours are not negatively impacted by nuisance factors such as dust and noise. • To ensure that local people are employed. • To ensure the safety of the community through proper access control, registration of workers, and community watch-dogs.	• Those described under previous headings plus establishing regular meetings with nearby neighbours. • Farmworkers may not wander in any area outside the farm. • Farmworkers to be employed must be registered as per the Labour law specifications. • No stock theft and poaching will be tolerated. Any farm worker/contract worker found guilty of these transgressions should be removed from the property, dismissed, and handed over to the police for sentencing. • No wood should be gathered from outside the study area and no plant or crop should be removed by the workforce. • Landowners will be fully compensated for stock or crop loss.	• The Applicant or representative Farm Manager must monitor and ensure that the site is fenced with correct warning signage that is displayed and visible before construction and must inspect the site regularly to re-erect fence or signage that might have been removed. • The Applicant must ensure that a Farm Manager is employed and that access to the Farm Manager is easily accessible for community members before construction commences.	• The representative farm manager must keep a complaint register and log any complaints received and report to the Contractor and Applicant. • Check training attendance register. • Observe whether activities are executed in line with EMPr requirements. • Completing monitoring report.	• Keep Complaints register on site. • Complaints followed up and dealt with. • Keep record of how targets were determined. • Keep record of training provided. • Proportion of workers that completed environmental training. • Compliance of workers with EMPr. • Keep record of staff by origin. • Monitoring Reports on file to be used for environmental auditing as per EA.

		• The Farm Manager must keep a complaint register and log any complaints received and report to the Contractor and Applicant. • The Applicant and Contractor to ensure priory/preference is given to local people for employment.		
Heritage, Archaeological and Palaeontological Management • To ensure that any archaeological and historical material of interest that	• Any subsurface evidence of archaeological sites or remains, e.g. stone tool artifacts, bone or ostrich eggshell fragments, charcoal and ash heaps, or remnants of stone-made structures or unmarked graves found during the construction phase of the development, must be reported to SAHRA APM Unit (Tel. 021 462 5402).	• Should it be required, the Applicant is responsible for acquiring any permits. • The Contractor, Applicant or representative Farm Manager must report any new findings if anything is unearthed	• Visual inspections • Completing monitoring report.	• Time to rehabilitation. • Size of disturbed areas. • Monitoring Reports on file to be used for environmental auditing as per EA.

might be found is reported to SAHRA. • To ensure that if any human remains are found, are reported to the local police, and SAHRA. • To ensure that contractors and personnel on site are aware of the responsibilities (preservation and appropriate management of new findings) and chain of command	• A Chance Find Protocol shall be implemented throughout all construction activities. • Should any previously unidentified archaeological structures, graves, stone-walled features or historical remains be encountered, the area shall immediately be designated as a temporary no-go area pending inspection by a qualified archaeologist. • Small in situ artefacts or material shall remain in place and be protected from damage until assessed by a specialist. • If unmarked human burials or human remains are uncovered, all work in the affected area shall cease immediately, and the South African Police Service, SAHRA Burial Grounds and Graves Unit, and a qualified archaeologist shall be notified. • Should any significant archaeological resources be identified, a Phase 2 rescue excavation may be required, subject to permits issued by SAHRA.	during construction immediately. • The Contractor, Applicant or representative Farm Manager must ensure the operators of earthmoving equipment are informed of the process to be followed should new findings be unearthed during construction before construction. • The Applicant and Contractor must ensure that construction around the new findings site ceases and sufficient time is provided for removal/collections of such material,		

should any archaeological and historical material of interest of human remains be found onsite.	• Sufficient time shall be allowed for the recording, recovery, or protection of heritage material where required. • All operators of earthmoving equipment shall receive induction regarding the Chance Find Protocol and their obligation to report any heritage discoveries immediately. • Any archaeological, palaeontological or burial find shall be immediately secured and clearly demarcated to prevent further disturbance until assessed by an appropriate specialist. • If fossil material is uncovered during excavation activities, work shall cease in the immediate area, and a qualified palaeontologist and SAHRA shall be notified for guidance.	should it be unearthed. • The Contractor, Applicant or representative Farm Manager must be present when a new area is cleared.		

GENERAL ADMINISTRATIVE RESPONSIBILITIES FOR OPERATIONAL PHASE

Operational Phase Actions:				
Item	Actions/Management Measures	Responsible Person & Time Frame	Monitoring Methods	Indicators
Ownership and Responsibility	• The responsibility of the sites are the applicant (Martelle Trust).	• The Applicant is responsible	• The applicant is responsible for environmental compliance.	• Documents submitted and approved by DAEARDLR.
Soil Management: • Maintain no erosion status; • Prevent soil degradation.	• Monitor rehabilitated areas after heavy rains during the operational phase. Implement remedial action immediately if erosion is detected. • If signs of erosion in the receiving environment below the Applicant should repair/rehabilitate these areas as soon as possible. • Implement proper salinity management practices. The land is suitable for irrigation provided that salinity risks are actively managed through sound irrigation practices. Dissolved salts introduced	• Site inspections should be conducted by the Applicant (after heavy rain events), or the responsible Farm Manager to detect signs of erosion. • The Applicant, or the responsible Farm Manager must inspect the site annually to ensure stormwater management systems are effective and no erosion results.	• Visual inspections. • Maintain register of pollution events and response. • Continued soil monitoring.	• Incidence of Erosion or soil degradation. • Number of pollution incidents and/or crop failure. • Time activities stopped.

	through irrigation water must be prevented from accumulating in the root zone. • Apply periodic leaching irrigation where necessary. Because the soils are freely drained and sodium levels are low, occasional leaching with excess irrigation water will maintain electrical conductivity (EC) within acceptable limits and prevent salt build-up. • Maintain good irrigation scheduling to avoid waterlogging and salinisation. Sustainable irrigation management is essential to ensure that salts do not accumulate over time and that soil productivity is maintained. • Apply fertiliser, particularly phosphorus (P), according to crop requirements. Phosphorus concentrations are naturally low and will need to be supplemented through fertiliser application during cultivation. • Monitor soil chemistry periodically during operation. Although current EC, ESP and SAR values fall within acceptable limits for	• Visual inspection must be conducted by the Applicant or the responsible Farm Manager to detect any source of soil pollution annually. • The Applicant is ultimately responsible for the any actions at the site that may result in sediment loss and/or erosion or lead to soil degradation.		• Number of recurring incidents. • Availability and completeness of register and records. • Monitoring Reports on file to be used for environmental auditing if required.

	irrigation, regular monitoring should be undertaken to ensure that these parameters remain within recommended thresholds under long-term irrigation. • Avoid excessive soil compaction. The Oakleaf soils possess a subsoil clay content close to the Department's of Agriculture 35% threshold. While root penetration is currently not restricted due to the weak soil structure, heavy machinery operations should be managed to maintain soil permeability and infiltration characteristics. • Recognise the naturally alkaline nature of the Prieska soils. The Prieska soils contain a hard carbonate horizon at approximately 1.8 m depth and are naturally alkaline; crop selection and fertilisation programmes should account for these conditions. • Retain the existing drainage characteristics of the soils. The Oakleaf soils are very deep (>2.5 m) and freely drained, while the Prieska soils are approximately 1.8 m deep with no significant drainage limitations. Agricultural practices should preserve these			

	favourable drainage properties and avoid activities that could impede infiltration.			
Irrigation runoff control • Prevent silt transport into drainage areas. • Allow for natural drainage. • Prevent pollution	• Irrigation runoff management should not endanger or degrade off-site environment. • Inform the responsible person(s) accordingly, if it is noted that the irrigation runoff systems are failing. • Mitigation measures listed under "soil management" in terms of pesticide and herbicide use.	• Site inspections should be conducted by the Applicant or the responsible Farm Manager annually or after heavy rain events to detect signs of soil structure failure. • The Applicant or the responsible Farm Manager must inspect the site to ensure irrigation runoff management are effective. • Visual inspection must be conducted by the Applicantor the responsible Farm Manager to detect any source of degradation after heavy rain events.	• Visual inspection of irrigation runoff receiving environment and downstream respective areas. • Review irrigation runoff plans.	• Incidence of water contamination. • Visible leaks/ water wastage. • Visible surface erosion. • Compliance with storm water management plan.
Traffic Management	• The same mitigation measures as listed under the construction phase.	• The Contractor, Applicant or representative Farm Manager must monitor and ensure that the correct signage is displayed, at the correct	• Visual inspection of vehicles and machinery, for: ○ Leaks. ○ Overloading.	• Number of incidents on non-compliance.

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		place, and are visible on a monthly basis. • The Contractor must ensure that all vehicles operating on the clearance site are properly maintained and serviced and road-worthy on a daily basis. • The Applicant and Farm Manager must keep a complaint register and log any complaints received regarding trucks and earthmoving machinery. • The Farm Manager must communicate with the Applicant and Contractor immediately once a complaint is received and attempt to resolve the issue within a week after the complaint. • The DAEARDLR is responsible for compliance monitoring.	• Keep record of vehicles entering the site and time they enter. • Keep record of incidents and complaints. • Completing monitoring report.	• Number of leaks and spills. • Cost of cleaning up spills. • Number of complaints. • Number of vehicles traveling to the site each day. • Condition of vehicles. • Monitoring Reports on file to be used for environmental auditing as per EA.

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		• The Contractor or Applicant must implement management actions.		
Socio-Economic • Ensure that where possible, local people are employed. • To ensure the safety of the community through proper access control, and proper signage and traffic control measures.	• Those mitigation measures are described under previous headings. • Staff members will not be allowed to access any other section of the landowners or abutting properties. • Stakeholders must continue with engagements with the surrounding communities through the appointment of a representative site manager. The representative site manager could also assist in raising any concerns/complaints noted by the affected community to the applicant. • Local people should be employed when new positions becomes available and where possible. • Any personnel found to be trespassing must be subjected to a disciplinary hearing. Any employee that is caught trespassing onto neighbouring properties and committing	• The Farm Manager must keep a complaint register and log any complaints received and report to the Applicant. • The Applicant and the representative Farm Manager are responsible for maintaining a Complaints Register throughout the operations. • The Applicant to ensure priory/preference is given to local people for new employment.	• The representative site manager must keep a complaint register and log any complaints received and report to the Applicant. • Observe whether activities are executed in line with EMPr requirements. • Continued monitoring.	• Keep Complaints register on site. • Complaints followed up and dealt with. • Keep record of how targets were determined. • Keep record of training provided. • Keep record of staff by origin. • Monitoring Reports on file to be

	criminal offences, should be immediately dismissed. • Changes in crime patterns will need to be monitored in consultation with the local police and community policing forums.			used for environmental auditing as per EA, if required.

DECOMMISSIONING PHASE

Should the activity be authorized, this is a permanent change from grazing to crop production. Should the activity be authorized, it is highly unlikely that the proposed development will be decommissioned. However, should crop production cease, the site will be used for pasture.

Therefore a decommissioning Phase for the EMP is not included in this management plan, since an EMP is a living document and would need to be amended and adopted as the years' progress. This is normally the function of an Environmental Audit, which should take place once every 5 years, at least.

Also, it is most likely that environmental laws and local municipal laws would be amended and requirements might change over the years. Due to the uncertainty of the laws few years from now, it is proposed that if the result is the removal of the crops and termination of the pivot areas, then a closure plan be submitted and approved by the relevant authority/ties before closure commence. Therefore at this stage, the decommissioning phase will not be discussed.

If for whatever reason the crops fails, the Applicant is responsible for the rehabilitation of the site back to a functional grazing unit and the necessary authorization must be obtained and the correct decommissioning protocol must be followed. The relevant State Departments (e.g. the DAEARDLR, (if applicable at the time of decommissioning) and an environmental consultant should be consulted before decommissioning.

Following the decommissioning of the site, the site should be rehabilitated back to a predetermined state, e.g. sufficient for grazing. A qualified botanical specialist should be contacted for more information on rehabilitation techniques.

MONITORING, REPORTING & AUDITING

A monitoring programme must be in place not only to ensure conformance with the Construction EMP (CEMP), but also to monitor any environmental issues and impacts which have not been accounted for in the CEMP that are, or could result in significant environmental impacts for which corrective action is required. Monitoring during construction must be on-going for the duration of this phase. The ECO must ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process will be to monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications;
- Ensure adequate and appropriate interventions to address non-compliance;
- Ensure adequate and appropriate interventions to address environmental degradation;

- Provide a mechanism for the lodging and resolution of public complaints;
- Ensure appropriate and adequate record keeping related to environmental compliance;
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site; and,
- Aid in communication and feedback to authorities and stakeholders.

All documentation e.g., audit/monitoring/compliance reports and notifications, required to be submitted to the DAEARDLR in terms of the Environmental Authorisation.

Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

NON-COMPLIANCE REPORTS

All supervisory staff including, the ECO must be provided with the means to be able to submit non-conformance reports to the representative Farm Manager or Applicant. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty-eight) hours.

The non-conformance report will be updated on the completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Farm Manager and ECO or as per DAEARDLR instruction.

INCIDENT REPORTS

According to Section 30 of National Environmental Management Act (NEMA), an "Incident" is defined as an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including:

a) the nature of the incident;

b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;
c) initial measures taken to minimise impacts;
d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and
e) measures taken and to be taken to avoid a recurrence of such incident.

Example of Incident Register:

Date	Incident - *describe what incident and possible explanation and possible reasons, including photo record. Assign a reference no. for incident.*	Action Taken – *provide details and proof of action e.g. documents, photos, etc.*	Signature

Example of Accident Register:

Date	Names of persons involved	Accident - *describe what accident, injuries, and possible explanation and possible reasons, including photo record. Assign a reference no. for accident.*	Action Taken – *provide details and proof of action e.g. documents.*	Signature

Example of Complaint Register:

Date	Names of persons involved	Accident - *describe what complaint was received and reasons, including photo record if possible.*	Action Taken – *provide details and proof of action taken to resolve the complaint e.g. documents.*	Signature

MONITORING REPORTS

A monitoring report will be compiled by the ECO as dictated by the conditions of the EA and must be submitted to the DAEARDLR for their records on request. This report should include the current status of environmental parameters during the construction phase, details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out, or any other aspect as per the EIA Regulations (2014, as amended).

Continued monitoring may continue on an annual basis during the operational phase, or as instructed by the DAEARDLR.

AUDIT REPORTS

The Applicant must ensure that project compliance with the conditions of the EA is audited by an independent auditor (e.g. qualified EAP appointed as an ECO), and that the audit reports are submitted to the DAEARDLR at intervals as dictated by the conditions of the EA. The audit report will be as prescribed by the EA. Such audits must be undertaken during the construction phase of the proposed development. The effectiveness of the mitigation measures and recommendations for amongst others the following: grievance incidents; waste management, alien and open space management, re-vegetation and rehabilitation, plant rescue and protection and traffic and transportation should be audited. The results must form part of the project monitoring and audit reports.

FINAL AUDIT REPORT

A final environmental audit report must be compiled by an independent external auditor (qualified EAP) and be submitted to DAEARDLR upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase. This report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions and the requirements of the EMPr.

ENVIRONMENTAL TRAINING

The goal of an environmental training or environmental awareness plan is to prescribe how the Applicant intends to inform all of his employees of all the possible environmental risks resulting from their particular line/function of work within the structures of the organization. This plan will also prescribe how the identified risks will be dealt with to avoid pollution and environmental degradation.

All personnel associated with the project must understand the purpose and benefits of the EMP.

The appropriate training must occur as part of an induction program and should include:

ENVIRONMENTAL MANAGEMENT INTRODUCTION TO ALL PERSONNEL:

General environmental information session/s to ensure that employees at each relevant function and level receive environmental information and are aware of the environmental management objectives.

It is also the responsibility of the Applicant or the ECO (if one is appointed) or the Farm Manager to conduct basic training with less literate employees describing the listed environmental impacts and the mitigation measures to be followed more practically. The Applicant may choose to employ an independent consultant (ECO) to conduct such training. Such training is best done in the employee's home language, onsite as it is more useful and visual. As a minimum the Basic Environmental Awareness Plan must address the following:

- The need for training
- General discussion on what is the environment
- Why must the environment be protected
- Types of environmental impacts
- Mitigation measures and Basic Rules to comply with

- Fines and Penalties
- Questions and Answers

JOB-SPECIFIC TRAINING

Employees whose function of work can cause significant environmental impacts must be trained, educated, and afforded the experience to ensure that their tasks are performed to the best of their ability to minimize environmental degradation on the site, with specific reference to the receiving environment.

The spinoff of Environmental training will produce a group of people being equipped and enriched with the knowledge to implement the main principles that were taught to them, outside of the workplace as well. It will enable them to put into practice their knowledge at home or other workplaces, should they one day leave the site.

The Applicant/ECO is responsible to provide training annually (or more regularly if the need should arise) to employees on:

- The importance of compliance with the objectives of the EMP and procedures to achieve the objectives of the EMP.
- Identifying the significant environmental impacts: actual or potential impacts and how employees' activities might influence the impacts.
- Benefits for improved personal performance with regards to environmental awareness.
- Their roles and responsibilities in achieving compliance with the objectives of the EMP and procedures to achieve the objectives of the EMP, including emergency preparedness and response requirements.
- The potential consequences of departure from specified operating procedures.

In terms of job-specific training, the Applicant, Farm Manager, or ECO, and Contractor must identify relevant personnel and training courses for employees performing tasks, which can cause significant environmental impacts. They must become competent based on appropriate education, training, and/or experience.

Comprehension training must include:

- Emergency preparedness and response, including an incident report.
- Soil stability and erosion control.
- Drainage management.
- Water conservation and water quality protection.
- Fire evacuations and risk control.
- Pesticide application.

- Poaching.
- Faunal incidences – prevention of disturbance to fauna, reporting any faunal mortalities.
- Alien vegetation identification and control.
- Waste management.
- Ability to recognize archaeological and palaeontological artefacts.
- Incentives and rewards for good environmental practice.

This list is not intended to be exclusive or exhaustive.

After training needs have been identified, it is the responsibility of the Applicant and ECO to ensure that employees attend the relevant identified training and attendance must be documented. The Applicant must decide on the appropriate time to conduct environmental training.

As an incentive to motivate employees, progress in compliance with the training programme can be recorded and evaluated to nominate and elect the best candidate who has improved personal performance with regard to environmental awareness. Such an employee may be rewarded at the discretion of the Applicant. This can be done through the following method:

- By Management through task observation;
- During internal and external audits, when the effectiveness of the EMP is evaluated;
- Own initiatives that are taken by employees to improve the environment.

The Environmental Awareness Plan must apply to the specific task and the level of understanding of the employee. Open communication between the employees and the Farm Manager, or ECO, the Contractor, and Applicant must be established and in the event of an environmental emergency, the Applicant, Farm Manager, and ECO must have process steps in place to ensure that the situation is contained and the correct procedure is followed to ensure that pollution and degradation do not occur.

Mitigation measures listed in this document must be used as a guideline to conduct such training and to establish the rules for operation. After such training, each employee may receive a certificate for completing the training. The Applicant, Farm Manager, or ECO may also have a checklist available onsite to ensure that employees are constantly aware of the mitigation measures.

DESCRIPTIONS OF SOLUTIONS TO RISKS

The following risks have been identified:

- Soil management and stability and erosion after heavy rains.
- Unauthorized clearing of natural vegetation.
- Correct irrigation to protect the water resource.

- Alien vegetation infestation.
- Waste management.
- Dust control.
- Pesticide control.
- Safety and security management.

The following procedures must be brought to the attention of all staff and suitable material/equipment provided to deal with them.

SOIL STABILITY AND EROSION DURING HEAVY RAINS

- Assess the site and downstream area of drainage and inform the responsible person (s) accordingly.
- Assess the potential hazard and inform the responsible person(s) accordingly.
- Ensure that the soil structure is functional and does not result in being washed away after heavy rains; inform the responsible person (s) accordingly.
- Ensure that erosion rills are not left to deteriorate but removed/filled in and seeded as soon as possible.

UNAUTHORIZED CLEARING OF NATURAL VEGETATION

- Stop the operator of heavy equipment immediately carrying on with such activity and request him to vacate the site.
- Determine if any plants can be saved and place them in the soil and water.
- Assess the potential hazard and inform the responsible person(s) accordingly.

CORRECT IRRIGATION TO PROTECT THE WATER RESOURCE.

- Consult the Soil Scientist regularly regarding irrigation scheduling.
- Assess the site after irrigation for signs of soil degradation.
- Assess the crop after irrigation for signs of over or under irrigation.
- Log and register meter readings of water abstracted and used for irrigation.

ALIEN VEGETATION INFESTATION

- Assess the level/scope of degradation caused by infestation and inform the responsible person(s) accordingly.
- Identify the alien plants establishing and the best method to remove such plants.
- Ensure that procedures are handled as prescribed in the EMP.
- Ensure that the areas cleared from alien vegetation be re-established with plant species natural to this area.

WASTE MANAGEMENT

- Minimize environmental impacts associated with waste.
- Apply waste management principles of preventing, minimize, recycle, or re-use, with disposal as the last option.
- No littering on the site.
- Maintain a clean and tidy site.

DUST CONTROL

- Ensure that appropriate dust suppression measures or temporary stabilizing mechanisms are used when dust generation is unavoidable (e.g. dampening with water, chemical soil binders, etc.), particularly during prolonged periods of dry weather.
- Identify when dust suppression has to be undertaken.
- Ensure that speed limits are strictly adhered to.

PESTICIDE CONTROL

- Assess protective clothing and equipment before handling or applying pesticides to ensure there is no tears/lack/faulty clothing or equipment.
- Ensure exposure time is reduced to what is necessary, to reduce the risk of poisoning.
- Ensure correct pesticides are used and instructions according to the labels are followed.
- Ensure an emergency kit is available at the site and contact details of health professionals are known to workers.
- If animals are found dead at the site, try to establish if it is due to pesticide poisoning.
- Inform abutting neighbours of the time and date of pesticide application and monitor crops.

SAFETY & SECURITY MANAGEMENT

- Ensure that construction workers and farmworkers are managed and informed of the consequences if trespassing occurs.
- Ensure suitable management of the labour force to prevent security-related issues.
- All requirements according to the OHS Act be followed and implemented.

ENVIRONMENTAL AWARENESS TRAINING

The following environmental training and training on dealing with emergencies and remediation measures for such emergencies:

ENVIRONMENTAL TRAINING

1. The Applicant, Farm Manager or ECO will have one-on-one information sessions with employees working in specific sections of the site.
2. Once a semester all employees should participate in a walkthrough of the specific site area and be requested to highlight unattended environmental impacts to increase their assessment ability and focus on potential impacts in the entire area.
3. Unattended impacts identified will be discussed and employees will be requested to provide solutions to such impacts. These solutions will be discussed and corrected if not in line with general environmental policies.
4. Employees should attend a 6 monthly or annual meeting to discuss any environmental aspect of concern and mechanisms to avoid such scenarios.
5. Employees will attend one course/seminar/presentation on environmental awareness.

TRAINING ON DEALING WITH EMERGENCIES AND REMEDIATION MEASURES FOR SUCH EMERGENCIES

- An emergency protocol will be established and documented and will deal specifically with the line of authority and responsibility and contact details of dedicated persons, including that of the landowner/abutting landowner.
- Potential emergencies will be determined and documented for each section of the site and will be discussed with individuals/groups. Emergencies identified at the site are erosion after heavy precipitation, unauthorized clearing of land, degradation of soil, pesticide poisoning, and alien vegetation infestation.
- Remediation measures, provisional and/or permanent, which are aligned with the conditions of the EMP will be documented for identified emergencies and will be discussed with employees. Each employee will be provided with a short manual on how to deal with identified emergencies.
- The Applicant or Farm Manager will provide an information session on dealing with emergencies and remediation of such emergencies once every two or five years by a recognized environmental practitioner (ECO).
- Employees will be informed on suitable material/equipment available to deal with emergencies and the functions of this material/equipment.

APPENDIX 1: POSSIBLE DECLARATION OF CONTRACTOR

I, _____, declare that:

- I/we have read and understood the content of the Environmental Management Plan and the relevant associated documents from specialists for the construction and renovations of infrastructure on Erf 971 and Erf 1, Prieska in the Siyathemba Municipal, of which Martelle Trust is the Applicant.
- I/we declare that I/we understand the responsibilities in terms of my/our role and responsibilities towards good environmental management practice.
- I/we declare that I/we understand the responsibilities in terms of my/our role and responsibilities towards good health and safety practice.
- I/we declare that I/we understand my/our role in terms of enforcing and implementing the requirements of the mitigation measures set out in the Environmental Management Plan.
- I/we declare that I/we understand my/our role in terms of honouring and enforcing the requirements set out in the Environmental Management Plan.
- I/we will comply with all applicable legislation.
- I/we have the expertise to perform the work as contracted.
- I/we will ensure that information containing my/our contract work is made available to the Applicant and ECO for their information with a reasonable opportunity to act on the situation.
- I/we will provide the competent authority with access to all information at my/our disposal regarding the contract work, whether such information is favorable to the Applicant or not.

_____ _____

Signature of the contractor Name of company

_____ _____

Date Witness signature

EAP CV

CURRICULUM VITAE
NATALIA SHARP

Personal Details	Date of birth: 12 August 1979 Nationality: South African Identity number: 790812 000 7080 Gender: Female Languages: English / Afrikaans
Qualifications:	BSc (2000) UFS – Zoology and Botany BSc Honors (2001) UFS - Limnology Masters in Environmental Management (2003) UFS - Evaluation of Phytoplankton as an indicator in a biomonitoring program, with special reference to the Modder River.
Experience (Twenty years' experience in environmental law and environmental management)	During the 2 years associated with the Centre for Environmental Management intense training was provided for equipping Natalia Sharp with adequate knowledge in terms of biomonitoring water systems and scientific report writing for research done by her through the Centre. Various scientific contributions were made during these few years which included formal reports to Bloem Water and seminars providing management principles for polluted water bodies, thus providing her with additional regulatory and environmental skills. During the 5 years associated with the DME, now changed to the Department of Mineral Resources (DMR), vast knowledge was gained in terms mine environmental management, the development, rehabilitation and closure of mining and prospecting areas. Environmental Management Programmes, Environmental Performance Assessment Reports, and Closure Reports were scrutinized continually. Therefore, adequate expertise was gained to assist the applicants with relevant environmental and mining advice and providing her with adequate knowledge to evaluate environmental impacts relating to mining. During the 11 years associated with SES (Stellenryck Environmental Solutions), Natalia Sharp has obtained immense understanding in completing environmental impact assessments, not only associated with mining projects, but also for a wide variety of different developing projects such as Light Industrial developments, Road upgrade projects, bush clearing for agricultural developments, and applications for exemptions, and so forth. She has excellent experience in writing environmental reports, which ranges from Scoping Reports, Environmental Management Plans, Environmental Awareness Plans, Mining Work Programs, Closure Plans, Risk Assessments, Performance Evaluations on projects, and Plan of Study reports. She has also

	been involved in performing biomonitoring on river systems associated with some of the projects, completing it by obtaining all the data and writing the Biomonitoring Report for the relevant Department. This is mainly attributed to her Limnology background and she is competently able to add value to this field in her current position. During the past 3 years of association with Digital Soils Africa (DSA) as an independent environmental consulting firm that are also soil specialists focussing on all soil solutions in the agricultural and environmental fields, Natalie Sharp has gained more exposure to projects involved with the Department of Agriculture and the Department of Water and Sanitation. This included applications for the cultivation of virgin soil and obtaining knowledge of the administrative processes in applying for these permits, assisting farmers with identifying suitable soils for cultivation and applying to the DWS for water use rights for irrigation. Natalie Sharp has also gained experience in GIS mapping with the free software QGIS because of working at DSA. In terms of management skills, DSA appointed Natalie Sharp as the lead project manager on all environmental-related projects: she managed the environmental authorisation projects and specialist team associated with such applications, including Section 24G applications, applications for protected plant species with the Department of Forestry, Water Use License Applications, Cultivation for virgin soil applications, SAHRIS applications, Civil Aviation approvals and correspondence with the Department of Defence. As the lead project manager, she has gained experience in proposals and cost analysis for projects and has established a network of professional connections in the Eastern Cape region and Northern Cape region. Centre for Environmental Management University of the Free State: Lab Assistant [2001 – 2003] Mine Environmental Management [2003-2005] at the Department of Mineral Resources: Environmental Officer
Previous Employment	Mine Environmental Management [2005-2008] at the Department of Mineral Resources: Senior Environmental Officer Stellenryck Environmental Solutions: Senior Environmental Practitioner [2008-2019]
Current Employment	Digital Soils Africa Pty Ltd: Senior Environmental Practitioner [2020-currently]
Professional affiliation/registration	Pri.Sci.Nat (Reg no. 123443) Reg. EAP (EAPASA) Member of IAIAsa (7237)
References	Darren Bouwer 083 703 3002 Johan van Tol 083 387 6243 Maartje Weyers 082 375 3662

Projects Completed (Summary)

Project Manager for Projects (DMRE):	Number Completed
Amendments to Environmental Management Plans (EMP)	2
Environmental Management Plans (EMP) with impact assessment included in the document - completed **prior** to 8 December 2014	73
Scoping Reports completed **prior** to 8 December 2014	5
Closure Reports & Risk Assessments for quarries	27
Performance Assessment Reports/Environmental Audits	42
Public Participation	80
Environmental Applications to DMRE **post** 8 December 2014	15
Scoping Reports completed **post** 8 December 2014	5
EIA's completed **post** 8 December 2014	3
BAR's + EMP completed **post** 8 December 2014	9
Biomonitoring and Reporting	1
Environmental Awareness Program and Basic Training	5
Conversion Applications for Mining Rights	3
Project Manager for Projects (DEDEAT)	
Basic Assessment Reports completed	15
Scoping and EIA completed	6
Public Participation	25
Section 24G Application and documents	5
Compost Farm registration	1
Part 1 and/or Part 2 Amendment Reports	2
Project Manager for Projects (DWS)	
eWULA applications and associated documentations	6
Rehabilitation Plans and Environmental Management Plans	8
Project Manager for Projects (DARDLR)	
Applications for cultivation of virgin soils	5
Project Manager for Projects (SAHRA)	
SAHRIS applications	9

DIE UNIVERSITEIT VAN DIE ORANJE-VRYSTAAT

THE UNIVERSITY OF THE ORANGE FREE STATE

HIERMEE WORD VERKLAAR DAT DIE GRAAD THIS IS TO CERTIFY THAT THE DEGREE

Baccalaureus Scientiae
Bachelor of Science

TOEGEKEN IS AAN
HAS BEEN CONFERRED UPON

NATALIA POTGIETER

NADAT AAN DIE STATUTE EN REGULASIES VAN DIE UNIVERSITEIT VOLDOEN IS. AS BEWYS DAARVAN PLAAS ONS ONS ONDERSKEIE HANDTEKENINGE EN DIE SEëL VAN DIE UNIVERSITEIT HIERONDER.

IN ACCORDANCE WITH THE STATUTES AND REGULATIONS OF THE UNIVERSITY. AS WITNESS OUR RESPECTIVE SIGNATURES AND THE SEAL OF THE UNIVERSITY BELOW.

VISEKANSELIER/VICE-CHANCELLOR

DEKAAN/DEAN

REGISTRATEUR/REGISTRAR

BLOEMFONTEIN
2001-03-16
1998013914

I certify that this document is a true copy/reproduction of the original, which was examined by me, and that, from my observations the original has not been altered in any manner.

Date: 12/4/2019 Signed:

Grant Lawrence Coley - C.A. (S.A.) Commissioner of Oaths (R.S.A.)

UNIVERSITEIT VAN DIE VRYSTAAT

UNIVERSITY OF THE FREE STATE

HIERMEE WORD VERKLAAR DAT DIE GRAAD THIS IS TO CERTIFY THAT THE DEGREE

Honneursbaccalaureus Scientiae

in LIMNOLOGIE

in LIMNOLOGY

TOEGEKEN IS AAN
HAS BEEN CONFERRED UPON

NATALIA POTGIETER

NADAT AAN DIE STATUTE EN REGULASIES VAN DIE UNIVERSITEIT VOLDOEN IS. AS BEWYS DAARVAN PLAAS ONS ONS ONDERSKEIE HANDTEKENINGE EN DIE SEëL VAN DIE UNIVERSITEIT HIERONDER.

IN ACCORDANCE WITH THE STATUTES AND REGULATIONS OF THE UNIVERSITY. AS WITNESS OUR RESPECTIVE SIGNATURES AND THE SEAL OF THE UNIVERSITY BELOW.

VISEKANSELIER/VICE-CHANCELLOR

DEKAAN/DEAN

REGISTRATEUR/REGISTRAR

BLOEMFONTEIN
2002-03-20
1998013914

Sertifiseer dat hierdie dokument 'n ware afskrif/fotostaat is van die voorlêer wat deur my persoonlik bevestig is en dat, volgens waarnemings die oorspronklike nie op enige wyse gewysig is nie.

I certify that this document is a true copy/reproduction of the original, which was examined by me, and that, from my observations the original has not been altered in any manner.

Date: 10/4/2019 Signed:

Grant Lawrence Coley - C.A. (S.A.) Commissioner of Oaths (R.S.A.)

UNIVERSITEIT VAN DIE VRYSTAAT

UNIVERSITY OF THE FREE STATE

HIERMEE WORD VERKLAAR DAT DIE THIS IS TO CERTIFY THAT THE

Magister in Omgewingsbestuur
Magister in Environmental Management

TOEGEKEN IS AAN
HAS BEEN CONFERRED UPON

NATALIA POTGIETER

NADAT AAN DIE STATUTE EN REGULASIES VAN DIE UNIVERSITEIT VOLDOEN IS. AS BEWYS DAARVAN PLAAS ONS ONS ONDERSKEIE HANDTEKENINGE EN DIE SEëL VAN DIE UNIVERSITEIT HIERONDER.

IN ACCORDANCE WITH THE STATUTES AND REGULATIONS OF THE UNIVERSITY. AS WITNESS OUR RESPECTIVE SIGNATURES AND THE SEAL OF THE UNIVERSITY BELOW.

VISEKANSELIER/VICE-CHANCELLOR

DEKAAN/DEAN

REGISTRATEUR/REGISTRAR

100+ UV·UFS 1904 - 2004

BLOEMFONTEIN
2004-04-23

I certify that this document is a true copy/reproduction of the original, which was examined by me, and that, from my observations, the original has not been altered in any manner.

Date: 12/4/2019 Signed:

Grant Lawrence Coley - C.A. (S.A.) Commissioner of Oaths (R.S.A.)

Environmental Assessment Practitioners Association of South Africa

Registration No. 2020/230

Herewith certifies that

NATALIA SHARP

is registered as an

Environmental Assessment Practitioner

Registered in accordance with the prescribed criteria of Regulation 15. (1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Effective: 01 April 2026

Expires: 31 March 2027

Chairperson

Registrar

SAQA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Natalia Sharp

Registration Number: 123443

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science (Professional Natural Scientist)

Effective **13 November 2019** Expires **31 March 2027**

President of Council

Chief Executive Officer

To verify this certificate scan this code

IAIAsa
Tel +27 (0)101 406 513
Cell +27 (0)82 961 5750

Address:
CUBE Workspace
1 Wedgewood Link Road
Bryanston
JHB

Email: operations@iaiasa.co.za

Website: www.iaiasa.co.za

IAIAsa Confirmation of Membership: 2026/2027
Natalie Sharp | Membership no: 7237

TO WHOM IT MAY CONCERN

Natalie Sharp, Digital Soils Africa (IAIAsa membership Number 7237) is a paid-up Full Member in good standing of the South African Affiliate of the International Association for Impact Assessment and has been a member of IAIAsa since Wednesday, March 1, 2023.

Membership has been continous from Wednesday, March 1, 2023 to date.

This membership is valid from 01 March 2026 to 28 February 2027.

IAIAsa is a voluntary association and is not a statutory body regulating the profession. Its members are expected to abide by the association code of ethics which is available on our website.

Any Individual conducting activities governed by the National Environmental Management Act 1998 (Act 107 of 1998) (NEMA) is required to be registered with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

Any practicing natural scientist is required to be registered in terms of the Natural Scientific Professions Act, 2003 (Act No. 27 of 2003) (Sections 18 (1) and 20(2)(a) with the South African Council for Natural Scientific Professions (SACNASP) in the relevant field of practice for the specialist work conducted.

IAIAsa is an Affiliate of IAIA which is an international body through a memorandum of understanding. IAIA is not responsible or liable for the actions or activities of the Affiliates. Membership of one does not imply membership of the other.

Any enquiries regarding this membership may be directed to the Secretariat at the above contact details.

Yours sincerely



Zama Mkhize-Pila
President 2025/2026

IAIAsa Membership Certificate

President: Z. Mkhize, Past President: C. Niemandt, President Elect: T. Mutshatshi, Secretary: B. Mthembu, Treasurer: M. Vawda.
Members: H. Antonopoulos, T. Hokinyane, O. Mafika, J. Minnaar, D. Wieners. Branch Chairs: M. Botha, N. Jamal, L. Mashego, H. Stander, T. Shakwane.

Full Name	Natalie Sharp
E-mail	natalie@dsafrica.co.za
Company Name:	Digital Soils Africa
Member Type:	Full
IAIAsa Membership Number:	7237
IAIAsa Member Since	Wednesday, March 1, 2023

President: Z. Mkhize, Past President: C. Niemandt, President Elect: T. Mutshatshi, Secretary: B. Mthembu, Treasurer: M. Vawda.
Members: H. Antonopoulos, T. Hokinyane, O. Mafika, J. Minnaar, D. Wieners. Branch Chairs: M. Botha, N. Jamal, L. Mashego, H. Stander, T. Shakwane.

Appendix I: Specialist's declaration of interest

Appendix I1: Dr Lloyd – Palaeonlogy & Heritage

agriculture, environmental affairs, rural development and land reform

Department:
agriculture, environmental affairs,
rural development and land reform .
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Application for authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014 as amended.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

1. Project title:

Pecan nut orchard on Erf 971 & Erf 1 of Farm Oranje-Oos, Siyathemba Local Municipality, Northern Cape province.

2. Details of the specialist:

Project Specialist:	Dr. L. Rossouw		
Trading name (if any):	Paleo Field Services		
Business reg. no./ID. no.:	6711225124086		
Contact person:	L. Rossouw		
Physical address:	Piet du Plooy Str. 12, Langenhovenpark, Bloemfontein, 9301		
Postal address:	" " "		
Postal code:	9330	**Cell:**	0842505992
Telephone:	0842505992	**Fax:**	
E-mail:	lloyd@paleofs.co.za		
Qualifications:	Phd		
Professional affiliation (s) (if any)	ASAPA & PSSA		

3. Details of the consultant

Project consultant/firm:	Digital Soils Africa (Pty) Ltd		
Business reg. no./ID. no.:	2012/111217/07		
Contact person:	Natalie Sharp		
Postal address:	45 Church Street, Walmer		
Postal code:	6070	**Cell:**	082 414 0472
Telephone:	082 414 0472	**Fax:**	
E-mail:	natalie@dsafrica.co.za		

Sertifiseer 'n ware afskrif van die oorspronklike / Certified a true copy of the ...
Datum 28/04/2026 Date
Ex Officio KOMMISSARIS VAN EDE
Ex Officio COMMISSIONER OF OATHS
BRAAM VAN WYK
PRINSIPAAL / PRINCIPAL
Grey Kollege Sekondêr
Jack Meiringstraat
Parkwes
Bloemfontein
Grey College Secondary
Jack Meiring ...
Pl...

4. Declaration by the specialist appointed in terms of the Environmental Impact Assessment Regulations, 2014 as amended.

I, Lloyd Rossouw, declare that --

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- 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 application, including knowledge of 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 have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant 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 application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Paleo Field Services

Name of company (if applicable):

28/07/2026

Date:

Signature of the Commissioner of Oaths:

Date:

Designation:

Official stamp (below):

Gesertifiseer 'n ware afskrif van die oorspronklike / Certified a true copy of the original

Datum 28/07/2026 Date

Ex Officio KOMMISSARIS VAN EDE
Ex Officio COMMISSIONER OF OATHS
BRAAM VAN WYK
PRINSIPAAL / PRINCIPAL

Grey Kollege Sekondêr
Jock Meiringstraat
Parkwes
Bloemfontein

Grey College Secondary
Jock Meiring Street
Parkwest
Bloemfontein

agriculture, environmental affairs, rural development and land reform

Department:
agriculture, environmental affairs,
rural development and land reform .
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Application for authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014 as amended.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

1. Project title:

Pecan nut orchard on Erf 971 & Erf 1 of Farm Oranje-Oos, Siyathemba Local Municipality, Northern Cape province.

2. Details of the specialist:

Project Specialist:	Dr HJB Butler		
Trading name (if any):	BioBase Environmental Pty LTD		
Business reg. no./ID. no.:	2024/104397/07		
Contact person:	H Butler		
Physical address:	14 Eddie de Beer, Dan Pienaar, Bloemfontein		
Postal address:	14 Eddie de Beer, Dan Pienaar, Bloemfontein		
Postal code:	9301	**Cell:**	0827718101
Telephone:		**Fax:**	
E-mail:	Hennie.butler@gmail.com		
Qualifications:	PhD (Zoology)		
Professional affiliation (s) (if any)	Southern African Wildlife Management Association (SAWMA)		

3. Details of the consultant

Project consultant/firm:	Digital Soils Africa (Pty) Ltd		
Business reg. no./ID. no.:	2012/111217/07		
Contact person:	Natalie Sharp		
Postal address:	45 Church Street, Walmer		
Postal code:	6070	**Cell:**	082 414 0472
Telephone:	082 414 0472	**Fax:**	
E-mail:	natalie@dsafrica.co.za		

4. Declaration by the specialist appointed in terms of the Environmental Impact Assessment Regulations, 2014 as amended.

I, HJB Butler, declare that --

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- 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 application, including knowledge of 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 have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant 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 application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

BioBase Environmental Pty LTD
Name of company (if applicable):

26 /05/2026
Date:

Signature of the Commissioner of Oaths:

2026-05-27
Date:

SERGEANT
Designation:

Official stamp (below):

SUID-AFRIKAANSE POLISIEDIENS
COMMUNITY SERVICE CENTRE
27-05-2026
BAYSWATER
SOUTH AFRICAN POLICE SERVICE

Abridged Curriculum Vitae
Hendrikus Johannes Beukes Butler, PhD

Department of Zoology & Entomology, University of the Free State, Bloemfontein, South Africa

Date of birth: 19 March 1966; Nationality: South African; Marital status: Married, three children

E-mail: butlerhj@ufs.ac.za Tel: 027 51 4012489

EMPLOYMENT: Lecturer

TERTIARY EDUCATION:
PhD Zoology University of the Free State
MSc Zoology University of the Free State
BSc Hons Zoology University of the Free State
BSc Zoology University of the Free State

ACADEMIC CONTRIBUTIONS AND COLLABORATIONS

Teaching Experience:

Teaching experience in **Animal biodiversity** (second year level)
Teaching experience in **Animal anatomy** (First- and second-year level)
Teaching experience in **Animal physiology** (First- and second-year level)
Teaching experience in **Animal behaviour** (Second-, third and Hons level)

Undergraduate students

First Year:

Biology Practical. First Year **(BLG 114)**	1995 - 2000
Zoology practical. First Year **(DRK 124)**	1995 - 1999
Biology practical. First Year **(BLG 124)**	2000 - 2002
Biology. First Year **(BLG 124)**	2000 – 2002
Biology practical. First Year **(BLG 144)**	2003, 2004
Biology. First Year **(BLG 144)**	2010 - 2017
Biology Lectures and Practical for schoolteachers from Randse Afrikaanse University. First and second year level.	2000, 2001
Biology. First Year **(ZLGY 1663)** 5 lectures	2025

Second Year:

Animal Behaviour. Second Year **(DRK 226)**	1997
Vertebrate Research Techniques. Second Year **(DRK 262)**	2000
Animal Behaviour. Second Year **(DRK 222)**	2000
Evolution and Distribution of Vertebrates **(DRK 242)**	2003, 2004
African Vertebrates. Second Year **(DRK 224)**	2006 – 2008
Exploring Life Sciences: From Passion to Profession (**ENZO 2605**)	2026
Introduction to Animal Physiology (**ENZO 2665**)	2026

Third Year:

Supervise Zoology Year Projects. Third Year	1999, 2000
African Vertebrates. Third Year **(DRK 352)**	2000 - 2004
Animal Behaviour. Third Year **(ZLGY 3744)**	2007 – 2025
Behavioural Ecology (**ZLGY 3744**)	2026

Honors:

Africa Ornithology. **(DRK 602)**	1999 – 2004
Animal Behaviour. **(ZLGY 6864)**	2007 – currently
Supervision of Research Projects (Hons).	27 students

Master's Degree Students

P.D.S. le Roux. Aspects of the Biology of Feral Pigeons *(Columbia livia)* in the Bloemfontein urban area. 2005 – 2007

L. Heyns. Using activity patterns and STR markers to distinguish between Blesbok *(Damaliscus pygargus phillipsi)* and Bontebok *(D. p. pygargus)* in the Free State. 2006 – 2010

D. du Plessis. Relative brain size in non-mammalian cynodonts and its implications for the evolution of endothermy. 2008 – 2010

A. Grobbelaar. Parasite induced behavioural changes in Fish. 2009 – 2011

M. van As. Livestock, Leopards and Brown Hyena: Conflicts of cohabitation in the Roodewalshoek Conservancy, Mpumalanga. 2008 – 2012

N. Jacobs. Functionality of colour differences in behavioural activities of Sable Antelope *(Hippotragus niger)*. 2010 – 2015

P. Olivier. Colour variation and population dynamics of Bovidae in the Free State: Management implications in the game farm industry. 2010 – 2015

R. Wiid. Population control of Rock Hyrax *(Procavia capensis)* in Bloemfontein residential areas. 2011 – 2017

E. Coetzee. Geophagia among cattle. 2011 – 2017

K. Darker. Geophagia among African elephants *(Loxodonta africana)* 2019 – 2023

K. Sutherland. Taste responses of South African game species to chemical stimuli. 2018 – 2023

J. Viljoen. The contribution of inselbergs to diversity in the Free State

grasslands. 2023 – current

Mini Dissertation Master of Environmental Management Supervisor

P.A. Hoffman. Area selection of game species around pans on a game ranch in the Western Free State. 2014 – 2016

PUBLIC CONTRIBUTIONS

13 public Lectures and/or talks

Invited guest speaker; "Extreme Life: Exploring Life in the Extremes and the Extremes of Life."

Production Ecology and Resource Conservation Graduate School, Wageningen, Netherlands.
November 2012.

COMMITTEES

Occupational Health & Safety Committee (Faculty of Natural and Agricultural Sciences)	1990 – 2017
Buildings Committee (Faculty of Natural and Agricultural Sciences)	2004 – 2018
Inter-faculty Animal Ethics committee	2010 – 2025

MEMBERSHIPS

Animal Behaviour Society	2009 – 2016
South African Wildlife Society Management Association (SAWMA)	2010 – currently

PUBLICATIONS

16 articles in peer reviewed journals

14 national conference contributions

8 international conference contributions

4 Book contributions

14 Unpublished technical reports

INTERNATIONAL VISITS

Deosai National Park (Himalayas, Pakistan)	September 1998
Deosai National Park (Himalayas, Pakistan)	June 1999
Dijon France	July 2008
Botswana	1996 – 2022

Wageningen Netherlands	November 2012
Madagascar VAHATRA	April 2015

OTHER ACADEMIC CONTRIBUTIONS

Organising committee of conferences

SAWMA Conference (Golden Gate)	2023
ZSSA Conference	2023

Karoo Ecology Research Unit (KERU)

- Established a research camp and laboratory on a private farm next to the Van der Kloof Dam.
- Giraffe research project.

TECHNICAL REPORTS

Amphibian and Reptile Survey; Anglo America, Kumba Iron Ore, Kolomela Mine.	2012 – currently
Beeshoek Mine, Postmasburg. Biodiversity Biomonitoring for EMX.	2025 – currently
Faunal biodiversity for Assmang (Pty) ltd Black Rock Mine Operations, Hotazel, Northern Cape: ASSMANG Manganese	2024 – currently
Rock Hyrax Capture and Relocation on Black Rock Mine Operations (BRMO), Hotazel, Northern Cape.	2024
Bat acoustic survey; Anglo America, Kumba Iron Ore, Kolomela Mine (Postmasburg).	2026

Southern African Wildlife Management Association

P.O. Box 217, Bloubergstrand, South Africa 7436 E-mail Address: ***office@sawma.co.za*** *Tel: 0+27 713523226*

Membership Certificate

This is to certify that

Dr. Hennie Butler

currently is a subscribed member of the Southern African Wildlife Management Association until 28 April 2027.

E M Marais

E. M Marais
SAWMA Secretariat

Date: 2026-03-25

agriculture, environmental affairs,
rural development and land reform

Department:
agriculture, environmental affairs,
rural development and land reform .
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Application for authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014 as amended.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

1. Project title:

Pecan nut orchard on Erf 971 & Erf 1 of Farm Oranje-Oos, Siyathemba Local Municipality, Northern Cape province.

2. Details of the specialist:

Project Specialist:	Prof Edward C. Netherlands		
Trading name (if any):	BioBase Environmental Pty LTD		
Business reg. no./ID. no.:	2024/104397/07		
Contact person:	E.C. Netherlands		
Physical address:	10 Ebenezer complex, 11 Deurmekaarbos Avenue, Bloemfontein, South Africa		
Postal address:	10 Ebenezer complex, 11 Deurmekaarbos Avenue, Bloemfontein, South Africa		
Postal code:	9301	**Cell:**	0791922833
Telephone:		**Fax:**	
E-mail:	ec.netherlands@gmail.com		
Qualifications:	PhD (Biology), MSc Environmental Sciences; Hons. Environmental Sciences; BSc Zoology & Botany		
Professional affiliation (s) (if any)	SACNASP; Herpetological Association of Africa (HAA) Executive Committee; Parasitological Society Of Southern Africa (PARSA)		

3. Details of the consultant

Project consultant/firm:	Digital Soils Africa (Pty) Ltd		
Business reg. no./ID. no.:	2012/111217/07		
Contact person:	Natalie Sharp		
Postal address:	45 Church Street, Walmer		
Postal code:	6070	**Cell:**	082 414 0472
Telephone:	082 414 0472	**Fax:**	
E-mail:	natalie@dsafrica.co.za		

4. Declaration by the specialist appointed in terms of the Environmental Impact Assessment Regulations, 2014 as amended.

I, Edward Charles Netherlands, declare that --

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- 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 application, including knowledge of 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 have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant 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 application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

BioBase Environmental Pty LTD
Name of company (if applicable):

26 /05/2026
Date:

Signature of the Commissioner of Oaths:

2026-05-27
Date:

SERGEANT
Designation:

Official stamp (below):

SUID-AFRIKAANSE POLISIEDIENS
COMMUNITY SERVICE CENTRE
27 -05- 2026
BAYSWATER
SOUTH AFRICAN POLICE SERVICE

Enquiries: G Letimela/ E-mail: gletimela@ncpg.gov.za
A.T. Makaudi
E-mail: eia@half.ncape.gov.za

Private Bag X6102, Kimberley, 8300
Tel. (053) 807 7430/Fax (053) 831 3530

ABRIDGED CURRICULUM VITAE – Edward Charles Netherlands, PhD

Department of Zoology and Entomology, PO Box 339, University of the Free State, 9300, South Africa

PROFILE

Tel. (w) +27 (0) 51 401 7585
Email: NetherlandsEC@ufs.ac.za
Date of birth: 1989-05-15
Nationality: South African
Languages: English (Native), Afrikaans (Fluent), Sesotho (Limited)

WEB LINKS:

Research Gate: https://www.researchgate.net/profile/Edward-Netherlands
Orcid ID: https://orcid.org/0000-0003-1856-0586

EMPLOYMENT & EDUCATION

CURRENT:
Associate Professor: Department of Zoology and Entomology, University of the Free State (UFS), RSA

TERTIARY EDUCATION:

PhD - Biology: KU Leuven & NWU (2015-2019)
MSc - Environmental Sciences (2013-2014)
BSc Honours - Environmental Sciences (2012)
BSc - Zoology, Botany & Tourism (2009 -2011)

SECONDARY EDUCATION:

Ficksburg High School: Matriculated – 2007

SPECIAL AWARDS:

2023: Finalist of the National Science and Technology Forum (NSTF) - TW Kambule-NSTF Awards: Emerging Researchers
2019: Parasitological Society of Southern Africa: Winner of the Senior WO Neitz Medal (Best PhD)
2018: Nation Research Foundation: Research Excellence for Next Generation Researchers Award (Best PhD)
2015: North-West University – Faculty Natural Sciences (2015): Winner of the S2A3 Medal (Best NWU MSc)
2015: Parasitological Society of Southern Africa (2015): Winner of the Junior WO Neitz Medal (Best MSc)

EDITORIAL ACTIVITIES:

Editorial board - **African Journal of Herpetology** - Print ISSN: 2156-4574 (2019 – current)

GUEST EDITOR:

African Journal of Wildlife Research - Print ISSN: 2410-7220; Online ISSN: 2410-8200 (2023)
African Zoology - Print ISSN: 1562-7020; Online ISSN: 2224-073X (2023-2025)
International Journal for Parasitology: Parasites and Wildlife - ISSN: 2213-2244 (2025)

LECTURING:

UFS: BLGY1663 Biology: Introduction to Zoology & Entomology – 1st year (2024)
UFS: ZLGY6862: Biodiversity – Excursion – Honours (2024 – current)
UFS: ZLGY3724: Life history strategies in arid environments - Third year (2022 – 2025)
UFS: ZLGY6844: Capita selecta – Herpetology – Honours (2022 – current)
NWU: Ectothermic vertebrates handling and ethics – Postgraduate (2019 – 2017)
NWU: OMSB 627: Herpetology in practice – Honours (2017 – 2021)

SUPERVISION:
Doctoral: 4 Current, 1 completed
Masters: 1 current, 8 completed
Honours: 9 competed

RESEARCH OUTPUTS

JOURNAL ARTICLES (Last 10/53)**:**

1. Dutton, H.R., Jacobs, F.J., Beytell, P.C., **Netherlands, E.C.**, Du Preez, L.H., Bullard, S.A. (2026). New genus and species of Liolopidae Odhner, 1912 (Platyhelminthes: Digenea) infecting Nile crocodile, Crocodylus niloticus (Laurenti, 1768)(Crocodilia: Crocodylidae) in the Kavango River, Namibia. *Journal of Parasitology*. *112(1) 21–27*. https://doi.org/10.1645/25-36
2. Barnard, M., Codron, D., Dutton, H.R., Bullard, S.A., H. du Preez, L.H., **Netherlands, E.C.** (2025). Life In Cold Blood: Exploring the cryptic diversity of species of Haemogregarina in Southern Africa's terrapins. *International Journal for Parasitology: Parasites and Wildlife*, 29, 101179. https://doi.org/10.1016/j.ijppaw.2025.101179
3. Jordaan, B.J., Alvaro, A., Cattaneo, G., Barnard, M., Epis, S., **Netherlands, E.C.** (2025). Unveiling Sauroleishmania in southern Africa: An investigation and supplementary description of Leishmania (Sauroleishmania) zuckermani from the gecko host Chondrodactylus bibronii. *International Journal for Parasitology: Parasites and Wildlife*, 28, 101154. https://doi.org/10.1016/j.ijppaw.2025.101154
4. Griesbaum, F., **Netherlands, E.C.,** Schäfer, M. (2025). First record of kin-cannibalism in Fornasini's Spiny Reed Frog, Afrixalus fornasini (Anura: Hyperolidae), tadpoles. *Reptiles & Amphibians*, 32, e23418. https://doi.org/10.17161/randa.v32i1.23418
5. Du Preez, L.H., **Netherlands, E.C.,** Minter, L.R. (2025). A new Rain Frog (Anura: Brevicipitidae; Breviceps) from the KwaZulu-Natal Midlands, South Africa. *African Journal of Herpetology*, 74:2, 188-209. https://doi.org/10.1080/21564574.2025.2478896
6. Le Roux, C., Cook, C.A., **Netherlands, E.C.,** Truter, M., Smit, N.J. (2025). Molecular and morphological characterization of 1 known and 3 new species of fish parasitic Trypanosoma Gruby, 1972 from the south coast of South Africa. *Parasitology*, 152, 531–550. https://doi.org/10.1017/S0031182025000496
7. Van As, M., **Netherlands, E.C.,** Van As, J., Cook, C.A., Smit, N.J. (2025). Life cycle stages of *Hepatozoon ingwe* (Apicomplexa: Adeleorina: Hepatozoidae) in an *Ixodes* sp. tick vector (Arthropoda: Ixodida: Ixodidae) and an African leopard *Panthera pardus pardus*. *International Journal for Parasitology: Parasites and Wildlife,* 26, 101049. https://doi.org/10.1016/j.ijppaw.2025.101049
8. Cajiao-Mora, K., Dutton, H.R., Jacobs, F.J., Beytell, P.C., **Netherlands, E.C.**, Du Preez, L.H., Bullard, S.A. (2025). Supplemental description of *Stephanoprora ornata* Odhner, 1902 (Digenea: Echinochasmidae) infecting the Nile crocodile, *Crocodylus niloticus* (Crocodylidae) from Namibia with emendation of Mesorchis Dietz, 1909 and a phylogenetic analysis. *Journal of Helminthology*. 99, e20, 1–14. https://doi.org/10.1017/S0022149X25000100
9. Megía-Palma, R., Sánchez-Montes, G., **Netherlands, E.C**., Palomar, G., Martínez-Solano, I. (2024). High prevalence of *Trypanosoma* infection in Iberian green frogs (*Pelophylax perezi*) and evidence of a negative relationship between blood parasites and two indices of frog body condition. *Basic and Applied Herpetology.* 00 (2024) 000-000. http://dx.doi.org/10.11160/bah.294
10. Jordaan, B.J., du Preez, L.H., **Netherlands, E.C.** (2024). Revisiting the diversity and phylogenetic relationships of trypanosomes (*Trypanosoma*) infecting pelomedusid (Pelomedusidae) freshwater turtles in Southern Africa. *Zoological Journal of the Linnean Society.* 202, zlae107. https://doi.org/10.1093/zoolinnean/zlae107

BOOKS & BOOK CHAPTERS:

1. Phaka FM, **Netherlands EC**, Kruger DJ, du Preez, LH (2017): A Bilingual Field Guide to the Frogs of Zululand. South African National Biodiversity Institute, Pretoria. 978-1-928224-19-8
2. Acosta AA, **Netherlands EC**, Retief F, de Necker L, du Preez L, Truter M, Alberts R, Gerber R, Wepener V, Malherbe W. Smit NJ. (2020). Conserving Freshwater Biodiversity in an African Subtropical Wetland: South Africa's Lower Phongolo River and Floodplain. In Managing Wildlife in a Changing World. IntechOpen. https://doi.org/10.5772/intechopen.93752
3. Vanhove MPM, Kmentová N, Luus-Powell WJ, **Netherlands EC**, de Buron I, Barger MA (2022): A snapshot of parasites in tropical and subtropical freshwater wetlands: modest attention for major players. In: Dalu T, & Wasserman RJ, (eds). Fundamentals of Tropical Freshwater Wetlands: From Ecology to Conservation Management. Academic Press, London. Chennai: Elsevier, 417–485. https://doi.org/10.1016/B978-0-12- 822362-8.00020-7

CONFERENCES; SYMPOSIA; & WORKSHOPS (Last 10)**:**

1. **Netherlands, E.C.*** Life Cycles and Vector Dynamics of Amphibian and Reptile Parasites. *2nd WIldlife MAlaria NETwork (WIMANET) COST Action Workshop, 25*–28 August 2025, Vilnius, Lithuania. (**Invited speaker**).
2. **Netherlands, E.C.*** Blood parasites of amphibians and reptiles. *2nd WIldlife MAlaria NETwork (WIMANET) COST Action Summer School,* 18–22 August 2025, Vilnius, Lithuania. (**Invited speaker**).
3. **Netherlands, E.C.*** The Biology and Interactions of Amphibian and Reptile Blood Parasites. *Faculty of Biological Sciences, Complutense University of Madrid,* 13 June 2025, Madrid, Spain. (**Invited speaker**).
4. **Netherlands, E.C.*** The Biology of Blood Parasites in Amphibians and Reptiles: Uncovering Host-Parasite Dynamics and Ecological Insights. *Department of Biosciences and Pediatric Clinical Research Center, University of Milan,* 23 May 2025, Milan, Italy. (**Invited speaker**).
5. **Netherlands, E.C.*** Life in Cold Blood: The Biology and Interactions of Amphibian and Reptile Blood Parasites. *Department of Biology and Biotechnology, University of Pavia,* 14 May 2025, Pavia, Italy. (**Invited speaker**).
6. **Netherlands EC.** The biology of blood parasites in amphibians and reptiles: Insights into host-parasite interactions and ecology. *VI International Conference on Malaria and Other Blood Parasites of Wildlife & III International Symposium of the Wildlife Diseases Research Network* 26–29 November 2024, Medellín, Colombia. (**Keynote speaker**).
7. **Netherlands EC***, Jordaan BJ, Du Preez LH & Van As J. Exploring the diversity of haemoparasites in *Smaug depressus* (flat dragon lizard), an endemic from the Soutpansberg mountain range in South Africa. *10th World Congress of Herpetology* 5–9 August 2024, Kuching, Sarawak, Malaysia.
8. **Netherlands EC**, Jordaan BJ, Du Buisson J, Haarhof T & Du Preez LH. Under the Dragon's Veil: investigating the diversity of blood parasites in the Flat dragon lizard (*Smaug depressus*) from the Soutpansberg mountain range. *51st Annual Congress of PARSA*, 17–20 September 2023, Muldersdrift.
9. **Netherlands EC**, Jordaan BJ, Du Buisson J, Haarhof T & Du Preez LH. Small dragons, big surprises: exploring the diversity of blood parasites in *Smaug depressus* (flat dragon lizard) from the Soutpansberg mountain range. Zoological Society of Southern Africa (ZSSA), 25–29 September 2023, Central Drakensberg.
10. **Netherlands EC***, du Preez LH. Haemoparasites found parasitizing species of *Leptopelis* (Arthroleptidae) from southern Africa. *19th meeting of the African Amphibian Working Group (AAWG).* Windhoek, Namibia, 22–23 November 2022.

GRANTS OBTAINED:

NRF: Knowledge, Interchange and Collaboration (KIC) (2025) – Grant No: KIC250326306724**:** 2nd WIldlife MAlaria NETwork (WIMANET) COST Action Summer School and Workshop, 18–28 August 2025, Vilnius, Lithuania (R39,240.00).

NRF: Foundational Biodiversity Information Programme (FBIP) (2025/2027) – Grant No: FBIS250408309449: Dragon Blood: Exploring the Diversity of Blood Parasites in South Africa's Dragon Lizards (R249,700.00).

NRF: National Equipment Programme (NEP) (2024/2025) - Laser Microdissection microscope system (R2,988, 970.00 + R1,494,485.00 = R4,483,455.00)

Herpetological Association of Africa Professional Research Grant (2023): Research on *Breviceps* (R15 000.00).

Interdisciplinary Research Grant (2023/2024) – UFS: Greater Kruger Herptile and Human Health (R100,000.00).

Foundational Biodiversity Information Programme (2021/2022) – National Research Foundation (NRF), Grant No: 129114: DNA Barcoding of Ectotherm Blood Parasites from Southern Africa (R185,000.00): Outputs to date: 2× Peer reviewed paper

Foundational Biodiversity Information Programme (2020/2021) – National Research Foundation (NRF), Grant No: 120782: Anuran Diversity and Habitat Utilisation in the Vhembe Biosphere (R199,500.00): Outputs to date: 3× Peer reviewed papers

Parasitological Society of Southern Africa (2019) – Early-career Conference Support grant.

Foundation for the Promotion of Biodiversity Research in Africa (2019) - Botanic Garden Meise, Belgium Grant.

Foundational Biodiversity Information Programme (2017/2018) – National Research Foundation (NRF), Grant UID 98114: Amphibian biodiversity and eco-tourism (R155,000.00): Outputs: 1× Field guide; 4× Peer reviewed papers; 3× MSc degrees; 4× Conference proceedings

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Edward Netherlands

Registration Number: 126419

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science (Professional Natural Scientist)

Effective **7 May 2025** Expires **31 March 2027**

President of Council

Chief Executive Officer

To verify this certificate scan this code

agriculture, environmental affairs,
rural development and land reform

Department:
agriculture, environmental affairs,
rural development and land reform .
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Application for authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014 as amended.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

1. Project title:

Pecan nut orchard on Erf 971 & Erf 1 of Farm Oranje-Oos, Siyathemba Local Municipality, Northern Cape province.

2. Details of the specialist:

Project Specialist:	Andri Corné van Aardt		
Trading name (if any):	Synaptis Environmental (Pty) Ltd		
Business reg. no./ID. no.:	7610180409107		
Contact person:	Andri van Aardt		
Physical address:	Springfield 30, 5 Paddy Goodrich Street, Pentagon Park		
Postal address:	N/A		
Postal code:	9301	**Cell:**	0836620164
Telephone:	N/A	**Fax:**	N/A
E-mail:	andri.vanaardt@gmail.com		
Qualifications:	PhD Botany		
Professional affiliation (s) (if any)	SACNASP 431584		

3. Details of the consultant

Project consultant/firm:	Digital Soils Africa (Pty) Ltd		
Business reg. no./ID. no.:	2012/111217/07		
Contact person:	Natalie Sharp		
Postal address:	45 Church Street, Walmer		
Postal code:	6070	**Cell:**	082 414 0472
Telephone:	082 414 0472	**Fax:**	
E-mail:	natalie@dsafrica.co.za		

4. Declaration by the specialist appointed in terms of the Environmental Impact Assessment Regulations, 2014 as amended.

I, Andri Coert van Aardt declare that --

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- 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 application, including knowledge of 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 have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant 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 application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Sparxis Environmental (Pty) Ltd
Name of company (if applicable):

02/06/2026
Date:

Signature of the Commissioner of Oaths:

2026.06.02
Date:

Sergeant
Designation:

Official stamp (below):

SUID-AFRIKAANSE POLISIEDIENS
COMMUNITY SERVICE CENTRE
02 -06- 2026
BAYSWATER
SOUTH AFRICAN POLICE SERVICE

Curriculum Vitae

ANDRI CORNÈ VAN AARDT

850316 0043 08 4



PERSONAL INFORMATION

SURNAME	Van Aardt
FULL NAMES	Andri Cornè
TELEPHONE NUMBER	Cell phone: 083 667 0169 Work: 051 401 2641
E-MAIL ADDRESS	andri.vanaardt@gmail.com
GENDER	Female
DATE OF BIRTH	16 March 1985
NATIONALITY	South African Citizen
HOME LANGAUGE	Afrikaans
OTHER LANGUAGES	English (Read, Write and Speak)

QUALIFICATIONS

High School

SCHOOL	Hoërskool Staatspresident Swart, BRANDFORT
HIGHEST GRADE PASSED	Grade 12
YEAR	2003
SUBJECTS	Afrikaans, English, Biology, Physical Science, Mathematics, Computyping, Physiology.

Tertiary Education

INSTITUTE	University of the Free State
DEGREES	**BSc Botany** (2006) (Botany & Zoology) **BSc Honours Botany** (2007) **MSc Botany** (2010) with distinction **PhD Botany** (2016) – Vegetation ecology of the putative Palaeo-Kimberley and Palaeo-Modder rivers and their catchments, Free State, South Africa

Completed Soil Science as an undergraduate subject to complement my Ph.D. research.

Complementary Education

- Attended the African Pollen Database meeting, presented by the Institute de Recherche pour le Developpement, Bondy France.
- Workshop on Palaeofire knowledge for current and future ecosystem management. Presented by the Global Paleofire Working Group. Presented in Montreal, Canada.
- Workshop on Analysing palaeoecological data with R. Presented by Prof. Steve Juggins at the AFQUA 2015 Conference and workshops, Cape Town, South Africa.
- AllWet RES Summer School in Germany. Presented by DAAD Higher Education Cooperation Program. "Welcome to Africa", presented at various wetlands in Germany.
- Wetland Management: Introduction & Delineation Short Course (Rietvlei Nature Reserve, Pretoria) presented by the Centre for Environmental Management, UFS at Rietvlei Nature Reserve in Pretoria.
- GIS Intermediate Short Course at the Centre for Environmental Management at the University of the Free State, Bloemfontein, South Africa.
- Determination of the present ecological state within the eco-classification process Course at the Centre for Environmental Management, UFS in Bloemfontein, South Africa.
- GIS and GPS Course at the Centre for Environmental Management, UFS in Bloemfontein, South Africa.
- Aquatic Biodiversity Winter School at: The Institute for Aquatic Biodiversity in Grahamstown, South Africa.

Fieldwork experience

As a researcher and consultant in the field of vegetation ecology I am involved in various projects involving various vegetation types and biomes in South Africa. This includes plant community descriptions, ecological interpretation and mapping of vegetation. I have worked and conducted fieldwork in various provinces (Free State, Eastern Cape, Northern Cape, Limpopo, Mpumalanga) of our country. This fieldwork was conducted in nature reserves or on privately owned farms which most of the time require extensive ground truthing. During this fieldwork I usually collection plant specimens for identification and processing in a scientific manner. I am familiar with the use of various methods to conduct research and can select the appropriate methodology depending on the nature of the question that needs to be answered. I have compiled seven environmental impact assessment reports that deals with the specialist study of vegetation. I also compiled a technical report that determined the veld condition and grazing capacity for a mine. As a researcher I have also reported on my own research, that were submitted to various national and international scientific journals. I have also been involved in reviewing various articles related to my field of specialization which is vegetation ecology.

RESEARCH

Research Links

Orchid:	https://orcid.org/0000-0003-0227-7567
ResearchGate	https://www.researchgate.net/profile/Andri-Van-Aardt
Google Scholar	https://scholar.google.co.za/citations?user=q29rf6oAAAAJ&hl=en

Peer Reviewed Publications

1. Sithole, J.V., Dayaram, A., **van Aardt, A.C.** 2025. Phytosociology of Golden Gate Highlands: A focus on Drakensberg-Amathole Afromontane Fynbos. *Koedoe 67(1), a1857.* doi.org/ 10.4102/koedoe.v67i1.1857
2. **Van Aardt, A.C.**, Scott, L., Grundling, P.-L., Grundling, A.T., Woodborne, S. 2024. Revisiting past savanna environments: Pollen analysis of the Colbyn wetland on the southern African central plateau. *Review of Palaeobotany and Palynology* IF 1.7. Q1
3. **Van Aardt, A.C.**, de Jager, J.C.L., van Tol, J.J. Submitted. Firebreaks and their effect on vegetation composition and diversity in grasslands of Golden Gate Highlands Park, South Africa. *Diversity* IF 2.5. Q2.
4. Gharbi, D., Berman, D., Neumann, F.H., Hill T., Sidla, S., Cilliers, S.S., Staats, J., Esterhuizen, N., Ajikah, L., Moseri, M., Quick, J.L, Hilmer, E., **Van Aardt, A.,** John, J., Garland, R., Finch J., Hoek W., Bamford M.5, Seedat, Y.R, Manjra, I.A, Peter, J. 2024. Ambrosia (ragweed) pollen – a growing aeroallergen of concern in South Africa. *World Allergy Organization Journal* IF 5.1. Q2
5. Goder-Goldberger, M., Gilead I., Boaretto E., Edeltin L., Horwitz L.K., Jacoby-Glass, Y., Lavi R., Neumann F.H., Porat, N., Toffolo, M., **Van Aardt, A.C.**, Zilberman, T., Crouvi, O. 2023. Living in an Ecotone: Late Middle Paleolithic occupations in the lower Besor Basin, north-western Negev Desert, Israel. *Antiguity* 97: 1-8. IF 1.953. Q1.
6. Esterhuizen, N., Berman, D., Neumann, F., Ajikah, L., Quick, L., Hilmer, E., **Van Aardt, A.,** Hoek, W., John, J., Garland, R., Hill, T., Finch, J., Bamford, M., Seedat, R., Manjra, A., and Peter, J. Accepted. The South African Pollen Monitoring Network: Insights from two years of national aerospora sampling (2019-2021). *Clinical and Translational Allergy* IF3.57. Q2
7. Lombard, M and **van Aardt A.C**. 2023. Method for generating foodplant fitness landscapes: With a foodplant checklist for southern Africa and its application to Klasies River. *Journal of Archaeological Sciences* 149: 1-12 IF 3.216.Q1
8. Scott, L., Neumann, F.H., **van Aardt, A.C.** and Botha, G.A. 2023. Palaeoenvironmental sequences surrounding Border Cave, South Africa, and review of conditions during Middle and Later Stone Age occupation. *Quaternary Science Reviews* 300:1-12 IF 4.112. Q1
9. Lombard, M and **Van Aardt, A.C.** 2022. Taking stock of foodplants growing in the Cradle of Humankind Fossil Hominin Site, South Africa. *African Archaeological Review* 39: 59-77 IF 1.29. Q1
10. Scott, L., Sobol, M., Neuman, F.H., Gil Romera, G., Fernández-Jalvo, Y., Bousman, C.B., Horwitz, L.K. and **Van Aardt, A.C.** 2022. Late Quaternary palaeoenvironments in the central semi-arid region of South Africa from pollen in cave, pan, spring, stream and dung deposits. *Quaternary International* 614: 84-97 IF 2.199. Q1

11. Brown, L.R., **Van Aardt, A.C.**, Janecke, B.B. 2020. A tribute to Pieter Johannes (Johann) du Preez. *Koedoe* 62(2), a1640. DOI: 10.4102/koedoe.v62i2.1640. IF 0.900. Q3 (Tribute)
12. Janecke, B.B., Van Tol, J.J., Smit, I.P.J., **Van Aardt, A.C.**, Riddell, E.S., Seaman, M.T., Swart, W.J., Du Preez, P.J. and Le Roux, P.A.L. 2020. Biotic and abiotic connections on a granite catena: Framework for multidisciplinary research. *Koedoe* 62(2), a1585 DOI: 10.4102/koedoe.v62i2.1600. IF 0.900. Q3
13. Theron E.J, **van Aardt A.C.**, du Preez P.J. 2020. Vegetation distribution along a granite catena, southern Kruger National Park, South Africa. *Koedoe* 62(2), a1588. DOI 10.4102/koedoe.v62i2.1588. IF 0.900. Q3
14. **Van Aardt A.C.**, Codron, D., Theron, E.J., du Preez P.J. 2020. Plant community structure and possible vegetation changes after drought on a granite catena in the Kruger National Park, South Africa. *Koedoe* 62(2), a1585 DOI: 10.4102/koedoe.v62i2.1585. IF 0.900. Q3
15. Scott L., **van Aardt A.C.**, Brink, J. S., Toffolo, M. B, Ochando, J. Carrión, J. S. 2020. Palynology of Middle Stone Age spring deposits in grassland at the Florisbad hominin site, South Africa. *Review of Palaeobotany and Palynology* 265: 13-26. IF 1.904. Q2
16. **Van Aardt, A.C.,** Scott, L and du Preez, PJ. 2017. Western Free State vegetation ecology: From past to present. *South African Journal of Botany* 109, 372. IF: 1.792. Q2 (Abstract)
17. **Van Aardt, A.C.**, Scott, L., Du Preez, P.J. 2016. Towards addressing the disjunction between palaeo- and modern ecology in the western Free State. *Quaternary International* 404: 190. IF: 2.481. Q1 (Abstract)
18. **Van Aardt, A.C.**, Bousman, C.B., Brink, J.S, Brook, G.A., Jacobs, Z., du Preez, P.J., Rossouw, L. and Scott, L. 2015. First chronological, palaeoenvironmental and archaeological data from the Baden-Baden fossil spring complex in the western Free State, South Africa. *Changing Climates, Ecosystems and Environments within Arid Southern African and Adjoining Regions*: *Palaeoecology of Africa*. CRC Press. PP117-152 (Chapter in a book)

Popular Journals

K.J. Brown, M.J. Power, M. Slowinski, **A.C. van Aardt**, O. Blarquez and P. Grondin. Workshop Report: Applying Palaeofire Records in Ecological Management. *Wildfire Magazine.* 27.1 February 2018

Conference Presentations

- **Van Aardt, A.C.,** de Jager, J.C.L., van Tol, J.J. Effect of annual burning on diversity and vegetation composition of Golden Gate Highlands National Park. 59th Annual Congress of the Grassland Society at Gariep Forever Resort 22-26 July 2024.
- **Van Aardt, A.C.,** Scott, L., Grundling, P-L., Grundling, A., Woodborne, S. Late Holocene paleoenvironmental reconstruction of the Savanna-Grassland ecotone, Gauteng, South Africa. XXIV Biennieal Congress Cango Valley, South Africa of the South African Society for Quaternary Research 19-24 May 2024.
- Sithole, J.V., Dayaram, A., **van Aardt, A.C.** 2024. Influence of Aspect on the Drakensberg Amathole-Afromontane Fynbos (Gd6) vegetation composition, Golden Gate Highlands National Park. 49th South African Association of Botanists (SAAB) Conference, Richardsbay Campus, University of Zululand, 7-11 January 2024.

- **Van Aardt, A.C.,** de Jager, J.C.L., Giddy, J.N., Dayaram., A. 2023. Karroid Islands in a sea of grasses, Free State Province, South Africa. 65th Annual Symposium of the International association of vegetation science, Coffs Harbour, Australia, 3 – 8 September 2023.
- Scott, L. and **van Aardt, A. C**. 2022. Updating the African Pollen Database (APD) for the Quaternary in the South African interior. workshop of the French Institute of South Africa (IFAS), Pleistocene Archaeology and Palaeoecology of the Free State, Florisbad, Free State, 14 July 2022.
- Müller, M., van Tol, J.J. **van Aardt, A.C.** 2022. Community distribution along topographical units in the Golden Gate Highlands National Park, Free State Province, South Africa. South African Mountain Conference, Champagne Sports Resort, KwaZulu-Natal, 14 – 17 March 2022
- McLean, C.C., van Tol, J.J., **van Aardt, A.C.**, Kotze, E., Edwards, A., Swart, W., Kotze, J.J. 2022. Quantifying soil degradation through microbial activity of alpine soils in the Northern Drakensberg, South Africa. South African Mountain Conference, Champagne Sports Resort, KwaZulu-Natal, 14 – 17 March 2022
- Ferreira, E.L., **van Aardt, A.C.**, Joubert, L. 2022. Possible effect of community composition on pollination rewards in three Nemesia species from Namaqualand. South African Association of Botanists 28th Annual Conference, 17-20 January 2022
- Nienaber, K, **Van Aardt, A.C.** Van Tol, J.J. 2021. Phytosociological classification of wetland vegetation in the Golden Gate Highlands National Park, Free State Province, South Africa. National Wetland Indaba 2021. Online. 20-21 October 2021
- Scott, L., Gil-Romera, G., Neumann, F. H., Sobol, M., Horwitz, L. K., **van Aardt, A.**, Fernandez-Jalvo, Y. 2019. Diverse modes of pollen taphonomy and late Quaternary palaeo-environments in the Kalahari. Session: Wonderwerk Cave and Related Research Projects in the Northern Cape Province. ASAPA 2019 (Association of Southern African Professional Archaeologists), Kimberley, South Africa, 2-4 July, 2019.
- **Van Aardt, AC,** du Preez, P.J. and Scott,L. 2019. Major plant communities and physical environment in the catchments of the putative palaeo-Kimberley and palaeo-Modder Rivers, Free State South Africa.
  16th Kimberley Biodiversity Research Symposium in Kimberley
- **Van Aardt, A.C.,** Scott, L., Theron, E.J., and Rossouw, L. 2019. Charred Cuticles in Tswaing Crater lake deposits: A palaeoenvironmental indicator? Oral communications. XXII Biennial Congress of the South African Society for Quaternary Research in Mossel Bay.
- **Van Aardt, A.C.,** Scott, L., Brink, J., Toffolo, B., Tomas, J.O. and Carrion, J. 2018. Palynological reconstruction of middle Pleistocene environments at Florisbad, Free State Province, South Africa. Oral communication
  Proceedings of the 20th Biennial Conference of the Palaeontological Society of Southern Africa in Bloemfontein.
- **Van Aardt, A.C.,** Scott, L and du Preez, PJ. 2017. Western Free State vegetation ecology: From past to present. Oral communication
  43rd Annual Conference of the South African Association of Botanists, University of Cape Town, Cape Town, South Africa.
- **Van Aardt, A.C.**, Scott, L. and Du Preez, P.J. 2015. *Towards addressing the disjunction between palaeo- and modern ecology in the western Free State*. Poster.
  AFQUA conference and workshops: The African Quaternary: environments, ecology and humans.

- **Van Aardt, A.C.**, Du Preez, P.J. and Scott, L. 2015. *Vegetation analysis of the catchments of two putative palaeo-rivers in the western Free State, South Africa.* Oral communication.
  41st Annual Conference of the South African Association of Botanists (SAAB).
- **Van Aardt, A.C.**, Scott, L., Bousman, C.B., Brink, J.S., Jacobs, Z. and Du Preez, P.J. 2014. *Palynological analysis of the spring mound Baden-Baden in the western Free State, South Africa.* Poster.
  From Past to Present: Changing Climates, Ecosystems and Environments of Arid Southern Africa; A Tribute to Louis Scott Conference.
- **Van Aardt, A.C.**, Du Preez, P.J., Scott, L. and Collins, N.B. 2013. *A vegetation and environmental analysis of the Palaeo-Kimberley, Palaeo-Modder Rivers and the surrounding area, Free State Province, South Africa.* Oral communication.
  1st African Water Symposium on Water Conflict. Centre for Environmental Management, University of the Free State.
- **Van Aardt, A.C.**, Du Preez, P.J., Scott, L. and Collins, N.B. 2012. *A vegetation and environmental analysis of the Palaeo-Kimberley, Palaeo-Modder Rivers and the surrounding area, Free State Province, South Africa.* Oral communication and a poster.
  9th Annual Inkaba yeAfrica GEO-FUTURE Workshop in Germany.
- **Van Aardt, A.C.** and Du Preez, P.J. 2011. *A vegetation and environmental analysis of the Palaeo-Kimberley, Palaeo-Modder Rivers and the surrounding area, Free State Province, South Africa.* Oral communication and a poster.
  INKABA yeAfrica – 8th Annual Workshop at GeoSynthesis 2011 Conference in Cape Town.
- **Van Aardt, A.C. and** Du Preez, P.J. 2011. *Classification of the riparian Communities along the Vet River, Free State Province, South Africa*. Poster.
  2nd Regional Conference of the Southern African Young Water Professionals at the CSIR international Convention Centre, Pretoria, South Africa.

Consulting and Technical Reports

Technical Reports

2025

Veld condition and Grazing capacity assessment for the Voorspoed Mine, Kroonstad, Free State Province by Dr A.C. van Aardt, J.V. Sithole and S. Crouse.

Environmental Impact Assessment reports

2025/2026

- An Ecological Report on the Flora: On the Farm Uitdraai Boerdery in the Northern Cape
- An Ecological Report on the Flora: On the following farms in the Northern Cape: Bloukrans: Portion 1 & 7 of farm Muishoek no.34, Goue Akker: Portion 6, 13 & 15 of farm Muishoek no.34, and Montery: Portion 13 & 28 of farm Muishoek
- An Ecological Report on the Flora: On the following farms in the Northern Cape: Tweefontein: Remainder of farm Tweefontein 373, and Kalkfontein: Portion 4 (Portion of Portion 2) of farm Kalkfontein

- An Ecological Report on the Flora: On the farms Erf 1 and Erf 971 Prieska in the Northern Cape

2022

- An Ecological Report on the Flora: Remainder of Farm Naauwtesfontein No.78, Hopetown
- A Follow up Ecological Report on the Flora: Remainder of Farm Naauwtesfontein No.78, Hopetown
- An Ecological report on the Flora: On Portion 2 (A Portion of Portion 1) of the farm Clydesdale 156, Division of Herbert in the Northern Cape.

2021

- An Ecological Report on the Flora: Portion 18 (Portion of Portion 15) of the farm Uitdraai no 33, Prieska

Peer review, Committees and Memberships

Manuscripts reviewed

- Royal Society Open Science
- Plant Ecology
- Vegetation Classification and Survey
- South African Journal of Science
- Scientific Reports
- Bothalia
- Folia Geobotanica

Scientific Committees

Southern African Mountain Conference 2022 – reviewer of abstracts
The 5th National Global Change Conference 2023 – reviewer of abstracts
Southern African Mountain Conference 2025 – reviewer of abstracts

Memberships

- South African Association of Botanists since 2018
- South African Society for Quaternary Scientists since 2018
- South African Council for Natural Scientific Professions – Ecological and Botanical Sciences (131584) since 2021
- International Association for Vegetation Science has been part of the African Chapter since 2022

Gesertifiseer 'n ware afskrif van die
oorspronklike dokument
Certified a true copy of the original document
05 March 2024
PATSON WALIWONA MANDA
HONEY PROKUREURS BLOEMFONTEIN
Commissioner of Oaths / Kommissaris van Ede
Practising Attorney / Praktiserende Prokureur R.S.A.

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

IT IS HEREBY CERTIFIED THAT, IN ACCORDANCE WITH THE STATUTES AND RULES OF THE UNIVERSITY, AND PURSUANT TO THE SUBMISSION OF A THESIS ENTITLED

HIERMEE WORD VERKLAAR DAT NADAT AAN DIE STATUTE EN REËLS VAN DIE UNIVERSITEIT VOLDOEN IS, ONDER MEER DEUR DIE VOORLEGGING VAN 'N PROEFSKRIF GETITEL

VEGETATION ECOLOGY OF THE PUTATIVE PALAEO-KIMBERLEY AND PALAEO-MODDER RIVERS AND THEIR CATCHMENTS, FREE STATE, SOUTH AFRICA

THE DEGREE DIE GRAAD

PHILOSOPHIAE DOCTOR

with specialisation in Botany
met spesialisasie in Plantkunde

HAS BEEN CONFERRED UPON
TOEGEKEN IS AAN

VAN AARDT, Andri Corné

AS WITNESS OUR RESPECTIVE SIGNATURES AND THE SEAL OF THE UNIVERSITY BELOW.

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VICE- CHANCELLOR / VISEKANSELIER

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REGISTRAR / REGISTRATEUR

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SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Andri Corné van Aardt

Registration Number: 131584

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)
Botanical Science (Professional Natural Scientist)

Effective **8 September 2021** Expires **31 March 2027**



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rural development and land reform .
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Application for authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014 as amended.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

1. Project title:

Pecan nut orchard on Erf 971 & Erf 1 of Farm Oranje-Oos, Siyathemba Local Municipality, Northern Cape province.

2. Details of the specialist:

Project Specialist:	Prof Johan van Tol		
Trading name (if any):			
Business reg. no./ID. no.:	8497195080089		
Contact person:			
Physical address:	18 Rorich Crescent, Bloemfontein		
Postal address:			
Postal code:	9322	**Cell:**	0833876243
Telephone:		**Fax:**	
E-mail:	johan@dsafrica.co.za		
Qualifications:	PhD (Soil Science)		
Professional affiliation (s) (if any)	Soil Science Society of South Africa SACNASP		

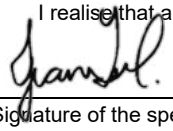
3. Details of the consultant

Project consultant/firm:	Digital Soils Africa (Pty) Ltd		
Business reg. no./ID. no.:	2012/111217/07		
Contact person:	Natalie Sharp		
Postal address:	45 Church Street, Walmer		
Postal code:	6070	**Cell:**	082 414 0472
Telephone:	082 414 0472	**Fax:**	
E-mail:	natalie@dsafrica.co.za		

4. Declaration by the specialist appointed in terms of the Environmental Impact Assessment Regulations, 2014 as amended.

I,__Johan van Tol_____, declare that --

- I act as the independent specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- 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 application, including knowledge of 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 have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant 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 application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Digital Soils Africa

Name of company (if applicable):

20/07/2026

Date:

Signature of the Commissioner of Oaths:

Date:

Designation:

Official stamp (below):

CURRICULUM VITAE

J.J. VAN TOL

2026

Curriculum Vitae: JJ van Tol
18 Rorich Crescent, Bloemfontein, 9301
E-mail: vantoljj@ufs.ac.za
Tel: +2783 387 6243

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Curriculum Vitae: JJ van Tol
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SUMMARY

Professor (full) in Soil Science; President of the Soil Science Society of South Africa; Chair of IUSS Working Group on Hydropedology; NRF C2 rated researcher; 95 peer reviewed publications; 9 peer reviewed book chapters and 1 book; 28 international and 65 national congress presentations; lead/involved in 19 externally funded research projects; produced 100+ scientific consultancy reports; received numerous awards/accolades for research and/or academic outputs.
Research focus: hydropedology, environmental soil science; soil physics; pedology

PERSONAL INFORMATION

Name: Jacobus Johannes (Johan)
Surname: van Tol
Identity Number: 8407195080089
Date of Birth: 19 July 1984
Drivers Licence: Code B
Nationality: South African
Home Language: Afrikaans
Other Languages: English
Home Address: 18 Rorich Crescent, Bloemfontein, South Africa, 9301
Work Address: Department of Soil, Crop and Climate Sciences, University of the Free State, Bloemfontein, South Africa.

QUALIFICATIONS

PhD. in Soil Science (UFS): Characterizing Sub-Surface Lateral flow in selected hillslope soils to facilitate hydrological predictions (2011).
M.Sc. Agric in Soil Science (UFS): Soil indicators of Hillslope Hydrology in the Bedford and Weatherley catchments (2008) – *cum laude.*
B.Sc. Agric (Hons) in Soil Science (UFS) in 2007 – *cum laude*.
B.Sc. Agric in Soil Science and Agronomy (UFS) in 2006.
Matriculate (Transvalia High School) in 2002 – average > 80%.

CAREER

Professor (full) (2024 -): University of the Free State
Responsibilities: Lecturing undergraduate and postgraduate modules, research, post graduate supervision and general institutional administration.

Director (2015 -): Digital Soils Africa (Pty) LTD
Responsibilities: Planning and execution of soil science consultancy projects.

Associate Professor & Senior Lecturer (2016 - 2023): University of the Free State
Responsibilities: Lecturing undergraduate and postgraduate modules, research, post graduate supervision and general institutional administration.

Lecturer & Senior Lecturer (2011 – 2016): University of Fort Hare

Responsibilities: Lecturing undergraduate and postgraduate modules, research, post graduate supervision and general institutional administration.

Researcher (2007 – 2011): University of the Free State

Responsibilities: Innovative research (field work, compiling research reports and training of assistant researchers), time-on-task lecturing (2009 – 2011).

TEACHING

Undergraduate modules at UFS (2016 -):

- SOIL3774: Soil classification and land-use planning (re-developed module)
- SOIL4834: Advanced classification and geomorphology
- SOIL3714: Soil fertility management
- SOIL3724: Soil pollution and management (considerable contribution to content)

Undergraduate modules at UFH (2011 - 2016):

- AGS211: Introduction to soil science (pedology, soil chemistry and soil fertility sections)
- AGS221: Pedology
- AGS322: Soil Taxonomy
- ALP313: Land Use Planning (soil science section)
- AGS413: Seminar in Soil Science
- AGS422: Soil Physics
- AGS401: Project in Soil Science

Undergraduate modules at UFS (2009 – 2011: time-on-task):

- GKD314: Soil Evaluation and Land-Use Planning
- GKD444: Soil Geography

Post graduate modules:

- SOIL7904: Land Evaluation
- AGS612: Soil Physics (Hons) - UFH
- AGS621: Pedology (Hons) – UFH
- AGS601&602: Seminar and project in soil science
- MOB708: Magister in Environmental Management (UFS) – The Soil Resource and Impact on the Environment (Guest lecturer since 2011)
- MOB741: Magister in Environmental Management (UFS) – Soil and Pollution (Guest lecturer since 2011)

EVALUATIONS

- External moderator for final year soil science modules for Stellenbosch University (2017-18) and hons modules at University of Pretoria (2026 -)
- External examiner of 4 PhD thesis' and 14 M.Sc dissertations from various Universities
- Internal examiner of 4 PhD thesis' and 4 M.Sc dissertations.

POST GRADUATE SUPERVISION

PhD:

1. Nebo, G. (PhD). Short term impacts of conservation agriculture practices on soil physical properties, moisture and temperature regimes, and draught resilience in a semi-arid South Africa (2025 – co-promotor; University of Fort Hare).
2. Nkosi, M. (PhD). Evaluating the impacts of urbanisation on water resources using a hydropedological approach: a case study of quaternary catchment X22 (2025 – co-promotor; University of Limpopo).
3. Kotze, J.J. (PhD). Towards a Landslide Early Warning System for South Africa (2025 - UFS)
4. Mc Lean, C.C. (PhD). Assessing the impact of degradation on soil quality within selected National Parks (2025 - UFS).
5. Strydom, T. (PhD). Short- and long-term impacts of experimental fires on selected soil properties in the Kruger National Park (2024 - UFS).
6. Smit, I.E. (PhD). Soil information in hydrological modelling: Mapping, modelling and applications in the macro-scale Sabie-Sand catchment (2024 - UFS).
7. Malongweni, S.O. (PhD). Fire-Herbivore interactions in savanna ecosystems of the Kruger National Park, South Africa: Impact on Soil Quality (2023 – UFS).
8. Harrison, R. (PhD). Interactions between dissolved organic carbon and hydropedology in Afromontane catchments (2023 – UFS).
9. Mamera, M. (PhD). Effect of biochar amendment on reducing migration of faecal pollutants from simulated pit latrines in soils with different textures (2022 – UFS).
10. Chichongue, O.J. (PhD). Comparison of crop management systems for smallholder farmers in Mozambique (2020 – UFS).
11. Bouwer, D. (PhD). Integration of soil morphology, chemistry and hydrometry for optimizing hydrological response models (2018 – UFS).
12. Cosmas, P. (PhD). Litter quality effects on the architecture of soil particles and erosion in the soils of the Ntabelanga area, Eastern Cape, South Africa (2016 – UFH).

In progress

13. Job, N. (PhD – SU). Integrating hydropedological assessments in wetland delineation and management (submission – end 2026).
14. Muller, M. (PhD). Impacts of conservation on soil-plant interactions in the Golden Gate National Park (submission – mid 2025).
15. Novela, M. (PhD). Factors impacting avocado yield and quality in the Limpopo region of South Africa (submission – end 2025).
16. Buys, J.A., (PhD)…
17. Daniel Isadory (PhD)
18. Mariné Blaauw (PhD).
19. Colby Weiss (PhD)
20. Siboniso Thela (PhD)
21. Bhavna Ramdhani (PhD)

M.Sc:

1. Buys, J.A. (M.Sc). Characterization of spatial and temporal variability in soil microbial biomass at Benfontein Nature Reserve (2024 – UFS). *Co-supervisor.*
2. Nienaber, K (M.Sc). Determining wetland health using plant and soil indicators in the Golden Gate Highlands National Park, Free State Province, South Africa (2023 - UFS). *Co-supervisor.*

3. Kotze, J.J. (M.Sc). Quantifying soil carbon stocks in Alpine areas of the Maloti-Drakensberg mountains using digital soil mapping approaches (2023 – UFS). ***Cum laude***
4. Muller, M. (M.Sc). Quantification of soil- and vegetation degradation in the Golden Gate Highlands National Park, Free State, South Africa (2022 – UFS). *Co-supervisor*
5. Baasi, L. (M.Sc). Characterisation of soil and vegetation of wetlands in Sehlabatebe, Lesotho (2022 – UFS)
6. Smit, I.E. (M.Sc). Impacts of soil information of process based hydrological modelling in the upper Goukou catchment, South Africa (2021 – UFS). ***Cum laude***
7. Seboko, R. (M.Sc). Charaterisation of soil carbon stocks in an urban environment. *Co-supervisor* (2021 – UFS).
8. Marx, J.D. (M.Sc). Long term effects of rangeland conditions on soil properties in semi-arid South Africa. (2021 – UFS).
9. Moorcroft, M-A (M.Sc). Identifying critical areas of overgrazing using the SWAT model. *Co-supervisor* (2020 - TU-Dresden).
10. Dinga, P. (M.Sc). An examination of *Pendimethalin* accumulation in agricultural soils of the Mpongwe district, Zambia (2020- UFS).
11. Baker, I. (M.Sc). Characterisation of vadose zone processes in a tailings facility. (2019 – NWU). *Co-supervisor*
12. Setsipane, T. (M.Sc). Characterisation of hydropedological processes on sandstone and tillite hillslopes in Kwa-Zulu Natal (2019 - UFS).
13. Du Plessis, C. (M.Sc). Large scale mapping of factors influencing erosion in the T35D-E catchments of the Eastern Cape, South Africa (2019 – UFH).
14. Ngesi, S. (M.Sc). Characterising and predicting the soil carbon balances associated with the Mzimvubu Water Project, Eastern Cape, South Africa (2019 - UFH).
15. Mamera. M. (M.Sc). Pollution potential of on-site dry sanitation systems associated with the Mzimvubu Water Project (2018 – UFH).
16. Magomani, I. (M.Sc). The effect of fire on hydraulic properties of rangeland soils. (2017 – UFH).
17. Tinnefeld, M. (M.Sc.). Conceptualise hydrological response models for selected arid soilscapes in the Douglas area, South Africa (2015 – UFS). *Co-supervisor.*
18. Chungag, A. (M. Phil). Impact of cattle unguided cattle husbandry on some urban peripheral and landscape elements: Case study in Alice (2015 – UFH). *Co-supervisor.*
19. Omar, M.Y (M.Sc.). Impacts of channel incision on soil water levels, soil morphology and vegetation in a degraded wetland in the Hogsback region, South Africa (2015 – UFH).
20. Bouwer, D. (M.Sc.). Hydrological response models for selected soilscapes in the Weatherley catchment (2013 – UFS). *Co-supervisor.* ***Cum laude.***

In progress:

21. David Shipangana
22. Omphile Mogapi
23. Tawanda Nyamandi
24. Ntokozo Maseka

Curriculum Vitae: JJ van Tol
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E-mail: vantoljj@ufs.ac.za
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PUBLICATIONS

Peer reviewed Journal Publications

1. van Tol, J.J., Clark, V.R., Kotzé, E. et al., 2026. Southern African mountain carbon: Lies, Lessons and Lighthouses. *Transactions of the Royal Society of South Africa*. https://doi.org/10.1080/0035919X.2026.2679016.
2. Van Tol, J.J., & Kotze, J.J., 2026. Towards a landslide early warning system for South Africa: Model coupling and evaluation. *South African Journal of Science.* https://doi.org/10.17159/sajs.2026/22201.
3. Anticho, L.A., Shomre, M.W., Alemu, M.D., van Tol, J.J., 2026. Integrated modelling of soil erosion under land-use and climate change in the Kulfo River Catchment, Ethiopia: implications for climate-resilient management. *Modelling Earth Systems and Environment.* 12:154. https://doi.org/10.1007/s40808-026-02800-0.
4. Alemu, M.D., Laekemariam, F., Belay, S., van Tol, J. & Mengistu, A.G., 2026. Landscape Transformation in Ethiopia's Abaya–Chamo Sub-Basin: Patterns and Dynamics of LULC Change (2016–2021). *Applied and Environmental Soil Science*, 2026; 2026:3757527. https://doi.org/10.1155/aess/3757527.
5. Alemu, M.D., Aweke, A., van Tol, J. & Mengistu, A.G., 2026. Spatio-temporal modeling of soil erosion dynamics under land use and land cover changes in the bilate river catchment, Ethiopia. *Environmental Earth Science*, 10.1007/s12665-025-12709-z
6. Melo, V.F., de Matos, C.H.L., Schaefer, E.C.G.R, Uchôa, S.C.P., Montenegro, R.A, Iuit, C.E.C., do Nascimento, C.R., Barni, P.E., Van Tol, J.J., Augusti, M.L., 2026. Indigenous lands of Roraima and ecosystem services: pedology and land use, vegetation cover, total carbon stock, and water resources. *Journal of Nature Conservation.* 90, 127175. https://doi.org/10.1016/j.jnc.2025.127175.
7. Marx, J.D.J., Kotzé, E., van Tol, J.J. & Loke, P.F., 2025. Simulated rangeland conditions and seasonal variations influence soil quality in semi-arid central South Africa, African Journal of Range & Forage Science, 42, 264-275, https://doi:10.2989/10220119.2025.2538057.
8. Kotze, J.J., Le Roux, J.J. & van Tol, J.J., 2025. Investigating Soil Properties at Landslide Locations in the Eastern Cape Province, South Africa. *GeoHazards*, 6, 68. https://doi.org/10.3390/geohazards6040068.
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Other publications

1. Van Tol, J.J., Franke, A.C., & Le Roux, J.J., 2023. Soil Erosion: Southern Africa's water tower is endangered. *Food & Agricultural Policy, Welternährung.*
2. Van Tol, J.J., Bouwer, D. & Le Roux, P.A.L., 2021. DWS guidelines for hydropedological surveys and minimum requirements. *Department of Water and Sanitation*.
3. Van Tol, J.J. & van Zijl, G.M., 2020. Regional soil information for hydrological modelling. *Water Wheel,* April 2021.
4. Van Tol, J.J., Le Roux, P.A.L. & Lorentz, S.A., 2017. The science of hydropedology – linking soil morphology with hydrological processes. *Water Wheel*, June/July 2017.

PRESENTED CONFERENCE PAPERS (N >80)

Selected *International*:

- Van Tol, J.J., Kotzé, J.J. Using SWAT+ modelling for landslide early warning prediction in South Africa. SWAT Conference, 17 – 20 June 2026, Thessaloniki, Greece.
- *Keynote:* Van Tol, J.J., Bieger, K., Arnold, J. Enhancing Hydropedological Models with Hydropedological Approaches for Improved Catchment Process Representation. International Conference on Water and Environmental Sustainability. 12 & 13 August 2024. Richards Bay, South Africa.
- van Tol, J., Kotze, J.J., Niedrist, G., Schneiderbauer, S., Delves & Clark, V. Alpine wetland degradation in the northern Maloti-Drakensberg: On the need for baseline research. 19 – 21 May 2024, Florence, Italy.
- Smit, I.E., Van Zijl, G.M., Van Tol, J.J. Examining the value of hydropedological insight on hydrological modelling in the Sabie catchment, South Africa. SWAT Conference, 26-30 June 2023, Aarhus University, Denmark.
- Van Tol, J.J., Bieger, K., Arnold, J. Using hydropedology to assist hydrological modelers. 30 July – 5 August, 2022. Glasgow, Scotland.
- Bieger, K., Schürz, C., Navarro, E.M., Gómez, A.S., van Tol, J. & Arnold J.G. Zonal calibration of SWAT+ models using soft data in R. Kirkham Conference. 28 Augustus – 2 September. Skukuza, South Africa.
- van Tol, J., Niedrist, G., Schneiderbauer, S., Delves, J., Hilpold, A., Szarzynski, J. & Clark, V. Establishing A Long-Term Socioecological Research Platform in the Maloti-Drakensberg: The Need, Focus and Lessons from the international community. Southern African Mountain Conference. 14 – 17 March 2022. Champagne Castel, South Africa.
- *Invited:* Van Tol, J.J., Bieger, K., Arnold, J., Le Roux, P.A.L., Lorentz, S., van Zijl. Hydropedological interpretation of soil information to serve the hydrological community. ASA, CSSA and SSSA International Annual Meeting. 7 – 10 November, 2021. Salt Lake City, Utah, USA.

- Strydom, T., Smit, I. & van Tol, J.J. Vegetation cover and physiognomy effects on C and N dynamics in long-term burnt and unburnt soils of a semi-arid savanna system. 1st International Congress on Fire in the Earth System: Humans and Nature. 3-7 November 2021, Valencia, Spain.
- Van Tol, J.J., & Lorentz, S.A. The application of hydropedological surveys to quantify the near surface impacts from mining wastes. 11th ICARD/IMWA Conference. 10 – 14 September 2018, Pretoria South Africa.
- *Invited:* Van Tol, J.J., Lorentz, S.A., van Zijl, G.M. & Le Roux, P.A.L. The contribution of hydropedological assessments to the sustainable management of water for all. 21st World Congress of Soil Science. 12 – 17 August 2018, Rio de Janeiro, Brazil.
- Van Tol, J.J., Lorentz, S.A. & Le Roux, P.A.L. Examples of hydropedological applications. 14th International Water Association Specialist Conference. 9 – 11 October 2017. Skukuza, Kruger National Park, South Africa.
- Van Tol, J.J & Lorentz, S.A. Understanding groundwater/surface-water interactions through hydropedological interpretations of soil distribution patterns. IAHS Scientific Assembly, 10 – 14 July, 2017, Port Elizabeth, South Africa.
- Lorentz, S.A., van Tol, J.J. & Le Roux, P.A.L. Using Hydropedology Surveys to Guide Process Based Hydrological Modelling in South Africa. IAHS Scientific Assembly, 10 – 14 July, 2017, Port Elizabeth, South Africa.
- Lorentz, S.A., van Tol, J.J. & Le Roux, P.A.L. Water and Solute Flux Simulation Using Hydropedology Survey Data in South African Catchments. European Geosciences Union, General Assembly, 23 – 28 April 2017, Vienna, Austria.
- Van Tol, J.J., van Zijl, G.M & Riddell, E.S. Application of Hydropedological insights in hydrological modelling. 3rd International Conference on Hydropedology. 16 – 19 August 2016, Beijing, China.
- Van Tol, J.J., Le Roux, P.A.L., Lorentz, S.A. & Hensley, M. Hydropedological classification of hillslopes to assist Environmental Impact Assessments. IAIAsa 20th Annual Conference. 11 – 14 August 2015, Champagne Castle, South Africa.
- Omar, M.Y., van Tol, J.J. & Le Roux, P.A.L. Effects of stream channel incision on soil water levels and soil morphology in a wetland in Hogsback, South Africa. International conference on building a new generation of agricultural scientists. 1 – 5 December, 2014, Kenyatta University, Kenya.
- Van Zijl, G.M., van Tol., J.J & Riddell, E.S. Digital soil mapping for hydrological modelling. The 6th Global Workshop on Digital Soil Mapping. 11 – 14 November 2014, Nanjing, China.
- Van Tol, J.J., Le Roux, P.A.L., Hensley, M. & Lorentz, S.A. Hydropedological classification of soilscapes in South Africa. 2nd International conference on Hydropedology, 22 – 27 July, Leipzig, Germany.
- Bouwer, D., van Tol, J.J. & Le Roux, P.A.L. Hydrological response model of a complex soilscape in the Weatherley catchment, South Africa. Eurosoil, 2 – 6 July 2012, Bari, Italy.
- Le Roux, P.A.L., van Tol, J.J., Hensley, M. & Lorentz, S.A., Soil indicators of hillslope hydrology. European Geosciences Union, General Assembly, 3 – 8 April 2011. Vienna, Austria.

FUNDED RESEARCH PROJECTS

1. Van Tol, J.J., et al. ESSPR project (R3 000 000).
2. Van Tol, J.J., & Kotze, E. Below ground carbon storage of Forest4People project. TU Munich (2023 – 2025) (R1 020 000).
3. Van Tol, J.J., Kotze, J.J. & Le Roux, J.J. Towards a Landslide Early Warning System for South Africa (LEWSSA). Water Research Commission (2023 – 2025). (R1 400 000).
4. Van Tol, J.J., Job, N., Bouwer, D., Murugan, S. & Le Roux, P.A.L., 2023. Hydropedological Assessment Guidelines: Theory and application in a South African wetland management context. Integrating hydropedology in wetland delineation and management guidelines. WRC Report No. TT 925/23. Water Research Commission (2021 – 2024). (R800 000).
5. Van Zijl, G.M., van Tol, J.J., Smit, I.E. Towards a hydrological soil map for South Africa. Water Research Commission (2021 – 2024). (R1 500 000).
6. van Aardt, A., Van Tol, J.J. & Matthews, N. Can carbon credits pay for soil restoration in Marakele National Park. Multidisciplinary research fund (2022 – 2023). (R70 000).
7. Van Tol, J.J. Developing a hydrological soil map and deriving resource areas critical to freshwater ecosystem support in selected catchments of South Africa. SANBI (2020 – 2021. (R550 000).
8. Van Tol, J.J. Hydropedological interpretation and application of regional soil information for water resource management. NRF Y-rated programme (2019 – 2021). (R300 000).
9. Van Tol, J.J., Chabala, L. Benefits of Using Biochar in Feacal Sludge Management in Pit Latrines. South Africa / Mozambique / Zambia Trilateral Joint Science and Technology Research (2019 – 2021). (R300 000).
10. Van Tol, J.J., van Zijl, G.M., Kotze, E., Establishing soil rehabilitation guidelines for important NRM areas. Department of Environmental Affairs (2019 – 2021). (R2 400 000).
11. Van Tol, J.J., Akpan, W., Maroyi, A., Mutengwende, N., Huchermeyer, N., Ngesi, S., Nqandeka, H.M., Mamera, M., Bradley, G. & Rowntree, K.M., 2018. The Mzimvubu Water Project: Baseline indicators for long-term impact monitoring. WRC project No. K5/2433. *Water Research Commission.* (R1 800 000).
12. Van Tol, J.J., van Zijl, G.M., Manyevere, A., Kanuka, G., Du Plessis, C., 2018. Characterisation and mapping of erodibility of soils in selected land types in support of the Ntabelanga and Laleni Ecological Infrastructure Project (NLEIP). Department of Environmental Affairs, National Resource Management. (R2 000 000).
13. Titshall, L., Zadorozhnaya, V., Botha, G., Crous, J., Le Roux, P.A.L., van Tol., J.J., van Zijl, G.M., et al. 2017. Understanding the role of regolith in site water balance and nutrient supply resilience for use in improved water and nutrient supply risk mapping for plantations. *Forestry South Africa.*
14. Le Roux, P.A.L., Hensley, M., Lorentz, S.A., van Tol, J.J., van Zijl, G.M., Kunene, B.T., Bouwer, D., Freese C.S., Tinnefeld, M & Jacobs, C.C. 2015. Hydrology of South African Soils and Hillslopes (HOSASH). WRC project No. K5/2021. *Water Research Commission.* (R5 000 000)
15. Van Tol, J.J., Akpan, W., Lange, D., Bokuva, C., Kanuka, G., Ngesi, S., Rowntree, K.M., Bradley, G. & Marroi, A. 2014. Conceptualising long term monitoring to capture environmental, agricultural and socio-economic impacts of the Mzimvubu Water Project in the Tsitsa River. WRC project No: KV 328/14. *Water Research Commission.* (R200 000)
16. Van Tol, J.J., 2014. Hydrology of Hogsback hillslopes and open-air laboratory. *Govan Mbeki Research and Development Centre.* (R60 000)
17. MT Seaman, M Watson, MF Avenant, AR Joubert, JM King, CH Barker, S Esterhuyse, D Graham, ME Kemp, PA le Roux, B Prucha, N Redelinghuys, L Rossouw, K Rowntree, F

Sokolic, L van Rensburg, B van der Waal, J van Tol & AT Vos, 2013. Testing a Methodology for Environmental Water Requirements for non-perennial rivers: The Mokolo Case Study. WRC Report TT579/13. *Water Research Commission*.

18. Esterhuyse, S., Adendorff, J., Avenant, M., Bragg, C., Cillie, D., Enke, G., Hutter, N., Kemp, M., Kijko, A., Louw, H., Nell, A., Ouzman, S., Prinsloo, H., Redelinghuys, N., Reynolds, D., Smit, A., Sokolic, F., Van Soelen, B., Van Tol, J., Vos, T and Watson, M. 2012. Report on the background review of impacts related to hydraulic fracturing and available databases for vulnerability indicators. WRC Report K5/2149. *Water Research Commission*.
19. Van Tol, J.J. & Coetzee, K., 2012. Hydropedological survey of Taylors Halt and Slagspruit sites. *Investigation into pollution from on-site dry sanitation systems*. WRC project K5/2115. *Water Research Commission*.
20. Le Roux, P.A.L., Van Tol, J.J., Kunene, B.T., Hensley, M., Lorentz, S.A., Van Huyssteen, C.W., Hughes, D.A., Evison, E., Van Rensburg, L.D. & Kapangaziwiri, E., 2011. Hydropedological interpretation of the soils of selected catchments with the aim of improving efficiency of hydrological models: WRC Project K5/1748. *Water Research Commission*. (R1 800 000).

CONSULTANCY PROJECTS (N > 120)

Selected projects:

- Van Tol, J.J., 2025. Agricultural assessment for the Kotulo Tsatsi PV project, Northern Cape Province. *Landscape Dynamics.*
- Van Tol, J.J., 2025. Agricultural assessment for access road to substation, Warmbad, Limpopo Province. *Licebo Environmental & Mining*.
- Van Tol, J.J. & Lombard, W.A., 2024. Agricultural Assessment for Christiana Protea Mining Project, Free Sate. *LW Consultants.*
- Van Tol, J.J., 2024. Agricultual compliance statement for oxidation ponds, Carnavon, Northern Cape. *EarthWorth Environmental Consultants*
- Van Tol, J.J. & Lombard, W.A., 2024. Agricultural Assessment and Compliance Statements for the Xhariep Pipeline and associated infrastructure, Free state Province. *Zutari*.
- Van Tol, J.J., 2023. Assessing soil health and extent of pollution around Rietpan, Free State Province. *MVB Consulting.*
- Van Tol, J.J., Hydropedological Assessment of Swartklip, Khayalitsha, Western Cape. *GEOSS Consulting.*
- Van Tol, J.J. & Bouwer, D., 2022. Hydropedological assessment of the Klipfontein View Clinic, Gauteng. *NTC Group.*
- Van Tol, J.J., 2021. Soil Quality Indicators and Success criteria to facilitate mine closure. *Redco Environmental Services.*
- Van Tol, J.J. & Mc Clean, C., 2021. Report on irrigation suitability of selected portions of the farm Kameelhoek, Postmasburg, Northern Cape. *AngloAmerican/EXM*
- Van Tol, J.J., 2021. Hydropedological assessment of the Kuiper wetland, Stanford/Hermanus, Western Cape. *GNEC.*
- Van Tol, J.J., 2021. SWAT+ modelling of the Weltevreden open-cast mine. *SAS Environmental.*
- Van Tol, J.J., 2020. Extent of pollution in selected soils in Chingola, Copperbelt Province, Zambia. *KLM Consultants.*
- Van Tol, J.J. & Bouwer, D., 2019. Hydropedological survey of the VOPAK site, Port of Richards Bay, KwaZulu Natal. *SRK Consultants.*

- Van Tol, J.J. & Bouwer, D., 2019. Report on the reuse of effluent waste and lime in the City of Umhlathuze. *Natural Resource Stewardship Programme, GIZ*.
- Van Tol, J.J. & Bouwer, D., 2019. Hydropedological survey of the proposed Dense Media Separation Stockpiles at Der Brochen, Limpopo Province. *SRK Consulting*.
- Van Zijl, G.M., Bouwer, D., van Tol, J.J., Lorentz, S.A. & Le Roux, P.A.L., 2018 Cosmo City Hydropedological report. *Joburg Roads Agency.*
- Van Tol, J.J., Prefeasibility study for ethanol production from sugarcane in Northern KwaZulu-Natal. *Green Cemba*.
- Van Tol, J.J., Van Zijl, G.M. & Barnard, J.H., 2018. Prefeasibility agronomic report for Khomanani irrigation schemes. *Kruger 2 Canyons.*
- Van Tol, J.J. & Le Roux, P.A.L., 2018. Hydropedological survey of Emhakhazeni mining sites near Belfast, Mpumalanga. *The Biodiversity Company.*
- Van Tol, J.J., Job, N., Rossouw, P.S., Haworth, S. & Cowden, C., 2016. Transient Wetland Research Approach. *Tongaat Hulett Developments: Amanzimnyama Farm.*
- Van Tol, J.J., 2014. Report on the agricultural potential of the proposed Castle Wind Farm and associated infrastructure near De Aar, Northern Cape. *Savannah Environmental.*
- Van Tol, J.J., 2012. Disaggregation of land types for determination of erosion sensitivity of selected sites in the Eastern Cape for afforestation. *Sigwale and Associates*
- Le Roux, P.A.L., Van Zijl, G.M., Bouwer, D. & van Tol, J.J., 2012. Layout of the ATCF II forestry development, Nampula, Mozambique. *ATCF II.*
- Kunene, B.T., Le Roux, P.A.L., van Tol, J.J., Hensley, M., Bouwer, D. & van der Merwe, R.H., 2010. Soil hydrology dynamics and catchment morphology of selected catchments in Lesotho.
- Le Roux, P.A.L., Bouwer, D., Van Zijl, G.M., Matshawu, B & van Tol, J.J., 2010. Hydrological flowpaths controlling the distribution of Zn at the Zincor mine, Springs. *Zincor*
- Le Roux, P.A.L. & Van Tol, J.J., 2008. Actions required for Hotazel pit water dewatering and gardening project: Action 1 Prefeasibility study.

LEADERSHIP AND MEMBERSHIPS

- President of the Soil Science Society of South Africa (SSSSA: 2023 - 2025).
- Council member of SSSSA since 2018
- Chair of the International Union of Soil Sciences Working Group on Hydropedology (2023 -). (Previously vice-chair (2020 – 2023).
- Chair of the Southern African Plant and Soil Scientific Committee (SAPSSC)
- Management Board member of South African Journal of Plant and Soil.
- Chair of Henry Lin Travel Awards committee – for Soil Science Society of America (2022)
- Head of Soil Science section in Department of Soil, Crop and Climate Sciences.
- Part of UFS Academic Leadership Programme (ALP) for 2023/2024.
- Director of Digital Soils Africa (Pty) LTD.
- NRF rated researcher: C2
- Board member of the South African Soil Surveyors Organisation (SASSO).
- South African Council of Natural Scientific Professions (SACNASP) – *Pr.Sci.Nat.*
- International Union of Soil Sciences (IUSS).

ORGANISATIONAL AND COMMUNITY SERVICE

- Associated editor: South African Journal of Plant and Soil
- Editor for Special Editions in *Vadose Zone Journal* and *Koedoe*
- Member of the Soil Classification Working Group of South Africa
- Chair of scientific committee of Combined Congress 23' and member of scientific committee of Kirkham, SAMC and GCC5 international conferences.
- Chairperson of the Local Organising Committee (Convenor) for the Combined Congress 2014, Grahamstown (360 delegates).
- Afromontane Research Unit (ARU) research champion tasked with establishment of Long Term Socio-Ecological Research Platform in Northern Drakensberg.
- Invited delegate to develop bilateral research call between China and SA in Beijing (2016).
- Invited delegate to promote groundwater/surface water interactions at the African Groundwater Network in Uganda (2017).
- Invited member of Rectors delegation to University of Lesotho (2022).
- NAS committee member for internal NRF reviews and revision of promotion policy.
- Several congress sessions chaired such as at the Combined Congress, Kirkham Congress and IUSS Congress in Glasgow.
- Reviewer of >50 (national and international) manuscripts, including *Geoderma, Journal of Hydrology, Vadose Zone Journal Hydrology and Earth System Sciences*.
- Organise and co-present a short course in advanced soil survey techniques (UFS – 2009).
- Departmental representative in the Faculty Higher Degree and Research Committee (UFH).
- Reference group member on several Water Research Commission projects.
- Reviewer of WRC project proposals (n > 8).
- Panel member and reviewer of NRF research projects.

AWARDS

- 2025: Soil Science Society of South Africa (SSSSA) Combined Congress - Best Paper on Innovation Technology (co-author)
- 2025: Southern Africa Mountain Conference (SAMC) - 3rd Place at PhD level (Supervisor of winner)
- 2024: South African Hydrological Society (SAHS) Conference - Best Oral Presentation (Supervisor of winner)
- SSSSA silver medal: Best paper by author over 30 years: Combined Congress, 20 – 23 January, 2020, Bloemfontein.
- Best paper on innovative technology (*co-author*): Combined Congress, 20 – 23 January, 2020, Bloemfontein.
- Vice-Chancellor's Developing Researcher Award, University of Fort Hare, 2014.
- SANCHIAS gold medal: Best paper by author < 35 years. 17th SANCHIAS Symposium, 1 – 3 September, 2014, Bellville.
- SANCHIAS silver medal: Best paper by young researcher (*co-author*): 17th SANCHIAS Symposium, 1 – 3 September, 2014, Bellville.

- SSSSA silver medal: Best paper on innovative research. Combined Congress, 20 – 23 January 2014, Grahamstown.
- SSSSA silver medal: Best paper by authors under 30: Combined Congress, 16 – 19 January 2012, Potchefstroom.
- Prestige PhD bursary: Academic Cluster (Water Management in Water Scarce Areas), UFS (2010).
- SSSSA silver medal: Best paper by authors under 30: Combined Congress, 19 – 21 January 2010, Bloemfontein.
- Best paper on new technologies (*co-author*): Combined Congress, 19 – 21 January 2010, Bloemfontein.
- Best presentation by young researcher (*runner-up*): 14th SANCHIAS Symposium, 21 – 23 September 2009, Pietermaritzburg.
- Best presentation by young researcher (*runner-up*): 13th SANCHIAS Symposium, 6 – 7 September 2007, Cape Town.
- SSSSA silver medal: Best final year Soil Science student in South Africa – 2006.

ADDITIONAL CAPACITY BUILDING

- Certificate in Environmental Law – University of Pretoria, 2017.
- Enrolled in Post Graduate Diploma in Higher Educational Teaching (PGDHET) – UFH.
- Workshop on Post Graduate Supervision, Govan Mbeki Research and Development Centre (GMRDC), UFH, 2014.
- SPSS software short course, UFH, 2014.
- Catchment Science Summer School, 21 – 26 August 2011, University of Aberdeen, Scotland.
- HYDRUS short course, December 2010, Kruger National Park.
- Numerous (> 10) SASSO workshops.

VISION

'Food and water for Africa'

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Jacobus Johannes van Tol

Registration Number: 400274/13

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Soil Science (Professional Natural Scientist)

Effective **28 August 2013** Expires **31 March 2027**

President of Council

Chief Executive Officer

To verify this certificate scan this code

Appendix J: Additional Information

Appendix J1: Plough certificate

agriculture
Department:
Agriculture
REPUBLIC OF SOUTH AFRICA

Directorate: Land and Soil Management, PO Box 2303, Kimberley, 8300
97 Kenilworth road, De Beers, Kimberley, 8301

From: Head of Office - Kimberley
Tel: (053) 807 2613 • **Fax:** (053) 807 2630 • **e-mail:** JanHarmV@dalrrd.gov.za
Enquiries: J.H.Vorster • **Ref:** 13/10/6/3 – D3 **Date issued:** 5-3-2026

Permit no. C0011 JHV/NC/2025

Mr. A.J. Potgieter

The farm Oranje Oos

Prieska

8940

RE: PERMISSION FOR CULTIVATION OF VIRGIN SOIL IN TERMS OF REGULATION 2 OF THE CONSERVATION OF AGRICULTURAL RESOURCES ACT, 1983, ACT 43 OF 1983, ON THE FARM UNIT: ERF 971 AND ERF 1 PRIESKA, SITUATED WITHIN SIYATEMBA LOCAL MUNICIPALITY, PIXLEY KA SEME DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE.

With reference to your application in terms of the provision of Regulation 2 of the Conservation of Agricultural Resources Act 1983 (Act 43 of 1983), **permission is hereby granted to cultivate 26 ha in total on Erf 971 and Erf 1 Prieska – Colesberg.**

Crop type: Cash crops: Maize, Wheat, Lucern and Pecan nuts.

The permit area is situated within GPS co-ordinates as indicated below: Also see the attached map.

Area 1: 1 ha

29°40'48.03"S 22°49'36.63"E 29°40'51.47"S 22°49'40.21"E 29°40'52.27"S 22°49'36.33"E

29°40'51.21" S 22°49'35.43"E

Area 2: 8.5 ha

29°40'59.65"S 22°49'32.81"E 29°40'57.18"S 22°49'43.63"E 29°40'59.62"S 22°49'45.04"E

29°41'11.85"S 22°49'30.06"E 29°41'9.28"S 22°49'29.61"E

Area 3: 5.5 ha

29°41'18.23"S 22°49'32.17"E 29°41'25.91"S 22°49'40.64"E 29°41'28.25"S 22°49'38.34"E

29°41'29.23"S 22°49'31.68"E 29°41'22.47"S 22°49'29.95"E

Area 4: 10 ha

29°41'38.86"S 22°49'51.52"E 29°41'28.42"S 22°50'7.37"E 29°41'35.70"S 22°50'11.41"E

29°41'42.57"S 22°49'53.45"E

Conditions and/or restrictions:

1. Water run-off control systems must be constructed in conjunction with the removal of natural vegetation to prevent erosion due to soil loss caused by water.
2. Sub-surface drainage system must be installed at the first signs of water logging and or salinity. Monitoring protocols will be recommended for early detection of water logging.
3. Cultivation should be restricted to high potential soils only.
4. Areas of cultivation must exclude all rocky outcrops and 10m horizontal from the natural waterways.
5. The clearing of natural vegetation for the irrigation development will trigger other environmental legislation and listed activities.

Camp/Land no./Area	Size	Soil depth	Soil forms	Soil Horison	Slope
Area indicated at co-ordinates as provided above.	26 ha	Varied 1.5 – 3 m	Prieska Oakleaf	Orthic A over neocarbonate on hard carbonate and Orthic A on deep neocutanic horison	Avg 1 %

Additional conditions in terms of CARA:

- **In terms of Regulation 7.(1) of the Conservation of Agricultural Resources Act (CARA) Act 43 of 1983,** subject to the provisions of the National Water Act, 1998 (Act 36 of 1998), and sub regulation (2) of this regulation, **no land user shall utilize the vegetation in a vlei, marsh or water sponge or within the flood area of a water course or within 10 metres horizontally outside flood area** in a manner that causes or may cause the deterioration of or damage to the natural agricultural resources.
- **If any signs of erosion (wind or water) appear necessary, soil protection control system must be constructed to** protect the cultivated land on his farm unit effectively against excessive soil loss as a result of erosion through the action of water or wind.
- Irrigation on the property must be done in such a manner that **no salination and/or water logging occur on the above mentioned or adjacent properties.**

- If salination and/or water logging do occur on the property or adjacent properties, the **land user will be held responsible to resolve the salination and/or water logging and any additional measures to prevent the repetition of salination and/or water logging on the above mentioned or adjacent properties.**
- **This permit does not exempt the land user from complying with other pieces of legislation regarding this activity**
- Your attention is drawn to the fact that above mentioned conditions are granted in terms of Act 43 of 1983. Failure to comply with the conditions is an offence and may lead to prosecution. If you experience any problem with the interpretation of this letter or any other problem concerning the above mentioned, do not hesitate to contact our office on the above-mentioned address.

Should you feel aggrieved by this decision you may lodge an appeal in writing within 14 days of receipt of this letter to: The Director: Land and Soil Management, Private bag X120, Pretoria. 0001

Yours faithfully,



……

MS. THEMBISILE MABUZA
CONTROL RESOURCE AUDITOR
ON BEHALF OF: EXECUTIVE OFFICER: ACT NO. 43 OF 1983
DIRECTORATE: LAND AND SOIL MANAGEMENT


Permit area C0011 JHV NC 2025-26 - Erf 971 and Erf 1 Prieska - A.J. Potgieter Oranje Oos
Write a description for your map.
Legend
Area 1-4: Erf 971 and Erf 1 Prieska = 26 ha in total
Orange River
Soon Le Roux Jeugkamp
Area 1: Erf 971 and Erf 1 Prieska = 1 ha
Area 2: Erf 971 and Erf 1 Prieska = 8.5 ha
Uitdraai Boerdery
Area 3: Erf 971 and Erf 1 Prieska = 5.5 ha
Area 3: Erf 971 and Erf 1 Prieska = 10 ha
R357
N
800 m
Google Earth
Image © 2026 Airbus

Received Time 29.Aug. 7:23

DW6/1

(054) 3340201/2/3/4

(054) 3340205

Steenka@dwaf.ncape.gov.za

A. STEENKAMP

2003 -08- 29

DEPARTMENT: WATER AFFAIRS AND FORESTRY

PRIVAATSAK X 5912, UPINGTON, 8800

AANDAG: MEV. C POTGIETER **FAKS 053-3531180**

Hiermee word dit bevestig dat daar volgens hierdie kantoor se Lys van Belasbare Oppervlaktes die volgende waterregte geregistreer is op die volgende persele:

Erf 967 Prieska dorpsgronde	9,2 ha
Erf 969 Prieska dorpsgronde	37,3 ha
Erf 970 Prieska dorpsgronde	21,1 ha
Erf 971 Prieska dorpsgronde	21,6 ha

Die uwe

GEBIEDSBESTUURDER
AS/as

054 3340205

DEPT-WATERWESE UPINGTON

#2723 P.001/001

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Enquiries : L.E Thebe
Telephone : 054-338 5838
Reference : PRIE_970/0
Registration No: 25165259

BY REGISTERED MAIL

MARTELLE
PO BOX 389
PRIESKA
8940

ORANGE WATER MANAGEMENT AREA (LOWER ORANGE)

PRIESKA, PRIESKA, PORTION 0, SIZE 21.10 ha: DECLARATION OF WATER USE AS AN EXISTING LAWFUL WATER USE IN TERMS OF SECTION 33(2) OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998).

Under Section 33(2) of the National Water Act, 1998 (Act 36 of 1998), the following volume(s) are declared as existing lawful water use(s) on the above mentioned property:

Type of water use	*Volume (m^3/annum)*
Taking of water for irrigation purposes	**211 000**
Taking of water for non-irrigation purposes	
Storing of water	

In terms of Section 148(1)*(e)* of the Act you may appeal against this declaration to the Water Tribunal within 30 (thirty) days from the date of this letter. The Water Tribunal can be contacted at Private Bag X316, Pretoria, 0001 or Tel: (012) 336-7034 or Fax (012) 336-7321. A copy of the appeal must be submitted to this office.

The Department will amend your registration certificate to reflect the above details. A new registration certificate will then be issued to you. If an appeal is lodged, the certificate may be amended again depending on the outcome of the appeal.

Yours faithfully

DIRECTOR GENERAL (ACTING):

For Minister of Water & Sanitation

DATE: 23/01/2017

Lower Orange V&V, Private Bag X5912, UPINGTON, 8800
Louisvale Road, Upington, 8801
Fax: 086 693 5055, Cell: 060 560 2852, E-mail: Thebee@dws.gov.za

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Enquiries : L.E Thebe
Telephone : 054-338 5838
Reference : PRIE_971/0
Registration No: 25165268

BY REGISTERED MAIL

MARTELLE
PO BOX 389
PRIESKA
8940

ORANGE WATER MANAGEMENT AREA (LOWER ORANGE)

PRIESKA, PRIESKA, PORTION 0, SIZE 21.60 ha: DECLARATION OF WATER USE AS AN EXISTING LAWFUL WATER USE IN TERMS OF SECTION 33(2) OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998).

Under Section 33(2) of the National Water Act, 1998 (Act 36 of 1998), the following volume(s) are declared as existing lawful water use(s) on the above mentioned property:

Type of water use	*Volume (m^3/annum)*
Taking of water for irrigation purposes	**216 000**
Taking of water for non-irrigation purposes	
Storing of water	

In terms of Section 148(1)*(e)* of the Act you may appeal against this declaration to the Water Tribunal within 30 (thirty) days from the date of this letter. The Water Tribunal can be contacted at Private Bag X316, Pretoria, 0001 or Tel: (012) 336-7034 or Fax (012) 336-7321. A copy of the appeal must be submitted to this office.

The Department will amend your registration certificate to reflect the above details. A new registration certificate will then be issued to you. If an appeal is lodged, the certificate may be amended again depending on the outcome of the appeal.

Yours faithfully

DIRECTOR GENERAL (ACTING):

For Minister of Water & Sanitation

DATE: 23/01/2018

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Louisvale Road, Upington, 8801
Fax: 086 693 5055, Cell: 060 560 2852, E-mail: Thebee@dws.gov.za

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Enquiries : L.E Thebe
Telephone : 054-338 5838
Reference : PRIE_969/0
Registration No: 25165240

BY REGISTERED MAIL

MARTELLE
PO BOX 389
PRIESKA
8940

ORANGE WATER MANAGEMENT AREA (LOWER ORANGE)

PRIESKA, PRIESKA, PORTION 0, SIZE 37.30 ha: DECLARATION OF WATER USE AS AN EXISTING LAWFUL WATER USE IN TERMS OF SECTION 33(2) OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998).

Under Section 33(2) of the National Water Act, 1998 (Act 36 of 1998), the following volume(s) are declared as existing lawful water use(s) on the above mentioned property:

Type of water use	*Volume (m^3/annum)*
Taking of water for irrigation purposes	**373 000**
Taking of water for non-irrigation purposes	
Storing of water	

In terms of Section 148(1)*(e)* of the Act you may appeal against this declaration to the Water Tribunal within 30 (thirty) days from the date of this letter. The Water Tribunal can be contacted at Private Bag X316, Pretoria, 0001 or Tel: (012) 336-7034 or Fax (012) 336-7321. A copy of the appeal must be submitted to this office.

The Department will amend your registration certificate to reflect the above details. A new registration certificate will then be issued to you. If an appeal is lodged, the certificate may be amended again depending on the outcome of the appeal.

Yours faithfully

DIRECTOR GENERAL (ACTING):

For Minister of Water & Sanitation

DATE: 23/01/2018

Lower Orange V&V, Private Bag X5912, UPINGTON, 8800
Louisvale Road, Upington, 8801
Fax: 086 693 5055, Cell: 060 560 2852, E-mail: Thebee@dws.gov.za

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Enquiries : L.E Thebe
Telephone : 054-338 5838
Reference : PRIE_967/0
Registration No: 25165231

BY REGISTERED MAIL

MARTELLE
PO BOX 389
PRIESKA
8940

ORANGE WATER MANAGEMENT AREA (LOWER ORANGE)

PRIESKA, PRIESKA, PORTION 0, SIZE 9.20 ha: DECLARATION OF WATER USE AS AN EXISTING LAWFUL WATER USE IN TERMS OF SECTION 33(2) OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998).

Under Section 33(2) of the National Water Act, 1998 (Act 36 of 1998), the following volume(s) are declared as existing lawful water use(s) on the above mentioned property:

Type of water use	*Volume (m^3/annum)*
Taking of water for irrigation purposes	**92 000**
Taking of water for non-irrigation purposes	
Storing of water	

In terms of Section 148(1)*(e)* of the Act you may appeal against this declaration to the Water Tribunal within 30 (thirty) days from the date of this letter. The Water Tribunal can be contacted at Private Bag X316, Pretoria, 0001 or Tel: (012) 336-7034 or Fax (012) 336-7321. A copy of the appeal must be submitted to this office.

The Department will amend your registration certificate to reflect the above details. A new registration certificate will then be issued to you. If an appeal is lodged, the certificate may be amended again depending on the outcome of the appeal.

Yours faithfully

DIRECTOR GENERAL (ACTING):

For Minister of Water & Sanitation

DATE: 23/01/2018

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water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Enquiries : L.E Thebe
Telephone : 054-338 5838
Reference : PRIE_971/0
Registration No: 25165268

BY REGISTERED MAIL

MARTELLE
PO BOX 389
PRIESKA
8940

ORANGE WATER MANAGEMENT AREA (LOWER ORANGE)

PRIESKA, PRIESKA, PORTION 0, SIZE 21.60 ha: DECLARATION OF WATER USE AS AN EXISTING LAWFUL WATER USE IN TERMS OF SECTION 33(2) OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998).

Under Section 33(2) of the National Water Act, 1998 (Act 36 of 1998), the following volume(s) are declared as existing lawful water use(s) on the above mentioned property:

Type of water use	*Volume (m^3/annum)*
Taking of water for irrigation purposes	**216 000**
Taking of water for non-irrigation purposes	
Storing of water	

In terms of Section 148(1)*(e)* of the Act you may appeal against this declaration to the Water Tribunal within 30 (thirty) days from the date of this letter. The Water Tribunal can be contacted at Private Bag X316, Pretoria, 0001 or Tel: (012) 336-7034 or Fax (012) 336-7321. A copy of the appeal must be submitted to this office.

The Department will amend your registration certificate to reflect the above details. A new registration certificate will then be issued to you. If an appeal is lodged, the certificate may be amended again depending on the outcome of the appeal.

Yours faithfully

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For Minister of Water & Sanitation

DATE: 23/01/2018

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