

# **SPECIALIST REPORT**

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**Scherp Arabie 743 KS (Portions 18 & R/E of 19)  
Marble Hall**

**ENVIRONMENTAL BASELINE DATA**  
**(Section 24G Rectification of Unlawful Development)**



**November 2022**

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## **ABBREVIATIONS.**

<b>ADU</b>	- Animal Demographic Unit.
<b>BCA</b>	- Biological Control Agents.
<b>BGIS</b>	- Biodiversity Global Information System.
<b>BRAHMS</b>	- Botanical Research and Herbarium Management System.
<b>CARA</b>	- Conservation of Agricultural Resources Act.
<b>CBA</b>	- Critical Biodiversity Area.
<b>DCA</b>	- Damage Causing Animals.
<b>DWS</b>	- Department of Water and Sanitation.
<b>ECO</b>	- Environmental Control Officer.
<b>EIA</b>	- Environmental Impact Assessment.
<b>EMPr</b>	- Environmental Management Programme.
<b>ESA</b>	- Ecological Support Area.
<b>GPS</b>	- Global Positioning System.
<b>GSDMBP</b>	- Greater Sekhukhune District Municipality Bioregional Plan.
<b>HWC</b>	- Human-Wildlife Conflict.
<b>IPM</b>	- Integrated Pest Management.
<b>KZN</b>	- KwaZulu-Natal Province.
<b>LCP</b>	- Limpopo Conservation Plan.
<b>LEDET</b>	- Limpopo Department of Economic Development, Environment & Tourism.
<b>LEMA</b>	- Limpopo Environmental Management Act.
<b>LTSS</b>	- Land Type Survey Staff.
<b>NEMA</b>	- National Environmental Management Act.
<b>NEMBA</b>	- National Environmental Management: Biodiversity Act.
<b>NFA</b>	- National Forests Act.
<b>NFEPA</b>	- National Freshwater Ecosystem Priority Areas.
<b>NR</b>	- Nature Reserve.
<b>PA</b>	- Protected Area.
<b>PNR</b>	- Private Nature Reserve.
<b>PPP</b>	- Plant Protection Products.
<b>SABAP2</b>	- Southern Africa Bird Atlas Project 2.
<b>SANBI</b>	- South African National Biodiversity Institute.
<b>SANDF</b>	- South African Defense Force.
<b>SDF</b>	- Spatial Development Framework.
<b>SDM</b>	- Sekhukhune District Municipality.
<b>SNR</b>	- Schuinsdraai Nature Reserve.

## 1. INTRODUCTION.

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The clearing of virgin land for the purpose of agricultural development is a listed activity under the National Environmental Management Act No. 107 of 1998 (NEMA). The Environmental Impact Assessment (EIA) process is conducted in terms of Section 24 (5) of the Act. The Act provides for co-operative, environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state. In terms of the Environmental Impact Assessment Regulations 984 & 985 published on 4 December 2014, (as amended on 7 April 2017) clearing of virgin land is a listed activity indicating that an Environmental Authorization is required prior to the commencement of the activity. The applicable farm also lies in the Critical Biodiversity Area 2 in terms of the Limpopo Conservation Plan but also has areas designated as Ecological Support Area 2.

Any landowner or developer wishing to establish new agricultural lands has to comply with the EIA regulations where the proposed project may trigger items listed under Listing Notices of the 2014 Regulations (as amended on 07 April 2017). Initially, an authorisation application for the clearance of approximately 120 hectares for the establishment of orchards on Portion 18 and R/E of Portion 19 of the farm Scherp Arabie 743 KS in the Ephraim Mogale Local Municipality, Sekhukhune District, Limpopo Province, was to be submitted.

<b>Listing Notice 1, Activity 13</b>
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<i>The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.</i>
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<b>Listing Notice 2, Activity 13</b>
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<i>The physical alteration of virgin soil to agriculture, or afforestation for the purposes of commercial tree, timber or wood production of 100 hectares or more.</i>
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<b>Listing Notice 2, Activity 15</b>
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<i>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for:</i>
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- |      |  |
|------|--|
| (i)  | <i>the undertaking of a linear activity; or</i>  |
| (ii) | <i>maintenance purposes undertaken in accordance with a maintenance management plan.</i> |

<b>Listing Notice 3, Activity 2</b>
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<i>The development of reservoirs, excluding dams, with a capacity of more than 250 cubic metres.</i>	
<b>e</b>	<b>Limpopo</b>
(ii)	<i>Outside urban areas:</i>
(dd)	<i>Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</i>

<b>Listing Notice 3, Activity 12</b>	
<i>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</i>	
<b>e</b>	<b>Limpopo</b>
(i)	<i>Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004.</i>
(ii)	<i>Within critical biodiversity areas identified in bioregional plans.</i>
(iii)	<i>On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.</i>

Failure to do so will render the landowner liable for prosecution in terms of Section 24F (2) (a) leading to compliance with Section 24G (1) that provides for ‘rectification of unlawful development’. This report forms part of the process of compliance with the legislative requirement, providing evidence of possible impact and any mitigation applicable to the resultant impact.

Potential impact on:-

- i. The environment;
- ii. Socio-economic conditions; and
- iii. The cultural heritage,

of any activity requiring authorization or permission by law must be considered, investigated and assessed prior to the implementation of the development.

However, the applicant commenced with bush clearing and landscaping activities before the required Environmental Authorization was issued by the Department of Economic Development, Environment and Tourism (Limpopo) and has, therefore, submitted an application under Section S24G, to seek authorization for the listed activities which commenced unlawfully without the required authorization.

The compilation of environmental baseline data is an integral part of the scoping process and as such, through desktop studies of historical data and monitoring actions, data is collated to provide a database as comprehensive as allowed by

prevailing conditions and available information. The information so gathered will also assist the Environment Control Officer (ECO) in the implementation of his duties.

## **SECTION 1: General Information.**

### **2. SPECIALIST DETAILS.**

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The details of the author (Specialist) of this report are as follows:

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### **3. SCOPE AND TERMS OF REFERENCE.**

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The scope of the investigation is to assess the terrestrial ecosystems affected by the unlawful activity. The receiving environment of the impact footprint has to be compared to adjoining natural areas to establish the probable baseline condition of the site.

1. The terms of reference for the assessment prior to the commencement of such an activity include the following:
  - Site description (general topography, geology, soil, climate).
  - A broad description of the vegetation type and plant communities with special reference to sensitive sites/habitat and their conservation importance.
  - Figures depicting images of all plants of interest.
  - A plant species list.
  - Monitoring of abundance of protected trees taller than 1,8m.
  - A list of fauna species based on observation, signs and possibility of occurrence in the specific habitat – specify species richness.
  - A list of all endemic, protected, threatened or red-list species, for both fauna and flora, if present.
  - Identify and list ecological impacts and potential future impacts resulting from the unlawful activity.
  - Identify and list alien invasive species.
  - Identify potential environmental/ecological impacts related to the unlawful activity and include measures to mitigate impacts.
2. Provide an analysis of the probable biodiversity and vegetation impact.
3. Use environmental significance scale to analyze specific components of the data acquired, if attainable, due to the unlawful activity.



4. Identify the most pertinent impacts resulting from the unlawful activity by analyzing collected data.

#### 4. SITE DESCRIPTION AND GENERAL INFORMATION.

The piece of land in question is located on a section of the property Scherp Arabie 743 KS (Portion 18 & R/E of 19) that forms part of an agricultural farm in the Ephriam Mogale Municipal area (Figure 1). The property is located along the Marble Hall to Schuinsdraai Nature Reserve road, lying just south of the nature reserve. Topographically the farm lies between the latitudes of 24° 53,8' and 24° 55,6' south, and longitudes 29° 18,7' and 29° 20,6' east. In terms of altitude, the farm is located at between 820m and 880m (reference 2429CD topographic map). Initially, large portions of the farm were under centre-pivot irrigation focussing on the cultivation of fodder for cattle/game. The remainder of the farm was in a 'natural' state and borders on the Elands River to the south. Subsequently, the farm has been unlawfully developed through the clearing of most vegetation for the proposed establishment of citrus orchards.

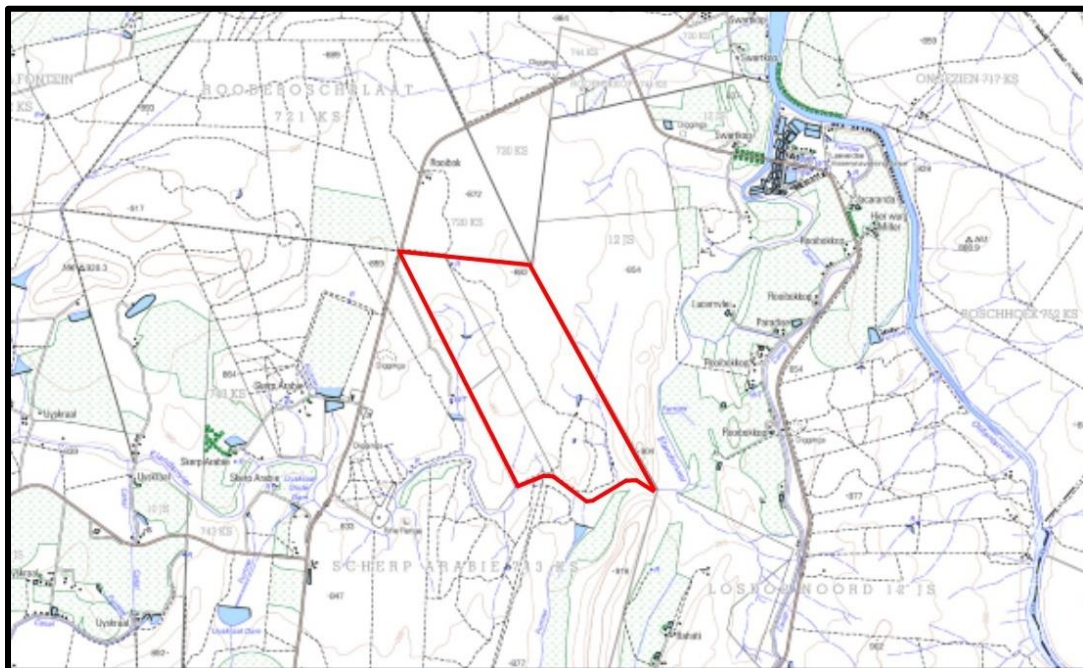
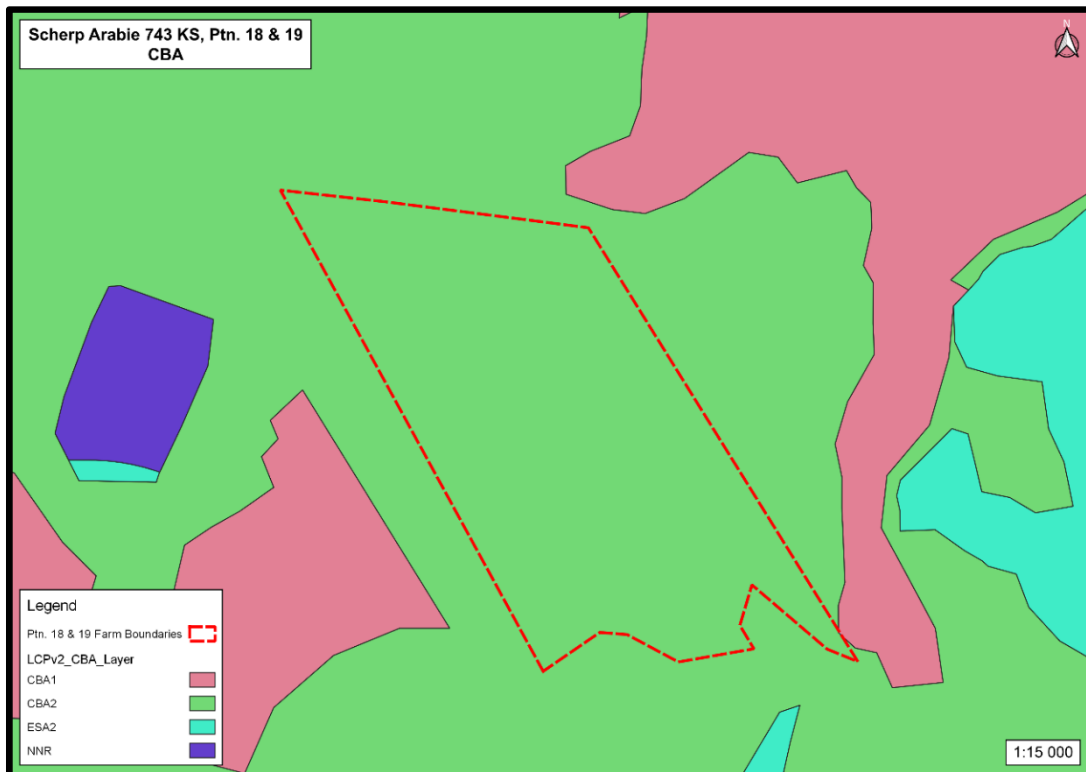


Figure 1. Regional location and physical boundaries of the Scherp Arabie farm.

The Sekhukhune District is important for supporting a range of ecological processes which are critical for ensuring long term persistence of biodiversity and the delivery of ecosystem services especially in the context of climate change. Well-functioning, largely undisturbed and natural ecosystems can improve the natural resilience to the

adverse effects of climate change and the vulnerability of people thereto. Riparian corridors and buffers; areas with temperature, rainfall and altitudinal gradients; areas of high diversity; areas of high plant endemism; refuge sites including south-facing slopes and kloofs; and priority large un-fragmented landscapes are all features in the environment which are more significant than others for supporting this resilience (Holness, 2015). Agriculture (irrigated fields) is concentrated in the south-west along the Olifants and Elands Rivers with scattered areas occurring in the north-east. Dryland fields (subsistence farming) occurs predominately in the centre of the District, extending northwards. The land cover data indicates that 65.75% of the Sekhukhune District is in a natural state. This high percentage is partially due to the PAs and the largely rural nature of the District. 14.2% is of SDM is covered by agriculture (Dryland Fields) and a further 8.7% is severely or irreversibly modified by settlements and 0.5% by mines (Desmet, 2017).

The Elands River that forms the southern boundary has two non-perennial drainage-lines that originate in and drain parts of the farm. The closest distance to the Elands River is approximately 1,3 km from the southern boundary of the proposed development area while the eastern boundary is approximately 1,4 km from the north-flowing section of the river.



**Figure 2. Location of the farm indicating the area of unlawful development in terms of the Limpopo Conservation Plan classifications.**

The classification of the area for the initial proposed development in terms of the Sekhukhune Bioregional Plan (Figure 2) is delineated as a Critical Biodiversity Area 2 (CBA2) with a small area as an Ecological Support Area 2 (ESA2) where agricultural activities are already practised. In terms of the Greater Sekhukhune District Municipality Bioregional Plan, the areas falling within CBA 2 are considered 'optimal' representing areas where there are other spatial options of achieving targets. In the Limpopo Province 40% of the area is classified as Critical Biodiversity Areas of which 22% is designated as CBA1. Due to the past agricultural land-use, a large section of the farm is considered as an Ecological Support Area 2 according to the classification categories. ESA2's are areas that are no longer intact but retain importance from an ecological process perspective. Arable agriculture, as is the intention of the proposed development, is listed as compatible with the land management objective of ESA2's so long as managed to ensure any populations of threatened species are maintained and ecological processes that support them are not impacted.

In the GSDMBP the farm (Portion 18 & R/E 19) is listed as part of a 'protected area' referred to as the P.R. de Jager PNR. The Olifants River is considered an ecological corridor and the corridor delineation includes at least part of the farm as it encompasses the lower portions of the Elands River. On the other hand, according to the Ephriam Mogale Local Municipality SDF, the area is considered a 'crop farming zone'.

The property was recently acquired by the new owner Mr. T Maripane. The business operates under the company Manini Holdings (Pty) Ltd. The land-use activities at the property of concern, in the past, was crop farming under centre-pivot irrigation and game farming on the remainder of the farm.

The activity i.e., clearance of indigenous vegetation for the purpose of agriculture, is required to be in compliance with the National Environmental Management Act No. 107 of 1998. An area of ±160ha was unlawfully cleared without the required environmental authorization and therefore triggered a Section S24G process. The requirements of the Limpopo Department of Economic Development, Environment and Tourism as the delegated Decision-making Authority and the Department of Agriculture, Fisheries and Forestry are to be considered.

## **SECTION 2. Environmental Information.**

### **5. METHODOLOGY.**

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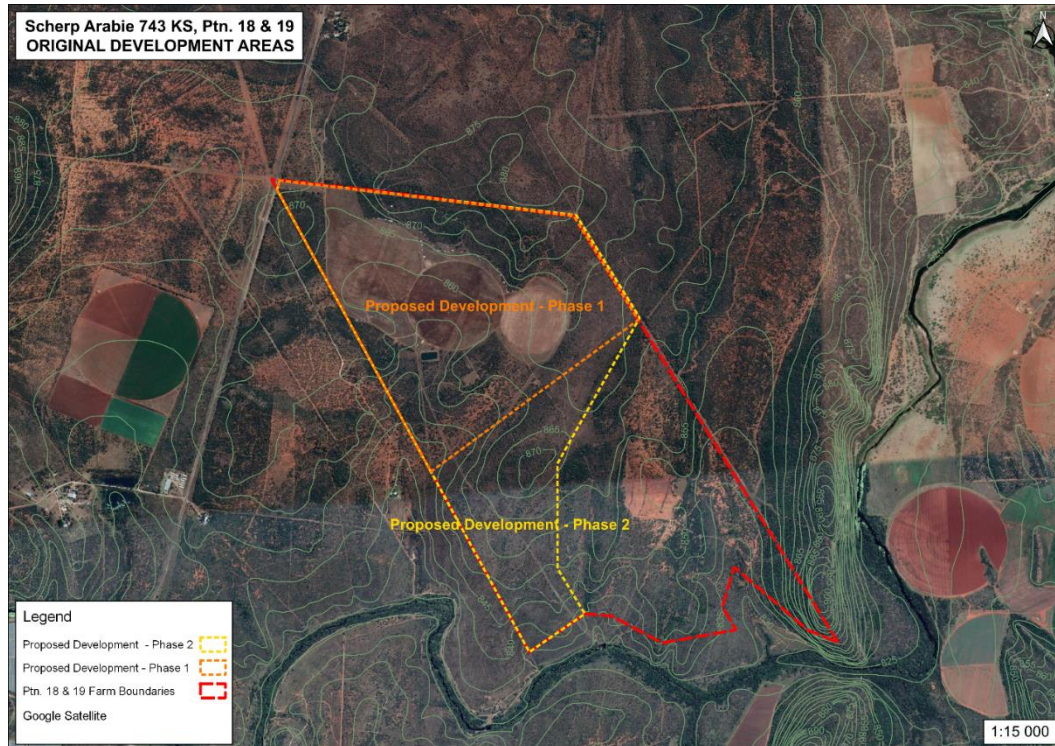
An understanding of the environmental status at the site identified for the proposed development was required and in order to achieve this, the following aspects of the environment needed to be investigated:

- a. General topography and landscape features of the site.
- b. Geology and soils of the area.
- c. Plant species occurring at the site and associated conservation status.
- d. Animal species that may inhabit or utilize the site.
- e. Other environmental features that may be impacted on.
- f. Disturbances already present at survey site.

The first two aspects were determined through desktop studies and observations made during site visits. Where necessary, concerns are highlighted to make the investigation more applicable to the site under investigation, more particularly after the unlawful activity.

Determination of plant species status required desk top study, consultation with persons on the ground and field observations through monitoring actions. As not all species may be identifiable during site visits due to seasonality, published lists for the area were also sourced. The site (Figure 3) that is to be affected by the then proposed activity was randomly traversed during the first visit and all species noted listed. As the greatest impact with the establishment of orchards would be on the woody plant component, formal transect surveys should have been conducted to determine general status of the woody layer and the status of protected tree species. Due to the unlawful activity, sampling transects could not be applied for tree species that are protected under different pieces of legislation [National Forests Act (No. 84 of 1998); Limpopo Environmental Management Act (No.7 of 2003)]. To provide an idea of what the status of protected tree species may have been, a short transect in the remaining 'natural' area was undertaken. Aspects documented include the species of tree and the height class of each individual. GPS co-ordinates were recorded for the start and end of the transect as indicated in Table 3.

Surveys of all the fauna species groups that may inhabit an area would not be possible within the time frames. Therefore, the surveys concentrated on species that may only temporarily occupy the area and those that are noted during visit as inhabiting the site on a more permanent basis. The latter component is determined through visual sightings, signs of occupation, nesting evidence or food plant presence. Consultation with persons on the ground and where necessary, historic information data bases were also used in determining possible presence of wildlife species.

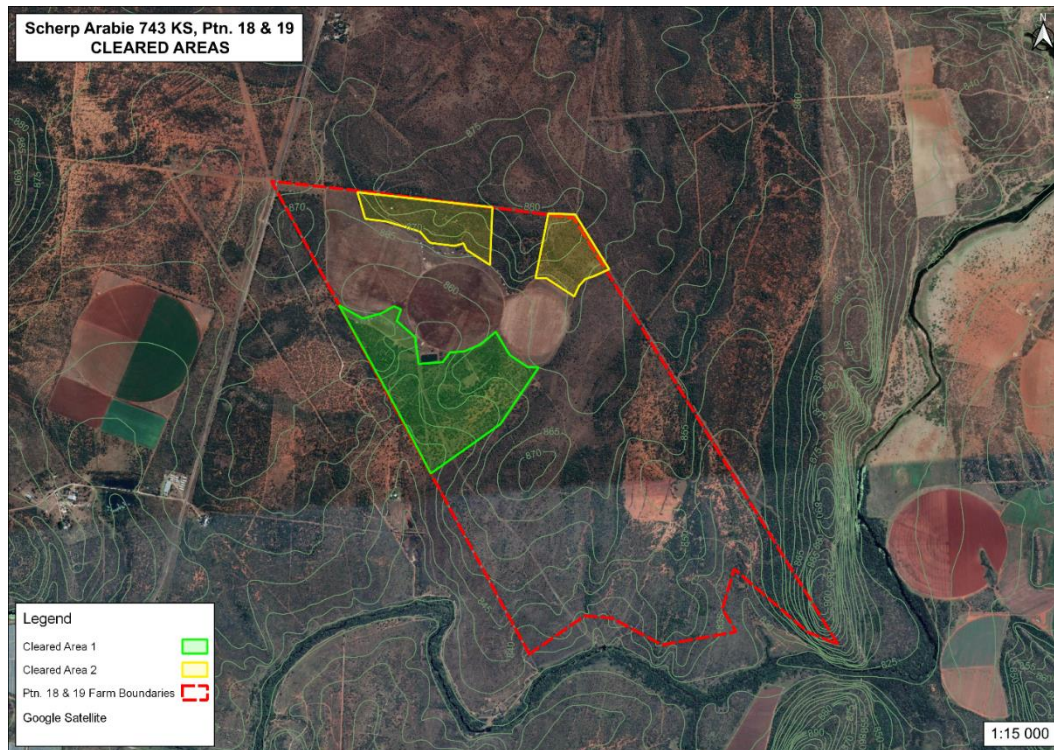


**Figure 3. Satellite image of Scherp Arabie farm showing farm boundaries and proposed development site.**

Surveys of all the fauna species groups that may inhabit the area would not have been possible within the time frames and now, more pertinently, as a result of the unlawful clearing of vegetation. Therefore, the surveys concentrated on species that may only temporarily have occupied the area and those that are noted during surveys as inhabiting the site on a more permanent basis. The latter component was determined through visual sightings, signs of occupation, nesting evidence or food plant presence. Consultation with persons on the ground and where necessary, historic information data bases were also used in determining possible presence of fauna species.

Geographical features of importance occurring at the site of investigation or found in the adjacent natural areas would be identified and evaluated, where possible, in terms of species richness and as refuges for fauna, and their ecological importance in

general. However, all such features have basically been destroyed by the unlawful activity, thereby, making such evaluations impossible.



**Figure 4. Satellite image of the Scherp Arabie developed site showing the extent of the unlawfully cleared areas.**

The purpose of the unlawful activity is to establish citrus orchards as part of an expansion programme for the farm. The extent of the unlawful activity is indicated in Figure 4 (compare with Figure 3). This action has compromised any surveys or monitoring efforts that may have been conducted in the cleared areas. The woody vegetation layer was totally removed, and the herbaceous layer destroyed in the process of land preparation for the establishment of the citrus orchards. Most unwanted vegetation remains were burnt or dumped in remaining 'natural' areas. The herbaceous layer may re-establish in the orchards at a later point, but many geophytic species have been severely compromised. The section of drainage-line associated vegetation in the south-western sector was also totally removed.

## 6. GEOLOGY & SOILS.

Geology refers to the complex rock formations of an area and has a major influence on other features of the landscape such as land form, soil, topography and vegetation. The central and eastern portions of the applicable municipal area are reportedly underlain by a variety of rocks of the Bushveld Igneous Complex. The general geology

of the area in which the Scherp Arabie farm lies is dominated by the Rashoop Granophyre Suite and Lebowa Granite Suite, subdivisions of the Bushveld Complex (Botha, 2010). In a LEDET (2013) report, it is stated for the nearby Schuinsdraai Nature Reserve, that the Lebowa Granite Suite is most dominant with some granophyre of the Rashoop Granophyre Suite. The most prominent rock types occurring in the region are: mudrock, quartzitic sandstone, ironstone, quartzite and feldspar. The Bushveld Complex contains some of the largest deposits of major minerals.

According to Mucina & Rutherford (2006) a close relationship exists between soils and vegetation in dry regions such as the case in most savannah areas. Where water is the main limiting factor, it is the physical properties of soil that determine the rainfall efficiency thereby influencing vegetation composition. In support of this, referring to soils, Peel *et al.* (2006) write that in semi-arid regions there is usually a good correlation between geological formation, soil type and vegetation type. This implies that the soil and parent rock from which the soil is formed exercise a strong influence on grazing management and the potential for agricultural practices. Soil affects the supply of water and nutrients to the plants. The soil moisture regime, a primary determinant of savanna dynamics and by extension vegetation composition, is influenced by four factors other than the pattern and amount of rainfall namely, infiltration, percolation, root extraction and evaporation.

Soils occurring in the Ephriam Mogale Municipal area can be divided into the following groups: in the west - shallow to moderately deep sandy-clay loam soils on flat and undulating terrain overlying rocks of the Ecca Group, principally shales and silicified sandstones and, in the east - deep, black, blocky vertisols of the Springbok Flats with moderate to deep sandy loam soils lining long stretches of the Olifants River valley in its middle reaches. Mucina & Rutherford (2006) described the dominant soil types to be found on the farm, in relation to the identified vegetation zone (SVmp 7), as well-drained, deep Hutton or Clovelly soils often with a catenary sequence from Hutton at the top to Clovelly on the lower slopes and, shallow, skeletal Glenrosa soils also occur. Most of the soils are suitable for commercial agriculture when sufficient water is available.

The Land Type Ah77 covers the whole of the Scherp Arabie farm (LTSS, 2002). The dominant soils in the Land Type Ah77 are given as Hutton-, Mispah- and Clovelly soils. The characteristics of each of these soils groups is as follows:

- The Hutton series consists of very deep, poorly drained soils that formed in alluvium from mixed sources.

- The Clovelly series consists of very deep, very poorly drained, very slowly permeable soils.
- The Mispah soil form is characterized by an Orthic A – horizon overlying hard rock.

Fey (2010) states that once the soil, as has probably happened in the past on this farm, has been disturbed through mechanical means for agricultural purposes i.e., ploughing, it is considered Anthropogenic soils. The original soil character and soil properties have been lost as a result and this is considered to now be the case with the greater part of the site under investigation following the unlawful activity.

**‘Enhanced erosion attributable to the influence of man has been so severe that the recent decrease in sediment yield can be ascribed to the reduced availability of erodible material as a result of the washing away of alluvial valleys and the stripping of topsoil from sensitive profiles.’**

Department of Water Affairs, 1986.

## 7. CLIMATE.

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The climate of the area is classified by Köppen and Geiger as BSh indicating that it is ‘hot semi-arid (steppe)’ type of climate. The Scherp Arabie farm lies just north of Marble Hall and the climate is pleasant, with an average maximum winter temperature of 23°C and an average maximum summer temperature of 29°C. Summer rainfall occurs and the area experiences cold winter months with infrequent frost.

For the region, the description by Mucina and Rutherford (2006) is that of an area of summer rainfall and very dry winters with effectively three seasons namely, a cool dry season from May to mid-August, a hot dry season from mid-August to about October and a hot wet season from about November to April. Data from the Sekhukhune Land Weather Station indicates that the average temperatures measured show moderate fluctuation with average summer temperature 23°C, with a maximum of 28°C and a minimum of 18°C. In winter the average is 13, 5°C with a maximum of 20°C and a minimum of 7°C.

Rainfall is an important driver within semi-arid ecosystems and therefore some data of recent trends is important to an investigation. Recent rainfall records for the Scherp Arabie farm area could not be obtained and, therefore, data for Marble Hall from a weather website were sourced. The data from this sites’ model does not truly reflect the climate data for the area.



It could be considered that this area is a desert 80% of the time due to its rainfall patterns and is, therefore, referred to as having a ‘local steppe climate’. The long-term mean annual rainfall for the area is given as 471mm by one source and at the Tompi Seleka weather station, it is recorded as 648mm per annum. These figures are considered representative of the historical rainfall pattern for the area.

The meteoblue.com website was consulted for historical climatic averages determined through the use of models. In Table 1 these figures are depicted, however, they are not considered to be significantly accurate.

<b>Table 1. Historic Climate Averages for Marble Hall (meteoblue.com)</b>			
<b>Month</b>	<b>Rainfall</b>	<b>Temperature</b>	
		<b>Maximum</b>	<b>Minimum</b>
July	1	22	4
August	2	25	7
September	6	29	11
October	28	28	14
November	37	31	16
December	39	32	17
January	31	32	18
February	24	31	17
March	24	30	16
April	10	28	13
May	5	25	9
June	1	22	5
	Annual Average: 208	Monthly Average: 27.9	Monthly Average: 12.3

## **8. SITE INVESTIGATIONS.**

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Considering that the investigation is in terms of a ‘rectification of an unlawful development’, normal methods of survey are not possible due to the impact of the said activity. Areas of natural vegetation have been cleared and landscaping applied for the purpose of establishing citrus orchards. The status of the environment is indeterminate and comparative surveys were not possible, therefore, focus shifted mainly to reporting on the status of the environment due to the impact of the unlawful activity as noted during the second site visit.

The first site visit was conducted on 21 January 2021 and served as an orientation visit combined with collecting data on species of both fauna and flora that were noted

when walking through sections of the then proposed development site. The main goal of the visit was to establish an understanding of the environmental status of the area under investigation. Initial data collected concentrated on the plant species present at the entire site and signs of occupation by faunal species in the available habitats. The scope of the project was to be re-evaluated and, therefore, the continuation of the investigation was delayed. It then became apparent that the landowner had unlawfully continued with the proposed development leading to a situation where the investigation was now to be conducted in terms of Section S24G of NEMA. The follow-up visit was, therefore, only undertaken on 27 April 2022 following notification that the activity had commenced without the required departmental authorization.

The affected terrain was traversed to gather data on impacts of the unlawful activity. Of concern was the fact that the development did not cease as required by law and the activities were continuing during the site visit. Different impact “zones” were investigated to provide critical data on the present status of the illegally developed areas and the remaining patches of natural vegetation. However, the total clearance of vegetation combined with the landscaping of the proposed orchards has compromised any possibilities of some form of comparative studies where impacts and mitigation measures can be assessed. For comparative purposes, through the use of images, attempts are made to compare the environmental status prior to and following the unlawful activities.

To indicate the impact on certain protected species, a short transect (Figure 6) was undertaken within the remaining patch of natural vegetation located along the northern farm boundary. An existing road was followed and all protected species within a 20 m wide belt along either side of the road was surveyed. Remnants of protected species in all remaining piles of vegetation debris were furthermore noted. Additional information was recorded on other plant species and species lists compiled from the remaining natural areas.

The resultant data from the limited surveys are listed in Addendum I. Of note is that there was an area of previous cultivation as depicted in Figure 3.

Recommendations for EIA scoping study botanical surveys as published by the South African National Biodiversity Institute (SANBI) state that such surveys should concentrate on species of conservation concern. If a sub-population of such a species is found at a development site, it would be one indicator of possible loss of biodiversity leading to increased risk of extinction. Furthermore, cognisance should be taken of the fact that this is only one aspect and others such as threatened ecosystems and the prevailing ecological processes at the site have to be considered.

The season of survey is also highlighted as an important factor as it can affect the results obtained. All these guidelines could be considered no longer applicable to this investigation as the area has already been entirely cleared of vegetation. The limited data gathered at the first site visit is, however, indicative of what status the environment had prior to the unlawful activity and during a period of highest expected rainfall. It should be accepted that not all identifiable plant species that may have occurred at the site, were evident at the time of that survey.

To determine the possible presence of Red Data species, plant species lists on the SANBI website for an area of 30km<sup>2</sup> within the 2429CD quarter-degree area were downloaded. Using the new SANBI search engine, BRAHMS (16 January 2021) a list containing 336 plant species was downloaded. Ten of the species listed are given as endemic and 32 are alien species of which 13 are considered 'invasive'. The list includes 60 grass species and 15 'cypress-type' species. According to BRAHMS, 10 of the listed plant species are 'endemic', all having a threat status of 'Least Concern'. The lists may not be complete but are a good representation of the possible flora composition of the area. Table 2 lists protected species recorded at the proposed development site and others known to occur in the area, even if having a threat status of 'Least Concern'.

<b>Table 2. Protected Plant Species Threat Status.</b>		
<b>Family</b>	<b>Species</b>	<b>Conservation Status &amp; Population Trend*</b>
ASPHODELACEAE	<i>Aloe cryptopoda</i>	Least Concern -
APOCYNACEAE	<i>Boophone disticha</i>	Least Concern Decreasing
CAPPARACEAE	<i>Boscia albitrunca</i> (Burch.) Gilg & Gilg-Ben.	Least Concern -
COMBRETACEAE	<i>Combretum imberbe</i> Wawra	Least Concern -
ANACARDIACEAE	<i>Sclerocarya birrea</i> (A. Rich.) Hochst. subsp. <i>caffra</i> (Sond.) Kokwaro	Least Concern -
EUPHORBIACEAE	<i>Spirostachys africana</i> Sond.	Least Concern -

\*According to: <http://redlist.sanbi.org>

From a legal perspective, flora protected under various pieces of legislation are usually investigated and surveys conducted to record the status of such species in a particular area. Species so listed and originally found to be present at the site, were

identified. Some examples of protected tree species, mostly post the unlawful activity, are illustrated in Figure 7.

The grass layer was not monitored during the initial survey and, the grass species listed in the references quoted above or listed during surveys, are included in applicable quoted plant species numbers. The grass species were furthermore included in the compiled species list (Table 10: Addendum I). The proposed activity is citrus orchard development and, therefore, the grass layer, including other flowering herbaceous plant species, will most likely be allowed to establish between the orchard rows.

The probable fauna of the area was determined mainly through historical data and observations during surveys and random walks through the area when on site. Evidence of fauna species presence is normally assessed firstly through visual sightings and then by track identification, scats at the site, nesting or roosting activity and feeding activity. Additionally, information on the larger mammal species present on the property would be sourced from various parties that have historically lived on or visited the farm. Most of the above was not attainable with this investigation so information from databases has had to be used as reference. Any information gathered is given in Table 12.

As part of the faunal component survey, any aspect that may indicate the presence of species from groups such as Arachnida, Reptilia, Amphibia or certain insect groups are noted. The importance of certain plant species or particular micro-habitats in relation to such organisms, is also discussed where pertinent.

The surveys on fauna and flora species are listed in tables contained in the addenda as indicated above and is discussed below.

## **8.1 VEGETATION.**

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The habitat type, according to Mucina & Rutherford (2006), is described as the savannah biome Central Sandy Bushveld SVcb 12 (Figure 5). Within the Ephraim Mogale Municipality's area of jurisdiction this habitat type covers 75,3% of the land, an estimated area of 143747 hectares (SANBI GIS). A large percentage (24%) of this habitat has been transformed by agriculture and urban development. Only 3% of the habitat type is statutorily protected with a further 2% protected in private nature reserves and SANDF properties (Mucina & Rutherford, 2006). According to the Limpopo Conservation Plan V2 (2013) this savannah biome is listed as 'least threatened' and is poorly protected in the both the South African and provincial context.

The vegetation at the investigated development site can be described as savannah woodland dominated by *Sclerocarya birrea*, *Spirostachys africana*, *Burkea africana*, *Combretum* species, *Senegalia* species, *Terminalia sericea*, *Vachellia* species and *Grewia* species. The grass layer has a good representation of perennial grass species such as: *Brachiaria nigropedata*, *Eragrostis pallens*, *E. rigidior*, *Hyerthelia dissoluta*, *Megathrysus maximus*, *Perotis patens* and *Dicerocaryum senecioides*.

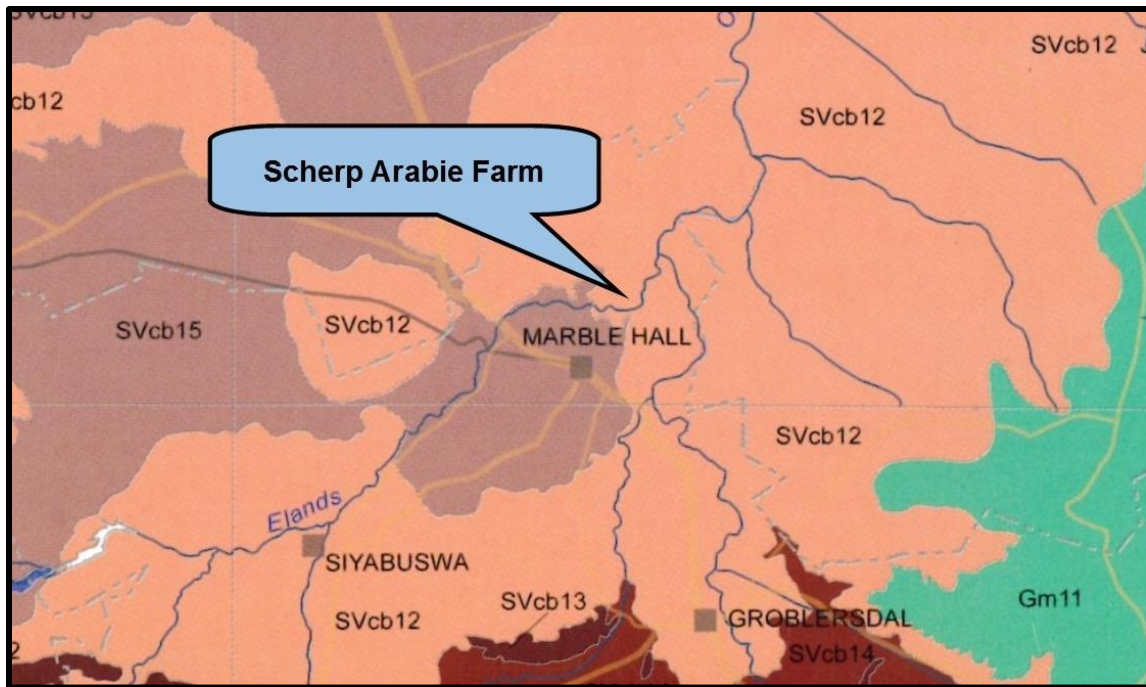


Figure 5. Scherp Arabie Farm location according to vegetation type (SVcb 12).

#### a) Protected Plant Species Survey.

Determining protected plant species presence in the unlawfully cleared area has been compromised by the activity. Additionally, if an option, once-off surveys understandably would not provide a comprehensive list of all plants and, therefore, other available sources had to be consulted and extrapolated data applied from initial surveys and remaining natural vegetation. The SANBI website was consulted and, using the BRAHMS search engine, data on the historically recorded plant species in the immediate area was determined. Data from searches using the BRAHMS search engine provides a list of 336 plant species, not of which have protection status. This was for an area of 30km<sup>2</sup> incorporating the initially proposed development site. Where available, the relevant conservation status for protected species, as published in literature or on relevant websites, is indicated. The population trends, if provided, as listed by the SANBI Red List evaluations, are also given. Protected species that may have been compromised by the unlawful

activity, some of which were listed in the first vegetation surveys on the farm and recorded in the subsequent transect survey, are also included in the data.

During the initial site visit and the follow-up survey following the unlawful activities, all plant species noted were listed. As indicated in Table 2, some of the listed plant species have been afforded some form of protection. Protected tree species, as given in various pieces of legislation, were furthermore identified and, where possible also identified in the vegetation rubble following the unlawful clearing of the area. Images of some remaining specimens were taken and, furthermore, of recognizable species in the rubble (Figures 7, 18 – 20).

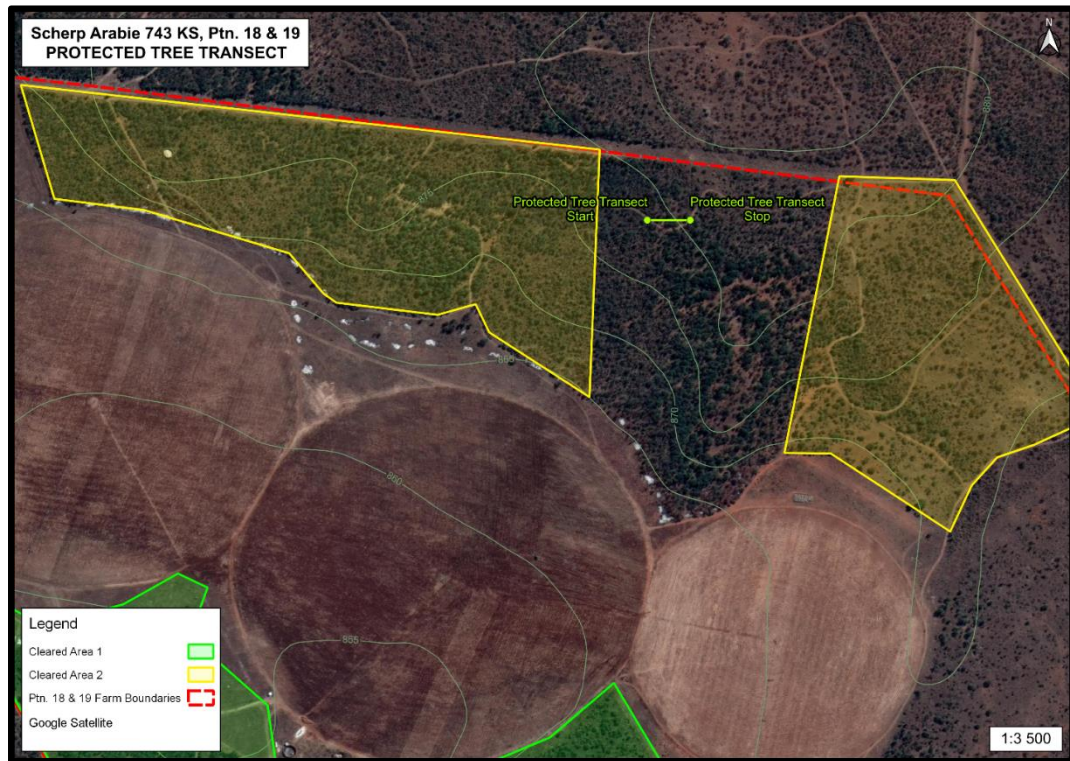


Figure 6. Location of survey transect in remaining ‘natural’ area - Protected Tree Species.

During the initial site visit and the follow-up survey, all identifiable plant species noted were listed. Protected tree species, as listed in various pieces of legislature, were furthermore identified, and where pertinent photographed, and recorded along a short transect line within the remaining ‘natural’ area (Table 3).

<b>Table 3. Survey Transect GPS Readings.</b>			
<b>Zone</b>	<b>Habitat</b>	<b>Start</b>	<b>End</b>
1	Natural Rocky Outcrop	24° 53' 59,0" S 29° 19' 27,8" E	24° 53' 59,0" S 29° 19' 29,7" E

Images of representative larger specimens of these species are shown in Figure 7. The tree species *Spirostachys africana*, the only tree species protected under LEMA that is known to occur on the farm, was found to be well represented in the remaining 'natural' vegetation. The only species protected under the NFA, *Boscia albitrunca*, recorded as still remaining in the 'natural' vegetation along the fringes of the bush-cleared areas, still had some large specimens remaining.

The data from the transect survey are given in Table 4 below. The dominant protected tree species was *Spirostachys africana* with most recorded in the 5,0-5,5 height class and good representation in the 4,0-4,5 and 3,0-3,5 height classes. As indicated by the data, and from within the remaining vegetation debris, *Boscia albitrunca* had many large specimens present in the area, most of which have now been destroyed by the unlawful bush-clearing activities.

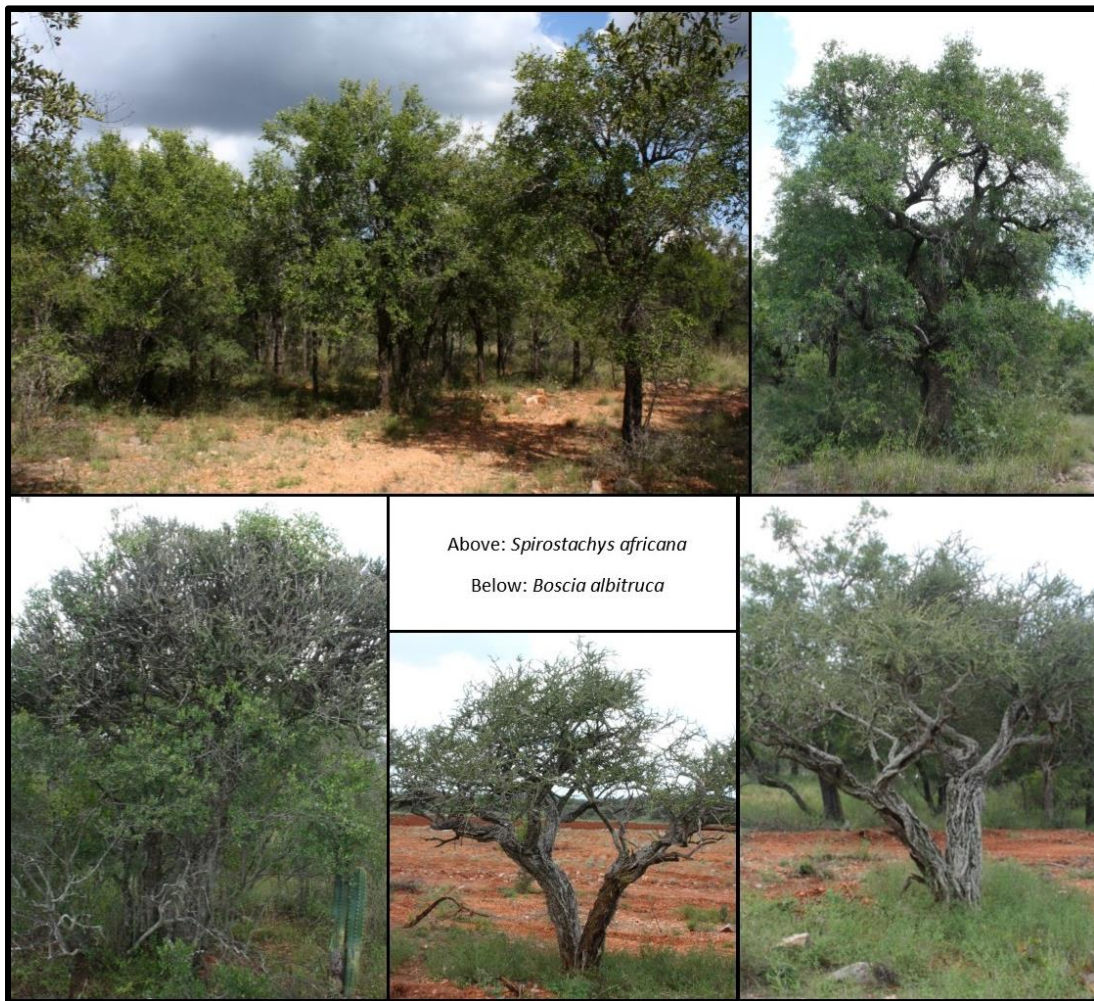


Figure 7. Examples of the two protected species, *Spirostachys africana* and *Boscia albitrunca* in the remaining 'natural' areas.

Other plant species that have been afforded some level of protection in legislation as indicated in Table 2 are species of succulents: *Aloe cryptopoda*; and a protected bulbous species, *Boophone disticha*, also recorded during surveys.

It has been indicated that in the development of citrus orchards, large specimens of any tree, thus not only protected species, can be accommodated within the confines of a citrus orchard without impacting on the operations of the orchard (Alberts, *pers. comm.*). During the initial site visit, in discussions with the land owner, an appeal was made for the preservation of the impressive *Boscia albitrunca* specimens but, as the evidence now indicates, this was not considered.

The data from the transect survey are given in Table 4 below. The dominant protected tree species was *Spirostachys africana* with most recorded in the 5,0-5,5 height class and good representation in the 4,0-4,5 and 3,0-3,5 height classes. As indicated by the data, and from within the remaining vegetation debris, *Boscia albitrunca* had many large specimens present in the area, most of which have now been destroyed by the unlawful bush-clearing activities.

<b>Table 4. Protected Tree Species Transect.</b>						
<b>Species</b>	<b>Height Class</b>					<b>Totals</b>
	<b>2,0-2,5</b>	<b>3,0-3,5</b>	<b>4,0-4,5</b>	<b>5,0-5,5</b>	<b>6,0-6,5</b>	
<i>Boscia albitrunca</i>	-	3	1	-	-	4
<i>Spirostachys africana</i>	3	10	10	16	9	48

**b) Plant Species Surveys.**

As part of the investigations, surveys of the plant species are conducted to provide a list of species present on the site of a proposed development. The initial surveys of plant species were conducted in two areas, namely, the high lying areas of the ridges along the northern farm boundary and the southern sections including the suspected previously farmed lower-lying areas, together with the central ridge on the farm. All plant species that were identifiable were listed thereby facilitating the determination of the presence of any other protected plants that occur in the areas of survey other than trees.

In Table 10 (Addendum I) all the identifiable plant species seen during the surveys are listed (95 species). Comparatively, the BRAHMS list for a much larger area is 344 plant species. Examples of some other plant species of interest found at the site are depicted in Figure 8. Figure 9 illustrates some of the succulent- and xerophytic species evident at the time of the second survey in the natural zone. A



small number of geophytic species were recorded but, due to the bush clearing activities, a number of specimens may not have been visible in the unlawfully cleared area at the time of the second survey.

Of the 95 plant species recorded, during the first visit to the farm, the northern area of survey delivered some 73 species while in the southern area of survey, 43 species were identified. Plant species were not surveyed during the second visit as the survey concentrated on the impact of the unlawful activities. It may be postulated that more than the three protected species initially recorded, may have been impacted during the bush-clearing and landscaping activities.



**Figure 8. Examples of flowering plant species recorded at the site: Top - *Aptosimum lineare*, *Dicliptera ?clinopodia*. Middle – *Ruellia patula*, *Hibiscus calyphyllus*. Bottom – *Pavonia burchellii*, *Leucas glabrata*.**

Of note was the low number of succulent species, other than *Aloe* spp., and bulbous geophytic species, recorded in areas outside of the northern natural rocky outcrops. Where the drainage-line had been cleared, specimens of *Crinum buphanoides* had emerged, however, it was doubtful that they may have been preserved as the orchard landscaping continued unabated. Even though no hemiparasitic species or epiphytic orchids were noted during the first visit, such species may have been present prior to the bush-clearing activities.

During the unlawful bush clearing operations, no specimens of any protected tree species were preserved. However, the landowner s' attention was brought to the existence of a number of large *Boscia albitrunca* specimens in the then area of proposed development. An appeal was made to protect the trees in the orchard setup, an acceptable practice within the industry, but this was not heeded.



**Figure 9. Examples of other plant forms recorded at survey site: (clockwise) *Aloe cryptopoda*, *Xerophyta retinervis*, *Euphorbia clavigera* and *Sansevieria aethiopica*.**

The absence of an appointed Environmental Control Officer to monitor and preserve fauna and flora, as is required by law, has compromised any mitigating actions that may have been applied during the development phase of this project. A biodiversity offset process would have been proposed as a contribution to the preservation of areas of concern and individual plant specimens. Even though severely limited, application of certain biodiversity offset actions may still be considered.

### **c) Riparian (Drainage-line) Vegetation.**

An ecosystem that may have been considered one of the most sensitive on the Scherp Arabie farm that has been affected by the unlawful activities, is the drainage-line running to the south (Figure 11). As it drains into the Elands River some 2 km to the south, the health of this system is of importance especially in an agricultural environment. It would have been a recommendation to have a buffer zone delineated along the drainage-line to preserve its integrity within the orchard system. The site of unlawful developmental activity presently under investigation has as the closest proximity to the Elands River, the south-western corner that is approximately 1300 m from the riparian zone. The Elands River is rated as a Class D river i.e., largely modified. Even though the Elands River is not directly impacted, any impacts affecting ephemeral water courses that drain into the river have to be considered. Land has now been cleared all the way through the drainage-line (Figure 10) and landscaping of the area continued for the establishment of the citrus orchard.

Working on wetland surveys, Husted & Kimberg (2016) described the necessity of protected zones along watercourses. The National Water Act defines this habitat as:

*“Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.”*

In accordance with the DWS (2005) guidelines, the riparian areas are also delineated and identified by considering the following specific indicators:

- are associated with a watercourse;
- contain distinctively different plant species than adjacent areas; and
- contain species similar to adjacent areas but exhibiting more vigorous or robust growth forms; and
- may have alluvial soils.

The DWS (2005) guideline states that not all riparian areas develop the same way and may not perform these functions to the same extent. It is important that a riparian area's capacity to provide the benefits listed is not reduced by activities of any development such as the unlawful activity now investigated. Many of these areas are best managed as natural areas, rather than being converted to other uses.



Figure 10. The bush cleared drainage-line and a *Crinum buphanoides* growing within the grass layer before and after the unlawful activity.

Buffer zones have been used in land-use planning to protect natural resources and limit the impact of one land-use on another. Such zones were not considered during the vegetation clearing that is now under investigation.

A recommendation that would have been forthcoming from the necessary EIA investigations prior to the implementation of any proposed development, would definitely have mitigated against impacting on the drainage-lines through the creation of buffer-zones along such water courses. Such decisions would have

been taken in terms of the Conservation of Agricultural Resources Act and the National Water Act.

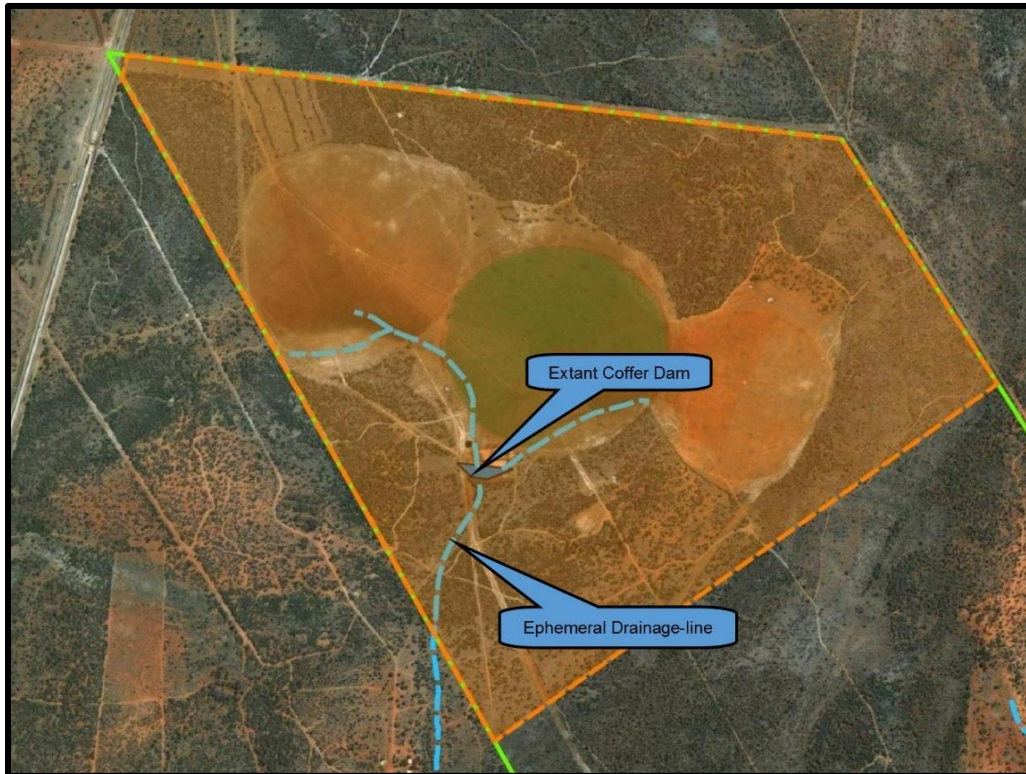


Figure 11. Location of the ephemeral drainage-lines and extant coffer dam: Scherp Arabie farm.

To preserve the functioning systems of the drainage-lines and to protect the aquatic and riparian habitats of the Elands River, buffer zones should have been maintained along the drainage-lines that feed into the Elands River system. Land-use practices along these drainage-line systems are of great importance in protecting vital aquatic and riparian terrestrial systems associated with the river habitat.

#### d) Alien Plants.

A number of undesirable alien plants were noted at the site of the proposed development during the initial site visit. In Tables 5 & 11, alien species observed are listed, an example of which is illustrated in Figure 12. Three cactus species, listed as Category I weeds under CARA, are of concern both environmentally and legally. Two of the three species were noted as having bio-control agents present but most plants have been removed by the unlawful activity. This action may be construed as being contributory to the spread of these cactus-types as they easily grow from cladode pieces and therefore, a cause for concern.

According to Mucina & Rutherford (2006), in the SVcb12 vegetation type, several alien plants are widely scattered but often at low densities. Such species include *Cereus jamacaru*, *Eucalyptus* species, *Lantana camara*, *Melia azedarach*, *Opuntia ficus-indica* and *Sesbania punicea*.



Figure 12. A large *Cereus jamacaru* 'preserved' during the bush clearing operations.

To deal with the cactus-types occurring on the property consideration has to be given to applying biological control methods on each of the species present. In Table 5, a list of the cactus-types noted is provided together with the introduced biological control agent (BCA) for that specific species of cactus. The presence of extant BCA's as recorded during surveys has been included in the table.

The control and, finally, eradication of the cactus-types that were present on the farm may have been a contribution to the biodiversity offset process, but the unlawful activity has complicated the process of biological control of the alien plant species.

### Table 5. Alien plants noted on Scherp Arabie farm

and their bio-control agents.			
Species	Common name	Bio-control Agent	BCA Present
<i>Cereus jamacaru</i>	Queen-of-the-Night	<i>Hypogeococcus pungens</i>	No
<i>Opuntia ficus-indica</i>	Sweet Cactus	<i>Dactylopius austrinus</i>	No
<i>Opuntia stricta</i>	Sour Prickly Pear	<i>Dactylopius opuntiae</i>	Yes
		<i>Cactoblastis cactorum</i>	Yes

Furthermore, the activities of agricultural production are contributory to the establishment and spread of alien species through habitat modification and irrigation. Efforts will be required to constantly address this environmental problem in the area of concern. In the citrus industry, certain tree species are used for windbreaks. The most common species unitized in the region is *Casuarina cunninghamiana* that is a listed Category 2 invasive species (Cabeton Training & Development, *et al.* 20??). As such, this species may only be planted for specific commercial purposes within a demarcated area. It may, furthermore, not be planted within 30 m of the 50-year flood-line and may not be allowed to spread outside of a demarcated area. The close proximity of the Elands River needs consideration if this species is to be used in the orchards if the unlawful activity is authorized to continue.

## 8.2 FAUNA.

The farm was mostly used for game farming under the previous ownership. The small area of extant centre-pivot agriculture was mostly to provide fodder for the game on the farm and on an adjoining property. Further to the north lies the Schuinsdraai Nature Reserve that in all probability, acts as a reservoir for many wildlife species. The wetland systems of the Flag Boshielo Dam and the Elands River, forming part of the Olifants River wildlife corridor, are also considered contributory to this process. As such, a number of organisms may potentially have occurred at the site or may have historically inhabited the area prior to the unlawful activity. The erection of game security fencing surrounding most game farms and the SNR, would have curtailed the movement of larger wildlife species in the area. Many of the smaller organisms that are sedentary or have small home ranges may potentially still have inhabited the area prior and subsequent to the bush-clearing activity. Of significant importance were the fossorial species whose presence is difficult to determine and may only have been evident during the soil disturbance as a result of the landscaping activities.

The unlawful activity also generated large quantities of unwanted plant material that was piled before being set alight. This action may have led to the demise of many small mammal- and reptile species still seeking refuge in cavities present in the uprooted trees. The landscaping of the orchards prior to the planting of citrus trees



would have impacted on fossorial- and burrowing species or other organisms aestivating in the soil. Without attendance by an appointed ECO as required by legislation, many specimens of a variety of species may have been lost in the process.

Climatic conditions may also contribute to the presence of organisms in a certain area. Drought conditions, for example, may influence the presence (or lack thereof) of certain species. In periods of higher rainfall, as was the case during the previous season, species of amphibian may be more prevalent especially within the drainage-line zone and in natural pans that may have been present in certain areas of the landscape.

The structure of the vegetation according to the adjacent natural areas would have been conducive to bird nesting activities or presence of suitable roosting opportunities. Larger trees that would provide such opportunities were well represented in the natural areas, both the rocky outcrop area and the suspected previously cultivated southerly area. Many small mammal species and reptiles would also have used appropriated cavities in trees. This aspect should, however, also be viewed in the context that the habitat type in question at the investigation site, though mostly modified by agriculture, is well represented in the local area. Loss of a large numbers of trees, possibly some containing cavities, would even further limit the opportunities available to cavity-breeding birds and small mammals.

<b>Table 6. Species Richness* for 2429CD ¼°-square.</b>		
<b>Group</b>	<b>Species Number</b>	<b>Conservation Status</b>
Butterflies	41	All species 'Least Concern'.
Dragonflies	31	All species 'Least Concern'.
Dung Beetles	9	Not applicable.
Frogs	14	All species 'Least Concern'.
Lacewings	2	Not applicable.
Mammals	40	<b>1 Endangered:</b> Roan Antelope. <b>2 Near Threatened:</b> Serval & Brown Hyena. <b>1 Vulnerable:</b> Leopard.
Reptiles	42	<b>1 Near Threatened:</b> Fitzsimmons' Flat Lizard <b>1 Vulnerable:</b> Nile Crocodile.
Scorpions	1	No Red List data available.
Spiders	1	No Red List data available.

\*As downloaded from ADU Virtual Museum on 26/04/2022.

The Animal Demographic Unit's Virtual Museum was sourced to determine the status of a variety of organism groups for the 2429CD ¼°-square. Some groups are poorly represented as the databases have received limited submissions and, in some cases,

no data at all. In Table 6 data for each group is depicted giving the number of species and conservation status of the species listed. It is only with the mammal group that threatened species are listed.

The initial visit was focussed on orientation and vegetation and, therefore, surveys of fauna was limited to observations while busy with the other components. Any signs noted of faunal organisms that were present or frequented the area were however recorded. Following the continued unlawful activity, the presence of faunal species would have been severely compromised. Historic data had to be sourced from available applicable documentation and consultation with parties present on the property. Each organism group considered to have been of importance is briefly discussed:

(1) Mammals.

In Table 7 the mammal species historically occurring on the SNR are listed (LEDET, 2013). Attempts to get data on species historically occurring on the property of investigation were unsuccessful as requests to the previous landowner were not heeded. The foot surveys conducted on the site of investigation during the first visit did not produce any significant results in terms of mammal species and, as a result of the unlawful activity, was significantly compromised during the second visit. Any signs of mammal species, including scat, tracks, feeding damage and burrows, if noted, were recorded. The only mammal species presence recorded during visits were Porcupine, *Hystrix africae-australis* (feeding activity) and a Grey Mongoose, *Herpestes pulverulentus* (observed).

<b>Common Name</b>	<b>Species</b>	<b>Common Name</b>	<b>Species</b>
Baboon, Chacma	<i>Papio ursinus</i>	Jackal, Back-backed	<i>Canis mesomelas</i>
Bushbuck	<i>Tragelaphus scriptus</i>	Kudu	<i>Tragelaphus strepsiceros</i>
Bushpig	<i>Potamochoerus porcus</i>	Reedbuck, Mountain	<i>Redunca fulvorufula</i>
Duiker, Common	<i>Sylvicapra grimmia</i>	Roan Antelope	<i>Hippotragus equinus</i>
Eland	<i>Tragelaphus oryx</i>	Steenbok	<i>Raphicerus campestris</i>
Giraffe	<i>Giraffa camelopardalis</i>	Waterbuck	<i>Kobus ellipsiprymnus</i>
Hartebeest, Red	<i>Alcelaphus buselaphus</i>	Warthog	<i>Phacochoerus aethiopicus</i>
Hippo	<i>Hippopotamus amphibius</i>	Wildebeest, Blue	<i>Connochaetus taurinus</i>
Hyena, Brown	<i>Parahyaena brunnea</i>	Zebra, Burchell's	<i>Equus burchelli</i>
Impala	<i>Aepyceros melampus</i>		

In a report on the Schuinsdraai Nature Reserve (LEDET, 2013), 22 mammal species (Table 7) are given as occurring on the reserve. The following are considered to be of note: brown hyena, steenbok and bushbuck.

Some of the listed species at SNR have some form of protective status e.g., Brown Hyena (Vulnerable), but their presence at this time on the unlawfully developed farm would not be expected. Other protected species that are present on the adjoining game farms may have in the past visited the Scherp Arabie farm.

The only rodent species on the farm confirmed as present during surveys was the Porcupine (*Hystrix africae-australis*). Feeding activity and quills indicated the presence of porcupine. Other rodents will dig burrows or occupy cavities in trees, tree stumps or termitaria. The unlawful activity is postulated as having a significant impact on the rodent population more particularly those occupying burrows in the areas that have been landscaped in preparation for the establishment of the orchards. Rodent burrows were noted during visits, however, no species could be determined. The bush clearing activities would, therefore, have impacted on this group of organisms through disturbance of the upper soil surface and removal of refuges e.g., tree stumps and possibly termitaria.

The boundary fences surrounding the unlawfully developed area is a standard game fence. As the farm was previously managed as a game farm, the purpose of the fence was intended to keep larger wildlife species in but now would serve to protect the orchards presently under development, from damage by any wildlife species.

## (2) Avifauna.

Bird species that were seen during site visits were of insignificant numbers but are listed in Table 12 (Addendum I). The presence of birds is not considered to be hugely significant but nesting activity needs to be considered. During the visits to the site, no confirmed nesting activity was recorded, however, it should be considered that the second visit was outside of breeding season and most of the vegetation had been removed. Signs of past nesting activity were looked for throughout visits mainly in terms of abandoned nests. The presence of recently fledged chicks is also considered of importance, but none were recorded during either visit.

As a large conservation area lies to the north of the Scherp Arabie farm and, to the north-east the Flag Boshielo Dam that is on the Olifants River, it would be expected that a number of aquatic and terrestrial birds, including raptor species, would also be present in surrounding habitats. Following the unlawful bush clearing and landscaping of the terrain for the citrus orchards, it is not expected that many bird species would remain on the developed site. The uprooting of larger trees during

the unlawful activity may have impacted on a number of potential nesting opportunities away from the river, dam and conservation area, especially in terms of ground- and cavity nesting birds, and smaller raptor species.

From the species list for the SABAP2 survey (pentad 2450\_2915) for the Scherp Arabie farm area (Table 12, Addendum I), no protected species have been recorded. However, with the nearby conservation area and dam such species may occasionally have traversed the site under investigation. No nesting sites for any of these species were recorded during surveys on the farm.

Research conducted on 2700 ha Selati Game Reserve (Pugh & Lee, 2018) in the Lowveld indicated high numbers of potential nesting trees for different nesting guilds. For example, 1105 trees were found suitable for small cavity nesters, 747 for both large cavity nesters and stick platform nesters. This provides an indication of the negative impact on the nesting potential of a number of avifauna species that may have resulted from the bush clearing activity on Scherp Arabie, even though on a much smaller scale.

In a report on the Schuinsdraai Nature Reserve (LEDET, 2013), 14 bird species are in the Red List of Threatened Species for that area. The following have been listed: **Endangered** – Saddle-bill Stork; **Near Threatened** – Half-collared Kingfisher, Lanner Falcon, Lesser Flamingo, Red-billed Oxpecker, Secretary Bird, Black-winged Pratincole\* & Pallid Harrier\*; **Vulnerable** – African Finfoot, Cape Griffon, Martial Eagle, Tawny Eagle, White-backed Vulture & Lesser Kestrel\*.

\* = Potential Palearctic breeding migrant.

### (3) Reptiles and Amphibians.

Evidence of reptile or amphibian activity at the site under investigation was limited with only some Lacertilia (lizards) noted. According to the ADU reptile species list, only 42 species are listed. Of these species, the two tortoises listed are hinged tortoise and the Serrated Tent Tortoise (*Psammobates oculifer*). Hinged tortoises are known to hibernate in burrows during dry spells and in winter. Of note is that such burrows can be as long as 1,3 m making this species susceptible during vegetation clearing activities, as was the case of the unlawful activity. In the Limpopo Province, except for the 2 monitor lizard species, all lizards, skinks, geckos and tortoises are listed under Schedule 3 of LEMA as Protected Species.

In a report on the Schuinsdraai Nature Reserve (LEDET, 2013), 16 reptile species are given as occurring in the area. The following are recorded as being of note: Nile crocodile, snouted cobra, shovel-snouted whip snake, stripe bellied sand

snake, Southern vine snake, Jones's girdle lizard, Bushveld lizard, common rough-scaled lizard, Kalahari tent tortoise and rock monitor lizard.

Burning of the piles of unwanted vegetation debris is considered to have had a significant impact on the reptile species present at the cleared site. The destruction of small rocky outcrops considered suitable habitat for certain reptiles would have impacted any populations occupying those habitats.

According to studies by Heermans (2010), due to their sedentary nature and limited dispersal ability, reptiles are at risk with fire. Under natural conditions adaptive behaviour towards fire includes seeking refuge in burrows or under surfaces while larger and more mobile species would flee from a fire. Dense vegetation build-up, equitable to a pile of vegetation debris, would ultimately result in high intensity 'incineration' fires that threaten reptile populations with high mortality and possible local extinction. Taking the above into consideration, it is postulated that the activities of heavy, landscaping machinery combined with the burning of plant material, had an impact on the herpetofauna in the unlawfully cleared area.

According to Du Preez & Carruthers (2009) 23 frog species could potentially occur in the region. From the records of the ADU Virtual Museum, 13 frog species have been submitted for the applicable ¼°-square. The lack of natural water bodies on the sites of investigation restricts opportunities for frog observations combined with the fact that most are active at night, more specifically, following a rain event. Of concern would be species of the *Breviceps* group that aestivate in the soils for long periods, only emerging when it rains. Furthermore, it is postulated that other frog species in the area of the unlawful activity would be in a state of aestivation and impacted as the continued activities of bush-clearing and landscaping, were mostly conducted during the early dry season. The close proximity of the perennial Elands River serves as a reservoir for amphibians.

In a report on the Schuinsdraai Nature Reserve (LEDET, 2013), 18 amphibian species are given as occurring in the area. The following are recorded as being of note: bushveld rain frog, Northern pygmy toad, painted reed frog, bubbling cassina, rubber banded frog, plain grass frog and tremolo sand frog.

It is postulated that in higher rainfall periods frogs would move from the river, along drainage-lines, into adjacent areas thereby possibly increasing the species complement and numbers of frogs in the affected area. No frog species occurring in the area is Red Data listed (Measey, 2011). No amphibian species occurring in the area is protected under LEMA.

#### (4) Invertebrates.

This group of organisms is very diverse and extensive surveys would be required at any site to obtain reliable data on the presence of any Red Data species. Therefore, desktop studies are conducted to red flag any species that may potentially occur in an area according to relevant databases. The fact that the site of concern has already been cleared of natural vegetation and is considered an anthropogenic environment due to the impacts, would present a different assembly of organisms (if any at all due to the continuing land modification) than what would have been expected under natural conditions.

During surveys to record signs of any organisms that may inhabit the area of concern, invertebrate activity or presence would also have been noted. Where either scorpion or baboon spider groups are concerned, indications of the presence of any species e.g., in the form of burrows, would be evident. The invertebrate situation in the original state of the natural area would have changed immediately following a good rainfall event as their activity is stimulated by significant rainfall. The unlawful activity has removed all vegetation thus destroying food plants, prey and larval host plants that support a variety of invertebrates. The radical landscaping activities associated with the establishment of an orchard would have destroyed all invertebrate activity within the soil as fossorial-living and burrowing species would have been compromised. Other species that aestivate in the soil or under rocks e.g., pupated Lepidoptera, are unearthed and die as a result.

Invertebrate activity is mostly driven by rainfall and higher temperatures. Prior seasons of drought or below average rainfall would have had a probable effect on invertebrate numbers and diversity. Even with the occurrence of an above-average rainfall season, there would be limited influence on numbers and diversity as generally there is a lag in the response to improved environmental conditions in most invertebrate populations.

Other than a few Orthoptera species and a number of Odonata species present at the extant coffer dam, together with the listed butterfly adults, not many Insecta species were recorded during site visits. Probably the most pertinent indicator of possible Lepidoptera activity is the presence of a number of larval host plant species (Table 12, Addendum I). The majority of the plant species (46 species) recorded in surveys are recognised larval host plants for Lepidoptera. Most, especially the herbaceous species, can safely be assumed to host larvae from the moth group of species.



**Figure 13. Examples of Lepidoptera presence at Scherp Arabie farm during the first visit:** (clockwise): African Veined White, Little Acraea, African Clouded Yellow, (with Mountain Sandman and Velvet-spotted Babul Blue), Red Tip, Topaz Babul Blue and Zebra White.

The presence of Lepidoptera species (Figure 13) is considered an indication of terrestrial health and during the first visit to the farm, butterfly activity was fairly prevalent. Even though only 23 species were recorded Table 12 (Addendum I), many more species could be expected to occur in the area particularly if the moth component is included. The number is higher than the 41 records submitted to LepiMap for the 2429CD  $\frac{1}{4}^{\circ}$ -square that includes the Scherp Arabie farm.

The importance of larval host plants for these organisms is often ignored and only where a Lepidoptera species is reliant on a host plant species of limited distribution, are steps taken for protection. Even though the habitats that may have been present at the site of investigation are well represented regionally, consideration should be

given to what was available and what invertebrates are active under the anthropogenic environment presently being developed.



Figure 14. Other insect group examples recorded at the Scherp Arabie site.

Lepidoptera larval host plants, both trees and herbaceous species, at the bush-cleared site, are now mostly absent. During the operational phase, species within the herbaceous layer will re-establish to a certain degree between the orchard rows once again providing potential larval host plants. The remaining islands of 'natural' vegetation and undisturbed areas on adjoining properties, will provide opportunities for Lepidoptera to continue their life cycles until the herbaceous layer, in particular, has regenerated. As the natural zones surveyed during the first visit represented a fully structured vegetation component, larval host plant species included tree and shrub species such as *Peltophorum africanum*, *Boscia albitrunca*, *Combretum apiculatum*, *Commiphora pyracanthoides*, *Grewia bicolor*, *Ehretia rigida*, *Gymnosporia buxifolia*, *Gardenia volkensii* and *Euclea natalensis*, amongst a good number of herbaceous plant species. Direct mitigating preservation measures are not considered pertinent in this investigation as the developmental impacts have already occurred.

Even though no baboon spiders or scorpions were seen during surveys, their presence was probable and would have been indicated by burrows for some of the species. Data was recorded in the remaining natural area on some of the larger species of web-spinning spiders (Figure 15) that are fairly common in the region. It may be assumed that a number of nocturnal species e.g., *Caerostris* spp. (Bark Spiders), were present prior to bush clearing operations that removed all suitable



habitat. Baboon spiders are known to inhabit areas of short grass increasing the possibility of later colonisation of the cleared zones.



Figure 15. Two web-spinning spider species recorded with at the Scherp Arabie site; (l) Black-lobed Garden Orb-web Spider & (r) Banded-legged Nephila.

Under normal EIA investigations, the probable and expected impacts to the invertebrate groups that are listed under some form of legislated protection, or are of general interest as environmental health indicators, are considered. However, due to the unlawful activity having already completely modified the environment at the area of interest, data from a more detailed survey has been compromised. In Table 8, the probable impact considering the present status of these invertebrate groups, is determined through the historic data available, relevant databases on their potential presence in the area of the unlawful activity, observations during surveys and by considering the availability (especially restricted) of the necessary habitat for their survival. The lifestyle of the specific group or individuals within such a group has been considered in evaluating the ability of the organism to have survived or fled from the disturbances associated with the unlawful bush-clearing and landscaping activities. Ratings are as follows:

- No impact = 0
- Limited impact = 1
- Moderate impact = 2

- High impact = 3
- Critical impact = 4

<b>Table 8. Impact Rating for Invertebrate Groups of Concern.</b>			
<b>Invertebrate Group</b>	<b>Construction Phase</b>	<b>Operational Phase</b>	<b>Comment</b>
<b>Chelicerates:</b>			
Araneae	4	0	Refuges of both arboreal and subterranean species (burrows) destroyed by bush-clearing and landscaping.
Scorpiones	3	1	Burrows of subterranean species destroyed by landscaping. Crevice dwelling species affected by vegetation removal, outcrop destruction and burning.
Solipugae	3	3	Refuges impacted by activities and food supply by PPP's. Some species diurnal while most nocturnal.
<b>Insects:</b>			
Lepidoptera	3	3	Impact related to destruction of larval host plants, disturbance of pupae and effect of plant protection products.
Odonata	2	2	Some Odonata are not directly associated with water in the adult phase and thus feed in other habitats. Pollution of water bodies may affect larvae.
Isoptera	2	3	Termitaria destroyed by heavy machinery in land preparation. Colonies that survive not allowed to rebuild structures.
Neuroptera	3	2	Breed in soil and rotting logs that will be disturbed by bush clearing and land preparation for orchards.
Coleoptera	4	2	Larvae and pupas of groups such as Buprestidae, Curculionidae, Carabaeinae, Scarabaeidae and Cicindellinae will be destroyed if debris burnt and with landscaping. Food supply for ground-dwellers affected by PPP's.
Hymenoptera (Formicidae)	2	3	Colonies whether in tree stumps or subterranean will be destroyed. Use of PPP's will impact on Formicidae species associated with crop pests e.g., aphids

### 8.3 WETLANDS.

The site of investigation on the Scherp Arabie farm does not encroach into the wetland zone of the nearby Elands River and is approximately 1300 m from the river at the nearest point. *(It should be mentioned that the new unlawfully constructed coffer dam,*

that did not form part of this investigation, is only 130 m from the Elands River). The same cannot be said for the drainage-line that drains from the area of the unlawful development (Figure 11). The extant centre-pivot irrigated lands are located at the source of this drainage-line, namely, the high-lying (882 m) area of the north-eastern part of the farm. With the prevention of degradation of the water resource, factors such as soil erosion and pollution through the use of pesticides and fertilizers would need to be addressed. Removing vegetation for the purpose of agriculture increases the susceptibility of soil to erosion if not adequately addressed from the onset. The excessive use of poisons may lead to high residue build-up in the soil that may eventually percolate into the aquatic system following a significant rain event or a high rainfall season. Indiscriminate use of fertilizers may result in the leaching of these chemicals into the aquatic system causing eutrophication of the system promoting excessive vegetation growth and establishment of algal blooms along the river.

In terms of the present unlawful bush-clearing activity, the above-mentioned ephemeral drainage-line has been compromised. The drainage-line feeding into the Elands River to the south has been impacted on as no buffer areas were considered.

Under the Conservation of Agricultural Resources Act, Swanepoel & Barnard (2007) sum up the relevant regulations. Regulation 7 (3) of the Act specifically provides for the “utilization and protection of vleis, marshes, water sponges and **watercourses**”. It further reads: “except on authority of written permission by the Executive Officer, no land-user shall:-

- a) drain or cultivate any vlei, marsh or water sponge or portion thereof on his farm unit,
- b) or cultivate any land on his farm unit within the flood area of a **watercourse**, or within 10 m horizontally outside the flood area of a watercourse”.

Regulation 8 (5) states that: “no land user shall remove or alter any obstruction in the natural flow pattern of run-off water on his farm unit, if such removal or alteration will result in excessive soil loss due to erosion...”.

Even though the pertinent drainage habitat affected by the unlawful bush-clearing activity is the singular ephemeral drainage-line, it is also considered a watercourse. The drainage-line may be considered less sensitive to impacts from the investigated activities, however, it finally drains into the Elands River where a cumulative impact may occur. It should be noted that the drainage-line has now been entirely modified in breach of the stipulations of CARA as discussed above.

In Macfarlane *et al* (2014), the importance of buffer zones to protect any form of water resource is emphasized. Buffer areas associated with water resources have been

shown to perform a wide range of functions, and on this basis, have been proposed as a standard measure to protect water resources and associated biodiversity. These functions include:

- Maintaining basic aquatic processes;
- Reducing impacts on water resources from upstream activities and **adjoining land uses** (*i.e., the citrus orchards*);
- Providing habitat for aquatic and **semi-aquatic species** (*i.e., aestivating amphibians and use of drainage-line pools in breeding season*);
- Providing habitat for **terrestrial species** (*i.e., variety of smaller wildlife species in the Scherp Arabie farm area*); and
- Any ancillary societal benefits.

When the determination of appropriate buffer zones would be considered, it is recommended to take into consideration the following:

- The aquatic impact buffer zone;
- Potential core habitats;
- Potential **ecological corridors**; and
- Relevant additional mitigating measures.

In terms of biodiversity conservation, Macfarlane *et al* (2014) further state that many aquatic and semi-aquatic species depend upon water resources for only portions of their life cycles and they require terrestrial habitats adjacent to the water resources to meet all their life needs. Without access to appropriate terrestrial habitat and the opportunity to move safely between habitats across a landscape, it will not be possible to maintain viable populations of many species. Therefore, core habitats and corridors need to be developed (*part of the planning phase of a development*) for the protection of species or habitats of conservation concern.

In the GSDMBP, the lower reaches of the Elands River are seen as part of the Olifants River wildlife corridor and the importance is described in terms of enlarging habitats, dispersal of young and re-use of empty “habitats”.

The National Freshwater Ecosystem Priority Areas (NFEPAs) (Nel *et al.*, 2011) identifies rivers, wetlands and estuaries in South Africa that are most important for sustaining the integrity and continued functioning of our freshwater ecosystems. The following is, furthermore, relevant for the Sekhukhune District:

In the State of Rivers report (2001), the Scherp Arabie farm falls within the Ecoregion 3.04. River habitats in this region are in a poor to unacceptable state. The exception is upstream of the Rust de Winter Dam where the Elands River is in a fair condition. In-stream biota in the Olifants River, of which the Elands River is a tributary, is fair to

poor, with the riparian vegetation being in a poor state. For the Elands River the riparian vegetation is fair, but in-stream biota varies from fair to unacceptable.

If the site under investigation bordered on the riparian zone of the Elands River, it is probable that a 50 m buffer area, extending horizontally from the centre of the river flow area, would have been recommended. This method is termed a 'fixed width approach' and typically applies a standard buffer width to a particular water resource type.

Macfarlane *et al* (2014) further suggest that in terms of the compliance requirements of an EMP, responsibilities of the appointed Environmental Control Officer would have had to include ensuring that the following aspects are being effectively implemented:

- The setback area (maximum widths required for water resource and/or biodiversity protection) has been demarcated clearly;
- Disturbances are being managed effectively;
- Possible rehabilitation is being successfully implemented; and
- Required management measures are being effectively implemented.

The above compliance requirements have obviously been neglected by unlawfully proceeding (and continuing) without the necessary approval of the Decision-making Authority.

## **9. UNLAWFUL ACTIVITY IMPACTS.**

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The unlawful activity has had a major impact on the various environmental components on the Scherp Arabie farm. From the initial observations during the first visit to the property, it was noted that certain areas were fairly pristine in terms of natural vegetation while other areas were suspected of having recovered following previous agricultural activity. The third area to be considered is the drainage-line that originates on the property and mouths into the Elands River that forms the southern boundary of the farm. A fourth area to be classified is the extant centre-pivot lands that had been farmed by the previous landowner to produce fodder for the game farming business.

### a). Ecosystems.

The ephemeral drainage-line is considered to be the largest ecosystem on the property to have been impacted by the unlawful activities (see Point d). All signs

of this system have been eradicated and permanently modified (Figure 10) through incorporation into the orchard layout. All vegetation has been removed and, as was noted during the site visit, the alignment of the orchards rows prior to landscaping, continued.

The micro-ecosystems affected by the unlawful activity also require mention. These include small plant communities of interest and refuges for wildlife.



Figure 16. Typical *Aloe marlothii* growth form on the rocky outcrops of Scherp Arabie.

Small populations of specific plant species were noted during the initial site visit and in the northernmost remaining natural area. Included were populations of *Aloe* species, *Xerophyta retinervis*, *Euphorbia* species and bulbous species. The *Aloe marlothii*, though not protected, was found to have small forests of specimens taller than 4 m (Figure 16). The *Aloe cryptopoda*, protected under LEMA, also had small populations scattered throughout the rocky outcrop area, most of which has now been modified (Figure 17). As indicated in Figure 9, the *X. retinervis* occurred in small groups within the rocky outcrops. Of the bulbous and 'rootstock' species noted in the outcrop area were the protected species *Boophone disticha*,

*Sansevieria aethiopica* and *Raphionacme* sp. Amongst the rock extrusions specimens of *Euphorbia clavigera* were recorded.

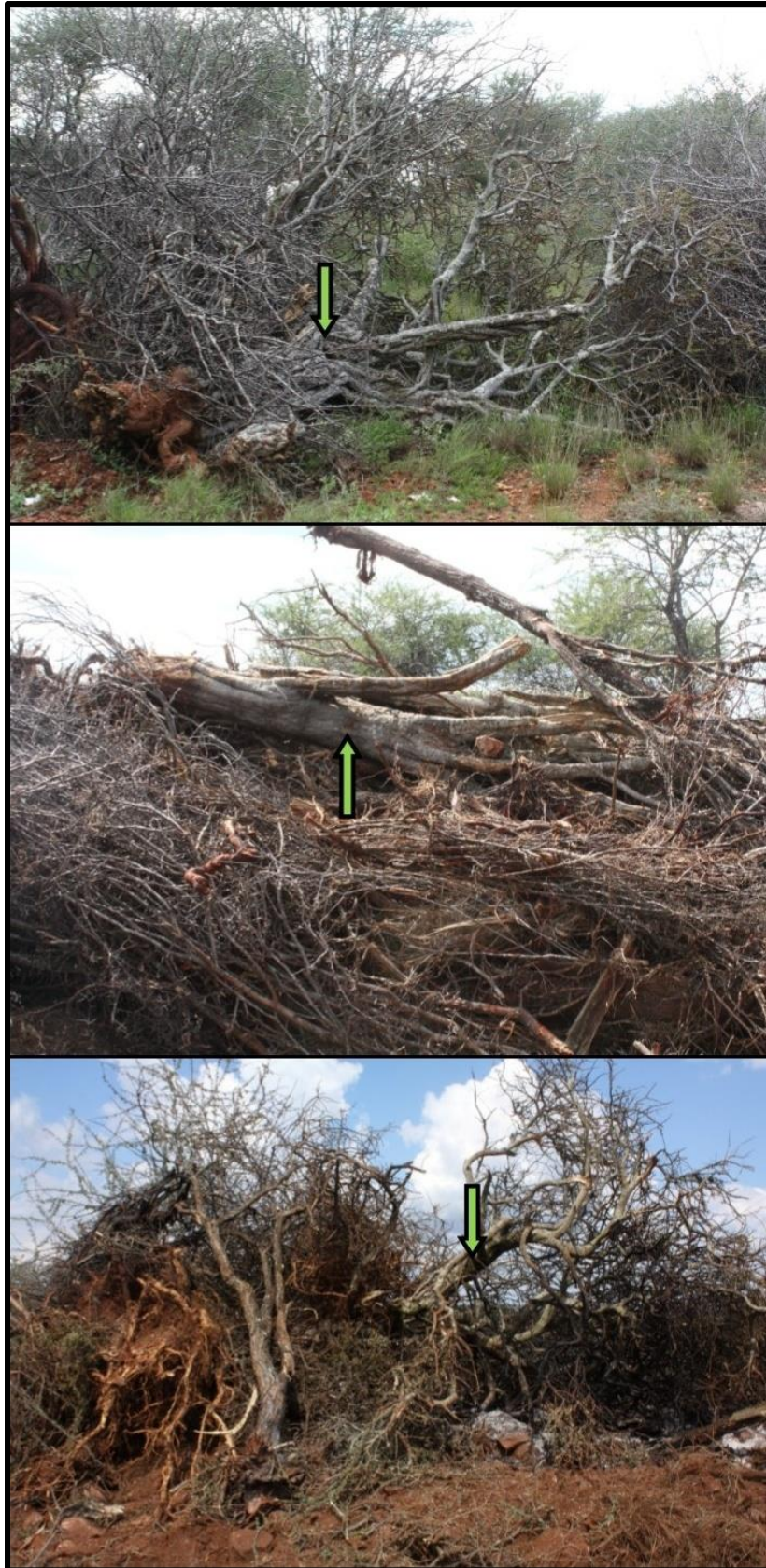


Figure 17. Cleared and modified area once part of the rocky outcrops of the northerly 'natural' area: Scherp Arabie.

The rocky outcrops so prominent in the 'natural' area served as refuges for wildlife, more specifically reptile species. A number of such habitats existed but have been destroyed with the rock debris now dumped on the fringes of the remaining 'natural' areas (Figure 21).

b). Protected Tree Species.

Only a few protected tree species were recorded during surveys, however, there were large populations of two species present. Fairly prevalent on the pristine natural areas of the farm was *Spirostachys africana* that has protection status under LEMA. The second species of note was *Boscia albitrunca* that was widely dispersed on the farm and is protected under the NFA. *S. africana* was found to occur in small 'forests' and *B. albitrunca*, where present, had specimens of significant stature. Specimens of both species were found to be amongst the remaining vegetation debris that had not been burnt (Figures 18 & 19).



**Figure 18. Examples of large *Boscia albitrunca* removed during the unlawful bush clearing activities.**



A third species, *Sclerocarya birrea*, also protected under the NFA, was also found to have been removed without the necessary authority and permits.

The removal of the protected tree species on its own is considered of importance but, the fact that the debris has unceremoniously been pushed into the small areas of remaining natural vegetation, is furthermore of great concern. In effect, the unlawful bush clearing has, therefore, had a double impact on the natural vegetation on the farm by destroying individual specimens and impacting the habitat of the remaining specimens.



**Figure 19. A large *Sclerocarya birrea* lying amongst the debris and, below, a number of freshly removed *Spirostachys africana* specimens.**

c). Protected Plants.

During both visits to the farm, some species of protected plants (other than trees) were recorded and these have also been impacted by the unlawful activity. For example, specimens of *Boophane disticha* were present in the natural areas and colonies of *Aloe cryptopoda* were to be found, especially in the northern rocky outcrops. Both these species are protected under LEMA. As indicated in Figure 20, evidence of impact on these protected plant species as a result of the unlawful bush-clearing activities was found.



**Figure 20.** Bush-clearing debris dumped over a colony of *Aloe cryptopoda* and the remains of a *Boophane disticha* after burning together with other bush-clearing debris.

d). Dumping of Rubble.

Resulting from the unlawful activity, large amounts of rubble from the bush-clearing operations and land preparation in terms of orchard landscaping, were noted throughout the property. Much of the vegetation debris had already been burnt thereby destroying the remains of many protected plant specimens that may have been removed during the process of bush-clearing.

Of the small patches of remaining natural vegetation, many have been further impacted by the dumping of heaps of vegetation debris by bulldozers and trucks, into these areas further impacting on the remaining 'natural' vegetation. Unearthed rocks, from more specifically the outcrops, now have been piled on the fringes of the 'natural' areas. These remaining 'natural' areas still support a number of

legislatively protected plant species and are considered small remaining refuges for wildlife still present on the farm.



**Figure 21. Rubble affecting remaining natural areas on the Scherp Arabie farm:  
(top) rock material from landscaping of adjacent rocky outcrop zone,  
(bottom) old tyres piled at a location that has been cleared, shoved into the remaining natural area.**



**Figure 22. Vegetation debris (including protected plant species) piled into the remaining 'natural' areas.**

e). Ephemeral Drainage-line.

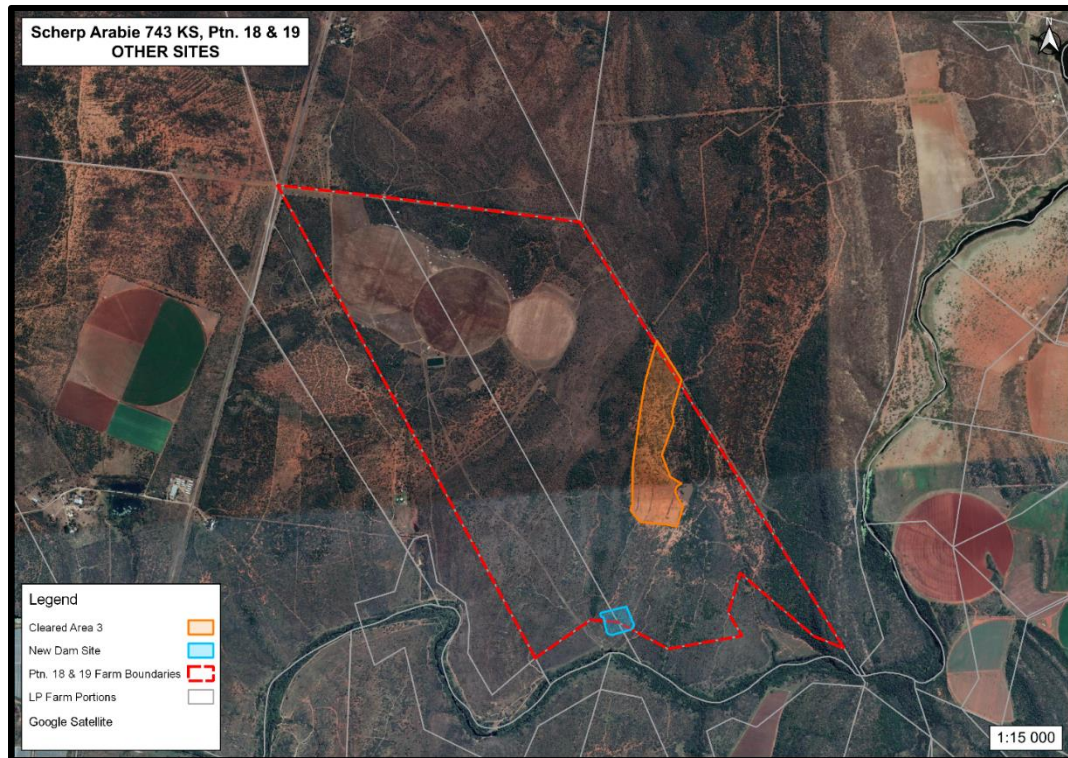
An ephemeral drainage-line (Figure 11) has its source on the farm. The extant centre-pivots had already impacted on this system. The remainder of the system has now been totally destroyed by the unlawful activity. All vegetation has been removed from the course of the drainage-line and surveyors were in the process of determination of the alignment of the orchards rows. The rows are to be placed at right-angles to the direction of the ephemeral drainage-line.

The postulated impact will have been on any breeding birds, more specifically cavity-nesters, as no specific surveys were done prior to the bush-clearing process. Small mammals may have been impacted including rodents and any other fossorial-living species e.g., moles. Reptiles and amphibians, either terrestrial or fossorial-living, would have been affected. Many amphibians go into aestivation in dry periods and would have been killed in the process.

Over and above the trees and shrubs that have been cleared, bulbous plant species have been unearthed and destroyed as a result.

e). Irrigation Dam Site.

During the second visit to access the impact of the unlawful activities, management on the farm failed to inform the consultants of the construction of a coffer dam in support of the proposed development. The site is located in the southern section of the farm that was not part of the original EIA process. This unlawful activity has impacted on an area of 2 ha as indicated in Figure 23.



**Figure 23. Location of the other unlawfully developed sites that were not indicated and, therefore, not investigated on the Scherp Arabie farm.**

The coffer dam has been located in an area close to the Elands River, a sensitive ecosystem that will be affected by the construction activities and probable future issues such as erosion.

**Footnote:** It has also been further indicated that another area of the farm (Figure 23) has been cleared for citrus orchard development. This area was not surveyed as part of the initial project description and the consultants were not informed of this development during the Section 24G investigation.

## 10. HUMAN-WILDLIFE CONFLICT.

Conflicts between humans and wildlife have probably occurred since the dawn of humanity and, as stated by Hill (1997), much evidence points to this phenomenon having occurred since recorded history. They occur on all continents and in developed as well as developing countries (Lamarque *et al.*, 2009). Among the main aggressors in the African context are crocodiles, hippos, lions, buffalo and elephants. It is not only the large animals that pose a threat as large aggregations of birds, rodents and insects can devastate crops in a short period (Lamarque *et al.*, 2009). Such conflict occurs when the resource requirements of humans and wildlife overlap leading to competition

for food and habitat resulting in tensions between people and wildlife (Seoraj-Pillai, 2016).

In South Africa, several abiotic factors also challenge farming efforts, namely decreasing soil fertility, low rainfall, increasing soil salinity and greenhouse gas emissions from livestock (Seoraj-Pillai & Pillay, 2016). Drought and famine have periodically had devastating effects in southern Africa and, during those periods of environmental stress, incidences of HWC also intensified. Environmental and climatic factors, therefore, increase opportunities for HWC, which manifest into crop and livestock damage.

The spread of agriculture, growth of the human population and increased urbanization in the developed world has resulted in the eradication of potentially dangerous mega-fauna (Muruthi, 2005). The human population is rapidly increasing and in Africa it has tripled in the 4 decades from 1960 leading to more settled agriculture spreading to marginal rangelands. DeGeorges (2009) states that sub-Saharan Africa's population has increased 5.5 - 6.5 times, from 95.9 - 114 million in 1900 to 622 million in 2000 with projections of between 1.5 - 1.8 billion people by the year 2050, therefore, hastening the decline of both wildlife and critical habitat. Habitat loss to wildlife and the effects of climate change has led to increased competition for resources (Lamarque *et al.*, 2009). Gabosho *et al.* (2015) state the transformation of global landscapes from predominantly wild to predominantly anthropogenic over the last centuries has created competition between humans and wildlife for space and resources and has reached unprecedented levels. This is supported by Seoraj-Pillai & Pillay (2016) who state that the ever more human-dominated landscapes have intensified natural habitat degradation and fragmentation, and wildlife populations are now in regular competition with people for resources, thus eliciting human-wildlife conflict (HWC). Hill (1997) postulates that with increasing population pressure, and the growing need for more land to be put under cultivation, it is likely that the existing conflict between people and wild animals will continue to escalate.

Nearly all species of wild animals are capable of inflicting damage. Large potentially dangerous species, those that gather in large groups or those that are most wide-ranging are more likely to cause problems than smaller species with restricted ranges. Today conflict between people and wildlife ranks high amongst the main threats to conservation in Africa. According to Seoraj-Pillai & Pillay (2016), characteristics of HWC incidences are dependent on the type of resident wildlife in the region and the farming practices that are typical for that area.

The intrinsic characteristics of wildlife, such as food preferences, can influence human-wildlife conflict (Lamarque *et al.*, 2009). Some particularly palatable crops may

attract wildlife over long distances. Reports indicate that crops such as maize and cassava are sought after by elephants. In cocoa plantations small mammals e.g., squirrels, porcupines and civets, have been reported as problematic (Nchanji, 2002). The same study indicated that the most regular raiders of principal food crops are the small mammals, especially rodents and the civet. These species are more often complained about by local community farmers than the large mammals e.g., elephants and buffalo.

The South African situation is entirely different to most other African countries as there are limited expansion opportunities for wildlife areas. Most areas outside of the fenced larger protected areas are densely populated rural communities or developed agricultural land. It can thus be confidently postulated that the incidences of human-wildlife conflict, especially if there is a conservation area in close proximity, are to increase in the future, with or without agricultural development. Restricted habitat, prolonged drought and exponential population growth is a cocktail for increasing conflict, particularly where elephants are concerned, as they seek new ranges to escape intra-specific conflict for ever-decreasing resources.

Environmental factors contribute in a large way to increased conflict with baboons. Seasonal variation in food availability contributes to higher conflict during dry periods (*pers. obs.*).

The ability of primates to transgress the boundaries of protected areas causes high-scale conflict with humans (Seoraj-Pillai & Pillay, 2016). A wide diversity of primates is known to conflict with humans globally. The ability of primates to adapt to anthropogenic-dominated agricultural ecosystems brings them into conflict with farmers and studies have shown that baboons (*Papio* spp.) are exceptional examples that cause extensive damage to crops.

In summation of their studies, Cancelliere, *et al.* (2018) state that as anthropogenic pressures on primate habitat worsen, primate use of human-modified environments also becomes more common. Wild primate groups are forced to alter their behavioral strategies in the light of these new ecological pressures and increased reliance on human-modified landscapes, can change ranging patterns, demographic profiles and increase group size.

Wallace & Hill (2012) report that primates with extensive raiding history can habituate quickly to crop-protection techniques. Deterrents might require cycling or modification over time to be effective, and farmers may need to monitor raiding to plan responses and will benefit most from deterrent techniques that discourage raiding by multiple



individuals, reduce the size of raiding groups, or decrease the amount of time that primates spend on farms.

Most agricultural production generates a certain amount of spoilt product, and this is generally dumped. This action is a double-edged sword as it may keep baboon troops and vervet monkeys away from the crops by providing a source of food or it may contribute to encouraging the animals (including elephants) to raid into the croplands after acquiring a taste for the product being produced.

As an agricultural problem animal, porcupines are well known but, more specifically as a problem with citrus, little are published. Bragg & Child (2016) state that porcupines are primarily persecuted for digging holes beneath fences. This action in itself is not problematic but may provide access to other problematic species primarily in stock farming or intensive game breeding projects. They are known to damage root crops in agricultural areas or ring-barking trees in fruit-producing areas. No mention is made of damage to citrus trees specifically, but the potential does exist. Other reported damage by porcupines is gnawing the irrigation pipes to obtain water, however, it has been mitigated by placing containers below a drip-nozzle to make water available to the animals. Together with warthog, and probably bush pig, porcupines reportedly only tend to enter the orchards by digging under the fences during periods of drought seeking water from irrigation pipes (Maree, *pers. comm.*).

Hippos are listed as a 'protected wild animal' but baboons, vervet monkeys and porcupine have no protective status in the Limpopo Environmental Management Act of 2003 and therefore different processes are required to address any DCA incidents involving these species. Issuing of a DCA permit on application from a landowner is preceded by an investigation into the circumstances surrounding the incident. Of importance are the mitigation measures applied by the landowner to protect the crops from damage by wildlife.

Mitigation measures considered pertinent for the large animal species are mostly in place with the game fencing surrounding the Scherp Arabie farm. When the crop starts to ripen and colour, guards need to be appointed to patrol the boundary fences and chase any potential raiders e.g., the primate species. Where the impact on the surrounding environment by the activities associated with orchard development and operation, a totally different viewpoint has to be considered.

Normally one would consider human-wildlife conflict only flowing from one direction i.e., from wildlife to a specific human activity. However, in this section the opposite is investigated where the impact of the human activity flows to wildlife. Activities associated with the unlawfully developed citrus orchards, infrastructure developments

and operation, may impact on the immediate surrounding habitat through e.g. increased erosion and the impact of plant protection products usage. The loss of habitat to wildlife is briefly discussed above but the impact of 'poisons' requires mention. Many of the pesticides registered for use in South Africa have been banned in many other countries due to their toxic effects on humans and wildlife, putting the environment at risk.

In the protection of citrus product in the orchards, collateral damage may occur in surrounding natural areas, both terrestrial and aquatic. Such action invariably targets invertebrates that are considered agricultural 'pests' but residues may enter sensitive environments e.g., rivers and wetlands. In the past the only method applied was the use of poisons or as referred to in modern-day terms, 'Plant Protection Products' (PPP). Such products are applied from spray mechanisms and, therefore, have the potential to be wind-driven into adjoining natural areas.

The decline in species is probable with the use of pesticides, particularly amphibians and soil micro-organisms (Goldblatt *et al*, 2010). Pesticides are known to kill amphipods and other species that are important in the food chain for fish and higher animals such as birds of prey. The advent of genetically modified herbicide-resistant crops has exacerbated the problem through indiscriminate spraying of herbicides such as Roundup. This product that is extremely toxic to amphibians, is sprayed on millions of hectares of crops and weeds in the USA. A recent study revealed that applying the recommended manufacturer's dose of Roundup unexpectedly caused an up to 71% decline in tadpoles.

The implementation of good management practices in orchards is further, of major importance. A number of aspects have to be considered some of which may potentially attract animals and others that may impact on the environment.

With the establishment of a proposed orchard, as intended with the unlawful activity, large amounts of unwanted material are generated e.g., remains of trees and cleared rubble. Any piles of such materials may have become refuges for unwanted animal species that cause damage to the orchard trees or fruit. An example would be rodents that may gnaw at tree stems or fruit causing damage. The piles of rock or tree debris from the clearing operations provide habitat for such species. If not properly cleared it may be considered by farm managers to use poisons that are not conducive to environmental protection and lead to impact on birds such as owls. Burning of the tree debris, as has been the case, has a major impact on wildlife that may seek refuge in the material both prior to removal i.e., in tree cavities or under bark, or following the removal.

During the operational phase of the proposed activity, for each pest and disease, methods of preventing any pest problem has to receive priority (Anon, 2015). If intervention is needed, the safest and most effective options should be considered. The approach is called Integrated Pest Management (IPM) and consist of 4 main steps:

1. Identification: Identify the pest or disease.
2. Prevention: Includes cultural approaches e.g., the use of disease-resistant varieties and adoption of good practices in the field. Included is the use of pesticides where this method is deemed appropriate.
3. Monitoring: Early detection of a pest or disease allows appropriate action to be taken to reduce losses and prevent its spread.
4. Control: Both cultural approaches e.g., removal of infected plants, and the use of appropriate pesticides are included. IPM often involves the combination of several different options.

In Unit 8 (Pests & Diseases Management) of the Citrus Production National Certificate 1 course material, integrated pest management is described as 'not a single pest control method but rather a series of pest management evaluations, decisions and controls' (Anon, ???). For example, when infestations are present and require immediate intervention, IPM presents options where the safest most effective methods available for the situation are chosen. The aim of IPM is to apply alternative measures to agricultural 'pest' control. The use of plant protection products (pesticides) is becoming less acceptable in the market place and recent regulations more restrictive. Consumer demands for sustainable products are increasing continually (Pekas, 2011).

With reference to the proposed development that led to the unlawful activity, it is considered that the probability of mass human-wildlife conflict situations developing at this site, is very remote. The fact that large areas of agriculture surround the Scherp Arabie farm and that conservation areas and game farms do not support large species of wildlife, are indicative of limited preventative measure requirements. As mentioned above, it is the smaller wildlife species that may be the cause of DCA incidences. Mitigation of such conflict situations will be required during the operational phase, if authorization is given for the unlawful development to continue.

## **10. DISTURBANCES.**

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No particular disturbance can be highlighted as the site of investigation has already been unlawfully cleared. The activity in itself could, therefore, be considered a

disturbance of the 'natural status quo' through all activities associated with the establishment of the citrus orchards. The construction of access roads, installation of irrigation infrastructure and erection of any fencing may all be considered a disturbance in terms of the natural status.

Encroachment into the drainage-line area is, to differing degrees of disturbance, considered a notable impact. Destruction of the associated vegetation layer and any organisms occupying any niches within the vegetation and the soil layer supporting the vegetation, would have required mitigating interventions.

The construction of the new coffer dam, belatedly reported, is a disturbance of major proportions. Once again there was no authorization and, therefore, this unlawful activity is considered a notable disturbance.

As no ECO had been appointed, no mitigating actions to protect or preserve any components of both fauna and flora, were identified and implemented.

**“You are not necessary; the air, earth, water and sky without you are fine.  
When you come back, remember that you are my guests!”**

Author unknown.  
(From: Pet Prayer Line Website)

## **SECTION3: Summary and Conclusions.**

### **11. ASSUMPTIONS AND UNCERTAINTIES.**

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The most pertinent assumption to be made in this investigation is that the natural areas surveyed during the first site visit were representative of the habitat that was present at the now unlawfully cleared site. Even though some of the re-established habitats may still be available to organisms during the operational phase, it will be limited to the herbaceous plant layer and the pedosphere as occupied by fossorial or burrowing wildlife species.

With any survey in terms of the EIA process, either where development is intended or unlawful activity has taken place, usually, a 'once-off' investigation situation applies. Ecosystem functioning is dynamic and can change from one season to the next under

conditions driven by rainfall patterns. As a result, it has to be assumed that the samples provided through monitoring actions are representative of the environmental status and that the majority of important species have been recorded. Such results have to be supported by historical data sourced from desktop studies and interviews.

The land-use history of the survey site i.e., agriculture and game farming, has impacted on the 'natural' ecological status of the area. Both vegetation and fauna are assumed to have been affected by any such history so all recommendations have to be based on the present *status quo*. All aspects of environmental management are considered in the light of this status and, therefore, provide a level of uncertainty in terms of 'natural' status.

At this point it is pertinent to mention that, due to the unlawful activity, as noted during the second site visit, the environmental status has been drastically altered. The most disturbing aspect is, that even though the proponent was instructed to cease all activities, this did not happen. Even whilst busy with surveys following that directive, activities continued and it can be accepted that the impact was in perpetual motion as bulldozers, trucks, cherry-pickers and surveyors doing the layout planning continued unabated.

Under the normal circumstances of an unlawful activity, impact would temporarily cease as the environmental authorization and punitive actions are considered. Here the opportunity to survey remaining natural areas would be available. Continuing with the EIA process, other forms of environmental impact other than climatic would require consideration. However, the impact of such influences are not regular and may be largely erratic requiring specific environmental conditions for such events to occur. One such contributing influence that is of major importance in many savannah regions is fire. Fire is an important determinant of vegetation structure and plant species diversity and is an important management tool that has probably not been applied to the area of concern for many decades and is certainly not an option due to poor grass layer production; partly as a result of climatic conditions and past intensive management practices. Some plant species, if still present, that are geophytic would only have been stimulated to grow by a fire event and therefore will not be evident during surveys if there has not been a recent fire. If any such species did occur historically at the site of investigation, the unlawful bush-clearing activities may have destroyed any individuals present. Species composition and tree density would have also been affected by a fire regime. Such uncertainties, in terms of a 'normal' EIA investigation, have to be accepted and the assumption made that the specific habitat where the unlawful activity occurred, is further well represented by similar reasonably natural environments in other areas, both adjoining the site or in the broader region.

Under normal survey conditions, years of extended below average rainfall would have had an impact on some species, both flora and fauna, making their presence at the sites under investigation difficult to determine. The lack of food sources and water would, in turn, restrict the movements of organisms. Following a satisfactory rain event species may emerge that were not evident at the sites during the investigations. This is especially pertinent to the amphibians as, for example, species such as the *Breviceps* spp., remain buried until suitable conditions are evident. Certain tortoise species that may have occurred on the property also hibernate in holes, not only seasonally, but also daily as they are crepuscular in their movements thus making their presence difficult to determine.

Destruction of the shrub and tree layer would have impacted on all ecosystems functioning within the available habitat at the site of investigation. Ecosystems are a combination of all components and the removal of one such component will have a snowball effect on the rest. Where total removal of one component e.g., the vegetation component, occurs even to a limited extent it will greatly impact on the rest of the components. Most organisms are reliant on the vegetation component in one form or another for their existence: total removal is equivalent to total local extinction in an affected area. The only mitigation pertinent to this scenario is possible presence of similar habitat in the adjoining game farm that receives a certain degree of protection.

Micro-habitats present at the site prior to the unlawful bush-clearing activity have either been totally eradicated or impacted to varying degrees. Which of these micro-habitats were present at the site, can only be speculated on. An example of one such habitat of which no signs remain, is termitaria that may have been present in the affected areas. Many geophytic and fossorial species that may have been rescued under conditions of an EMPr are assumed to have been lost during the unlawful land preparations.

The use of heavy machinery in any scenario will impact on the environment. In the present case, where heavy machinery continued to operate unabated, disturbing the upper 0,5+ m top soil layer through ripping and landscaping for the citrus orchards, impact on fauna and flora must have been significant with no recourse through mitigating actions. Species, plant or animal, which are not visible could not be removed in time and have been lost or killed in the preparatory process. The activities will have impacted on fossorial fauna, other sedentary or hibernating fauna and geophytic flora. Burning of the vegetation remnants following the bush-clearing would have had a similar impact. Dumping of rubble in the few remaining areas of natural habitat has compounded this impact. The presence of an appointed ECO and/or a representative of the conservation authority could, in mitigation, have saved any species that may have been disturbed or threatened with destruction by the activity.

However, in terms of unlawful activities, such an appointment would not have been made and the impact in terms of preservation of organisms and plants is, therefore, unknown.

The degree of 'wetland' development along the affected drainage-lines is also uncertain as the bush-clearing and landscaping has passed directly through the drainage-lines present. It is only through satellite imagery and comparative analysis in adjacent natural areas that any idea of impact on drainage-lines, as a result of the total destruction of this habitat, may be determined. As stated by Swanepoel & Barnard (2007), South Africa has policies and acts protecting our wetlands, but overlaps and gaps regarding wetland legislation exist, and shared responsibilities between different government departments lead to ineffective implementation. Furthermore, there is a need for clear guidelines regarding the sustainable use of wetlands (not total annihilation) in agriculture as this is vital for their conservation in South Africa. Ambiguities such as the above make it difficult to present effective recommendations in mitigations against impacts that contribute to wetland preservation in terms of any proposed development.

## **12. RESULTS AND IMPLICATIONS.**

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"Nature teaches beasts to know their friends": - Shakespeare.

Where a specific piece of natural vegetation has already been bush-cleared, determining results and implications may be considered superfluous as the damage has already been done. The situation pertinent to this investigation is that an area has been unlawfully cleared and, to provide some basis as to what the status of the area was prior to the clearing activity, a comparative study was required. Data from the initial surveys in the areas that have now been unlawfully cleared, will contribute in determining environmental status and, combined with data recorded in the small remaining natural area, provide a reasonable indication as to the impact of the unlawful activity in the absence of any mitigation measures. The cleared areas are

also considered to have differing parameters functioning as one section was considered pristine and a second area as rehabilitated old agricultural lands.

The status of the different zones of investigation are described below to provide an understanding of factors affecting the present environmental status.

### **12.1 Unlawfully Bush-cleared Zone 1 – Rocky Outcroppings.**

Present environmental status characteristics:

- Woody and shrub layers have been removed.
- Herbaceous layer removed in the landscaping process.
- Soil structure destroyed in landscaping of orchard row establishment.
- Rocky outcrop structures excavated and removed.
- Vegetation debris, unearthed rock and other rubble dumped in remaining patches of natural vegetation.
- Removed plant material burnt in piles throughout the site.
- Protected tree species (3) and a bulbous plant species impacted.

The present status of the area identified above, is summarized in the introductory bullets. The habitat and micro-habitats provided by the woody layer component have all been compromised by the bush-clearing process. Protected woody species have been removed through this process and then furthermore, impacted through the dumping of vegetation debris and a variety of rubble in the remaining patches of natural vegetation. The herbaceous layer has also been totally compromised and protected species in this layer impacted.

Most soils in South Africa are susceptible to erosion and, with the removal of all vegetation, the potential for extensive erosion occurring with a large rain event has increased exponentially. Certain areas that had already been landscaped for the orchard rows are not along a contour line but delineated down the slope. Only once the herbaceous layer re-establishes will the potential for erosion decrease in these areas.

Removal of vegetation for whatever purpose, will impact on wildlife, more pertinently the smaller organisms not easily observed. This may include any organism from small mammals down to the reptiles, amphibians and invertebrates. The magnitude of this impact in retrospect is difficult to determine and can, therefore, only be speculated. Also to be considered is the impact on wildlife that still sought refuge in the piles of up rooted plant material prior to burning.

### **12.2 Unlawfully Bush-cleared Zone 2 – Previously Cultivated.**



Present environmental status characteristics:

- Woody and shrub layers have been removed.
- Herbaceous layer removed in the landscaping process.
- Soil structure destroyed in landscaping for orchard row establishment.
- Rocky outcrop structures excavated and removed.
- Vegetation debris, unearthed rock and other rubble dumped in remaining patches of natural vegetation.
- Drainage-lines running from extant agricultural lands to the south cleared of all trees and shrubs.
- Bulbous species growing along the drainage-line exposed and vulnerable to the continued landscaping process.
- Removed plant material burnt in piles throughout the site.
- Protected tree species (2) impacted.

The present status of the area identified above, is summarized in the introductory bullets. The vegetation structure and species component of this area points to this zone having been cultivated in the past. The habitat and micro-habitats, though limited, provided by the woody layer component have all been compromised by the bush-clearing process. Protected woody species have been removed through this process, the most pertinent of which was large *Boscia albitrunca* specimens that potentially could have been saved within the orchard set-up. The dumping of vegetation debris and rubble in the remaining patches of natural vegetation has, furthermore, impacted on protected species. The herbaceous layer has also been totally compromised and protected species in this layer impacted.

A poorly-defined ephemeral drainage-line, running through the western part of this zone, has been totally compromised. All vegetation has been removed and no attempt made to provide the legally required buffer zone to protect the watercourse. The presence of bulbous plant species within this specific ecosystem was not considered and, in the absence of an ECO, probably destroyed in the illegally continued landscaping activities.

As with section 12.1, the soils of this area are also highly susceptible to erosion. Here too the alignment of the orchard rows has not followed any contour and intersects with the drainage-line at right-angles. Erosion susceptibility is high and the encroachment into the drainage-line may result in accelerated erosion potential. A re-established herbaceous layer will alleviate some of the erosion probability more particularly along the ephemeral drainage-line.

Removal of vegetation for whatever purpose, will impact on wildlife, more pertinently the smaller organisms not easily observed. This may include any organism from small mammals down to the reptiles, amphibians and invertebrates. As this area has the drainage line passing through, it is postulated that many amphibians may have been compromised. The magnitude of this impact in retrospect is difficult to determine and can, therefore, only be speculated. Also to be considered is the impact on wildlife that still sought refuge in the piles of up rooted plant material prior to burning.

### 12.3 Remaining Natural Areas.

Present environmental status characteristics:

- Shrub and woody layers generally still intact.
- Specimens of all protected plant species discussed still preserved.
- Northerly and western patches of 'natural' vegetation still reasonably intact while the central high-ground has had a certain amount of disturbance resulting from previous agricultural activities.
- The herbaceous layer still well represented in all three zones.
- Some of the rocky outcrop structures that may have served as wildlife refuges still remain in these areas.
- Vegetation debris, unearthed rock and other rubble dumped in most remaining patches of 'natural' vegetation.
- Protected plant species affected by the dumping activity associated with the bush-clearing.
- In some instances, vegetation debris burnt in piles lying adjacent to natural vegetation still remaining.

The remaining islands of natural vegetation was used during the second visit to further collect data in determining what the status was of the areas affected by the unlawfully bush-clearing activity. Past land-use practice for the property was game farming and limited agriculture under centre-pivot irrigation. It can thus be safely assumed that the remaining natural areas are, therefore, a good representation of the habitat prevalent throughout the central Sandy Bushveld vegetation type.

The transect survey conducted in the northerly natural area considered to be dominated by rocky outcroppings, focussed on protected tree species, indicated that there were three protected tree species, as listed in legislation, present. *Spirostachys africana* was noted as being the most dominant along the transect, occurring mostly in small copses. No protected shrub was recorded but a bulbous plant species and Aloe species were recorded in the species listing.

The herbaceous layer was found to be fairly well represented in the natural vegetation zones with 38 herbaceous/bulbous species recorded and 24 grass species. No specifically protected species of herbaceous plants were found along the transect line for the protected tree species. Of interest, however, were other bulbous species and a scattering of succulents.

In terms of protected wildlife species, no definite confirmation of the presence of such mammal species was recorded. However, the erection of game proof fencing in the past may have curtailed any access into this area for such species should they have occurred in the immediate vicinity. There were no sightings of protected avifauna but, according to historical data, some species may occur in the remaining natural habitats on the greater farm. No reptile species were recorded, however, it should be noted that most are protected under LEMA. Where the presence of amphibians is concerned, the lack of water bodies and no rainfall events during the periods of survey, would have lowered the possibilities of recording such species.

#### **12.4 Operational Mitigation Measures.**

Once the Section S24G process has been finalized and if authorization to continue with the orchard development is received, aspects of management procedures in terms of mitigation measures should be applied. Such aspects include the following:

- Maintain the herbaceous vegetation layer between the orchard rows.
- Plant replacement protected tree specimens on the farm as part of the biodiversity offset process.
- Restrict the use of herbicides on the herbaceous vegetation between orchard rows.
- Only apply pesticides under extreme conditions when IPM is insufficient or fails.
- Any signs of erosion development to be addressed immediately with corrective actions.
- Rehabilitate a 10 m buffer zone along the ephemeral drainage-line as part of mitigation and a biodiversity offset process.

#### **12.5 Further Comment or Results.**

Additional aspects of affected environmental components in terms of their conservation status and any implications that the unlawful activity and continued operations might have, are addressed.

- Characteristics of the unlawfully cleared site and adjacent natural areas considered of importance were noted to determine the sensitivity status of the directly affected area.

The site of the unlawful development is in proximity to the Elands River. Even though the closest point is about 1300 m from the river, the impacts could flow towards the river as the drainage-line system at the site is a tributary of the river. As such, the status of the drainage-line is important in terms of the impact of the unlawful activity.

Goldblatt *et al.* (2009), state that a characteristic of most South African soils is that they are extremely vulnerable to degradation and have low recovery potential. Thus even small mistakes in land management can be devastating, with little chance of recovery. Tight control of further activities associated with heavy machinery and the maintenance of the buffer areas, may have been required only if the developmental activities ceased as required by law. Prevention of infringement into the rocky outcrop areas, to limit the impacts on that specific environment, may have been achievable under the application of the correct procedures.

The larger tree specimens in almost all habitats, both protected tree species and 'trees of interest', may be recognised as micro-habitats, not only through the provision of browse, but also as refuges to a number of wildlife species and habitat for avifauna to roost and nest in. All vegetation in the unlawfully cleared areas, however, has been removed even though a request was made to preserve the large *Boscia albitrunca* specimens present on the farm. This was viewed as a potential contribution to biodiversity offset process. Suitably sized buffer areas along the fringes of the northerly rocky outcrop areas may have been a good representation of this process.

- The observations conducted to determine the presence of fauna species that may be of concern, did not indicate the presence of many species or any species of high conservation concern. However, the bush clearing activities would have impacted on wildlife through the modification and destruction of a range of suitable habitats. It is only through comparative data that a vestige of what might have occurred at the site, could have been determined.

When considering the fauna of the area, signs of permanent occupation or regular utilization by any species of conservation concern is recorded together with the listing of all wildlife species observed. During visits to the site no significant evidence of larger wildlife species was found.

Even though the habitat itself is not unique, bush-clearing leads to drastic habitat modification. Cognisance was needed of more specifically fossorial and aestivating species e.g., certain reptile and amphibian species, that spend most of their lives below the soil surface and others such as Hinge-back Tortoises that are active for very short periods.

Nocturnal small mammals may have occupied refuges in larger trees or rocky outcrops as would many reptile species from the Serpentes and Lacertidae groups. Cavity-nesting birds, at the time of bush-clearing, may possibly have had eggs or fledglings. Nests of ground-breeding birds may similarly have been impacted on.

It is considered that mainly species afforded some form of protection under LEMA, may have been compromised by the bush-clearing activity. Trying to assess the impact after the fact is difficult, even where a comparative survey in an undisturbed area is considered.

If the nearby conservation area of Schuinsdraai Nature Reserve is referenced, there is a range of larger protected wildlife species that may have historically occurred in the area, but are not considered to have been present prior to the bush-clearing activity. Species of smaller mammals are the most probable to have still occupied the area of investigation. Wildlife species, including protected species, listed in the ADU Virtual Museum are also probable occupants in the area and may have been present on the property at the time of bush-clearing.

- As indicated in the report, the vegetation previously comprising the habitat where the unlawful bush clearing took place, is not unique as it is largely conserved in the nearby protected area (Schuinsdraai NR), the Wallmansthal SANDF property and some private game farms.

The Central Sandy Bushveld (SVcb 12) is regionally reasonably well represented with sections protected in a number of small conservation areas. Therefore, it may be concluded that the impact of the unlawful activity is somewhat insignificant in terms of preservation. However, the importance of the vegetation type must be considered where the contribution to the survival of organisms dwelling in such areas is concerned. The vegetation type is colonised by an array of interesting plant species and consequently a unique array of wildlife species and ecological processes.

Some of the plant species that are protected under various pieces of legislation that occur in the vegetation type, may potentially have been impacted on. Confirmation of the presence of such species was limited to the initial site visit and the small remaining patches of 'natural' vegetation. The impact on some species labelled as 'of interest' is considered more pertinent in terms of biodiversity preservation. The criteria that led to protection status of a species in legislation may be questionable e.g. *Sclerocarya birrea*, as it is considered that many other species may be more deserving of protection. Only two species that were recorded at the site of investigation are protected under the National Forests Act (No. 84 of 1998) i.e., *Boscia albitrunca* and *Sclerocarya birrea*. The relevant provincial legislation, the Limpopo Environmental Management Act (No.7 of 2003), lists *Spirostachys africana* as a protected species and other plants species include *Boophone disticha* and *Aloe cryptopoda*.

Of more concern, as previously stated, is the fact that in some cases unique specimens of certain plant species (including protected species) were possibly destroyed during the unlawful bush-clearing activity. Focus should therefore not only be on protected species impact but also what impact there may have been on specimens of other species. The same standards and actions should, therefore, be applied to **all** specimens of note in both groups.

A number of interesting smaller plants were also recorded but it is speculated that many more species may have been affected. Included are species of aloe, bulbous plants that are not highly visible (especially in the dry season), other succulents and certain climbers, some of which were recorded. Removal of these plants by any interested parties prior to the bush-clearing required consideration and should have been managed by the ECO. Many such plants are larval host plants for Lepidoptera and their preservation may have formed part of a biodiversity offset process.

- Any bush-clearing activity has wide-ranging impacts, some immediate and others long-term. The processes associated with agricultural activities are continual as long as the production continues.

The impact of the bush clearing activity was not only from a physical point of view where plants and animals were directly affected by the operations of heavy machinery. The loss of habitat in terms of refuges has to be considered especially where species of limited mobility are concerned. Fossorial species, burrow dwellers and aestivating individuals from certain groups of organisms are all susceptible to any disturbance of the soil layer.

Furthermore, during the operational phase, the indirect impact of plant protection products needs consideration, especially where collateral damage may occur in adjoining natural areas, both terrestrial and aquatic. In mitigation, as the intended crops are for the export market, the prescripts of GlobalG.A.P. would apply (Addendum II). Additional to this, regulations pertaining to the Conservation of Agricultural Resources Act and the Pesticide Management Policy published under the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act that are applicable to the use of plant protection products, are also relevant.

- The vegetation debris and rock rubble generated by the bush-clearing activity requires that it is cleared to allow for the establishment of orchards.

Appropriate processing of vegetation debris and rock rubble would have been recommended as part of the scoping and EIA basic assessment process where mitigation measures are determined. This aspect would fall under the guidance of an appointed ECO as a matter of priority with effective means of dealing with this material presented. Burning of the vegetation remains, a practice generally noted in agriculture, is not considered an environmentally friendly option as the intense heat generated by burning piles of wood causes sterilization of the soil, a condition that may persist for many years. Wildlife still seeking refuge in the remains were probably destroyed by the all-consuming fires required to achieve the goal of clearing the area in its entirety. Rocks that were unearthed were dumped on the fringes of the remaining islands of natural vegetation. Under the guidance of an ECO, the rocks may have been used in a positive way to create refuges for wildlife. Identified areas within the orchard or on the fringes of the orchard where the piled rock rubble would serve the purpose of creating 'artificial' habitats, is considered contributory to the biodiversity offset process.

The use of vegetation remains in brush-packing projects to improve herbaceous layer coverage should have been considered. Larger sections such as the main trunks may have been ideal for use in erosion control efforts.

- The present investigation is in reference to an unlawful activity that has already occurred. The requirement of the EIA process to identify no-go areas is difficult to address as a result.

All micro-habitats that were in existence and may have been given no-go status have generally been destroyed and, therefore, affected by the unlawful activity. Examples of micro-habitats are the termitaria, shallow water wallows on upland areas and cavities within dry tree stumps or some live tree specimens. Each one of the examples supports a diversity of life-forms in different ways.

The ephemeral drainage-line may also have been considered a no-go area.

- Applying a buffer area to the drainage-line would have been a recommendation but all drainage-line habitat has been destroyed at the site of investigation.

The drainage-line area has been bush-cleared and will in future require specific monitoring for any signs of erosion. Under the Conservation of Agricultural Resources Act (CARA) Section 7 (1) it is stated that: “*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 such flood area in a manner that causes or may cause the deterioration of or damage to the natural agricultural resources*”. Mitigation measures are required in such instances and, if any future developments are authorized, buffer areas have to be delineated in accordance with the relevant legislation.

Delineation of buffer areas is, therefore, a priority in the process of mitigation and the biodiversity offset process.

## 14. KEY ISSUES.

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In terms of the Section S24G Rectification Process, the following key issues are applicable to this investigation.

- **Legal prescripts and implications.**  
The activity, in terms of the applicable Environmental Impact Regulations, commenced and continued without the required legislative requirements in terms of the National Environmental Management Act, 1998 (Act 107 of 1998). Through a Section S24G process, the law provides for the application of environmental authorization to legalize the development. The requirements of the process are to evaluate both the biophysical and the social environment affected by the project. Furthermore, mitigation measures for the operational phase to reduce the associated negative impacts in order to promote sustainable development and resource use, are recommended.

Subsection (1) (a) or (b) of NEMBA states that no activity may negatively impact the survival of any species in or significantly disrupt the integrity of the ecological systems of the area. Permits are issued in terms of Section 87 where authorisation for restricted activities is regulated for threatened or protected species.

- **Protection status afforded the area.**



The Scherp Arabie farm was previously managed as a game farm with a small area of cropland agriculture. It is only the delineation of land into the various conservation categories as published in the Limpopo Conservation Plan that provides some form of protection.

Processes in terms of preservation include the Limpopo Conservation Plan (Version 2) with the associated classification of CBA's and ESA's. The Sekhukhune Municipality District Bioregional Plan, published in 2019 and based on the original Limpopo Conservation Plan, provides updated classification and delineation of the relevant zoning categories. These categories are based on biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes. In terms of Critical Biodiversity Areas according to the LCP, as indicated in Figure 2, the property is entirely delineated as a Critical Biodiversity Area 2 (CBA2) but, as there were extant agricultural lands, should have a section of Ecological Support Area 2 (ESA2).

According to the Sekhukhune District Municipality Bioregional Plan (2019) the farm furthermore, lies along the fringes of the Olifants River ecological corridor that stretches across the local district from the central southern boundary to the north-eastern boundary. An ecological corridor is an area of habitat allowing the connectivity of wildlife populations. Ecological connectivity is critical for the long-term persistence of biodiversity in the face of on-going climate change and increased land modification.

- **Regional location in terms of protected areas.**

As mentioned in this report, the Scherp Arabie farm lies some 12 km south of the provincial Schuinsdraai Nature Reserve, the only statutory protected area in proximity to the farm. In the past the farm formed part of the P.J. de Jager Private Nature Reserve, a formal conservation area that probably is no longer in existence and has now been sub-divided and having different, and conflicting, land-uses. It may be considered that the proposed activity for the unlawfully cleared area is in conflict with certain adjacent land-uses but extant irrigated lands were present on the Scherp Arabie farm prior to the change in land ownership. The habitat affected by the bush-clearing activity is not considered of conservation concern as it is classified as 'Least Threatened' and is well represented to the east including sections of the SNR.

- **Protected plant species status.**

No plant species of 'high conservation concern' were noted at both the initial 'natural' vegetation zones, or the remaining patches of 'natural' vegetation following the unlawful bush-clearing activity. There were some plant species recorded that are protected under the National Forests Act and LEMA recorded at the site.

Even though the presence of what is considered 'mature, large old trees' of the *Boscia albitrunca* species, was brought to the attention of the landowner, no effort was made to preserve any of these specimens. The species probably the most affected by the bush-clearing activity was the provincially protected *Spirostachys africana*. Small copses of this species were evident throughout the higher-lying areas of what is considered rocky outcroppings.

As no ECO was appointed prior to bush-clearing activities, decisions on how to deal with each identified case pertaining to protected tree species, was not possible. Environmental responsibility should have been extended to not only include arbitrarily selected protected species but unique specimens of **all** plant forms deserving of preservation.

- **Protected faunal species status.**

The presence of any faunal species of high conservation concern could not be confirmed at the unlawfully bush-cleared site or in the remaining 'natural' areas. Data from historical records and species lists from proximal conservation areas indicate that such species do occur in the region. Mammal species e.g., Brown Hyena, bird species e.g., Cape Griffon and Saddle-bill Stork, reptile species e.g., Jones's Girdle Lizard, and some amphibians may have been present at the site. Any individuals of these groups that were at the site prior to the bush-clearing operations may have been disturbed by the activities. Concerning fossorial and some arboreal species, the impact is difficult to assess as such species are generally not easily observed. Without the presence of an ECO monitoring the operations, any disturbed specimens could not have received mitigating preservation efforts.

- **Management actions following Section 24G rectification process.**

As mitigation for the unlawful activities, recommendations included in this report require consideration. Actions in terms of drainage-line buffer area delineation, protected tree species preservation, wildlife rescue, promotion of herbaceous layer protection between orchard rows and wildlife refuge maintenance, are considered important in the application of a biodiversity offset process as described in the report. The appointment of an interim ECO would be the first priority, who, as part of his duties, must ensure that all legal requirements are addressed and mitigating

measures put in place. The implementation of continual monitoring actions in surveying the flora progress e.g., the appearance of leaves of bulbous plant species that survived the landscaping activity, any recolonization of wildlife that needs attention through relocation or protection, and the control of PPP's application to prevent collateral damage in the remaining patches of 'natural' vegetation. Where necessary, representatives of the conservation authority, or designated knowledgeable persons, should be consulted to assist with the recommended remedial actions.

- **Preservation of woody plant species.**

Maintaining large numbers of trees and shrubs within the orchard environment is obviously not plausible. However, in many instances, certain high-profile species are saved from bush-clearing by the farmers. At the site under investigation, all vegetation was cleared making the preservation of the protected species occurring within the confines of the proposed orchard, a non-viable option. Even though only a single large *Sclerocarya birrea* was observed during the first visit, it was found to have been uprooted at the second visit. This species is considered problematic within the citrus producing industry as it is perceived to attract fruit-flies when bearing fruit. No other species of tree was preserved in the delineated orchard, no matter the size or stature of a specific individual ('trees of interest').

- **Preservation of bulbous and succulent plant species.**

The unlawful bush-clearing activity would not only have impacted on the woody plant layer but also the herbaceous layer, more specifically the succulent- and bulbous plant species. Not many specimens were recorded in the cleared areas, probably due to the landscaping activities, but representatives were recorded in the adjacent 'natural' areas during the first site visit. Included were mostly non-protected succulent- and bulbous plant species with two protected species identified. The protected bulbous species, *Boophone disticha*, was noted as having been impacted directly as remains of one such plant was found amongst the ashes of burnt vegetation debris. To mitigate further impact on such species during the resumption of activities associated with the establishment of orchards on completion of the rectification process, should any bulbous species regenerate in the areas of landscaping, these plants should be removed for relocation purposes to an identified safe area.

Populations of the protected succulent species, *Aloe cryptopoda*, occur on the farm mostly in the higher rocky outcrop habitats. Specimens of this species were probably also affected by the unlawful bush-clearing and landscaping activities but, have also been impacted by the dumping of various rubble in the remaining

'natural' areas. Specimens still lying in the vegetation debris or covered by the dumping of rubble require rescue and relocation to a safe area.

An appointed ECO, prior to the initiation of the unlawful activities, could have identified such plants for translocation to a safe area or made the plants available to interested parties for gardening purposes. All legal prescripts and requirements would have had to be followed in this process.

- **Soil and erosion impact.**

The bush-clearing activity within an area designated as 'natural' increases the vulnerability of the soil to erosion. The activities of the heavy machinery used in the bush-clearing process and orchard landscaping, have disrupted soil integrity in varying degrees. With the onset of the rainfall season, if a large rain event should occur, the impact will be significant. The alignment of orchards rows in certain areas are down the natural incline making the exposed and disturbed soils susceptible to erosion. Encroachment into the drainage-line has impacted on sensitive soils that are highly susceptible to accelerated erosion. In mitigation, efforts are needed to address any signs of erosion at the onset thereof, taking appropriate steps to prevent escalation. The establishment of a herbaceous layer between the orchard rows would contribute to the prevention of soil erosion. Early implementation of erosion control measures to stabilize detected erosion sites and diverting water run-off from these channels, is imperative.

- **Allocation of safe-zones and no-go zones.**

As part of the pre-construction phase for a proposed development, recommendations would be made for the identification and delineation of safe zones and no-go zones. With the present activity under investigation, this would be difficult as the bush-clearing has already been completed and landscaping of the orchard continuing unabated. As part of the rectification process, this aspect should be addressed.

Where fauna is concerned, the possibility may exist that certain wildlife groups re-colonize the area of investigation. Should the development process continue, any disturbed organisms would need to be caught and released in suitable habitats in safe areas. The bordering game farm area, having similar habitat, would be suitable for such translocations with the approval of the landowner.

In terms of the above, with the commencement of any activities, clear delineation of no-go areas will be required. The unlawful activity has already encroached into the drainage-line and modified most of the natural habitat associated with the rocky outcroppings. All recommended protection and mitigation measures need to be

applied as determined through this rectification process and, with future proposed developments, are to be considered and implemented.

## 15. POTENTIAL IMPACTS AND MITIGATION MEASURES.

The impacts associated with the unlawful development that were identified as key issues are, where plausible, listed and evaluated using the methodology as required in the terms of reference. All aspects of the environment that have legislative protection are evaluated in retrospect for potential impacts and this applies to both protected and non-protected species and environs. In some instances, aspects associated with the continuation of the development following the rectification process, should it receive authorization, are addressed. The focus will fall on the operational phase as the construction (development) phase that proceeded without authorization is basically complete aside from the installation of irrigation systems and planting of orchard trees. Considering the fact that the unlawful activity has, for all intents and purposes, concluded the development phase, applying mitigation measures to the associated activities would be superfluous. Further complications to the process is that the activities never ceased at the onset of the Section S24G rectification procedure as is required by the legal regulations of NEMBA.

The nature of the probable operational impact is determined by quantifying the impact according to the criteria as described in Table 9 below.

<b>Definition Key to Table 9.</b>	
Status	Refers to the predicted effect of the impact on the affected environment
Extent	Refers to the scale of the impact
Duration	Refers to the lifetime of the Impact
Magnitude	Describes the intensity of the impact
Probability	Describes the chance that an impact will occur
Significance	Refers to the significance of the identified impact in terms of the combined impact of the above aspects (Extent + Duration + Magnitude x Probability = Significance)

<b>Table 9. Quantification of Impact Criteria.</b>			
<b>Criteria</b>	<b>Weight</b>	<b>Categories</b>	<b>Description</b>
Status	N/A	Neutral	Impact neither advantageous nor adverse.
	N/A	Positive	Impact is beneficial.
	N/A	Negative	Impact is harmful or adverse.
	1	Very Low	Impact limited to site and its immediate vicinity.

Extent	2	Low	Impact will affect local neighbourhoods within a 10-12 km radius of the proposed activity.
	3	Medium	Regional – impact will have a provincial affect and may affect neighbouring provinces.
	4	High	Nationally - impact will affect the whole of South Africa.
	5	Very High	Internationally – impact will affect beyond South Africa’s borders.
Duration	1	Very Short	0 – 1 year.
	2	Short-term	2 – 5 years.
	3	Medium-term	5 – 15 years.
	4	Long-term	> 15 years.
	5	Permanent	Impact will only stop after the operational life of the activity.
Magnitude	0	None	No Impact.
	2	Minor	Impact does not affect any natural function or process.
	4	Low	Impact affects environment but natural processes and functions can continue.
	6	Moderate	Impact alters environment, but natural processes and functions can continue, even if modified.
	8	High	Impact alters environment, natural processes and functions cease temporarily or permanently.
	10	Extreme	Impact alters environment, natural processes and functions cease permanently.
Probability	1	Very Improbable	< 20% chance that impact will occur.
	2	Improbable	20% - 40% chance that impact will occur.
	3	Probable	40% - 60% chance that impact will occur.
	4	Highly Probable	60% - 80% chance that impact will occur.
	5	Definite	> 80% chance that impact will occur regardless of preventative measures.
Significance	2-12	Negligible	Very low impact, almost no mitigation measure necessary.
	13-30	Low	Low impact, mitigation can easily be achieved.
	31-56	Moderate	Impact will be real but not substantial, mitigation feasible.
	57-90	High	Impact real and substantial, mitigation feasible but difficult.
	91-100	Very High	High impact, mitigation not possible.

1. Land-use Change from Wildlife Production to Agriculture.					
Impact: Destruction of habitat and protected species.					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Permanent	High	Definite	High (70)

**Description of the impact:** The establishment of the citrus orchard required the removal of all existing vegetation. This unlawful activity of bush-clearing and orchard establishment has already been implemented thus the Section S24G process was triggered. The developmental phase continued even though lawfully it should have ceased only to continue following the rectification process and authorization. All natural woody species habitat has been removed for agricultural purposes. Adjacent areas are natural and a drainage-line is threatened by encroachment. The area probably supported a number of smaller wildlife species that occupied various habitats within the previously natural area and drainage-line. Large specimens of both protected tree species and 'trees of interest' are found in the remaining natural patches of vegetation and were also present in the bush-cleared areas indicating that similar examples were removed in the bush-clearing process. Bulbous and succulent plant species, some protected, have also been affected by the unlawful activity as many were probably uprooted by the bush-clearing activity.

**Mitigation Measures:**

- Immediate appointment of an ECO to oversee the operational phase after rectification.
- With continuation of orchard establishment and once fully operational, be aware of any bulbous or succulent plant species and remove such specimens to identified safe areas.
- If discovered within the landscaped area, any small protected plant species removed and translocated to a safe area.
- Plant replacement indigenous trees in areas not designated for orchard establishment as part of the biodiversity offset process.
- Maintain the herbaceous layer between developed orchard rows to as replacement habitat for both fauna and flora species still present and that may re-colonize the area.
- Remaining patches of natural vegetation will serve as refuge for wildlife species displaced by the unlawful activity.
- Utilize unearthed rocks to establish a rock-pile refuges for wildlife within the orchard environment.
- Rehabilitate areas identified as sensitive i.e., the drainage-line, during final development and operational phase.

Significance with mitigation					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Permanent	Moderate	Highly Probable	Moderate (48)

2. Species of High Conservation Concern (Fauna & Flora).					
Impact: Destruction of protected species.					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Long-term	High	Definite	High (65)

**Description of the impact:** The establishment of the agricultural orchards requires the removal of all natural vegetation. The vegetation at the site was unlawfully removed and in the process, protected plant species were impacted on. A number of protected fauna and flora species would have occupied the natural habitats that constituted the site prior to the bush-clearing process. The previous land-use was game farming implying that the site was reasonably natural, albeit with a small area of agriculture, and containing an array of protected species. Evidence of the destruction of a number of protected tree species and a bulbous species was noted during the investigation. No specimens of protected tree species were spared even though an appeal was directed at the landowner. Disturbance of the soil may have uprooted protected bulbous or succulent species. Protected wildlife species may have been destroyed or disturbed by the activity of bush-clearing and landscaping for the orchard. Species unable to flee from the niches they occupied were impacted on during the unlawful activity. Reptile species were probably present in a variety of habitats, many protected under LEMA. Destruction of rocky outcroppings and burning of the vegetation debris further impacted on these species as many also occupy refuges within trees. A variety of other protected wildlife e.g., baboon spiders, tortoises and amphibians, naturally occur in the area of site under investigation and will have been impacted. A number of wildlife organisms probably occupied a range of refuges available throughout the site. Cavities in trees, either natural or created by cavity-nesting birds, may have contained refuge-seeking protected nocturnal small mammal species and these may also have been impacted by the bush-clearing operations.

**Mitigation Measures:**

- If discovered during operational phase, small protected plant species will be transplanted at identified safe areas.
- Attempts to rehabilitate sensitive areas recommended for preservation e.g., drainage-line, to continue should authorization for continuation of the activity be granted.
- Plant replacement indigenous trees (including protected species) in areas not designated for later orchard development as part of the biodiversity offset programme.
- Remove and transplant or donate all bulbous and succulent species noted or uprooted.
- Be continually aware of signs indicating the presence of protected fauna species i.e., burrows, tracks or foraging activity.
- The habitat is not unique and considered sufficiently replicated in the region.
- Provide staff awareness training on the protection of all fauna species thereby sensitizing them to the safety of such species which may include protected species.
- Contribute to an off-site stewardship programme as part of the biological offset process.

**Significance with mitigation**

Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Long-term	Moderate	Highly Probable	Moderate (44)

**3. Species Preservation (Fauna & Flora).**

**Impact: Localized extinction of species.**



Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Long-term	High	Highly Probable	Moderate (52)
<p><b>Description of the impact:</b> Clearing of natural vegetation will impact on all plant and animal species present through habitat destruction or modification. Many species not under legal protection that form part of various ecological systems, were present at the site of investigation before the unlawful activity and may still be represented in the remaining natural areas. Floristic ecosystems associated with woody species were eradicated impacting on many organisms. Fauna that occupy different habitats within all ecological niches, were eradicated if they were not able to flee the impact of the bush-clearing activity. Avifauna nesting in woody species e.g., cavity-nesters, are disturbed and nests containing eggs or fledglings probably destroyed. Reptile species seeking refuge in tree-hollows or burrows may have been killed in the process of vegetation removal. If present, bulbous plant species and succulents are damaged or uprooted. Epiphytes including hemi-parasites are eradicated in conjunction with the woody substrates they grow on. Burning of the vegetation debris in the clearing process affects all wildlife species still seeking refuge in the tree trunks and the epiphytes and hemi-parasites attached to the uprooted transplant substrates.</p>					
<p><b>Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Remaining smaller plant species e.g., bulbs, succulents and shrubs of interest, re-located or additional specimens purchased to recreate habitats at identified 'safe' areas.</li> <li>• Any wildlife e.g., fossorial species or hibernating individuals, disturbed by the continuation of activities to be re-located to secure areas of similar habitat.</li> <li>• During the operational phase maintain the herbaceous layer between developed orchard rows to preserve both fauna and flora species that may utilizing this modified habitat.</li> <li>• Remaining patches of natural vegetation maintained that will serve as refuge and alternate habitat for any remaining wildlife and for preservation of representative flora.</li> <li>• Utilize unearthed rocks resulting from the unlawful activity to establish a rock-pile refuge for wildlife within the orchard environment.</li> <li>• The habitat is not unique and considered sufficiently replicated in the region.</li> </ul>					
<b>Significance with mitigation</b>					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Long-term	Moderate	Highly Probable	Moderate (44)

<b>4. Erosion prevention and control.</b>
<b>Impact: Accelerated soil erosion and donga formation.</b>

Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Long-term	Moderate	Highly Probable	Moderate (44)
<p><b>Description of the impact:</b> Removal of the woody vegetation cover and disturbance of the soil stability with landscaping for the orchard layout, has increased the probability of erosion occurring. Alignment of proposed orchard rows down the gradient is contributory to accelerated erosion. The ephemeral drainage-line has been totally destroyed together with the vegetation it supported, increasing the risk of erosion. Uncontrolled water flow leads to accelerated water speed contributing to erosion action. This is pertinent where vegetation cover has been removed and landscaping applied down the gradient.</p>					
<p><b>Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Attempt to rehabilitate the drainage-line through allowing vegetation to re-establish and provide a buffer as further protection.</li> <li>• Construct drainage mitres at regular intervals along management roads especially down any gradient.</li> <li>• Rehabilitate any areas showing signs of erosion channelling as a result of the bush-clearing activity and construct water channelling structures where necessary.</li> <li>• Maintain the herbaceous layer (grass &amp; herbs) between orchards rows as an erosion prevention measure.</li> <li>• Trenching within the proposed drainage-line buffer area must be avoided.</li> <li>• Water run-off control structures put in place along susceptible landscaped orchards rows.</li> </ul>					
<b>Significance with mitigation</b>					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Medium-term	Moderate	Probable	Low (30)

**5. Impact on ecosystems – on site and surrounding.**

**Impact: Damage to natural ecosystems.**

Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Long-term	High	Highly Probable	Moderate (52)
<p><b>Description of the impact:</b> Infringement into habitats regarded as sensitive or possibly designated no-go areas has disrupted functioning ecosystems and safe refuges in areas considered to be 'natural' prior to the unlawful activity. The site has been cleared of woody vegetation and soil disturbed in the process. All micro-habitats associated with woody plant species and the upper soil layer have been destroyed or disturbed through the bush-clearing and land preparation process. Drainage-line encroachment has impacted on associated fauna &amp; flora, and heavy earth-moving machinery moving in the drainage-line area has caused damage to vegetation and the stability of the soil substrate.</p>					
<p><b>Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Implement measures to rehabilitate and protect remnants of still functioning ecosystems.</li> <li>• Maintain a good herbaceous layer between the planted orchards rows to support the invertebrate and fossorial wildlife still present or that re-colonize the area.</li> <li>• Utilize unearthed rocks in creating habitats for reptiles and small mammals at designated sites within the orchard layout.</li> <li>• Provide sufficient buffer areas to allow heavy machinery operational leeway without entering identified buffer- or sensitive areas and remaining patches of 'natural' vegetation.</li> <li>• Provide staff awareness training to sensitize them to the continued preservation of the rehabilitated habitats described above.</li> </ul>					
<b>Significance with mitigation</b>					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Very Low	Medium-term	High	Highly Probable	Moderate (48)

**6. Impact on aquatic systems.**

Impact: Water pollution and collateral poisoning.					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Low	Permanent	High	Highly Probable	High (60)
<p><b>Description of the impact:</b> The establishment of the citrus orchards under investigation may have potentially enhanced soil erosion following the unlawful removal of the existing 'natural' vegetation. Silt generated by uncontrolled erosion will affect water quality in the Elands River if precautions are not implemented to curtail or prevent excessive erosion, especially as these areas are required to be left undisturbed for the duration of the rectification process. Disturbance of soils during vegetation removal operations and encroachment into the sensitive drainage-line and rocky outcropping areas by heavy earth-moving machinery increases the risk of erosion. The use of this heavy machinery increases the probability of pollution through fuel and lubricant spills from poorly serviced machines as no provision made for a bunded servicing area. With initiation of the operational phase, management of the orchard will require the use of plant protection products in the newly-established orchards. Due to the above, the possibility exists of collateral damage to organisms in the adjacent natural areas and aquatic habitats of the Elands River.</p>					
<p><b>Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• Erosion control program implemented immediately as the development has continued without authorization and then continually monitored following the rectification process.</li> <li>• Buffer zone as recommended re-instated along the drainage-line and maintained throughout.</li> <li>• Appropriate measures applied to manage refuelling and maintenance of heavy earth-moving machinery and, if any spills have occurred, attended to immediately.</li> <li>• Legislative regulations and GlobalG.A.P. prescripts applied to all aspects of storage and application of plant protection products.</li> <li>• Application of Integrated Pest Management systems wherever possible.</li> <li>• Provide staff awareness training to ensure correct procedures are applied with all the above functions.</li> </ul>					
Significance with mitigation					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Low	Permanent	Moderate	Probable	Moderate (39)

7. Impact on aquatic systems.					
Impact: Interruption of sustainable water flow in Ga-Selati River.					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Medium	Permanent	High	Highly Probable	High (64)
<p><b>Description of the impact:</b> The establishment of orchards will require water resources for irrigation purposes. The farm has registered water usage for 30 ha sourced from the Elands River for the farm but have applied for an additional quota for 140 ha. The establishment of the extended orchards will impact on the sustainable water flow to support ecological processes in the aquatic system. Utilization of water from the river, especially during periods of drought, to irrigate orchards, will affect the flow of water to the Flag Boshielo Dam and therefore the Schuinsdraai NR protected area downstream from the unlawful development. The potential lack of water flow will affect aquatic organisms and may lead to reduction in riparian vegetation status. Refuges within the riparian habitat will decline and the river system pools supporting the aquatic ecosystems diminish over time.</p>					
<p><b>Mitigation Measures:</b></p> <ul style="list-style-type: none"> <li>• The allocation of water quotas from the Elands River is managed by DWS.</li> <li>• The Trans-Elands Water Board exists in the farming community and controls irrigation quotas thus ensuring a continued flow of water resources downstream.</li> <li>• The methods of irrigation for citrus orchards whereby micro-irrigation systems are used greatly conserves water.</li> <li>• Protected areas invariably have supplementary water provision in the form of boreholes that mitigates the river (or dam) being the only water source available to wildlife.</li> </ul>					
Significance with mitigation					
Status	Extent	Duration	Magnitude	Probability	Significance
Negative	Medium	Permanent	Moderate	Probable	Moderate (42)

In reference to the above evaluations that are done mostly in retrospect to the unlawful activity, the draft National Biodiversity Offset Policy, as published by the Department of Environmental Affairs in 2017, is considered very pertinent in the rectification process. According to Van Staden *et al* (2018), offsets are the last resort form of mitigation, only to be implemented if nothing else can mitigate the impact. Normally, prior to this the mitigation sequence of ‘to avoid, minimize and rehabilitate’, impacts would be considered. SANBI defines biodiversity offsets as “*measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken*”.

Where a significant negative impact to biodiversity cannot be avoided or minimized, or, as in this case, unlawfully implemented, desirable developments may be approved based on a biodiversity offset. The offsets can be classified in two ways i.e., an on-site offset would entail a biodiversity stewardship agreement and management mechanism for the area set aside, while an off-site offset would conserve biodiversity at an alternative site. Biodiversity offsets should be located in CBAs as receiving areas for it to contribute effectively to protected area expansion and biodiversity

conservation. To compensate for residual biodiversity loss, offsets can comprise of either single or composite areas.

In terms of this investigation, no 'prevention and mitigation' measures are applicable in terms of the development phase, as the correct process was not followed resulting in the Section 24G action.

Quoting from the Ezemvelo KZN Wildlife Concise Guideline, Van Staden *et al.* (2018) further qualify the biodiversity offset process as 'not to be considered when the residual impacts are of 'very high' significance (e.g., if an irreversible impact will occur within an area designated as a CBA)'. This statement is applicable to the present investigation but the biodiversity offset process will, however, still receive consideration. Additionally, environmental offsetting is considered to provide a means by which to slow – and possibly even **reverse** – “ecological deficit” by counterbalancing the degradation, destruction and depletion of natural resources through protection, rehabilitation, restoration and replenishment thereof. In cases where the development is authorized for overriding public and economic considerations, some form of compensation other than ecological offsetting may be required. Ecological offsetting is aimed at counterbalancing residual impacts on biodiversity, whilst compensation may take the form of a contribution to a socially desirable cause. National departments do, however, note that offsets need to be undertaken based on the ecological importance and sensitivity and vulnerability of the ecosystem.

Good practice within the agricultural sector as proposed by Goldblatt *et al.* (2010), can contribute to the mitigation of a proposed development, or as in this case of unlawful development, (and contribute to biodiversity offset processes). By taking into consideration the impacts that have affected the immediate environment in a broader sense and, through the implementation of the recommended good practice principals in future, negative impacts can be mitigated at different levels depending on the specific activities. Following are some of the suggested actions that have been adapted to the unlawful citrus orchard development presently under investigation:

- Identify remaining natural ecosystems of importance on the farm and draw up a management plan for their future protection. This should include activities such as invasive alien plant control, reconnecting natural systems by establishing corridors and drainage system buffer areas, erosion control, judicious water use, pollution control, hunting and poaching control, species checklists, etc.
- Where applicable, enter into a biodiversity stewardship agreement with the local conservation agency and/or neighbouring protected areas.
- Rehabilitate and maintain water sources (e.g., drainage-lines) and wetlands.

- Ensure sustainable extraction rates and monitoring systems when utilizing natural resources or harvesting indigenous species.
- Minimize the use of herbicides; use mulch instead.
- Minimize the use of pesticides and rather encourage plant health (through healthy soil and suitable tree varieties) and populations of pest predators (e.g., in addition to maintaining herbaceous plant layers between orchard rows, leave patches of natural vegetation throughout the farm. Drainage-line buffer areas would have served this purpose.).
- Prevent pesticide, herbicide and fertilizer run-off into the environment e.g., the Elands River system.
- Implement Integrated Pest Management systems to reduce the need for any pesticide application.

## **16. CONCLUSIONS.**

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- The unlawful activity impacted on natural areas that had functional ecosystems present with sensitive habitats in terms of vegetation communities and drainage-line areas. However, the habitat type found at the site is considered 'vulnerable' according to SANBI BGIS biome classification and is regionally replicated in smaller nature reserves and private game farms.
- Two species of protected trees were noted as being fairly prevalent on the farm prior to the unlawful activity. A limited number of bulbous- and succulent plant species specimens (two protected species) were recorded with unearthed unidentifiable bulbs noted in landscaped lands. Wildlife species with protection status, affected by the activity, may still occur on the property and in the remaining natural areas of the farm. Therefore, it is considered that the unlawful activity would not have greatly impacted the integrity of any species, however, the lack of mitigation measures during the unlawful development phase is of concern.
- Cognizance must be taken of disturbed micro-habitats, such as dead tree stumps, and the location of individual plant specimens or specific plant colonies considered to be of 'interest' due mainly to the size, species and growth form that may still occur in the bush-cleared zone or immediately adjacent. In mitigation, where possible, succulent- and bulbous plant species emerging post bush-clearing, should be removed to safe-zones identified at the orchard development site or made available to outside interested parties. Permit requirements must be determined and relevant documentation obtained for any such actions.
- Removal of the woody vegetation layer potentially destroyed many nesting opportunities for certain bird species e.g. cavity-nesters. Some of the larger trees may

have supported a variety of nest-types and the lower shrub layer, a variety of smaller bird species and scrape-nesting species. During surveys at the unlawfully bush-cleared site, not many bird species were observed and were generally more active in adjacent 'natural' areas.

- Wildlife species that are not highly visible, are probably the most affected by activities such as bush-clearing. Fossorial species and aestivators such as the *Breviceps* frog genus, would not have received any mitigating actions during the unlawful activities. Tortoise species e.g., Lobatse Hinge-backed Tortoise, are known to hibernate for extended periods and on a daily basis, therefore, also making them susceptible to any disturbance. Other burrowing or hibernating wildlife species were also potentially threatened during these activities. Any soil disturbance associated with vegetation clearing, landscaping or installation of irrigation systems, requires that actions, on a continual basis, are implemented to rescue such species. With no ECO present or EIA-determined guidelines, this was not possible at the site.
- No signs of serious erosion damage resulting from the unlawful activity were evident during visits. This may be due to the fact that the unlawful activity has mainly taken place during a period of low rainfall leading into the dry season. The erosion potential of some areas e.g., along the gradient, where the bush-clearing activity occurred requires mitigation. The alignment of the landscaped orchards rows in some instances is down the gradient. The affected drainage-line has sensitive soils and preventative measures are considered necessary through the placement of erosion control structures and constant monitoring actions. Where necessary actions to control erosion should be implemented and disturbed areas resulting from the unlawful activity, rehabilitated as soon as possible. Should the continuation of the development receive authorization, erosion preventative measures must be applied immediately wherever required.
- Drainage-lines need protection from any direct impact or any collateral damage that may result due to an unlawful activity or when authorization is given for a proposed development. These areas are considered a refuge for organisms that may remain following bush-clearing or may populate areas of suitable habitat when the activity is fully operational. Failure to delineate crucial buffer areas to protect these habitats has resulted in the total loss of the drainage-line habitat.
- The unlawful activity has led to the destruction of natural habitat and, as a result, impacted on protected tree species in particular and the vegetation component in general. Evidence of protected plant species impact within the vegetation layer at the bush-cleared site was recorded.



- Through the process of biodiversity offsets, sensitive habitats and species that have been affected by bush-clearing activities can be mitigated to a certain extent. Allowing protected tree species to remain within the orchard and the removal of bulbous- or succulent plant species to demarcated safe-zones, are examples of actions that should be applied. Efforts to capture and relocate wildlife species found, that are affected by the agricultural activities, to safe-zones or adjacent natural habitats far removed from the site, furthermore contribute to this process. Combined with the 'Good Practice' principles that have been discussed, through the rehabilitation of potential areas of erosion, preservation of all remaining adjacent natural habitats and the implementation of drainage-line buffer areas, the biodiversity offset process will be facilitated and should continue in the event of authorization granted for the activity to resume.
- Should environmental authorization for the continuation of the activity in the unlawfully cleared area be granted, the appointment of an Environmental Control Officer that is knowledgeable in all fields that have been addressed in this report is recommended to successfully implement mitigation measures and biodiversity offset processes for the operational phase of the development.
- There is a clear indication of significant impacts on certain environmental aspects resulting from the unlawful activity. Under the normal EIA process, prior to the implementation of a proposed development, it is considered that only where there is no clearly defined reason for withholding environmental authorization, would approval be considered as a result of an investigation. If the continuation of this development in terms of the operational phase is authorized, mitigation measures as described in this report should be addressed and biodiversity offsets applied.

## **SECTION 4: References.**

Animal Demographic Unit. <http://vmus.adu.org.za>

Anon, 2015. Citrus Production National Certificate I: Unit 8 – Pests & Diseases Management. NEPAD Publication.

Botha, P.J. 2010. The distribution, conservation status and blood biochemistry of Nile crocodiles in the Olifants river system, Mpumalanga, South Africa. *Phd Dissertation*, University of Pretoria.

Bragg, C. & M.F. Child. 2016. A conservation assessment of *Hystrix africae-australis*. In: Child, M.F., L. Roxburgh, E. Do Linh San, D. Raimondo & H.T. Davies-Mostert. Editors. *The Red List of Mammals of South Africa, Swaziland and Lesotho*. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

BRAHMS: (<http://brahms.sanbi.org>).

Branch, B. 1998. *Field guide to snakes and other reptiles of Sothern Africa*. Struik Publishers, Cape Town.

Cabeton Training & Development. 20??. Learner Guide: Pests, Diseases and Weeds. Citrus Academy, Hillcrest.

Cancelliere, E.C., C.A. Chapman, D. Twinomugisha & J.M. Rothman. 2018. The nutritional value of feeding on crops: Diets of vervet monkeys in a humanized landscape. *Afr J Ecol.* **00**:1–8.

<https://doi.org/10.1111/aje.12496>

DeGeorges, P.A. & B.K. Reilly. 2009. The realities of community based natural resource management and biodiversity conservation in sub-Saharan Africa. *Sustainability* 1, 734-788.

Department of Agriculture, Forestry and Fisheries. Conservation of Agricultural Resources Act No. 43 of 1983.

Department of Agriculture, Forestry and Fisheries. Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act No. 36 of 1947.

Department of Agriculture, Forestry and Fisheries. National Forests Act No. 84 of 1998.

Department of Agriculture, Forestry and Fisheries. Pesticide Management Policy for South Africa. Government Gazette No. 33899, 2010.

Department of Economic Development, Environment and Tourism, Limpopo Province. Limpopo Environmental Management Act No. 7 of 2003.

Department of Economic Development, Environment and Tourism, Limpopo Province. 2013. Five-year strategic plan for Schuinsdraai Nature Reserve, Limpopo Province, South Africa. NCC Environmental Services. <https://www.yumpu.com/en/document/read/39462160/download-ncc-environmental-services>

Department of Economic Development, Environment and Tourism, Limpopo Province. 2013. Limpopo Conservation Plan v2: Technical report EDET/2216/2012.

Department of Economic Development, Environment and Tourism, Limpopo Province. 2019. Sekhukhune District Bioregional Plan: Final.

Department of Environmental Affairs and Tourism. National Environmental Management: Biodiversity Act No. 10 of 2004.

Department of Environmental Affairs and Tourism. National Environmental Management Act No. 107 of 1998.

Department of Environmental Affairs and Tourism. National list of ecosystems that are threatened and in need of protection. Government Notice 1002 of 9 December 2012.

Department of Water and Sanitation. 2001. State of the rivers report: Crocodile, Sabie-Sand & Olifants river systems. *WRC Report No, IT 147/01*. <http://www.csir.co.za/rhp/>

Department of Water and Sanitation. 2005. A practical field procedure for identification and delineation of wetlands and riparian areas: Edition 1.

Department of Water and Sanitation. National Water Act No. 36 of 1998.

Desmet, P.G., Holness, S., Skowno, A. Egan, V.T. 2013. Limpopo Conservation Plan v2: Technical Report. Contract Number EDET/2216/2012. Report for LEDET by ECOSOL GIS.

Dippenaar-Schoeman, A. 2014. *Field guide to the spiders of South Africa*. Lapa Publishers, Pretoria.

- Du Preez, L. & V. Carruthers. 2009. *A complete field guide to the frogs of Southern Africa*. Struik Nature, Cape Town, South Africa.
- Ephriam Mogale Local Municipality. 2021. Spatial Development Framework.
- Ephriam Mogale Local Municipality. 2015/16. Integrated Development Plan.
- Fabian, A. & G. Germishuizen. 1997. *Wild flowers of northern South Africa*. Fernwood Press, Vlaeberg.
- Fey, M. 2010. *Soils of South Africa*. Cambridge University Press, Cape Town.
- Gobosho, L., D. H. Feyssa & T.M. Gutema. 2015. Identification of Crop Raiding Species and the Status of Their Impact on Farmer Resources in Gera, Southwestern Ethiopia. *International Journal of Sciences: Basic and Applied Research (IJSBAR)* Volume **22**: 2 pp 66-82.
- GlobalG.A.P. ???. GlobalG.A.P. integrated farm assurance: All Farm Base | Crops Base | Fruit and Vegetables. Cologne, Germany. [www.globalgap.org](http://www.globalgap.org).
- Goldblatt, A., I. Kotze, B. Corcoran, M. Botha, T. Brinkcate & H-J. Hawkins. (2010). AGRICULTURE: FACTS & TRENDS, South Africa. (Brochure published by WWF-SA).
- Heermans, B.C. 2010. Large vegetated termitaria and fire impacts on reptilian community assemblage in a miombo woodland system heavily impacted by elephants. MSc. Thesis - DST-NRF Centre of Excellence, Percy Fitz Patrick Institute of African Ornithology, University of Cape Town.
- Hill C.M. 1997. Crop-raiding by wild vertebrates: the farmer's perspective in an agricultural community in western Uganda. *Int. J. Pest. Manage.* **43**(1): 77 – 84.
- Holness, S. (2015) An exploratory integrated spatial prioritization for the Olifants Catchment: Bringing livelihoods, ecosystem services, climate change adaptation and biodiversity issues together to identify an integrated set of natural and semi-natural priority areas for supporting overall system resilience. USAID Southern Africa and AWARD, February 2015.
- Husted, A. & P. Kimberg. 2016. Riparian habitat and wetland delineation impact assessment for the proposed surface water developments for augmentation of

- the Western Cape water supply system. Biodiversity Company. *Unpublished Report*.
- Lamarque, F., Anderson, J., Fergusson, R., Lagrange, M., Osel-Owusu, Y. & Bakker, L. 2009. *Human-wildlife conflict in Africa: causes, consequences and management strategies*. Food and Agriculture Organization of the United Nations. Report 157, Rome.
- Land Type Survey Staff. 2002. Land types of South Africa. Department of Agriculture. Pretoria.
- Macfarlane, D.M., I.P. Bredin, J.B. Adams, M.M. Zungu, G.C. Bate, and C.W.S Dickens. 2014. *Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries. Final Consolidated Report*. WRC Report No TT 610/14, Water Research Commission, Pretoria.
- Marais, J. 2004. *A complete guide to the snakes of Southern Africa*. Struik Publishers, Cape Town.
- Measey, G.J. (ed.). 2011. Ensuring a future for South Africa's frogs: a strategy for conservation research. *SANBI Biodiversity Series 19*. South African National Biodiversity Institute, Pretoria.
- Mucina, A., M.C. Rutherford (Eds.). 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia 19*. South African Biodiversity Institute, Pretoria.
- Muruthi, P. 2005. *Human-wildlife conflict: Lessons learned from AWF's heartlands*. African Wildlife Foundation Working Papers.
- Nchanji, A. 2002. *Crop damage around Northern Banyang-Mbo Wildlife Sanctuary*. **In:** Human-Wildlife Conflict – Identifying the problem and possible solutions. Albertine Rift Technical Reports Volume I.
- Nel, J.L., A. Driver, W.F. Strydom, A. Maherry, C. Petersen, L. Hill, D.J. Roux, S. Nienaber, H. van Deventer, E. Swartz and L.B. Smith-Adao. 2011. *Atlas of freshwater ecosystem priority areas in South Africa: Maps to support sustainable development of water resources*. WRC Report No. TT 500/11. Water Research Commission, Pretoria.
- Peel, M.J.S., H. Biggs & P.J.K. Zacharias. 2006. The evolving use of stocking rate indices currently based on animal number and type in semi-arid heterogenous landscapes and complex land-use systems. *African Journal of Range & Forage Science* 15 (3): 117-127.

- Pekas, A. 2011. Biological pest control in citrus: An alternative to chemical pesticides with benefits for essential oil quality. IFEAT International Conference Proceedings, 'Spain: Bridging Continents and Cultures': 115-124.
- Plath, B.L. & D.G. Paterson. (????). Land Type Ah77, Nylstroom 2428. Land Type Inventory.
- Pugh, G. & D. Lee. 2018. Are African Elephants having a negative impact on the ability for bird species to nest in Selati Game Reserve, South Africa. *Dissertation*, University of South Wales.
- SABAP2 (<https://sabap2.adu.org.za>)
- SANBI (<http://redlist.sanbi.org/species.php?>)
- SANBI GIS (<https://bgis.sanbi.org/LUDS/Home/Municipality/137>)
- Seoraj-Pillai, N. 2016. *Human-wildlife conflict in subsistence and commercial farmers in north-eastern South Africa*. Ph.D. Thesis, Faculty of Science, University of the Witwatersrand, Johannesburg.
- Seoraj-Pillai, N. & N. Pillay. 2016. A meta-analysis of human–wildlife conflict: South African and global perspectives. *Sustainability* 2017: 9, 34
- Smithers, R.H.N. 1983. *The mammals of the Southern African subregion*. University of Pretoria, Pretoria, South Africa.
- Swanepoel, C.M. & R.O. Barnard. 2007. *Report to the Water Research Commission on the project "Development of Policy in Wetland Management in Agriculture"*. WRC Report No. K 8/710, Water Research Commission, Pretoria.
- Van Oudtshoorn, F.P. 1992. *Guide to grasses of South Africa*. Briza Publikasies, Arcadia, Pretoria.
- Van Staden, S., N. Cloete, K. Marais, A. Mileson, C. Hooten and H de Beer. 2018. *Biodiversity offset and compensation study and implementation plan*. Scientific Aquatic Services.
- Van Wyk, B. & S. Malan. 1988. *Field guide to the wild flowers of the Witwatersrand & Pretoria region*. Struik Publishers, Cape Town.

Wallace G.E. & C.M. Hill. 2012. Crop Damage by Primates: Quantifying the Key Parameters of Crop-Raiding Events. *PLOS ONE* 7(10): e46636.doi:10.1371/journal.pone.0046636

Woodhall, S. 2005. *Field guide to butterflies of South Africa*. Struik Publishers, Cape Town.

# Addendum I



**Scherp Arabie 743 KS (Portion 18 & R/E of 19)**

## **SURVEY SPECIES LISTS**



<b>Table 10. Plant species listed at site.</b>				
<b>DESCRIPTION</b>		<b>PRESENT</b>		
<b>Plant Species</b>	<b>Form</b>	<b>21 January 2021</b>		
		<b>Zone 1</b>	<b>Zone 2</b>	
<i>Abutilon austro-africanum</i>	Herb	X		
<i>Agathisanthemum bojeri</i>	Succulent		X	
<i>Aloe cryptopoda</i>	Succulent	X		
<i>Alternanthera pungens</i>	Herb		X	
<i>Aloe marlothii</i>	Succulent	X	X	
<i>Aptosium lineare</i>	Herb	X		
<i>Aristida barbicolis</i>	Grass	X	X	
<i>A. stipitata</i>	Grass	X		
<i>Asparagus ?setaceus</i>	Climber	X		
<i>Barleria sinensis</i>	Herb		X	
<i>Berchemia zeyheri</i>	Tree	X		
<i>Boophane disticha</i>	Bulbous	X		
<i>Boscia albitrunca</i>	Tree	X	X	
<i>Cenchrus ciliaris</i>	Grass		X	
<i>Chloris virgata</i>	Grass	X		
<i>Chlorophytum sp.</i>	Bulbous		X	
<i>Cleome angustifolia</i>	Herb		X	
<i>Combretum apiculatum</i>	Tree	X		
<i>C. hereroense</i>	Tree	X		
<i>Commelina ?erecta</i>	Herb	X		
<i>Commicarpus pentandrus</i>	Herb		X	
<i>Commiphora pyrhaanthiodes</i>	Tree	X		
<i>Conyza bonariensis*</i>	Herb	X		
<i>Crinum buphanoides</i>	Bulbous		X	
<i>Cuccumis zeyheri</i>	Creeper	X		
<i>Cussonia paniculata</i>	Tree	X		
<i>Cymbopogon excavatus</i>	Grass	X		
<i>Dichrostachys cinerea</i>	Tree	X		
<i>Dicliptera ?clinopodium</i>	Herb	X		
<i>Digitaria eriantha</i>	Grass	X		
<i>Diospyros lyciodes</i>	Shrub	X	X	
<i>Ehretia rigida</i>	Shrub	X		

<i>Enneapogon cenchroides</i>	Grass	X	X	
<i>Eragrostis curvula</i>	Grass	X	X	
<i>E. gummiphloea</i>	Grass	X	X	
<i>E. lehnmaniana</i>	Grass	X	X	
<i>E. rigidor</i>	Grass	X		
<i>E. superba</i>	Grass	X		
<i>Euclea natalensis</i>	Shrub	X		
<i>Euclea sp.</i>	Shrub	X		
<i>Euphorbia clavigera</i>	Shrub	X		
<i>Flaveria bidentis*</i>	Herb		X	
<i>Gardenia volkensii</i>	Shrub	X		
<i>Geigeria burkei</i>	Herb		X	
<i>Grewia bicolor</i>	Shrub	X	X	
<i>G. monticola</i>	Shrub		X	
<i>Gymnosporia buxifolia</i>	Shrub	X		
<i>Helichrysum ?splendidum</i>	Herb		X	
<i>Helictotrichon turgidulum</i>	Grass	X		
<i>Heliotropium ciliatum</i>	Herb		X	
<i>Heteropogon contortis</i>	Grass	X		
<i>Hibiscus calyphyllus</i>	Herb	X		
<i>Justicia flava</i>	Herb		X	
<i>Kyphocarpa angustifolia</i>	Herb	X	X	
<i>Leucas glabrata</i>	Herb	X		
<i>Megathyrsus maximus</i>	Grass	X	X	
<i>Melinis repens</i>	Grass	X		
<i>Ochna inermis</i>	Shrub	X		
<i>Ocimum angustifolium</i>	Herb	X		
<i>Pappea capensis</i>	Tree	X		
<i>Parapolydora ?natalensis</i>	Herb		X	
<i>Pavonia burchellii</i>	Herb	X	X	
<i>Peltophorum africanum</i>	Tree	X		
<i>Pterodiscus sp.</i>	Herb	X		
<i>Pupalia indica</i>	Herb		X	
<i>Raphionacme sp.</i>	Bulbous	X		
<i>Ruellia pantula</i>	Herb	X		
<i>Sansiveria aethiopica</i>	Rootstock	X	X	
<i>Schmidtia pappophoroides</i>	Grass		X	
<i>Sclerocarya birrea</i>	Tree	X		
<i>Securinega virosa</i>	Shrub		X	
<i>Senegalia ?hereroensis</i>	Tree		X	

<i>Senegalia senegal</i>	Tree	X	X	
<i>Senna italica</i>	Herb	X		
<i>Setaria verticillata</i>	Grass	X		
<i>Sida cordifolia</i>	Herb		X	
<i>Schmidtia pappophoroides</i>	Grass	X		
<i>Solanum panduriforme</i>	Herb	X	X	
<i>Spirostachys africana</i>	Tree	X	X	
<i>Sporobolis fimbriatus</i>	Grass	X		
<i>Strychnos madagascariense</i>	Tree	X		
<i>Stylochaeton natalensis</i>	Bulbous	X	X	
<i>Terminalia prunoides</i>	Tree		X	
<i>Themeda triandra</i>	Grass	X		
<i>Thunbergia neglecta</i>	Herb	X		
<i>Tragia rupestris</i>	Herb	X		
<i>Tragus berteronianus</i>	Grass	X	X	
<i>Tricholaena monachne</i>	Grass	X		
<i>Urochloa mossambicensis</i>	Grass	X	X	
<i>Vachellia gerrardii</i>	Tree	X		
<i>V. nilotica</i>	Tree	X	X	
<i>V. tortilis</i>	Tree	X	X	
<i>Waltheria indica</i>	Herb	X		
<i>Xerophyta retinervis</i>	Rootstock	X		
<i>Zizyphus mucronata</i>	Tree		X	

60	Lepidoptera Larval Host Plants
Blue Font	Protected Species

<b>Table 11. Alien plant species listed at site.</b>			
<b>Species</b>	<b>Common name</b>	<b>Prevalence</b>	<b>Category</b>
<i>Argemone mexicana</i>	Mexican Poppy	Localized	<b>1b</b>
<i>Bidens pilosa</i>	Blackjack	Localized	-
<i>Cereus jamacaru</i>	Queen-of-the-Night	Localized	<b>1b</b>
<i>Opuntia ficus-indica</i>	Sweet Prickly Pear	Widespread	<b>1b</b>
<i>O. stricta</i>	Sour Prickly Pear	Widespread	<b>1b</b>
<i>Datura stramonium</i>	Bone Apple	Localized	<b>1b</b>
<i>Zinnia peruviana</i>	Wildejacobregop	Localized	-

Category 1: Prohibited plants that will no longer be tolerated, neither in rural nor urban areas, except with the written permission of the executive officer or in an approved bio-control reserve.

Category 2: Plants with the proven potential of becoming invasive, but which nevertheless have certain beneficial properties that warrant their continued presence in certain circumstances.

Category 3: Plants with a proven potential of becoming invasive but are popular ornamentals or shade trees. Not allowed to occur anywhere unless in existence before the new regulations and do not occur within 30m of the 1:50 year flood line.

**Table 12. Faunal Species Listed at Sites.**

<b>MAMMALS</b>								
SPECIES	COMMON NAME		SIGN of PRESENCE					
			Seen	Scat	Burrow	Tracks	Signs	Damage
<i>Aepyceros melampus</i>	Impala			X				
<i>Hysterix africae-australis</i>	Porcupine			X			X	X
<i>Helogale parvula</i>	Mongoose, Grey		X					
-	Rodents			X	X			

**Table 12 (contd.). Faunal species listed at site.**

<b>BIRDS (SABAP2 records also indicated)</b>						
Common Name	SABAP2	Sign of Presence				
		Seen	Call	Pellets	Nest	Fledged
Babbler, Arrow-marked	Y		X			
Batis, Chinspot	Y		X			
Bee-eater, White-fronted	Y					
Bishop, Southern Red	Y					
Brubru	Y					
Bulbul, Dark-capped	Y					
Bushshrike, Orange-breasted	Y					
Canary, Black-throated	Y					
Canary, Yellow-fronted	Y					
Cisticola, Rattling	Y					
Cormorant, Reed	Y					
Crake, Black	Y					
Crombec, Long-billed	Y					
Crow, Pied	Y					
Darter, African	Y					
Dove, Laughing	Y					
Dove, Namaqua	Y	X				
Dove, Red-eyed	Y					
Drongo, Fork-tailed	Y					
Eagle, African Fish			X			
Egret, Cattle	Y	X				
Finch, Scaly-feathered	Y					
Flycatcher, Marico	Y					
Francolin, Crested		X				
Go-away-bird, Grey	Y					
Goose, Egyptian	Y					
Goshawk, Southern Pale Chanting	Y					
Guineafowl, Helmeted	Y					
Harrier-hawk, African	Y					

Helmetshrike, White-crested		X				
Heron, Black-headed		X				
Heron, Green-backed	Y					
Heron, Grey	Y					
Hornbill, Southern Red-billed	Y					
Hornbill, Southern Yellow-billed	Y					
Ibis, Hadeda	Y					
Kingfisher, Malakite	Y					
Kingfisher, Pied	Y					
Kite, Black-shouldered	Y					
Lapwing, African Wattled	Y					
Lapwing, Blacksmith	Y					
Lapwing, Crowned	Y					
Lark, Sabota	Y					
Martin, Brown-throated	Y					
Masked-weaver, Southern	Y					
Myna, Common	Y					
Neddicky	Y					
Oriole, Black-headed	Y					
Ostrich, Common	Y					
Ox-pecker, Red-billed	Y					
Quelea, Red-billed	Y					
Quelea, Red-billed	Y					
Robin-Chat, White-throated	Y					
Roller, Lilac-breasted	Y					
Scrub-robin, White-browed	Y					
Shrike, Crimson-breasted	Y					
Shrike, Magpie	Y					
Shrike, Southern White-crowned		X				
Snake-eagle, Black-chested	Y					
Sparrow, Souther Grey-headed	Y					
Sparrow-weaver, White-browed	Y					
Starling, Cape Glossy	Y					
Sunbird, White-bellied	Y					
Swallow, Barn		X				
Swallow, Lesser-striped		X				
Swallow, Pearl-breasted	Y					
Swallow, Wire-tailed	Y					
Swamp-warbler, Lesser	Y					
Swift, Little	Y	X				
Tchagra, Brown-crowned	Y					
Thick-knee, Spotted	Y					
Thrush, Kurrichane	Y					
Tit, Ashy	Y					
Tit, Southern Black			X			
Tit-babbler, Chestnut-vented	Y					

Turtle-dove, Cape	Y					
Wagtail, Cape	Y					
Wood-hoopoe, Green	Y					

Table 12 (contd.). Faunal Species Listed at Scherp Arabie.						
INVERTEBRATES: Butterflies						
Species	Common Name	Sign of Presence				
		Seen	Larva	Chrysalis	Eggs	Oviposit
<i>Danaus chrysippus</i>	African Monarch	X				
<i>Acraea oncaea</i>	Window Acraea	X				
<i>Byblia ilithyia</i>	Spotted Joker	X				X
<i>Junonia hierta cebrene</i>	Yellow Pansy	X				
<i>Cigaritis natalensis</i>	Natal Bar	X				
<i>Cigaritis ella</i>	Ella's Bar	X				
<i>Axiocerses amanga amanga</i>	Bush Scarlet	X				
<i>Zintha hintza</i>	Hintza's Blue	X				
<i>Leptotes pirthous pirthous</i>	Zebra Blue	X				
<i>Azanus ubaldus</i>	Velvet-spotted Babul Blue	X				
<i>Azanus jesous jesous</i>	Topaz-spotted Babul Blue	X				
<i>Zizula hylax</i>	Gaika Blue	X				
<i>Pinacopteryx eriphia eriphia</i>	Zebra White	X				X
<i>Colotis vesta argillaceus</i>	Veined Tip	X				
<i>Colotis antevippe gavisa</i>	Red Tip	X				
<i>Colotis agoye</i>	Speckled Sulphur Tip	X				
<i>Colotis evagore antigone</i>	Small Orange Tip	X				
<i>Colotis eris eris</i>	Banded Gold Tip	X				
<i>Belenois aurota aurota</i>	Brown-veined White	X				
<i>Colias electo electo</i>	African Clouded Yellow	X				
<i>Eurema brigitta brigitta</i>	Broad-bordered Grass Yellow	X				
<i>Spialia delagoae</i>	Delagoa Sandman	X				
<i>Spialia mafa mafa</i>	Mafa Sandman	X				

INVERTEBRATES: Others						
Species	Common Name	Sign of Presence				
		Seen	Signs	Burrow	Nest	Tracks
<i>Nesciothemis farinosa</i>	Black-tailed Skimmer	X				
<i>Diplacodes lefebvrii</i>	Black Percher	X				
<i>Acanthacris ruficornis</i>	Garden Locust	X				
<i>Nephila senegalensis</i>	Banded-legged Nephila	X				
<i>Argiope lobata</i>	Black-lobed Garden Orb-web Spider	X				

## Addendum II



### **Scherp Arabie 743 KS (Portion 18 & R/E of 19)**

S24G Environmental Baseline Data – Scherp Arabie 743 KS (Portion 18 & R/E of 19)



**GLOBALG A.P. INTEGRATED FARM ASSURANCE**  
(Edited)

<b>Table 13. GlobalG A.P. integrated farm assurance.</b>			
<b>Nº</b>	<b>Control Point</b>	<b>Compliance Criteria</b>	<b>Level</b>
<b>AF 4</b>	<b>WORKERS' HEALTH, SAFETY AND WELFARE</b>		
AF 4.2.2	Do all workers handling and/or administering veterinary medicines, chemicals, disinfectants, plant protection products, biocides and/or other hazardous substances and all workers operating dangerous or complex equipment as defined in the risk analysis in AF 4.1.1 have evidence of competence or details of other such qualifications?	Records shall identify workers who carry out such tasks, and can demonstrate competence (e.g. certificate of training and/or records of training with proof of attendance). This shall include compliance with applicable legislation. No N/A. For aquaculture, cross-reference with Aquaculture Module AB 4.1.1. In livestock, for workers administering medicines proof of adequate experience is also required.	Major Must
<b>AF 6</b>	<b>WASTE AND POLLUTION MANAGEMENT, RECYCLING AND RE-USE</b>		
AF 6.2.3	Are holding areas for diesel and other fuel oil tanks environmentally safe?	All fuel storage tanks shall conform to the local requirements. When there are no local requirements to contain spillage, the minimum is bunded areas, which shall be impervious and be able to contain at least 110% of the largest tank stored within it, unless it is in an environmentally sensitive area where the capacity shall then be 165% of the content of the largest tank. There shall be no-smoking signs displayed and appropriate fire emergency provisions made nearby.	Minor Must
AF 6.2.5	Is the water used for washing and cleaning purposes disposed of in a manner that ensures the minimum health and safety risks and environmental impact?	Waste water resulting from washing of contaminated machinery, e.g. spray equipment, personal protective equipment, hydro-coolers, or buildings with animals, should be collected and disposed of in a way that ensures the minimum impact on the environment and the health and safety of farm staff, visitors and nearby communities as well as legal compliance. For tank washings see CB 7.5.1.	Recom
<b>AF 7</b>	<b>CONSERVATION</b>		
AF 7.1.1	Does each producer have a wildlife management and conservation plan for the farm business that acknowledges the impact of farming activities on the environment?	There shall be a written action plan that aims to enhance habitats and maintain biodiversity on the farm. This can be either an individual plan or a regional activity that the farm is participating in or is covered by. It shall pay special attention to areas of environmental interest being protected and make reference to legal requirements where applicable. The action plan shall include knowledge of integrated pest management practices, nutrient use of crops, conservation sites, water supplies, the impact on other users, etc.	Minor Must
AF 7.1.2	Has the producer considered how to enhance the environment for the benefit of the local community and flora and fauna? Is this policy compatible with sustainable commercial agricultural production and does it strive to minimize environmental impact of the agricultural activity?	There should be tangible actions and initiatives that can be demonstrated 1) by the producer either on the production site or at the local scale or at the regional scale 2) by participation in a group that is active in environmental support schemes concerned with habitat quality and habitat elements. There is a commitment within the conservation plan to undertake a baseline audit of the current levels, location, condition etc. of the fauna and flora on the farm, so as to enable actions to be planned. Within the conservation plan, there is a clear list of priorities and actions to enhance habitats for fauna and	Recom.

		flora where viable and to increase biodiversity on the farm.	
AF 7.2.1	Has consideration been given to the conversion of unproductive sites (e.g. low-lying wet areas, woodlands, headland strips, or areas of impoverished soil, etc.) to ecological focus areas for the encouragement of natural flora and fauna?	There should be a plan to convert unproductive sites and identified areas that give priority to ecology into conservation areas where viable.	Recom.
<b>CB 3</b>	<b>SOIL MANAGEMENT AND CONSERVATION</b>		
CB 3.5	Does the producer use techniques to reduce the possibility of soil erosion?	There is evidence of control practices and remedial measures (e.g. mulching, cross line techniques on slopes, drains, sowing grass or green fertilizers, trees and bushes on borders of sites, etc.) to minimize soil erosion (e.g. water, wind).	Minor Must
CB 3.6	Has the producer taken into account the nutrient contribution of organic fertilizer applications?	An analysis from the supply is carried out or recognized standard values are used, which take into account the contents of NPK nutrients (nitrogen (N), phosphorus (P), potassium (K)) in organic fertilizer applied in order to avoid soil contamination.	Minor Must
<b>CB 4</b>	<b>FERTILIZER APPLICATION</b>		
CB 4.3.1	Separately from plant protection products?	The minimum requirement is to prevent physical cross-contamination between fertilizers (organic and inorganic) and plant protection products by using a physical barrier (wall, sheeting, etc.). If fertilizers that are applied together with plant protection products (i.e. micronutrients or foliar fertilizers) are packed in a closed container, they can be stored with plant protection products.	Minor Must
CB 4.3.5	In an appropriate manner that reduces the risk of contamination of water sources?	All fertilizers are stored in a manner that poses minimum risk of contamination to water sources. Liquid fertilizer stores/tanks shall be surrounded by an impermeable barrier to contain a capacity to 110% of the volume of the largest container, if there is no applicable legislation.	Minor Must
CB 4.4.3	Is organic fertilizer stored in an appropriate manner that reduces the risk of contamination of the environment?	Organic fertilizers shall be stored in a designated area. Appropriate measures, adequate according to the risk assessment in AF 1.2.1., have been taken to prevent the contamination of water sources (e.g. concrete foundation and walls, specially built leak-proof container, etc.) or shall be stored at least 25 meters from water sources.	Minor Must
<b>CB 5</b>	<b>WATER MANAGEMENT</b>		
CB 5.1.1	Are tools used routinely to calculate and optimize the crop irrigation requirements?	The producer can demonstrate that crop irrigation requirements are calculated based on data (e.g. local agricultural institute data, farm rain gauges, drainage trays for substrate growing, evaporation meters, water tension meters for the percentage of soil moisture content). Where on-farm tools are in place, these should be maintained to ensure that they are effective and in a good state of repair. N/A only for rain-fed crops.	Minor Must
CB 5.2.1	Has a risk assessment been undertaken that evaluates environmental issues for water management on the farm and has it been reviewed by the management within the previous 12 months?	There is a documented risk assessment that identifies environmental impacts of the water sources, distribution system and irrigation and crop washing usages. In addition, the risk assessment shall take into consideration the impact of own farming activities on off-farm environments, where information is known to be available. The risk assessment shall be completed, fully implemented and it shall be reviewed and approved annually by the management. See Annex AF.1 (General Guideline for Risk Assessments) and Annex CB.1 (Guideline for On-farm Water Management) for further guidance. No N/A.	Minor Must <i>(Will become Major Must as of 1 July 2017)</i>
CB 5.2.2	Is there a water management plan available that identifies water sources and measures to ensure	There is a written and implemented action plan, approved by the management within the	Minor Must <i>(Will)</i>

	the efficiency of application and which management has approved within the previous 12 months?	previous 12 months, which identifies water sources and measures to ensure efficient use and application. The plan shall include one or more of the following: maps (see AF 1.1.1.), photographs, drawings (hand drawings are acceptable) or other means to identify the location of water source(s), permanent fixtures and the flow of the water system (including holding systems, reservoirs or any water captured for re-use). Permanent fixtures, including wells, gates, reservoirs, valves, returns and other above-ground features that make up a complete irrigation system, shall be documented in such a manner as to enable location in the field. The plan shall also assess the need for the maintenance of irrigation equipment. Training and/or retraining of personnel responsible for the oversight or performance duties shall be provided. Short and long-term plans for improvement, with timescales where deficiencies exist, shall be included. This can either be an individual plan or a regional plan.	<i>become Major Must as of 1 July 2017)</i>
CB 5.2.3	Are records for crop irrigation/fertigation water usage and for the previous individual crop cycle/s with total application volumes maintained?	The producer shall keep records of the usage of crop irrigation/fertigation water that include the date, cycle duration, actual or estimated flow rate, and the volume (per water meter or per irrigation unit) updated on a monthly basis, based on the water management plan and an annual total. This can also be the hours of systems operating on a timed flow basis.	Minor Must
CB 5.4.1	Where legally required, are there valid permits/licenses available for all farm water extraction, water storage infrastructure, on-farm usage and, where appropriate, any subsequent water discharge?	There are valid permits/licenses available issued by the competent authority for all farm water extraction; water storage infrastructure; all on-farm water usage including but not restricted to irrigation, product washing or flotation processes; and where legally required, for water discharge into river courses or other environmentally sensitive areas. These permits/licenses shall be available for inspection and have valid dates.	Minor Must
CB 5.4.2	Where the water permits/licenses indicate specific restrictions, do the water usage and discharge records confirm that the management has complied with these?	It is not unusual for specific conditions to be set in the permits/licenses, such as hourly, daily, weekly, monthly or yearly extraction volumes or usage rates. Records shall be maintained and available to demonstrate that these conditions are being met.	Major Must
<b>CB 6</b>	<b>INTEGRATED PEST MANAGEMENT</b>		
CB 6.1	Has assistance with the implementation of IPM systems been obtained through training or advice?	Where an external adviser has provided assistance, training and technical competence shall be demonstrated via official qualifications, specific training courses, etc., unless this person has been employed for that purpose by a competent organization (e.g. official advisory services). Where the technically responsible person is the producer, experience shall be complemented by technical knowledge (e.g. access to IPM technical literature, specific training course attendance, etc.) and/or the use of tools (software, on-farm detection methods, etc.).	Minor Must
CB 6.2	"Prevention"?	The producer shall show evidence of implementing at least two activities per registered crop that include the adoption of production practices that could reduce the incidence and intensity of pest attacks, and thereby reducing the need for intervention.	Major Must
CB 6.3	"Observation and Monitoring"?	The producer shall show evidence of a) implementing at least two activities per	Major Must

		registered crop that will determine when and to what extent pests and their natural enemies are present, and b) using this information to plan what pest management techniques are required.	
CB 6.4	"Intervention"?	The producer shall show evidence that in situations where pest attacks adversely affect the economic value of a crop, intervention with specific pest control methods will take place. Where possible, non-chemical approaches shall be considered. Not applicable when the producer did not need to intervene.	Major Must
<b>CB 7</b>	<b>PLANT PROTECTION PRODUCTS</b>		
CB 7.1.2	Does the producer only use plant protection products that are currently authorized in the country of use for the target crop (i.e. where such an official registration scheme exists)?	All the plant protection products applied are officially and currently authorized or permitted by the appropriate governmental organization in the country of application. Where no official registration scheme exists, refer to the GLOBALG.A.P. Guideline (Annex CB 3) on this subject as well as the FAO International Code of Conduct on the Distribution and Use of Pesticides. Refer also to Annex CB 3 for cases where the producer takes part in legal field trials for final approval of PPPs by the local government. No N/A.	Major Must
CB 7.1.3	Is the plant protection product that has been applied appropriate for the target as recommended on the product label?	All the plant protection products applied to the crop are suitable and can be justified (according to label recommendations or official registration body publication) for the pest, disease, weed or target of the plant protection product intervention. If the producer uses an off-label PPP, there shall be evidence of official approval for use of that PPP on that crop in that country. No N/A.	Major Must
CB 7.2.1	Are the persons selecting the plant protection products competent to make that choice?	Where the plant protection product records show that the technically responsible person making the choice of the plant protection products is a qualified adviser, technical competence shall be demonstrated via official qualifications or specific training course attendance certificates. Fax and e-mails from advisers, governments, etc. are permissible. Where the plant protection product records show that the technically responsible person making the choice of plant protection products is the producer, experience shall be complemented by technical knowledge that can be demonstrated via technical documentation (e.g. product technical literature, specific training course attendance, etc.).	Major Must
CB 7.3.1	Are records of all plant protection product applications kept and do they include the following minimum criteria: - Crop name and/or variety - Application location - Date and end time of application - Product trade name and active ingredient - Pre-harvest interval	All plant protection product application records shall specify: - The crop and/or variety treated. No N/A. - The geographical area, the name or reference of the farm, and the field, orchard or greenhouse where the crop is located. No N/A. - The exact dates (day/month/year) and end time of the application. The actual date (end date, if applied more than one day) of application shall be recorded. Producers need not record end times, but in these cases it shall be considered that application was done at the end of the day recorded. This information shall be used to crosscheck compliance with the pre-harvest intervals. No N/A. - The complete trade name (including formulation) and active ingredient or beneficial organism with scientific name. The active ingredient shall be recorded or it shall be possible to connect the trade name information to the active ingredient. No N/A.	Major Must

		- The pre-harvest interval has been recorded for all plant protection product applications where a pre-harvest interval is stated on the product label or, if not on label, as stated by an official source	
CB 7.3.3	Justification for application?	The name of the pest(s), disease(s) and/or weed(s) treated is documented in all plant protection product application records. If common names are used, they shall correspond to the names stated on the label. No N/A.	Minor Must
CB 7.3.4	Technical authorization for application?	The technically responsible person making the decision on the use and the doses of the plant protection product(s) being applied has been identified in the records. If a single individual authorizes all the applications, it is acceptable to record this person's details only once. No N/A.	Minor Must
CB 7.3.6	Application machinery used?	The application machinery type (e.g. knapsack, high volume, U.L.V., via the irrigation system, dusting, fogger, aerial, or another method) for all the plant protection products applied (if there are various units, these are identified individually) is detailed in all plant protection product application records. If it is always the same unit of application machinery (e.g. only 1 boom sprayer), it is acceptable to record the details only once. No N/A.	Minor Must
CB 7.3.7	Weather conditions at time of application?	Local weather conditions (e.g. wind, sunny/covered and humidity) affecting effectiveness of treatment or drift to neighboring crops shall be recorded for all PPP applications. This may be in the form of pictograms with tick boxes, text information, or another viable system on the record. N/A for covered crops.	Minor Must
CB 7.3.8	Does the producer take active measures to prevent pesticide drift to neighboring plots?	The producer shall take active measures to avoid the risk of pesticide drift from adjacent plots e.g. by making agreements and organizing communication with producers from neighboring plots in order to eliminate the risk for undesired pesticide drift, by planting vegetative buffers at the edges of cropped fields, and by increasing pesticide sampling on such fields. N/A if not identified as risk.	Recom.
CB 7.5.1	Is surplus application mix or tank washings disposed of in a way that does not compromise food safety and the environment?	Applying surplus spray and tank washings to the crop is a first priority under the condition that the overall label dose rate is not exceeded. Surplus mix or tank washings shall be disposed of in a manner that does compromise neither food safety nor the environment. Records are kept. No N/A.	Minor Must
CB 7.7.1	Are plant protection products stored in accordance with local regulations in a secure place with sufficient facilities for measuring and mixing them, and are they kept in their original package?	The plant protection product storage facilities shall: - Comply with all the appropriate current national, regional and local legislation and regulations. - Be kept secure under lock and key. No N/A. - Have measuring equipment whose graduation for containers and calibration verification for scales been verified annually by the producer to assure accuracy of mixtures, and are equipped with utensils (e.g. buckets, water supply point, etc.), and they are kept clean for the safe and efficient handling of all plant protection products that can be applied. This also applies to the filling/mixing area if this is different. No N/A. - Contain the plant protection products in their original containers and packs. In the case of breakage only, the new package shall contain all the information of the original label. Refer to CB. 7.9.1 No N/A.	Major Must
CB 7.7.2	Sound?	The plant protection product storage facilities are built in a manner that is structurally sound and robust.	Minor Must

		Storage capacity shall be appropriate for the highest amount of PPPs that need to be stored during the PPP application season, and the PPPs are stored in a way that is not dangerous for the workers and does not create a risk of cross-contamination between them or with other products. No N/A.	
CB 7.7.6	Located away from other materials?	The minimum requirement is to prevent cross contamination between plant protection products and other surfaces or materials that may enter into contact with the edible part of the crop by the use of a physical barrier (wall, sheeting, etc.). No N/A.	Minor Must
CB 7.7.8	Is the plant protection product storage facility able to retain spillage?	The plant protection product storage facilities have retaining tanks or products are banded according to 110% of the volume of the largest container of stored liquid, to ensure that there cannot be any leakage, seepage or contamination to the exterior of the facility. No N/A.	Minor Must
CB 7.7.9	Are there facilities to deal with spillage?	The plant protection product storage facilities and all designated fixed filling/mixing areas are equipped with a container of absorbent inert material such as sand, floor brush and dustpan and plastic bags that must be in a fixed location to be used exclusively in case of spillage of plant protection products. No N/A.	Minor Must
CB 7.8.4	When mixing plant protection products, are the correct handling and filling procedures followed as stated on the label?	Facilities, including appropriate measuring equipment, shall be adequate for mixing plant protection products, so that the correct handling and filling procedures, as stated on the label, can be followed. No N/A.	Minor Must
CB 7.10.1	Are obsolete plant protection products securely maintained and identified and disposed of by authorized or approved channels?	There are records that indicate that obsolete plant protection products have been disposed of via officially authorized channels. When this is not possible, obsolete plant protection products are securely maintained and identifiable.	Minor Must
<b>FV 1</b>	<b>SITE MANAGEMENT</b>		
FV 1.1.1	Does the risk assessment for the farm site carried out as identified in AF 1.2.1. make particular reference to microbial contamination?	As part of their risk assessment for the farm site (see AF 1.2.1.), producers shall identify the locations of nearby commercial animal operations, composting and potential sources for ingress by domestic and wild animals, and other contamination routes such as floodwater intrusion and dust.	Major Must