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LIM/EIA/0000948/2019

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED DEVELOPMENT OF ± 340 HECTARES OF ORCHARDS ON PORTIONS 1, 29, 30 & 31 OF BEJA 39 LT, ALBASINI DAM AREA, MAKHADO LOCAL MUNICIPALITY, VHEMBE DISTRICT, LIMPOPO PROVINCE

30 January 2020

Prepared for: Eastern Produce Estates SA (Pty) Ltd
Compiled by: JH Botha
Document version 2.0 – Final

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FINAL EIA REPORT FOR THE PROPOSED DEVELOPMENT OF ± 340 HECTARES OF ORCHARDS ON PORTIONS 1, 29, 30 & 31 OF BEJA 39 LT, ALBASINI DAM AREA, MAKHADO LOCAL MUNICIPALITY, VHEMBE DISTRICT, LIMPOPO PROVINCE

30 January 2020

PROJECT APPLICANT

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JH Botha *(Pri Sci Nat)*
Senior Environmental Scientist – M.Sc. Environmental Management

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REPORT DISTRIBUTION LIST

Surname	Organisation	Position/ Property
Landowner		
Mr P Anderson	Eastern Produce Estates SA (Pty) Ltd	P1, 29, 30 & 31 of Beja 39 LT
Neighbouring landowners		
Mrs Anthea Lombard	Beja Hengelparadys	RE of Beja 39 LT
Mr Dennis Gilbert	Rionde Farm/Gilbert Packers	RE of P5 of Sterkstroom 6LT
Frits Ahrens		RE of P15 of Sterkstroom 6LT
Mr Andrè Prinsloo	Molozi Ttrust	P5 of Beja 39 LT
Ika Cronje	Charles Schlesinger Trust	P6 & 7 of Beja 39 LT
Sanet Badenhorst	El Shaddai	P16 of Beja 39 LT
Dr Tigere	Last Sanctuary	P19 of Beja 39 LT
Jacques Bouwer	Bergheim Estates	RE of P28 of Beja 39 LT
Wynand Louw		RE of Nooitgedacht 3 LT
	Rumic Investments CC	RE of P16 of Goedehoop 8 LT
Nelson	Matidza-Luonde CPA	P17 of Beja 39 LT
	Pilosmart (Pty) Ltd	P20 of Beja 39 LT
	Ruele Fresh Primary Cooperative Ltd	P3 of Hayani 51 LT
Ms Mirungu L Malungana		P3 of Hayani 51 LT
Other I&AP's		
Mr Dries Alberts		
Mr Mukheti	Eskom	Eskom servitude
Mr Ian MacDonald	Soutpansberg Boat Club	
Authorities		
Municipal Manager Director Planning & Dev Councillor Ward 15	Makhado Local Municipality	
Municipal Manager	Vhembe District Municipality	
Mr David Nethengwe	Department of Water & Sanitation	DD: Water Resource Oversight
Mr Foletji Mahlakoane	Department of Agriculture (DAFF)	
Mr Kenneth Maunye	Department of Rural Development & Land Reform	
Mr S Monyepao	Limpopo Department Agriculture	
Case Manager	South African Heritage Resources Agency (SAHRA)	Natasha Higgitt
Mr SW Mothapo	Limpopo Department of Economic Development, Environment & Tourism (LEDET)	

DOCUMENT HISTORY

Report No	Date	Version	Status
12/1/9/2-V93 LIM/EIA/0000948/2019	27 November 2019	1.0	Consultation EIAR
12/1/9/2-V93 LIM/EIA/0000948/2019	30 January 2020	2.0	Final EIAR

RELATED DOCUMENTS

Report No	Date	Version	Report name
12/1/9/2-V93	10 October 2019	2.0	Final Scoping Report
	August 2019	1.0	Ecological & Riparian/Wetland Impact Assessment
	23 October 2019	1.0	Archaeological Impact Assessment
12/1/9/2-V93 LIM/EIA/0000948/2019	30 January 2020	2.0	EMPR

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1 OBJECTIVE OF THE EIA PROCESS

According to Regulation No R 982 of 4 December 2014 (as amended on 7 April 2017), the objective of the EIA process is to, through a process of consultation:

a. Identify the policies and legislation relevant to the study and how the study complies with the policies and legislation.
b. Motivate the need and desirability of the proposed activity including the need and desirability of the activity in the context of the preferred location
c. Identify the location of the development footprint within the preferred site based on an impact assessment and risk ranking process which includes cumulative impacts and a ranking process of all the identified alternatives focussing on the geographical, physical, biological, social, economic and cultural aspects of the environment.
d. Determine the
    a. Nature, significance, consequence, extent, duration and probability of the impacts occurring to inform preferred alternatives; and
    b. Degree to which these impacts
        i. Can be reversed;
        ii. May cause irreplaceable loss of resources, and
        iii. Can be avoided, managed or mitigated.
e. Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment
f. Identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity
g. Identify suitable measures to avoid, manage or mitigate identified impacts and
h. Identify risks that need to be managed and monitored.

2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Name of EAP: AGES Limpopo (Pty) Ltd – Mr JH Botha
Contact details of EAP:
Physical Address: 120 Marshall Street, Polokwane, 0699
Telephone number: 015 291 1577
Fax number: 087 940 0516
E-mail: **jbotha@ages-group.com**

Expertise of EAP: Mr J Botha has been employed at AGES Limpopo for the past 15 years and holds the position of Senior Environmental Scientist. He has gained extensive knowledge and experience

regarding the development of Environmental Impact Assessments for all types of developments as well as the development of environmental management plans, spatial development frameworks and strategic environmental assessments. (Refer to CV of EAP – Appendix G).

3 LOCATION OF ACTIVITY

3.1 SURVEYOR GENERAL 21 DIGIT CODES OF DEVELOPMENT AREA

P1 of Beja 39 LT -	T0LT000000000039000001
P29 of Beja 39 LT -	T0LT000000000039000029
P30 of Beja 39 LT -	T0LT000000000039000030
P31 of Beja 39LT -	T0LT000000000039000031

3.2 PHYSICAL ADDRESS AND FARM NAME

The proposed orchards will be located on Portions 1, 29, 30 & 31 of Beja 39 LT on Beja Estate north of and adjacent to the Albasini Dam in the Makhado Local Municipality (See attached locality map below – Figure 1).

3.3 COORDINATES OF DEVELOPMENT AREA

The following coordinates are at the centre of the proposed orchards:

23°05'37.15"S 30°04'56.48"E

3.4 NATURE OF ACTIVITY

The proposed project will entail the following:

- Clearance of ± 340 ha of indigenous vegetation for orchards to plant macadamia and avocado trees.
- Water will be sourced from boreholes (95%), streams (3.2%) and the Albasini Dam (1.8%) according to the Existing Lawful Water Use for the farm portions – see Appendix F.
- Trees will be irrigated with drippers or micro-jets.

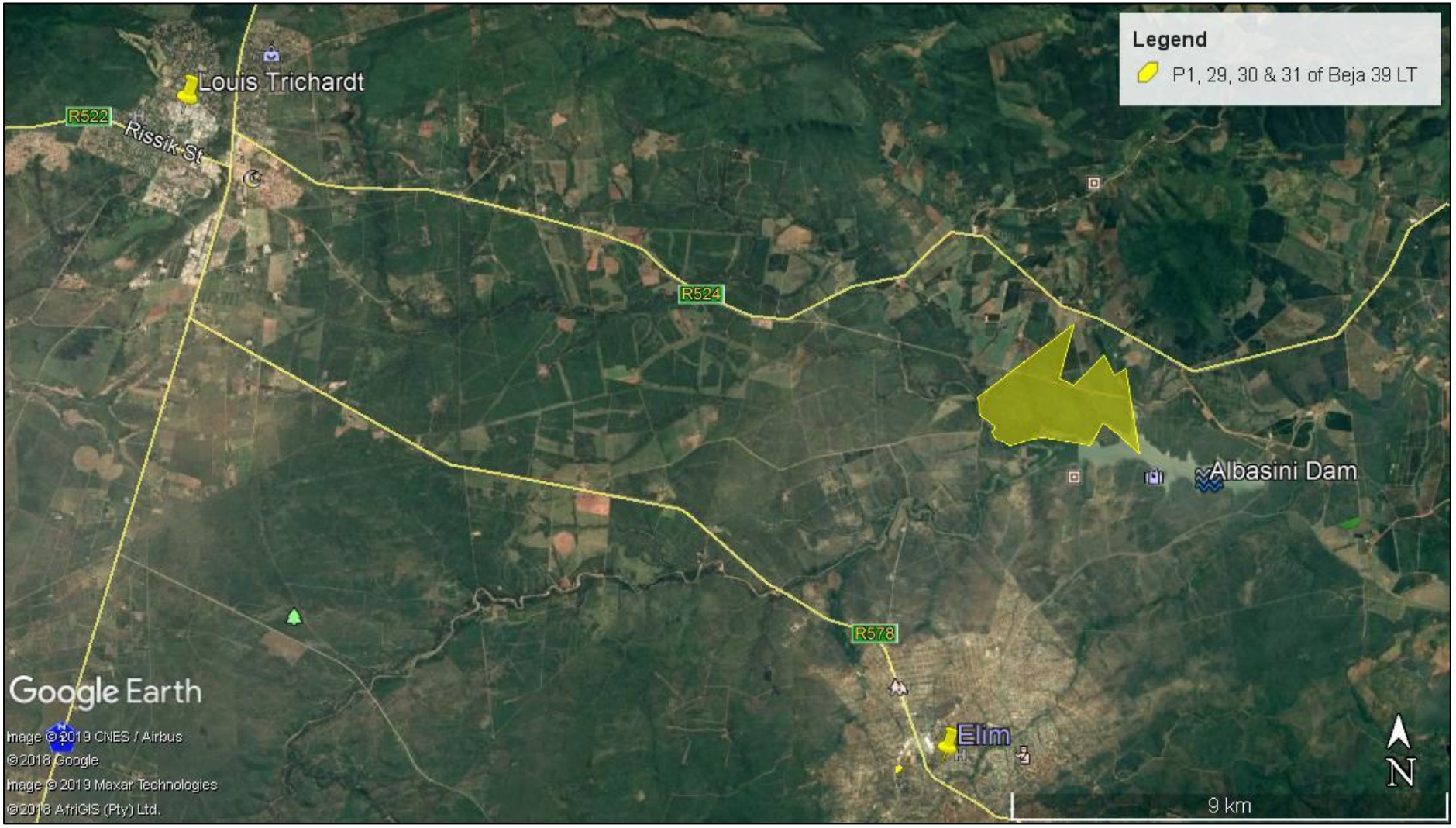

Figure 1. Location of the proposed orchards

4 SCOPE OF THE PROPOSED ACTIVITY

4.1 LISTED ACTIVITIES TRIGGERED IN TERMS OF NEMA

Relevant notice	Description
GN R.984, Item 15 ***"The clearance of an area of 20 hectares or more of indigenous vegetation."***	Approximately 340 ha will be cleared for orchards.

5 LEGAL AND POLICY REQUIREMENTS

The following is a list of relevant Acts applicable to the proposed project. Legislation is however not limited to this list.

Table 1: Summary of relevant legislation

Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
National Water Act, 1998 (Act No. 36 of 1998)
National Forests Act, 1998 (Act No. 84 of 1998)
National Environmental Management Act, 1998 (Act No. 107 of 1998) NEMA EIA Regulations 2014 (GN R. 982, 983, 984, 980 of 4 December 2014)
National Heritage Resources Act, 1999 (Act No. 25 of 1999)
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
National Veld and Forest Fires Act, 1998 (Act No. 101 of 1998)
Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003)
Occupational Health and Safety Act, 1993 (Act No. 80 of 1993)

6 NEED/DESIRABILITY FOR PROPOSED ORCHARDS

Approximately 140 ha of Beja Estate are old croplands that have been cultivated in the past. These areas are infested with alien invader species, are very dense and a fire hazard during dry conditions. There are also approximately 6 ha of *Eucalyptus* trees which have not been managed for many years. The eradication of these invader trees which utilises large amount of groundwater will result in more water being available for agriculture and crop production on the farm while the establishment of orchards on these areas over the next eight years will result in food production, income generation and job creation.

Macadamia nuts are high in demand and the presence of Royal Macadamia close by who constantly requires more macadamias places this area in a favourable position for macadamia orchards. The demand for avocados is on the increase, especially the international market, and the climate and soils are very suitable for avocado production.

7 CONSIDERATION OF ALTERNATIVES

Site alternatives were limited to Beja Estate. The old croplands and *Eucalyptus* plantations are logical alternatives, while natural woodland areas outside of drainage lines and dams have also been identified for orchards development – see figure 3.

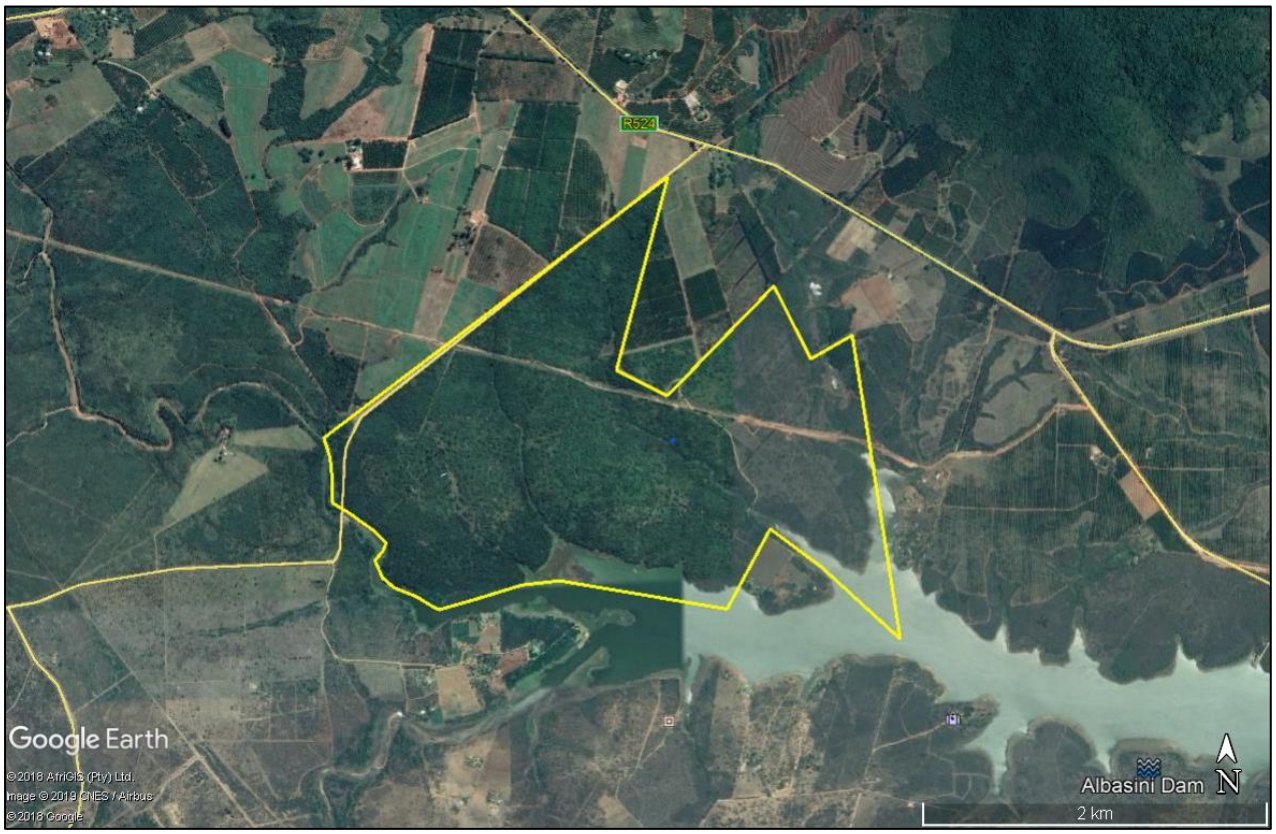

Figure 2. Beja Estate indicating the surrounding land uses

The whole of the project area was traversed by the ecologist and heritage specialist to determine which areas can be developed. The following criteria were used in the evaluation:

- Rare and endangered species and protected species
- Sensitive vegetation and habitats (including riparian areas and buffer areas)
- Topography (slope)
- Water resources (wetlands & drainage channels)
- Presence of cultural heritage resources

The outcome of these investigations indicated the areas which could be developed for orchards (figure 3).

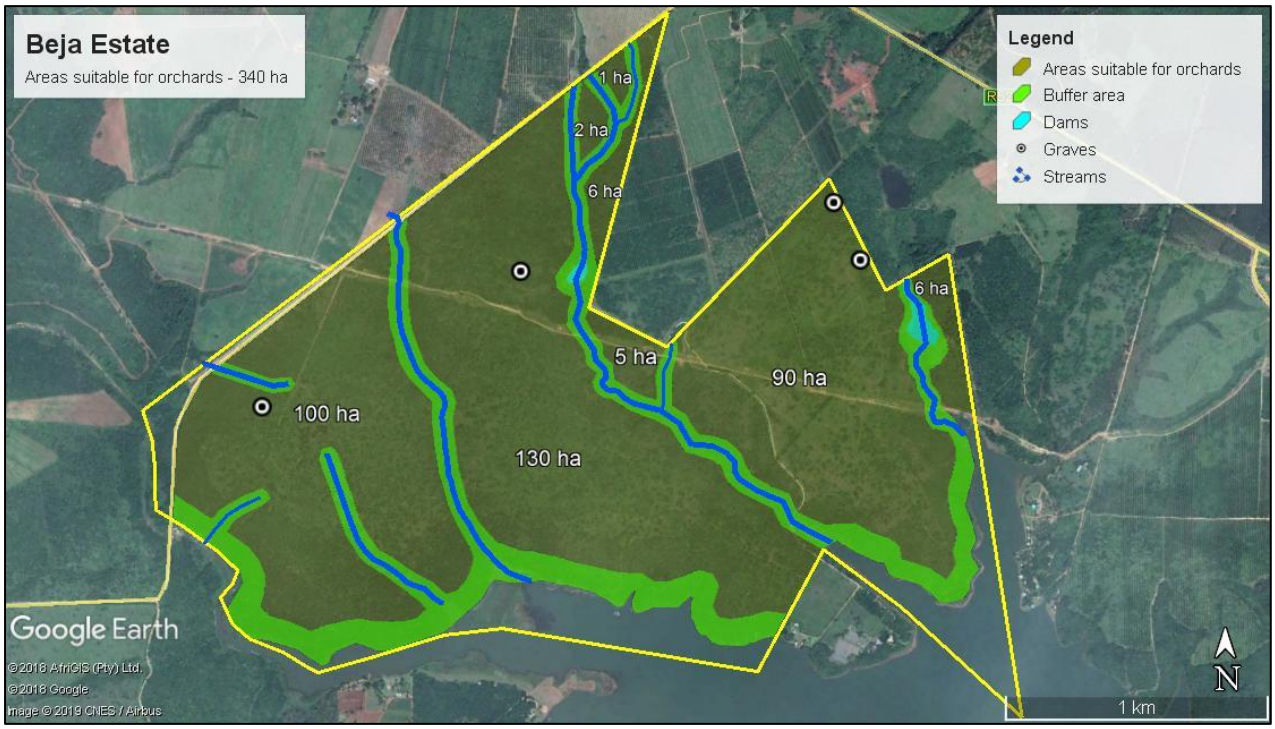

Figure 3. Areas suitable for the development of orchards

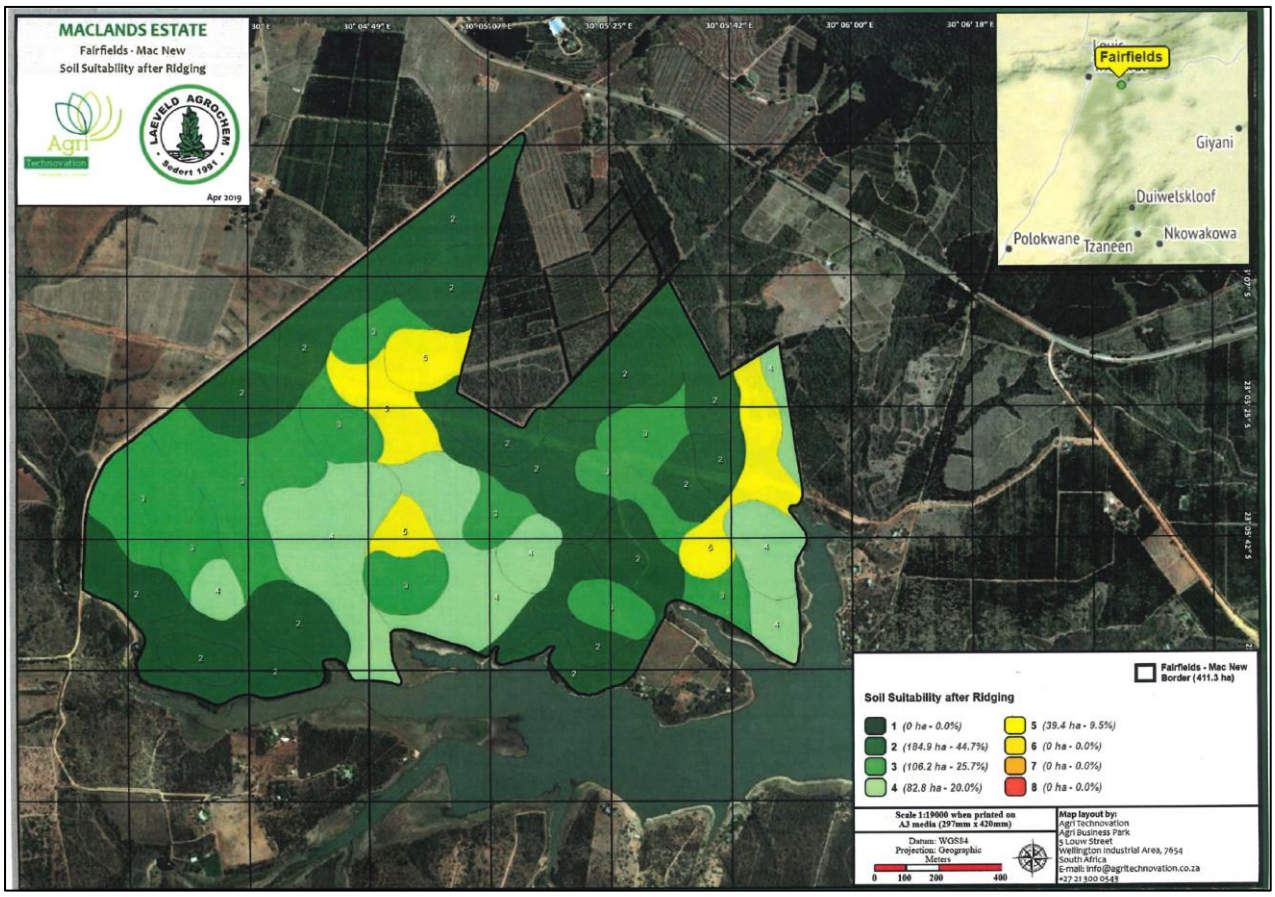

Figure 4. Soil suitability for orchards (1 – highly suitable, 8 – unsuitable)

8 DETAILS OF PUBLIC PARTICIPATION PROCESS UNDERTAKEN

8.1 NEWSPAPER ADVERTISEMENT

The proposed project was advertised in the *Zoutpansberger* on 2 August 2019 to inform people about the orchards and request them to identify environmental issues of concern. An example of this notice is attached in Appendix B.

8.2 SITE NOTICE

Site notices in English were fixed at the entrance to Beja Estate and along the gravel road linking the R524 and R578 on 25 July 2019. An example of this notice and photos of the displayed notices is attached in Appendix B.

8.3 BACKGROUND INFORMATION DOCUMENTS

Background Information Documents (BID's) were e-mailed or hand delivered to neighbours and interested & affected parties.

Background information documents were also sent to:

- Makhado Local Municipality
- Ward 15 Councillor – Makhado Local Municipality
- Vhembe District Municipality
- Department of Water & Sanitation (DWS)
- National Department of Agriculture (DAFF)
- Limpopo Department of Agriculture (DAFF)
- Department of Rural Development & Land Reform (DRDLR)
- Limpopo Department of Economic Development, Environment & Tourism (LEDET)

An example of the Background Information Document is included in Appendix B as well as proof of the distribution thereof.

8.4 SCOPING REPORT AND PLAN OF STUDY FOR EIA

- The Consultation Scoping Report and Plan of Study for EIA was available for a 30-day review period (3 September 2019 – 4 October 2019) to relevant government departments, neighbouring communities and registered I&APs – see Appendix B.
- Site visits were conducted with officials from LEDET, DWS and Makhado Local Municipality.

- The Final Scoping Report and Plan of Study for EIA was approved by LEDET on 18 November 2019.

8.5 CONSULTATION ENVIRONMENTAL IMPACT ASSESSMENT REPORT

- The Consultation Environmental Impact Assessment Report (CEIAR) was submitted to LEDET on 27 November 2019 and to Interested and Affected Parties on 27 & 28 November 2019 and was available for comments until 29 January 2020.

8.6 SUMMARY OF ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

- The following comments were received:
  - Mrs Anthea Lombard from Beja Hengelparadys is concerned about security breaches from the farm during and after development.
  - Mr Dries Alberts, an agricultural consultant, supports the development.
  - Mr Ian Macdonald on behalf of the Soutpansberg Boat Club “fully supports the proposed development but is concerned about reduction in the dam level, noise from pumps & sprayers, impact on water quality resulting from chemical and fertilizer drift and leaching and the impact on aquatic and terrestrial fauna and flora”. See full comments and response in Appendix B.
  - LEDET, requesting:
    - that consultation with the South African Heritage Resources Agency (SAHRA) must take place regarding the graves found on site during the Archaeological Impact Assessment; that recommendations from the heritage specialist must be made in this regard, and that SAHRA must be included in the Interested and Affected Party register. Proof of consultation has been provided (Addendum A to the Archaeological Impact Assessment) and SAHRA has been included in the register of Interested and Affected Parties.
    - clarity as to how the proposed development footprint has been determined with consideration to the ecosystem status (listed as Tzaneen Sour Bushveld, a Vulnerable Ecosystem according to the National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection of 2011) of the site. Comments from the ecological specialist has been provided to address this concern.
  - refer Appendix B.

Comments were received from DAFF and DWS on the Scoping Report – refer to Appendix B.

9 ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE FOOTPRINT

9.1 AIR QUALITY AND NOISE

During the clearance phase the use of machinery and the movement of vehicles will generate dust, exhaust emissions and noise. During the operational phase orchards will only be maintained (pruned, fertilized and sprayed with insecticides). Low levels of noise will be created during the movement of tractors through the orchards.

9.2 CLIMATE

The study area is located in the summer rainfall region of South Africa, with precipitation generally occurring mainly in the period between October and April. The mean annual precipitation for the area measured over 63 years is approximately 791 mm, as measured at Driefontein (weather station 0723-338A; Midgley et al, 1994). This is generally a frost-free area.

9.3 LAND USE

- The farms are zoned as agricultural.
- There are three small *Eucalyptus* plantations and approximately 140 ha are covered by old croplands on the properties. The remaining area is natural woodland in a degraded state due to the presence of alien invader species.
- The dense vegetation and high presence of alien invader species pose a major fire risk at this stage.
- Several drainage channels traverse the area and there are two man-made dams.

Surrounding land uses are as follow:

- Orchards, croplands, grazing lands, plantations and ecotourism.
- The Albasini Dam borders the area to the south.

9.4 WATER AVAILABILITY

Water will be sourced from boreholes, streams and the Albasini Dam according to the registered legal water use for the estate – see Appendix F.

According to the water use calculations in Table 3, there is more than sufficient water available for the proposed 340 ha orchards.

Table 2. Water use calculations

Water balance Beja Estate			
Sources of water in m^3			**Totals (m^3)**
Legal water use from boreholes			5 581 704
Legal water use from streams			195 657
Legal water use from Albasini dam			109 053
Total			**5 886 414**
Orchards to be developed	**Ha**	**Need m^3/ha/year**	**Totals (m^3)**
Macadamia	200	11 850	2 370 000
Avocado	140	12 200	1 708 000
Totals	340		4 078 000
Surplus still available			**1 808 414**

9.5 TOPOGRAPHY AND DRAINAGE

The regional topography of the study area is classified as slightly to moderately undulating plains, with the soils mostly suitable for tree farming.

The study area is located within Quaternary Catchment Area (QCA) A91A and A91B that forms part of the Levhuvhu River Catchment Management Area (CMA).

The drainage lines and water courses with minimum buffer areas as delineated by the wetland specialist are indicated on the maps in figures 3 & 4. A civil engineer has certified that the proposed orchards are outside the 1:100-year flood lines – Appendix A.3.

9.6 STORM WATER

There are non-perennial drainage channels found throughout the proposed orchards areas. The civil engineer agreed that the proposed orchards indicated in figure 11 are outside the 1:100-year flood lines and a certified map has been included as Appendix A.3.

Contours and storm water control measures to control water run-off will be implemented according to the same principles applied on the orchards on other properties owned by the applicant (Maclands Estate).

9.7 GEOLOGY & SOILS

The Levubu/Albasini Dam area is underlain by a Goudplaats Gneiss Basement, forming the foundation for a relatively flat and undulating topography. The gneiss is biotite rich and predominates the Levubu geology. The sequential Schiel Complex, which intruded the gneisses, consists of porphyritic syenite. The younger Vaalian age granites, which are leucocratic, muscovite- and biotite rich, intruded the basement complex. Granite and gneiss outcrops are sparsely distributed, although a syenite outcrop to the south of Levubu, and a biotite-muscovite granite outcrop to the east of Levubu are apparent. Numerous diabase dykes have intruded across the area, trending in a north-east direction. Levubu's red soil is considered an indication of deep granite weathering in comparison to the light coloured, gravel to sandy soils found at higher altitudes.

9.8 VEGETATION (APPENDIX C)

The most recent classification of the area by *Mucina & Rutherford (2006)* shows the site to be part of the Tzaneen Sour Bushveld with an endangered conservation status. Only 3% is statutorily conserved and some 41% has been transformed mainly by cultivation and plantations.

The Tzaneen Sour Bushveld is classified as a Vulnerable Ecosystem according to the National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection of 2011.

The Vulnerable Tzaneen Sour Bushveld is listed as a threatened ecosystem by Sanbi on a broadscale basis. Any representation of this vegetation type considered in a pristine / natural state, should be carefully considered at ground-level (small scale) before any development is approved.

Therefore the ecological surveys focused on verifying the state of the vegetation on the proposed development site. After thorough surveys of the plant communities and flora it was concluded that this vegetation type has been severely degraded on the proposed development footprint through previously cultivated land (± 140 ha), *Eucalyptus* plantations (± 6 ha) and invasion by alien species such as *Chromolaena odorata, Lantana camara, Solanum mauritianum* and many other weed species. In fact, more than 80% of the lower shrub stratum of this specific farm portion has been invaded. **The vegetation on site therefore does not represent pristine vegetation and constitute severely degraded land because of old lands and alien species invasion.** This was taken into consideration in the conclusion of the ecological report that states that based on the ecological surveys and provided all mitigation measures recommended are adhered to, the development can be supported.

The proposed cropland development sites occur on a landscape varying from slightly undulating to moderately undulating plains, bisected by drainage channels. The vegetation units on the site vary according to soil characteristics, topography and land-use. Some sections of the site represent old cultivated fields in a secondary state of succession, varying in density and species composition. Vegetation units were identified on the footprint development sites and can be divided into 5 distinct vegetation units according to soil types and topography.

- *Vachellia sieberiana – Lantana camara* woodland:
    - Dense woodland variation;
    - Secondary old fields (open variation);
- *Vachellia sieberiana – Vachellia karroo – Lantana camara* woodland;
- *Eucalyptus* plantations;
- Drainage features
    - Rivers with riparian woodland:
        - Non-perennial sandy riverbeds with riparian woodland;
        - *Phragmites australis* sandy riverbeds;
        - Perennial Levuhu River floodplain with riparian woodland;
    - Man-made dams (depressions)
- Rocky outcrop.

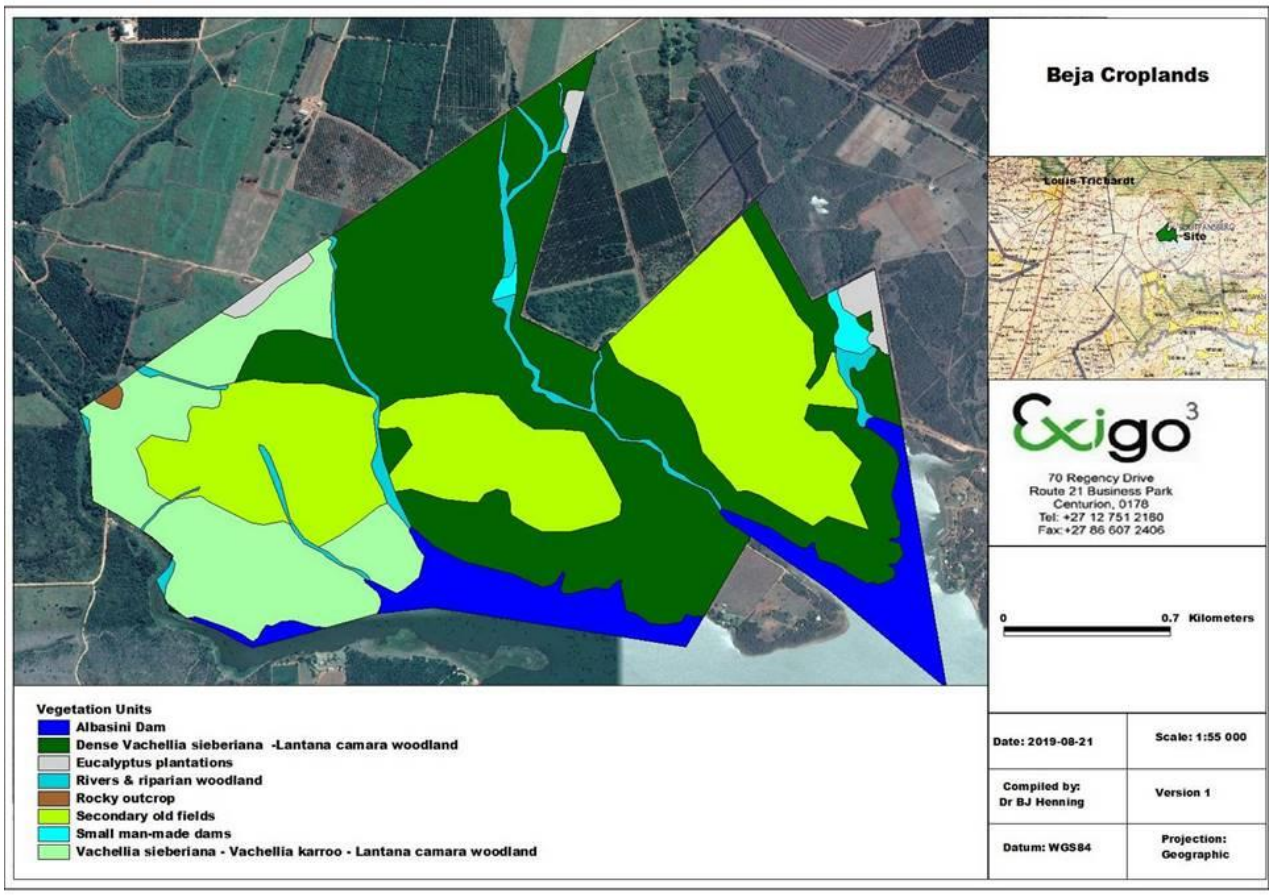

Figure 5. Vegetation units of the project area

Following the investigation and ecological interpretation of the vegetation in the study area and faunal habitat, the following observations and recommendations were made by the ecologist regarding the impacts on the vegetation:

- No red data plant species were found on the site due to the state of the vegetation and physical environment of the larger area mostly not being suitable for any of the red data plant species that may potentially occur in the area.
- Should any of the three protected tree species (Marula, Leadwood & Bushman's tea) be impacted by the proposed developments a permit application must be submitted to the Department of Environment, Forestry and Fisheries to remove these species.
- The woodland areas have a Medium or Medium-low Sensitivity due to its widespread distribution in the project area. The cropland developments can be supported in these areas, provided that a licence is obtained for the removal/destruction of the protected trees.
- The secondary old fields have a Medium-Low Sensitivity.
- The exotic plantations on site have a low sensitivity and unlimited development can be supported in these areas. The eradication of the plantations will significantly improve the baseflow of the streams and rivers in the area;

- The drainage channels and riparian woodland have a High Sensitivity. These areas are important corridors to rare and endemic fauna found in the area.
- The 14 species of Category 1b alien invaders recorded on site must be controlled according to the requirements of CARA.

9.9 WETLAND INTEGRITY ASSESSMENTS (APPENDIX C)

All the rivers on site (non-perennial and perennial Levuhu River) have a “Moderately Modified” Present Ecological Status (PES)(Class C). The channels have been impacted by sedimentation, slight bank erosion, alien species invasion, road crossings, wood harvesting and overgrazing. The Ecological Importance and Sensitivity (EIS) of the area is ‘Moderate’ and considered to be ecologically important and sensitive at least on a local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications and may play a small role in moderating the quantity and quality of water entering downstream areas. The most significant biodiversity features in this section of the rivers are birdlife and amphibians utilising the small dams for breeding and foraging.

9.10 FAUNA (APPENDIX C)

Habitat destruction within the study area will impact on flora and fauna in the following ways:

- The clearing of areas for orchards will lead to the loss of individual plants such as grasses, forbs, trees and shrubs that will be cleared on the footprint areas.
- Due to habitat loss and development activities animals will migrate from the impacted areas and terrestrial numbers will decrease.
- If one considers the habitat descriptions of the red data species, some of them are limited in range or threatened as a direct result of habitat loss in the southern African sub-region (e.g. red duiker), although many of the species in table 13 of Appendix C are not limited by direct habitat loss due to their widespread occurrence (e.g. eagle species have large home ranges).
- The area in general is quite homogenous and therefore has a low potential for biodiversity considering the surrounding vegetation types as well as the degraded state of the site.
- Orchards development will not significantly influence the natural feeding and movement patterns of the existing fauna in the area considering that sensitive habitats will be avoided and buffered to prevent impacts. The protection of different habitat types such as the riparian woodland in the area will be important to ensure the survival of the different animals due to each species’ individual needs and requirements. Sufficient natural corridor sections should be protected around the proposed development footprints to

allow fauna to move freely between the different vegetation units on the property.

9.11 IMPACT OF WATER ABSTRACTION FROM DAM ON FAUNA AND FLORA

Human activities, such as abstraction (the direct removal of water from aquifers) and impoundment (construction of dams for various purposes); have greatly modified the natural flow regimes of the Levuhu River in the larger area. The amount of water planned for abstraction from the Albasini Dam to irrigate the orchards is 1.8% of the Existing Lawful Use for the farms. The following are potential impacts associated with water abstraction on fauna and flora of the Albasini Dam:

- Shifts in invertebrate assemblages. For example, reduced abundance of filter feeding invertebrates and a reduction of stoneflies and heptageniid mayflies, which favour clean stones and well-oxygenated water, and an increase in taxa associated with low velocity including chironomids and molluscs. Some macro invertebrates are able to survive short episodes of low flow, providing adequate refugia are available. However, prolonged artificially low flow conditions can lead to invertebrate mortality or replacement by more tolerant groups of invertebrate.
- Low flows may inhibit the growth of certain aquatic plants.
- Change in fish communities, with species requiring higher oxygen concentrations being replaced by more generalist species.

Although some impacts are anticipated these impacts are minimal considering the abstraction volume from the dam itself (1.8% of total water needed).

9.12 SENSITIVITY ANALYSIS (APPENDIX C)

The Critical Biodiversity Areas (CBA's) are indicated on figure 7. The orchards are located in the following areas:

- Most of the area is located in a "CBA2" area according to the following criteria:
    - Climate change – the replacement of degraded indigenous vegetation with orchards will help to combat climate change.
    - Vhembe Biosphere – the area falls within the transitional zone where agriculture is allowed.
    - Tzaneen Sour Bushveld - most of this area is in a largely degraded state (old lands and plantations and alien invaders) and not a representative example of this veld type.
    - Corridors and aquatic buffers – the 30 m buffer along drainage channels and

dams and the 100 m buffer from the Levubu River and Albasini Dam will ensure that corridors remain functional.

- Threatened species (African Finfoot & Tawny Eagle) – the habitat of the African Finfoot (rivers, streams and dams with good cover on the banks) will not be disturbed. The Tawny Eagle prefers open dry habitats such as open grasslands, savannas and mountainous regions. They tend to avoid dense forests as these may restrict their movement. Because of the dense trees and shrubs with long grass species the study area is not an optimal habitat for these birds.
- This study area should rather be classified as an "ESA" area or "Other Natural Area" that should be managed for sustainable development.

- A section of the site is classified as "No Natural Habitat remaining".
- A small section of the site is classified as an "ESA2" that is considered a more accurate representation for the entire site.

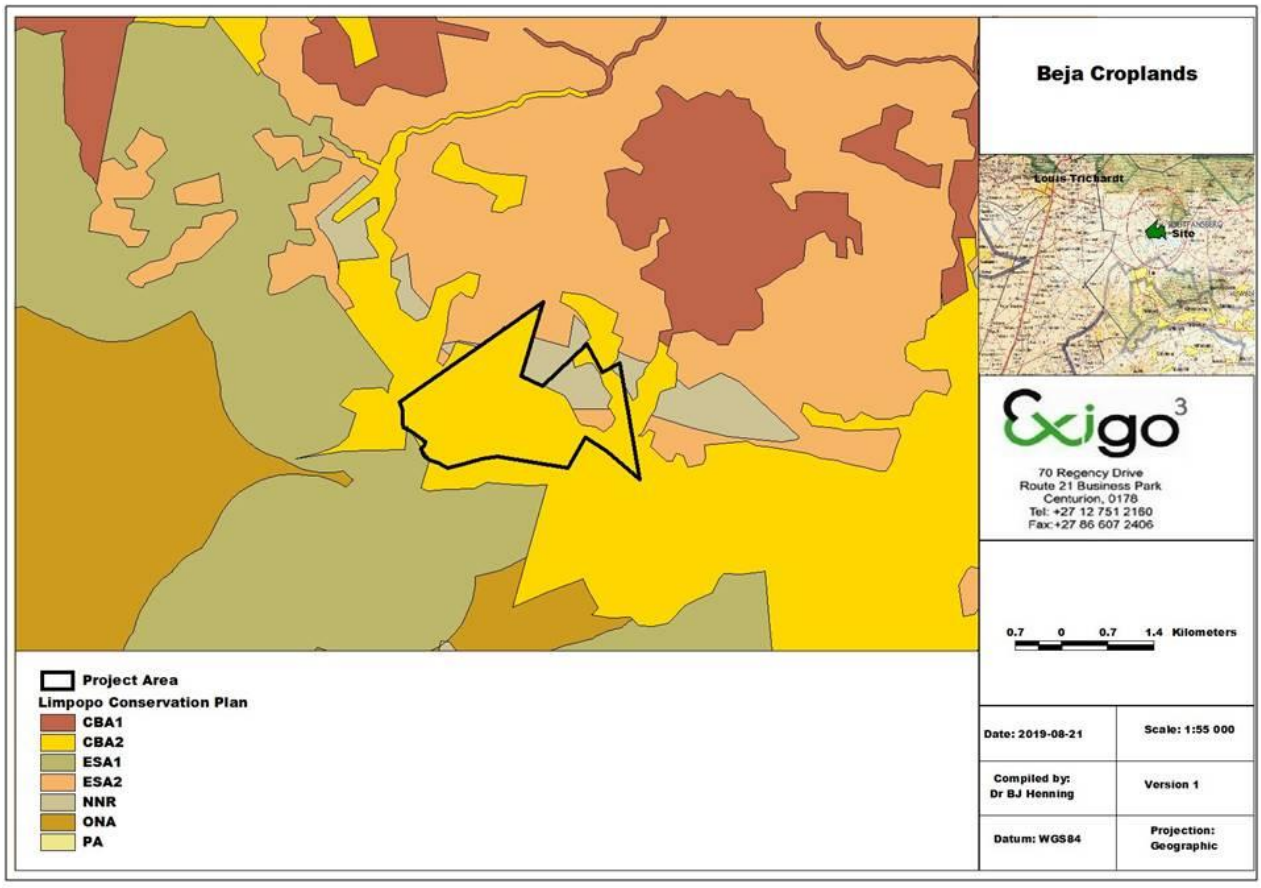

Figure 6. Critical Biodiversity map

The classification of the study area into different sensitivity classes and development zones was based on information collected at various levels on different environmental characteristics. Factors which determined sensitivity classes were as follows:

- Presence, density and potential impact of development on rare and protected plant species.
- Conservation status of plant communities in the Savanna Biome.
- Critical Biodiversity Areas.
- Important Bird Areas.
- Drainage & hydrology of area.
- Previous land use and state of the vegetation in general.

Figure 7 represents the sensitivity map for the project area.

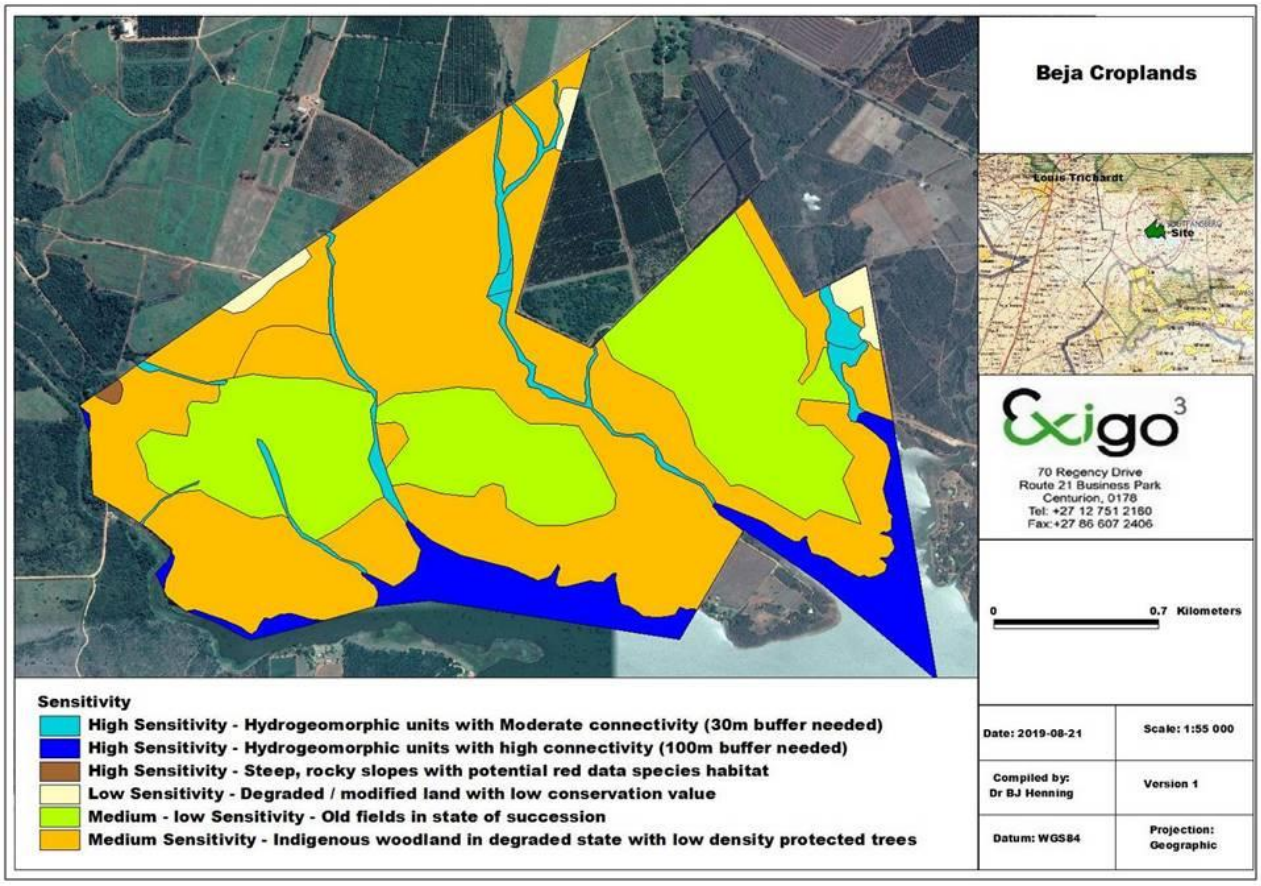

Figure 7. Sensitivity map for the project area

9.13 SOCIO-ECONOMIC ASPECTS OF MAKHADO LOCAL MUNICIPALITY

Unemployment: 45% of the economically inactive population are unemployed.

Economic profile of local municipality:
The formal economy of the Makhado Municipality can be considered a “dual economy”, as it comprises two distinct elements namely the sophisticated economy of the Makhado town and surrounding farms and the informal economies of surrounding townships and rural areas.

Makhado town provides a regional function to the surrounding areas (e.g. trade services, banking, manufacturing, storage etc), because of its size and level of sophistication.

The agriculture, trade and services sectors largely drive the formal economy of Makhado Town, Vleifontein, Elim, Dzanani, Levubu and Vuwani. A portion of the Makhado economy comprises of the processing of primary products produced locally.

Challenges:

- An increase in the levels of unemployment implies a decrease in monetary income. The low levels of income have an impact on the ability of the community to afford the cost of the services rendered to them.
- Local tourism is not developed to its full potential.
- There is in general a low level of formal education, vocational training and the development of entrepreneurship. People may be aware of economic opportunities but cannot gain access to capital.
- A large portion of the community does not have the knowledge nor access to the information required for proper personal financial management.
- The formal economy is very dependent on services.
- There is also a lack of proper tourism and marketing programmes.

Economic growth:

The municipality has developed the Local Economic Development Strategy in order to create opportunities for local residents, assist in the alleviation of poverty, the redistribution of resources and opportunities to the benefit of all local residents. **The strategic thrusts of the LED plan are the following:**

- Overcoming the constraints to economic development in Makhado.
- Creating an enabling environment for local economic development.
- SMME and entrepreneurship development.
- Support to co-operatives

In light of the aforementioned, the following conclusions can be made about the socio-economic profile of the municipality:

- The gender profile of the municipality indicates a high proportion of females (55%) for Makhado. This situation suggests that a significant number of their male counterparts have migrated elsewhere for opportunities.
- It is interesting to note that 31% of the population in Makhado is illiterate.
- With regard to employment, approximately 55% of the total population are formally employed in Makhado.
- The majority of the population (77%) falls within the economically inactive age categories.

As it is suggested the majority of the male population work elsewhere and as such the general income of households is remittance income from these migrant workers.

9.14 SOCIO-ECONOMIC VALUE OF THE ACTIVITY

What is the expected capital value of the activity on completion?	**R 60 000 000**	
What is the expected yearly income that will be generated by or as a result of the activity?	**R 66 000 000**	
Will the activity contribute to service infrastructure?	[redacted]	**NO**
Is the activity a public amenity?	[redacted]	**NO**
How many new employment opportunities will be created in the development and construction phase of the activity/ies?	**70**	
What is the expected value of the employment opportunities during the development and construction phase?	**R 2 450 000**	
What percentage of this will accrue to previously disadvantaged individuals?	**95%**	
How many permanent new employment opportunities will be created during the operational phase of the activity?	**90**	
What is the expected current value of the employment opportunities during the first 10 years?	**R 27 000 000 direct and R18 000 000 downstream**	
What percentage of this will accrue to previously disadvantaged individuals?	**90%**	

The following socio-economic impacts may arise during the clearance and establishment phases of the proposed orchards:

- Socio-economic benefits through job creation (especially in the lower skilled levels).
- Training and capacity building with enhancement of the skills of individual workers.

During the operational phase the following impacts and issues are anticipated:

- Provision of job opportunities for local and skilled workers.
- Skills development of workers.

9.15 VISUAL ASPECTS

Clearing of areas will result in a change of the visual attributes especially in the short to medium term. The change of *Eucalyptus* plantations to orchards will have a positive visual impact. The change from vegetation that is in a secondary succession phase and degraded natural veld that have been encroached by indigenous species and invaded by alien species to orchards will improve the visual attributes of the area especially because it is within a fruit estate that is highly

productive in terms of agriculture. Macadamia nut and avocado trees are perennial and therefore the area is not ploughed on an annual basis which also reduces visual impact.

9.16 HERITAGE RESOURCES (APPENDIX D)

According to the Phase 1 Heritage/Archaeological Resources Scoping Report the following information was obtained during the site survey in September 2019:

- The remains of a culvert as well as Beja and Lombard farmstead remains dating to the Historical Period are poorly preserved and hold no heritage meaning or significance.
- Four burial sites occur within the project site. These sites are of high significance and must be conserved *in situ* with a buffer of 20 m around them. The sites must be fenced with access gates. A case was registered with SAHRA under Case number 14721.
- No Iron Age remains were recorded.
- No Stone Age remains were recorded.
- The area lies within the grey zone regarding palaeontological sensitivity on the SAHRIS map.

If subsurface archaeological deposits, artefacts or skeletal material are recovered during the orchards establishment process, all activities at that specific site must be suspended and reported to the Limpopo Heritage Authority or the archaeologist, and may require further mitigation measures.

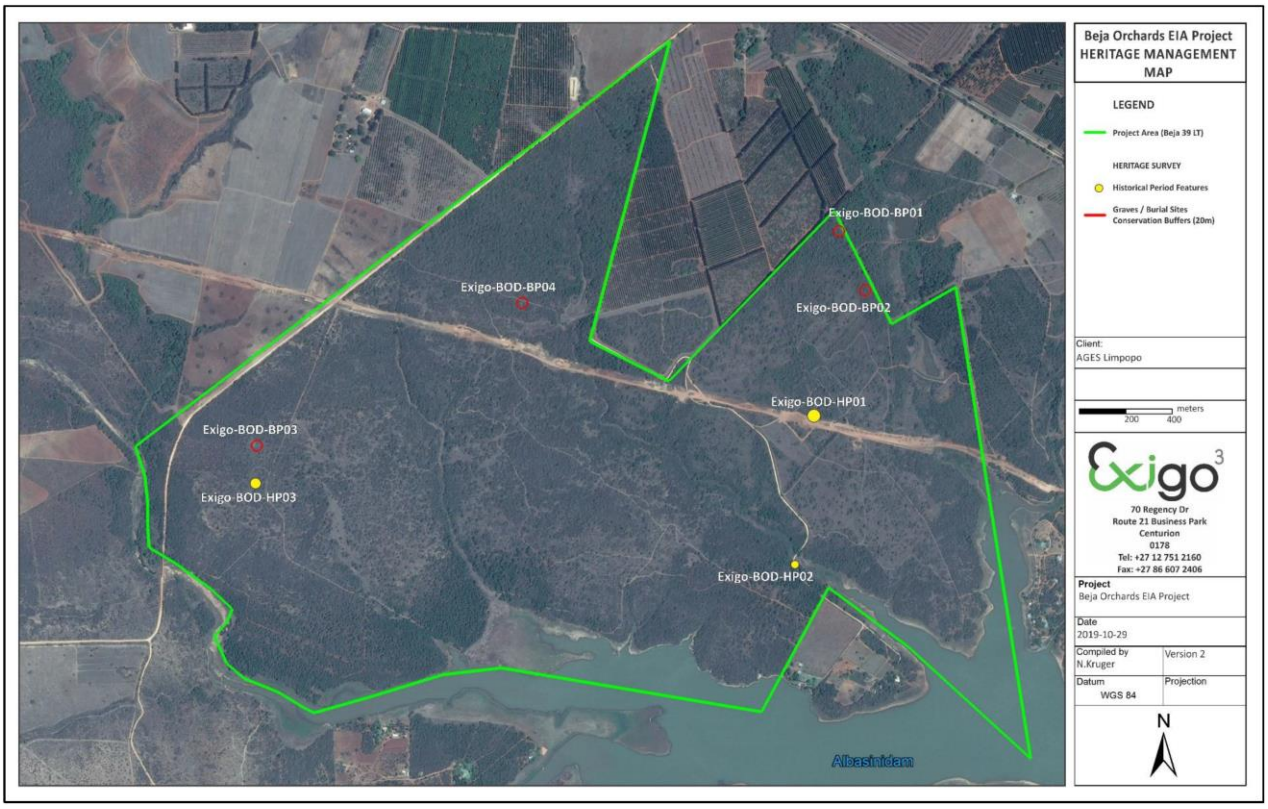

Figure 8. Positions of recorded heritage sites

9.17 SOLID WASTE MANAGEMENT

The establishment of the orchards will mainly produce vegetation debris that will be used for compost and firewood.

All recyclable material (used pipes, plastics and steel) should be recycled.

10 IMPACTS AND RISKS IDENTIFIED

10.1 METHODOLOGY USED IN RANKING THE NATURE, SIGNIFICANCE, CONSEQUENCES, EXTENT, DURATION AND PROBABILITY OF POTENTIAL IMPACTS AND RISKS ASSOCIATED WITH THE ALTERNATIVES

To assess the impacts on the environment, the process will be divided into two main phases namely the development phase and the operational phase. The activities, products and services present in these two phases will be studied to identify and predict all possible impacts.

In any process of identifying and recognising impacts, one must recognise that the determination of impact significance is inherently an anthropocentric concept. *Duinker and Beanlands, (1986) in DEAT 2002. Thompson (1988), (1990) in DEAT 2002* stated that the significance of an impact is an expression of the cost or value of an impact to society.

However, the tendency is always towards a system of quantifying the significance of the impacts so that it is a true representation of the existing situation on site. This will be done by using where ever possible, legal and scientific standards which are applicable.

The significance of the aspects/impacts of the process will be rated by using a matrix derived from *Plomp (2004)* and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The consequence matrix uses parameters like severity, duration and extent of impact as well as compliance to standards. Values of 1-5 are assigned to the parameters that are added and averaged to determine the overall consequence. The same process is followed with the likelihood that consists of two parameters namely frequency and probability. The overall consequence and the overall likelihood are then multiplied to give values ranging from 1 to 25. These values as shown in the following table are then used to rank the significance. It must be said however that in the end, a subjective judging of an impact can still be done, but the reasons for doing so must be qualified.

Table 3. Significance ratings (Plomp 2004)

Significance	Low -	Low-Medium -	Medium -	Medium-High -	High -
Overall Consequence X Overall Likelihood	1-4.9	5-9.9	10-14.9	15-19.9	20-25

Significance	Low +	Low-Medium +	Medium +	Medium-High +	High +
Overall Consequence X Overall Likelihood	1-4.9	5-9.9	10-14.9	15-19.9	20-25

Description of the parameters used in the matrixes

Severity:

Low	Low cost/high potential to mitigate. Impacts easily reversible, non-harmful insignificant change/deterioration or disturbance to natural environments
Low-medium	Low cost to mitigate Small/ potentially harmful Moderate change/deterioration or disturbance to natural environment.
Medium	Substantial cost to mitigate. Potential to mitigate and potential to reverse impact. Harmful Significant change/ deterioration or disturbance to natural environment
Medium-high	High cost to mitigate. Possible to mitigate Great/Very Harmful Very significant change/deterioration or disturbance to natural environment
High	Prohibitive cost to mitigate. Little or no mechanism to mitigate. Irreversible. Extremely Harmful Disastrous change/deterioration or disturbance to natural environment

Duration:

Low	Up to one month
Low-medium	One month to three months
Medium	Three months to one year
Medium-high	One to ten years
High	Beyond ten years

Extent:

Low	Within the orchards footprint
Low-medium	Within Beja Estate
Medium	Within surrounding farms
Medium-high	Within Makhado municipality area
High	Vhembe region

Frequency:

Low	Once/more a year or once/more during operation
Low-medium	Once/more in 6 months
Medium	Once/more a month
Medium-high	Once/more a week
High	Daily

Probability:

Low	Almost never/almost impossible
Low-medium	Very seldom/highly unlikely
Medium	Infrequent/unlikely/seldom
Medium-high	Often/Regularly/Likely/Possible
High	Daily/Highly likely/definitely

Compliance:

The following criteria are used during the rating of possible impacts.

Low	Best Practise
Low-medium	Compliance
Medium	Non-compliance/conformance to policies etc. - internal
Medium-high	Non-compliance/conformance to legislation etc. - external
High	Directive, prosecution of closure or potential for non-renewal of licences or rights

10.2 ASSESSMENT CRITERIA

The terms of reference for the study include criteria for the description and assessment of environmental impacts. These criteria are drawn from the *Integrated Environmental Management Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts*, published by the DEA in terms of the Environmental Impact Assessment. These criteria include:

Table 3: Impact Assessment Criteria

Nature of impact This is an appraisal of the type of effect the proposed activity would have on the affected environmental component. The description should include what is being affected and how.		
Extent The physical and spatial size of the impact.	**Site**	The impact could affect the whole, or a measurable portion of the above-mentioned properties.
	Local	The impacted area extends only as far as the activity, e.g. the footprint.
	Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining farms.
Duration The lifetime of the impact; this is measured in the context of the lifetime of the base.	**Short term**	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than any of the phases.
	Medium term	The impact will last up to the end of the establishment of the orchards, where after it will be entirely negated.
	Long term	The impact will continue or last for the entire operational life of the orchards, but will be mitigated by direct human action or by natural

		processes thereafter.
	Permanent	The only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
Intensity	**Low**	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
	Medium	The affected environment is altered, but function and process continue, albeit in a modified way.
	High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
Probability The likelihood of impacts occurring. Impact may occur for any length of time during the life cycle of activity and not at any given time.	**Improbable**	The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
	Probable	There is a possibility that the impact will occur to the extent that provisions must be made therefore.
	Highly probable	It is most likely that the impacts will occur at some or other stage of the orchards. Mitigation plans must be drawn up before the undertaking of the activity.
	Definite	The impact will take place regardless of prevention plans, and there can only be relied on mitigation actions or contingency plans to contain the effect.
Determination of significance. Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.	**No significance**	The impact is not substantial and does not require any mitigation action.
	Low	The impact is of little importance, but may require limited mitigation.
	Medium	The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
	High	The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the proposed orchards unacceptable. Mitigation is therefore essential.

The general approach to this study has been guided by the principles of Integrated Environmental Management (IEM). In accordance with the IEM Guidelines issued by the DEA, an open approach, which encourages accountable decision-making, was adopted.

10.3 POSITIVE AND NEGATIVE IMPACTS THAT THE PROPOSED ACTIVITY AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY

- The positive impact that the development will have on the community is a socio-economic impact because of job creation. This will help to alleviate poverty in the area.
- The production of food for the local and export market will have a positive socio-economic impact.
- The development of orchards will reduce the fire hazard of the dense vegetation drastically.
- The removal of indigenous vegetation and faunal habitat is a negative impact.
- Increased use of water for irrigation may have a negative impact on the water resource if not managed correctly.

10.4 CONCLUDING STATEMENT INDICATING THE PREFERRED ALTERNATIVE AND LOCATION OF THE ACTIVITY

The preferred alternative was selected based on the following facts:

- Current successful farming with macadamia trees by the applicant.
- Dripper/micro-jets irrigation will be the most effective way of irrigation.
- The site is currently unused and has the potential to become a successful and productive farm.
- The woodland areas have a Medium or Medium-low Sensitivity due to its widespread distribution in the project area.
- The secondary old fields associated have a Medium-Low Sensitivity.
- The exotic plantations on site have a low sensitivity and unlimited development can be supported in the area. Eradication of alien vegetation and plantations will significantly improve the baseflow of the streams and rivers and water availability in the area.
- The drainage channels, Albasini Dam and riparian woodland have a High Sensitivity. These areas are important corridors to rare and endemic fauna found in the area. Buffer zones of 30 meters for the smaller non-perennial rivers and 100 meters for the perennial Levubu River and Albasini Dam should be strictly adhered to.
- Red duiker was identified on site but their habitat is the riverine areas that will not be disturbed.
- Low numbers of protected trees occur on site.
- The site has moderate slopes and suitable soils.
- The four burial sites are of high significance and must be conserved *in situ* with a buffer of 20 m around them. The sites must be fenced with access gates.

11 DESCRIPTION OF THE PROCESS TO IDENTIFY AND RANK THE ENVIRONMENTAL IMPACTS THAT THE ACTIVITY WILL IMPOSE ON THE PREFERRED LOCATIONS THROUGH THE LIFE OF THE ACITIVITY

An environmental impact is defined as a change in the environment, be it the physical/chemical, biological, cultural and or socio-economic environment. Any impact can be related to certain aspects of human activities in this environment and this impact can be either positive or negative. It could also affect the environment directly or indirectly and the effect of it can be cumulative.

11.1 DESCRIPTION OF ENVIRONMENTAL ISSUES AND RISKS IDENTIFIED DURING THE EIA PROCESS

The potential aspects that were assessed during the EIA process are:

- Air quality
- Noise aspects
- Water use from available resources
- Surface and groundwater impacts and its effect on dam levels
- Impacts on water quality
- Soil pollution and degradation
- Ecological aspects
- Heritage resources aspects
- Visual aspects
- Socio-economic aspects
- Safety, security and health aspects

The following possible key environmental impacts were identified:

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Air Pollution and noise		
Dust	• During clearance of vegetation • Management of orchards	• Health problems • Air pollution
Emissions	• Vehicle emissions and veld fires • Spraying of herbicides, pesticides and fertilizer during operation • Burning of cleared vegetation	
Noise	• Vegetation clearance and preparation of orchards. • Farming activities during operational phase	
Water quality		
Silt deposition in water drainage lines	• Erosion risk due to increased run-off from orchards	• Siltation of aquatic ecosystem
Pollution by *E.coli*	• Poorly planned and managed sanitation facilities	• Water pollution & health risk
Pollution from herbicides, pesticides and fertilizers	• Spillages & cleaning of spray tanks • Over dosage • Drift & leaching of chemicals	• Water pollution & health risk
Pollution from solid waste	• Dumping of household waste	• Water pollution & health risk
Water quantity		
Over-use of water	• Using more water than allocated	Over-use of a scarce resource
Biodiversity		
Decline in plant species-diversity Decline in animal species diversity	• Clearing of areas for orchards • Loss of habitat due to orchards establishment	• Loss of biodiversity • Loss of biodiversity

ENVIRONMENTAL ISSUES	POSSIBLE CAUSE	POTENTIAL IMPACTS
Land and Soil Degradation		
Soil contamination	• Spillages from tractors and machinery	• Effect on soil ecology and groundwater
Soil pollution	• Use of herbicides, pesticides and fertilizers (including drift & leaching)	• Effect soil characteristics, ecology and groundwater
Soil degradation	• Erosion if storm water from orchards is not managed correctly	• Loss of topsoil
Cultural/Heritage		
Possible loss of heritage sites	• Damage during construction or operation	• Possible loss of cultural heritage sites
Visual impact		
Visual impact and impact on sense of place	• Orchards	• Impact on character of landscape
Socio-economic impacts		
Job creation and skills development	• Increase in temporary and permanent job opportunities during the construction and operational phases	• Socio- economic benefit
Health and Safety		
Injuries to staff	• Injuries to staff during the operation of construction machines as well as during soil preparation	• Health Impact on staff
Security of area and impact on neighbours	• Development of Estate will result in presence of workers on site • Fencing of Estate will assist in keeping criminals out	• Potential threat to neighbours • Improved safety for neighbours

11.2 IMPACTS & MITIGATION MEASURES OF DEVELOPMENT & OPERATIONAL PHASES

All the possible impacts that can be predicted in both the development and operational phases of the proposed orchards are addressed. Specific mitigation measures are proposed and the significance of these impacts are described with and without the mitigation measures.

11.2.1 Atmospheric Pollution and Noise

Clearance and soil preparation phase:

During this phase dust (especially during dry and windy conditions) and exhaust fumes will be created by earthmoving equipment and construction vehicles that will level the area and clear vegetation. There will also be noise created by the vehicles during this phase. Burning of plant material will also create smoke.

Operational phase:

During this phase exhaust gasses and spraying of insecticides will impact on air and water quality.

Tractors, pumps and sprayers will generate noise.

A de-husking facility may be developed after 7 years that will generate noise.

Project Phase	Impact :Atmospheric Pollution and noise								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Clearance and soil preparation phase	Vegetation clearance – movement of vehicles	Dust and fumes from vehicles	Low	Low	Low	Medium	High	Low-Medium	Low-Medium
	Vegetation clearance – movement of vehicles	Noise	Low	Low	Low	Medium	High	Low-Medium	Low-Medium
	Vegetation – burning of plant material	Excessive smoke	Medium	Low	Low-Medium	Low	Medium	Low-Medium	Medium
Operational phase	Use of pumps, tractors and farming vehicles	Noise & exhaust gasses	Low	Low	Low	Medium-High	High	Low-Medium	Low-Medium
	Spraying of insecticides and herbicides	Insecticide and herbicides fumes/drift	Low	Low	Low-medium	Medium	High	Low-Medium	Low-Medium
	Operation of de-husking facility	Noise	Low	Low	Low-medium	Medium	High	Low-Medium	Low-Medium

Mitigation measures – Clearance of vegetation and soil preparation phase:

- Vehicles must be maintained to avoid excessive noise levels and also the generation of excessive fumes from machinery.
- Plant material should preferably not be burnt on site. Plant material can be used as mulch or compost. Thicker branches can be removed for firewood by the community. Strict control of access and the routes used must be exercised to prevent traffic into sensitive and buffer areas.
- Open fires for cooking are only to be made at designated and safe areas. A person must be designated to be responsible for overseeing open fires at all times.
- Firebreaks around Beja Estate must be maintained to decrease the risk of accidental fires.

Mitigation Measures - Operational Phase:

- Vehicles and pumps must be maintained as to not produce excessive fumes and noise.
- Spraying of herbicides, pesticides and fertilizer must be done when wind speed is low.
- The possible de-husking facility should be positioned as far away as is practical from receptors sensitive to noise.

11.2.2 Groundwater and Surface Water Pollution

Clearance and soil preparation phase:

- During this phase the lack of sanitation could result in ground water pollution and associated health risks.
- The spillages of fuel and lubricants from construction vehicles could occur.

Operational Phase:

- Pollution from sanitation facilities, oil/fuel and other lubricants may lead to water pollution.
- Fertilizers, pesticides and herbicides applied at the project site during operation can create pollution if not handled and applied correctly.

Project Phase	Impact: Groundwater and Surface water Pollution								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Clearance and soil preparation phase	Spillages of fuel and oil during use of machinery and movement of vehicles	Surface and groundwater pollution	Low	Low-Medium	Low	Medium	Medium	Low	Low-Medium
	Unavailability of toilet facilities at the orchard development site	Water pollution	Low-Medium	Low-Medium	Low	Medium	Low	Low	Low-Medium
Operational phase	Use of pesticides, herbicides and fertilizers at orchards	Water pollution	Low-Medium	Medium	Low-medium	Medium	Medium	Low-Medium	Medium
	Unavailability of toilet facilities at orchards	Water pollution	Low-Medium	Low-Medium	Low	Medium	Low	Low	Low-Medium
	Leakages of fuel and oil from tractors and farming vehicles	Surface and groundwater pollution	Low	Medium	Low	Medium	Medium	Low	Medium-low

Mitigation measures - Clearance and soil preparation phase:

- Pit latrines must be provided on the edges of the orchards. These toilets must be sprayed weekly with Effective Micro-organisms (EM) to ensure effective biological breakdown.
- Machinery are to be maintained to reduce the risk of excessive spillages of fuel and oils.
- Limited storage of fuel, oils and lubricants must only take place at the planned shed and offices.
- Re-fuelling and maintenance must be done at the farm workshop on Maclands Estate.

Mitigation measures - operational phase:

- Vehicles to be maintained as to not spill diesel and oil.
- Pit latrines must be provided on the edges of the orchards. These toilets must be sprayed weekly with Effective Micro-organisms (EM) to ensure effective biological breakdown.

- Application of insecticides, herbicides and fertilizers must be according to correct methods and dosages.

11.2.3 Water Use / Water Quantity

Operational phase:

- Beja Estate has an existing water allocation from boreholes, streams and the Albasini Dam, sufficient to cater for irrigation of the 340 ha new orchards.

Project Phase	Impact: Water use								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Operational phase	Use of water from boreholes and streams (98% of ELU)	Reduction in water sources	Medium	High	Medium	Medium	Medium	Medium	Medium
	Use of water from Albasini Dam (1.8% of ELU)	Fluctuation of dam level	Low	High	Low-medium	Low-medium	Low	Low-Medium	Low-Medium

Mitigation measures - Operational Phase:

- The specialist studies indicated that only 340 ha of the originally envisaged 400 ha is environmentally sustainable for orchards.
- The water balance table has been adjusted accordingly and water use must remain within these parameters that will result in a 31% (1 808 414 m^3 per annum) saving from the ELU volume.
- All irrigation to be via dripper or micro jet systems.
- Groundwater levels must be monitored monthly to manage pumping rates.
- Contingency plans must be in place to reduce water use if water levels are reducing drastically.

11.2.4 Land and Soils

Clearance and soil preparation phase:

- During this phase soil pollution can occur due to oil and diesel spillages during the operation of construction vehicles.
- Soil pollution can occur due to unavailability of sanitation facilities.

- Loss of topsoil (erosion) can occur due to storm water over cleared areas.

Operational phase:

- During this phase soil pollution can occur due to leakages of fuel/oil or other lubricants from tractors and vehicles.
- Loss of topsoil (erosion) can occur due to storm water over cleared areas.

Project Phase	Impact: Land and soils								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Clearance and soil preparation phase	Oil and diesel spillages during use of machinery and vehicles	Soil pollution	Low	Low	Low	Medium	Medium	Low	Low-Medium
	Unavailability of sanitation facilities at the orchard development site	Soil pollution	Low	Low	Low	Medium	Medium	Low	Low-Medium
	Vegetation clearance – storm water over cleared sections	Soil loss	Low-Medium	Low-medium	Low-medium	Medium	Medium-High	Low	Medium
Operational phase	Storm water flow through orchards during heavy rainfall	Loss of topsoil	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low	Low-Medium
	Leakages of fuel/oil and other lubricants resulting from the use of tractors and other farming vehicles	Soil pollution	Low	Medium	Low	Medium	Low-Medium	Low	Low-Medium
	Unavailability of toilet facilities at orchards	Water pollution	Low-Medium	Low-Medium	Low	Medium	Low	Low	Low-Medium

Mitigation measures - Clearance and soil preparation phase:

- Machinery are to be maintained to avoid the risk of excessive oil and fuel spillages.
- The storage of fuel, oils and lubricants must only take place at a designated storage room at the offices and shed.

- Pit latrines must be provided on the edges of the orchards. These toilets must be sprayed weekly with Effective Micro-organisms (EM) to ensure biological breakdown.
- Removal of vegetation to be limited to the orchard footprint areas. Removed vegetation can also be used to stabilize exposed sections.
- Implementation and regular maintenance of adequate erosion control measures (contours and drainage channels) of the cleared areas and roads must be done.

Mitigation measures - Operational Phase:

- Vehicles to be maintained to prevent excessive oil and fuel leaks.
- Any damages to soil stabilization measures must be repaired immediately.
- Pit latrines must be provided on the edges of the orchards. These toilets must be sprayed weekly with Effective Micro-organisms (EM) to ensure effective biological breakdown.
- Contours and drainage canals must be maintained.

11.2.5 Archaeological, Cultural and Social Features

Clearance and soil preparation phase:

- The clearing of the site may have a negative impact on the archaeological features of the site. Care must be taken in the excavation and moving of soil to observe any archaeological feature of importance, which must be left undisturbed and reported to the archaeological consultant for comments and actions.
- The identified grave sites must be protected.

Operational phase:

- The operational phase will not have any negative impact on the archaeological features of the site, provided the recommendations of the Archaeological Impact Assessment (Annexure D) are adhered to.

Mitigation measures:

- A 20 m buffer area around the graves must be protected.
- Graves must be fenced with entrance gates.
- Care must be taken to record anything of archaeological value unearthed during the construction process. Please refer to the Archaeological Impact Assessment

(Annexure D). The archaeologist or SAHRA must be notified whenever anything of potential heritage value is discovered.

11.2.6 Ecology (Fauna & Flora)

Clearance and soil preparation phase:

- During vegetation clearance a loss of faunal habitat will occur.
- Loss of indigenous flora will occur due to the removal of trees and shrubs.
- Trenching for services may result in animal injury and mortality.
- The presence of construction workers and security personnel on site poses the risk of poaching of wildlife.
- A loss of indigenous flora and fauna can occur due to possible accidental fires.
- Alien invader species must be controlled.

Operational phase:

- During this phase some fauna will move back to the orchards.
- Alien invaders will be controlled.

Project Phase	Environmental Aspect: Ecology (Fauna and Flora)								
	Activity that causes impact	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Clearance and soil preparation phase	Vegetation clearance	Loss of vegetation and faunal habitat	Medium	High	Low	Low	High	Low-Medium	Medium
	Possible accidental fires	Loss of biodiversity	Medium	Low	Low - Medium	Low	Low	Low	Low-Medium
	Removal of protected trees	Loss of protected species	Low	High	Low	Low	High	Low	Medium
	Vegetation removal	Reduction in alien invader species and natural encroacher species	Low-Medium+	High+	Low+	Medium+	High+	Medium+	Medium+
Operational phase	Human activities - the killing or snaring of animals	Loss of fauna	Low	Medium	Low-Medium	Medium	Low-Medium	Low	Low-Medium
	Maintenance of orchards	Control of alien invader and encroacher species	Medium-High+	High+	Low+	Medium+	High+	Medium-High+	Medium-High+

Mitigation measures – Clearance and soil preparation phase:

- The necessary permit to remove protected Marula, Leadwood and Bushman's tea trees must firstly be obtained from the Department of Environment, Forestry and Fisheries prior to the removal thereof.
- No trees may be cut or destroyed for firewood outside the footprint of the orchards. Removal of vegetation is to be confined to the orchards footprint areas.
- No alteration of the drainage areas is recommended, especially considering it to be a stressed catchment. A 30-meter buffer should be implemented around the riparian woodland of the smaller drainage channels and a 100-meter buffer from the Levubu River and Albasini Dam.
- Woody vegetative cover that is removed can be used for compost.
- Only removed vegetation (wood) during site clearance can be used as firewood by workers and the community. Fires may however only be made at designated areas.
- Staff must be educated on the dangers of accidentals fires. The necessary safety measures must be in place on site.
- The alien invader species on site must be controlled according to the requirements of CARA.
- Trenches and excavated areas must be adequately cordoned off or backfilled as soon as possible to prevent animal injury and mortality.

Mitigation measures – Operational phase:

- Appropriate management measures for the control of alien invasive species must be instituted.
- No killing of fauna by snaring or trapping must be allowed. Strict fines for transgressors must be implemented and enforced.

11.2.7 Visual impacts

Clearance and soil preparation phase:

- The removal of indigenous vegetation will have a definite visual impact and will result in a change in the landscape characteristics of the site

Project Phase	Impact: Visual								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Clearance and soil preparation phase	Removal of vegetation – change in landscape features	Visual	Low	High	Low-Medium	Low	High	Medium	Medium

Mitigation measures - Clearance and soil preparation phase:

- Vegetation removal must be confined to the orchards footprint areas.
- Large indigenous trees occurring on the borders of the orchards should remain where possible.
- No alteration of the drainage areas is recommended, especially considering it to be a stressed catchment. A 30-meter buffer should be implemented around the riparian woodland of the smaller drainage channels and a 100-meter buffer from the Levubu River and Albasini Dam. These buffers are indicated in figure 3.

11.2.8 Health and fire hazards

Clearance and soil preparation phase:

- Possible injuries to staff may occur during the operation of construction machines as well as during soil preparation.
- Burning of removed vegetation may also lead to veld fires.

Operational phase:

- During this phase possible injuries may occur to staff during the operation of machines.
- Spraying of insecticides and herbicides could be dangerous to personnel.

Project phase	Impact: Health and Safety								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Clearance and soil preparation phase	Operation of construction vehicles or machinery	Possible injuries to staff	Medium	Low	Low	Low	Low	Low	Low-Medium

Project phase	Impact: Health and Safety								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
	Increase in crime	Theft and attacks on neighbours	Low-medium	Low	Low-medium	Low-medium	Low-medium	Low	Low-Medium
Operational phase	Possible accidental veld fires occurring during farming activities	Health – injury	Medium	Low	Low-Medium	Low	Low-Medium	Low-Medium	Medium
	Spraying of insecticides/ herbicides	Inhalation of insecticides/ herbicides	High	Medium	Low	Low-Medium	Low-Medium	Low	Low-Medium
	Possible injuries to staff during farming activities	Health - injuries	High	Medium	Low	Low-Medium	Low-Medium	Low	Low-Medium
	Increase in crime	Theft and attacks on neighbours	Low-medium	Low	Low-medium	Low-medium	Low-medium	Low	Low-Medium

Mitigation measures – Clearance and soil preparation phase:

- The Safety Act, 1993 (Act No. 80 of 1993) requires the designation of a Health and Safety representative when more than 20 employees are employed.
- Fire breaks should comply with the National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) (Chapter 4: Duty to Prepare and maintain firebreaks). An emergency plan must be in place so that any uncontrolled fire can be combated in the most efficient manner.
- No vegetation may be burnt on the premises or surrounding areas.
- Staff must be adequately trained and provided with the necessary safety gear/clothing during vegetation clearance and during the operation of machinery.
- There must be a person trained and accredited to administer first aid on Beja Estate and a first aid medical kit must be available at the farm office.
- According to mr Anderson the entire farm will be fenced with electrical and security fencing with security guards patrolling and gate and access controls.

Mitigation measures – Operational phase:

- The Safety Act, 1993 (Act No. 80 of 1993) requires the designation of a Health and Safety representative when more than 20 employees are employed.
- Fire breaks should comply with the National Veld and Forest Fire Act (Act No. 101 of 1998) (Chapter 4: Duty to Prepare and maintain firebreaks). An emergency plan must be in place so that any uncontrolled fire can be combated in the most efficient manner.
- No vegetation may be burnt on the premises or surrounding areas.
- Staff must be adequately trained and provided with the necessary safety gear/clothing during operation of machinery and spraying of insecticides & herbicides.
- There must be a person trained and qualified to administer first aid on Beja Estate as well as a first aid medical kit available.
- According to mr Anderson the whole farm will be fenced with electrical and security fencing with security guards patrolling and gate and access controls.

11.2.9 Socio-economic impact

Clearance and soil preparation phase as well as operational phase:

- The establishment of orchards will create more jobs. This will also provide for training and skills development.
- More food will be produced that will assist in food security.

Project phase	Impact: Job creation								
	Activity/Aspect	Specific impact	Severity	Duration	Extent	Frequency	Probability	Significance	
								With Mitigation	Without Mitigation
Clearance and soil preparation phase	Job creation	Job creation	Medium-low +	Low +	Medium+	Medium +	High +	N/A	Medium +
Operational phase	Job creation	Job creation	Medium-low +	High +	Medium+	High +	High +	N/A	Medium +
	More productive orchards	Increased food production and food security	Medium +	High +	Medium+	High +	High +	N/A	Medium-High +

Mitigation measures - Clearance and soil preparation phase as well as operational phase:

- Where viable, the work must be executed in a labour-intensive manner to create as many jobs as possible.

11.3 ASSESSMENT OF POTENTIALLY SIGNIFICANT IMPACTS

Impacts with a rating of Medium-high or High are impacts which are regarded as potentially significant, rated without any mitigation measures. In this impact assessment no potentially significant negative impacts have been identified.

11.3.1 CUMULATIVE IMPACTS

1) The orchards will result in a low-medium negative cumulative impact on water use but the removal of alien invader species will have a low positive cumulative impact on water use.
2) The removal of indigenous vegetation will have a low-medium negative cumulative impact on remaining natural habitat.
3) The removal of alien invaders will have a medium positive cumulative impact on spreading of seeds and plants.
4) The removal of dense vegetation with alien invaders will have a medium positive cumulative impact on the occurrence of uncontrolled fires.
5) The fencing and security measures will have a medium positive cumulative impact on safety in the area.
6) The establishment of orchards will have a medium positive cumulative impact on food production and job creation.

12 ENVIRONMENTAL IMPACT STATEMENT – SUMMARY OF KEY FINDINGS

12.1 HERITAGE/ARCHAEOLOGICAL IMPACT ASSESSMENT (APPENDIX D)

- No areas designated for socio-religious activities were recorded on the site.
- No remains from the historical period were recorded.
- One fenced grave could be identified.
- No Iron Age remains were recorded.
- No Stone Age remains were recorded.
- The area lies within the grey zone of palaeontological sensitivity on SAHRIS map.
- From a heritage resources management point of view, there is no objection with regard to the development.

- The discovery of previously undetected subterranean heritage remains on the terrain must be reported to the Limpopo Heritage Authority or the archaeologist, and may require further mitigation measures.

12.2 ECOLOGICAL REPORT (APPENDIX C)

The proposed site for the orchards is mostly on secondary old fields that were cultivated as tea plantations. A sensitivity analyses was conducted to identify the most suitable areas for the orchards. From this investigation and ecological surveys the following main observations were made:

- The woodland areas have a Medium or Medium-low Sensitivity due to its widespread distribution in the project area. The orchards developments can be supported in these areas, provided that a licence is obtained for the eradication of the protected trees;
- The secondary old fields associated have a Medium-Low Sensitivity;
- The exotic plantations on site have a low sensitivity and unlimited development can be supported in the area. The eradication of the plantations will significantly improve the baseflow of the streams and rivers in the area;
- The drainage channels and riparian woodland have a High Sensitivity. These areas serve as important corridors to rare and endemic fauna found in the area.

The importance of rehabilitation and implementation of mitigation processes to prevent any negative impacts on the environment on the areas surrounding the orchards should be considered a high priority.

No red data plant species were found on the site due to the state of the vegetation and physical environment of the larger area mostly not being suitable for any of the red data plant species that may be found in the area.

Some potential rare fauna may also occur in the area, and specific mitigation measures need to be implemented to ensure that the impact of the development on the species' habitat will be low. Corridors such as the riverine forest are important to allow fauna to move freely between the areas of disturbance.

A number of impacts the orchards development might have on the fauna and flora of the site were identified and assessed. A few of these were assessed as having potentially medium significance, including the following:

- Destruction or disturbance to sensitive ecosystems leading to reduction in the overall extent of a particular habitat;

- Increased soil erosion;
- Impairment of the movement and/or migration of animal species resulting in genetic and/or ecological impacts;
- Destruction/permanent loss of individuals of rare, endangered, endemic and/or protected species;
- Soil and water pollution through spillages, leaching or drifting of chemicals;

Mitigation measures provided must be implemented to reduce these impacts from a higher to a lower significance.

12.3 SUMMARY OF POSITIVE AND NEGATIVE IMPACTS AND RISKS OF THE PROPOSED ACTIVITY AND IDENTIFIED ALTERNATIVES

Advantages of the proposed orchards:

- Job creation and skills development will benefit the people from surrounding communities
- Food will be produced for the local and export markets and factories
- Alien invader and encroacher plant species numbers will be reduced and controlled
- Safety of the area will be improved

Disadvantages of proposed orchards:

1) Removal of indigenous vegetation
2) Loss of habitat for fauna
3) Increased water use

13 AUTHORISATION OF ACTIVITY AND CONDITIONS

The purpose of this report is to provide the relevant authority with sufficient information regarding the potential impacts of the development to make an informed decision regarding the approval of the Environmental Impact Assessment report. Potential impacts were identified in consultation with I&AP's and technical specialists and were assessed using a matrix and by applying professional knowledge.

Impacts with a rating of ***Medium-high* or *High*** are impacts which are regarded as potentially significant, rated without any mitigation measures. In this impact assessment no potentially significant negative impacts have been identified.

It is the professional opinion of AGES that the proposed development of ± 340 ha of orchards does not present any fatal flaws in terms of substantial negative impacts to the environment and

therefore will not have any significant detrimental impacts to render the project unfeasible. The Department is therefore respectfully requested to evaluate this Impact Assessment Report, as part of an application that has been lodged in terms of Chapter 5 of the National Environment Management Act, 1998 (Act No. 107 of 1998), in respect of the activities identified in Government Notice R984.

It is proposed that the following conditions must be included in the Record of Decision if the project is authorised:

- All of the mitigation measures contained in this report must be implemented.
- The management and or mitigation measures contained in the Environmental Management Program must be implemented (See Appendix E).
- The necessary permits and authorizations must be obtained before activities can commence. The removal of protected trees will necessitate a permit from the Department of Environment, Forestry and Fisheries.
- The Department of Economic Development, Environment and Tourism as well as the Department of Agriculture must be informed before activities commence.
- Local labour should be used during the clearance and soil preparation phase.
- No killing of fauna by snaring or trapping must be allowed. Strict fines for transgressors must be implemented and enforced.
- Trenches and excavated areas must be adequately cordoned off or backfilled as soon as possible to prevent animal injury and mortality.
- Vehicles and machinery must be properly maintained to prevent spillages of fuels and oils onto soils.
- Toilet facilities must be provided to workers.
- Dripper irrigation must be used and it should be ensured that no water is wasted.
- Regular maintenance and the implementation of adequate erosion control measures of the exposed soil and road sections must be done.
- The identified grave sites must be fenced and a 20 m buffer conserved around the sites.
- Care must be taken to record anything of archaeological value unearthed during the clearance and soil preparation process. The archaeologist or SAHRA must be notified whenever anything of importance is discovered.
- No trees may be cut or destroyed for firewood outside the footprint of the orchards. Removal of vegetation is to be confined to the orchard footprint areas.
- Preferably no plant material may be burnt on site. Thicker branches can be removed for firewood by the community. Strict control of access and the routes used must be exercised to prevent traffic into sensitive and buffer areas.
- Only removed vegetation (wood) during site clearance can be used as firewood.

- Open fires for cooking are only to be made at designated and safe areas. A person must be designated to be responsible for overseeing open fires at all times.
- Large indigenous trees occurring on the borders of the orchards must where possible be left.
- No alteration of the drainage areas is recommended, especially considering it to be a stressed catchment. A 30-meter buffer should be implemented around the riparian woodland of the streams and 100 metres from the Albasini Dam.
- Staff must be educated on the dangers of accidentals fires. The necessary safety measures must be in place on site.
- Fire breaks should comply with the National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) (Chapter 4: Duty to Prepare and maintain firebreaks). An emergency plan must be in place so that any uncontrolled fire can be combated in the most efficient manner.
- The applicant is responsible for the eradication of alien invasive species.
- Safety Act, 1993 (Act No. 80 of 1993) requires the designation of a Health and Safety representative when more than 20 employees are employed.
- Staff must be adequately trained and provided with the necessary safety gear/clothing during vegetation clearance and during the operation of machinery.
- There must be a first aid trained person on the estate as well as a first aid medical kit.
- Application of insecticides, herbicides and fertilizers must be according to correct methods and dosages.
- Spraying of insecticides must be done during periods of no wind, or at least when wind speed is low. Refrain from applying insecticides during strong winds.
- The de-husking facility should be positioned as far away as is practical from receptors sensitive to noise.
- Monitoring of volume of water abstracted from the Albasini Dam must take place on a monthly basis.
- Groundwater levels must be monitored monthly to manage pumping rates.
- Contingency plans must be in place to reduce water use if water levels are reducing drastically.

14 ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

- In this report it is assumed that the contractor/estate management will act responsibly taking the environment into consideration at all times.
- It is assumed that the applicant will ensure that the mitigation measures in this report are complied with and that all monitoring and maintenance requirements will be followed closely.

15 CONCLUDING RECOMMENDATION BY EAP

The purpose of this report is to provide LEDET with sufficient information regarding the potential impacts of the development to make an informed decision regarding the approval/rejection of the Environmental Impact Assessment report and issuing of a positive/negative Environmental Authorization.

The potentially significant negative impacts that have been identified should be mitigated through the implementation of the mitigation measures highlighted in this report. AGES believes that the proposed mitigation measures will effectively reduce the impacts to acceptable levels.

Potential impacts were identified in consultation with I&AP's and technical specialists (where applicable) and were assessed using a matrix and by applying professional knowledge. **The recommendation of all specialists' reports must be strictly implemented.**

It is the professional opinion of AGES that the proposed development does not present any fatal flaws in terms of negative impacts to the environment and therefore will not have any significant detrimental impacts to render the project unfeasible.

The Department is therefore respectfully requested to evaluate this Final Environmental Impact Assessment Report (EIAR), as part of an application that has been lodged in terms of Chapter 5 of the National Environment Management Act, 1998 (Act No. 107 of 1998), in respect of the activities identified in Government Notice R 984:

Relevant notice	Description
GN R.984, Item 15 ***"The clearance of an area of 20 hectares or more of indigenous vegetation."***	Approximately 340 ha of indigenous vegetation will be cleared for orchards.

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