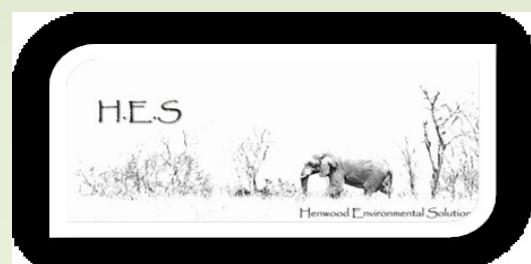


August 2018

**FINAL BASIC ASSESSMENT REPORT FOR THE CLEARING AND
CULTIVATION OF APPROXIMATELY 17.46 HA, ON THE FARM
BOSKOM 1025 JT .**



Compiled for:
Boschkom Estates Pty Ltd



PROJECT DETAILS

FILE REFERENCE NUMBER: 1/3/1/16/1E-164.

TITLE: Clearing and cultivation of approximately 14.6ha on the Farm Boskom, 1025 JT.

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PROJECT NAME: Clearing and cultivation of approximately 14.6ha on the Farm Boskom, 1025 JT.

REPORT STATUS: Final

REPORT NUMBER: 01

SUBMISSION DATE: August 2018



STEVEN HENWOOD

(Nature Conservation Diploma)



agriculture, rural development,
land & environmental affairs

MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

**Basic assessment report in terms of the National Environmental Management Act,
1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment
Regulations, 2014.**

(For applicant / EAP to complete)

File Reference Number:

1/3/1/16/1E-164.

Project Title:

**The clearing and cultivation of
approximately 14.6ha on the
Farm Boskom, 1025 JT**

Name of Responsible Official:

--

(For official use only)

NEAS Reference Number:

--

Date Received:

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SECTION A: EXECUTIVE SUMMARY

Henwood Environmental Solutions, as Independent Environmental Consultants and Impact Assessors, has been appointed by Boschkom Estates Pty Ltd, to conduct the Environmental Impact Assessment for the proposed clearing and cultivation of approximately 14.6ha on the Farm Boskom, 1025 JT.

The project proposal has been informed by intensive planning so as to ensure that this proposed activity has a minimal negative impact, while promoting positive impacts, on the receiving environment. There are no locality alternatives for this project. The inputs received during Public Participation as well as those highlighted through consultation with various authorities, were used to revise and further inform specifics related to the development.

Specialist studies related to the terrestrial ecology, wetland ecology, crowned eagle as well as the historical environment were commissioned.

In this regard, various mitigation measures have been recommended to minimize impacts. Furthermore, these measures have been incorporated into the Basic Assessment Report and Draft Environmental Management Plan.

Public Participation

Public participation forms an integral component of the EIA process. The public participation process for the project initiation and Draft Basic Assessment Phase is outlined in detail in Section 4 of this report.

The approach adopted for the DBAR and FBAR phase of the project was to liaise predominantly with registered I&AP's or those directly affected by the proposed activities. Consequently, subsequent correspondence has only been directed to registered I&AP's and commenting Authorities.

The public participation process to date has entailed the following key components:

- Placing an advertisement in the Lowvelder (English). This advertisement served to advertise the proposed development and associated EIA process while inviting all potential I&AP's to register as I&AP's.
- Erecting site notices at the entrance to the site as well as in prominent places on the site's boundary.
- Lodging copies of the Draft Basic Assessment Report, for public review and comment.
- Submission of the draft BAR to all departments and registered I&AP's for review and comment.

Key Environmental Issues

The assessed impacts were identified in the planning phase and have been subjected to detailed investigation and assessment. These impacts include potential biophysical and social impacts that may arise during the operational phase of the proposed activities (i.e. long-term impacts) and construction phase impacts (i.e. short-term impacts).

The methodology was developed by Henwood Environmental Solutions and has been continually refined and improved based on our experience in applying it to many EIA processes. The methodology is broadly consistent to that described in the NEMA EIA Regulations and in the DEA Guideline Document for these regulations (DEAT, 2006).

Each issue identified for the proposed study area was taken into consideration in order to ascertain the most suitable layout that has the least possible impacts, or the most manageable impacts, on the environment.

The following table summarises the significance of the identified potential impacts (i) before mitigation; and (ii) once recommended mitigation measures are in place.

Ref. (Pg)	Description of impact	Significance of Impact	
		Without Mitigation	With Mitigation
Construction Phase Impacts			
64	Fauna and Flora	Medium (-)	Low (-)
67	Impact on Crowned Eagle	Medium (-)	Low (-)
68	Aquatic Ecosystems	Medium (-)	Low (-)
70	Historical	Low (-)	Low (-)
71	Loss of Topsoil and Soil Erosion (Hydrological)	Medium (-)	Low (-)
72	Ground and Surface Water Impact	Medium (-)	Low (-)
73	Noise Pollution	Medium (-)	Low (-)
74	Visual Impact	Medium (-)	Low (-)
75	Employment Opportunities	Low (+)	High (+)

Ref. (Pg)	Description of impact	Significance of Impact	
		Without Mitigation	With Mitigation
Operational Phase Impacts			
78	Stormwater Management	Moderate (-)	Low (-)
79	Visual Impact – “Sense of Place”	Low (-)	Medium (+)
80	Use of pesticides	Medium (-)	Low (-)

Recommended Management Actions

A variety of mitigation measures have been identified that could mitigate the scale, intensity, duration or significance of the impacts. These measures, which have been informed by various related specialist studies, are included in this Final Basic Assessment Report (FBAR) and in the draft EMPr (attached). The FBAR and draft EMPr also includes guidelines to be applied during the construction and operational phases of the project.

Conclusion

Development, by its very nature, implies impact. The EIA process identifies and quantifies these impacts. Where possible these impacts are avoided through planning revision. In other cases, mitigation is proposed to reduce the severity and significance of the impacts.

The FBAR provides a summary description of the feasible alternatives and potential impacts identified during the DBAR Phase; additional information on the affected environment, a description and assessment of the potential impacts associated with the various feasible alternatives as well as an indication of potential mitigation measures; conclusions and various recommendations with regard to the way forward; and a series of Appendices containing relevant information, including the various specialist studies.

The draft EMPr provides much more detailed mitigation measures and should all proposed mitigation measures be instituted it is not envisaged that the proposed development poses any negative impacts of high significance which cannot be mitigated.

It is the final considered opinion of the Environmental Assessment Practitioner (Henwood Environmental Solutions) that the proposed development (clearing and cultivation of approximately 14.6ha on the Farm Boskom, 1025 JT) will **not** have a detrimental negative impact on the surrounding environment if all mitigation measures are implemented.

It is therefore the **EAP's recommendation that authorisation be granted provided that good environmental practices be implemented**; and that this will include environmentally sensitive planning and design of all structures.

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SECTION B: BACKGROUND INFORMATION

Table 1: Details of Applicant and EAP

Project applicant:	Nico Van Zyl	
Trading name (if any):	Boschkom Estates Pty Ltd	
Contact person:	Anita McGarry	
Physical address:	Farm Boschkom, Sudwala Road, Mpumalanga	
Postal address:	Postnet Suite #022, Private Bag x11326, Nelspruit, Mpumalanga	
Postal code:	1200	Cell: 082 625 7073
Telephone:	013 753 3962	Fax: 013 753 2041
E-mail:	admin@lvt2001.co.za	
Environmental Assessment Practitioner:	Henwood Environmental Solutions (HES)	
Contact person:	Steven Henwood	
Postal address:	PO Box 12340, Steiltes, Nelspruit	
Postal code:	1213	Cell: 078 672 3645
Telephone:	078 672 3645	Fax:
E-mail:	shenwood@mweb.co.za	
Qualifications:	Nat. Dip. Nature Conservation	
Professional affiliations (if any):	IAIASA	
Curriculum Vitae	See Appendix F; Annexure D for the EAP's Curriculum Vitae	

SECTION C: DETAILED DESCRIPTION OF THE PROPOSED ACTIVITY

Describe the activity, which is being applied for, in detail. The description must include the size of the proposed activity (or in the case of linear activities, the length) and the size of the area that will be transformed by the activity.

Table 2: Activity Description

Nico Van Zyl (Boschkom Estates Pty Ltd) (the applicant) proposes clearing and cultivation of macadamias on the Farm Boskom, 1025 JT.

The proposed development site is adjacent to existing agricultural fields and therefore no new infrastructure will be developed on site. Although the site is zoned for Agriculture, it is currently undisturbed natural bush.

To this end the following components constitute the project:

Macadamia Farming:

- Macadamia trees will be planted on the suitable soils.
- A total area of 14.6ha is to be cleared and utilized for agriculture (macadamia tree)
- The trees will be farmed according to best practice standards.

See proposed layout for orientation and reference Appendix A.

Table 3: Activity Description as per the project description that relates to the applicable listed activity.

Government Notice R983 Activity No.	Describe the relevant Basic Assessment Activity in writing as per Listing Notice 1 (GN No. R983)	Describe the portion of the development as per the project description that relates to the applicable listed activity
Activity 27	<p><i>“The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—</i></p> <p style="padding-left: 40px;"><i>(i) the undertaking of a linear activity;</i></p> <p style="padding-left: 80px;"><i>or</i></p> <p style="padding-left: 40px;"><i>(ii) (ii) maintenance purposes undertaken in accordance with a maintenance management plan”</i></p>	<p>The cultivation of macadamias will result in an area of 17.46 ha (174 600 meters squared) of indigenous vegetation being cleared.</p>

Government	Describe the relevant Basic Assessment	Describe the portion of the development
------------	--	---

Notice R985 Activity No:	Activity in writing as per Listing Notice 3 (GN No. R985)	as per the project description that relates to the applicable listed activity
Activity 12 (f) (ii)	<p><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></p> <p>f. Mpumalanga <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; ii. Within critical biodiversity areas identified in bioregional plans; or iii. 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 or proclamation in terms of NEMPAA.</i></p>	<p>The cultivation of macadamias will result in an area of 17.46 ha (174 600 meters squared) of indigenous vegetation being cleared.</p>

SECTION D: PROPERTY/SITE DESCRIPTION

Provide a full description of the preferred site alternative (farm name and number, portion number, registration division, erf number etc.):

Table 4: Site Alternative Description

The Farm Boskom, 1025 JT, Mbombela Local Municipality, Mpumalanga.

T	0	J	T	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	5
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Indicate the position of the activity using the latitude and longitude of the centre point of the preferred site alternative. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection. The position of alternative sites must be indicated in Section B of this document.

25° 25' 27.8093" S, 30° 45' 19.9326"

Table 5: Activity Position

Latitude (S):			Longitude (E):		
25°	25'	18.8047"	30°	44'	49.8335"

In the case of linear activities:

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

Latitude (S):		Longitude (E):	
o	'	o	'
o	'	o	'
o	'	o	'

SITE OR ROUTE PLAN (SEE APPRNDIX A)

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

The site or route plans must be at least A3 and must include the following:

- 6.1 a reference no / layout plan no., date, and a legend / land use table
- 6.2 the scale of the plan which must be at least a scale of 1:2000;
- 6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
- 6.4 the exact position of each element of the application as well as any other structures on the site;
- 6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
- 6.6 all indigenous trees taller than 1.8 meters and all vegetation of conservation concern (protected, endemic and/or red data species);
- 6.8 servitudes indicating the purpose of the servitude;
- 6.9 sensitive environmental elements within 100 meters of the site or sites including (but not limited thereto):
 - watercourses and wetlands;
 - the 1:100 year flood line;
 - ridges;
 - cultural and historical features;
- 6.10 10 meter contour intervals

SITE PHOTOGRAPHS (SEE APPENDIX B)

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached as an appendix to this form.

FACILITY ILLUSTRATION (SEE APPENDIX C)

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

SECTION E: BASIC ASSESSMENT REPORT

Prepare a basic assessment report that complies with Regulation 22 of the Environmental Impact Assessment Regulations, 2010. The basic assessment report must be attached to this form and must contain all the information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation 25, and must include:

Table 6: Basic Assessment Content Check List

(Checklist
for official
use only)

1. Details of the EAP, including curriculum vitae.	Pages 2, 10 & Appendix F	
2. The location of the activity, including: <ul style="list-style-type: none"> i. the 21 digit Surveyor General code of each cadastral land parcel; ii. where available, the physical address and farm name; iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties. 	Page 13 and 19	
3. A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale.	Page 13, 69 and Appendix A	
4. A description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and a description of the activities to be undertaken including associated structures and infrastructure	Pages 11 and 12	
5. Description of the policy and legislative context within which the development is proposed including- <ul style="list-style-type: none"> i. an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and ii. how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments 	Page 31	
6. A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Page 36	
7. A motivation for the preferred site, activity and technology alternative.	Pages 36 – 44	

<p>8. A full description of the process followed to reach the proposed preferred alternative within the site, including:</p> <ul style="list-style-type: none"> i. details of all the alternatives considered; ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- <ul style="list-style-type: none"> a. can be reversed; b. may cause irreplaceable loss of resources; and c. can be avoided, managed or mitigated; vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. the possible mitigation measures that could be applied and level of residual risk; ix. the outcome of the site selection matrix; x. if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and xi. a concluding statement indicating the preferred alternatives, including preferred location of the activity; 	<ul style="list-style-type: none"> i) Pages 36 – 44 ii) Pages 36 – 44 iii) Page 32 iv) Pages 19 – 30 v) Pages 48 – 65 vi) Pages 48 – 50 vii) Pages 45 – 48 viii) Pages 48 – 65 ix) Pages 74 – 77 x) N/A xi) Pages 67 	
<p>9. A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including-</p> <ul style="list-style-type: none"> i. a description of all environmental issues and risks that were identified during the environmental impact assessment process; and ii. (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of 	<p>Pages 48 – 67</p>	

<p>mitigation measures;</p>		
<p>10. an assessment of each identified potentially significant impact and risk, including-</p> <ul style="list-style-type: none"> i. cumulative impacts; ii. the nature, significance and consequences of the impact and risk; iii. the extent and duration of the impact and risk; iv. the probability of the impact and risk occurring; v. the degree to which the impact and risk can be reversed; vi. the degree to which the impact and risk may cause irreplaceable loss of resources; and vii. the degree to which the impact and risk can be avoided, managed or mitigated; 	<p>Pages 48 – 67</p>	
<p>11. Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;</p>	<p>Pages 16 – 36 and 48 – 67</p>	
<p>12. An environmental impact statement which contains-</p> <ul style="list-style-type: none"> i. a summary of the key findings of the environmental impact assessment; ii. a map at an appropriate scale which superimposes the proposed activity and its associated iii. structures and infrastructure on the environmental sensitivities of the preferred site iv. indicating any areas that should be avoided, including buffers; and v. a summary of the positive and negative impacts and risks of the proposed activity and vi. identified alternatives; 	<p>Pages 48 - 67</p>	
<p>13. Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr.</p>	<p>Pages 48 - 67</p>	
<p>14. Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.</p>	<p>Page 67</p>	
<p>15. A description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.</p>	<p>Page 71</p>	
<p>16. A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be</p>	<p>Pages 67</p>	

authorised, any conditions that should be made in respect of that authorisation;		
17. Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised.	N/A	
18. An undertaking under oath or affirmation by the EAP in relation to the correctness of the information provided in the reports; <ul style="list-style-type: none"> i. the inclusion of comments and inputs from stakeholders and I&AP's; ii. the inclusion of inputs and recommendations from the specialist reports where relevant; and iii. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts; 	Appendix F	
19. Any specific information that may be required by the competent authority; and	None	
20. Any other matters required in terms of section 24(4)(a) and (b) of the Act.	None	

The basic assessment report must take into account -

- (a) any relevant guidelines; and
- (b) any departmental policies, environmental management instruments and other decision making instruments that have been developed or adopted by the competent authority in respect of the kind of activity which is the subject of the application.

*In terms of Regulation 22(4), the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub regulation 22(2)(h), exist.

Table 7: Indication of evaluation of alternatives

Have reasonable and feasible alternatives been identified, described and assessed?	YES ✓	
If NO, the motivation and investigation required in terms of Regulation 22(4) must be attached as an Appendix to this document		

1 Description of the Affected Environment by the Proposed Activity

The proposed site falls within the Legogote Sour Bushveld Veldtype, as defined in the Vegetation of Southern Africa, Lesotho and Swaziland, (Ladislav Mucina and Michael C. Rutherford 2006). Legogote Sour Bushveld is classified as an endangered vegetation type. More recently, Legogote Sour Bushveld has been listed as a Threatened Ecosystem and classified as Vulnerable.

Typical Legogote Sour Bushveld is characterised by open to dense woodland on gently to moderately undulating terrain with high density of trees and shrubs.

1.1 Locality and physical geography

The proposed development site is located approximately 23km to the west of Nelspruit to the north of the N4 highway. The proposed development is located within Quaternary Catchment X22B, in the Nkomati Water Management Area. The Houtbosloop river are located to the west, and the Crocodile river to the south of the site.

The study area includes two alternative development sites, and specialist were requested to inspect and evaluate approximately 31.2ha.

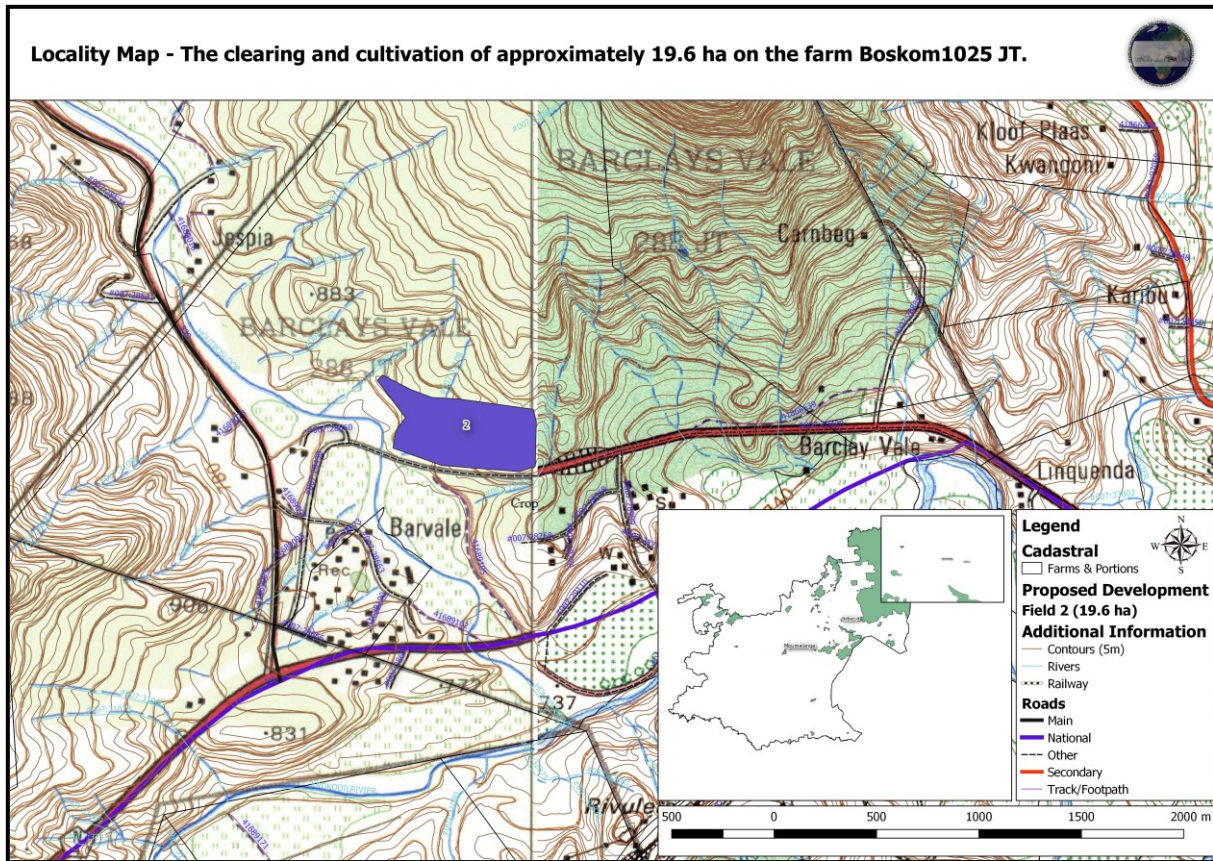


Figure 1: Locality

1.2 Geology and soils

The Study Area is underlain by Nelspruit Granites of the Swazian Era and archaean ultramafic rocks with a complex composition, including serpentines. The soils contain high concentrations of heavy metals which are toxic to most plants (Mucina and Rutherford 2006). Soils within the Study Area have a moderate to high risk of erosion (Figure 2)

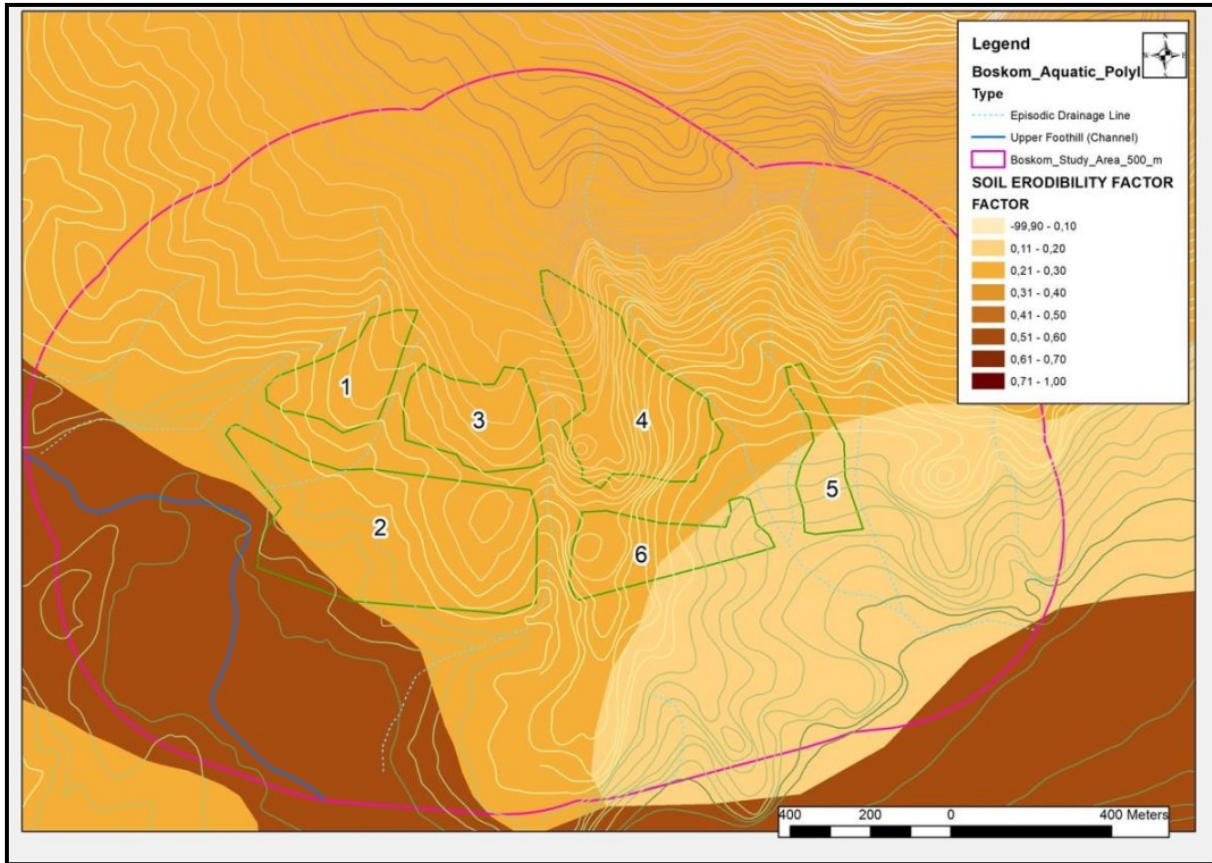


Figure 2: Soil erodibility (Extracted from Schulze and Horan, 2006).

1.3 Topography

The topography of the two proposed development areas comprises hills with moderate to steep slopes. Field 1 – 9.7% average slope; Field 2 – 6,2% average slope; Filed 3 6.6% average slope; and Filed 4 – 10.2% average slope. Elevation within the Study Area ranges between 750 and 975 m amsl.

Figure 3 and 4 below show the specific topography and Figure 4 the degree of slope, of the proposed development site.

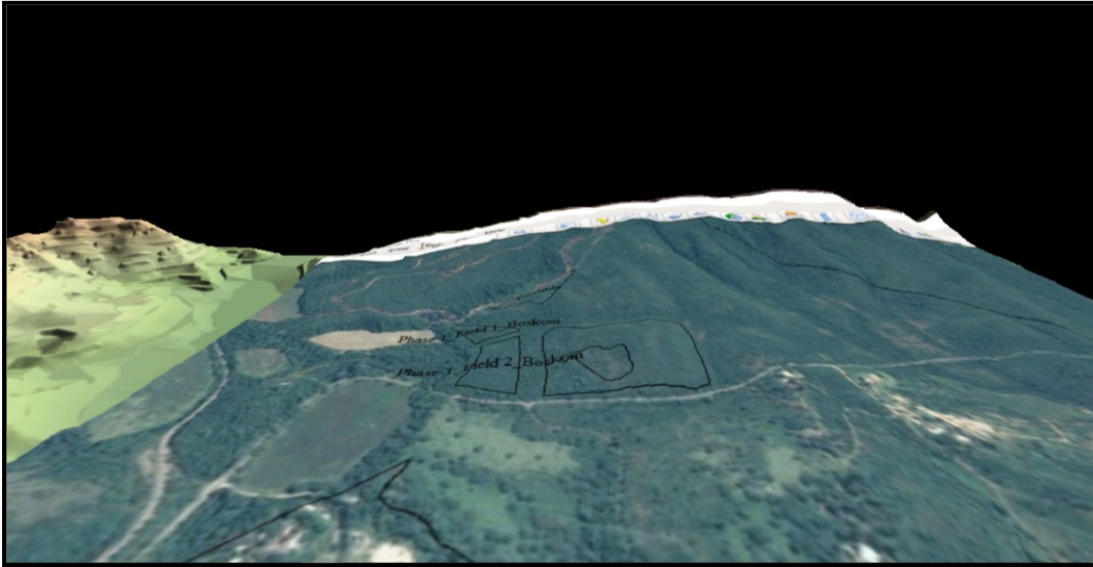


Figure 3: 3D model of the site.

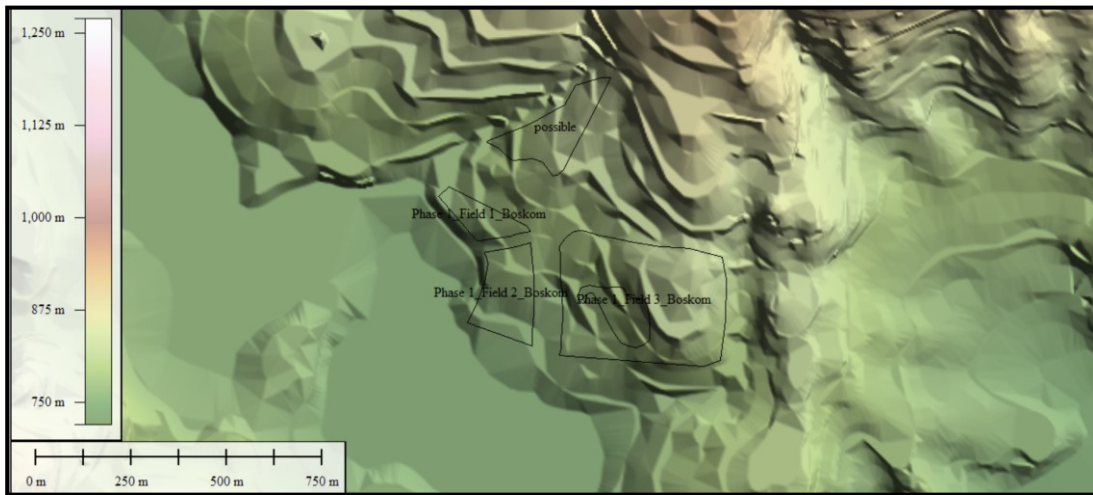


Figure 4: Topography of the site and surrounding area

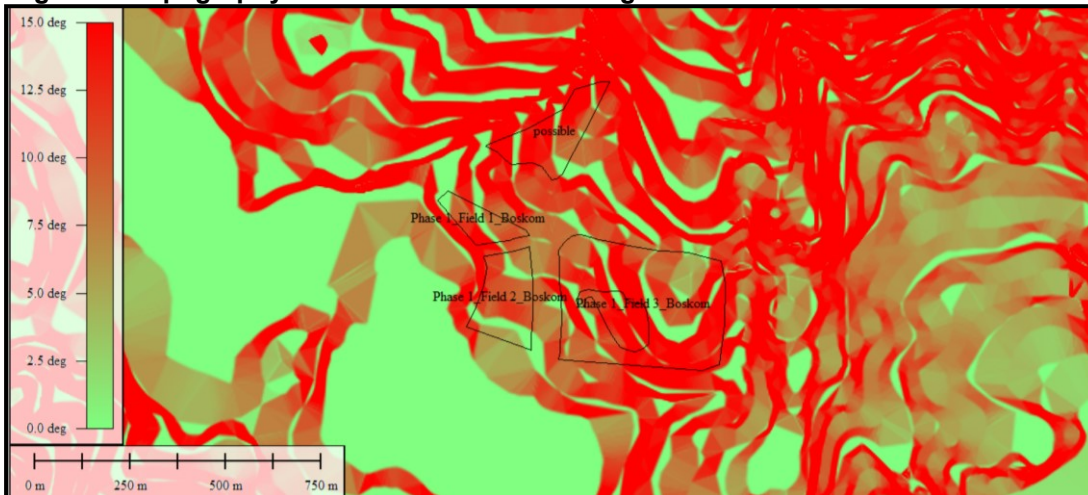
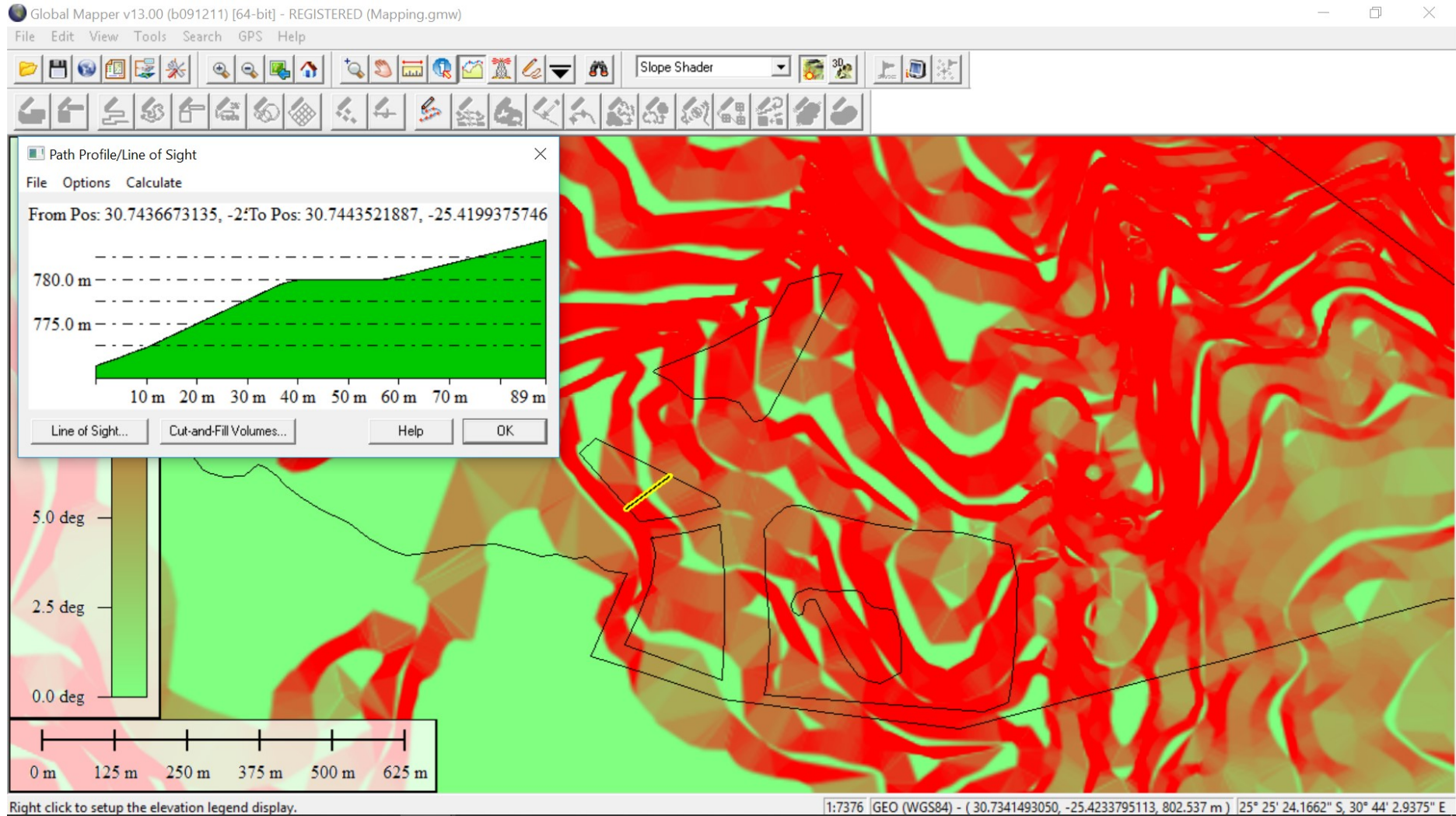


Figure 5: The degree of slope of the site

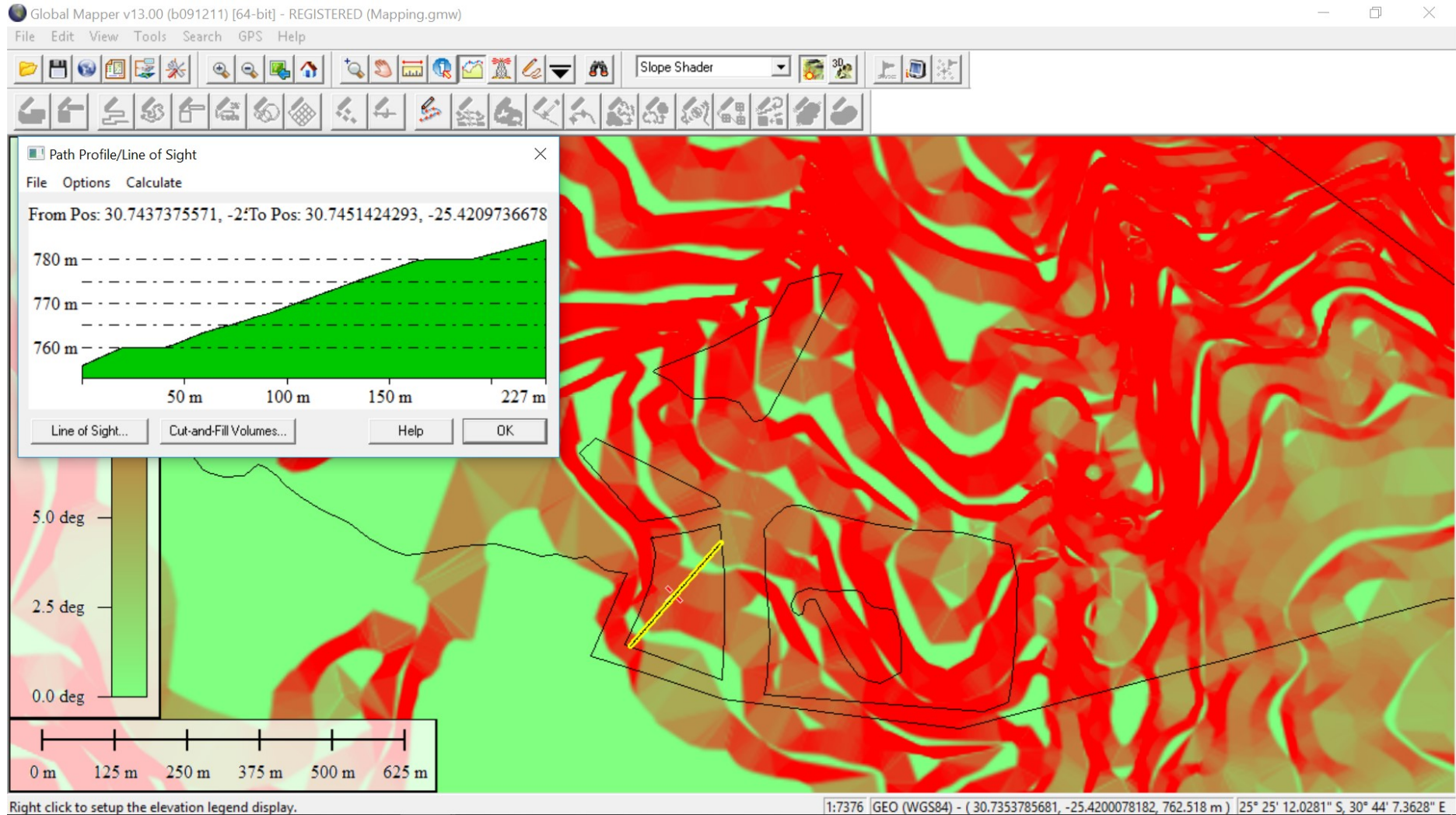
Field 1



Average Slope is 9.7%

Field 2

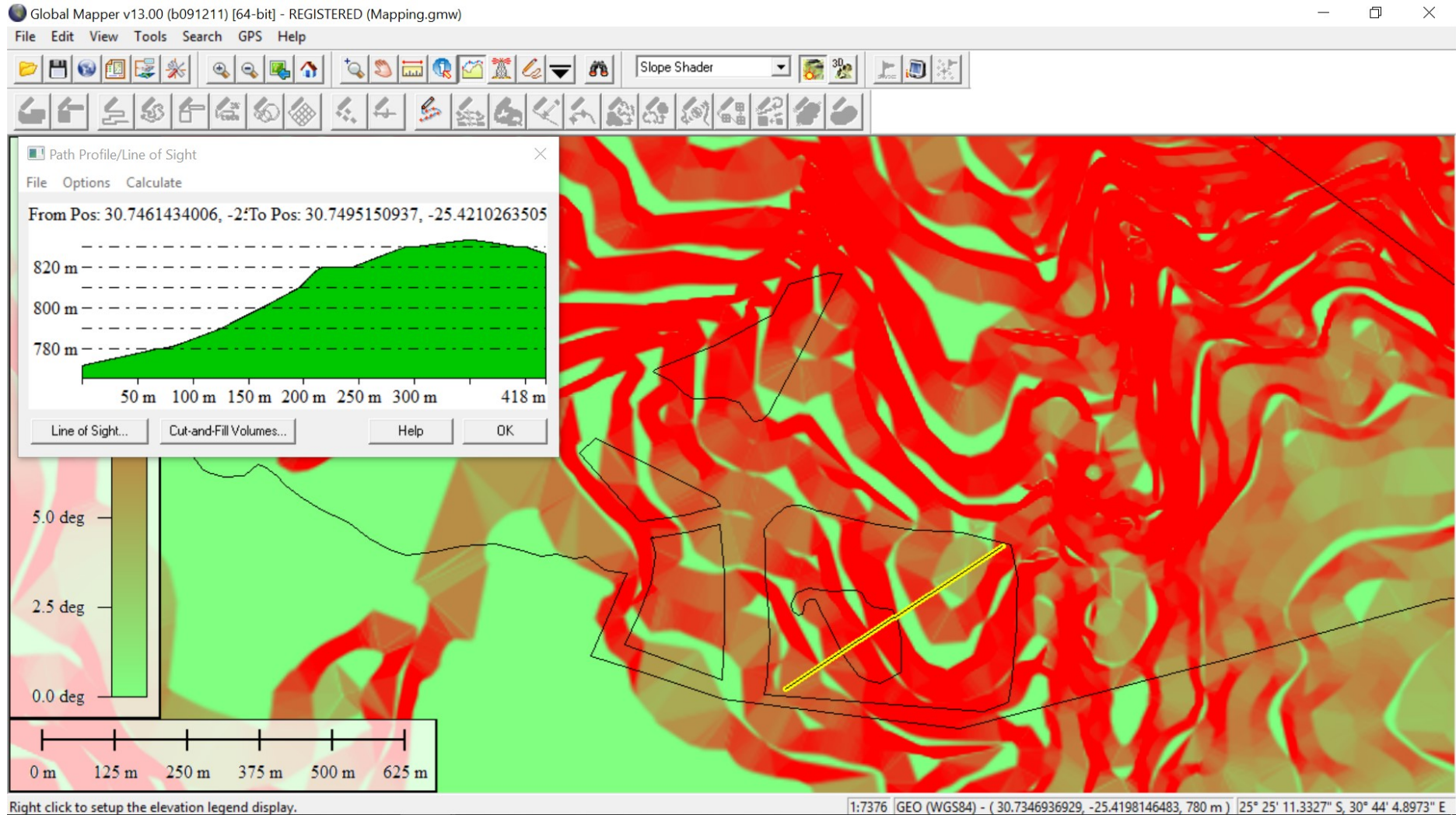




Average Slope is 6.2%

Field 3

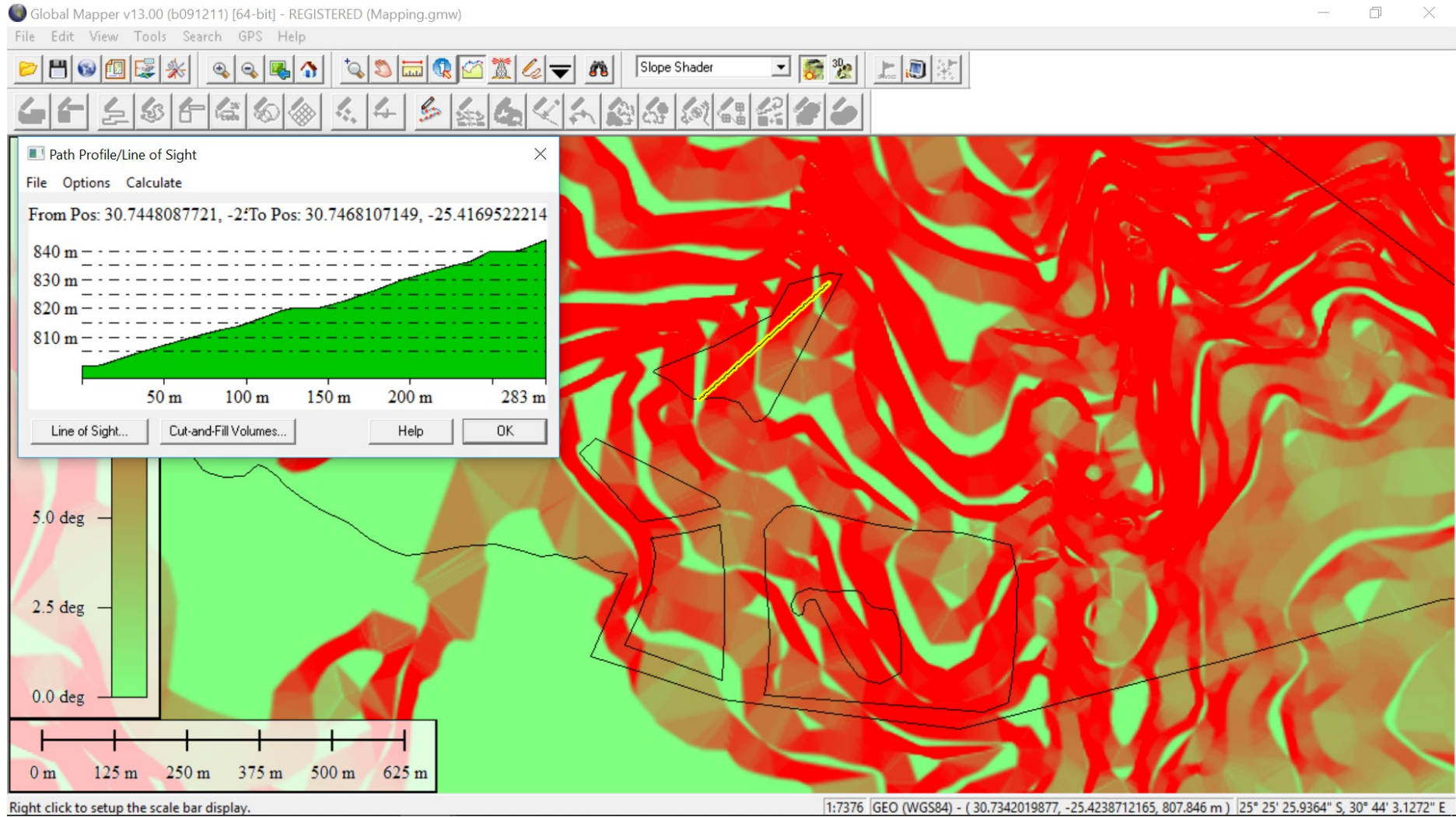




Average Slope is 6.6%

Field 4





Average Slope is 10.2%



1.4 Climate

Summer rainfall and dry winters occur, with MAP from 652mm (Schulze and Lynch, 2006), and 813 to 844mm (Hijmans et al. 2005). Mean monthly maximum and minimum temperatures 35.7° and 1.6° for October and July (Nelspruit), respectively.

1.5 Biological aspects

1.5.1 Terrestrial Ecology

Regional Context

According to Mucina & Rutherford (2006), there are three vegetation types present on Barclay Vale: Legogote Sour Bushveld, Barberton Serpentine Sourveld and Northern Mistbelt Forest. The latter, however, is a very broad-based description and has subsequently been subdivided into a number of forest types within the Mpumalanga Biodiversity Sector Plan (M BSP) (Lötter *et al.*, 2014b). This particular vegetation type is now classified as Eastern Dry Afrotropical Forest. However, the proposed field lies within the Legogote Sour Bushveld only. This vegetation type is described in more detail below:

Legogote Sour Bushveld covers the more southerly and westerly portions of the study area and is classified as an **Endangered** vegetation type (Mucina & Rutherford, 2006). More recently, Legogote Sour Bushveld has been listed as a Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9 December 2011), and classified as **Vulnerable**. This vegetation type is virtually endemic to Mpumalanga Province, marginally extending into the Limpopo Province. It occurs on the granite and quartzite foothills of Mpumalanga and Limpopo Provinces below the escarpment west of the Kruger National Park, extending from Mariepskop in the north down through Mbombela to Barberton in the south. Legogote Sour Bushveld originally covered about 352 314 ha, of which 57.5% has been transformed, mostly through cultivation and urbanisation¹.

Typical Legogote Sour Bushveld is characterised by open to dense woodland on gently to moderately undulating terrain with a high diversity of trees and shrubs. Typical canopy species include *Parinari curatellifolia*, *Pterocarpus angolensis*, *Sclerocarya birrea* subsp. *caffra*, *Acacia sieberiana* var. *woodii*, *Combretum molle* and *C. zeyheri*. The shrub layer contains amongst others *Bauhinia galpinii*, *Acacia ataxacantha*, *Diospyros lycioides* subsp. *sericea*, *Searsia pentheri*, *Erythroxylon emarginatum* and *Dichrostachys cinerea* subsp. *nyassana*. Common herbs include *Agathisanthemum bojeri*, *Gerbera ambigua*, *Waltheria indica* and *Hibiscus sidiformis*. Grasses are strongly dominated by *Hyperthelia dissoluta* but other commonly recorded species include *Panicum maximum* and *Schizachyrium sanguineum*. Succulents are represented by *Aloe petricola*, *Euphorbia vandermerwei* and *Stapelia gigantea*².

Barberton Serpentine Sourveld is mapped as occurring in the far south-western portion of the study area (Figure 4) and is classified as a **Vulnerable** vegetation type by Mucina & Rutherford (2006), although it is not listed as a Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9

¹ Lotter et al., 2014b

² Mucina & Rutherford, 2006

December 2011). This vegetation type is also endemic to the Mpumalanga Province and occurs in small, fragmented areas from Malelane in the northeast to Badplaas in the south-west. The portions on Boskom 1025-JT are at the very western-most edge. Barberton Serpentine Sourveld occurs in hilly terrain on serpentinite geology, giving rise to soils with high heavy metal content and as a result are toxic to many plants. It originally covered approximately 11 000 ha but 27% of that has been transformed³.

Typical Barberton Serpentine Sourveld supports stunted woody vegetation with a welldeveloped grass and herb layer. Dominant small trees include *Acacia caffra*, *A. davyi*, *Faurea rochetiana* and *Pavetta edentula*. Shrubs found include *Searsia rogersii*, *Helichrysum kraussii* and *Erythroxylum delagoense*. The dominant herbs include *Jamesbrittenia grandiflora*, *Thunbergia atriplicifolia* and *Rhynchosia totta*. Grasses are diverse, with *Loudetia simplex* and *Themeda triandra* being dominant³.

Eastern Dry Afrotperate Forest (Northern Mistbelt Forest) is mapped to occur over most of the study area (Figure 2) and is classified by Mucina & Rutherford (2006) as **Least Threatened** and by the MBSP as **Poorly Protected**. It is not listed as a Threatened Ecosystem (Notice 1002 of Government Gazette 34809, 9 December 2011). This vegetation type is centred on the middle Crocodile and Elands River Valleys in the rain shadow of the Mpumalanga Escarpment where climatic conditions encourage a dry, deciduous forest to develop. Eastern Dry Afrotperate Forest originally covered approximately 8400 ha of which 5% has been transformed. Eastern Dry Afrotperate Forest is dominated by the trees *Apodytes dimidiata*, *Celtis africana*, *Chionanthus foveolatus* subsp. *foveolatus*, *Combretum kraussii* and *Cryptocarya woodii*. Common shrubs include *Diospyros whyteana*, *Gymnosporia harveyana*, *Olinia emarginata* and *Searsia lucida*. *Senecio deltoideus* is a frequently encountered herbaceous species. Grasses are scarce but dominated by *Oplismenus hirtellus*⁴

³ Mucina & Rutherford, 2006

⁴ Mucina & Rutherford, 2006

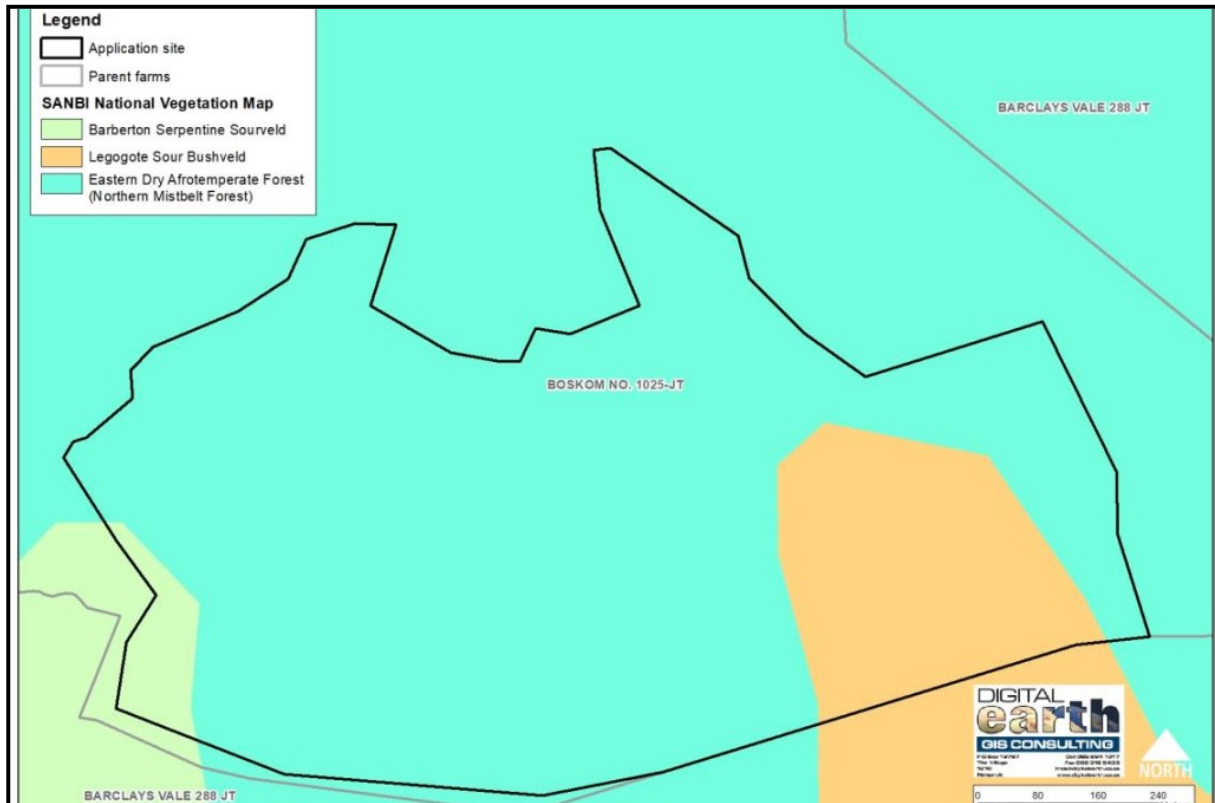


Figure 6: Location of the various vegetation types on Boskom (Mucina & Rutherford, 2006)

Local Vegetation Communities

Three untransformed vegetation communities were identified within the proposed development sites on the basis of distinctive vegetation structure (grassland, woodland, thicket, etc.), floristic composition (dominant and diagnostic species) and position in the landscape (mid-slopes, terrace, crest, etc.). The untransformed vegetation communities are described in detail below (alien plant species are indicated by an asterisk):

***Annona senegalensis* – *Loudetia simplex* Open Woodland**

Annona senegalensis – *Loudetia simplex* Open Woodland is restricted to areas of relatively shallow soils on hill-crests in scattered portions of the study area. It may formerly have covered most of the study area and has subsequently been invaded by a number of indigenous and alien plant species. It covers approximately 7 ha which equates to just over 9 % of the area surveyed. Vegetation structure is Short Open Woodland (*sensu* Edwards, 1983) with a well-developed herbaceous layer. The canopy layer is dominated by the trees *Annona senegalensis* and *Searsia pentheri* with other frequently occurring trees including *Heteropyxis natalensis* and *Dombeya rotundifolia* var. *rotundifolia*. The shrub layer is reasonably well developed and contains *Dodonaea viscosa* var. *angustifolia*, *Senecio microglossus*, *Helichrysum kraussii*, *Diospyros lycioides* subsp. *sericea* and *Searsia rogersii*. The ground layer is diverse and is dominated by the grasses *Loudetia simplex*, *Hyperthelia dissoluta* and *Themeda triandra*. Small seeps are found embedded within the far eastern portions of this community where the grass *Imperata cylindrica* becomes dominant. Herbaceous plants recorded include *Crabbea hirsuta*, *Hilliardiella aristata*, *Barleria ovata* and *Lasiosiphon capitatus*.

A total of 112 species (58 % of the entire list) was recorded from Open Woodland (Appendix 1). This is the highest species list of all the vegetation communities despite many herbaceous plants being sterile or not visible during fieldwork. Species fidelity, which is closely linked to community uniqueness, is very high, with 76 species (68 % of the community list) occurring nowhere else in the study area. Four conservation-important species were recorded with one considered to be of conservation concern as defined by Raimondo *et al.* (2009)¹. *Merwillia plumbea* is assessed as Near Threatened. An unidentified *Gladiolus* species, *Faurea saligna* and *Merwillia plumbea* are protected under the Mpumalanga Nature Conservation Act (No. 10 of 1998) and *Searsia rogersii* is endemic to Mpumalanga.

***Acacia ataxacantha* – *Celtis africana* Riparian Thicket**

This vegetation community occurs along the narrow episodic drainage lines across the study area (Figure 8). Riparian Thicket covers 17 ha or approximately 22 % of the study area. Vegetation structure is mostly Low to Tall Thicket (*sensu* Edwards, 1983). The most frequently encountered canopy trees are *Acacia ataxacantha* and *Celtis africana* although a number of sub-dominant trees such as *Combretum kraussii*, *Harpephyllum caffrum*, *Maytenus undata*, *Syzygium cordatum* subsp. *cordatum* and *Berchemia zeyheri* occur. The understory is diverse but poorly defined in places due to the high abundance of climbers and dense shrub growth, but the following species are frequently encountered: *Diospyros whyteana*, *Hippobromus pauciflorus*, *Dalbergia armata*, *Searsia pentheri*, *Rhoicissus tomentosa*, *Hyperacanthus amoenus*, *Halleria lucida*, *Gymnosporia harveyana* subsp. *harveyana*, *Olinia emarginata* and *Ruttya ovata*. The ground layer is poorly vegetated due to the poor quality light entering the dense canopy but the grasses *Setaria megaphylla* and *Oplismenus hirtellus*, as well as the herbs *Hypoestes aristata* var. *aristata* and *H. forskaolii*, and the geophyte *Dietes iridioides* are found in scattered populations. This vegetation community is perhaps closer to fitting the description for Eastern Dry Afrotropical Forest that is shown by Mucina & Rutherford (2006) to occur widely on Boskom 1025-JT.

A total of 74 species (38 % of the entire list) was recorded from Riparian Thicket; the lowest of the three vegetation communities present (Appendix 1). Species fidelity is high, with 31 species (42 % of the community list) occurring nowhere else in the study area. Two conservation-important plant species were located, namely the tree *Berchemia zeyheri* and

the climber *Dioscorea cotinifolia*, both protected under the Mpumalanga Nature Conservation Act (No. 10 of 1998).

***Acacia ataxacantha* - *Bauhinia galpinii* Disturbed Thicket**

This vegetation community occurs over most of the study area and is probably of a secondary nature where woody species have invaded open woodland habitats. *Acacia ataxacantha* - *Bauhinia galpinii* Disturbed Thicket covers 53 ha, which represents 70 % of the entire study area. Vegetation structure is Low to Tall Thicket (*sensu* Edwards, 1983) (Figure 6) but would probably be open to closed woodland in its natural state. Although the dominant woody plants in the canopy are the tree *Acacia ataxacantha* and the scrambler *Bauhinia galpinii*, species diversity is high and the following canopy trees and climbers are found throughout: *Heteropyxis natalensis*, *Maytenus undata*, *Combretum molle*, *Dombeya rotundifolia* var. *rotundifolia*, *Pterocarpus rotundifolius* subsp. *rotundifolius*, *Peltophorum africanum*, *Acacia caffra*, *A. natalitia*, *Berchemia zeyheri* and *Dalbergia armata*. Smaller woody species are dominated by the alien invasive shrub * *Lantana camara* which grows in impenetrable thickets across much of this community. Other frequently observed shrubs include *Hippobromus pauciflorus*, *Coddia rudis*, *Diospyros lycioides* subsp. *sericea*, *Euclea natalensis* subsp. *natalensis*, *Dichrostachys cinerea* subsp. *nyassana*, *Gymnosporia buxifolia* and *Asparagus virgatus*. Herbs and geophytes are scarce due to the invasion by * *Lantana camara* and * *Jacaranda mimosifolia* but those located include *Hypoestes forskoolii*, *Pupalia lappacea* var. *lappacea* and * *Salvia coccinea*. Grasses are similarly scarce but *Panicum maximum* and *Setaria megaphylla* occur in low abundance.

A total of 84 species (44 % of the entire list) was recorded from Disturbed Thicket, the second highest species richness of the three vegetation communities in the study area. Species fidelity is high with 29 species (35 % of the community list) occurring nowhere else in the study area. Three conservation-important species were recorded during fieldwork, though none of these are considered to be of conservation concern as defined by Raimondo *et al.* (2009). One species is protected under the National Forests Act (No. 30 of 1998), namely the tree *Pittosporum viridiflorum* and two species are protected under the Mpumalanga Nature Conservation Act (No. 10 of 1998), namely the tree *Berchemia zeyheri* and the climber *Dioscorea cotinifolia*. A number of other protected plants potentially occur within this community but the impenetrable thickets of *Lantana camara* prevented access to many areas.

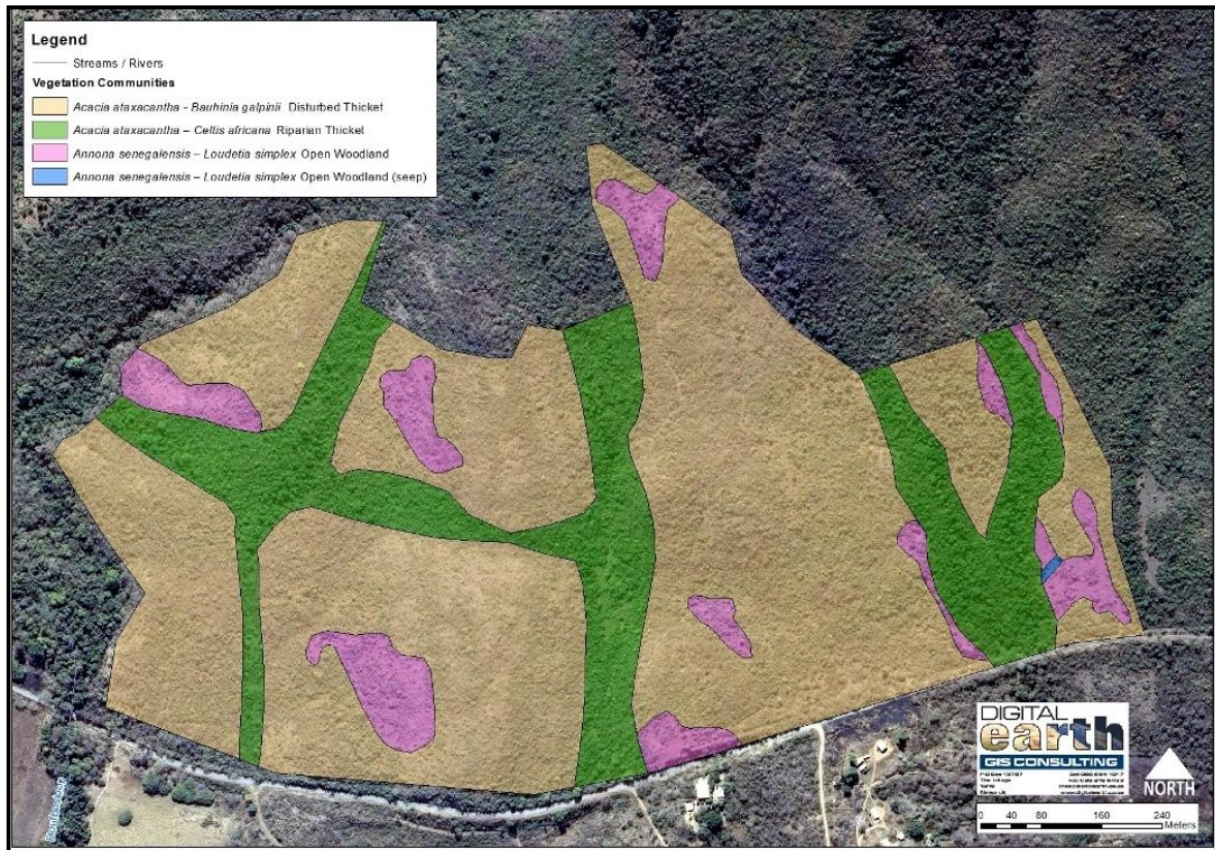


Figure 7: Vegetation communities identified within the Boskom study area.

The Open Woodland vegetation community has **High** Biodiversity Value due to a combination of High Conservation Importance and Moderate Functional Value scores. This community can be considered typical of a **Vulnerable** vegetation type (Barberton Serpentine Sourveld) and it is **endemic** to the Mpumalanga Province. Four conservation-important species were recorded with one considered to be of conservation concern. *Merwillia plumbea* is assessed as **Near Threatened**. *Gladiolus* sp., *Faurea saligna* and *Merwillia plumbea* are protected under the Mpumalanga Nature Conservation Act (No. 10 of 1998) and *Searsia rogersii* is endemic to Mpumalanga. It potentially supports one **Endangered** mammal, namely Mountain Reedbuck, and three **Near Threatened** mammals, namely Serval, Honey Badger and Side-striped Jackal. One bird listed as **Vulnerable** (Lanner Falcon) potentially forages over this community. The Riparian Thicket vegetation community has **High** Biodiversity Value resulting from Moderate Conservation Value and High Functional Value scores. Riparian Thicket was rated as having High Functional Importance because of a high rating in the following components:

- Provisioning Services – fibres, medicinal plants;
- Regulating Services - flood attenuation;
- Supporting Services – nutrient cycling, migration corridors.

Two Provincially protected plant species were confirmed to occur, namely *Berchemia zeyheri* and *Dioscorea cotinifolia*. One **Near Threatened** mammal was confirmed to occur (Natal Red Duiker) and one additional species potentially occurs (Honey Badger). One **Vulnerable** bird species almost certainly hunts over this community as well, namely Crowned Eagle, which may also breed within the study area.

The Disturbed Thicket vegetation community has **Moderate** Biodiversity resulting from Moderate Conservation Value and Moderate Functional Value scores. Although classified as Legogote Sour Bushveld, and **Endangered** vegetation type, it does not accurately represent that classification due to the high infestation levels of alien invasive plants, particularly *Lantana camara*. Vegetation structure has been significantly altered and the species diversity of the ground layer is significantly lower than that of typical Legogote Sour Bushveld. Three Nationally or Provincially protected plant species were confirmed to occur, namely *Pittosporum viridiflorum*, *Dioscorea cotinifolia* and *Berchemia zeyheri*. One **Near Threatened** mammal was confirmed to occur (Natal Red Duiker) and one additional species potentially occurs (Honey Badger). One **Vulnerable** bird species probably regularly hunts over this community, namely Crowned Eagle. The study area is assessed as **Critical Biodiversity Area** (CBA) Irreplaceable by the MBSP (Lötter *et al.*, 2014, Figure 3). Factors contributing to this assessment include the following:

- Legogote Sour Bushveld – Endangered Vegetation Type
- Barberton Serpentine Sourveld – Vulnerable Vegetation Type
- *Chiloglanis bifurcus* – Endangered fish species
- *Adenia wilmsii* – modelled distribution, Endangered plant species
- Strategic Water Source Area
- Climate change priority - landscape facet
- Supporting ecological corridor

The MBSP recommends low-impact land-uses in CBA's and that vegetation be kept in a natural state for maintaining biodiversity. These areas could be incorporated into formal Protected Areas through biodiversity stewardship agreements. Examples of recommended land-uses include low-intensity livestock or game ranching. However, the vegetation within the study area is not typical of Legogote Sour Bushveld as it has been encroached by indigenous and alien invasive woody species and the vegetation structure has changed from open woodland to thicket. The small patches of Barberton Serpentine Sourveld are representative of that vegetation type, but are very small and fragmented and may be lost to bush encroachment in the next few years. No habitat occurs for the Endangered *Chiloglanis bifurcus*.



Figure 8: Biodiversity Values of Vegetation Communities in the Boskom Study Area

Provided the recommendations suggested in this and the terrestrial ecology report are followed, there is ***no objection*** to the proposed developments on Boskom 1025 JT, in terms of the terrestrial ecosystems of the study area. However, if construction was to proceed without the implementation of the mitigation measures given in section 7 and development recommendations in Table 6 of the terrestrial ecology report then we would object to the development application.

1.5.2 Wetland Ecology

The proposed development is located on the foot slopes of Mount Carmel, near Sudwala Caves, on the farm Boskom 1025 JT, which was previously part of Barclay Vale 288 JT. The site is about 25 km west of Nelspruit, Mpumalanga Province. The proposed development comprises six areas totalling about 52 hectares north of the N4 highway. The Study Area for this report considered all aquatic ecosystems within 500 m of the two proposed development areas, as required in terms of Government Notice 509 (26th August 2016). The Study Area for this report covered an area of 330 hectares. The Study Area is located on the boundary between quarter degree squares 2530BC and BD.

Aquatic Ecosystem Classification and Delineation

The proposed development could impact to two hydro-geomorphic aquatic ecosystem types namely: Seepage Wetlands and Upper Foothill (Houtbosloop), plus a number of episodic drainage lines.

Sensitive Aquatic Habitats

All wetlands and watercourses within the Study Area as considered ecologically sensitive.

Ecological and Functional Importance

The overall Ecological and Functional Importance of aquatic ecosystem types within the Study Area were rated as follows: • Seepage Wetlands: *Low* • Upper Foothill (Houtbosloop): *High*

Present Ecological State

The Present Ecological State of the potentially impacted aquatic ecosystems within the Study Area in March 2018 were rated as follows: • Seepage Wetlands: *Natural* (Category A: 95%) • Upper Foothill (Houtbosloop): *Moderately Modified* (Category C: 78%) The main causes of degradation were associated with clearing of riparian vegetation for agricultural development that took place in 2017, and subsequent colonisation by alien invasive vegetation.

Ecological Risks

The following risks of the proposed development to aquatic ecosystems were identified:

- **Impact of Clearing on Hillslope Seepage Wetlands.** Development of the Proposed Development Area 5 will impact directly on a patch mosaic of small episodic and seasonal seepage wetlands that are characterised by vertic clays of the Rensburg Soil Formation.
- **Impact of Access Roads and Clearing on Watercourses.** Increased road network and hardened surfaces that change magnitude of stormwater runoff, and lead to potential increase in turbidity (short-term), and erosion (long-term), in receiving watercourse (Houtbosloop).
- **Impact of Clearing on Indigenous Riparian Vegetation.** Disturbance and compaction of soils during the Construction Phases for all proposed areas is likely to create conditions suitable for the spread and proliferation of alien invasive vegetation, and associated reduction in biodiversity of indigenous species in riparian zones.
- **Impact of Pesticides Use on Aquatic Ecosystems.** Aerial drift and runoff of pesticides could impact sensitive biota in the Houtbosloop.

Recommendations

- **Authorisation**
 - **Proposed Development Area No 5**

Authorisation of the Proposed Development Area No 5 in relation to potential impacts on aquatic ecosystems is not recommended on the grounds that the proposed development in this area will destroy a patch mosaic of seasonal and episodic Hillslope Seepage Wetlands that are in a *Natural* Present Ecological State (Category A), and because soils in this area comprise vertic clays of the Rensburg Soil Formation, which are unsuited for cultivation.

- **Proposed Development Areas No's 1, 2, 3, 4 & 6**

Authorisation of the remaining Proposed Development Areas in relation to potential impacts on aquatic ecosystems is ***recommended*** on the grounds that the risks to aquatic ecosystems can be easily minimised by adhering to the recommended control measures as detailed in Appendix F.

- **Monitoring**

Monitoring of aquatic ecosystems is not considered necessary because of the low risks of the proposed development on aquatic biodiversity.

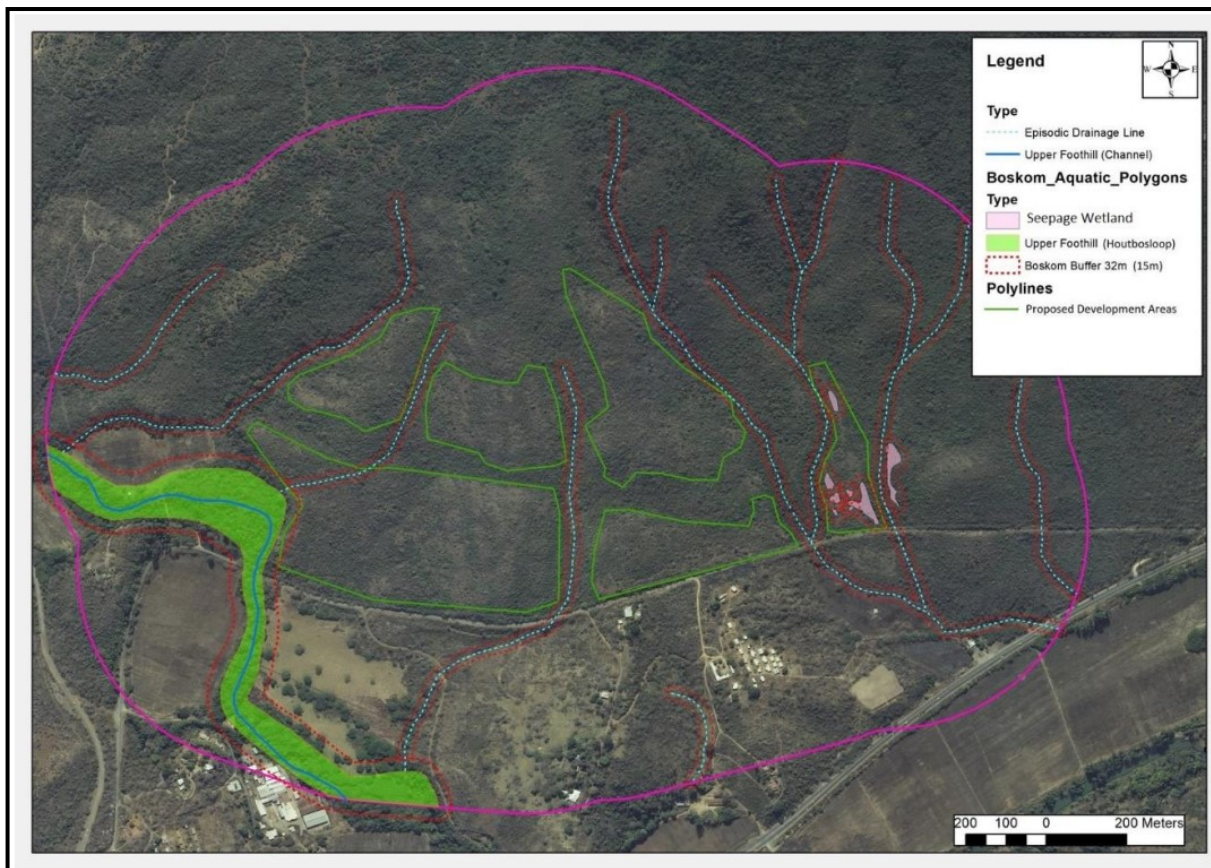


Figure 9: The aquatic areas identified with 500m of possible development site

1.5.3 Crowned Eagle

After two hours of scanning the bush, cliffs and drainage lines I noticed a typical nest tree 1,5kms away. On closer inspection (400m) a nest was confirmed. Due to the extremely thick bush, it was not possible to get closer to the nest. Even though the light was poor, it was possible to make out an adult Crowned Eagle standing on the nest confirming that it will in all likelihood breed this year. These large eagles breed every second year in the lowveld.

The approximate nest coordinates are:

-25.388100S; 30.727681

Altitude 812m

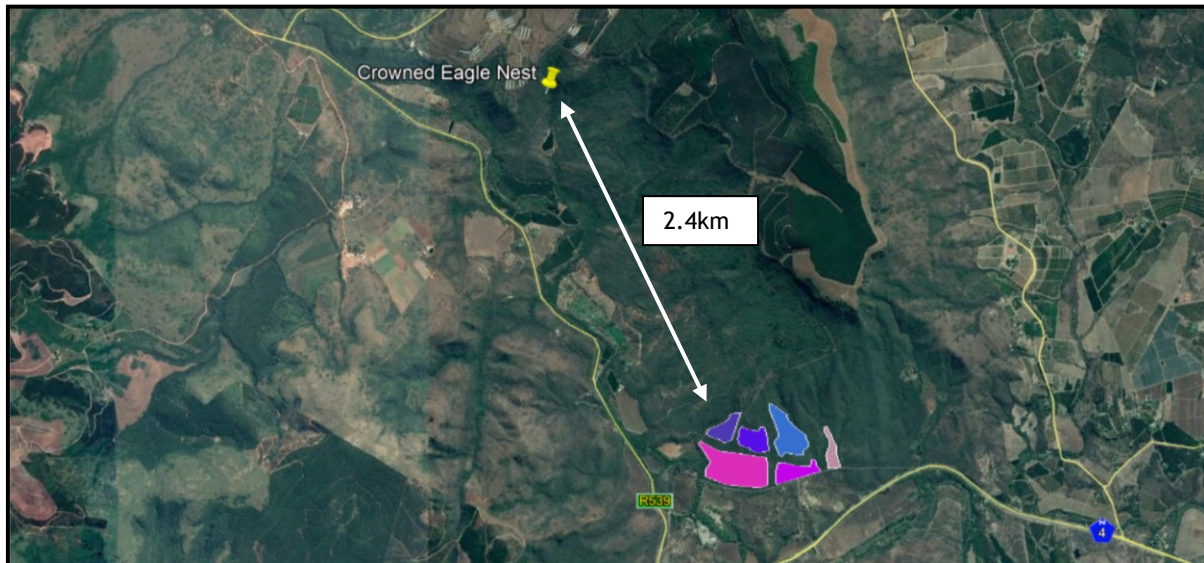


Figure 10: Locality (in proximity to the proposed field) of the crowned eagle nesting site.

Conclusion:

The Crowned Eagle nest is approximately 2.4km away from the proposed bush clearing for the Macadamias. It is unlikely that this change of land use will significantly negatively the Crowned Eagles. The prey of this eagle is largely Red Duiker, Grey Duiker and small Bushbuck as well as Vervet Monkeys. All the above species are relatively abundant in the valley and again the clearing should not significantly impact on their availability to the Crowned Eagles.

1.6 Social and economic aspects

The land on which the proposed agriculture, is to take place, is owned by the applicant and is currently classified as agricultural land. Sustainable farming on this property appears to be achievable.

- **Economy of the local and greater area**

Sustainable development ensures that we meet our present needs without compromising our ability to meet future needs. Considerations of sustainability become increasingly important as global climate change poses new challenges for the future of humanity and social issues become more relevant to the growing world population. As a significant regional player in the agricultural sector, Boschkom Estates Pty Ltd focuses on optimising the social and environmental impact of its operations, without compromising economic viability. It is the group's goal to position itself as employer and partner of choice for employees, communities, business initiatives and governments.

The proposed project encompasses all of the above and should be seen as having the potential to strengthen the local area economically.

- **The Rural Economy**

As a large employer, Boschkom Estates Pty Ltd plays an increasingly significant economic role in the broader Mbombela area. As a farming company, they proactively support the socio-economic upliftment of the community residents of the areas in which we operate.

This project will play a key role in affording the local community the chance to grow and develop in a positive social and economic way.

- **Local Employment**

The group provides permanent employment for a large number of people. Employees are generally sourced from communities in close proximity to the farming operations and the wages and benefits earned support many more people than those directly employed.

1.7 Cultural aspects

No sites of heritage or archaeological significance were identified in the proposed project areas. A total of twenty one (21) survey orientation locations were documented (SO 1-21) which includes a GPS location and photographs of the landscape at that particular location. Surveying the study areas proved very difficult and to a large extent impossible as a consequence of impenetrable thicket. Surface visibility and access was reduced due to very dense bush and undergrowth which included Lantana and sickle bush and dense thick grass cover. This limited exploration of some of the proposed study areas which are often also of a very steep gradient and consequently historically uninhabitable. Consequently, no survey track logs exist for some of the study areas (see maps in Appendix C of the HIA).

Where field surveying was possible, no sites or features of archaeological or heritage significance was located. Social consultation with the farm manager confirmed that to their knowledge no graves or heritage features are located in the proposed project areas (also see section 3.2 of the HIA.; social consultation). It is recommended that an archaeologist monitor vegetation clearing activities if it is permitted. In terms of the archaeological component of the Act (25 of 1999, section 35) no sites were located or recorded. In terms of the built environment in the project area (section 34 of the Act) no significant buildings were identified. In terms of burial grounds and graves (section 36 of the Act) no graves or gravesites were identified. It is not within the expertise of this report or the surveyor to comment on possible palaeontological remains which may be located in the study area. The bulk of archaeological remains are normally located beneath the soil surface. It is therefore possible that some significant cultural material or remains were not located during this survey and will only be revealed when the soil is disturbed. Should excavation or large scale earth moving activities reveal any human skeletal remains, broken pieces of ceramic pottery, large quantities of sub-surface charcoal or any material that can be associated with previous occupation, a qualified archaeologist should be notified immediately. This will also temporarily halt such activities until an archaeologist has

assessed the situation. It should be noted that if such a situation occurs it may have further financial implications.

Recommended management measures

Management objectives include not to impact on sites of heritage significance. Monitoring programmes which should be followed when a “chance find” of some heritage object or human remains occur, include the following: The contractors and workers should be notified that archaeological sites might be exposed during the construction work.

- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a museum, preferably one at which an archaeologist is available, so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999).

1.7.1 Palaeontological

The site lies on ancient rocks of the Chuniespoort and Pretoria Supergroups. There are no fossils in the Hekpoort Formation as it is volcanic. The Black Reef Formation and Malmani Subgroup banded ironstone and dolomites, although formed by the chemical activities of ancient algae, photosynthesis and oxygen production, are not known to have preserved fossil algae near Nelspruit. Since the project is to clear soils of vegetation for agriculture there is no chance of finding even microfossils.

- As far as the palaeontological heritage is concerned the project can continue and no further assessment is required.

2 Detailed description of the proposed development.

2.1 Water supply

Water will be supplied to the site via extraction within the ambit of existing water rights. In this regard and as verified by **Adv Maritza Uys**:

- Boskom 1025 has a total of **29 ha** water available. Please see copy of email confirmation inserted below.

Anita

Boschkom se water is soos volg:

Boskom 1025 (ged 5/272 en Ged 13/288): 29 ha (11 ha vanaf Ged 13 + 18 ha vanaf Ged 5)
 9 BOSCHKOM 272 (uit Gedeeltes 6 en 8): 18 ha (HBL geverifieer)+ 53,9 (oorgedra vanaf Krok) = 71,9 ha
 Gedeelte van Restant BARCLAYS VALE 288: 60,5 ha (40% aandeel in totale waterregte op 0/288)

TOTALE WATERREGTE: 161,4 HA

Groete

Maritza



Adv. Maritza Uys



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Section in yellow is relevant and has been translated for ease of reference. It reads as follows:

“Boskom 1025 (portion 5/272 and portion 13/288): 29 ha (11 ha from portion 13 + 18 ha from portion 5)

2.2 Electrical supply

Electricity will be supplied to the site via an existing powerline and transformer.

Sanitation and Waste

The development of macadamia trees will be an extension of existing agricultural activities in the area and would require no development of sanitation or waste facilities.

2.3 Access

Access to the site will be via an existing road. See layout and locality maps in this regard.

2.4 Storm water

It is not anticipated that runoff will increase from current site activities.

3 Prescribed Environmental Management Standards, Practices, Policies, Guidelines or Legislation

The following legislation, guidelines, departmental policies, environmental management instruments and/or other decision-making instruments that have been developed or adopted by a competent authority in respect of activities associated with a development of this nature, were identified and considered in the preparation of this basic assessment report:

- a. Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983), as amended.
- b. DEA (2010), Public Participation 2010, Integrated Environmental Management Guideline Series 7, Department of Environmental Affairs, Pretoria, South Africa.
- c. DEA&DP (2010) Guideline on Alternatives, EIA Guideline and Information Document Series. Western Cape Department of Environmental Affairs & Development Planning (DEA&DP).
- d. DEAT (2002) Specialist Studies, Information Series 4, Department of Environmental Affairs and Tourism (DEAT), Pretoria.
- e. DWA (2007), Guideline for Developments within a Floodline (Edition 1), Department of Water Affairs and Forestry, Pretoria, South Africa.
- f. DWAF (2004) General Authorisation No. 399 in the Government Gazette No. 26187 dated 26 March 2004.
- g. Ferrar, A.A. & Lotter, M.C. 2007. Mpumalanga Biodiversity Conservation Plan Handbook. Mpumalanga Tourism & Parks Agency, Nelspruit.
- h. Government Notice No. R. 543, R. 544, R. 545, R. 546 and R. 547 in Government Gazette No. 33306 of 18 June 2010.
- i. Haydorn, A.E.F. (2006) Rational Assessment of Development in Sensitive Environments (Ref: ENPLCRIT). Tel/Fax: (021) 887 4382. eMail: heydaef@adept.co.za

- j. National Environmental Management Act, 1998 (Act No. 107 of 1998) (“NEMA”).

4 Public Participation Process

- The Public Participation Process (PPP) was undertaken according to Regulation 54 of the EIA Regulations, 2014, and took into consideration the Public Participation 2010 Guideline Document (DEA, 2010).
- The level of public participation was determined by taking into account the scale of the anticipated impacts of the proposed project, the sensitivity of the affected environment and the degree of controversy of the project, and the characteristics of the potentially affected parties. Based on the findings of the aforementioned consideration, there was no reason to elaborate on the minimum requirements of the public participation process outlined in the EIA Regulations, 2014 or use reasonable alternative methods for people desiring of but unable to participate in the process due to illiteracy, disability or any other disadvantage.
- Potentially interested and affected parties were notified of the proposed application by –
- Fixing a notice board at a place conspicuous to the public. (APPENDIX E, Annexure A & B). There was no reasonable alternative site (Section D6).
- Giving written notice to owners and occupiers of land adjacent, (APPENDIX E; ANNEXURES C, D, G and H), and organs of state having jurisdiction in respect of the proposed activity. The applicant, Boschkom Estates Pty Ltd, is the owner of the land. Consequently, a Background Information Document (BID) was prepared and distributed via email (APPENDIX E, Annexure C & D) to:

Table 8: List of Stakeholders

The owner or person in control of that land if the applicant is not the owner or person in control of the land: The applicant is the owner or person in control of the land.				
The occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken: The applicant occupies the site where the activity is to be undertaken (Boschkom Estates Pty Ltd). There was no reasonable alternative site (Section D 7).				
Owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken:				
Francois Joubert	Hotazel Developments		0844684516	gm@joubertenseuns.co.za
Grant Casey/Stacey			0836315158	grant.casey@telkomsa.net
Nico Van Zyl	Boschkom Estates			nico@lvt2001.co.za
Elmari Swanepoel	Boschkom Estates			admin@lvt2001.co.za
The municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area: The site is not designated a ward.				
The municipality which has jurisdiction in the area: Mbombela Municipality (MLM)				

Noko Michael Seanego (013 759 2190)

Any organ of state having jurisdiction in respect of any aspect of the activity:

Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA)

Robyn Luyt (Rluyt@mpg.gov.za, 082 672 7868)

Mpumalanga Tourism and Parks Agency (MTPA)

Frans Krige (frans@mtpa.co.za, (084 232 2902)

Komilla Narasoo (knarasoo@mtpa.co.za)

Department of Agriculture

Mr Frans Mashamba (FransMas@nda.agric.za)

- Placing an advertisement in a local newspaper, the Lowvelder (APPENDIX E, Annexure E & F). No official Gazette existed at the time of the application. The proposed activity shall not have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it will be undertaken.
- Lodging a copy of the Draft Basic Assessment and making it available for public and authority comment, from 20 July 2018 to the 20th August 2018, a period of 30 days. Registered I&AP's were contacted directly regarding the availability of the report.

In terms of regulation 55(1), all organs of state which have jurisdiction in respect of the proposed activity and all persons who submitted written comments or requested, in writing, to be registered were placed on the register (APPENDIX E, Annexure I & J).

A summary of the issues raised (**APPENDIX E, Annexure J**) -

Table 9: Comments and Responses

Person	Issue	Person	Response
INITIAL PPP			
Frans Mashabela (Agriculture)	Due to the cultivation practices around this area, is clear this will contribute to the food reserves of the country. The clearing should not have severe negative impacts on areas outside the required area. The natural resources are scarce resources that cannot be renewed and must be preserved in an environmental responsible manner.	Steven Henwood (EAP)	Noted.
Frans Mashabela (Agriculture)	The farm Boskom 1025 JT is situated on an open hills or ridges with sloping percentages ranging from 8.0 to 12.0 %. This type of slope is vulnerable to water erosion; therefore, a great care is required during clearing. The season of the year is also important, when clearing this area; the safe period is during dry season when the rainfalls are scarce, like in the winter months. This will give the land user a good time to prepare his land; construct conservation measures that may prevent soil erosion. The drainage lines should not be disturbed, and this will minimizing erosion. The soil in this area is lacking strong texture, this may pose a threat to erosion; therefore the conservation measures must be adequate in time.	Steven Henwood (EAP)	Noted. Slope has been taken into consideration when choosing the preferred site alternative. In this regard a slope analysis was conducted with the following conclusions: "The topography of the two proposed development areas comprises hills with moderate to steep slopes. Field 1 – 9.7% average slope; Field 2 – 6,2% average slope; Filed 3 6.6% average slope; and Filed 4 – 10.2% average slope. Elevation within the Study



			<p>Area ranges between 750 and 975 m amsl."</p>
<p>Frans Mashabela (Agriculture)</p>	<p>The ecosystem in the area is threatened because is vulnerable to harm due to on-going developments activities in the valley, therefore good technical measures are required to sustain it</p>	<p>Steven Henwood (EAP)</p>	<p>The initial scope of the Ecological Report covered the entirety of both Barclay Vale and Montrose. The scope was later reduced to talk to the proposed site only, however the report relating to both properties was still included. This may have resulted in some misunderstanding and ambiguity.</p> <p>There are definitely sections on Montrose and adjacent subdivisions of Barclay Vale that have had riparian vegetation cleared. However, apart from the legal removal of alien vegetation I (the EAP) am unaware of any large scale illegal clearing on the</p>



			property section that contains the proposed site.
K. Malele (MTPA)	The sensitivity if the above mentioned farm was assessed according to the Mpumalanga Biodiversity Sector Plan (MBSP; MTPA, 2014). This sensitivity was assessed in terms of a terrestrial and freshwater assessment. In the MBSP, sensitive areas are identified in terms of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). CBAs and ESAs are deemed to be necessary to ensure protection of biodiversity, environmental sustainability, and human well-being, and are to remain unaltered. Therefore no form of mining or development is permitted on those areas (Mining and biodiversity guideline)	Steven Henwood (EAP)	Noted.
K. Malele (MTPA)	The terrestrial assessment , which was also included in your Ecology study and Biodiversity Value Assessment shows that there are <i>CBA Irreplaceable areas</i> within the proposed 17.46 HA of the proposed development. The MTPA would therefore recommend that if possible, the clearing be done on the other natural areas in order to conserve the functionality of the <i>CBA Irreplaceable areas</i> . However, the assessment has shown that the vegetation within the study area has been encroached by indigenous and alien woody species. There are also patches of Barberton Serpentine Sourveld which are very small and fragmented which are said could be lost to bush encroachment in the next few years.	Steven Henwood (EAP)	Noted. The entire 14.6ha is located within an area designated as CBA Irreplaceable. However of all the possible alternative fields , the areas proposed have poorer biodiversity rating as were thus accepted as the most feasible alternative location.
K. Malele (MTPA)	The freshwater assessment showed that there is a CBA River, and that the area is within an <i>ESA Important Sub-catchment</i> . This wetland has been delineated and no clearing should occur within the delineated zone. According to the Aquatic Delineation and Risk Assessment proposed development areas no 1, 2, 3, 4, and 6 are recommended for development while development area no 5 is not recommended. This because the proposed development in this area could destroy a patch mosaic of seasonal and episodic Hillslope Seepage Wetlands that are in a Natural Present Ecological State (Category A).	Steven Henwood (EAP)	Noted. Only the least sensitive area in terms of the Aquatic assessment have been incorporated into the preferred layout. All Sensitive aquatic

			systems and areas have been excluded and buffered according.
K. Malele (MTPA)	<p>During the clearing operation, the reptiles, mammals and birds must be allowed to move freely into new safer habitats.</p> <p>All invasive alien plants must be eradicated using correct methods.</p> <p>All the negative environmental impacts that could arise as a result of this project should be avoided, minimized, mitigated or rehabilitated to its pre-development land use or to the standards agreed to with the land owner.</p> <p>The applicant must effectively implement and adhere to all the conditions of the EMP and all the action plans</p>	Steven Henwood (EAP)	Noted. All of these requirements have been taken into consideration in the EMP and impacts and mitigation section of the BAR.
M Masango (DARDLEA)	<p>1. Please note that this department will not consider authorising the removal of indigenous vegetation from land that is not arable. Land that is not arable due to inter alia, lack of sufficient water for irrigation, rockiness, steepness, excessive wetness, incorrect soil type., must be identified and excluded accordingly. In this light, this office further refers to the ecological study dated May 2018, in which it was recommended that the slope analysis be done to determine which area are too steep for crop planting. Please confirm how slope analyses informed the layout.</p>	Steven Henwood (EAP)	<p>Noted. Slope has been taken into consideration when choosing the preferred site alternative. In this regard a slope analysis was conducted with the following conclusions:</p> <p>“The topography of the two proposed development areas comprises hills with moderate to steep slopes. Field 1 – 9.7% average slope; Field 2 – 6,2% average slope; Filed 3 6.6% average</p>



			<p>slope; and Filed 4 – 10.2% average slope. Elevation within the Study Area ranges between 750 and 975 m amsl.”</p> <p>Potential fields within the study area that exhibited an average slope greater than 12 % were excluded. Moreover, rock outcrops within the proposed fields were excluded due to lack of arable soils and slope excessiveness. The current layout has excluded all areas where slope is greater than 12%. Any slopes below this were deemed arable with strict erosion mitigating measures being enforced.</p>
<p>M Masango (DARDLEA)</p>	<p>2. Comments from MTPA must be included in the final basic assessment report.</p>	<p>Steven Henwood (EAP)</p>	<p>Noted. These have been included.</p>



<p>M Masango (DARDLEA)</p>	<p>2. Comments from I&APs must be included in the final basic assessment report. 3. The final basic assessment report must include an issues and response report, as well as copies of and responses to comments received from all I&APs, including these comments.</p>	<p>Steven Henwood (EAP)</p>	<p>Noted. These have been included.</p>
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5 Need and Desirability

The Boschkom Estates Pty Ltd wishes to cultivate macadamias within the Farm Boskom, 1025 JT farm. They intend to plant macadamias.

In order to cultivate the proposed field, the area must be cleared of the natural bush that occurs on the site. In addition to this, and due to the current agricultural scale of economy, the applicant wishes to extend his current farming area thus increasing the total area available for planting.

The desire to utilise the proposed field, was precipitated by the fact that the most economically viable option available to the owner is to optimize the use of existing resources, while adding further value by extending and incorporating additional sections of arable land. A large section adjacent to the proposed field is currently disturbed.

The proposed site is ideal for agriculture (specifically growing macadamias), as the soils, water and growing region are ideal.

6 Feasible and Reasonable Alternatives

6.1 Legislative Background

The very consideration of a development in terms of EIA is about the consideration of alternatives related to the development. The NEMA prescribes that all environmental impact assessments, which are to be utilised in informing an application for environmental authorisation, must identify and investigate the alternatives to the activity on the environment and include a description and comparative assessment of the advantages and disadvantages that the proposed activity and feasible and reasonable alternatives will have on the environment and on the community, that may be affected by the activity. If, however, after having identified and investigated alternatives, no feasible and reasonable alternatives exist, no comparative assessment of alternatives, beyond the comparative assessment of the preferred alternative and the option of not implementing the activity, is required during the assessment phase. In this instance, the EAP managing the application must provide the competent authority/DARDLEA with detailed, written proof of the investigation(s) undertaken and motivation indicating that no reasonable or feasible alternatives, other than the preferred alternative and the no-go option.

6.2 Definition of Alternatives

“Alternatives”, in relation to a proposed activity, means different means of meeting the general purposes and requirements of the activity, which may include the following types of alternatives:

- The property on which, or location where, it is proposed to undertake the activity;
 - Refers to both alternative properties as well as alternative sites on the same property.
- The type of activity to be undertaken;
 - Provision of public transport rather than increasing the capacity of roads.
- The design or layout of the activity;
 - Different architectural and or engineering designs.

- Consideration of different spatial configurations of an activity on a particular site (Site Layout)
- The technology to be used in the activity;
 - Option of achieving the same goal by using a different method or process.
- The operational aspects of the activity;
- Demand
 - When a demand for a certain product or service can be met by some alternative means, i.e. the demand for electricity/storm water controls could be met by supplying more energy or using energy more efficiently by managing demand.
- Input
 - Input alternatives for projects that may use different raw materials or energy sources in their processes.
- Routing
 - Alternative routes generally applies to linear developments (pipeline routes).
- Scheduling and Timing
 - Where a number of measures might play a part in an overall programme, but the order in which they are scheduled will contribute to the overall effectiveness of the end result.
- Scale and Magnitude
 - Activities that can be broken down into smaller units and can be undertaken on different scales, i.e. for a housing development there could be the option 10, 15 or 20 housing units.
- The option of not implementing the activity (no-go option).
 - The no-go option is taken to be the existing rights on the property and this includes all the duty of care and other legal responsibilities that apply to the owner of the property. All the applicable permits must be in place for a land use to be an existing right.

The key criteria when identifying and investigating alternatives are that they should be “feasible” and “reasonable”. The “feasibility” and “reasonability” of and the need for alternatives must be determined by considering, *inter alia*, (a) the general purpose and requirements of the activity, (b) need and desirability, (c) opportunity costs, (d) the need to avoid negative impact altogether, (e) the need to minimise unavoidable negative impacts, (f) the need to maximise benefits, and (g) the need for equitable distributional consequences. The (development) alternatives must be socially, environmentally and economically sustainable. They must also aim to address the key significant impacts of the proposed residential development by maximising benefits and avoiding or minimising the negative impacts.

Identification and Investigation of Alternatives Including Motivations

Given the aforementioned definition and description of alternatives, alternatives for investigation in this assessment were first identified by considering whether the different types of alternatives could meet the general purposes and requirements of the need to expand Boschkom Estates Pty Ltd business model and offer increased capacity/services to the macadamia growers in the region, and subsequently constitute a comparable activity. Thereafter, the need for an alternative was assessed to determine whether it warranted further investigation. Certain alternatives could not be considered as legitimate alternatives for comparable assessment from the onset of the assessment process because they apply to aspects/parts of the proposed activity. Consequently, they were considered

throughout the assessment process to address site-specific impacts when the need for mitigation was identified by the relevant specialist studies.

Purpose and Requirements of clearing and planting macadamias

The purpose for clearing and planting macadamias is to increase Boschkom Estates Pty Ltd business model.

Alternative No. 1: Property and Location

Purpose and Requirements

The development of the proposed site is a right held by the owners and will also improve the ability of the owner's to successfully run and operate their business in a financially viable manner. Moreover, the size and suitability of the proposed site as well as the fact that this site is owned by the applicant, precludes consideration of alternative properties. Because macadamias do not yield as much as other tree crops, it is necessary to have more trees for a viable operation. The addition of this "new area" to the existing macadamia crops will add immense value and improve the economic viability of the entire operation.

An alternative property does **not** meet the needs as described above. Neither does an alternative site, given that the proposed site is located adjacent to currently disturbed areas and that the site itself was rated as having a moderate to low biodiversity value. In addition to this and considering the aesthetic value and relatively high ecological sensitivity of properties and other sites in the area, an alternative location is **unable** to meet the needs as described. The applicant would thus like to plant and develop the site identified as field 1.

Methodology

NA

Criteria used to investigate and assess alternatives

NA

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

Activity can only occur on land within close proximity to their current operation and moreover, the size and suitability of the proposed site as well as the fact that this site is owned by the applicant, precludes consideration of alternative properties. To suggest an alternative site in the surrounding ecologically sensitive areas would also be **unreasonable**.

An alternative location on the applicant's property was considered (north-eastern portion of the Farm Barclay Vale 288, JT). Due to the ecological sensitivity of this area it would be unreasonable to consider this portion of the site as well as splitting the development of the site into two orchards.

Alternative No. 2: Type of Activity

Purpose and Requirements

The specific nature of this activity, fundamentally to increase Boschkom Estates Pty Ltd business model, does **not** afford alternative types of activities that can meet the same purposes or requirements, specifically providing the owners of the land the ability improve, successfully market, run and ultimately operate their business in a financially viable manner.

Methodology

NA

Criteria used to investigate and assess alternatives

NA

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

The purpose and requirements for increasing Boschkom Estates Pty Ltd business model and realising the owner's right to improve, successfully market, run and ultimately operate their business in a financially viable manner, **cannot** be achieved by using an alternative type of activity. Consequently, this type of alternative is **not applicable**.

Alternative No. 3: Design and Layout

Purpose and Requirements

The purpose and requirements for increasing Boschkom Estates Pty Ltd business model and realising the owner's right to improve, successfully market, run and ultimately operate their business in a financially viable manner, **can** be achieved using different layout and or engineering designs, and by considering different spatial configurations of the development on the particular site (Site Layout).

Methodology

Specialist studies were undertaken during the assessment process to identify potential impacts on the environment and community/neighbours and recommend appropriate mitigations to avoid or minimise negative impacts or enhance beneficial impacts. Those mitigations informed the final and preferred Site Layout (Appendix A, Annexure B).

Criteria used to investigate and assess alternatives

The Site Layout was designed to take cognisance of and address specific impacts. The assessment of the specific impacts associated with the Site Layout included a study of the nature of the impact, the extent and duration of the impact, the probability of the impact occurring, the degree to which the impact can be reversed, the degree to which the impact may cause irreplaceable loss of resources, and the degree to which the impact can be mitigated (Section D 6).

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

Whilst alternative designs and or site layouts are reasonable, particularly given the need to avoid negative impacts or to minimise unavoidable negative impacts, the extent of those changes is restricted by the site itself and surrounding ecological sensitivities. Furthermore, the changes are informed by the findings contained in the relevant specialist studies. Consequently, this type of alternative had to be considered throughout the assessment process and evolve incrementally as and when the impacts were identified by the relevant specialist studies. The final and preferred site layout is an outcome of the aforementioned process or the 'end result'. The fact that it could not be predicted from the onset of the assessment process made it impossible to propose as an alternative for assessment.

Alternative No. 4: Technology



Purpose and Requirements

The purpose and requirements for increasing Boschkom Estates Pty Ltd business model and realising the owner's right to improve, successfully market, run and ultimately operate their business in a financially viable manner, **can** be met by this type of alternative, specifically by using different technologies (methods or processes during the construction)

Methodology

Various technologies for the planting of macadamias were evaluated by the project team. Specialist studies were undertaken during the assessment process to identify potential impacts on the environment and community and recommend appropriate mitigations to avoid or minimise negative impacts or enhance beneficial impacts. Those mitigations informed the final and preferred technologies and materials to be used.

Criteria used to investigate and assess alternatives

Recommendations made regarding the utilisation of proper and suitable technologies to plant macadamias were undertaken to address specific impacts. The assessment of the specific impacts associated with the site layout included a comparison of the nature of the impact, the extent and duration of the impact, the probability of the impact occurring, the degree to which the impact can be reversed, the degree to which the impact may cause irreplaceable loss of resources, and the degree to which the impact can be mitigated

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

The purpose and requirements of the proposed development **can** be achieved by using this type of alternative, 'technology'. Consequently, this type of alternative is applicable. In addition, alternative technologies were sought throughout the assessment process to address specific impacts identified by the specialist studies, in the manner described in the above-mentioned alternative for 'Design and Layout (Alternative No. 3).

Alternative No. 5: Operational Aspects

Purpose and Requirements

Whilst alternative operational aspects (procedures) can meet the purpose for increasing Boschkom Estates Pty Ltd business model, they **cannot** meet the purpose of realising the owner's right to improve, run and ultimately operate their business in a financially viable manner. Consequently, the proposed development has been proposed to directly address operational and management flaws that could not be accomplished by simply revising operational procedures.

Methodology

NA

Criteria used to investigate and assess alternatives

NA

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

Comparative assessment of alternative operational aspects (procedures) against the development of planting macadamia trees, highlight that alternative operational procedures (within the existing ambit)

could not reasonably achieve the same operational efficiency requirements that the proposed project would.

Alternative No. 6: Demand

Purpose and Requirements

The purpose and requirements for increasing Boschkom Estates Pty Ltd business model and realising the owner's right to improve, successfully market, run and ultimately operate their business in a financially viable manner **cannot** be met by this type of alternative, specifically by reducing the demand (or need) for the proposed activity. The owner is entitled to expand current operations and in so doing improve, successfully market, run and ultimately operate their business in a financially viable manner. Within reason this right cannot be unreasonably withheld.

Methodology

NA

Criteria used to investigate and assess alternatives

NA

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

The purpose and requirements for increasing Boschkom Estates Pty Ltd business model and realising the owner's right to improve, successfully market, run and ultimately operate their business in a financially viable manner **cannot** be achieved by using this type of alternative, 'demand'. Consequently, this type of alternative is not applicable. Never the less, alternative means were sought throughout the assessment process to address specific impacts identified by the specialist studies, in the manner described in the above-mentioned alternative for 'Design and Layout (Alternative No. 3).

Alternative No. 7: Input

Purpose and Requirements

The purpose and requirements for increasing Boschkom Estates Pty Ltd business model region and realising the owner's right to improve, successfully market, run and ultimately operate their business in a financially viable manner **can** be met using different raw materials or energy sources.

Methodology

NA

Criteria used to investigate and assess alternatives

NA

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

However, the need for alternative inputs (to address site-specific impacts) cannot be predicted at the onset of the assessment process and is, therefore, not reasonable. However, alternative raw materials or energy sources were sought throughout the assessment process to address specific impacts identified by the specialist studies, in the manner described in the above mentioned alternative for 'Design and Layout (Alternative No. 3).

Alternative No. 8: Routing

Purpose and Requirements

The purpose and requirements for increasing Boschkom Estates Pty Ltd business model and realising the owner's right to improve, successfully market, run and ultimately operate their business in a financially viable manner **cannot** be met using an alternative route. This specific type of alternative generally applies to linear developments, such as pipeline routes.

Methodology

NA

Criteria used to investigate and assess alternatives

NA

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

This type of alternative, 'Routing', is not applicable. Never the less, alternative routes for internal services were sought throughout the assessment process to address specific impacts identified by the specialist studies, in the manner described in the above-mentioned alternative for 'Design and Layout (Alternative No. 3).

Alternative No. 9: Scheduling and Timing

Purpose and Requirements

The purpose and requirements for increasing Boschkom Estates Pty Ltd business model as well as the services/capacity rendered to the macadamia growers in the region and realising the owner's right to improve, successfully market, run and ultimately operate their business in a financially viable manner **can** be met using alternative scheduling and timing, specifically changing the order in which activities are scheduled to contribute to the overall effectiveness of the end result.

Methodology

NA

Criteria used to investigate and assess alternatives

NA

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

However, the need for alternative scheduling or timing (to address site-specific impacts) cannot be predicted at the onset of the assessment process and is, therefore, not reasonable. However, alternative scheduling or timing was sought throughout the assessment process to address specific impacts identified by the specialist studies, in the manner described in the above-mentioned alternative for 'Design and Layout (Alternative No. 3). For example, rehabilitation should not be left until the end of construction, etc.

Alternative No. 10: Scale and Magnitude

Purpose and Requirements

The purpose and requirements for increasing Boschkom Estates Pty Ltd business model as well as the services/capacity rendered to the macadamia growers in the region and realising the owner's right to improve, successfully market, run and ultimately operate their business in a financially viable manner **cannot** be met using an alternative scale or magnitude, specifically a smaller physical footprint.

Methodology

NA

Criteria used to investigate and assess alternatives

NA

Reasoned explanation why an alternative was or was not found to be reasonable or feasible

This type of alternative, 'Scale and Magnitude', is not applicable. The growing of macadamias is limited by financial and operational viability and this is directly linked to an economy of scale.

Alternative No. 11: No-go Option

The option of not implementing the activity (no-go option), was used as the benchmark against which all impacts associated with the proposed development were assessed.

Conclusion

Some types of alternatives were not applicable to the nature of the proposed activity, including its purpose or requirements ('Type of Activity', 'Technology', 'Demand', 'Routing' and 'Scale and Magnitude'). A range of different types of alternatives did exist, but not all warranted investigation ('Property and Location', 'Design and Layout', 'Input', 'Scheduling and Timing'). Based on the findings of the investigation that was undertaken (of 'Operational Aspects') and reasoned motivation there was no verifiable evidence for the existence of any reasonable and feasible alternative(s) other than the preferred option and the no-go option, at the time of this environmental impact assessment process. Consequently, no reasonable and feasible alternatives other than the preferred option and the no-go option were identified, described and assessed. Having said that, alternatives, specifically modifications and changes to activities in order to prevent and/or mitigate environmental impacts, were considered throughout the assessment process. The development proposal was amended in an incremental manner throughout the EIA process to address impacts and issues, as and when the need for mitigation was identified.

7 Environmental Impacts

The purpose of the assessment is to synthesise and analyse information relevant to the environmental impacts of a proposal. In order to achieve this, two elements, namely the outline of methodology used and the systematic assessment of the impacts are required.

The environmental significance scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can be ecological, economic, social, or all of the aforementioned. The evaluation of the significance of an impact relies heavily on the values of the person making the judgement. For this reason, impacts of especially a social nature need to reflect the values of the affected society.

Sub-Section 7.4 identifies the issues associated with the proposed development, providing the significance scale and mitigation measures to reduce negative impacts and enhance positive impacts. Section 7.1 provides an explanatory note on the methodology adopted for assessing the significance of the identified impacts.

To facilitate informed decision-making, EIA's must endeavour to come to terms with the significance of the potential environmental impacts associated with particular development activities. Despite their attempts at providing a completely objective and impartial assessment of the environmental implications of development activities, EIA processes can never completely escape the subjectivity inherent in attempting to define significance. Recognising this, we have attempted to address potential subjectivity in the current process as follows:

- Being explicit about the difficulty of being completely objective in the determination of significance, as outlined above.
- Developing an explicit methodology for assigning significance to impacts and outlining this methodology in detail in this BAR. Having an explicit methodology not only forces the assessor to come to terms with the various facets contributing toward determination of significance, thereby avoiding arbitrary assignment, but also provides the reader of the BAR with a clear summary of how the assessor derived the assigned significance.
- Wherever possible, differentiating between the likely significance of potential environmental impacts as experienced by the various affected parties.

Although these measures may not totally eliminate subjectivity, they provide an explicit context within which to review the assessment of impacts.

7.1 Assessment Methodology

This section outlines the methodology used to assess the significance of the potential environments impacts. For each impact, the EXTENT (spatial scale), MAGNITUDE and DURATION (time scale) are described. These criteria are used to ascertain the significance of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The mitigation described represents the full range of plausible and pragmatic measures and does not imply that they would or should be implemented. The tables below show the scale used to assess these variables, and define each of the rating categories.

Table 10: Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	Regional	Beyond 5 km of the proposed activity.
	Local	Within 5 km of the proposed activity.
	Site specific	On site or within 100 m of the site boundary.
Magnitude of impact (at the indicated spatial scale)	High	Natural and/ or social functions and/ or processes are <i>severely</i> altered.
	Medium	Natural and/ or social functions and/ or processes are <i>notably</i> altered.
	Low	Natural and/ or social functions and/ or processes are <i>slightly</i> altered.
	Very Low	Natural and/ or social functions and/ or processes are <i>negligibly</i> altered.
	Zero	Natural and/ or social functions and/ or processes remain <i>unaltered</i> .
Duration of impact	Construction	Up to 2 years.
	Short Term	0-5 years (after construction).
	Medium Term	5-15 years (after construction).
	Long Term	More than 15 years (after construction).

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of arriving at the different significance ratings is explained in Table 11.

Table 11: Definition of significance ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High	<ul style="list-style-type: none"> High magnitude with a regional extent and long term duration. High magnitude with either a regional extent and medium term duration or a local extent and long term duration. Medium magnitude with a regional extent and long term duration.
Medium	<ul style="list-style-type: none"> High magnitude with a local extent and medium term duration. High magnitude with a regional extent and short term duration or a site specific extent and long term duration. High magnitude with either a local extent and short term duration or a site specific extent and medium term duration. Medium magnitude with any combination of extent and duration except site specific and short term or regional and long term. Low magnitude with a regional extent and long term duration.

Low	<ul style="list-style-type: none"> • High magnitude with a site specific extent and short term duration. • Medium magnitude with a site specific extent and short term duration. • Low magnitude with any combination of extent and duration except site specific and short term. • Very low magnitude with a regional extent and long term duration.
Very low	<ul style="list-style-type: none"> • Low magnitude with a site specific extent and short term duration. • Very low magnitude with any combination of extent and duration except regional and long term.
Neutral	<ul style="list-style-type: none"> • Zero magnitude with any combination of extent and duration.

Once the significance of an impact has been determined, the PROBABILITY of this impact occurring as well as the CONFIDENCE in the assessment of the impact, are estimated using the rating systems outlined in Table 12 and Table 13 respectively. It is important to note that the significance of an impact should always be considered in concert with the probability of that impact occurring. Lastly the REVERSIBILITY is estimated using the rating system outlined in Table 14.

Table 12: Definition of probability ratings

PROBABILITY RATINGS	CRITERIA
Definite	Estimated greater than 95 % chance of the impact occurring.
Highly probable	Estimated 80 to 95 % chance of the impact occurring.
Probable	Estimated 20 to 80 % chance of the impact occurring.
Possible	Estimated 5 to 20 % chance of the impact occurring.
Unlikely	Estimated less than 5 % chance of the impact occurring.

Table 13: Definition of confidence ratings

CONFIDENCE RATINGS	CRITERIA
Certain	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

Table 14: Definition of reversibility ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	The activity will lead to an impact that is permanent.
Long Term	The impact is reversible within 2 to 10 years after construction.
Short Term	The impact is reversible within the 2 years of construction.

7.2 Subjectivity in Assigning Significance

To facilitate informed decision-making, EIA's must endeavour to come to terms with the significance of the potential environmental impacts associated with particular development activities. Despite their attempts at providing a completely objective and impartial assessment of the environmental implications of development activities, EIA processes can never completely escape the subjectivity inherent in attempting to define significance. Recognising this, we have attempted to address potential subjectivity in the current process as follows:

- Being explicit about the difficulty of being completely objective in the determination of significance, as outlined above.
- Developing an explicit methodology for assigning significance to impacts and outlining this methodology in detail in this BAR. Having an explicit methodology not only forces the assessor to come to terms with the various facets contributing toward determination of significance, thereby avoiding arbitrary assignment, but also provides the reader of the BAR with a clear summary of how the assessor derived the assigned significance.
- Wherever possible, differentiating between the likely significance of potential environmental impacts as experienced by the various affected parties.

Although these measures may not totally eliminate subjectivity, they provide an explicit context within which to review the assessment of impacts.

7.3 Consideration of Cumulative Impacts

The National Environmental Management Act requires the consideration of cumulative impacts as part of any environmental assessment process. EIA's have traditionally, however, failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires co-ordinated institutional arrangements; and
- EIA's are typically carried out on specific developments, whereas cumulative impacts may result from broader biophysical, social and economic considerations, which typically cannot be addressed at the project level.

In terms of the proposed agriculture and new processing plant the following cumulative impacts have specifically been identified:

- Storm water control.
- Loss of indigenous vegetation.
- Loss of topsoil and sedimentation
- Use of pesticides

7.4 Construction Phase Impacts

The construction phase impacts are those impacts on the biophysical and socio-economic environment that would occur during the construction⁵ phase of the proposed project. They are inherently temporary in duration but may have longer lasting effects. The construction phase impacts could potentially include:

The bio-physical issues identified include:

- Fauna and Flora (Destruction of habitat)
- Impact on wetland
- Loss of topsoil / Soil Erosion
- Ground and surface water impact
- Geology and soils

The socio-economic impacts identified include:

- Noise pollution
- Visual pollution
- Traffic impact
- Historical impact
- Employment Opportunities (+)

A summary of the construction phase impacts (assessed within the draft BAR) is provided below.

Table 15: Summary of construction impacts

Ref. (Pg)	Description of impact	Significance of Impact	
		Without Mitigation	With Mitigation
	Construction Phase Impacts		
64	Fauna and Flora	Medium (-)	Low (-)
67	Impact on Crowned Eagle	Medium (-)	Low (-)
68	Aquatic Ecosystems	Medium (-)	Low (-)
70	Historical	Low (-)	Low (-)
71	Loss of Topsoil and Soil Erosion (Hydrological)	Medium (-)	Low (-)
72	Ground and Surface Water Impact	Medium (-)	Low (-)
73	Noise Pollution	Medium (-)	Low (-)
74	Visual Impact	Medium (-)	Low (-)
75	Employment Opportunities	Low (+)	High (+)

A summary of the integrated construction phase impacts:

⁵ In this regard construction should be interpreted as those activities associated with the clearing and planting of the proposed fields as well as those of developing the processing plant.

Table 16: Summary of integrated construction impacts for Barclay Vale 288, JT

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Site specific/ Local	Site specific/ Local
Magnitude	High (-)	Medium Low (-)
Duration	Construction	Construction
Significance	Medium (-)	Low (-)
Probability	Highly Probable	Highly Probable
Confidence	Certain	
Reversibility	Short Term	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

7.4.1 Fauna and Flora

Description of the environment

Description of the environment

Three (3) habitat types are found within the study area on Boskom. Legogote Sour Bushveld, Barberton Serpentine Sourveld and Eastern Dry Afrotemperate Forest (Northern Mistbelt Forest).

A Baseline Terrestrial Ecology Study & Biodiversity Value Assessment was undertaken by ECOREX and findings were based on a field visit at the start of the dry season. It is possible that plants which flower at other times of the year were underrepresented although this is not seen as a limitation that could affect the Record of Decision as the specialist has extensive experience in the area. Sufficient data were collected in order to assess habitat suitability for potentially occurring Threatened plant species.

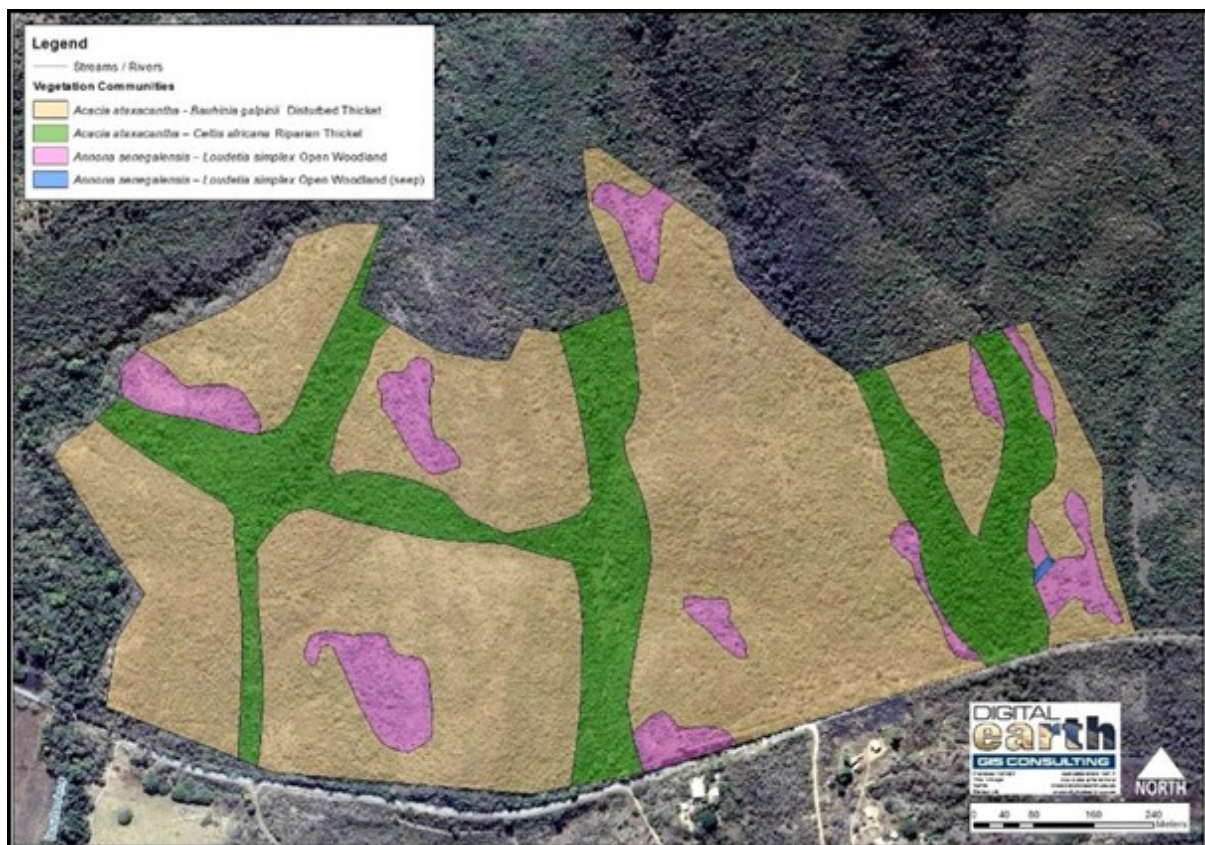


Figure 11: Vegetation communities identified within the study area



Figure 12: Biodiversity Values of Vegetation Communities in the study area

Table 17: Fauna and Flora

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Regional	Site
Magnitude	Medium (-)	Low (-)
Duration	Short term	Short term
Significance	Moderate (-)	Low (-)
Probability	Low (-)	Low (-)
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

The Open Woodland vegetation community has **High** Biodiversity Value due to a combination of High Conservation Importance and Moderate Functional Value scores. This community can be considered typical of a **Vulnerable** vegetation type (Barberton Serpentine Sourveld) and it is **endemic** to the Mpumalanga Province. Four conservation-important species were recorded with one considered to be of conservation concern. *Merwillia plumbea* is assessed as **Near Threatened**. *Gladiolus* sp., *Faurea saligna* and *Merwillia plumbea* are protected under the Mpumalanga Nature Conservation Act (No. 10 of 1998) and *Searsia rogersii* is endemic to Mpumalanga. It potentially supports one **Endangered** mammal, namely Mountain Reedbuck, and three **Near Threatened** mammals, namely Serval, Honey Badger and Side-striped Jackal. One bird listed as **Vulnerable** (Lanner Falcon) potentially forages over this community. The Riparian Thicket vegetation community has **High** Biodiversity Value

resulting from Moderate Conservation Value and High Functional Value scores. Riparian Thicket was rated as having High Functional Importance because of a high rating in the following components:

- Provisioning Services – fibres, medicinal plants;
- Regulating Services - flood attenuation;
- Supporting Services – nutrient cycling, migration corridors.

Two Provincially protected plant species were confirmed to occur, namely *Berchemia zeyheri* and *Dioscorea cotinifolia*. One **Near Threatened** mammal was confirmed to occur (Natal Red Duiker) and one additional species potentially occurs (Honey Badger). One **Vulnerable** bird species almost certainly hunts over this community as well, namely Crowned Eagle, which may also breed within the study area.

The Disturbed Thicket vegetation community has **Moderate** Biodiversity resulting from Moderate Conservation Value and Moderate Functional Value scores. Although classified as Legogote Sour Bushveld, and **Endangered** vegetation type, it does not accurately represent that classification due to the high infestation levels of alien invasive plants, particularly *Lantana camara*. Vegetation structure has been significantly altered and the species diversity of the ground layer is significantly lower than that of typical Legogote Sour Bushveld. Three Nationally or Provincially protected plant species were confirmed to occur, namely *Pittosporum viridiflorum*, *Dioscorea cotinifolia* and *Berchemia zeyheri*. One **Near Threatened** mammal was confirmed to occur (Natal Red Duiker) and one additional species potentially occurs (Honey Badger). One **Vulnerable** bird species probably regularly hunts over this community, namely Crowned Eagle. The study area is assessed as **Critical Biodiversity Area** (CBA) Irreplaceable by the MBSP (Lötter *et al.*, 2014, Figure 3). Factors contributing to this assessment include the following:

- Legogote Sour Bushveld – Endangered Vegetation Type
- Barberton Serpentine Sourveld – Vulnerable Vegetation Type
- *Chiloglanis bifurcus* – Endangered fish species
- *Adenia wilmsii* – modelled distribution, Endangered plant species
- Strategic Water Source Area
- Climate change priority - landscape facet
- Supporting ecological corridor

The MBSP recommends low-impact land-uses in CBA's and that vegetation be kept in a natural state for maintaining biodiversity. These areas could be incorporated into formal Protected Areas through biodiversity stewardship agreements. Examples of recommended land-uses include low-intensity livestock or game ranching. However, the vegetation within the study area is not typical of Legogote Sour Bushveld as it has been encroached by indigenous and alien invasive woody species and the vegetation structure has changed from open woodland to thicket. The small patches of Barberton Serpentine Sourveld are representative of that vegetation type, but are very small and fragmented and may be lost to bush encroachment in the next few years. No habitat occurs for the Endangered *Chiloglanis bifurcus*.

Mitigation measures

- No agricultural activities to take place within the Riparian Thicket or Open Woodland vegetation communities due to their high biodiversity values.
- A conservation buffer to be established around all riparian areas. A buffer of 20 m is recommended around the Riparian Thicket community.
- A conservation buffer of 32 m to be established around the small wetland seep in the eastern portion of the study area.

- Natural areas where trees are to be planted should be checked by a suitably experienced botanist prior to construction to locate any conservation-important species.
- All existing and proposed roads should contain adequate stormwater drainage and erosion control measures.
- A search for the possible nesting site of the Vulnerable Crowned Eagle should be undertaken. According to local Crowned Eagle researcher Dr. Garth Batchelor a pair is thought to nest in the area, but the nest site has yet to be located due to the inaccessibility of certain parts.
- Poaching could be a significant threat. If any external labour teams are used during construction, then these teams should preferably be accommodated off site; if this is not possible then teams should be carefully monitored to ensure that no unsupervised access to plant and animal resources takes place.
- All alien plants currently established within the study area should be destroyed and regular follow-ups should take place.
- Some slopes in the northern parts of the study area appear to be greater than 12%. A slope analysis should therefore be performed to determine which areas are too steep for crop planting.

Provided the recommendations suggested in ecology report are followed, there is no objection to the proposed developments on Boskom 1025-JT in terms of the terrestrial ecosystems of the study area.

Cumulative impact

The clearing and subsequent loss of limited and degraded indigenous vegetation, is unavoidable. This would add to the overall loss of indigenous vegetation within this area.

However, sections of the surrounding vegetation show signs of previous impact, which detracts from its localized conservation importance. If, combined with concerted efforts to and buffer areas potential loss of indigenous vegetation may be adequately compensated.

7.4.2 Potential impact on Crowned Eagles

Description of the environment

The African Crowned Eagle is currently classified as near threatened in South Africa. This means that its population should be monitored.

As part of a new agricultural project, virgin vegetation will have to be cultivated to create new lands. These envisaged lands are within the territory of a pair of Crowned Eagles which is an endangered species. The cultivation of lands within their home range could negatively impact the survival of this pair of eagles.

Table 18: Impact on Crowned Eagles

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Site	Site
Magnitude	Low (-)	Very Low (-)
Duration	Short term	Short term
Significance	Moderate (-)	Low(-)
Probability	Possible	Unlikely
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

The Crowned Eagle nest is approximately 2.4km away from the proposed bush clearing for the Macadamias. It is unlikely that this change of land use will significantly negatively the Crowned Eagles. The prey of this eagle is largely Red Duiker, Grey Duiker and small Bushbuck as well as Vervet Monkeys. All the above species are relatively abundant in the valley and again the clearing should not significantly impact on their availability to the Crowned Eagles.

The development of further limited agricultural lands in the valley and adjacent hills should not impact on the eagles so long as it does not negatively impact on the nest site or on their prey base. In this regard the potential impact that clearing and cultivation may have on the crowned eagle, is considered to be of **moderate significance** prior to mitigation and **low** with mitigation measures implemented

Mitigation measures

- The proposed cultivation of further lands should be done judiciously.
- Crops that are to be cultivated should also be considered and especially their impact on prey species. Crowned Eagles feed largely on Vervet Monkeys, and small antelope. Crops that attract these species should be considered carefully.

Cumulative impact

None.

7.4.3 Impact on Aquatic Ecosystems

Description of the environment

The proposed development is located on the foot slopes of Mount Carmel, near Sudwala Caves, on the farm Boskom 1025 JT, which was previously part of Barclay Vale 288 JT. The site is about 25 km west of Nelspruit, Mpumalanga Province. The proposed development comprises six areas totalling about 52 hectares north of the N4 highway. The Study Area for this report considered all aquatic ecosystems within 500 m of the two proposed development areas, as required in terms of Government Notice 509 (26th August 2016). The Study Area for this report covered an area of 330 hectares. The Study Area is located on the boundary between quarter degree squares 2530BC and BD.

Table 19: Impact on aquatic ecosystems

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Site	Site
Magnitude	High (-)	Medium (-)
Duration	Short term	Short term
Significance	Moderate (-)	Low (-)
Probability	Highly Probable	Probable
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

The overall Ecological and Functional Importance of aquatic ecosystem types within the Study Area were rated as follows:

- Seepage Wetlands: **Low**
- Upper Foothill (Houtbosloop): **High**

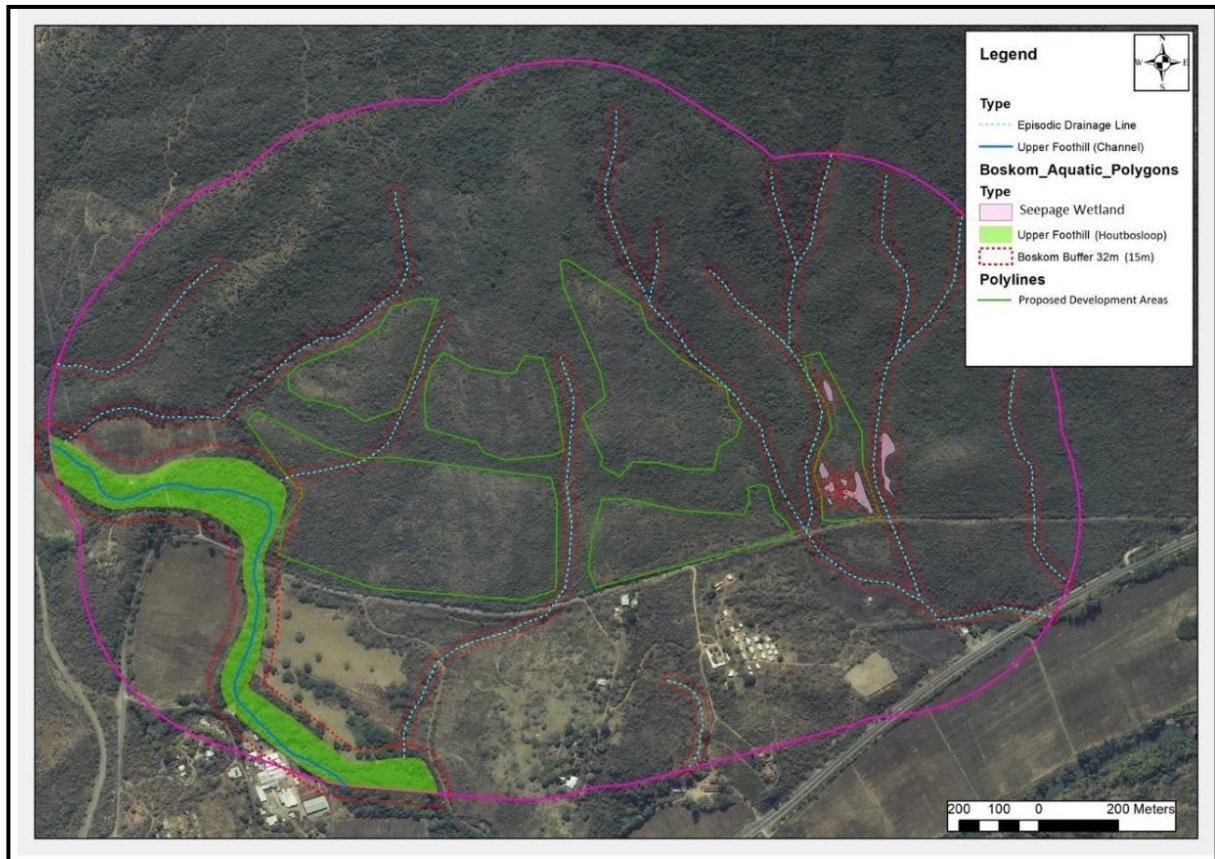


Figure 13: The aquatic areas identified with 500m of possible development site

The following risks of the proposed development to aquatic ecosystems were identified:

- **Impact of Clearing on Hillslope Seepage Wetlands.** Development of the Proposed Development Area 5 will impact directly on a patch mosaic of small episodic and seasonal seepage wetlands that are characterised by vertic clays of the Rensburg Soil Formation.

- **Impact of Access Roads and Clearing on Watercourses.** Increased road network and hardened surfaces that change magnitude of stormwater runoff, and lead to potential increase in turbidity (short-term), and erosion (long-term), in receiving watercourse (Houtbosloop).
- **Impact of Clearing on Indigenous Riparian Vegetation.** Disturbance and compaction of soils during the Construction Phases for all proposed areas is likely to create conditions suitable for the spread and proliferation of alien invasive vegetation, and associated reduction in biodiversity of indigenous species in riparian zones.
- **Impact of Pesticides Use on Aquatic Ecosystems.** Aerial drift and runoff of pesticides could impact sensitive biota in the Houtbosloop.

Authorisation of the Proposed Development Areas (Proposed Development Areas No's **1, 2, 3, 4 & 6**) in relation to potential impacts on aquatic ecosystems is **recommended** on the grounds that the risks to aquatic ecosystems can be easily minimised by adhering to the recommended control measures as detailed in Appendix F

Mitigation measures

- The proposed development may continue.
- Buffer Zones for Drainage Lines (15 m). Buffer zones of no development within 15 m on either side of episodic drainage lines should be excluded from development, as shown in Figure 5-2.
- Stormwater Management. All road approaches to drainage line crossings must have humps to divert stormwater into vegetation buffer zones and in doing so, prevent stormwater entering directly into drainage lines.
- Control Alien Invasive Vegetation. Alien invasive vegetation in drainage line and riparian zones must be controlled. Alien invasive vegetation within the property should be controlled. Personnel tasked to control alien vegetation should receive appropriate training in the following: methods and control measures; equipment and techniques; types of herbicides and dosages applied; mixing techniques; storage of chemicals and equipment; health and safety issues; plant identification; procedures for equipment washing; equipment maintenance; record keeping, inter alia.
- Pesticide Management. Appropriate use of pesticides according to label instruction, and appropriate training of staff in the use, management and storage of pesticides

If all proposed activities are kept within the clearable areas and mitigation measures are implemented, then this impact is of potentially **low** significance.

Cumulative impact

None

7.4.3 Historical

Description of the environment

No sites of heritage or archaeological significance were identified in the proposed project areas. A total of twenty one (21) survey orientation locations were documented (SO 1-21) which includes a GPS location and photographs of the landscape at that particular location. Surveying the study areas proved very difficult and to a large extent impossible as a consequence of impenetrable thicket. Surface visibility and access was reduced due to very dense bush and undergrowth which included Lantana and sickle bush and dense thick grass cover. This limited exploration of some of the proposed study areas which are often also of a very steep gradient and consequently historically uninhabitable. Consequently, no survey track logs exist for some of the study areas (see maps in Appendix C of the HIA).

The site lies on ancient rocks of the Chuniespoort and Pretoria Supergroups. There are no fossils in the Hekpoort Formation as it is volcanic. The Black Reef Formation and Malmani Subgroup banded ironstone and dolomites, although formed by the chemical activities of ancient algae, photosynthesis

and oxygen production, are not known to have preserved fossil algae near Nelspruit. Since the project is to clear soils of vegetation for agriculture there is no chance of finding even microfossils.

As far as the palaeontological heritage is concerned the project can continue and no further assessment is required.

Table 20: Heritage impacts

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Site	Site
Magnitude	Medium (-)	Low (-)
Duration	Short term	Short term
Significance	Low (-)	Low (-)
Probability	Probable	Unlikely
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

No sites of cultural importance were identified on the site. The significance of this impact is thus **low**.

Mitigation measures

Management objectives include not to impact on sites of heritage significance. Monitoring programmes which should be followed when a “chance find” of some heritage object or human remains occur, include the following: The contractors and workers should be notified that archaeological sites might be exposed during the construction work.

- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the Environmental Control Officer shall be notified as soon as possible;
- All discoveries shall be reported immediately to a museum, preferably one at which an archaeologist is available, so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the Environmental Control Officer will advise the necessary actions to be taken;
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site; and
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999).

If all proposed activities are kept within the clearable areas and mitigation measures are implemented then this impact is of potentially **low** significance.

Cumulative impact

None

7.4.5 Loss of topsoil and soil erosion

One of the potential impacts of clearing and cultivation is the loss of topsoil and sedimentation of the downstream environment. This is due to the clearing of land, which leads to the runoff from the site having a high sediment load. Potential sedimentation is therefore of particular concern.

Description of the environment

The fields are located within a versatile topographical unit. Increased runoff due to agricultural activities would increase the potential loss of soil. The surrounding areas are all vulnerable to erosion

if not managed correctly. The proximity of the fields to streams and wetlands, increases the possibility of these streams being silted up if proper stormwater management is not implemented.

Table 21: Loss of topsoil and soil erosion.

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Local	Local
Magnitude	Medium (-)	Low (-)
Duration	Short term	Short term
Significance	Medium (-)	Low (-)
Probability	Probable	Unlikely
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

Where possible, clearing and agricultural activities should be scheduled to occur outside of the rainy period, thereby reducing the volume of runoff during clearing and planting. If this is not possible then extra precaution needs to be taken to reduce this impact. This potential impact is considered to be of **low significance** with mitigation measures implemented.

Mitigation measures

- Outflow from cut-off drains and stormwater diversions should be attenuated sufficiently to prevent erosion of receiving environment
- Topsoil must be windrowed along the edge of the footprint, including in situ vegetation.
- Adequate stormwater measures must be installed to ensure runoff does not result in erosion and export of soils, particularly topsoil.
- Clearing activities in and around watercourses should be planned for the dry season, to reduce likelihood of sedimentation of same watercourses.
- The contractor must ensure that all vehicles and equipment are in a sound state of repair and do not leak hydrocarbons onto the ground beneath.
- All existing roads must have suitable erosion containment measures in place.
- All residual material must be removed once no longer needed, to ensure they do not inhibit the restoration of ecological function to the area, especially in the buffer zones.

Cumulative impact

One of the potential impacts of clearing and planting is the sedimentation of downstream environments. This is due to the clearing of land, which leads to the runoff from the site having a high sediment load. Potential sedimentation of the tributary is therefore of particular concern.

7.4.6 Ground and Surface water impact

During clearing, planting and the construction of the processing plant, pollutants may find their way into drainage channels and watercourses. Typical sources of pollution include oils and fuels from vehicles.

Description of the environment

Due to the fact that the site is in close proximity of the Houtbosloop, the possible impact of agricultural activities is a reality and should therefore be assessed.

Table 22: Ground and Surface Water Impact

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Local	Local
Magnitude	Medium (-)	Low (-)
Duration	Short term	Short term
Significance	Medium (-)	Low (-)
Probability	Probable	Unlikely
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

Surface and Groundwater pollution can be caused by various activities during the clearing and cultivation phase if not properly managed. These activities include:

- Preparation of fields -
 - Levelling of sites
 - Production of litter from staff
 - Inadequate ablution facilities
 - Construction and operation of storm water management system
 - Increase in surface run-off water due to hardened surfaces
 - Oil dripping from standing vehicles
 - Spills from servicing or re-fuelling
 - Leaks from stored fuel and oil

Mitigation measures

- All maintenance and repair work of vehicles will be carried out within an area designated for this purpose, equipped with the necessary pollution containment measures.
- The ground under the servicing and refuelling areas must be protected against pollution caused by spills and/or tank overfills.
- In the event of a breakdown or emergency repair, any accidental spillage must be cleaned up or removed immediately.
- All equipment and machinery must be maintained in good order. Regular checks must be undertaken for leaks and any found must be immediately repaired.
- The farm manager must ensure that reasonable precautions are taken to prevent the pollution of the ground and water resources on and adjacent to the sites during the clearing and cultivation phase.
- No natural watercourse is to be used for the cleaning of tools or any other apparatus. This includes for purposes of bathing, or the washing of clothes etc. All washing operations will take place at a location where waste water can be disposed of in an acceptable manner.
- The farm manager must maintain good housekeeping practices that ensure that all work sites are kept tidy and litter free, ensuring no runoff of refuse into surrounding watercourses.
- No spills may be hosed down into the surrounding natural environment. All contaminated soil is to be excavated to the depth of contaminant penetration, placed in 200 litre drums and removed to an appropriate registered landfill site.
- A drainage diversion system is to be installed to divert run-off from areas of potential pollution. Internal storm water reticulation is to be constructed early on in the project in order to significantly reduce the storm water effluent during clearing and planting,
- There should be monitoring and inspection of the site's drainage system to ensure that the water flow is unobstructed.

Cumulative impact

There are no cumulative impacts associated with this impact.

7.4.7 Noise pollution

Description of the environment

The area has a rural agricultural and natural sense of place.

Table 23: Noise Pollution

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Local	Local
Magnitude	Medium (-)	Low (-)
Duration	Short term	Short term
Significance	Medium (-)	Low (-)
Probability	Probable	Unlikely
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

Clearing and agricultural activities, vehicles and personnel on site would cause an increase in noise in the area, which may impact negatively on adjoining landowners and users. This impact is considered of **moderate** significance prior to mitigation and could be reduced to **low**.

Mitigation measures

Impacts of noise generation during clearing, planting and construction in general could be mitigated by ensuring that all regulations relating to noise generation are observed and by restricting work to normal working hours. Further to this the following mitigation measures are of relevance:

- Landowners and neighbours should be informed prior to any activities that are bothersome taking place.
- Notify adjacent landowners of after-hours work and of any other activity that could cause a nuisance.
- No loud music is permitted on site.
- Noise from labourers to be controlled
- If noise levels at the boundaries of the site exceed 7dB above ambient levels, then the local health authorities are to be informed.
- Respond to community complaints with regard to noise generation, taking reasonable action to eliminate and/or minimise the impact.
- Where complaints cannot be addressed to the satisfaction of all parties, then the farm manager will, upon instruction by the ECO, provide an independent and registered Noise Monitor to undertake a survey of the noise output levels. Recommendations to reduce noise to legislated levels must be implemented.

This potential impact could be readily managed by effective implementation of an EMP.

Cumulative impact

None

7.4.8 Visual Impact – “Sense of Place”

Description of the environment

The clearing and planting of the fields as well as the construction of a processing plant, could have a visual impact on the scenic views and sense of place immediately surrounding the sites.

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria and specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, current landuse, etc...) play a significant role.

A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The most noteworthy aspect contributing to the sense of place of the proposed development area, is the presence of open farm land, undeveloped and natural bush.

Table 24: Visual Impact – “Sense of Place”.

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Local	Local
Magnitude	Medium (-)	Low (-)
Duration	Short term	Short term
Significance	Medium (-)	Low (-)
Probability	Probable	Unlikely
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

The anticipated visual impact of clearing and cultivating (due to the natural surroundings on the property) on the visual character of the landscape is expected to be of **moderate** significance and may be mitigated to **low**.

Mitigation measures

- In terms of screening, all existing vegetation on the periphery of the site is to be maintained as a visual buffer. This should be a minimum of 20 meters.
- This visual buffer zone must systematically have alien species removed and the natural vegetation remaining should be augmented with additional indigenous species.
- In terms of all infrastructure, it is recommended the access road and all structures be planned so that the unnecessary clearing of vegetation is avoided. This implies making use of already disturbed sites rather than pristine areas wherever possible and avoiding large tree specimens and dense established vegetation areas.
- Mitigation of visual impacts associated with the clearing, albeit temporary, entails proper planning, management and rehabilitation. In addition, it is vital that vegetation is not unnecessarily cleared or removed.
- The fields and buildings must be maintained in a neat and visually acceptable state throughout the operational life.

Cumulative impact

There are no cumulative impacts associated with this impact.

7.4.9 Employment opportunities

Description of the environment

There will definitely be a positive economic impact during the clearing and planting phase as temporary employment will be provided through the installation of services as well as the actual clearing, grubbing and planting. There is the potential for local suppliers to also benefit from the proposed activity.

This positive impact will, however, be negated if out-of-town contractors are employed who utilise non-local workers and make use of supplies brought in from other provinces (i.e. Gauteng). If local labour and suppliers are utilised during the construction phase this potential **positive** socio-economic impact will go from a **low to high (+) significance**.

Table 25: Employment opportunities

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Local	Local
Magnitude	Low (+)	Medium (+)
Duration	Short term	Short term
Significance	Low (+)	High (+)
Probability	Probable	Probable
Confidence	Sure	
Reversibility	Reversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Cumulative impact

Not applicable.

7.5 Environmental Management Plan and Environmental Control Officer

As alluded to under Section 6 and 7, all of the aforementioned construction phase impacts could be addressed and minimised by the development and effective implementation of an Environmental Management Programme (EMPr). Accordingly, a draft EMPr for both construction and operational phases will be prepared (see draft report attached as **Appendix F; Annexure A**). Prior to construction, an appropriately qualified environmental consultant should ensure that the draft EMPr be amended to take cognisance of any further requirements included in the RoD. This EMPr should be incorporated into the Civil Tender Document, since this would ensure that:

- The Contractor is made aware of the EMPr “up front”;
- The EMPr is presented in a form and language familiar to the Contractor;
- The Contractor is able to cost for compliance with the EMPr; and
- The EMPr is binding within a well-developed legal framework.

To give appropriate effect to the environmental controls, it is essential that this EMPr be enforced by an appropriately qualified, independent Environmental Control Officer (ECO). The roles and responsibilities of the ECO should include:

- Ensuring that the necessary environmental authorisations and permits have been obtained;
- Monitoring and verifying that the EMPr is adhered to at all times and taking action if the specifications are not followed;
- Monitoring and verifying that environmental impacts are kept to a minimum;
- Reviewing and approving construction method statements with input from the Engineers;
- Assisting the Contractor in finding environmentally responsible solutions to problems;
- Giving a report back on the environmental issues at the monthly site meetings and other meetings that may be called regarding environmental matters;
- Keeping records of all activities/ incidents on Site in the Site Diary concerning the environment;
- Inspecting the site and surrounding areas regularly with regard to compliance with the EMPr;
- Keeping a register of complaints in the Site Office and recording and dealing with any community comments or issues;
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel coming onto site;
- Ensuring that activities on site comply with other relevant environmental legislation;
- Ordering, via the Engineer’s Representative, the removal of person(s) and/or equipment not complying with the specifications;
- Issuing of fines for contraventions of the EMPr;
- Completing monitoring checklists; and
- Keeping a photographic record of progress on Site from an environmental perspective.

7.6 Operational Phase Impacts

The operational phase impacts are those impacts on the biophysical and socio-economic environment that would occur during the operational phase of the proposed project and are inherently long-term in duration. The operational phase impacts could potentially include:

The bio-physical issues identified include:

- Storm water management

The socio-economic impacts identified include:

- Visual Impact – “Sense of Place”
- Use of pesticides
- Noise

A summary of the operation phase impacts (assessed within the draft BAR) is provided below.

Table 26: Operational Phase Impacts

Ref. (Pg)	Description of impact	Significance of Impact	
		Without Mitigation	With Mitigation
Operational Phase Impacts			
78	Stormwater Management	Moderate (-)	Low (-)
79	Visual Impact – “Sense of Place”	Low (-)	Medium (+)
<u>80</u>	Use of pesticides	Medium (-)	Low (-)

7.5.1 Storm water management

Description of the environment

A potential increase in bare soil under trees due to shading will increase the storm water runoff.

Table 27: Storm water management

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Local	Local
Magnitude	Medium (-)	Low (-)
Duration	Short term	Short term
Significance	Moderate (-)	Low (-)
Probability	Probable	Unlikely
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

Erosion and siltation can be caused by stormwater runoff from the site if not properly managed. During the Operational phase, the significance of this impact may be mitigated to **Low** as crops established will provide natural stabilisation of the terrain against erosion. Stormwater infrastructure will be designed to manage runoff.

Mitigation measures

All rainwater drainage points from hardened surface should be designed to reduce water velocity and prevent erosion of wetlands, streams and surrounding natural vegetation, at the point of water entry into the systems.

Topsoil is to be replaced by direct return where feasible (i.e. replaced immediately on the area where planting is complete), rather than stockpiling it for extended periods, and may not be used for building or maintenance of roads.

Erosion protection measures should include, but not be limited to:

- Topsoil must be windrowed along the edge of the footprint, including in situ vegetation.
- Adequate stormwater measures must be installed to ensure runoff does not result in erosion and export of soils, particularly topsoil.
- Clearing activities in and around watercourses should be planned for the dry season, to reduce likelihood of sedimentation of same watercourses.
- The contractor must ensure that all vehicles and equipment are in a sound state of repair and do not leak hydrocarbons onto the ground beneath
- All existing roads must have suitable erosion containment measures in place.
- All residual material must be removed once no longer needed, to ensure they do not inhibit the restoration of ecological function to the area, especially in the buffer zones.

Cumulative impact

None.

7.5.2 Visual impact

Description of the environment

The operation and maintenance of the fields could have a visual impact on the scenic views and sense of place immediately surrounding the sites.

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria and specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, current landuse, etc...) play a significant role.

A visual impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The most noteworthy aspect is the presence of open farm land, undeveloped and natural bush.

Table 28: Visual Impact

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Local	Local
Magnitude	Medium (-)	Low (-)
Duration	Short term	Short term
Significance	Low (-)	Medium (+)
Probability	Probable	Unlikely
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

The anticipated visual impact of maintaining the macadamia trees (due to the natural surroundings on the property) on the visual character of the landscape is expected to be of **low** significance and may be mitigated to **medium positive**.

Mitigation measures

- In terms of screening, all existing vegetation on the periphery of the site is to be maintained as a visual buffer. This should be a minimum of 20 meters.
- This visual buffer zone must systematically have alien species removed and the natural vegetation remaining should be augmented with additional indigenous species.

- In terms of all infrastructure, it is recommended the access road and all structures be planned so that the unnecessary clearing of vegetation is avoided. This implies making use of already disturbed sites rather than pristine areas wherever possible and avoiding large tree specimens and dense established vegetation areas.
- Mitigation of visual impacts associated with the clearing, albeit temporary, entails proper planning, management and rehabilitation. In addition, it is vital that vegetation is not unnecessarily cleared or removed.
- The fields and processing plant must be maintained in a neat and visually acceptable state throughout the operational life.

Cumulative impact

None.

7.5.3 Use of pesticides

Description of the environment

The area in which the proposed activities are to be situated, falls within a Conservation Biodiversity Area and is surrounded by relatively intact vegetation and functional wetlands. This habitat in turn plays host to a plethora of fauna and flora including insects, birds and fish.

Crops must be protected against unwanted consumption by fauna. Possible risk of loss of crops to disease must also be minimised.

It is normal practice to control possible crop damage by utilising pesticides.

Table 29: Use of pesticides

	Preferred Layout	
	Without mitigation	With mitigation
Extent	Site	Site
Magnitude	Low (-)	Very Low (-)
Duration	Short term	Short term
Significance	Medium (-)	Low (-)
Probability	Possible	Unlikely
Confidence	Sure	
Reversibility	Irreversible	

Significance: positive impacts indicated by no shading & (+), negative impacts indicated by shading & (-)

Impact assessment

Pesticides are widely used to control the growth and proliferation of undesirable organisms that, if left unchecked, would cause significant damage to forests, crops, stored food products, ornamental and landscape plants, and building structures. The use of pesticides in both agricultural and non-agricultural settings provides important benefits to society, contributing to an abundant supply of food and fibre and to the control of a variety of public health hazards and nuisance pests.

Owing to the fact that they are designed to be biologically active, pesticides have potential to cause undesirable side effects. These include adverse effects on workers, consumers, community health and safety, groundwater, surface waters, and non-target wildlife organisms. In addition, pesticide use raises concerns about the persistence and accumulation of pesticides in food chains quite distant from the original point of use, and about the role of certain pesticides in causing reproductive failure and endocrine system abnormalities in both wildlife and humans and other species that are not their intended target. It is therefore, important to control the use of pesticides, by carefully weighing the benefits that they confer against any possible adverse effects.

The relatively small scale and given that all mitigation measures as indicated below, are implemented it is expected that the significance of this impact will **low**.

Mitigation measures

General Mitigation:

- Chemical control of pests on Barclay Vale
- may not take the form of pesticides that pose unmanageable risk such as:
 - Those containing Endocrine Disrupting Properties (EDP),
 - Those containing Persistent Organic Pollutants (POPs),
 - Those containing carcinogenic and immunotoxic potential,
 - Those containing formulations classified by WHO as Extremely Hazardous (class 1a) and Highly Hazardous (class 1b), as well as
 - Pesticides associated with frequent and severe poisoning incidents.
- To maintain healthy populations of natural enemies and pollinators, use pesticides sparingly and in accordance with the label and local regulations. Also consider these general guidelines for pesticide applications:
 - Choose selective pesticides
 - Identify the pest and use resources available to determine which pesticides will specifically control that pest. Avoid broad-spectrum insecticides such as organophosphates, carbonates, and pyrethroids, which indiscriminately kill everything. Also avoid broad-spectrum herbicides, which reduce floral plants that attract pollinators.
 - Choose nonpersistent pesticides
 - Some pesticides leave residues that kill natural enemies and pollinators long after the initial application (residual toxicity); in addition to immediately killing them (contact toxicity).
 - Choose less harmful formulations
 - Generally, dusts, powders, and microencapsulated pesticides are the most harmful to honey bees, and aerial spraying is the most hazardous method of application. Liquid solutions and granules are the least detrimental to pollinators.
 - Spot-treat
- Targeting your application to specific areas where the pest is a problem will reduce the harm to natural enemies and pollinators.
 - Time applications
- To protect pollinators and other fauna, avoid spraying when flowers are in bloom. Apply pesticides during the evening or early morning when pollinators are less active. Do not apply when temperatures will be especially low or when dew is expected. Risk of pesticide toxicity is prolonged under these conditions, since residues remain on plants longer.
- Consider water management practices that reduce pesticide movement off-site
- Consult relevant publications.
- Consider practices that reduce air quality problems:
 - When possible, reduce volatile organic compound (VOC) emissions by decreasing the amount of pesticide applied, choosing low-emission management methods, and avoiding emulsifiable concentrate (EC) formulations.
- Protection of water quality:
 - Include instituting buffer zones, restricting aerial spraying in a certain proximity to surface water bodies.
- Food Safety:
 - Insure that pesticides are properly labelled, and the producers apply those pesticides in accordance with the label. To ensure compliance with relevant legislation.
- Worker Protection:
 - The Occupational Health and Safety Act (OHSA). 1993 (Act No. 85 of 1993) regulates health and safety at the workplace for all workers. This Act places the onus on employers to maintain a safe workplace. The regulation makes provision for various mandatory safety measures to protect the health of workers handling hazardous chemicals, such as risk assessment, safety training, safe practices and medical, biological and environmental monitoring of all workplaces.
- Pesticide disposal and container management

- South Africa has enacted several laws in an attempt to ensure that toxic wastes are disposed of without becoming a danger to people or the environment. This legislation includes the Hazardous Substance Act, 1973 (Act No. 15 of 1973), the Environmental Conservation Act, 1989 (Act 73 of 1989), the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965), and the National Environmental Management Act, 1998 (Act 107 of 1998).

Specific Mitigation:

- Before an application:
 - Ensure that spray equipment is properly calibrated to deliver the desired pesticide amount for optimal coverage.
 - Use appropriate spray nozzles and pressure to minimize off-site movement of pesticides.
 - Avoid spraying during these conditions:
 - Wind speed over 8 km/h
 - Temperature inversions
 - Just prior to rain or irrigation (unless it is specifically recommended, as when incorporating a soil-applied pesticide)
 - At tractor speeds over 3 km/h
 - Identify and take special care to protect sensitive areas (for example, waterways or riparian areas) surrounding your application site.
 - Review and follow labelling for pesticide handling, personal protection equipment (PPE) requirements, storage, and disposal guidelines.
 - Check and follow restricted-entry intervals (REI) and preharvest intervals (PHI).
- After an application:
 - Record application date, product used, rate, and location of application.
 - Follow up to confirm that treatment was effective.

Cumulative impact

The increase in the number of areas planted to macadamia or any other crop and the necessity to control pests that affect the success of these crops, could lead to the increased utilisation of pesticides. This in turn could lead to possible negative impacts on the fauna surrounding the fields. However, the wise and judicious use of chemicals to control pests as well as the implementation of mitigatory measures listed above would reduce the significance of this impact to **LOW**.

7.7 Final Conclusions and Recommendations

The essence of all EIA processes is aimed at ensuring informed decision-making and environmental accountability. Furthermore, it assists in achieving environmentally sound and sustainable development. In terms of NEMA (No 107 of 1998), the commitment to sustainable development is evident in the provision that “development must be socially, environmentally and economically sustainable and requires the consideration of all relevant factors. In addition, the preventative principle is required to be applied, i.e. that the disturbance of ecosystems and loss of biological diversity are to be “...avoided, or ... minimised and remedied” and “disturbance of the landscape and the nation’s cultural heritage is avoided and where it cannot be altogether avoided is minimised and remedied”. Therefore, negative impacts on the environment and on people’s environmental rights in terms of the Constitution (Act 108 of 1996)) should be anticipated and prevented, and where they cannot be altogether prevented, they must be minimised and remedied in terms of “reasonable measures”. “Reasonable measures” implies that “every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law and cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment”.

7.7.1 Conclusions

The preceding chapters provide a detailed assessment of the anticipated environmental impacts on specific components of the biophysical and social environments associated with the proposed development and operation of the processing plant and macadamia plantation. This FBAR has

provided a comprehensive assessment of the potential environmental impacts, identified by the EIA team and I&AP's, associated with the proposed project. **This investigation has not identified any potential impacts on the biophysical or social environments that are so severe as to suggest that the proposed activity should not proceed.** The design has taken cognisance of the various environmental considerations and accordingly, incorporates remedial measures aimed at curtailing the significance of the potential negative environmental impacts associated with the proposed development, as well as enhancing the potential positive environmental (including Socio-economic) impacts.

The significance of the potential environmental (biophysical and social) impacts associated with the proposed macadamia plantation are summarised in Table 30.

It should be noted that the impacts have been assessed with a reasonable amount of confidence, i.e. in terms of the defined confidence ratings presented in Table 13.

From Table 30 it is apparent that there is **no** long term or operational phase impacts of significant concern. The negative impacts associated with the operational phase are likely to be of **medium to low** significance, particularly if the proposed mitigation measures are implemented. Moreover, there are a number of potential positive impacts associated with the proposed development, viz., the creation of positive construction and operational phase impacts on employment.

With regards to the short term or construction phase impacts, the significance of the construction phase impacts are likely to be curtailed by the relatively short duration of the construction phase. Moreover, many of the construction phase impacts could be mitigated by the effective implementation of the mitigation measures outlined above. If these measures were put into practice the significance of all construction phase impacts would be reduced to **low**. While the probability of the construction phase impacts occurring is relatively high without mitigation, the effective implementation of the mitigation measures will reduce the probability of the impacts occurring.

Table 30: Summary of the significance and probability of the potential positive and negative impacts associated with the proposed development.

Ref. (Pg)	Description of impact	Significance of Impact	
		Without Mitigation	With Mitigation
Construction Phase Impacts			
64	Fauna and Flora	Medium (-)	Low (-)
67	Impact on Crowned Eagle	Medium (-)	Low (-)
68	Aquatic Ecosystems	Medium (-)	Low (-)
70	Historical	Low (-)	Low (-)
71	Loss of Topsoil and Soil Erosion (Hydrological)	Medium (-)	Low (-)
72	Ground and Surface Water Impact	Medium (-)	Low (-)
73	Noise Pollution	Medium (-)	Low (-)
74	Visual Impact	Medium (-)	Low (-)
75	Employment Opportunities	Low (+)	High (+)

Ref. (Pg)	Description of impact	Significance of Impact	
		Without Mitigation	With Mitigation
Operational Phase Impacts			
78	Stormwater Management	Moderate (-)	Low (-)
79	Visual Impact – “Sense of Place”	Low (-)	Medium (+)
80	Use of pesticides	Medium (-)	Low (-)

It is felt that the proposed macadamia orchard will have no detrimental negative impact on the environment and should the necessary mitigation measures be implemented there are no impacts envisaged of high significance or any fatal flaws.

In this regard, the EAP sees no reason as to why the proposed activity may not be authorised.

7.6.2 Recommendations and Environmental Impact Statement

Should the proposed activity be authorised, the most important mitigation measures, which should be stipulated as requirements in any authorisation include the following:

- The Construction Phase EMPr that addresses, *inter alia*, the issues discussed under Construction Phase impacts, *viz.* Ecological sensitivity, erosion and sedimentation, deterioration of water quality, heritage impact, noise disturbance and socio-economic impacts, traffic, windblown dust, litter/waste and safety should be effectively implemented for the duration of the project.
- A suitably qualified professional should be appointed to act as the ECO and oversee the implementation of the EMPr during construction.
- In terms of screening, all existing vegetation on the periphery of the site is to be maintained as a visual buffer.
- A conservation buffer to be established around all riparian areas. A buffer of 20 m is recommended around the Riparian Thicket community.
- In terms of screening, all existing vegetation on the periphery of the site is to be maintained as a visual buffer. This should be a minimum of 20 meters.
- If any human remains are discovered during earth moving activities, excavations must stop at the location of these findings and these must be treated with respect. The South African Heritage Resources Agency must be notified immediately. An archaeologist may be required to remove the remains at the expense of the developer.
- Effective design of all stormwater outlet areas to prevent erosion and flooding at the point of discharge and immediately downstream.
- Appropriate landscaping and rehabilitation of indigenous vegetation should be included in the development of the site.
- Construction should be planned so that the unnecessary clearing of vegetation is avoided.
- Measures are taken to ensure that personnel and the general public are safe at all times.
-

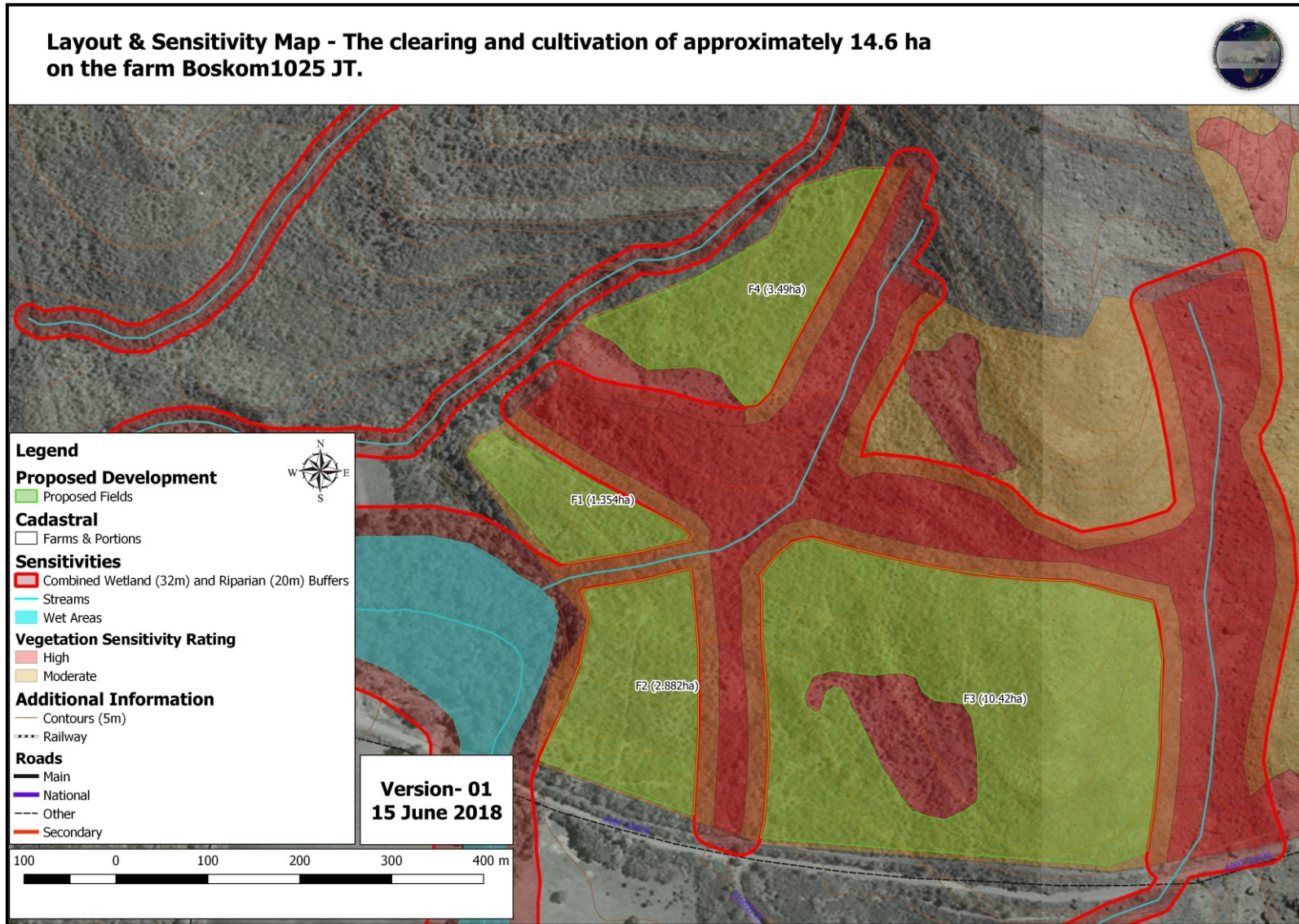


Figure 14: Sensitivity Map

8 The way forward

The competent environmental authority (i.e. DARDLEA) will review the final BAR and decide whether or not to grant authorisation.

Once DARDLEA has reviewed the Final BAR they will either issue a Record of Decision based on the information contained in the Final BAR or indicate that further information is required in order to make an informed decision with regard to the proposed activities. If a Record of Decision is issued, this would be communicated by means of letters to all identified I&AP's. Following the issuing of the Record of Decision, there will be a 10-day notice of intent to appeal period, followed by a 30-day appeal period within which I&AP's will have an opportunity to appeal against DARDLEA's decision to the Provincial MEC for Environmental Affairs and Development Planning in terms of the National Environmental Management Act.

9 References

CILIER, JP (2017) Phase 1 Archaeological and Heritage Impact Assessment on the farms Farm Boskom, 1025 JT and Montrose 290 JT in respect of proposed agricultural development, Mpumalanga Province.

DEAT (2006a) *Guideline 3: General Guide to the Environmental Impact Assessment Regulations, 2006, Integrated Environmental Management Guideline Series*. National Department of Environmental Affairs and Tourism (DEAT), Pretoria.

DEAT (2006b) *Guideline 5: Assessment of Alternatives and Impacts in Support of the Environmental Impact Assessment Regulations, 2006, Integrated Environmental Management Guideline Series*. National Department of Environmental Affairs and Tourism (DEAT), Pretoria.

KEATIMILWE, K. & ASHTON, P.J. (2005) *Guideline for the review of specialist input in the EIA process*. Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP), Cape Town.

LOCHNER, P. (2005) *Guideline for Environmental Management Plans*. Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP), Cape Town.

MCKENZIE, D (2017) Farm Boskom, 1025 JT, Baseline Terrestrial Ecology Study & Biodiversity Value Assessment.

MÜNSTER, F. 2005. (2005) *Guideline for determining the scope of specialist involvement in the EIA process*. Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP), Cape Town.

OBERHOLZER, B. (2005) *Guideline for involving visual and aesthetic specialists in the EIA process*. Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning (DEA&DP), Cape Town.

PALMER, R (2017), Barclay Vale 288JT, EIA Specialist Report – Aquatic Delineation and Risk Assessment. Mbombela Local Municipality, Mpumalanga Province

10 Assumptions, Uncertainties and Gaps in Knowledge

In undertaking this investigation and compiling the EIA Report, the following has been assumed:

- The information provided by the applicant is accurate and unbiased;
- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed development and associated infrastructure.

11 Representations and Comments

Person	Issue	Person	Response
INITIAL PPP			
Frans Mashabela (Agriculture)	Due to the cultivation practices around this area, is clear this will contribute to the food reserves of the country. The clearing should not have severe negative impacts on areas outside the required area. The natural resources are scarce resources that cannot be renewed and must be preserved in an environmental responsible manner.	Steven Henwood (EAP)	Noted.
Frans Mashabela (Agriculture)	The farm Boskom 1025 JT is situated on an open hills or ridges with sloping percentages ranging from 8.0 to 12.0 %. This type of slope is vulnerable to water erosion; therefore, a great care is required during clearing. The season of the year is also important, when clearing this area; the safe period is during dry season when the rainfalls are scarce, like in the winter months. This will give the land user a good time to prepare his land; construct conservation measures that may prevent soil erosion. The drainage lines should not be disturbed, and this will minimizing erosion. The soil in this area is lacking strong texture, this may pose a threat to erosion; therefore the conservation measures must be adequate in time.	Steven Henwood (EAP)	Noted. Slope has been taken into consideration when choosing the preferred site alternative. In this regard a slope analysis was conducted with the following conclusions: "The topography of the two proposed development areas comprises hills with moderate to steep slopes. Field 1 – 9.7% average slope; Field 2 – 6,2% average slope; Filed 3 6.6% average slope; and Filed 4 – 10.2% average slope. Elevation



			<p>within the Study Area ranges between 750 and 975 m amsl."</p>
<p>Frans Mashabela (Agriculture)</p>	<p>The ecosystem in the area is threatened because is vulnerable to harm due to on-going developments activities in the valley, therefore good technical measures are required to sustain it</p>	<p>Steven Henwood (EAP)</p>	<p>The initial scope of the Ecological Report covered the entirety of both Barclay Vale and Montrose. The scope was later reduced to talk to the proposed site only, however the report relating to both properties was still included. This may have resulted in some misunderstanding and ambiguity.</p> <p>There are definitely sections on Montrose and adjacent subdivisions of Barclay Vale that have had riparian vegetation cleared. However, apart from the legal removal of alien vegetation I (the EAP) am unaware of any large scale illegal</p>



			clearing on the property section that contains the proposed site.
K. Malele (MTPA)	The sensitivity if the above mentioned farm was assessed according to the Mpumalanga Biodiversity Sector Plan (MBSP; MTPA, 2014). This sensitivity was assessed in terms of a terrestrial and freshwater assessment. In the MBSP, sensitive areas are identified in terms of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). CBAs and ESAs are deemed to be necessary to ensure protection of biodiversity, environmental sustainability, and human well-being, and are to remain unaltered. Therefore no form of mining or development is permitted on those areas (Mining and biodiversity guideline)	Steven Henwood (EAP)	Noted.
K. Malele (MTPA)	The terrestrial assessment , which was also included in your Ecology study and Biodiversity Value Assessment shows that there are <i>CBA Irreplaceable areas</i> within the proposed 17.46 HA of the proposed development. The MTPA would therefore recommend that if possible, the clearing be done on the other natural areas in order to conserve the functionality of the <i>CBA Irreplaceable areas</i> . However, the assessment has shown that the vegetation within the study area has been encroached by indigenous and alien woody species. There are also patches of Barberton Serpentine Sourveld which are very small and fragmented which are said could be lost to bush encroachment in the next few years.	Steven Henwood (EAP)	Noted. The entire 14.6ha is located within an area designated as CBA Irreplaceable. However of all the possible alternative fields , the areas proposed have poorer biodiversity rating as were thus accepted as the most feasible alternative location.
K. Malele (MTPA)	The freshwater assessment showed that there is a CBA River, and that the area is within an <i>ESA Important Sub-catchment</i> . This wetland has been delineated and no clearing should occur within the delineated zone. According to the Aquatic Delineation and Risk Assessment proposed development areas no 1, 2, 3, 4, and 6 are recommended for development while development area no 5 is not recommended. This because the proposed development in this area could destroy a patch mosaic of seasonal and episodic Hillslope Seepage Wetlands that are in a Natural Present Ecological State (Category A).	Steven Henwood (EAP)	Noted. Only the least sensitive area in terms of the Aquatic assessment have been incorporated into the preferred layout. All

			Sensitive aquatic systems and areas have been excluded and buffered according.
K. Malele (MTPA)	<p>During the clearing operation, the reptiles, mammals and birds must be allowed to move freely into new safer habitats.</p> <p>All invasive alien plants must be eradicated using correct methods.</p> <p>All the negative environmental impacts that could arise as a result of this project should be avoided, minimized, mitigated or rehabilitated to its pre-development land use or to the standards agreed to with the land owner.</p> <p>The applicant must effectively implement and adhere to all the conditions of the EMP and all the action plans</p>	Steven Henwood (EAP)	Noted. All of these requirements have been taken into consideration in the EMP and impacts and mitigation section of the BAR.
M Masango (DARDLEA)	<p>1. Please note that this department will not consider authorising the removal of indigenous vegetation from land that is not arable. Land that is not arable due to inter alia, lack of sufficient water for irrigation, rockiness, steepness, excessive wetness, incorrect soil type., must be identified and excluded accordingly. In this light, this office further refers to the ecological study dated May 2018, in which it was recommended that the slope analysis be done to determine which area are too steep for crop planting. Please confirm how slope analyses informed the layout.</p>	Steven Henwood (EAP)	<p>Noted. Slope has been taken into consideration when choosing the preferred site alternative. In this regard a slope analysis was conducted with the following conclusions:</p> <p>“The topography of the two proposed development areas comprises hills with moderate to steep slopes. Field 1 – 9.7% average slope; Field 2 – 6,2% average slope; Filed 3</p>



			<p>6.6% average slope; and Filed 4 – 10.2% average slope. Elevation within the Study Area ranges between 750 and 975 m amsl.”</p> <p>Potential fields within the study area that exhibited an average slope greater than 12 % were excluded. Moreover, rock outcrops within the proposed fields were excluded due to lack of arable soils and slope excessiveness. The current layout has excluded all areas where slope is greater than 12%. Any slopes below this were deemed arable with strict erosion mitigating measures being enforced.</p>
<p>M Masango (DARDLEA)</p>	<p>2. Comments from MTPA must be included in the final basic assessment report.</p>	<p>Steven Henwood (EAP)</p>	<p>Noted. These have been included.</p>



<p>M Masango (DARDLEA)</p>	<p>2. Comments from MTR must be included in the final basic assessment report. 3. The final basic assessment report must include an issues and response report, as well as copies of and responses to comments received from all I&APs, including these comments.</p>	<p>Steven Henwood (EAP)</p>	<p>Noted. These have been included.</p>
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12 Specific Information

To date no other specific information was required by the Mpumalanga Department of Economic Development, Environment and Tourism.

13 Matters Required in terms of sections 24(4)(a) and (b) of the Act

None

SECTION F: APPENDICES**APPENDIX A: SITE PLAN(S)**

- Annexure A: Locality Map
- Annexure B: Preferred layout including onsite sensitivities

APPENDIX B: SITE PHOTOGRAPHS

- Annexure A: Site photos

APPENDIX C: FACILITY ILLUSTRATION(S)**APPENDIX D: SPECIALIST REPORTS**

- Annexure A: Wetland Delineation and Risk Assessment
- Annexure B: Ecological Sensitivity Assessment
- Annexure D: Historical Impact Assessment
- Annexure E: Palaeontological Report

APPENDIX E: PUBLIC PARTICIPATION PROCESS

- Annexure A: Site notice text
- Annexure B: Proof of displayed notice boards
- Annexure C: Background Information Document (BID) text
- Annexure D: Proof of given Background Information Document (BID) - distributed via email and by hand
- Annexure E: Advertisement text
- Annexure F: Proof of placed advertisement
- Annexure G: Letter of notification of EIA
- Annexure H: Proof of given Letter of notification
- Annexure I: List of registered Interested and Affected Parties (I&AP's)
- Annexure J: Comments and responses
- Annexure K: Proof of given Draft BAR

APPENDIX F: OTHER

- Annexure A: Draft Environmental Management Programme
- Annexure C: Curriculum Vitae of EAP
- Annexure D: Declaration by EAP.