



DRAFT BASIC ENVIRONMENTAL ASSESSMENT

August 2014. DRAFT

Lion Sands
GAME RESERVE

PROJECT:

Basic Environmental Assessment
for the Construction of a lodge and
additional staff accommodation,
Lion Sands, Sabi Sand Game
Reserve

CONSULTANT:

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APPLICANT:

Lion Sands Private Game Reserve
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PROPERTY:

The farm Kingstown 380KU

Ref. No: 17/2/3/E-257





**Basic assessment report in terms of the
Environmental Impact Assessment Regulations, 2010, promulgated in terms
of the National Environmental Management Act, 1998(Act No. 107 of 1998), as
amended.**

(For applicant / EAP to complete)

File Reference Number:

17/2/3/E-257

Project Title:

Upgrading of buildings and construction of additional chalets and staff housing at Lion Sands Ivory Lodge, Sabi Sand Game Reserve.

Name of Responsible Official:

Millicent Masango / R. Luyt

(For official use only)

NEAS Reference Number:

Date Received:

Kindly note that:

1. Required information must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. Tables can be extended as each space is filled with typing.
2. Where applicable **black out** the boxes that are not applicable in the form.
3. An incomplete report may be returned to the applicant for revision.
4. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
5. All reports (draft and final) must be submitted to the Department at the address of the relevant **DISTRICT OFFICE** given below or by delivery thereof to the relevant **DISTRICT OFFICE**. Should the reports not be submitted at the relevant district office, they will not be considered.
6. No faxed or e-mailed reports will be accepted.
7. One copy of the draft version of this report must be submitted to the relevant district office. The case officer may request more than one copy in certain circumstances.
8. **Copies of the draft report must be submitted to the relevant State Departments / Organs of State for comment.** In order to give effect to Regulation 56(7), proof of submission/delivery of the draft documents to the State Departments / Organs of State must be attached to the draft version of this report.
9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.
10. All specialist reports must be appended to this document, and all specialists must complete a declaration of independence, which is obtainable from the Department.

SECTION A: BACKGROUND INFORMATION

Project applicant:	Lion Sands Private Game Reserve (Pty) Ltd.	
Trading name (if any):		
Contact person:	Andre Morgan	
Physical address:	Farm Kingston 380 KU, Sabi Sand Wildtuin, Mpumalanga	
Postal address:	PO Box 488, Skukuza	
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Environmental Assessment Practitioner:	Emross Consulting (Pty) Ltd	
Contact person:	Andrew Rossaak	
Postal address:	PO Box 507, White River	
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Telephone:	0137502782 / 0130070077	Fax: 086 675 4320
E-mail:	andrew@emross.co.za	
Qualifications:	M.Sc. Ecology and 15+ years of experience in environmental field	
Professional affiliations (if any):	SACNASP reg no: 400167/08; GSSA registered professional; IAIAAsa	

SECTION B: 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.

The upgrading of the existing main lodge and boma into a two-bedroom villa, the upgrading of the existing westerly-most chalet into a public area, the upgrading of the current reception into a spa and gym, the construction of three additional chalets and the construction of an additional staff house.

SECTION C: PROPERTY/SITE DESCRIPTION

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

Remainder portion of the farm Kingston 380 KU

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.

Latitude (S):		Longitude (E):	
24°	58.370'	31°	31.718'

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

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 metres and all vegetation of conservation concern (protected, endemic and/or red data species);
- 6.7 servitudes indicating the purpose of the servitude;
- 6.8 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):
 - a) watercourses and wetlands;
 - b) the 1:100 year flood line;
 - c) ridges;
 - d) cultural and historical features;
- 6.9 10 metre contour intervals

SITE PHOTOGRAPHS

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

FACILITY ILLUSTRATION

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 D: 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:

(Checklist for official use only)

1. A description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity.	
2. An identification of all legislation and guidelines that have been considered in the preparation of the basic assessment report.	
3. Details of the public participation process conducted in terms of Regulation 21(2)(a) in connection with the application, including – (i) the steps that were taken to notify potentially interested and affected parties of the proposed application; (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given; (iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 55 as interested and affected parties in relation to the application; and (iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	
4. A description of the need and desirability of the proposed activity;	
5. A description of any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives will have on the environment and on the community that may be affected by the activity;	
6. A description and assessment of the significance of any environmental impacts, including— cumulative impacts, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the activity; 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;	

7.	Any environmental management and mitigation measures proposed by the EAP;	
8.	Any inputs and recommendations made by specialists to the extent that may be necessary;	
9.	A draft environmental management programme containing the aspects contemplated in regulation 33;	
10.	A description of any assumptions, uncertainties and gaps in knowledge;	
11.	A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	
12.	Any representations, and comments received in connection with the application or the basic assessment report;	
13.	The minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants;	
14.	Any responses by the EAP to those representations, comments and views;	
15.	Any specific information required by the competent authority; and	
16.	Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	

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 subregulation 22(2)(h), exist.

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

SECTION E: CONSULTATION WITH OTHER STATE DEPARTMENTS

Provide a list of all State Departments / Organs of State that have been consulted and registered as interested and affected parties, and to whom draft reports have been submitted for comment. **Proof of submission / delivery of the draft report to all State Department / Organs of State must be attached to this document.**

Department:	Kruger National Park		
Contact person:	Tracy-Lee Petersen		
Postal address:	PO Box 394, SKUKUZA		
Postal code:	1350	Cell:	074 580 5583
Telephone:	013 735 4271	Fax:	013 735 4051
Email:	TracyP@sanparks.org		

Department:	Mpumalanga Parks and Tourism Agency		
Contact person:	Komilla Narasoo/ Frans Krige		
Postal address:	Private Bag X11338, NELSPRUIT		
Postal code:	1200	Cell:	084 232 2902
Telephone:	013 254 0279	Fax:	013 254 0279
Email:	franskrige@telkomsa.net		

Department:	Bushbuck Ridge Local Municipality		
Contact person:	Municipal Manager – Mr. Doctor Shabangu		
Postal address:	Private Bag X9308, Bushbuck Ridge		
Postal code:	1280	Cell:	
Telephone:	013 799 1851/7	Fax:	013 799 1865
Email:	shabangud@bushbuckridge.gov.za		

Department:	Sabi Sand Game Reserve		
Contact person:	Edwin Pierce – SSW Ecological Officer		
Postal address:			
Postal code:		Cell:	078 804 0347
Telephone:		Fax:	
Email:	ecologist@sabisand.co.za		

Department:	Department of Water Affairs	
Contact person:	Sampie Shabangu	
Postal address:		
Postal code:	Cell:	082 857 4275
Telephone:	Fax:	
Email:	shabangus2@dwa.gov.za	

Department:	Inkomati Catchment Management Agency	
Contact person:	Thomas Gyedu-Ababio	
Postal address:		
Postal code:	Cell:	078 893 8924
Telephone:	Fax:	
Email:	thomasga@inkomaticma.co.za	

SECTION E: APPENDICES

The following appendices must be attached to the basic assessment report as appropriate:

Site plan(s)

Photographs

Facility illustration(s)

Specialist reports

Comments and responses report

Other information

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1 INTRODUCTION

The Lion Sands Ivory Lodge is located within the Sabi Sands Game Reserve, an area renowned worldwide as a popular tourist destination. The various lodges and reserves which occur throughout the Sabi Sand Game Reserve attract a large number of tourists on an annual basis, which contributes significantly towards local economic growth and development in the area. Lion Sands Private Game Reserve (Pty) Ltd. would like to undertake a number of developmental activities which will serve to increase the capacity of the lodge facility and accommodate a greater number of guests at any given time, ultimately promoting eco-tourism throughout the region. The proposed increase in capacity only relates to beds, the number of game viewing vehicles traversing the property, at any one time, will not increase. All developmental activities will be undertaken in an environmentally-friendly manner, and strong efforts will be made to ensure that the development footprint is kept to a minimum and the impact of the development is reduced as far as possible, with the primary objective of sustainability in mind.

In order to proceed with the proposed developmental activities, Lion Sands Private Game Reserve (Pty) Ltd. is required to apply for environmental authorisation from the decision-making authority. As a result, EMROSS Consulting (Pty) Ltd. has been appointed, as independent environmental consultants, by Lion Sands Private Game Reserve (Pty) Ltd. to undertake the necessary actions required to apply for environmental authorisation from the Mpumalanga Provincial Government Department of Economic Development, Environment and Tourism (MDEDET, the decision-making authority) for the conversion of the main lodge and boma, the upgrading and expansion of the westerly-most chalet, the construction of three additional chalets, and the construction of an additional staff house.

The new proposed developments will be informed by essential ecological and environmental aspects which have been identified in the assessment. Any recommendations which are provided in this Basic Assessment Report have been generated by ecological and environmental specialists who recognize the importance of ecological integrity and optimal ecosystem functionality. Furthermore, the provided recommendations are aimed at reducing the impact which any developmental activities may have on the receiving environment and vice versa, and have been generated in accordance with the National Environmental Management Principles to ensure the mitigation of any possible impacts and promote sustainability.

The Lion Sands Ivory Lodge is located on the remainder portion of the farm Kingston 380KU within the Sabi Sands Game Reserve; an area which has been declared “protected” in terms of NEMPAA. The site where the proposed developments are to occur is situated along the Sabi River to the north-west of Skukuza Staff Village (Figure 1).

The relevant legislation which is applicable to the proposed developmental activities is discussed in section 4 of this report.



Figure 1: Location of the proposed developmental activities to proceed at the Lion Sands Ivory Lodge within the Sabi Sand Game Reserve (Source: Google Earth 2014).

2 DESCRIPTION OF PROPOSED ACTIVITIES

In an effort to upgrade the accommodation facilities and improve the experience of guests, the decision-makers at the Lion Sands Ivory Lodge have proposed to make a number of developmental changes based on the identification of various needs and requirements. Additionally, the decision-makers have identified the need to accommodate more guests at the Lion Sands Ivory Lodge which requires the construction of additional chalets. These developmental changes will serve to fulfil all the needs and requirements identified by the relevant parties concerned and are discussed in detail below. It is worth noting that the proposed activities below were achieved following the consideration of a variety of alternative options which are more fully described in section 7.

TWO-BEDROOM GUEST UNIT

The existing main lodge and boma is to be modified into a luxurious two-bedroom guest unit (Figure 2). These modifications will provide paying guests with comfortable and luxurious accommodation, contributing to the unique experience and ultimately ensuring an unforgettable stay.

PUBLIC AREA

The westerly-most chalet (#6 – Peregrene) is to be converted into the new “public area” or common area for guests. The existing building will be expanded and modified (Figure 2). The public area will be utilised predominantly as a dining and lounge area where guests will dine and relax.

THREE IDENTICAL CHALETS

Three new chalets are proposed to be developed within the demarcated area illustrated in Figure 2. These chalets will be identical to the existing six chalets and will increase the capacity of the lodge from 6 units to 9. The exact positioning of the chalets has not yet been determined; however, their proposed development will proceed within the demarcated footprint, and this entire area was subjected to an ecological survey. It should be kept in mind that the chalets will occupy only a fraction of the demarcated area and the exact layout and placement of the chalets will be determined based on the recommendations of the specialist ecological report, the existing vegetation and the topography of the site.

STAFF HOUSE

The proposed construction of an additional staff house is scheduled to occur in close proximity to the existing staff housing (Figure 2). The staff house will provide accommodation to additional staff members whose employment is necessary in order to cater for the needs of additional paying guests to the Lion Sands Ivory Lodge. There are four possible alternatives for the location of the additional staff house which have been discussed in section 7 and assessed in section 12 of this report.

GYM AND SPA

It is proposed that the existing reception area and curio shop is to be converted into a gym and spa (Figure 2). This facility will allow for an increased range of activities made available to the paying guest and will ultimately contribute to their experience. This developmental activity does not require authorisation as it entails solely the internal refurbishments of the existing infrastructure.

The possible alternatives that have been considered for all of the proposed developments above are discussed in detail in section 7 of this report.



Figure 2: Satellite image indicating the locations of the existing buildings to be modified and the sites where the proposed new developments are to occur (Source: Google Earth 2014).

3 DESCRIPTION OF RECEIVING ENVIRONMENT

The site where the proposed developments are to occur is situated on a section of the northern bank of the Sabi River in a region of the Lowveld, which forms part of the Savanna biome and is characterized by plant assemblages which are associated with the Granite Lowveld (SVI 3) vegetation type (Mucina & Rutherford 2006). The conservation status of SVI 3 is listed as “vulnerable” (Figure 3).



Figure 3: The vegetation occurring at the site is characteristic of the Granite Lowveld (SVI 3) vegetation type (Source: Biodiversity GIS 2007).

TWO-BEDROOM VILLA

The main lodge and boma area, to be converted into the two-bedroom villa, is situated alongside the river bank of the Sabi River and is surrounded by large trees and other vegetation which are characteristic of the riparian zone. The topography of the site is relatively flat, with the river bank undulating downward towards the river in front of the development.

PUBLIC AREA

The westerly-most chalet, to be expanded and converted into the public area, is located alongside the river bank of the Sabi River. This site is situated on a slightly undulating slope which proceeds towards the river and is surrounded by riverine vegetation as well as lowland vegetation that is associated with the Granite Lowveld vegetation type.

THREE IDENTICAL CHALETS

The site which has been demarcated for the proposed development of the three new identical chalets is situated on an undulating slope which proceeds towards the river. The intensity of the slope gradually increases closer towards the river. This site is characterized by a mix of lowland and upland vegetation that is associated with the Granite Lowveld vegetation type, as well as riverine vegetation closer to the river.

STAFF HOUSE

The new staff house is proposed to be developed within the fenced area of the camp footprint to the south-west, and in close proximity, to the existing staff housing. This site is considerably flat and is characterised by a mix of lowland and upland vegetation that is associated with the Granite Lowveld vegetation type.

It should be noted that all the structures and proposed new developments mentioned above are outside of the known flood lines (2012, 2013 and 2014 floods were well below these areas) (Figure 4). The flooding potential thus appears to be small and has not been considered in great detail here, although the potential was included in the assessment tables in section 12.

4 APPLICABLE LEGISLATION

In terms of the National Environmental Management Act (NEMA), the activities proposed may trigger the thresholds considered in the listed activities under schedule of activities as follows:

GNR 544:

Activity 24 *“The transformation of land bigger than 1000 square metres in size, to residential, retail, commercial, industrial or institutional use, where, at the time of the coming into effect of this Schedule such land was zoned open space, conservation, or had an equivalent zoning.”*

GNR 546:

Activity 18(a)(ii)(aa) *“The expansion of a resort, lodge, hotel and tourism or hospitality facilities where the development footprint will be expanded in Mpumalanga province: outside urban areas, in: a protected area identified in terms of NEMPAA, excluding conservancies.”*

The following legislation may also be applicable to the proposed developments, in no particular order:

- › Constitution of Republic of South Africa 108 Of 1996; (Constitution)
- › National Environmental Management Act 107 of 1998; (NEMA)
- › Conservation of Agricultural Resources Act 43 of 1983; (CARA)
- › Environmental Conservation Act 73 of 1989; (ECA)
- › Promotion of Administrative Justice Act 3 of 2000; (PAJA)
- › Promotion of Access to Information Act 2 of 2000; (PAIA)
- › National Veld and Forest Act 101 of 1998; (NVFA)
- › National Forests Act 84 of 1998; (NFA)
- › National Heritage Resources Act 25 of 1999; (NHRA)
- › National Environmental Management Biodiversity Act 10 of 2004; (NEM-BA)
- › Mpumalanga Nature Conservation Act 10 of 1998; (MNCA) and
- › National Water Act 108 of 1997; (NWA)

The Constitution, The PAJA and PAIA deals with people’s rights – the right to be heard, obtain information; have an environment that is not harmful and the right to receive fair treatment in the process. This is dealt with in the public participation process in section 5 below.

The NEMA, CARA, ECA and NVFA deals with people's responsibility to take due care of the environment. This is covered in various sections of this report, the environmental management plan (EMPr) and specialist reports. The specialist ecological report also covers the requirements of the MNCA. Should it be necessary to damage protected trees, the appropriate applications will need to be submitted to Department of Agriculture Forestry and fisheries or MTPA.

The Heritage Act lists certain activities in section 38 of that act, which requires a heritage impact assessment.

"Section 38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;

(b) the construction of a bridge or similar structure exceeding 50 m in length;

(c) any development or other activity which will change the character of a site—

(i) exceeding 5 000 m² in extent; or

(ii) involving three or more existing erven or subdivisions thereof; or

(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or

(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;

(d) the re-zoning of a site exceeding 10 000 m² in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development."

It is assessed that a heritage impact assessment is not required for the proposed activity.

5 PUBLIC PARTICIPATION PROCESS

In accordance with the Constitution of the Republic of South Africa, it is the right of persons to have the environment in which they live protected in a responsible and sustainable manner. Every person also has the right of access to information and should be informed of any proposed scheduled activities. Therefore, an important aspect of the Environmental Impact Assessment is to identify potential Interested and Affected Parties and to provide accessible information regarding any proposed development to any Interested and Affected Parties, to which they may raise comments and voice any concerns associated with the proposed development.

REGULATORY PROCESS OF IDENTIFICATION, NOTIFICATION AND RESPONSE OF INTERESTED AND AFFECTED PARTIES

GNR 543, Section 54(2) prescribes that Interested and Affected Parties must be identified and notified through the following approach:

- By placing notice boards in relevant places;

- By directly notifying all land owners and occupants of affected properties;
- By directly notifying neighbours to affected properties;
- By directly notifying ward councillors, rate payers associations, municipality and any relevant organ of state;
- By advertisement in local newspaper; and
- Any other method found reasonable for reaching affected parties which may not be reached with the above-mentioned methods.

In return the registered Interested and Affected Party is expected to:

- Submit all comments in writing to the consultant;
- Adhere to time frames given for commenting or submit a written motivation for why a longer commenting period is needed; and
- Disclose any direct business, financial, personal or other interest in the approval or refusal of the development.

APPLICATION OF THE REGULATORY PROCESS

Identification of Interested and Affected Parties

The relevant Interested and Affected Parties were identified and notified about the proposed developments through three distinct methods:

- Authority identification and contact.
- Direct contact of land owners and other potential Interested and Affected Parties.
- Notices and media advertising.

Authority identification and contact

Various authorities having jurisdiction were included in the EIA process and were provided with the necessary information regarding the proposed developments. Additionally, the following authorities were consulted with and requested for the provision of comment on any issues or concerns regarding the proposed developments:

- Ehlanzeni District Municipality;
- Mpumalanga Tourism and Parks Agency;
- Kruger National Park;
- Sabi Sands Wildtuin Management;
- Mpumalanga Department of Environment;
- The Department of Water Affairs and
- The Inkomati Catchment Management Agency.

As the development is in a reserve neighbouring the Kruger National Park (KNP); the MTPA and KNP were informed about the proposed developments. Jurisdiction of the Lion Sands Private Game Reserve lies within the Ehlanzeni District Municipality and as a result, the local municipality was informed about the proposed developments. As the

development is in the vicinity of a water course the Department of Water Affairs and the Inkomati Catchment Management Agency was also informed of the proposed development.

Direct contact of land owners and other potential Interested and Affected Parties

All neighbouring landowners, along with the Sabi Sand Wildtuin Management and other potential Interested and Affected Parties which surround the Lion Sands Private Game Reserve were contacted directly and notified about the proposed developments at the Lion Sands Ivory Lodge.

Notices and media advertising

An advert was placed in the advertising section of the local newspaper, the *Lowvelder*, providing information about the proposed developments on the 14th March 2014. A site notice was also erected at Shaws Gate, the southern-most entrance gate to the Sabi Sand Game Reserve on the 11th March 2014. A copy of both the newspaper advertisement and the notice at Shaws Gate is provided in Appendix 2 along with a complete list of all registered Interested and Affected Parties.

All comments and issues which have been raised by any Interested and Affected Parties pertaining to the proposed developments have been recorded as a means of identifying all key social and environmental issues (including project alternatives) regarding the proposed development.

SUMMARY OF COMMENTS AND RESPONSES

(This section will be updated with comments received from I&APs)

The Bushbuck Ridge Local Municipality was notified of the proposed development via e-mail on 14 April 2014. The municipality had not submitted any comments at the time of finalising the draft BA report.

The Mpumalanga Tourism and Parks Agency and Kruger National Park were contacted by e-mail, on 14 April 2014. No comments have been received.

The neighbouring landowners were sent an information document via e-mail to inform of the proposed development also on 14 April 2014.

Copies of correspondence with I&AP's are included in Appendix 2.

No comments or concerns have been received from the interested and affected parties at this stage.

6 NEED AND DESIRABILITY

A large portion of South Africa's protected areas are private properties and these are important for conserving biodiversity. These properties, however need to be maintained and this is often achieved through eco or wildlife-tourism. The financial benefits received from ecotourism contribute to the sustainability and conservation of the protected area network. Eco and wildlife tourism is a well-developed and accepted conservation land use and it is supported by conservation agencies.

Lions Sands Ivory Lodge have identified, through monitoring the lodge utilisation and market data, that there is a demand for the tourism product they are able to offer. The intention is thus to access this demand through increasing the capacity of the lodge to accommodate a greater number of guests at any given time. The decision has been undertaken to investigate these proposed developments in a sustainable manner, where the proposed developments will have a limited footprint and impact on the receiving environment and will serve to fulfil the identified needs and requirements.

7 ALTERNATIVE ACTIVITY AND SITES

The proposed developmental activities is the result of various alternative options being considered and evaluated. These included the complete new development of an eight-sleeper lodge, where development was to proposed either at a preferred site or at an alternative site.

The preferred site for development of the proposed eight-sleeper lodge was within the current demarcated camp area (Figure 4). An alternative site for development of the proposed eight-sleeper lodge was situated to the north-east of the existing lodge (Figure 4). Construction of the lodge at this site would require the demolition of some existing staff housing and the development of new staff housing. The development of the lodge would have occurred across a drainage line, requiring a pedestrian walkway to be constructed. This area has been affected by past flooding events and, as a result, the lodge would potentially be susceptible to damage caused by future floods. Furthermore, based on the ecological survey undertaken on these sites, it was determined that there was a high frequency of protected trees and vegetation of ecological importance which may be compromised by the development.

As a result of the investigations into these options, alternatives were sought and a lower impact, option was proposed that simply involved the expansion of one of the existing lodges. This avoided many impacts associated with a new lodge such as the development of an additional kitchen and back-of-house facility, new services (power, water and sewage reticulation) and significantly increased camp footprint.

The current proposal is more environmentally conservative and sustainable.

STAFF HOUSE

There are four identified sites within the demarcated area for the development of a new staff house as illustrated in Figure 4. Various parameters associated with environmental risks and

other impacts were considered and utilised as a guideline to provide recommendations for the preferred site for development of the staff house. The assessment of the site options is provided in section 12 of this report.



Figure 4: Location of the preferred lodge site, alternative lodge site and staff accommodation (Source: Google Earth 2014).

8 POTENTIAL ENVIRONMENTAL IMPACTS

The proposed development could potentially have an impact on, or be impacted by, various components of the physical environment. Potential environmental impacts that should be considered when planning, designing and constructing the various developments are considered below. The likelihood of these is considered and appropriate mitigation measures are included in section 10 below.

Damage to infrastructure by flooding:

The ever-changing global climate has seen an increase in extreme local weather conditions in recent years and there is a strong possibility of an increase in the regularity and intensity of flooding events in the future. Flooding has generally been infrequent in the past; however there have been local flooding events over the past three years which have resulted in high river flows, close to, or in excess of, the 1:100 year flood lines.

It is expected that the impact of future flooding events will be minimal at the sites where each of the proposed developmental activities are to occur. The demarcated site for the proposed development of the staff house is situated a suitable distance from the river so as not to be affected by future flooding events. The majority of the area of the demarcated site where the proposed development of the three proposed new chalets is situated a suitable distance above

and from the river; however, the potential impacts of future flooding events should be considered in the fine scale location of the new chalets. The public area, which is currently the westerly-most chalet, has not been affected by previous flooding events and it is expected that it will not be impacted by flooding events in the near future. The new two-bedroom unit (converted current public area) is located in close proximity to the river; however, it is located on the inside section of a river bend which largely reduces the risk of the building being affected by bank undercutting and erosion. It too has not been damaged by past flooding events.

Utility services and trenching:

The provision of utility services to each of the proposed developments is necessary for the supply of water and electricity and the removal and of sewage. Trenching is necessary as these services must be placed underground to protect them and prevent damage (and resultant issues) which can be caused by wildlife such as elephant or vehicles. Trenching can, however, act as a temporary habitat barrier and care and planning must be undertaken when installing services.

Electricity will be supplied to each of the proposed developments from the existing supply point (transformer) (Figure 5). A new water treatment and supply facility is planned to be constructed to replace the existing 'Jojo tanks'. This new facility is to be located in close proximity to the demarcated area for the new staff house. A new sewerage facility (above ground package plant) has been recently installed in the north-eastern section of the lodge.

Figure 5 illustrates the potential route which each utility service would follow in order to link up with the existing services (Note: The exact location of the three new chalets is currently being assessed using the ecological data; therefore the probable route each utility service will follow has been sketched to terminate within the demarcated area for the proposed development).



Figure 5: Potential electricity (yellow), water (blue) and sewage (brown) utility routes which link to the developmental sites (Source: Google Earth 2014).

Habitat loss as a result of the development footprint:

The footprint of any development has an impact on the natural landscape which it occupies as it reduces the size of the natural habitat available for dynamic ecosystem functioning.

The development of the new staff house will occur within the existing camp footprint of the Lion Sands Ivory Lodge. This area is currently in a natural vegetated state and has previously been rendered inaccessible to various faunal species (due to the camp fence) and the development in this area will not have a significant impact on fauna through habitat loss. Some vegetation will be impacted on and lost through the developmental process; however, the vegetation species occurring at this site are not considered to be sensitive or threatened (ecological report).

The modification and upgrading of the main lodge and boma into the two-bedroom unit will not result in the further loss of habitat as the footprint will likely end up being slightly reduced. Potential impacts here may be the establishment of alien vegetation on the reduced footprint.

The expansion and modification of the westerly-most chalet into the public area may result in the removal of vegetation occurring within the proposed expansion footprint. This vegetation is not considered to be threatened, vulnerable, however it is expected that the impact of the development will be small and be within the existing development footprint.

The site for the proposed development of the three new chalets occurs outside of the Lion Sands Ivory Lodge camp development footprint and will require the camp fence to be moved to incorporate it. The development of the three chalets will have a direct impact on vegetation at the site and the expansion of the fence would render this area inaccessible to large fauna. The impacts which may be caused by these developments have been considered in the ecological report and the implementation of the various mitigation measures supplied in section 10 of this report aim to reduce these habitat impacts. There is some risk that protected trees or large trees may be damaged, however it is our understanding and recommendation that the trees will be incorporated into the unit design and layout.

The recommendations provided in the specialist ecological report (Appendix 4) should be adhered to during the construction process. No protected trees should be removed or impacted on and the impact on vegetation of ecological importance should be avoided. The mitigation measures provided in section 10 incorporate the ecological report recommendations.

Lack of rehabilitation leading to loss of soil and alien plant establishment:

The absence or lack of sufficient management practises associated with the rehabilitation of areas following construction activities can lead to accelerated soil erosion as well as promote the establishment of alien plant species. These occurrences can have dramatic impacts and may impact vital ecological processes which are responsible for maintaining ecosystem health and viability. Such effects must be avoided through implementation of soil management practises during the construction process, as well as implementation of the Environmental Management Programme (see draft in Appendix 5) in order to avoid any potential impacts subsequent to the construction process.

Other possible impacts of the construction process and buildings on the receiving environment:

The proposed developments could potentially have an impact on the following components of the physical environment:

Soils

Soil erosion, loss of topsoil and deterioration of soil quality are the main potential impacts that could be caused during the construction process. Once disturbed, soil becomes more susceptible to erosion. The resultant infrastructure may cause changes to natural drainage patterns and the diversion of storm-water may result in large volumes of water being concentrated in certain areas, thereby increasing the risk of erosion. Erosion of the soil surface greatly increases the risk of losing topsoil, ultimately impairing the soils ability to support vegetation growth. It may also provide sites for the establishment of alien plants.

During construction, hydrocarbons leaking from construction vehicles, refuelling depots and concrete mixing areas may result in the contamination of soils.

The sourcing of sand and gravel for the construction of the building may result in erosion and degradation of soil, and sand and stone brought onto site from alternative areas possesses the risk of carrying with it alien plants and other biota.

Surface and ground water

The risk of contamination of ground and surface water may increase during the construction process.

Elevation of sediment loads due to eroded soil particles which enter watercourses may affect sun penetration, water temperature and levels of oxygen available to aquatic species.

Temporary ablution facilities for the construction crew have the potential to impact on surface water in the form of chemicals, pathogens and nutrient enrichment.

Contamination of surface water with cement or concrete can be detrimental to aquatic organisms as it increases the alkalinity of the water.

Hydrocarbon spills from construction vehicles may have a detrimental impact on surface water.

Flora

Natural vegetation can be impacted by construction activities such as stock piling of materials and clearing of the development footprint. Flora may also be impacted on by increased access to a site, leading to the harvesting of or disturbance to certain plants.

Fauna

Increased traffic and disturbance to a site during the process of construction may have an impact on the wildlife occurring in an area as the presence of humans and noise may disturb animals, resulting in the animals dispersing from the area.

Fauna can also be directly impacted through the accidental or intentional killing of animals during the construction process.

Any flora which is impacted on during the construction process is likely to have an impact on various animals which rely on such vegetation for refuge or food.

Cultural – historical / socio – economic impacts

Construction activities may disturb archaeological or cultural artefacts, if any such are present. This is dealt with in the Environmental Management Programme.

Possible impacts of the development to the aesthetic nature of the area

Noise pollution

Activities carried out during the construction process can generate a large amount of noise pollution. The main sources of noise pollution are produced by construction vehicles and machinery, as well as the construction team carrying out the construction activities. Noise pollution can increase the stress levels of animals in the vicinity and may also detract from the experience of paying guests at nearby facilities.

Once construction of the proposed developments has been completed, the noise generated at the site will be limited, and very similar to the current pre development levels.

Light pollution

Light pollution may be created if construction takes place outside of daylight hours. This case is most unlikely as it will not only generate light pollution but also a great deal of noise pollution which will be disruptive to persons in close proximity to the site of construction.

During operation of the facility, the use of outside lights may cause light pollution and increase the visual impact. This is a particular concern in a reserve even though the sites are close to or within an existing development.

Dust pollution

A large amount of dust may be produced during the construction process, especially if the construction process takes place predominantly during the dry season. The greatest occurrence of dust production will primarily be around the construction site.

Dust generated during the construction process will be limited to vehicle generated dust on the roads. This should be reduced as most travels will be at a slow pace or on foot.

Visual impact

The visual aesthetics of a building contribute largely to the 'sense of place' impression which is radiated to any person. It is important to provide guests and other persons with this 'sense of place' feeling, especially in an eco-tourism or game reserve context. Care should be taken throughout the planning and construction process whereby aesthetics should be considered as

an important focus point of the development. Limiting the visual impact of a building requires considerations to be taken during site selection of the development right through to the level of designing the building. The sustainable utilisation of natural resources and cover will allow the building to blend in with its natural surroundings and reduce its visual impact.

Utilisation of resources

Water utilisation

Each of the new proposed developmental activities will be supplied with water by the new water supply facility. Sustainable water utilisation should be practised by construction personnel during the construction process as well as by guests and other personnel who may temporarily occupy each of the buildings once construction has been completed.

Energy consumption

Each of the new proposed developments will be linked to the existing electricity transformer. As is the case with water utilisation, care should be taken by the relevant persons to practise sustainable electricity utilisation and ensure that their energy consumption footprint is kept to a minimum.

9 THE NATIONAL ENVIRONMENTAL MANAGEMENT PRINCIPLES

The primary objective of an environmental impact assessment is to determine the possible effects, both positive and negative, which any developmental activities may have on the receiving environment, and vice versa. An assessment of this sort also takes the relevant legislative framework into consideration and ensures that the proposed developmental activities are not listed activities in the National Environmental Management Act. Additionally, ascertaining that the proposed developmental activities proceeds in adherence to the National Environmental Management Principles is useful and compliments the entire decision-making process, where the most suitable decisions will be made in order to optimise sustainability of the development on an economic, social and ecological scale.

Table 1 provides a checklist for the adherence of the proposed developmental activities to the National Environmental Management Principles.

Table 1: Checklist for adherence of the proposed developmental activities to the National Environmental Management Principles

Principle	Specification	√ / X	Notes
2. (1)	The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and—		
(a)	shall apply alongside all other appropriate and relevant considerations, including the State's responsibility to respect, protect, promote and fulfil the 35 social and economic rights in Chapter 2 of the Constitution and in particular the basic needs of categories of persons disadvantaged by unfair discrimination;	√	In the process of determining the potential environmental, social and economic impacts that the proposed development may potentially have, the NEMA legislation was considered alongside other relevant legislation (see unit 4) which addresses these issues.
(b)	serve as the general framework within which environmental management and implementation plans must be formulated;	√	The proposed developments have been planned to proceed in accordance with certain facets of the Environmental Management Programme (see draft in Appendix 5) and will ensure the procession of all scheduled developments are sustainable and environmentally-friendly.
(c)	serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment;	√	All information in this report has been provided to the consultant by the applicant and serves to aid in the decision-making process of the competent authority when considering the potential authorisation of the proposed developments.
(d)	serve as principles by reference to which a conciliator appointed under this Act must make recommendations; and	√	This Basic Assessment Report aims to provide the conciliator with all the necessary information regarding the proposed development, upon which balanced and informed decisions and recommendations can be made in association with any issues concerning environmental aspects as well as issues raised by interested and affected parties.
(e)	guide the interpretation, administration and implementation of this Act, and any other law concerned with the protection or management of the environment.	√	Guide the interpretation of the regulation
(2)	Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.	√	All interested and affected parties associated with the proposed development were contacted and provided with the opportunity to raise any issues and voice any concerns regarding the developmental activities. This report considers and addresses all appropriate environmental factors and social interests which may be of concern regarding the proposed developments. See unit 5 and Appendix 2.
(3)	Development must be socially, environmentally and economically sustainable.	√	The preferred option of the developmental activities was carefully selected from a range of possible alternatives (see section 7) with the primary objective of addressing environmental, social and economic issues and achieving a balanced resolution for such issues (see mitigation measures in section 10), ultimately promoting improved sustainability.
(4) (a)	Sustainable development requires the consideration of all relevant factors including the following:		
(i)	That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;	√	The preferred actions and developmental activities discussed in this report have been carefully assessed and selected based on their reduced impact on the receiving environment, where any potential implications of the proposed

			developmental activities on the environment have been considered, and the planned implementation of managerial procedures will ensure the mitigation of any impacts. See Appendix 4 for the specialist ecological report and unit 10 for the mitigation measures.
(ii)	that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;	√	The implementation of managerial procedures during the construction process will ensure that any pollution and degradation of the environment are avoided or minimised. The construction process will proceed in accordance with the recommendations provided in the Environmental Management Programme (waste management section) and will serve to minimise the production of pollution and degradation to the environment (see Appendix 5).
(iii)	that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;	√	Each of the proposed developmental activities will proceed in an environmentally-friendly manner, where various mitigation measures and management procedures will be implemented to ensure that the developments have a minimal impact on the receiving environment and where possible, ensure that the development footprint is reduced.
(iv)	that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;	√	Any waste produced by the developmental activities will be managed and addressed in accordance with the Waste Act and the Environmental Management Programme (see Appendix 5).
(v)	that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;	√	It will be ensured that all non-renewable resources; such as fuel, electricity and water, will be utilised during the construction process in a sustainable manner.
(vi)	that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;	√	The utilisation and exploitation of renewable resources will proceed in a sustainable and environmentally-friendly manner. No natural resources from threatened and endangered environments will be exploited i.e. no protected trees will be harvested and utilised during the construction process unless the appropriate licensing has been acquired.
(vii)	that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and	√	The various options for the proposed developments have been carefully reviewed through the Environmental Impact Assessment process to determine all potential environmental risks associated with the developments. The most viable options were selected to ensure the reduction of the impact and increased sustainability of the developments.
(viii)	that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.	√	All potential impacts have been considered (see units 8 and 12), the rights of interested and affected parties have been considered and any concerns and issues raised by interested and affected parties have been addressed (see Appendix 2), and the appropriate mitigation measures for any potential issues and impacts have been recommended (see unit 10).
(b)	Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.	√	Each of the proposed developmental activities has been considered by ecological and environmental specialists with an understanding of the dynamics of ecosystem patterns and processes and recognizes the importance of ecosystem integrity and functionality.

(c)	Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.	√	This has been achieved through the public participation process being open and balanced. Furthermore, the practicality and sustainability of any decisions have been considered and assessed for potential impacts that they may have, both directly and indirectly, on interested and affected parties in the future.
(d)	Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.	√	Due to the locality and scale of the proposed activities, it is regarded to be of low impact and has no potential to negatively impact surrounding communities.
(e)	Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.	√	Ensuring that the construction process proceeds under the approved Environmental Management Programme will ensure that this principle is achieved.
(f)	The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured.	√	All neighbouring landowners and other interested and affected parties have been identified and contacted and the proposed activities have been advertised accordingly (see unit 5 and Appendix 2). As independent consultants, we are receptive to any comments regarding issues of concern to interested and affected parties until the final report is issued (a period of approximately 4 months).
(g)	Decisions must take into account the interests, needs and values of all interested and affected parties, and this includes recognising all forms of knowledge, including traditional and ordinary knowledge.	√	All comments have been noted and any issues and concerns raised by interested and affected parties have been considered and addressed (Appendix 2).
(h)	Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.	√	Due to the localised footprint and small scale of the project, it is difficult to satisfy this principle in the broader sense; however, construction personnel will be provided with environmental guidelines to follow during the construction process. The construction process will also proceed under the guidance and recommendations of an environmental control officer in order to ensure that any activities are correctly undertaken with minimal impact.
(i)	The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.	√	All provided in this report.
(j)	The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.	√	The rights of workers and others are not infringed on in any way through this assessment.
(k)	Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.	√	This report attempts to provide all the relevant information in order to achieve transparent and open decision-making.
(l)	There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.		Not applicable
(m)	Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.		Not applicable
(n)	Global and international responsibilities relating to the environment must be discharged in the national interest.		Not applicable
(o)	The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.		Sustainability of low-impact wildlife tourism is an important component of achieving this principle.

(p)	The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.		This has been accepted and guides the mitigation measures to a large extent (see unit 10).
(q)	The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.		No group are excluded in this application.
(r)	Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.		The proximity of the proposed development to the river system is the trigger for this assessment and all potential impacts of the development on and within the riparian zone have been considered.

10 POSSIBLE AND RECOMMENDED MITIGATION MEASURES

Mitigation means 'to reduce the severity of something'. This may be by implementation of practical measures to reduce, limit or eliminate adverse impacts or enhance project benefits and protect public and individual rights.

The potential environmental concerns for the proposed development have been considered and investigated. Where appropriate, mitigation measures have been proposed. In many cases, the existing procedures are sound environmental impact prevention measures themselves, and little or no additional mitigation is necessary in many aspects.

The mitigation measures provided below cut across various potential impacts and should be considered as a suite of mitigation measures that may be implemented.

The following mitigation measures and procedures are recommended:

- Minimise the area of vegetation clearance and avoid exposing soils that are vulnerable to erosion.
- Areas susceptible to erosion must be protected by installing appropriate temporary or permanent drainage works and storm water energy dispersion structures.
- When excavating trenches, top soil and sub soils should be kept separate in order to facilitate the soils being replaced in the right order following construction. Topsoil, the upper 5-10cm of soil, often contains the appropriate quantities of humus and plant seeds to assist with rapid and efficient rehabilitation of vegetation once the construction is completed. The purchase of new topsoil or compost and seeds can be very costly, an expense which can be avoided by conserving and replacing topsoil. Importing topsoil is not the most viable option as it increases the risk of importing alien invasive plants.
- All services (water, sewage and power) can be combined in the same trench.
- All materials to be installed in a trench must be on site prior to excavating the trench in order to minimise the time period that the trench is open, thus reducing the risk of animal injury or entrapment.
- Disturbed soil and vegetation provides ideal conditions for the establishment of pioneer plant species. Many alien invasive plants are considered to be pioneer plants and can rapidly colonise and establish themselves in disturbed areas. For this reason, sound and rapid rehabilitation is necessary in order to avoid the ecological impacts caused by alien plant species. Rehabilitation must be promoted and any alien plants must be physically removed or eradicated.
- Implement appropriate topsoil management practices (stripping, stockpiling and reuse during rehabilitation of disturbed areas).
- All materials for building must be sourced off site from sustainable and appropriately licensed sources (sand, stone etc.) and must be free from contaminants.

- Areas which have been disturbed during the construction process, including spoil dumps and stockpile areas, should be rehabilitated as soon as possible after the disturbance has ceased.
- Ensure compliance with legislation such as the Conservation of Agricultural Resources Act, Hazardous Substances Act, and the Integrated Pollution and Waste Management Act.
- Ensure the appropriate handling of hazardous substances. Any hazardous substance must be stored in bunded containers in a locked area.
- Polluted soils should be remediated. This can be done *in situ* with an appropriate hydrocarbon-destroying microbe solution.
- Ensure correct waste management. Waste sorting and recycling should be carried out where possible.
- Waste management must be undertaken such that human-wildlife conflict will be avoided.
- Ensure that the placing of concrete batching plants and vehicle servicing areas etc. are such that they avoid areas susceptible to soil and water pollution, particularly drainage lines.
- It should be kept in mind that archaeological deposits often occur below the soil surface. Should artefacts or skeletal remains be discovered during the construction of the building, the project proponent must be notified in order for an investigation and evaluation of the find(s) by a qualified archaeologist or a specialist in the related field to take place according to the National Heritage Resources Act (Act 25, 1999).
- Working hours should be kept to normal working hours from 6am to 5pm or as per the reserve or lodge regulations.
- Suitable site toilet facilities should be installed. The use of evaporative or eco-loos is suggested rather than chemical toilets. In many instances it is possible to link in to the existing sewage reticulation.
- Keep the building site orderly at all times and use screening, especially for unsightly areas such as temporary ablution facilities and storage areas.
- External lights should be positioned such that they point towards the ground and are shielded. Where possible all point light sources should be shaded and no naked lights should be visible from outside the buildings.
- Care must be taken when considering the roofing materials and colours used. The use of highly reflective surfaces must be avoided as reflected sunlight can create a visual impact and affect the 'sense of place' experience.
- If dust becomes problematic, roadways should be dampened. Following construction, these areas should be vegetated.
- Water use must be continually monitored and all water must be clean.
- Water saving measures must be implemented wherever practical.
- The increase in energy use will be mitigated by the extensive use of LED and CFL light bulbs. Any water heating and other energy uses will be made as environmentally friendly as possible.
- Where reasonably possible, power saving solutions will be sought and the building must meet the national building standards in terms of water heating and energy use.

- The recommendations provided in the specialist ecological report should be adhered to during the construction process. No protected trees or vegetation of ecological importance should be impacted on or removed.
- Protected fauna should not be impacted on during the construction process i.e. baboon spider nesting sites should be relocated to appropriate locations under the guidance of a specialist.
- The site topography and existing natural vegetation should be utilised as far as possible in order to minimise the impact of the developments.

11 SUSTAINABILITY CONSIDERATIONS

Consideration and effort is being applied to sustainability measures in the design of the various developments. These include the implementation of green building techniques, reducing the environmental footprint, minimising disturbance and applying techniques which ensure the aesthetics of the developments compliment their surroundings. Furthermore, each of the developments has been planned with a focus primarily aimed at sustainability and the importance of maintaining ecological integrity so as not to disrupt the functioning of ecosystem patterns and processes.

12 ENVIRONMENTAL IMPACT EVALUATION

An 'environmental impact' considers the environmental consequences, whether positive or negative, that a proposed development is likely to have on the receiving environment. The significance of an environmental impact depends on its extent, intensity and duration, sensitivity of the receiving environment, the degree of change, and the probability that the proposed development will impact the receiving environment.

METHOD AND CRITERIA

Based on responses to issues identified for the proposed site, and adopting the precautionary principle in cases of uncertainty, potential impacts associated with each issue were subjectively classified according to the direction of impact viz. positive, negative or neutral. Negative impacts need to be addressed by management intervention, whereas positive and neutral impacts are considered to be accounted for.

Table 2 provides a total impact score which the following developmental activities may have in association with various impact parameters which have been identified: the conversion of the existing main lodge and boma into a two-bedroom villa, expansion and conversion of the westerly-most chalet into the public area and the construction of the three additional chalets.

Table 3 provides an impact score that the development of the staff house may have in association with various impact parameters which have been identified. This impact score serves as an indication of the common impact which development of the alternatives will have within the demarcated area for the proposed staff house.

Table 4 is a site evaluation which compares the four alternative development options for the staff house. Each of the alternatives receives a rating based on various impact parameters which have been identified wherefrom the preferred site for development of the staff house can be selected.

The potential impacts are described and assessed for significance. Significance is assessed by scoring each impact on the basis of four variables: its frequency, severity, duration and its spatial implications.

On the understanding that a significant impact is one which, either in isolation or in combination with other impacts, could have a material influence on the decision making process, including the specification of mitigating measures; and is rated according to impact scores as follows:

Low (scoring less than 10)
Medium (scoring 10 – 15)
High (scoring more than 15)

The four variables with their score criteria are detailed below:

Frequency / Probability (FR)

The frequency or likelihood of activities having an impact on the environment:

1. Almost never / almost impossible.
2. Very seldom / highly unlikely.
3. Infrequent / unlikely / seldom.
4. Often / regularly / likely / possible.
5. Daily / highly likely / definitely.

Severity (SV)

The degree of change to the baseline environment in terms of reversibility of impact; sensitivity of receptor; duration of impact; controversy potential and precedent setting; threat to environmental and health standards:

1. Insignificant / non-harmful.
2. Small / potentially harmful.
3. Significant / slightly harmful.
4. Great / harmful.
5. Disastrous / extremely harmful.

Duration (DR)

The length of time over which activities will cause a change on the environment or vegetation:

1. One day to one month.
2. One month to one year.
3. One year to ten years.
4. Life of operation.
5. Post closure.

Spatial scope (SS)

The geographical coverage:

1. Activity specific.
2. Area specific.
3. Whole site.
4. Regional (neighbouring areas).
5. National.

The score is calculated for each aspect as the sum of the mitigated impacts to provide an impact value. The impact values are summed to a total score.

ASSESSMENT OF POTENTIAL IMPACTS

The results of the impact assessment are summarised in the tables below. The expansion is considered separately from the new staff house as there are no alternative sites for the expansion as it is reliant on the existing infrastructure.

Construction, expansion and conversion of all tourism accommodation and lodge-related sites

Table 2: Assessment of the potential impacts associated with tourist accommodation and lodge-related developmental activities

ISSUE	FREQUENCY		SEVERITY		DR	SS	IMPACT	SIGNIFICANCE
	Unmitigated	Mitigated	Unmitigated	Mitigated				
CONSTRUCTION- 3 CHALETS, CONVERSION- TWO-BEDROOM VILLA, EXPANSION & CONVERSION- PUBLIC AREA								
Loss of sense of place	4	2	3	2	4	3	11	Medium
Loss of habitat	5	3	4	2	5	3	13	Medium
Cumulative impact	4	3	4	3	5	3	14	Medium
Loss of ecosystem services	4	2	4	2	5	3	12	Medium
Soil loss potential	4	2	4	2	4	3	11	Medium
Light pollution	3	2	2	1	4	2	9	Low
Noise pollution	3	1	2	1	4	2	8	Low
Visual impact	4	3	3	2	4	3	12	Medium
Waste pollution	3	2	3	2	4	3	11	Medium
Risk of flooding and pollution	2	1	4	2	4	4	11	Medium
Long lasting footprint	5	4	4	3	5	2	14	Medium
TOTAL							126	

Conclusions:

From the assessment results in Table 2 it is apparent that there is a potential for the proposed developments to have an impact on the receiving environment. Implementation of the relevant mitigation measures (section 10) and the EMP (Appendix 5) will aid in ensuring that these impacts are minimised and the long-lasting effects of the developmental footprint are reduced. Impacts which may affect the experience of paying guests i.e. noise and light pollution are considerably low. With an overall impact score of 126, the proposed developmental activities are considered to be of medium to low impact.

Staff House

Table 3: Assessment of the common potential impact which development of the alternatives will have within the demarcated area for the proposed staff house

ISSUE	FREQUENCY		SEVERITY		DR	SS	IMPACT	SIGNIFICANCE
	Unmitigated	Mitigated	Unmitigated	Mitigated				
IMPACT WITHIN DEMARCATED AREA FOR DEVELOPMENT OF STAFF HOUSE								
Loss of sense of place	3	1	2	1	5	2	9	Low
Loss of habitat	3	1	3	2	5	2	10	Medium
Cumulative impact	3	2	3	2	5	2	11	Medium
Loss of ecosystem services	3	1	3	2	5	2	10	Medium
Soil loss potential	3	1	3	2	5	2	10	Medium
Light pollution	2	1	2	1	4	2	8	Low
Noise pollution	2	1	2	1	4	2	8	Low
Visual impact	2	1	2	2	4	2	9	Low
Waste pollution	3	2	3	2	4	3	11	Medium
Risk of flooding and pollution	2	1	2	1	4	2	8	Low
Long lasting footprint	3	2	3	2	4	3	11	Medium
TOTAL							105	

Conclusions:

With a total impact score of 105, the proposed staff house is considered to be within the lower spectrum of a medium impact rating. This can be largely accredited to its small size and the fact that construction is scheduled to occur within the existing development footprint of the camp. The implementation of the relevant mitigation measures provided in section 10 and carried through to the EMP (Appendix 5) will ensure that the impact of the proposed developmental activities are minimised.

The decision on the preferred option from the range of alternatives for the developmental of the staff house was made based on the site evaluation in Table 4 below.

Table 4: Site evaluation for the impact of each of the staff house alternatives

ISSUE	ALTERNATIVE STAFF HOUSES			
	1	2	3	4
Impact on protected trees (Note 1 & 2)				
<i>Frequency occurrence of protected trees (A)</i>	0	0	1	0
<i>Distance to protected trees in metres (a)</i>	0	0	9.60	0
Total impact	0	0	10.4	0
Presence of larger indigenous trees (>3m) (Note 3)				
<i>Frequency occurrence of larger trees (B)</i>	1	0	0	1
<i>Distance to larger trees in metres (b)</i>	9.30	0	0	4.40
Total impact	10.8	0	0	22.7
Trenching required (in metres) Total impact	18	54	56	18
Noise and aesthetic impact to guests (distance to guest rooms in meters) (C) (Note 4)	163	124	91	133
Total impact	61	80	109	75
TOTAL IMPACT SCORE	79.8	134	165	120.1

Note: 1. the frequency occurrence of trees, both for protected and large indigenous species, accounts for those trees within a 10m radius from the center of each proposed alternative developmental site. A radius of 10m gives an appropriate circular area within which a house of any shape of 300m² can be developed and includes a buffer zone that may be impacted on during the construction process.

2. Total potential impact on protected trees = $A/a \times 100$
 where: protected trees occur within a 10m radius from the centre of the developmental site; and
 should the frequency occurrence be greater than 1, the total potential impact will equal the summation of the individual calculations i.e. $((A_1 / a_1) \times 100) + ((A_2 / a_2) \times 100) + \dots$

3. Total potential impact on larger indigenous trees = $B/b \times 100$
 where: larger indigenous trees occur within a 10m radius from the centre of the developmental site; and
 should the frequency occurrence be greater than 1, the total potential impact will equal the summation of the individual calculations i.e. $((B_1 / b_1) \times 100) + ((B_2 / b_2) \times 100) + \dots$

4. Total noise and aesthetic impact to guests = $1/C \times 10000$
 Where C = the distance of the alternative development sites to the nearest guest rooms
 Adjustment of the scores in this way is so that the closest developmental site will have a greater noise and aesthetic impact to guests. Additionally, multiplying the values by 10000 allows for a more evenly quantifiable spread of impact figures.

Summation of all the impact values for each of the parameters reveals a total impact score for each of the alternatives for the staff house. Based on this impact summary, we recommend that alternative 1 is the preferred developmental option as it possesses the lowest impact score. It is a sufficient distance from guest accommodation and so will have a reduced aesthetic, noise and light impact, if any at all. Furthermore, the potential to impact protected trees during the construction process is minimal as there are none in close proximity to the developmental site. The large *Acacia nigrescens* can be utilised for shade and cover for the proposed staff house and should not be impacted upon.

13 SPECIALIST RECOMMENDATIONS

All recommendations provided in the attached specialist ecological report (Appendix 4) should be adhered to at all times during the process of construction.

The implementation of the mitigation measures (section 10) along with the Environmental Management Programme (Appendix 5), both during the process of construction and during operation of the various facilities, will ensure a reduced footprint and minimal impact to the receiving environment.

We recommend that the proposed staff house be constructed at alternative site 1 for the reasons supplied in section 12 of this report.

When deciding on the precise locations for the development of the three additional chalets, the potential risks of damage caused by flooding events should be considered to ensure they are constructed a sufficient distance from the river. Furthermore, should any development occur within 32m of the river, the following NEMA legislation will be triggered: GNR 546- Activity 16 (iii) (a)(ii)(aa) *“The construction of buildings with a footprint exceeding 10 square metres in size where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line in Mpumalanga: outside urban areas, in: a protected area identified in terms of NEMPAA, excluding conservancies.”*

The most viable options for each development are those which have been proposed in this report as they have been generated under consideration of the surrounding environment, where the importance of ecosystem functionality and the practise of sustainable developmental has been the primary focus. In some cases it will be impossible to entirely avoid an impact at the respective sites; however, the implementation of mitigation measures, appropriate building designs and construction procedures will ensure that a large extent of the impact will be mitigated. The vegetation type, although in a protected area, is not locally threatened and no irreplaceable habitat will be damaged during the construction process of the proposed developmental activities.

The practise of sustainability does not only apply to an ecological and environmental context but also to an economic and social context. The proposed activities above are the preferred options

which aim to optimise the financial feasibility and minimise the environmental footprint of the developments.

14 ENVIRONMENTAL MANAGEMENT PROGRAMME

The recommendations provided in the Environmental Management Programme (Appendix 5) should be applied during the process of construction as well as post-construction so as to manage and mitigate any potential impacts caused by the proposed developmental activities.

15 ASSUMPTIONS AND LIMITATIONS

This Basic Assessment Report has been prepared on the strengths of the information available, from our field surveys, specialist reports and other information provided by the applicant at the time of the assessment. The assessment was conducted as a desktop and field survey. Topographical and ecological maps were utilised. The assumptions made and constraints that were prevalent did not have any significant restrictive or negative implications on the study.

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

- The information provided by the client is accurate;
- The scope of this investigation is limited to assessing the environmental impacts associated with the construction of the proposed infrastructure.
- Should the project be authorised, the applicant will affect any layout changes, recommendations and mitigation measures outlined in this assessment and the authorisation provided into the detailed design and construction contract specifications of the proposed project.

16 EAP RECOMMENDATIONS

Based on the information that has been provided by the applicant and site inspections undertaken by ecological and environmental specialists, it was assessed that the proposed developments will have a small impact on the receiving environment. The application and implementation of the comprehensive Environmental Management Programme along with the mitigation measures will ensure that the proposed developmental activities proceed in an environmentally-friendly and low-impact manner.

Based on the assessment and information gathered, the EAP recommends that the various activities are authorised on the preferred sites.

PREFERRED ALTERNATIVES

All of the proposed developmental activities associated with the upgrading and expansion of Lion Sands Ivory Lodge are the preferred activities.

Alternative 1 is the preferred site for development of the staff house.

NO-GO ALTERNATIVE

The no-go alternative would be to not proceed with the proposed developmental activities. There is no requirement to recommend the no-go option as the proposed developments will fulfil the needs and requirements which have been identified by the relevant parties concerned at the Lion Sands Ivory Lodge. Furthermore, the assessed impacts are low and potential impacts may be mitigated.

ADDITIONAL MITIGATION MEASURES

The environmental management programme (EMPr) should form part of the contract between the construction company and the client. This will ensure adherence to the EMPr both during the process of construction and when construction has been completed.

An Environmental Control Officer (ECO) should be appointed for the various construction activities, on a separate project basis. This will assist the contractor overcoming any unforeseen issues at the time of construction as well as provide a level of assurance and oversight to stakeholders that the site is being well managed.

ECO involvement in the various projects is recommended as follows:

- The Ivory lodge developments should have a minimum of monthly audits.
- The staff house should have a minimum an initial audit and contractor initiation and a final audit on completion.

17 CONCLUSION

Based on the information contained in this report, it is the view of the environmental assessment practitioner that the construction of the proposed developments may be undertaken at the preferred sites, given that the Environmental Management Programme and all mitigation measures are adhered to during the construction process.



Topographic map 2431 DC



Source: Google Earth



Source: Google Earth

CORRESPONDENCE WITH LOCAL MUNICIPALITY AND NEIGHBOURS

The various authorities and neighbours were contacted via e-mail on 14 April 2014, with information of the proposed development.

Correspondence is included in the following pages. No comments has been received to date

Identified Interested and Affected Parties:

Contact person	Title	Connection / interest
Graham Kennedy	Singita General Manager	Neighbour West
General Manager	Mala Mala	Neighbour East
Bruce Watson	Marthly	Neighbour North
Edwin Pierce / Dave Powrie	Ecologist/ warden	Sabi Sand Game Reserve
Sampie Shabangu	Control Biodiversity Officer	Department of Water Affairs
Thomas Gyedu-Ababio	Chief Operations Officer	Inkomati Catchment Mgmt Agency
Tracy-Lee Ann Petersen	Tracy-Lee Petersen	Kruger National Park
Frans Kriege	Frans Krige	Mpu Tourism and Parks Agency
Municipal Manager	Municipal Manager	Bushbuck Ridge LM

The environmental assessment process was advertised in the Lowvelder Local Newspaper on 14 March 2014.

A Site Notice was erected at the Shaws Gate on 11 March 2014.



Photo: Site notice at Shaws Gate

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THE CONSTRUCTION OF A <12 BED LODGE AND ADDITIONAL STAFF HOUSING, WITHIN THE LION SANDS PRIVATE GAME RESERVE, SABI SAND NATURE RESERVE MDEDET Ref. No. 17/2/3/E-257.

Description of proposed activities: Lion Sands wishes to make various improvements and expansions to their existing camp on the remainder portion of the farm Kingstown 380KU. These activities are listed under GNR 546 of 18 June 2010 as requiring environmental authorisation.

Name of Proponent: Lion Sands Private Game Reserve
 P O Box 488, Skukuza, 1350.
 Name of Consultant: EMROSS Consulting (Pty)Ltd,
 P O Box 507, White River, 1240
 Tel: 013 750 2782 or Fax: 086 6754 320
 e-mail: andrew@emross.co.za
 Contact person: Andrew Rossaak @ 082 3399 627

The date of publication of this advertisement is the 11th of March 2014. In order to ensure that you are identified as an interested and/or affected party, please submit your name, contact information and interest in the matter to the contact person given above within 30 days of publication of this advertisement.



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**VARIOUS CONSTRUCTION AT LION SANDS,
SABI SAND GAME RESERVE
MDEDET Ref. No. 17/2/3/E-257**

Description of proposed activity: Lion Sands wishes to construct a 8 bed lodge, and additional staff accommodation, all within or close by the existing Lion Sands Camp. The camp is located within the Sabi Sand Game Reserve, on the farm Kingstown 380KU, Bushbuckridge Local Municipality, Mpumalanga Province.

Name of Proponent: Lion Sands Private Game Reserve
PO Box 488, Skukuza, 1350

Name of Consultant: Emross Consulting (Pty)Ltd
PO Box 507, White River, 1240
Tel: 013-750-2782 or e-mail: andrew@emross.co.za

Contact person: Andrew Rossaak @ 082-339-9627

The **date of publication** of this advertisement is Friday 14 March 2014. In order to ensure that you are identified as an interested and/or affected party, if you so wish, please submit your name, contact information and interest in the above mentioned project to the contact person given above **within 30 days of publication of this advertisement.**

AC5258

Photo: Advertisement of the proposed activity in the Lowveld

45, Nelspruit, 1200, ingedien of gerig word.
 Adres van eienaar: p/a PV&E Town Planners, Posbus 413003, Craighall, 2024.
 Tel: 012-244-3870
 Faks: 012-244-3111
 E-pos: regandsandra@telkomsa.net
 Datum van eerste publikasie: 14 Maart 2014.
 AC005262



GEDEELTE 93 (GEDEELTE VAN GEDEELTE 25) VAN DIE FLAAS CAIRN 306 JT
 K: Kennis Maatskappij van Omliggende Eienskerpe
 Omliggende Eienskerpe gemagtigde agent van die hieronder genoemde eiendom, gee hiermee kennis in terme van Ordinaris op Dorpsbeplanning en Dorpe vir 'n dorpsontwikkeling, Cairn Dorp, geleë op Gedeele 92 (Gedeele van Gedeele 25) van die plaas Cairn 306 JT en Gedeele 93 (Gedeele van Gedeele 25) van die plaas Cairn 306 JT.
 Die voorgestelde dorp is

Gedeeltes 7, 9 en 10 (gedeeltes van Gedeele 2) van die plaas Blyvoortzicht 383
 JY Mpumalanga Provinsie, gee hiermee kennis ingevolge artikel 56(1)(b)(i) van die Ordinaris op Dorpsbeplanning en Dorpe, 1986 dat ons by die Emakhazeni Plaaslike Munisipaliteit aansoek gedoen het vir die wysiging van die Emakhazeni Grondgebruikskema, 2010, deur die hersoneering van die benoemde eiendomme, geleë suid van die N4 (tussen Bellfast

otherwise stated) in the estates specified below will be open for inspection of all persons interested therein for a period of 21 days (or shorter or longer if specially stated) from the date specified or from the date of publication hereof, whichever may be later, and at the offices of the Masters and Magistrates as stated.
 Should no objections thereto be lodged with the Masters concerned during the specified period, the executors will

NOTICE
NOTICE TO CREDITORS IN DECEASED ESTATE
 All persons having claims against the under-mentioned estate must lodge it with the Executor concerned within 30 days (or as indicated) from date of publication hereof.
 Estate No. 11152/2013
 Surname: Mokoena
 First Names: Freddy Boy
 Date of birth: 1963-01-16
 ID: 6301165461084
 Last address: Stand 43, Phola Trust.
 Date of death: 2013-07-12
 Name of Executor or Authorised Agent: Lunga Irvin Mokoena
 Address: Stand 43, Phola Trust
 Advertiser Name: NTULI NOBLE INC
 Address: 35 Hendrik Potgieter Street, Nelspruit, 1200
 Email: law@ntulinnoble.co.za
 Tel: 013-755-2603
 AC005144

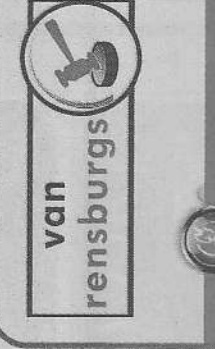
REGISTRATION AS A BUYER IS REQUIRED TO BE SUBJECT TO THE DIRECTIVE OF THE CONSUMER PROTECTION ACT 68 OF 2008 (URL http://www.info.gov.za/download/infocentre/0199961) (b) FIGA LEGISLATION - PROOF OF IDENTITY AND ADDRESS PARTICULARS (c) PAYMENT OF A REGISTRATION FEE OF R-11 ON REGISTRATION CONDITIONS OF SALE WHICH MAY BE INSPECTED AT THE OFFICE OF THE SHERIFF GRASSKOP 25 LEIBNIZ STREET, GRASSKOP DATED AT PRETORIA ON 5TH FEBRUARY 2014.
 ROBIGH WOLMARANS & LUDEROTZ
 ATTORNEY FOR THE PLAINTIFF
 BLOCK C, EQUIPMENT PARK 520 BROOKMAN ROAD SECURIDALE PRETORIA
 REFERENCE: (E307059.B1)VD.BURG(LVDW) TELEPHONE: 012-632-8990
 AC005265

to the Conditions of Sale which may be inspected at the office of the SHERIFF WHITE RIVER, during normal office hours Monday to Friday, Tel: 013-751-1452, or at the offices of the attorneys acting jointly as Creditor/Plaintiff:
 REAAN SWANEPOEL
 ATTORNEYS
 C/O PETZER DU TOIT & RAMULIFHO, CNR RICHARD & CHURCH STREETS, HATFIELD, PRETORIA
 011-431-3834 - Ref: R Swaneepoel
 SIGNED AT JOHANNESBURG ON this day of 2014.
 REAAN SWANEPOEL
 ATTORNEYS
 120 WILHELM AVENUE
 FAIRLAND, JHB 2195
 DOGEB & FLORA CLINIC
 TEL: 011-431-3834 (JHB)
 FAX: 011-431-3835 (JHB)
 REF: R SWANEPOEL (JHB)
 C/O PETZER DU TOIT & RAMULIFHO
 HATFIELD BRIDGE OFFICE
 CNR RICHARD & CHURCH STREETS
 HATFIELD PRETORIA
 AC005268



CRYSTAL SPRINGS MOUNTAIN LODGE!!
WORLD CLASS RCI AFFILIATED RESORT TO BE SOLD AS A GOING CONCERN TOGETHER WITH ADJOINING 2500 ha GAME FARM - PILGRIMS REST, MPUMALANGA

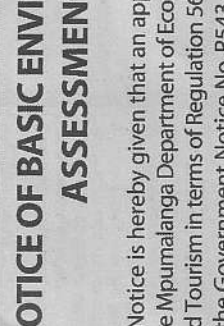
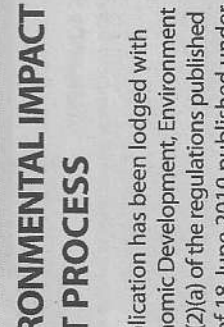
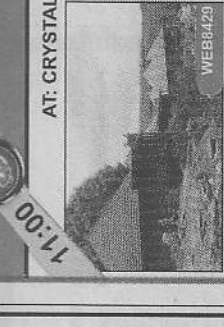
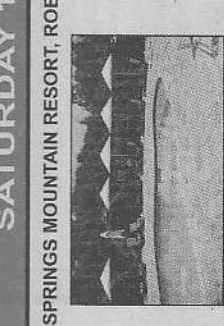
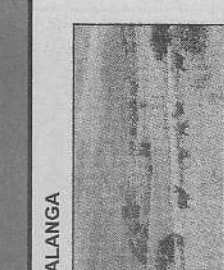
FALL OF THE HAMMER - NO RESERVE!!
SATURDAY 12 APRIL 2014



AT: CRYSTAL SPRINGS MOUNTAIN RESORT, ROBBERS PASS, PILGRIMS REST, MPUMALANGA

Lot 1 - Extent: ± 2 075 ha - Share block one
Crystal Springs Mountain Lodge:
 130 chalets/units in a variety of sizes, styles and locations. Additional 14 units currently utilized as staff accommodation. Main entrance, reception building, coffee shop, pub and restaurant, various other staff accommodation including spacious managers house. Satellite stations, laundry and workshops. Clubhouse with sauna, jacuzzi's, gym, steam room, hot-pool and beauty salon. Excellent recreational facilities such as tennis and squash courts, heated pools, games room and children's play area. Infrastructure consisting of roads, transformers, equipped boreholes, reservoirs and earth dam. Right to further development of 276 units.

Lot 2 - Extent: ± 2527 ha Mantsibi Game Ranch:
Adjacent to Lot 1
Improvements:
 2 houses comprising of 2 x 2 bedroom and 1 x 3 bedroom units each with separate bathrooms and living rooms etc.
Water:
 Large earthen dam
Game:
 Blesbuck, Blue Wildebeest, Eland, Gems buck, Giraffe, Impala, Kudu, Red Hartebeest, Tsetsebe, Waterbuck.



327101NW

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MDEDET Ref. No. 17/2/3/E-257
 Description of proposed activity: Lion Sands wishes to construct a 8 bed lodge, and additional staff accommodation, all within or close by the existing Lion Sands Camp. The camp is located within the Sabi Sand Game Reserve, on the farm Kingstown 380KU, Bushbuckridge Local Municipality, Mpumalanga Province.
Name of Proponent: Lion Sands Private Game Reserve
 PO Box 488, Skukuza, 1350
Name of Consultant: Emross Consulting (Pty)Ltd
 PO Box 507, White River, 1240
 Tel: 013-750-2782 or e-mail: andrew@emross.co.za
Contact person: Andrew Rossaak @ 082-339-9627
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Contact person: Andrew Rossaak @ 082-339-9627
 The date of publication of this advertisement is Friday 14 March 2014.
 In order to ensure that you are identified as an interested and/or affected party, if you so wish, please submit your name, contact information and interest in the above mentioned project to the contact person given above within 30 days of publication of this advertisement.

AC5255

Phone our friendly Classifieds Consultants Tel 013-754-1669 Fax 013-753-2422

10% Deposit & commission. R500 000-00 Registrations Fee. Bidders to register & supply proof of identity and residence. Regulations to Consumer Protection Act - www.vansauctions.co.za
 Rules of Auction to be viewed at 1066 Jan Shoba Street, Brooklyn, Pretoria.
 Tel 086 111 8257 | Auctioneers: Louis van Rensburg & Martin Pretorius



10% Deposit & commission. R500 000-00 Registrations Fee. Bidders to register & supply proof of identity and residence. Regulations to Consumer Protection Act - www.vansauctions.co.za
 Rules of Auction to be viewed at 1066 Jan Shoba Street, Brooklyn, Pretoria.
 Tel 086 111 8257 | Auctioneers: Louis van Rensburg & Martin Pretorius

Subject: Re: Lion Sands proposed upgrades - Notification of Application for Environmental Authorisation
From: Mr Guy More <guy.more@swaziplant.co.za>
Date: 2014/02/20 09:28 AM
To: mette@emross.co.za
CC: Matthew Alenkirk <ecologist@lionsands.com>

Hi Mette

You are correct and you may contact me anything pertaining to new buildings on the property.

I have also copied Matt in who is the WWT ecologist and will help with any issues on the ground.

Yours Sincerely,

Guy More
Tel: +268 24371344/24371188
Fax: +27 (0) 86 545 0000
Cell (SA): +27 (0) 82 936 2581
Cell (SD): + 268 7602 8366
guy.more@swaziplant.com

On 19 Feb 2014, at 6:05 AM, Mette Rossaak <mette@emross.co.za> wrote:

Dear Guy More,

Lion Sands have engaged Emross Consulting, an independent environmental services company, to undertake the required environmental impact assessment (EIA) as part of an application for environmental authorisation. The Lion Sands are proposing expansions to their staff accommodation, along with the establishment of additional tourism accommodation within their existing camp area, on the remainder portion of the farm Kingstown 380KU, in the Sabi Sand Game Reserve.

Following discussions with Robert and Andre Morgan, we understand that you are a trustee of the Warthog Wallow Trust which owns the land. In terms of the EIA regulations, we are required to notify the trust (landowner) of the proposed development and receive comment / consent.

PLEASE can I ask you to reply to this email and confirm (or correct where applicable) that you are a trustee of the Warthog Wallow Trust, that you are authorised to provide comment and consent on behalf of the trust for the proposed developments, and that this is the correct contact address for notification of The Warthog Wallow Trust (landowner).

If it is not to be yourself, please also let me have the full name and contact details of the person you wish to represent the Warthog Wallow Trust in the public participation process. As the trust is automatically an interested and affected party, we will keep you informed of the progress, reports and outcomes.

If you have any questions - or if we can be of any service, please feel free to contact myself or Andrew at the numbers below.

Thank you and kind regards

--

Mette Rossaak
Certified Environmental Assessment Practitioner
<graphics1.bmp>
Emross Consulting (Pty) Ltd.
Tel 013 750 2782 / 013 007 0077
Cell 082 3399 627
Fax 086 675 4320

Subject: Lion Sands - Application for Environmental Approval

From: Mette Rossaak <mette@emross.co.za>

Date: 2014/04/14 07:08 PM

To: undisclosed-recipients;

BCC: Frans Kriege <franskriegt@telkomsa.net>, Tracy-Lee Petersen <TracyP@sanparks.org>, Edwin Pierce <ecologist@sabisand.co.za>, warden@sabisand.co.za, shabangud@bushbuckridge.gov.za, "Shabangu Sampie Howard (NSP)" <ShabanguS2@dwa.gov.za>, Thomas Gyedu-Ababio <thomasga@inkomaticma.co.za>, Rod Wyndham <bushmanager@sabisabi.com>, Hilton Loon <hloon@sabisabi.com>, kirkmanslodgemanager@andbeyond.com, Andre at MORE <andre@morehotels.co.za>, robert@morehotels.co.za

Dear Sir/ Madam,

You may be aware that Lion Sands Private Game reserve are planning to undertake improvements and developments within their camp, in the Sabi Sand Game Reserve.

Emross Consulting has been appointed as independent environmental consultants to apply for environmental authorisation for these activities and in that connection investigate the potential environmental risks in connection with the construction and to propose mitigation measures where possible.

An important part of this process is the participation of interested and potentially affected parties. You have been identified as an interested and affected party as your property is neighbouring to Lion Sands, or because you represent an authority with jurisdiction, and as such we would value any comments you may have.

I have attached, for your information, a background document that outlines the proposals for the developments. We have identified some studies that need to be undertaken in the evaluation of the various proposed sites, and the information provided is what we have at present.

If you wish to comment, you can use the online form on the downloads page of our website (www.emross.co.za) or simply reply to this email. All comments will be noted and included in the report.

We are available to meet with you, or your representative in the Sabi Sand, to discuss the proposals, and hear and document your concerns or comments. Please let us know if you wish to have a face-to-face meeting so that we can make an appointment with you.

If you have no comments or concerns at this stage, that is fine (and common) – please just let us know. You will still have an opportunity to view the draft and the final report prior to submission to the authorities (likely to be complete in 3 to 4 months time).

Should you **not** wish to receive further correspondence regarding these assessments, please inform us to that effect by replying to this email.

If you have any questions, please feel free to contact me.

Many thanks for your time, and kind regards

--

Mette Rossaak
Certified Environmental Assessment Practitioner



Emross Consulting (Pty) Ltd.

Tel 013 750 2782 / 013 007 0077

Cell 082 3399 627

Fax 086 675 4320

— Attachments: —

BID Lion Sands #3.pdf

1.6 MB



BACK GROUND INFORMATION DOCUMENT

April 2014.

PROJECT:

Basic Environmental Assessment
for the Construction of a lodge and
additional staff accommodation,
Lion Sands, Sabi Sand Game
Reserve

CONSULTANT:

EMROSS Consulting
P.O. Box 507
White River
1240
Phone: 013 750 2782
Cell: 082 3399 627
Fax: 086 675 4320
Email: andrew@emross.co.za

APPLICANT:

Lion Sands Private Game Reserve
Contact: Andre Morgan
Postal address: PO Box 488
Skukuza
1350
Phone: 013 735 5000
Fax: 013 735 5330
Email: andre@morehotels.co.za

PROPERTY:

The farm Kingstown 380KU

Ref. No: 17/2/3/E-257



1 INTRODUCTION

As part of a an upgrade and continual improvement program, Lion Sands Private Game Reserve (the applicant) has contracted Emross Consulting, as independent environmental consultants, to undertake the required actions to apply for environmental authorisation from the Mpumalanga Provincial Government Department of Economic Development, Environment and Tourism (MDEDET, the decision-making authority) for a proposed new lodge developments within the Lion Sands Camp in the Sabi Sands Game Reserve.

Government notices no. R 544-546 stipulates activities which require authorisation, in terms of the National Environmental Management Act (Act 107 of 1998). Government notice 543 prescribes the manner in which the assessment must be undertaken.

2 PROPOSED DEVELOPMENT

Lion Sands currently consists of three luxury lodges situated close together along the Kruger Park boundary. The planning of these camps have put them all in relatively close proximity to one another and has thus negated the necessity for a number of staff camps and has allowed service and management structures to be combined and located centrally. The footprint of the operation has therefore been contained to the minimum while ensuring the ability to provide guests with a world class product. The new developments listed below have been planned with this ethos of a limited environmental footprint in mind.

In terms of GNR 546 activity 18: "*The expansion of lodge facilities where the development footprint will be expanded*" requires environmental authorisation in protected areas. Other activities requiring authorisation may also be applicable. This is explained in section 3 below.

2.1 Additional Lodge – 8 sleeper

The proposed development is in essence an extension of the existing Lion Sands River Lodge complex. There are two proposed sites for the new lodge (*Figure 1*). The preferred site is an un-impacted area to the west of the existing lodge, following the river bank (*Figure 2*). The alternative site would involve the demolition of some staff housing and to construct the units on the exiting footprint and extending it across a small drainage line (involving a walkway across this drainage line to connect the accommodation units) (*Figure 3*).

2.2 Senior Management Staff houses

With the potential demolition of the senior management houses on the alternative site of the proposed lodge development, it is proposed to construct additional senior staff accommodation units of 80-100m². It is proposed that these units are located near the existing senior staff accommodation (*Figure 4*).



Figure 1: Satellite image indicating the location of the various proposed activities.



Figure 2: Satellite image indicating the preferred site for Lodge Expansion.



Figure 3: Satellite image indicating the alternative site for Lodge Expansion.



Figure 4: Satellite Image indicating location of the proposed Senior Staff Accommodation.

3 LEGISLATIVE CONTEXT

In terms of the National Environmental Management Act (NEMA), the activities proposed are regarded as listed activities under schedule of activities as follows:

GN R 546, activity # 18(a)ii(aa); *“The expansion of a resort, lodge and tourism or hospitality facilities where the development footprint will be expanded”*.

GN R 546, activity 5(a); *“The construction of resorts, lodges or other tourism accommodation facilities that sleep less than 15 people”*.

GN R 546, activity 16(iv)(a)iii(aa) *“The construction of buildings with a footprint exceeding 10m² in size; where such construction occurs within 32m of a watercourse....”*.

GN R 546, activity 16(iv)(a)iv(aa) *“The construction of infrastructure covering 10m² or more; where such construction occurs within 32m of a watercourse....”*.

This means that the proposed development requires a Basic Environmental Assessment to be conducted in order to obtain environmental authorisation.

The proposed developments may also be subject to regulations contained in other legislation, such as the:

- National Heritage Resources Act (No 25 of 1999, Section 38);
- Conservation of Agricultural Resources Act (No 43 of 1983);
- National Water Act (No 36 of 1998);
- National Environmental Management Act (No 107 of 1998);
- Constitution of the Republic of South Africa (Act 108 of 1996);
- Promotion of Access to Information Act (No 2 of 2000); and
- Mpumalanga Nature Conservation Act (No 10 of 1989).

4 THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The legislation calls for a basic assessment to establish potential environmental and social impacts of the proposed developments. The assessment will look at avoiding or minimising potential environmental damage and promote sustainable development.

The assessment process commences with a planning stage. During this stage;

- An application is lodged with the decision making authority, in this case the Mpumalanga Department of Economic Development, Environment and Tourism.
- Site visits by specialists may be required if deemed necessary to assess the site and potential impacts that could be caused by the proposed development, and
- Potential interested and affected parties to the development are identified.

The planning stage is followed by a participation stage. During this stage;

- A site visit is conducted with the decision making authority, and
- Notices and advertisements are publicised and identified interested and affected parties are consulted.

Then there is a reporting stage, during which:

- Property information and public comment along with, various assessments and specialist inputs are incorporated into a report, assessing the proposed development in context of the site.

The final stage is again Public Participation:

- The compiled report is made available for comment and finally submitted with comments to the lead authority for decision making.

Please refer to the appended flow diagram and time frames for a Basic Assessment.

5 PUBLIC PARTICIPATION PROCESS

According to the Constitution of the Republic of South Africa everybody has the right to have the environment protected, amongst others through sustainable development. Everybody also have the right to be informed and to access information.

Therefore a very important part of the Environmental Impact Assessment is to identify and receive comment from interested and affected parties relating to the proposed development.

This is done by contacting neighbouring landowners, by advertising the process in the Lowvelder, by erecting notices on site, and also by contacting special affected parties such as the Kruger National Park and Mpumalanga Tourism and Parks Agency.

Registered interested and affected parties have the right to comment on reports regarding the development to be submitted by the consultant to the department.

In return the registered interested and affected party is expected to:

- Submit all comments in writing to the consultant;
- Adhere to time frames given for commenting or submit a written motivation for why a longer commenting period is needed; and
- Disclose any direct business, financial, personal or other interest in the development and/or approval or refusal of the development.

6 WHO TO CONTACT

Should you wish to register as an interested and affected party to this process and should you have any special concerns that you wish to be addressed during the assessment process, please send your name and contact details and issues to be addressed to:

Emross Consulting Pty Ltd.
Andrew Rossaak
PO Box 507
White River
1240
Cell: 082 339 9627
Fax: 086 675 4320
E-mail: andrew@emross.co.za

There is also a simple registration form on our website which you may wish to use.

Website: www.emross.co.za

Notice will be published in the Lowvelder and a site notice has been erected at Shaws Gate. Interested and affected parties have **30 days to register**. We will, however, be accepting comments throughout the process. In order for issues to be fully assessed, it would be preferable to receive these at the start of the process.

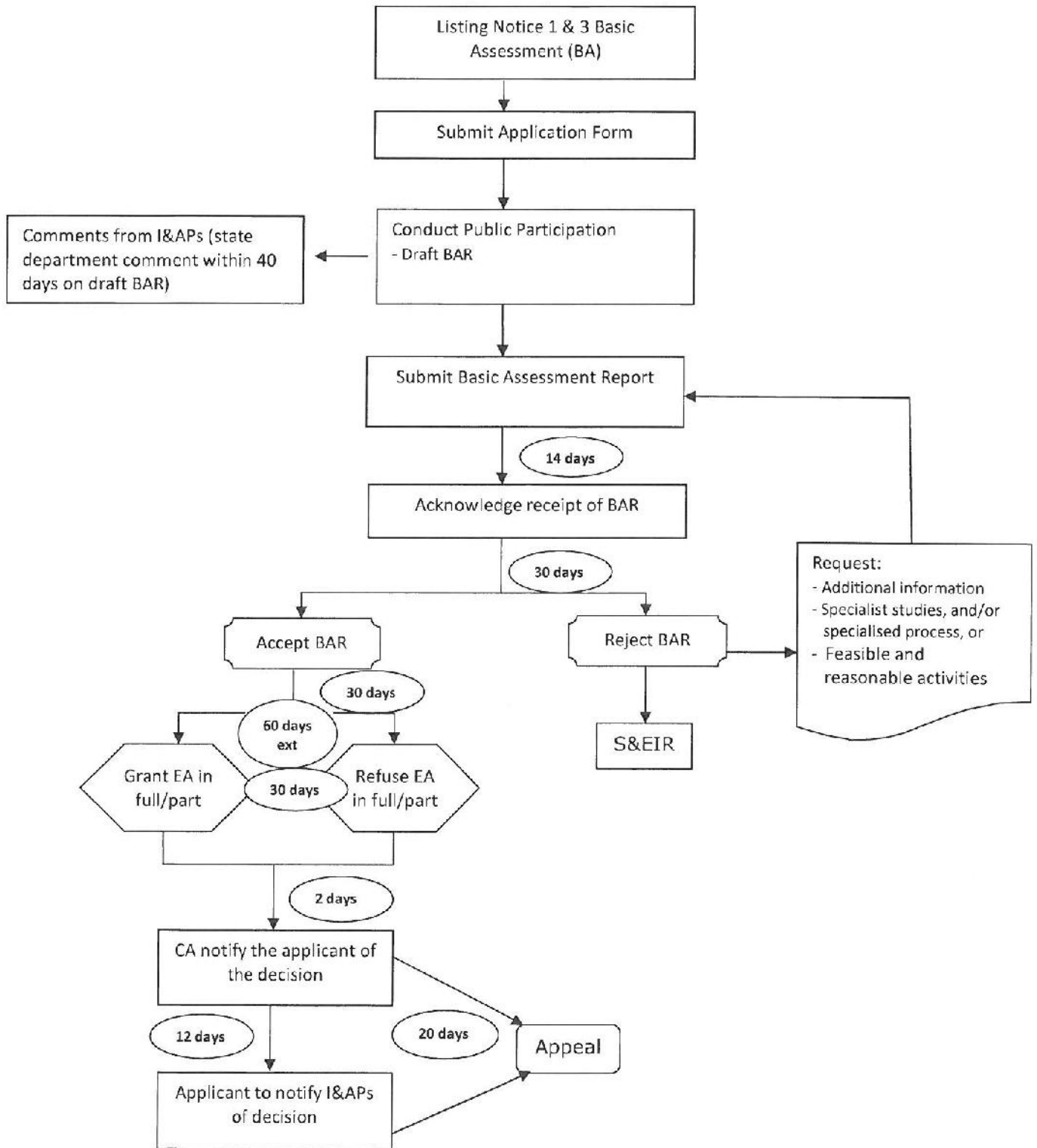
NEMA TIME FRAMES

BASIC ASSESSMENT PROCESS
Submit Application form to CA
CA acknowledges and accepts application form within 14 days
Public participation process commences, which includes providing I&AP's 30 days to register
Submit draft Basic Assessment Report (BAR) to CA
Submit draft BAR to I&AP's and State Departments & provide 40 days for comment (30 for I&AP's)
Compile final BAR after receipt of comments
Provide I&AP's and State Departments with 21 days to comment on final BAR
Submit final BAR with comments received to CA
CA acknowledges receipt of final BAR within 14 days
Within 30 days of acknowledging receipt of BAR, CA to accept or reject the report, or request additional information
Within 30 days of accepting the BAR, CA to grant or refuse authorisation
On reaching a decision, the CA must, within 2 days notify the applicant of the decision.
The applicant must, within 12 days of the date of the decision, notify I&AP's of the decision and publish a notice

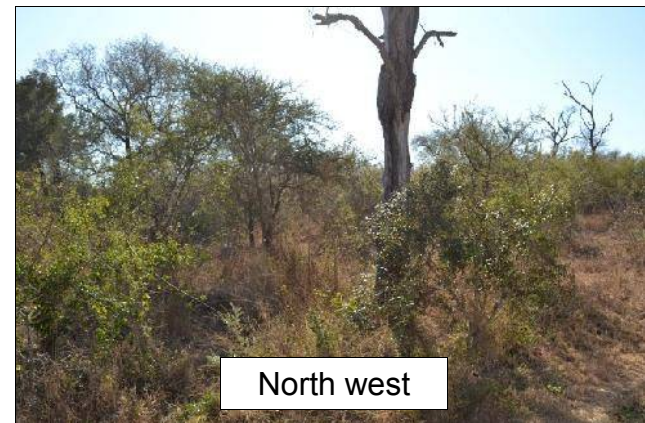
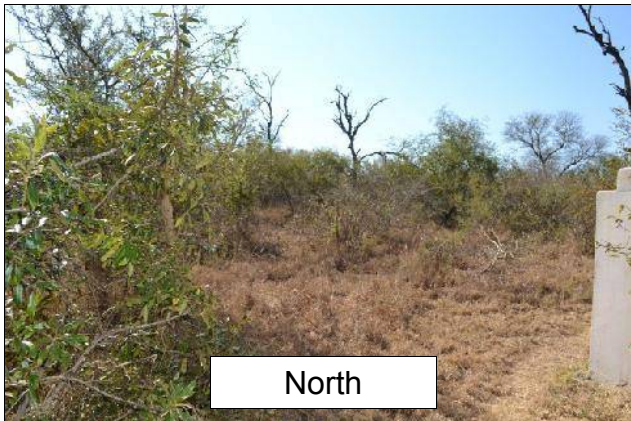
- Highlighted rows refer to compulsory minimum time frames for public participation. The time frames are legislated and cannot be reduced.
- Public participation minimum timeframe for BAR process = 91 days (3 months).
- Where reports are required to be amended, additional public review periods may be required.



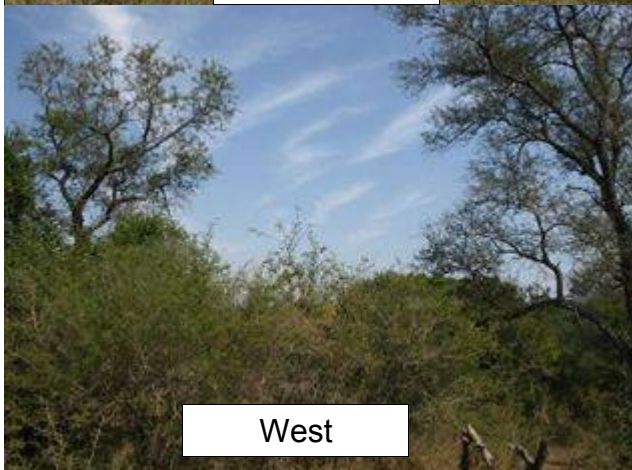
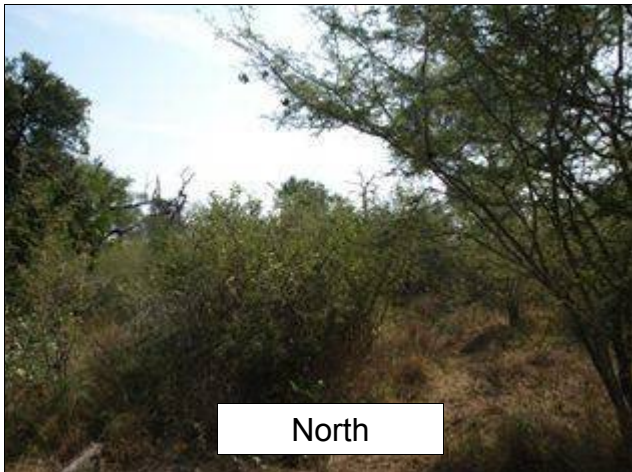
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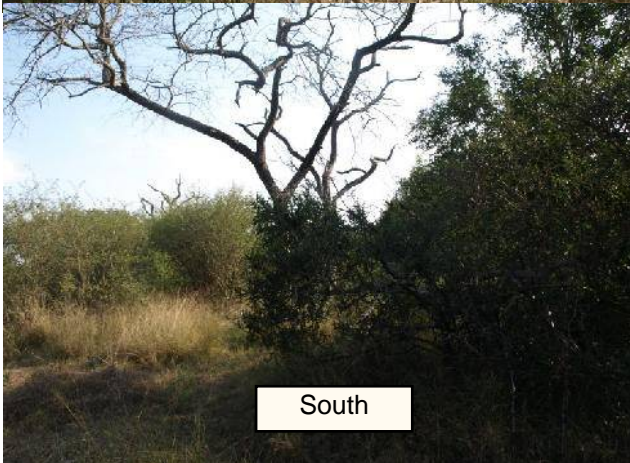
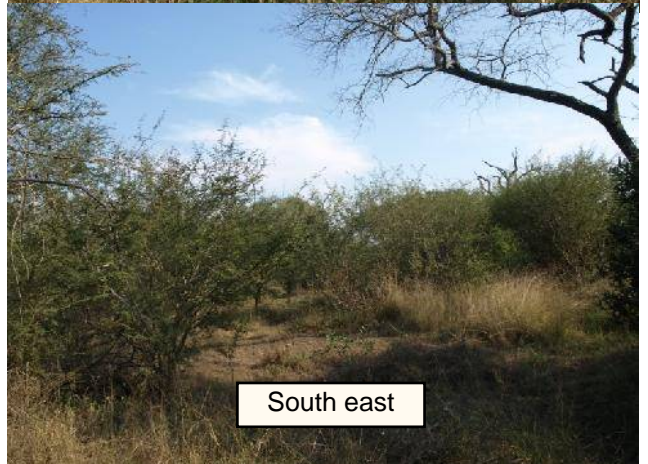
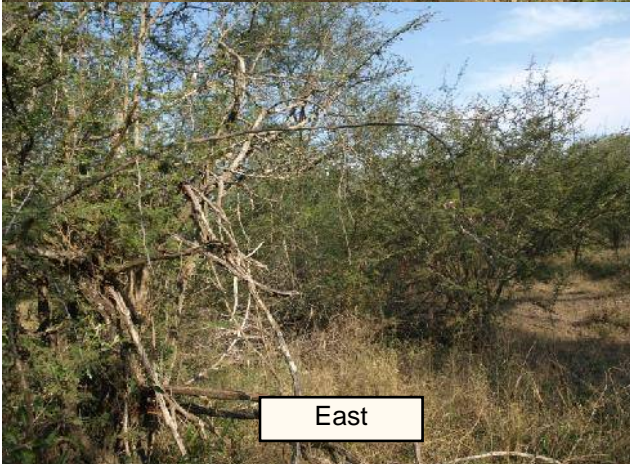
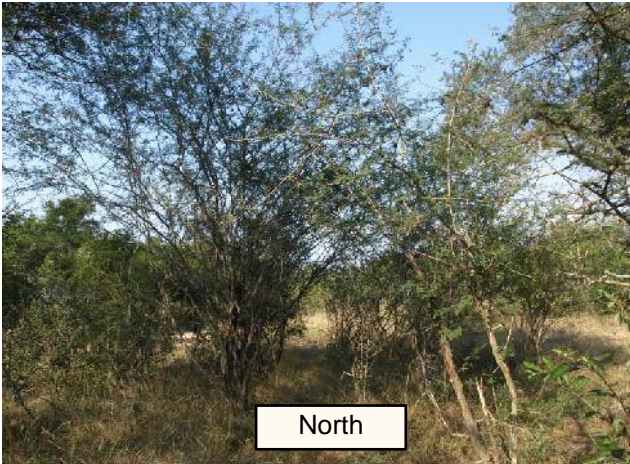
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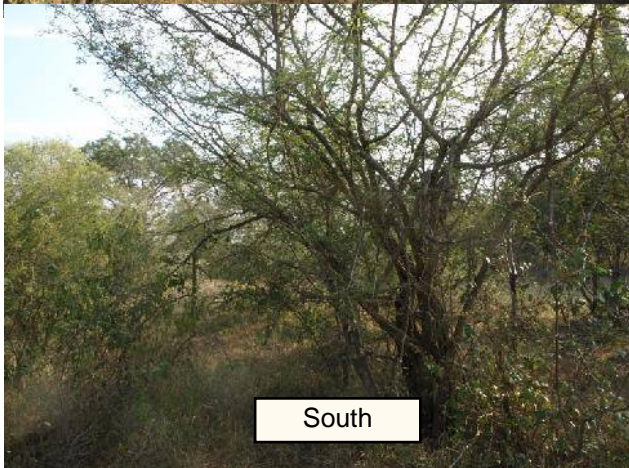
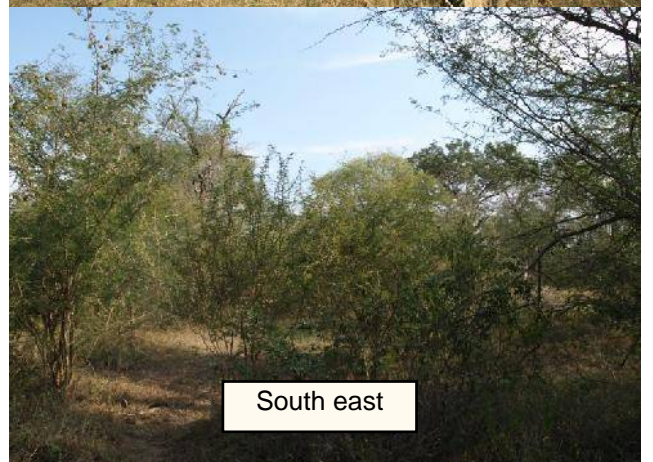
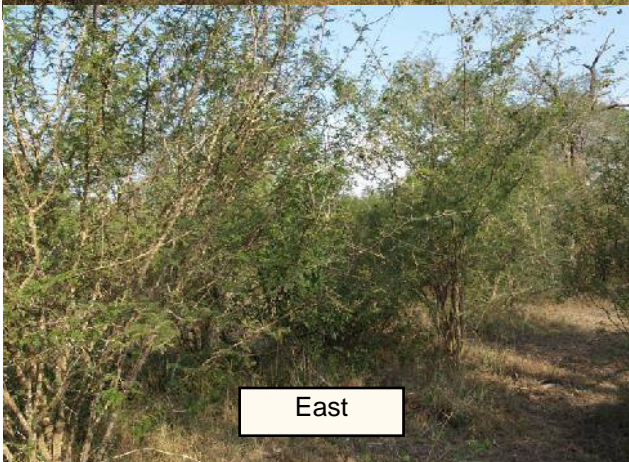
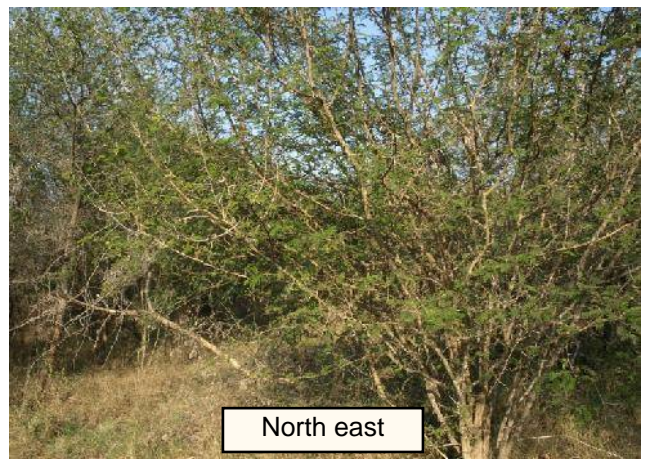
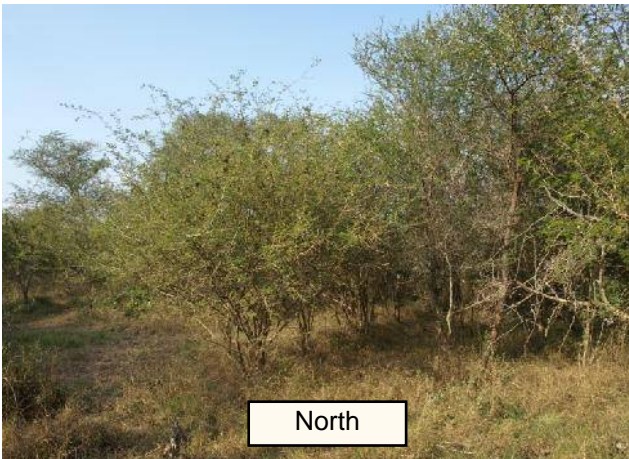
Site for Three New Chalets:



Senior management accommodation Alt 1:



Senior management accommodation Alt 2:



Senior management accommodation Alt 3:



North



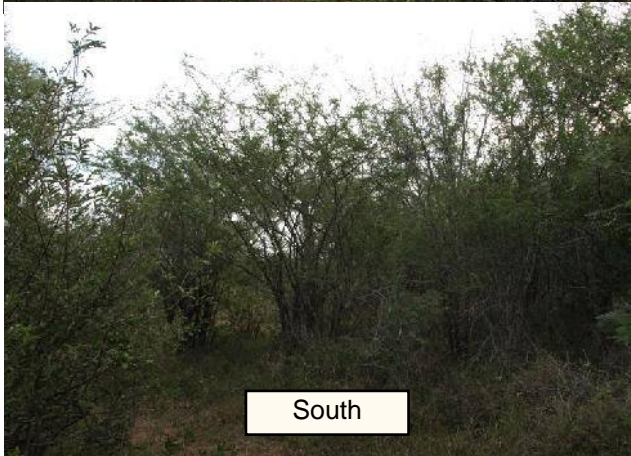
North east



East



South east



South

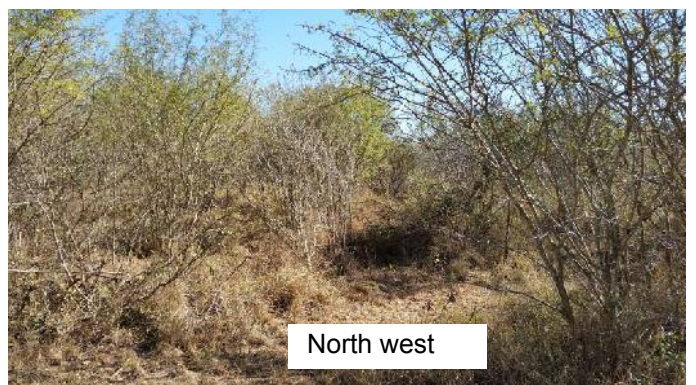
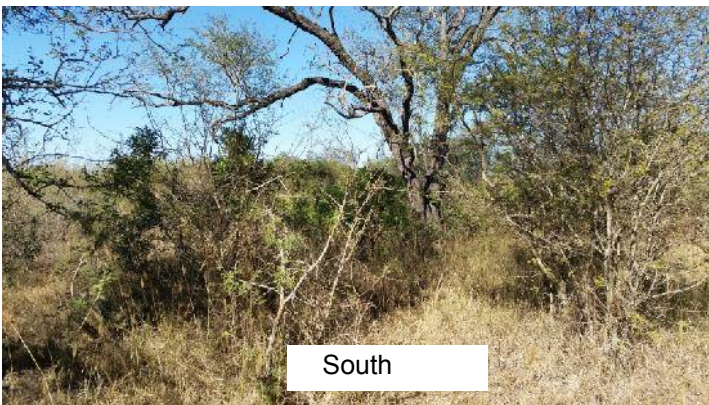
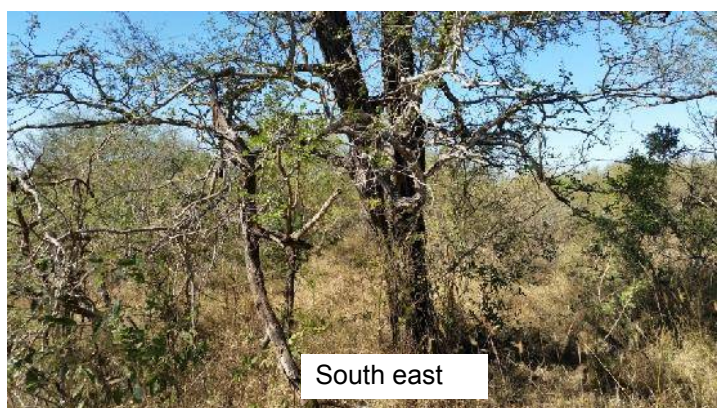
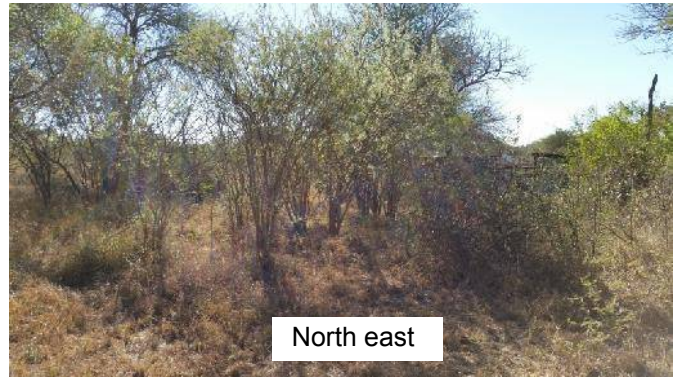
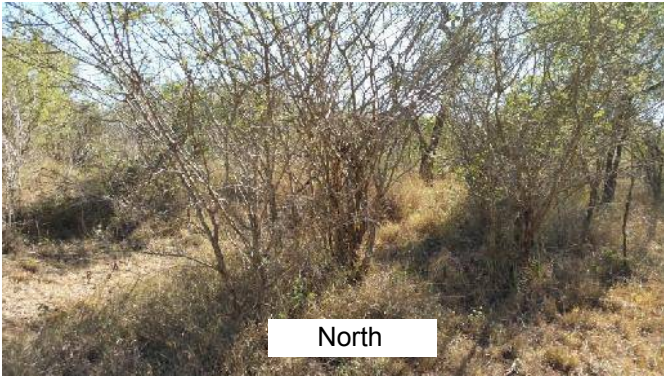


South west



West

Senior management accommodation Alt 3:



VEGETATION ASSESSMENT

VEGETATION ASSESSMENT

EXTENSIONS AND UPGRADES - LION SANDS IVORY LODGE

SABI SAND WILDTUIN

Lion Sands
SABI SAND

May 2014

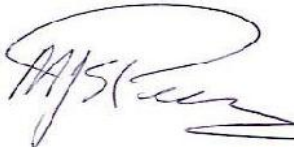
Prepared for EMROSS Consulting (Pty) Ltd.

By Dr Mike Peel and Mr Graeme Wolfaard

P.O. Box 7063, Nelspruit, 1200

Declaration of Independence

We declare that we have been appointed as independent consulting ecologists with no affiliation with or vested financial interests in the proponent, other than for work performed. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. Remuneration for our services is not linked to approval by any decision-making authority responsible for authorising this development.

A handwritten signature in black ink, appearing to read 'MJS Peel', with a large, sweeping flourish at the end.

Mike J.S. Peel

May 2014

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ACKNOWLEDGEMENTS

We thank Mette and Andrew Rossaak and Anthony Emery for their logistic support.

The team working on this project included:

Mike Peel

Graeme Wolfaard

Lucas Manaka

1. INTRODUCTION

In accordance with the Environmental Impact Assessment Regulations (GNR 543) as listed in the National Environmental Management Act, 1998 (Act no. 107 of 1998); EMROSS Consulting (Pty) Ltd. has assigned Mike Peel to conduct an ecological assessment of the vegetation occurring within the footprint of the proposed developmental activities, to occur at Lion Sands Ivory Lodge, Sabi Sand Game Reserve. Additionally, elements of ecosystem infrastructure as well as the presence of mammal, avian and invertebrate fauna were noted at each of the proposed developmental sites.

2. OBJECTIVES

The primary objective of this study is to provide recommendations for the proposed development from the perspective of a specialist ecologist. Any suggested recommendations should be considered as reflective and advisory, based on the expertise of the specialist, and should be applied in order to ensure sensible and informed decision-making. The advised recommendations are based on the potential impact which the proposed developmental activities may have on the receiving environment, as well as the potential impact which the receiving environment may have on the developments. Furthermore, the recommendations in this report are based on an expert understanding of the importance of sustainability and the preservation of biodiversity patterns and processes, effectively ensuring the promotion and maintenance of optimal ecosystem functionality, and ultimately perpetuating insurance of ecosystem services, providing benefit to any interested and affected parties on an ecological, social and economic scale.

3. TERMS OF REFERENCE

This report illustrates the findings of the assessment conducted on the terrestrial ecosystems that occur within the impact footprint of the proposed development, and includes:

- a.* A description of the vegetation communities, including the vegetation type, as well as the presence of unique or unstable/sensitive habitats along with their conservation status;
- b.* A geo-reference of all protected, endemic and/or red list species found;
- c.* A geo-reference of all tree species larger than 1.8m;
- d.* Comments on the viability and appropriateness of the proposed developmental activities at each potential site;
- e.* A tabulated list of all plants and mammals potentially occurring at the sites within this particular habitat or vegetation type.

4. STUDY AREA

a. Study sites

The study area is situated at the Lion Sands Ivory Lodge, on the remainder portion of the farm Kingstown 380KU, within the Sabi Sand Game Reserve. There are a number of developmental activities which are proposed to occur at various sites. The first is the modification or upgrading of the existing main lodge and boma (24°58'25.17"S 31°31'49.87"E) into a two-bedroom villa (Figure 1). The second activity involves the modification or upgrading of the existing westerly-most chalet into a public area. The third activity entails the construction of three additional chalets, which will be identical or very similar to the existing six chalets. The final activity involves the development of new staff housing, where four separate houses will be constructed (24°58'19.20"S 31°31'42.00"E). The reception area (24°58'24.70"S 31°31'45.72"E) will be modified into a gym and spa, an activity which is not expected to have an impact on the surrounding environment as this process entails solely the internal refurbishments of the existing infrastructure.

Cardinal photographs of each of the proposed potential developmental sites are provided in Appendix A.



Figure 1: Location of the developmental activities proposed to occur at the Lion Sands Ivory Lodge (Source: Google Earth 2014).

b. Background information: Vegetation occurring in the study area

The study area occupies a section of the northern bank of the Sabie River in a region of the Lowveld, which forms part of the Savanna Biome (Figure 2) and is characterized by plant assemblages that are associated with the Granite Lowveld (SVI3) vegetation type (Mucina and Rutherford 2006). The conservation status of this vegetation type is listed as vulnerable, with more than 20% having been transformed up to date as a result of agricultural practises and development (Mucina and Rutherford 2006).

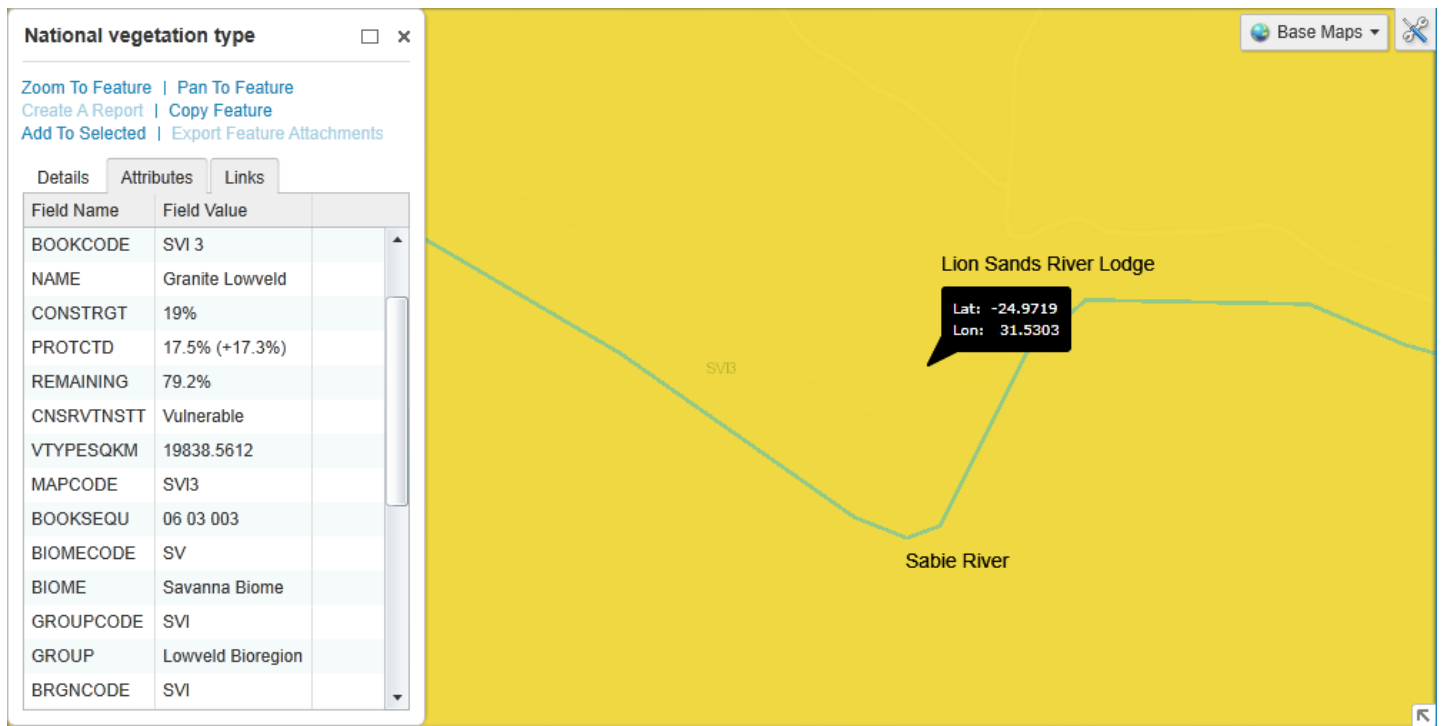


Figure 2: Illustration and details of the biome and vegetation type wherein the study area occurs (Source: Biodiversity GIS- SANBI)

The uplands of the Granite Lowveld (SVI3) are typically characterized by deep sandy soils, which play host to tall shrub-lands that are interspersed with few trees to moderately dense and low woodlands (Mucina and Rutherford 2006). The upper vegetation layer is dominated by *Terminalia sericea*, *Combretum zeyheri*, *Combretum apiculatum*, *Sclerocarya birrea* and *Strychnos madagascariensis* whilst the herbaceous layer is primarily composed of *Digitaria eriantha* (sub-canopy), *Panicum maximum* (under canopy), *Pogonarthria squarrosa*, *Tricholaene monachne* and *Eragrostis rigidior* (Mucina and Rutherford 2006).

Conversely, the lowlands are characterized by open savanna to dense thicket, with the woody layer being dominated by *Acacia nigrescens*, *Dichrostachys cinerea*, *Diospyros mespiliformis*, *Euclea divinorum* and *Grewia bicolor*; whilst *Panicum maximum*, *Digitaria eriantha* and *Aristida congesta* are the dominant species in the relatively dense ground layer (Mucina and Rutherford 2006).

5. METHODS

The vegetation survey was conducted as per the terms of reference received from the principal consultants.

a. Sampling sites

A desktop analysis of the proposed developmental sites was conducted using Google Earth (2014) in order to determine any existing homogenous vegetation communities present at each of the sites. Based on this analysis, it was determined that one could expect a transition in the vegetation communities occurring at each of the sites and that there were no distinctive and major heterogeneous communities which would require separate sampling effort for the determination of the species composition of such heterogeneous communities. As a result, several transects were systematically traversed within the footprint of each of the potential sites of the proposed developments, where all herbaceous species occurring within 10m on either side of each of the transect lines were recorded, allowing for a comprehensive representation of the species composition within the developmental footprint.

Any protected tree species, as well as both individual trees and bush clumps exceeding 1.8m in height, were recorded and geo-referenced. Other information gathered from the study site included the presence of significant features such as ecosystem infrastructure (i.e. termite mounds) and the presence of vertebrate, avian and invertebrate fauna, based on direct sightings as well as indirect indication of presence i.e. spoor and scat.

b. Analysis

All recorded and geo-referenced elements from the assessment were entered into Google Earth (2014) to provide a visual representation of both the spatial distribution of the tree layer, particularly of protected tree species, as well as the location and proximity of any ecosystem elements which may trigger concern around the viability and appropriateness of the development.

6. RESULTS

a. Herbaceous Layer

The results from the vegetation survey which was undertaken at each of the proposed sites yielded a list of herbaceous species that were identified within the study area (Table 1). A complete list of herbaceous species which potentially occur within the study area, but were not necessarily recorded within any of the sampling sites, is listed in Appendix B.

Table 1: All herbaceous species recorded in the potential developmental sites

Herbaceous species
<i>Aristida adscensionis</i>
<i>Aristida congesta</i> var. <i>barbicollis</i>
<i>Aristida congesta</i> var. <i>congesta</i>
<i>Bothriochloa radicans</i>
<i>Cenchrus ciliaris</i>
<i>Chloris gayana</i>
<i>Chloris pycnothrix</i>
<i>Chloris virgata</i>
<i>Cymbopogon pospischilii</i>
<i>Cynodon dactylon</i>
<i>Dactyloctenium geminatum</i>
<i>Digitaria eriantha</i>
<i>Eleusine coracana</i>
<i>Enteropogon macrostachyus</i>
<i>Eragrostis aspera</i>
<i>Eragrostis rigidior</i>
<i>Eragrostis superba</i>
<i>Heteropogon contortus</i>
<i>Melinis repens</i>
<i>Panicum maximum</i>
<i>Pogonarthria squarrosa</i>
<i>Sorghum bicolor</i>
<i>Sporobolus africanus</i>
<i>Sporobolus fimbriatus</i>
<i>Sporobolus nitens</i>
<i>Themeda triandra</i>
<i>Trachypogon spicatus</i>
<i>Urochloa mosambicensis</i>

b. Woody layer, presence of ecosystem infrastructure, presence of invertebrate, avian and vertebrate fauna

The following subsection has been divided into five sections, each coinciding with a potential developmental site, and labelled accordingly. Tables 2-6 illustrate: a list of all individual trees or clumps of trees which exceed a height of 1.8m along with their geo-referenced locations; geo-referenced records of all protected tree species listed under the 'Mpumalanga Nature Conservation Act of 1998' and the 'Notice of the List of Protected Tree Species Under the National Forests Act, 1998 (Act No. 84 of 1998)' (November 2013); and comments on the presence of ecosystem infrastructure and vertebrate, avian and invertebrate fauna based on direct sightings, as well as indirect evidence (i.e. the presence of spoor or scat or vocalisations heard).

Figures 3 and 4 provide a visual representation of the spatial distribution of the tree layer of protected tree species and large trees which need to be considered when planning the development project, as well as the location and proximity of any significant ecosystem infrastructure elements to the proposed development at each of the sites.

A comprehensive list of the tree species which may be encountered in the study area is provided in Appendix C, a list of herbivores which may be encountered is listed in Appendix D, and a list of carnivores and other small mammals potentially occurring in the study area is listed in Appendix E.

i. Site for expansion of Chalet 6 into public area and construction of three new chalets

Table 2: Relevant ecosystem components present at the developmental site¹

Species	Co-ordinates	Comments
<i>Gymnosporia senegalensis</i>	24°58'20.7"S 31°31'39.3"E	A few golden orb spiders
<i>Grewia bicolor</i>	24°58'20.7"S 31°31'39.3"E	
<i>Dichrostachys cinerea</i> (x16)	24°58'21.3"S 31°31'39.6"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'21.3"S 31°31'39.5"E	
<i>Acacia nigrescens</i>	24°58'21.6"S 31°31'39.6"E	Large tree
<i>Dichrostachys cinerea</i> (x8)	24°58'21.8"S 31°31'39.5"E	Brown-hooded kingfisher
<i>Spirostachys africana</i>	24°58'21.9"S 31°31'39.5"E	African firefinch
<i>Spirostachys africana</i> (x5)	24°58'22.0"S 31°31'39.2"E	Emerald-spotted wood dove
<i>Dichrostachys cinerea</i> (x6)	24°58'22.0"S 31°31'39.2"E	Common Scimitarbill
<i>Euclea natalensis</i>	24°58'22.0"S 31°31'39.2"E	Black-capped Bulbul
<i>Gymnosporia buxifolia</i>	24°58'21.8"S 31°31'39.1"E	
<i>Grewia flavescens</i>	24°58'21.8"S 31°31'39.1"E	
<i>Euclea natalensis</i> (x3)	24°58'22.1"S 31°31'38.8"E	
<i>Spirostachys africana</i> (x5)	24°58'22.1"S 31°31'38.8"E	
<i>Gymnosporia buxifolia</i> (x2)	24°58'22.1"S 31°31'38.8"E	African firefinch
<i>Capparis sepiaria</i> (x2)	24°58'22.2"S 31°31'38.8"E	
<i>Pappea capensis</i>	24°58'22.2"S 31°31'38.8"E	
<i>Diospyros mespiliformis</i>	24°58'22.2"S 31°31'38.8"E	Very large tree
<i>Euclea natalensis</i>	24°58'22.2"S 31°31'38.7"E	
<i>Euclea divinorum</i>	24°58'22.2"S 31°31'38.7"E	
<i>Acacia nilotica</i>	24°58'22.2"S 31°31'38.7"E	
<i>Combretum apiculatum</i>	24°58'22.5"S 31°31'38.8"E	

¹ Applicable to all following tables:

= tree species protected under the Mpumalanga Nature Conservation Act (Act No. 10 of 1998)

= tree species protected under the National Forest Act (Act No. 84 of 1998)

<i>Flueggea virosa</i>	24°58'22.5"S 31°31'38.8"E	
<i>Dichrostachys cinerea</i>	24°58'22.5"S 31°31'38.8"E	
<i>Spirostachys africana</i> (x7)	24°58'22.5"S 31°31'38.8"E	
<i>Acacia nilotica</i>	24°58'22.6"S 31°31'39.0"E	
<i>Gymnosporia senegalensis</i> (x2)	24°58'22.6"S 31°31'39.0"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'22.6"S 31°31'39.0"E	
<i>Acacia nigrescens</i>	24°58'22.6"S 31°31'39.1"E	Large tree
<i>Gymnosporia senegalensis</i> (x4)	24°58'22.8"S 31°31'38.9"E	
<i>Grewia flavescens</i>	24°58'23.0"S 31°31'38.8"E	
<i>Acacia nilotica</i> (x3)	24°58'23.0"S 31°31'38.8"E	
<i>Spirostachys africana</i>	24°58'23.0"S 31°31'38.8"E	
<i>Gymnosporia senegalensis</i> (x2)	24°58'23.0"S 31°31'38.8"E	
<i>Euclea natalensis</i>	24°58'23.0"S 31°31'38.8"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'22.9"S 31°31'39.2"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'22.8"S 31°31'39.4"E	
<i>Grewia flavescens</i>	24°58'22.7"S 31°31'39.5"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'22.4"S 31°31'39.7"E	Levaillant's cuckoo
<i>Flueggea virosa</i> (x4)	24°58'22.3"S 31°31'39.9"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'22.3"S 31°31'39.9"E	
<i>Dichrostachys cinerea</i> (x15)	24°58'22.4"S 31°31'40.2"E	Elephant dung
<i>Euclea natalensis</i>	24°58'22.2"S 31°31'40.1"E	
<i>Combretum hereroense</i>	24°58'22.2"S 31°31'40.1"E	
<i>Grewia flavescens</i>	24°58'22.0"S 31°31'40.3"E	
<i>Ziziphus mucronata</i>	24°58'22.0"S 31°31'40.3"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'21.7"S 31°31'40.7"E	
<i>Dichrostachys cinerea</i> (x19)	24°58'21.7"S 31°31'40.7"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'21.6"S 31°31'40.6"E	
<i>Acacia karroo</i>	24°58'21.6"S 31°31'40.6"E	
<i>Grewia flavescens</i> (x2)	24°58'21.6"S 31°31'40.6"E	
<i>Acacia nigrescens</i>	24°58'21.4"S 31°31'40.5"E	Large tree
<i>Dichrostachys cinerea</i> (x6)	24°58'21.4"S 31°31'40.5"E	
<i>Acacia tortilis</i>	24°58'21.1"S 31°31'40.5"E	
<i>Gymnosporia senegalensis</i>	24°58'21.0"S 31°31'39.0"E	
<i>Acacia gerrardii</i>	24°58'21.0"S 31°31'39.0"E	
<i>Gardenia volkensii</i>	24°58'21.0"S 31°31'39.0"E	
<i>Zanthoxylum capense</i>	24°58'21.0"S 31°31'39.0"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'21.2"S 31°31'39.0"E	Anthill; spider burrows
<i>Dichrostachys cinerea</i>	24°58'21.4"S 31°31'38.9"E	
<i>Grewia bicolor</i>	24°58'21.4"S 31°31'38.7"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'21.6"S 31°31'38.7"E	
<i>Searsia gueinzii</i>	24°58'21.7"S 31°31'38.5"E	
<i>Acacia nigrescens</i>	24°58'21.9"S 31°31'38.5"E	Large tree
<i>Spirostachys africana</i> (x2)	24°58'22.0"S 31°31'38.6"E	
<i>Spirostachys africana</i>	24°58'22.1"S 31°31'38.6"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'22.2"S 31°31'38.5"E	
<i>Gymnosporia senegalensis</i>	24°58'22.4"S 31°31'38.5"E	
<i>Flueggea virosa</i>	24°58'22.2"S 31°31'38.1"E	

<i>Gymnosporia senegalensis</i>	24°58'22.2"S 31°31'38.1"E	
<i>Acacia nilotica</i> (x2)	24°58'22.5"S 31°31'38.4"E	
<i>Spirostachys africana</i>	24°58'22.6"S 31°31'38.7"E	
<i>Combretum imberbe</i> (x4)	24°58'22.8"S 31°31'38.3"E	
<i>Flueggea virosa</i>	24°58'22.8"S 31°31'38.2"E	
<i>Gymnosporia senegalensis</i>	24°58'22.9"S 31°31'38.3"E	
<i>Acacia nilotica</i>	24°58'22.9"S 31°31'38.4"E	
<i>Spirostachys africana</i> (x5)	24°58'23.0"S 31°31'38.5"E	
<i>Grewia bicolor</i>	24°58'23.1"S 31°31'38.5"E	
<i>Spirostachys africana</i> (x3)	24°58'23.1"S 31°31'38.7"E	
<i>Spirostachys africana</i> (x3)	24°58'23.4"S 31°31'38.9"E	
<i>Acacia nilotica</i>	24°58'23.4"S 31°31'38.9"E	
<i>Spirostachys africana</i>	24°58'23.2"S 31°31'39.1"E	
<i>Acacia nigrescens</i>	24°58'23.2"S 31°31'39.1"E	
<i>Flueggea virosa</i>	24°58'23.2"S 31°31'39.1"E	
<i>Zanthoxylum capense</i>	24°58'23.0"S 31°31'39.5"E	
<i>Acacia nigrescens</i>	24°58'23.0"S 31°31'39.5"E	Large tree
<i>Gardenia volkensii</i>	24°58'23.0"S 31°31'39.5"E	
<i>Acacia gerrardii</i>	24°58'23.2"S 31°31'39.4"E	
<i>Spirostachys africana</i>	24°58'23.2"S 31°31'39.4"E	
<i>Gardenia volkensii</i>	24°58'23.2"S 31°31'39.7"E	Large tree
<i>Spirostachys africana</i>	24°58'23.2"S 31°31'39.7"E	Large tree
<i>Dichrostachys cinerea</i> (x3)	24°58'22.9"S 31°31'39.8"E	
<i>Euclea natalensis</i>	24°58'22.8"S 31°31'40.0"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'22.8"S 31°31'40.0"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'22.6"S 31°31'40.1"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'22.6"S 31°31'40.1"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'22.5"S 31°31'40.3"E	
<i>Acacia nigrescens</i>	24°58'22.4"S 31°31'40.4"E	Large tree
<i>Zanthoxylum capense</i>	24°58'22.3"S 31°31'40.4"E	
<i>Grewia hexamita</i>	24°58'22.3"S 31°31'40.5"E	
<i>Dichrostachys cinerea</i> (x16)	24°58'22.2"S 31°31'40.7"E	
<i>Combretum apiculatum</i>	24°58'22.2"S 31°31'40.6"E	Elephant activity
<i>Dichrostachys cinerea</i> (x2)	24°58'21.9"S 31°31'40.8"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'21.7"S 31°31'40.8"E	
<i>Acacia gerrardii</i>	24°58'21.8"S 31°31'40.9"E	
<i>Dichrostachys cinerea</i> (x10)	24°58'21.6"S 31°31'40.9"E	
<i>Grewia bicolor</i>	24°58'21.6"S 31°31'40.9"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'21.4"S 31°31'41.0"E	
<i>Acacia nigrescens</i>	24°58'21.1"S 31°31'40.6"E	Large tree
<i>Gymnosporia buxifolia</i>	24°58'21.1"S 31°31'40.6"E	
<i>Flueggea virosa</i>	24°58'21.1"S 31°31'40.6"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'21.1"S 31°31'40.6"E	
<i>Boscia foetida</i> subsp. <i>rehmanniana</i>	24°58'21.1"S 31°31'40.6"E	
<i>Searsia gueinzii</i>	24°58'21.1"S 31°31'40.6"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'21.3"S 31°31'41.0"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'23.4"S 31°31'39.8"E	

<i>Spirostachys africana</i> (x2)	24°58'23.3"S 31°31'39.8"E	
<i>Gymnosporia buxifolia</i> (x2)	24°58'23.2"S 31°31'39.8"E	
<i>Diospyros mespiliformis</i> (x2)	24°58'23.2"S 31°31'39.8"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.1"S 31°31'39.9"E	
<i>Diospyros mespiliformis</i> (x2)	24°58'23.1"S 31°31'40.1"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.0"S 31°31'40.1"E	
<i>Euclea divinorum</i>	24°58'23.0"S 31°31'40.1"E	
<i>Acacia nigrescens</i>	24°58'23.0"S 31°31'40.1"E	Large tree
<i>Dichrostachys cinerea</i> (x2)	24°58'22.8"S 31°31'40.0"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'22.5"S 31°31'40.1"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'22.7"S 31°31'40.2"E	
<i>Acacia nigrescens</i>	24°58'22.4"S 31°31'40.3"E	Large tree
<i>Dichrostachys cinerea</i> (x10)	24°58'22.4"S 31°31'40.4"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'22.2"S 31°31'40.5"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'22.1"S 31°31'40.5"E	
<i>Dichrostachys cinerea</i> (x8)	24°58'22.0"S 31°31'40.5"E	
<i>Dichrostachys cinerea</i> (x14)	24°58'21.9"S 31°31'40.4"E	
<i>Grewia flavescens</i> (x2)	24°58'21.7"S 31°31'40.4"E	
<i>Acacia nigrescens</i>	24°58'21.5"S 31°31'40.4"E	Large tree
<i>Grewia hexamita</i>	24°58'21.5"S 31°31'40.5"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'21.4"S 31°31'40.5"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'21.3"S 31°31'40.9"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'21.5"S 31°31'40.9"E	
<i>Grewia bicolor</i>	24°58'21.6"S 31°31'40.9"E	
<i>Acacia tortilis</i>	24°58'21.6"S 31°31'40.9"E	
<i>Dichrostachys cinerea</i>	24°58'21.6"S 31°31'40.9"E	
<i>Acacia tortilis</i>	24°58'21.6"S 31°31'41.1"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'21.6"S 31°31'41.1"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'21.7"S 31°31'41.2"E	
<i>Acacia nigrescens</i>	24°58'21.9"S 31°31'41.1"E	
<i>Dichrostachys cinerea</i> (x8)	24°58'21.9"S 31°31'41.1"E	
<i>Grewia flavescens</i>	24°58'22.0"S 31°31'41.2"E	
<i>Dichrostachys cinerea</i> (x8)	24°58'22.0"S 31°31'40.9"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'22.1"S 31°31'40.9"E	
<i>Grewia flavescens</i>	24°58'22.2"S 31°31'41.0"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'22.2"S 31°31'41.0"E	
<i>Dichrostachys cinerea</i> (x12)	24°58'22.2"S 31°31'40.7"E	
<i>Ziziphus mucronata</i>	24°58'22.2"S 31°31'40.7"E	
<i>Grewia bicolor</i>	24°58'22.4"S 31°31'41.0"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'22.4"S 31°31'41.0"E	
<i>Grewia bicolor</i>	24°58'22.4"S 31°31'41.1"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'22.4"S 31°31'41.1"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'22.6"S 31°31'40.9"E	
<i>Ziziphus mucronata</i>	24°58'22.7"S 31°31'40.7"E	
<i>Capparis sepiaria</i>	24°58'22.8"S 31°31'40.7"E	
<i>Grewia flavescens</i>	24°58'22.9"S 31°31'40.6"E	
<i>Dichrostachys cinerea</i>	24°58'22.9"S 31°31'40.6"E	

<i>Dichrostachys cinerea</i> (x2)	24°58'22.9"S 31°31'40.6"E	
<i>Grewia flavescens</i>	24°58'23.0"S 31°31'40.4"E	
<i>Acacia nilotica</i>	24°58'23.0"S 31°31'40.7"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'23.0"S 31°31'40.7"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'23.1"S 31°31'40.6"E	
<i>Dichrostachys cinerea</i>	24°58'23.1"S 31°31'41.0"E	
<i>Ziziphus mucronata</i>	24°58'23.1"S 31°31'41.0"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'23.2"S 31°31'41.2"E	
<i>Philenoptera violacea</i>	24°58'23.4"S 31°31'41.1"E	
<i>Grewia flavescens</i>	24°58'23.4"S 31°31'41.1"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'23.4"S 31°31'41.1"E	
<i>Searsia gueinzii</i>	24°58'23.4"S 31°31'41.1"E	
<i>Diospyros mespiliformis</i>	24°58'23.4"S 31°31'41.1"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'23.5"S 31°31'40.9"E	
<i>Ziziphus mucronata</i>	24°58'23.5"S 31°31'40.9"E	
<i>Flueggea virosa</i>	24°58'23.5"S 31°31'40.9"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'23.4"S 31°31'40.4"E	
<i>Acacia nigrescens</i>	24°58'23.4"S 31°31'40.4"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.2"S 31°31'40.4"E	
<i>Acacia tortilis</i>	24°58'23.4"S 31°31'40.3"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'23.4"S 31°31'40.3"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.4"S 31°31'40.1"E	
<i>Combretum imberbe</i>	24°58'23.6"S 31°31'40.4"E	Large tree
<i>Acacia nigrescens</i>	24°58'23.6"S 31°31'40.6"E	Large tree
<i>Sclerocarya birrea</i>	24°58'23.7"S 31°31'40.5"E	Large tree
<i>Dichrostachys cinerea</i> (x4)	24°58'23.5"S 31°31'40.1"E	
<i>Euclea natalensis</i>	24°58'23.5"S 31°31'39.9"E	
<i>Diospyros mespiliformis</i>	24°58'23.5"S 31°31'39.8"E	
<i>Spirostachys africana</i>	24°58'23.5"S 31°31'39.8"E	
<i>Searsia gueinzii</i>	24°58'23.5"S 31°31'39.8"E	
<i>Euclea natalensis</i>	24°58'23.5"S 31°31'39.7"E	
<i>Acacia nilotica</i>	24°58'23.5"S 31°31'39.7"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'23.6"S 31°31'39.7"E	
<i>Dichrostachys cinerea</i>	24°58'23.9"S 31°31'40.4"E	
<i>Gymnosporia buxifolia</i>	24°58'23.9"S 31°31'40.4"E	
<i>Diospyros mespiliformis</i>	24°58'23.9"S 31°31'40.4"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'23.9"S 31°31'40.6"E	
<i>Acacia nigrescens</i>	24°58'24.1"S 31°31'40.9"E	Large tree
<i>Diospyros mespiliformis</i>	24°58'24.1"S 31°31'40.9"E	Large tree
<i>Diospyros mespiliformis</i>	24°58'24.0"S 31°31'41.0"E	Large tree
<i>Grewia bicolor</i>	24°58'24.0"S 31°31'41.0"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'23.6"S 31°31'40.9"E	
<i>Flueggea virosa</i>	24°58'23.6"S 31°31'40.9"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'23.6"S 31°31'41.1"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.1"S 31°31'41.3"E	
<i>Philenoptera violacea</i>	24°58'23.1"S 31°31'41.3"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.7"S 31°31'41.4"E	

<i>Dichrostachys cinerea</i> (x4)	24°58'23.4"S 31°31'41.5"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.5"S 31°31'41.7"E	
<i>Grewia bicolor</i>	24°58'23.5"S 31°31'41.7"E	
<i>Dalbergia melanoxylon</i>	24°58'23.4"S 31°31'41.8"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'23.4"S 31°31'41.8"E	
<i>Acacia tortilis</i>	24°58'23.4"S 31°31'41.8"E	
<i>Diospyros mespiliformis</i>	24°58'23.3"S 31°31'41.6"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'23.3"S 31°31'41.6"E	
<i>Euclea natalensis</i>	24°58'23.3"S 31°31'41.6"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'23.0"S 31°31'41.3"E	
<i>Dichrostachys cinerea</i> (x8)	24°58'22.9"S 31°31'41.5"E	
<i>Grewia flavescens</i>	24°58'22.9"S 31°31'41.7"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'22.9"S 31°31'41.7"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'22.9"S 31°31'41.7"E	
<i>Ziziphus mucronata</i>	24°58'22.9"S 31°31'41.9"E	
<i>Ziziphus mucronata</i>	24°58'22.9"S 31°31'41.8"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'22.9"S 31°31'41.8"E	
<i>Grewia flavescens</i>	24°58'22.9"S 31°31'41.8"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.0"S 31°31'41.8"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'22.7"S 31°31'42.0"E	
<i>Ziziphus mucronata</i>	24°58'22.7"S 31°31'42.0"E	
<i>Spirostachys africana</i>	24°58'22.6"S 31°31'42.4"E	
<i>Acacia nigrescens</i>	24°58'22.6"S 31°31'42.2"E	
<i>Acacia nigrescens</i>	24°58'22.5"S 31°31'42.0"E	Large tree
<i>Dichrostachys cinerea</i> (x3)	24°58'22.5"S 31°31'42.0"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'22.5"S 31°31'41.8"E	
<i>Gymnosporia buxifolia</i>	24°58'22.5"S 31°31'41.8"E	
<i>Ziziphus mucronata</i>	24°58'22.2"S 31°31'41.7"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'22.2"S 31°31'41.7"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'22.0"S 31°31'41.8"E	
<i>Dichrostachys cinerea</i> (x12)	24°58'21.9"S 31°31'42.1"E	
<i>Gardenia volkensii</i> (x2)	24°58'21.9"S 31°31'42.3"E	
<i>Dichrostachys cinerea</i> (x10)	24°58'22.0"S 31°31'42.5"E	
<i>Acacia nigrescens</i>	24°58'22.3"S 31°31'42.8"E	Large tree
<i>Dichrostachys cinerea</i>	24°58'22.5"S 31°31'42.6"E	
<i>Spirostachys africana</i>	24°58'22.7"S 31°31'42.4"E	
<i>Acacia tortilis</i>	24°58'22.9"S 31°31'42.6"E	
<i>Grewia flavescens</i>	24°58'22.9"S 31°31'42.6"E	
<i>Diospyros mespiliformis</i>	24°58'23.1"S 31°31'42.6"E	
<i>Spirostachys africana</i>	24°58'23.1"S 31°31'42.6"E	
<i>Dichrostachys cinerea</i>	24°58'23.1"S 31°31'42.6"E	
<i>Acacia nigrescens</i>	24°58'23.2"S 31°31'42.5"E	Large tree
<i>Spirostachys africana</i> (x7)	24°58'23.2"S 31°31'42.4"E	
<i>Ziziphus mucronata</i>	24°58'23.3"S 31°31'42.5"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.3"S 31°31'42.5"E	
<i>Spirostachys africana</i>	24°58'23.3"S 31°31'42.5"E	
<i>Ziziphus mucronata</i>	24°58'23.5"S 31°31'42.2"E	

<i>Diospyros mespiliformis</i> (x2)	24°58'23.8"S 31°31'42.1"E	
<i>Gymnosporia buxifolia</i>	24°58'23.6"S 31°31'41.8"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'23.6"S 31°31'41.8"E	
<i>Dichrostachys cinerea</i> (x13)	24°58'23.9"S 31°31'41.7"E	
<i>Grewia flavescens</i> (x2)	24°58'23.9"S 31°31'41.7"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.9"S 31°31'42.1"E	
<i>Spirostachys africana</i>	24°58'23.9"S 31°31'42.1"E	
<i>Ziziphus mucronata</i>	24°58'23.9"S 31°31'42.1"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'23.9"S 31°31'42.1"E	
<i>Acacia nigrescens</i> (x2)	24°58'23.9"S 31°31'42.1"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'23.9"S 31°31'42.1"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'23.9"S 31°31'42.0"E	
<i>Grewia flavescens</i>	24°58'23.9"S 31°31'42.0"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'23.9"S 31°31'42.0"E	
<i>Ziziphus mucronata</i>	24°58'23.9"S 31°31'42.0"E	
<i>Acacia nigrescens</i>	24°58'24.1"S 31°31'41.3"E	Large tree
<i>Euclea natalensis</i>	24°58'24.1"S 31°31'41.3"E	
<i>Grewia flavescens</i>	24°58'24.1"S 31°31'41.3"E	
<i>Terminalia sericea</i>	24°58'24.1"S 31°31'41.4"E	
<i>Grewia flavescens</i>	24°58'24.1"S 31°31'41.4"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'24.1"S 31°31'41.4"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'24.3"S 31°31'41.5"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'24.3"S 31°31'41.6"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'24.4"S 31°31'41.9"E	
<i>Acacia nilotica</i>	24°58'24.4"S 31°31'41.9"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'24.4"S 31°31'41.5"E	
<i>Ziziphus mucronata</i>	24°58'24.6"S 31°31'41.7"E	
<i>Acacia tortilis</i>	24°58'24.6"S 31°31'41.9"E	
<i>Acacia tortilis</i>	24°58'24.7"S 31°31'42.0"E	
<i>Grewia flavescens</i>	24°58'24.7"S 31°31'41.6"E	
<i>Combretum apiculatum</i>	24°58'24.7"S 31°31'41.6"E	
<i>Acacia nigrescens</i>	24°58'24.6"S 31°31'41.4"E	
<i>Ziziphus mucronata</i>	24°58'24.6"S 31°31'41.3"E	
<i>Ziziphus mucronata</i> (x2)	24°58'24.6"S 31°31'41.2"E	
<i>Grewia hexamita</i>	24°58'24.6"S 31°31'41.2"E	
<i>Acacia nilotica</i>	24°58'24.5"S 31°31'41.0"E	
<i>Grewia monticola</i>	24°58'24.8"S 31°31'41.0"E	
<i>Euclea natalensis</i>	24°58'24.9"S 31°31'42.1"E	
<i>Acacia nigrescens</i>	24°58'24.9"S 31°31'42.1"E	
<i>Acacia tortilis</i>	24°58'24.7"S 31°31'42.0"E	
<i>Grewia monticola</i> (x2)	24°58'24.5"S 31°31'42.0"E	
<i>Gardenia volkensii</i>	24°58'24.5"S 31°31'42.0"E	
<i>Combretum apiculatum</i>	24°58'24.5"S 31°31'42.4"E	
<i>Combretum imberbe</i>	24°58'24.5"S 31°31'42.4"E	
<i>Grewia flavescens</i> (x2)	24°58'24.7"S 31°31'42.4"E	
<i>Philenoptera violacea</i>	24°58'25.1"S 31°31'42.5"E	

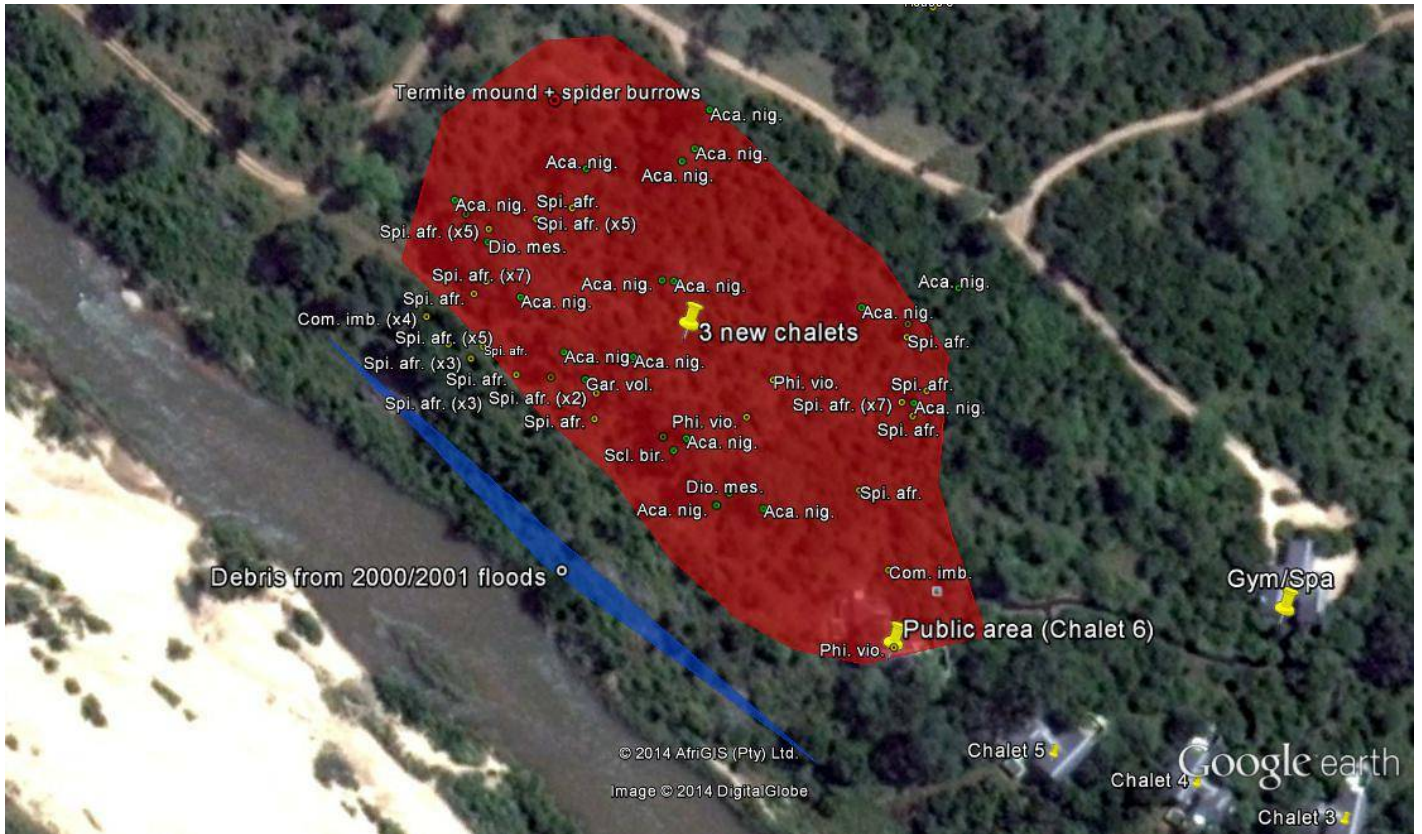


Figure 3: Visual representation of the location of protected trees and significant ecosystem infrastructure elements within the potential footprint of the developmental site (Source: Google Earth 2014).

Note: Trees marked with a yellow marker are protected and trees marked with a green marker are large trees which should be avoided during the construction process.

iii. House 1

Table 3: Relevant ecosystem components present at house 1

Species	Co-ordinates	Comments
<i>Acacia nigrescens</i>	24°58'17.3"S 31°31'41.3"E	Large tree
<i>Acacia karroo</i>	24°58'17.3"S 31°31'41.3"E	
<i>Euclea divinorum</i>	24°58'17.3"S 31°31'41.3"E	Hyena spoor
<i>Grewia flavescens</i>	24°58'17.3"S 31°31'41.3"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'17.5"S 31°31'41.3"E	
<i>Grewia bicolor</i>	24°58'17.5"S 31°31'41.3"E	
<i>Euclea divinorum</i> (x3)	24°58'17.5"S 31°31'41.3"E	
<i>Ehretia amoena</i>	24°58'17.5"S 31°31'41.3"E	
<i>Zanthoxylum capense</i>	24°58'17.5"S 31°31'41.3"E	
<i>Acacia nigrescens</i>	24°58'17.7"S 31°31'41.5"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'17.7"S 31°31'41.5"E	
<i>Acacia tortilis</i>	24°58'17.8"S 31°31'41.7"E	
<i>Euclea divinorum</i>	24°58'17.8"S 31°31'41.7"E	
<i>Zanthoxylum capense</i>	24°58'17.8"S 31°31'41.7"E	
<i>Rhoicissus tridentata</i>	24°58'17.8"S 31°31'41.7"E	
<i>Acacia nigrescens</i>	24°58'17.9"S 31°31'41.6"E	Large tree
<i>Gymnosporia buxifolia</i> (x5)	24°58'17.9"S 31°31'41.6"E	
<i>Grewia flavescens</i>	24°58'17.9"S 31°31'41.6"E	
<i>Acacia nigrescens</i> (x5)	24°58'18.1"S 31°31'41.3"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'18.1"S 31°31'41.3"E	
<i>Euclea divinorum</i>	24°58'18.1"S 31°31'41.3"E	Elephant dung
<i>Pappea capensis</i> (x2)	24°58'18.0"S 31°31'41.0"E	
<i>Dichrostachys cinerea</i>	24°58'18.0"S 31°31'41.0"E	Dark-capped bulbul
<i>Gymnosporia buxifolia</i>	24°58'18.0"S 31°31'41.0"E	
<i>Acacia karroo</i>	24°58'18.0"S 31°31'41.0"E	
<i>Acacia nigrescens</i>	24°58'17.9"S 31°31'41.0"E	
<i>Zanthoxylum capense</i>	24°58'17.9"S 31°31'41.0"E	
<i>Dichrostachys cinerea</i>	24°58'17.9"S 31°31'40.9"E	
<i>Dichrostachys cinerea</i>	24°58'17.7"S 31°31'40.9"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'17.6"S 31°31'41.0"E	
<i>Acacia nigrescens</i>	24°58'17.5"S 31°31'40.9"E	

iv. House 2

Table 4: Relevant ecosystem components present at house 2

Species	Co-ordinates	Comments
<i>Dichrostachys cinerea</i>	24°58'18.5"S 31°31'40.4"E	
<i>Acacia nigrescens</i>	24°58'18.5"S 31°31'40.4"E	
<i>Acacia tortilis</i>	24°58'18.5"S 31°31'40.6"E	House sparrow
<i>Dichrostachys cinerea</i> (x4)	24°58'18.5"S 31°31'40.6"E	
<i>Acacia nigrescens</i>	24°58'18.6"S 31°31'40.8"E	Golden orb spider
<i>Dichrostachys cinerea</i> (x7)	24°58'18.6"S 31°31'40.8"E	
<i>Acacia tortilis</i>	24°58'18.6"S 31°31'40.8"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'18.7"S 31°31'40.8"E	
<i>Grewia bicolor</i>	24°58'18.7"S 31°31'40.8"E	
<i>Acacia nigrescens</i>	24°58'18.7"S 31°31'40.8"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'18.9"S 31°31'40.8"E	
<i>Dichrostachys cinerea</i> (x9)	24°58'19.0"S 31°31'40.5"E	
<i>Grewia bicolor</i>	24°58'18.8"S 31°31'40.3"E	
<i>Acacia nigrescens</i>	24°58'18.8"S 31°31'40.3"E	
<i>Dichrostachys cinerea</i>	24°58'18.8"S 31°31'40.3"E	
<i>Dichrostachys cinerea</i>	24°58'18.7"S 31°31'40.2"E	
<i>Acacia nigrescens</i>	24°58'18.6"S 31°31'40.0"E	Golden orb spider
<i>Flueggea virosa</i>	24°58'18.6"S 31°31'40.0"E	
<i>Euclea natalensis</i>	24°58'18.4"S 31°31'40.1"E	
<i>Gymnosporia senegalensis</i>	24°58'18.4"S 31°31'40.1"E	
<i>Dichrostachys cinerea</i>	24°58'18.4"S 31°31'40.1"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'18.5"S 31°31'40.2"E	
<i>Grewia hexamita</i>	24°58'18.5"S 31°31'40.2"E	
<i>Flueggea virosa</i>	24°58'18.3"S 31°31'40.2"E	
<i>Gymnosporia buxifolia</i>	24°58'18.3"S 31°31'40.2"E	

v. *House 3*

Table 5: Relevant ecosystem components present at house 3

Species	Co-ordinates	Comments
<i>Grewia bicolor</i>	24°58'20.3"S 31°31'42.5"E	
<i>Gymnosporia buxifolia</i>	24°58'20.3"S 31°31'42.5"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'20.5"S 31°31'42.3"E	
<i>Acacia tortilis</i>	24°58'20.5"S 31°31'42.3"E	
<i>Grewia bicolor</i>	24°58'20.5"S 31°31'42.3"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'20.5"S 31°31'42.1"E	Golden orb spider
<i>Philenoptera violacea</i>	24°58'20.5"S 31°31'42.1"E	
<i>Acacia tortilis</i>	24°58'20.5"S 31°31'42.1"E	
<i>Acacia tortilis</i>	24°58'20.3"S 31°31'42.0"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'20.3"S 31°31'42.0"E	
<i>Dichrostachys cinerea</i> (x8)	24°58'20.2"S 31°31'42.0"E	
<i>Acacia tortilis</i>	24°58'20.2"S 31°31'42.0"E	
<i>Ziziphus mucronata</i>	24°58'20.2"S 31°31'42.0"E	
<i>Dichrostachys cinerea</i> (x18)	24°58'20.1"S 31°31'41.8"E	
<i>Acacia tortilis</i>	24°58'20.1"S 31°31'41.8"E	
<i>Flueggea virosa</i>	24°58'20.1"S 31°31'41.8"E	
<i>Dichrostachys cinerea</i> (x11)	24°58'19.9"S 31°31'41.8"E	
<i>Acacia nigrescens</i>	24°58'19.9"S 31°31'41.8"E	
<i>Acacia tortilis</i> (x2)	24°58'19.8"S 31°31'41.9"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'19.8"S 31°31'41.9"E	
<i>Acacia nigrescens</i>	24°58'19.8"S 31°31'41.9"E	
<i>Dichrostachys cinerea</i> (x7)	24°58'19.9"S 31°31'42.2"E	
<i>Ziziphus mucronata</i>	24°58'19.9"S 31°31'42.2"E	
<i>Grewia flavescens</i>	24°58'19.9"S 31°31'42.2"E	
<i>Gymnosporia buxifolia</i>	24°58'19.9"S 31°31'42.4"E	
<i>Zanthoxylum capense</i>	24°58'19.9"S 31°31'42.4"E	
<i>Grewia bicolor</i>	24°58'19.9"S 31°31'42.4"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'19.9"S 31°31'42.4"E	
<i>Euclea natalensis</i>	24°58'19.9"S 31°31'42.4"E	
<i>Searsia gueinzii</i>	24°58'19.9"S 31°31'42.4"E	

vi. **House 4**

Table 6: Relevant ecosystem components present at house 4

Species	Co-ordinates	Comments
<i>Zanthoxylum capense</i>	24°58'19.9"S 31°31'44.3"E	
<i>Acacia nigrescens</i>	24°58'19.9"S 31°31'44.3"E	Large tree
<i>Ziziphus mucronata</i>	24°58'19.9"S 31°31'44.3"E	
<i>Dichrostachys cinerea</i> (x2)	24°58'20.0"S 31°31'44.1"E	
<i>Ziziphus mucronata</i>	24°58'20.0"S 31°31'44.1"E	
<i>Dichrostachys cinerea</i> (x5)	24°58'20.1"S 31°31'43.9"E	
<i>Acacia tortilis</i>	24°58'19.8"S 31°31'44.0"E	
<i>Grewia bicolor</i> (x3)	24°58'19.8"S 31°31'44.0"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'20.1"S 31°31'43.7"E	
<i>Acacia erubescens</i>	24°58'20.1"S 31°31'43.7"E	
<i>Zanthoxylum capense</i>	24°58'20.1"S 31°31'43.7"E	
<i>Acacia nigrescens</i>	24°58'20.1"S 31°31'43.7"E	Large tree
<i>Acacia karroo</i>	24°58'20.1"S 31°31'43.7"E	
<i>Dichrostachys cinerea</i>	24°58'19.9"S 31°31'43.5"E	
<i>Dichrostachys cinerea</i> (x6)	24°58'19.7"S 31°31'43.6"E	
<i>Acacia tortilis</i>	24°58'19.5"S 31°31'43.6"E	
<i>Ziziphus mucronata</i>	24°58'19.5"S 31°31'43.6"E	
<i>Grewia bicolor</i>	24°58'19.5"S 31°31'43.6"E	
<i>Philenoptera violacea</i>	24°58'19.4"S 31°31'43.6"E	
<i>Ehretia rigida</i>	24°58'19.3"S 31°31'43.6"E	
<i>Commiphora pyracanthoides</i>	24°58'19.3"S 31°31'43.6"E	
<i>Grewia bicolor</i>	24°58'19.3"S 31°31'43.6"E	
<i>Ziziphus mucronata</i>	24°58'19.5"S 31°31'43.8"E	
<i>Dichrostachys cinerea</i> (x3)	24°58'19.5"S 31°31'43.8"E	
<i>Dichrostachys cinerea</i> (x8)	24°58'19.6"S 31°31'43.9"E	
<i>Acacia gerrardii</i>	24°58'19.6"S 31°31'43.9"E	
<i>Dichrostachys cinerea</i>	24°58'19.6"S 31°31'44.0"E	
<i>Cassia abbreviata</i>	24°58'19.5"S 31°31'44.2"E	
<i>Cissus cornifolia</i>	24°58'19.5"S 31°31'44.2"E	
<i>Zanthoxylum capense</i>	24°58'19.5"S 31°31'44.2"E	
<i>Dichrostachys cinerea</i>	24°58'19.5"S 31°31'44.2"E	
<i>Dichrostachys cinerea</i> (x4)	24°58'19.8"S 31°31'44.1"E	
<i>Flueggea virosa</i>	24°58'19.8"S 31°31'44.1"E	
<i>Ehretia rigida</i>	24°58'19.8"S 31°31'44.1"E	
<i>Grewia bicolor</i> (x2)	24°58'19.8"S 31°31'44.1"E	



Figure 4: Visual representation of the location of protected trees and significant ecosystem infrastructure elements within the footprint of houses 1, 2, 3 and 4 (Source: Google Earth 2014).

Note: Trees marked with a yellow marker are protected and trees marked with a green marker are large trees which may hinder construction.

c. Utility infrastructure

Electricity will be provided to each of the proposed developmental activities by the existing transformer (Matthew Altenkirk *pers. comm.* 9 May 2014). A new water supply facility is being constructed to replace the existing 'Jojo tanks', which are located in close proximity to the new staff housing. A new sewerage facility is also being developed in the north-eastern section of the lodge.

Figure 5 illustrates the potential route which each utility service would follow in order to be linked to each of the proposed developmental activities (Note: The exact location of the three new chalets is not known; therefore the probable route each utility service will follow has been sketched to end within the zone which has been allocated for the proposed development). The new public area will need to be linked up to the new water supply facility and the new sewerage facility and should remain linked to the existing electricity transformer.



Figure 5: Potential electricity (yellow), water (blue) and sewerage (brown) utility routes which link to the developmental sites (Source: Google Earth 2014).

7. DISCUSSION

a. Site for expansion of Chalet 6 into public area and construction of three new chalets

A total of three protected tree species were recorded at the proposed developmental site (geo-referenced in Table 2). The first being *Spirostachys africanus* (52 individuals), protected under the Mpumalanga Nature Conservation Act (Act No. 10 of 1998); the second species being *Combretum imberbe* (6 individuals), protected under the National Forest Act (Act No. 84 of 1998); and the third being *Philenoptera violacea* (3 individuals), protected under the National Forest Act (Act No. 84 of 1998). These trees must not be impacted on in any way during construction. Smaller individuals may be relocated to an alternative site only, however, under the guidance of the ecologist of Lion Sands.

There are numerous large trees, both protected and unprotected, that occur throughout the zone which has been designated for the proposed expansion of Chalet 6 into a public area and the construction of three new chalets (geo-referenced in Table 2). These trees are characteristic of the riparian zone, play an important ecological role in the system and provide shade as well as visual cover for the houses. As such they should not be impacted upon during construction.

A termite mound was recorded on the site, which had a number of Funnel-web spider (Family: Agelenidae) burrows on the western slope. It is believed that these burrows have been abandoned as no spider activity was observed (Matthew Altenkirk *pers. comm.* 20 May 2014). The location of the termite mound should be taken into account during the phase of development planning as they may later damage or destroy parts of buildings (i.e. wooden structures) if constructed in close proximity to the mound.

The flood line of the river can be seen in Figure 3. The debris which was observed on the riverbank is a result of the floods of 2000 (Matthew Altenkirk *pers. comm.*, 20 May 2014).

Figure 5 reveals the routing that utility services are most likely to follow in order to link the new chalets to a supply of water and electricity, and to the sewerage facility. These routings must follow the roads so as not to increase the footprint of the development.

b. New Staff Housing

Two individuals of *Philenoptera violacea*, a tree species protected under the National Forest Act (Act No. 84 of 1998), were found within the zone designated for the development of the new staff housing (geo-referenced in Tables 5 and 6). These trees must not be removed or damaged during the process of construction.

There are three large *Acacia nigrescens* trees which also occur within the zone designated for the construction of the staff housing. Although this species is not protected, it is advisable to avoid these trees during construction. These trees could be utilized effectively to provide shade for houses 1 and 4.

Figure 5 indicates the routing that utility services are most likely to follow in order to link the new chalets to a supply of water and electricity, and to the sewerage facility. These routings must follow the roads so as not to increase the footprint of the development.

8. CONCLUSIONS

The proposed developments will not have a significant impact on the receiving environment, as long as the recommendations provided in this report are adhered to. No protected tree species occurring in any of the potential developmental sites may be removed or damaged. It is advised that larger trees which are not protected, but are characteristic of the riparian zone, should be avoided during the construction process as they play a crucial role in maintaining ecosystem functionality, productivity as well as contributing aesthetically to the lodge site.

The developments close to the river are unlikely to be affected by future flooding events, however, caution should be taken when deciding on the final location of each development and the unpredictability of nature and the environment should be considered.

During the vegetation survey, the presence of *Lantana camara* was noted on numerous occasions. Although it is difficult to eradicate alien plant species such as *Lantana camara* entirely, management should remain persistent with their efforts to mitigate the potential negative ecological effects that species such as this may cause.

Sustainability issues are critical in any development of this kind and in order to maintain a healthy and dynamic system; social, ecological and economic goals and priorities must as far as possible be balanced. It is also vital to consider the unpredictability of the natural environment when planning new developments such as this. Although conditions may be ideal at present, decisions made now may have adverse effects should environmental conditions, such as climatic conditions, change in the future. Unpredictable environmental conditions could potentially play a critical role in determining the future economic feasibility of any development.

9. REFERENCES AND ADDITIONAL READING

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10. APPENDIX A: CARDINAL PHOTOGRAPHS

Site for expansion of Chalet 6 into public area and construction of three new chalets

(24°58'20.89"S 31°31'39.17"E)



North



North East



East



South East

APPENDIX A: CARDINAL PHOTOGRAPHS (CONTINUED)



South



South West



West



North West

APPENDIX A: CARDINAL PHOTOGRAPHS

Staff House 1

(24°58'17.4"S 31°31'41.0"E)



North



North East



East



South East

APPENDIX A: CARDINAL PHOTOGRAPHS (CONTINUED)



South



South West



West



North West

APPENDIX A: CARDINAL PHOTOGRAPHS

Staff House 2

(24°58'18.5"S 31°31'40.4"E)



North



North East



East



South East

APPENDIX A: CARDINAL PHOTOGRAPHS (CONTINUED)



South



South West



West



North West

APPENDIX A: CARDINAL PHOTOGRAPHS

Staff House 3

(24°58'20.2"S 31°31'42.4"E)



North



North East



East



South East

APPENDIX A: CARDINAL PHOTOGRAPHS (CONTINUED)



South



South West



West

North West

APPENDIX A: HOUSE 4 CARDINAL PHOTOGRAPHS

(24°58'19.82"S 31°31'44.11"E)



North



North East



East



South East

APPENDIX A: HOUSE 4 CARDINAL PHOTOGRAPHS (CONTINUED)



South



South West



West



North West

11. APPENDIX B: HERBACEOUS SPECIES OCCURRING IN LION SANDS PRIVATE GAME RESERVE

FALSE PANICLES

2	Low	Snowflake Grass	<i>Andropogon eucomus</i>
1	Ave.	Large Silver Andropogon	<i>Andropogon huillensis</i>
D	High	Red Grass	<i>Themeda triandra</i>
1	Ave.	Boat Thatching Grass	<i>Hyparrhenia cymbaria</i>
1	Low	Broad-leaved Turpentine Grass	<i>Cymbopogon excavates</i>
1	Low	Narrow-leaved Turpentine Grass	<i>Cymbopogon plurinodis</i>
1	Low	Giant Turpentine Grass	<i>Cymbopogon validus</i>
1	Low	Blue Thatching Grass	<i>Hyparrhenia tamba</i>
1	Ave.	Common Thatching Grass	<i>Hyparrhenia hirta</i>
1	Ave.	Fine Thatching Grass	<i>Hyparrhenia filipendula</i>
1	High	Blue Grass	<i>Andropogon gayanus</i>
1	Ave.	Yellow Thatching Grass	<i>Hyperthelia dissolute</i>
1	Low	Red Autumn Grass	<i>Schizachyrium sanguineum</i>
D	Ave.	Boat Grass	<i>Monocymbium ceresiiforme</i>
D	High	Swamp Couch	<i>Hemarthria latissima</i>

UNBRANCHED INFLORESCENCES

2	Low	Dwarf Grass	<i>Oropetium capense</i>
1	Low	Quinine Grass	<i>Urelytrum agropyroides</i>
2	Ave.	Spear Grass	<i>Heteropogon contortus</i>
1	Low	Giant Spear Grass	<i>Trachypogon spicatus</i>
2	Ave.	One-finger Grass	<i>Digitaria monodactyla</i>
2	Low	Pincushion Grass	<i>Microchloa caffra</i>
1	Low	Sickle Grass	<i>Ctenium concinnum</i>
D	High	Mopane Grass	<i>Enteropogon macrostachyus</i>
3	Low	Wire Grass	<i>Elionurus muticus</i>
2	Low	Carrot-seed Grass	<i>Tragus berteronianus</i>
2	Low	Cat's Tail	<i>Perotis patens</i>
E	Low	Fountain Grass	<i>Pennisetum setaceum</i>
D	Ave.	Thimble Grass	<i>Fingerhuthia africana</i>
D	High	Foxtail Buffalo Grass	<i>Cenchrus ciliaris</i>
D	High	Golden Bristle Grass	<i>Setaria sphacelata</i> var. <i>sericea</i>
D	High	Common Bristle Grass	<i>Setaria sphacelata</i> var. <i>sphacelata</i>
D	Ave.	Creeping Bristle Grass	<i>Setaria sphacelata</i> var. <i>torta</i>
D	High	Vlei Bristle Grass	<i>Setaria incrassate</i>

PANICLES

2	Low	Tassel Three-awn	<i>Aristida congesta</i> subsp. <i>Congesta</i>
3	Low	Ratstail Dropseed	<i>Sporobolus africanus</i>
1	Low	Cottonwool Grass	<i>Imperata cylindrical</i>
2	Ave.	Bur Bristle Grass	<i>Setaria verticillata</i>
2	Ave.	Woolly Love Grass	<i>Eragrostis ciliaris</i>
1	Ave.	Hairy Trident Grass	<i>Tristachya lucothrix</i>
3	Low	Gongoni Three-awn	<i>Aristida junciformis</i>
2	Low	Annual Three-awn	<i>Aristida adscensionis</i>
3	Low	Bottlebrush Grass	<i>Enneapogon scoparius</i>
2	Ave.	Nine-awned Grass	<i>Enneapogon cenchroides</i>
2	Ave.	Black-seed Sorghum	<i>Sorghum versicolor</i>
2	Low	Long-awned Grass	<i>Aristida stipitata</i>
2	Low	Rough Three-awn	<i>Aristida rhiniochloa</i>

2	Ave.	Weather Love Grass	<i>Eragrostis nindensis</i>
2	Ave.	Narrow Heart Love Grass	<i>Eragrostis racemosa</i>
2	Ave.	Heart-seed Love Grass	<i>Eragrostis capensis</i>
2	Ave.	Saw-tooth Love Grass	<i>Eragrostis superba</i>
D	High	Sand Quick	<i>Schmidtia pappophoroides</i>
1	Ave.	Bristle-leaved Red Top	<i>Melinis nerviglumis</i>
2	Ave.	Common Russet Grass	<i>Loudetia simplex</i>
2	Ave.	Hairy Love Grass	<i>Eragrostis trichophora</i>
2	Ave.	Broad Curly Leaf	<i>Eragrostis rigidior</i>
2	Low	Sticky Love Grass	<i>Eragrostis viscosa</i>
2	Low	Gum Grass	<i>Eragrostis gummiflua</i>
D	High	Dropseed Grass	<i>Sporobolus fimbriatus</i>
D	Ave.	Small Panicum	<i>Panicum ecklonii</i>
2	High	Sweet Grass	<i>Panicum schinzii</i>
2	Ave.	Blue-seed Grass	<i>Tricholaena monachne</i>
2	Low	Natal Red Top	<i>Melinis repens</i>
2	Low	Stink Love Grass	<i>Eragrostis cilianensis</i>
2	Low	Tite Grass	<i>Eragrostis inamoena</i>
2	Low	Footpath Love Grass	<i>Eragrostis pseudosclerantha</i>
2	Low	Fibrous Dropseed	<i>Sporobolus stapfianus</i>
2	Low	Red Dropseed	<i>Sporobolus festivus</i>
2	Ave.	Lehmann's Love Grass	<i>Eragrostis lehmanniana</i>
3	Low	Giant Three-awn	<i>Aristida meridionalis</i>
2	Low	Purple Three-awn	<i>Aristida scabrivalvis</i>
2	Low	Rolling Grass	<i>Aristida bipartite</i>
2	Low	Rough Love Grass	<i>Eragrostis aspera</i>
2	Low	Shade Eragrostis	<i>Eragrostis biflora</i>
2	Low	Christmas Tree Grass	<i>Sporobolus panicoides</i>
2	Ave.	Pan Dropseed	<i>Sporobolus ioclados</i>
	Ave.	Pearly Love Grass	<i>Eragrostis rotifer</i>
	Ave.	Bronze Love Grass	<i>Eragrostis heteromera</i>

PANICLES CONTINUED

	High	Common Wild Sorghum	<i>Sorghum bicolor</i>
2	Ave.	Narrow Curly Leaf	<i>Eragrostis chloromelas</i>
2	High	Weeping Love Grass	<i>Eragrostis curvula</i>
D	Low	Common Reed	<i>Phragmites australis</i>
D	High	Guinea Grass	<i>Panicum maximum</i>
D	High	Small Buffalo Grass	<i>Panicum coloratum</i>
D	High	Couch Panicum	<i>Panicum repens</i>
D	High	Broad-leaved Panicum	<i>Panicum deustum</i>
2	Ave.	False Signal Grass	<i>Brachiaria deflexa</i>
2	Low	Spreading Three-awn	<i>Aristida congesta</i> subsp. <i>Barbicollis</i>
1	Low	Purple Plume Grass	<i>Bothriochloa bladhii</i>
	High	Rice Grass	<i>Leersia hexandra</i>
D	High	Broad-leaved Bristle Grass	<i>Setaria megaphylla</i>

DIGITATE INFLORESCENCES

2	Low	Catstail Dropseed	<i>Sporobolus pyramidalis</i>
2	Low	Curly-leaved Dropseed	<i>Sporobolus nitens</i>
2	Ave.	Arrow Grass	<i>Setaria sagittifolia</i>
2	Low	Herringbone Grass	<i>Pogonarthria squarrosa</i>
D	High	Black-footed Water Grass	<i>Eriochloa meyeriana</i>
D	High	Swamp Grass	<i>Diplachne fusca</i>
2	Low	Catstail Vlei Grass	<i>Dinebra retroflexa</i>

2	High	Jungle Rice	<i>Echinochloa colona</i>
D	High	Antelope Grass	<i>Echinochloa pyramidalis</i>
1	Ave.	Brown-seed Finger Grass	<i>Digitaria diagonalis</i>
E	Ave.	Vasey Grass	<i>Paspalum urvillei</i>
2	Low	Small Rolling Grass	<i>Trichoneura grandiglumis</i>
2	Ave.	Plume Chloris	<i>Chloris roxburghiana</i>
	Low	False Love Grass	<i>Bewisia biflora</i>
D	High	Perennial Signal Grass	<i>Urochloa oligotricha</i>
2	Low	Long-plumed Finger Grass	<i>Digitaria velutina</i>
2	Low	Goose Grass	<i>Eleusine coracana</i>
D	High	Vlei Finger Grass	<i>Dichanthium annulatum</i>
2	Ave.	Pinhole Grass	<i>Bothriochloa insculpta</i>
2	Low	Stinking Grass	<i>Bothriochloa radicans</i>
1	Ave.	Hippo Grass	<i>Ischaemum fasciculatum</i>
	Ave.	Turf Grass	<i>Ischaemum afrum</i>
2	Low	Black-seed Finger Grass	<i>Digitaria ternate</i>
D	High	Common Finger Grass	<i>Digitaria eriantha</i>
D	High	Vlei Bluestem	<i>Andropogon appendiculatus</i>
2	High	Couch Grass	<i>Cynodon dactylon</i>
D	High	Rhodes Grass	<i>Chloris gayana</i>

DIGITATE INFLORESCENCES CONTINUED

2	Ave.	Feather-top Chloris	<i>Chloris virgate</i>
2	Low	Spiderweb Grass	<i>Chloris pycnothrix</i>
1	Ave.	Black-seed Grass	<i>Alloteropsis semialata</i>
D	High	Brown Rhodes Grass	<i>Eustachys paspaloides</i>
2	High	Giant Crowfoot	<i>Dactyloctenium giganteum</i>
2	Ave.	Common Crowfoot	<i>Dactyloctenium aegyptium</i>
2	Ave.	LM Grass	<i>Dactyloctenium australe</i>
D	Ave.	Broad-leaved Bluestem	<i>Diheteropogon amplexens</i>
3	Low	Thread-leaved Bluestem	<i>Diheteropogon filifolius</i>
1	Ave.	Hairy Blue Grass	<i>Andropogon chinensis</i>
1	Ave.	Stab Grass	<i>Andropogon schirensis</i>
	Ave.	False Couch Grass	<i>Digitaria longiflora</i>
2	Ave.	Veld Paspalum	<i>Paspalum scrobiculatum</i>
1	Ave.	Common Signal Grass	<i>Brachiaria brizantha</i>
2	Low	Garden Urochloa	<i>Urochloa panicoides</i>
2	High	Bushveld Signal Grass	<i>Urochloa mosambicensis</i>
2	Ave.	Sweet Signal Grass	<i>Brachiaria eruciformis</i>
D	High	Black-footed Grass	<i>Brachiaria nigropedata</i>
D	Ave.	Velvet Signal Grass	<i>Brachiaria serrate</i>
2	Ave.	Kalahari Water Grass	<i>Echinochloa holubii</i>
	Low	Basket Grass	<i>Oplismenus hirtellus</i>
D	High	Nile Grass	<i>Acroceras macrum</i>

12. APPENDIX C: TREE SPECIES OCCURRING IN LION SANDS PRIVATE GAME RESERVE

ARECACEAE

22	Wild Date Palm	<i>Phoenix reclinata</i>
24	Northern Lala Palm	<i>Hyphaene petersiana</i>

ALOACEAE

28.1	Krantz Aloe	<i>Aloe arborescens</i>
29.5	Mountain Aloe*	<i>Aloe marlothii</i>
30.4	Lebombo Aloe	<i>Aloe spicata</i>

DRACAENACEAE

30.9	Large-leaved Dragon-tree	<i>Dracaena alectrifomis</i>
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MYRICACEAE

37	Broad-leaved Waxberry	<i>Morella pilulifera</i>
38	Lance-leaved Waxberry	<i>Morella serrate</i>

CELTIDACEAE

39	White-stinkwood	<i>Celtis Africana</i>
42	Pigeonwood	<i>Trema orientalis</i>
43	Thorny-elm	<i>Chaetachme aristata</i>

MORACEAE

63	Large-leaved Rock Fig	<i>Ficus abutilifolia</i>
48	Common Wild Fig*	<i>Ficus burkei</i>
64	Hairy Rock Fig	<i>Ficus glumosa</i>
55	Red-leaved Fig	<i>Ficus ingens</i>
48.1	Peters Fig	<i>Ficus petersii</i>
60	Wonderboom Fig	<i>Ficus salicifolia</i>
65	Lowveld Fig*	<i>Ficus stuhlmannii</i>
50	Broom-cluster Fig	<i>Ficus sur</i>
66	Sycamore Fig*	<i>Ficus sycomorus</i>
62	Small-leaved Rock Fig	<i>Ficus tettensis</i>

URTICACEAE

70	Rock Tree Nettle	<i>Obetia tenax</i>
71	Soap Nettle	<i>Pouzolzia mixta</i>

PROTEACEAE

73	Escarpment Beechwood	<i>Faurea galpinii</i>
76	Broad-leaved Beechwood	<i>Faurea rochetiana</i>
75	Willow Beechwood	<i>Faurea saligna</i>

SANTALACEAE

100	Rock Tannin-bush	<i>Osyris lanceolata</i>
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OLACACEAE

101	Small-fruit Olax	<i>Olax dissitiflora</i>
102	Blue Sourplum	<i>Ximenia Americana</i>
103	Sourplum*	<i>Ximenia caffra</i>

PORTULACACEAE

104	Spekboom	<i>Portulacaria afra</i>
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ANNONACEAE

106	Shakama-plum	<i>Hexalobus monopetalus</i>
105	Wild Custard-apple	<i>Annona senegalensis</i>
<u>CAPPARACEAE</u>		
130	Hedge Caper-bush	<i>Capparis sepiaria</i>
130.1	Woolly Caper-bush	<i>Capparis tomentosa</i>
122	Shepherds-tree	<i>Boscia albitrunca</i>
129.1	Green-leaved Wormbush	<i>Cadaba natalensis</i>
129.3	Grey-leaved Wormbush	<i>Cadaba termitaria</i>
132	Bead-bean	<i>Maerua angolensis</i>
133	Bush-cherry	<i>Maerua cafra</i>
<u>ESCALLONIACEAE</u>		
138	False Shiny-leaf	<i>Choristylis rhamnoides</i>
<u>PITTOSPORACEAE</u>		
139	Cheesewood	<i>Pittosporum viridiflorum</i>
<u>ROSACEAE</u>		
145	Oldwood	<i>Leucosidea sericea</i>
147	African Almond	<i>Prunus Africana</i>
<u>CHRYSOBALANACEAE</u>		
146	Mobola-plum	<i>Parinari curatellifolia</i>
<u>CONNARACEAE</u>		
147.1	Itch-pod	<i>Cnestis polyphylla</i>
<u>MIMOSOIDEAE</u>		
150	Worm-cure Albizia	<i>Albizia anthelmintica</i>
152	Rock Albizia	<i>Albizia brevifolia</i>
154	Broad-pod Albizia	<i>Albizia forbesii</i>
155	Bushveld Albizia	<i>Albizia harveyi</i>
153	Many-stemmed Albizia	<i>Albizia petersiana</i>
158	Large-leaved Albizia	<i>Albizia versicolor</i>
160	Flame Thorn	<i>Acacia ataxacantha</i>
160.1	Sticky Thorn	<i>Acacia borleae</i>
161	Black Monkey Thorn	<i>Acacia burkei</i>
162	Common Hook Thorn	<i>Acacia Caffra</i>
163.1	Corky-bark Thorn	<i>Acacia davyi</i>
164	Blue Thorn	<i>Acacia erubescens</i>
164.1	Flaky-bark Thorn	<i>Acacia exuvialis</i>
167	Red Thorn	<i>Acacia gerrardii</i>
168.1	Horned Thorn	<i>Acacia grandicornuta</i>
178	Knob Thorn	<i>Acacia nigrescens</i>
179	Scented-pod Thorn	<i>Acacia nilotica</i>
183.1	River Thorn	<i>Acacia robusta</i>
184.1	River Climbing Thorn	<i>Acacia schweinfurthii</i>
185.1	Bushy Three-hook Thorn	<i>Acacia Senegal var. rostrata</i>
187	Paperbark Thorn	<i>Acacia sieberiana</i>
188	Umbrella Thorn	<i>Acacia tortilis</i>
189	Fever-tree Acacia*	<i>Acacia xanthophloea</i>
159	Ana-tree	<i>Faidherbia albida</i>
190	Sickle-bush	<i>Dichrostachys cinerea</i>
<u>CAESALPINIOIDEAE</u>		
202	Weeping Boer-bean*	<i>Schotia brachypetala</i>

203	Dwarf Boer-bean*	<i>Schotia capitata</i>
207	Pod-mahogany	<i>Afzelia quanzensis</i>
208.2	Pride-of-De Kaap	<i>Bauhinia galpinii</i>
209	Camels-foot	<i>Piliostigma thonningii</i>
212	Long-tail Cassia	<i>Cassia abbreviata</i>
213	Eared Senna	<i>Senna petersiana</i>
213.2	Red-wing	<i>Pterolobium stellatum</i>
215	African-wattle	<i>Peltophorum africanum</i>

PAPILIONOIDESE

216	Wild-mango	<i>Cordyla Africana</i>
241	Nyala-tree	<i>Xanthocercis zambesiaca</i>
222	Tree Wistaria*	<i>Bolusanthus speciosus</i>
225.12	Eared Rattle-pod	<i>Crotalaria capensis</i>
226.9	Fountain-bush	<i>Psoralea pinnata</i>
227.6	Grassland Hoofleaf-pea	<i>Otholobium wilmsii</i>
226	Cork-bush	<i>Mundulea sericea</i>
229.1	River-bean	<i>Sesbania sesban</i>
230	Hairy Caterpillar-pod	<i>Ormocarpum trichocarpum</i>
231	Thorny-rope	<i>Dalbergia armata</i>
232	Zebrawood*	<i>Dalbergia melanoxylon</i>
236	Kiaat	<i>Pterocarpus angolensis</i>
237	Round-leaved Bloodwood	<i>Pterocarpus rotundifolius</i>
238	Apple-leaf*	<i>Philenoptera violacea</i>
243.1	Dwarf Coral-tree	<i>Erythrina humeana</i>
244	Broad-leaved Coral-tree	<i>Erythrina latissima</i>
245	Sacred Coral-tree	<i>Erythina lysistemom</i>

ERYTHROXYLACEAE

248	Small-leaved Coca-tree	<i>Erythroxylum delagoense</i>
249	African Coca-tree	<i>Erythroxylum emarginatum</i>

BALANTIACEAE

251	Green-thorn*	<i>Balanites maughamii</i>
252	Small Green-thorn	<i>Balanites pedicellaris</i>

RUTACEAE

253	Small Knobwood	<i>Zanthoxylum capense</i>
256	Cape-chestnut	<i>Calodendrum capense</i>
261	White-ironwood	<i>Vepris lanceolata</i>
260	Rock White-ironwood	<i>Vepris reflexa</i>
262	Wild-mandarin	<i>Toddaliopsis bremekampii</i>
265	Perdepis	<i>Clausena anisata</i>

KIRKIAEAE

267	White Kirkia	<i>Kirkia acuminata</i>
269	Mountain Kirkia	<i>Kirkia wilmsii</i>

BURSERACEAE

270	Poison-grub Corkwood*	<i>Commiphora Africana</i>
285.1	Tall Firethorn Corkwood	<i>Commiphora glandulosa</i>
277	Copper-stem Corkwood	<i>Commiphora harveyi</i>
278	Paperbark Corkwood	<i>Commiphora marlothii</i>
280	Velvet-leaved Corkwood	<i>Commiphora mollis</i>
283	Sweet-root Corkwood	<i>Commiphora neglecta</i>
285	Firethorn Corkwood	<i>Commiphora pyracanthoides</i>

287	Glossy-leaved Corkwood*	<i>Commiphora schimperi</i>
<u>MELIACEAE</u>		
293	Wooden-banana	<i>Entandrophragma caudatum</i>
297	Lowveld Honeysuckle-tree	<i>Turraea nilotica</i>
296.1	Small Honeysuckle-tree	<i>Turraea obtusifolia</i>
298	Cape-ash	<i>Ekebergia capensis</i>
299	Rock-ash	<i>Ekebergia pterophylla</i>
301	Natal-mahogany*	<i>Trichillia emetic</i>
<u>MALPIGHIACEAE</u>		
303.5	Mothfruit	<i>Acridocarpus natalitius</i>
<u>POLYGALACEAE</u>		
302.2	Purple-broom	<i>Polygala virgate</i>
303	Violet-tree	<i>Securidaca longepedunculata</i>
<u>EUPHORBIACEAE</u>		
305	False Lightning-bush	<i>Andrachne ovalis</i>
308	Kudu-berry	<i>Pseudolachnostylis maprouneifolia</i>
309	Whiteberry-bush	<i>Flueggea virosa</i>
311	Potato-bush	<i>Phyllanthus reticulatus</i>
310	Peacock-berry	<i>Margaritaria discoidea</i>
314	Forest Ironplum	<i>Drypetes gerrardii</i>
318	Tassel-berry	<i>Antidesma venosum</i>
322	Blue Sweetberry	<i>Bridelia cathartica</i>
324	Mitzeerie	<i>Bridelia micrantha</i>
325	Velvet Sweetberry	<i>Bridelia mollis</i>
327	Lebombo-ironwood	<i>Androstachys johnsonii</i>
328	Lavender Croton	<i>Croton gratissimus</i>
329	Fever-berry	<i>Croton megalobotrys</i>
329.2	Rough-leaved Croton	<i>Croton menyharthii</i>
329.3	Small Lavender Croton	<i>Croton pseudopulchellus</i>
330	Forest Croton	<i>Croton sylvaticus</i>
332.2	False Bead-string	<i>Micrococca capensis</i>
335.1	Forest False-nettle	<i>Acalypha glabrata</i>
336.2	Lightning-bush	<i>Clutia pulchella</i>
341	Tamboti*	<i>Spirostachys africana</i>
346	Bushveld Candelabra Euphorbia*	<i>Euphorbia cooperi</i>
351	Naboom*	<i>Euphorbia ingens</i>
355	Rubber-hedge Euphorbia	<i>Euphorbia tirucalli</i>
357.1	Dead-man's Tree	<i>Synadenium cupulare</i>
<u>ANACARDIACEAE</u>		
360	Marula*	<i>Sclerocarya birrea</i>
361	Wild-plum	<i>Harpephyllum caffrum</i>
362	Live-long	<i>Lannea discolor</i>
363	False-marula*	<i>Lannea schweinfurthii</i>
364	Red-beech	<i>Protorhus longifolia</i>
371	Drooping Resin-tree	<i>Ozoroa engleri</i>
375	Resin-tree	<i>Ozoroa paniculosa</i>
377	Currant Resin-tree	<i>Ozoroa sphaerocarpa</i>
380	Red Currant	<i>Searsia chirindensis</i>
381	Nana-berry	<i>Searsia dentata</i>
378	River Karee	<i>Searsia gerrardii</i>

384	Thorny Karee	<i>Searsia gueinzii</i>
386	Karee	<i>Searsia lancea</i>
387	Rock Karee	<i>Searsia leptodictya</i>
388.1	Waxy Currant	<i>Searsia lucida</i>
391	Crow-berry	<i>Searsia pentheri</i>
392	Common Currant	<i>Searsia pyroides</i>
393.1	Blunt-leaved Currant	<i>Searsia rehmanniana</i>

AQUIFOLIACEAE

397	African Holly	<i>Ilex mitis</i>
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CELASTRACEAE

398	Silky-bark	<i>Maytenus acuminata</i>
401	Cape-blackwood	<i>Maytenus peduncularis</i>
403	Koko-tree	<i>Maytenus undata</i>
405	White Candlewood	<i>Pterocelastrus echinatus</i>
408	Red Candlewood	<i>Pterocelastrus rostratus</i>
399	Common Spikethorn	<i>Gymnosporia buxifolia</i>
399.6	Blue Spikethorn	<i>Gymnosporia glaucophylla</i>
399.9	Tropical Spikethorn	<i>Gymnosporia maranguensis</i>
399.2	Black Forest Spikethorn	<i>Gymnosporia harveyana</i>
402	Confetti Spikethorn	<i>Gymnosporia senegalensis</i>
404	Bushmans-tea	<i>Catha edulis</i>
416	Bushveld Saffron*	<i>Elaeodendron transvaalense</i>
410	Kooboo-berry*	<i>Mystroxydon aethiopicum</i>

ICACINACEAE

422	White-pear	<i>Apodytes dimidiata</i>
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SAPINDACEAE

425	African False-currant	<i>Allophylus africanus</i>
423	Small-leaved False-currant	<i>Allophylus decipiens</i>
430.1	Northern Soap-berry	<i>Deinbollia xanthocarpa</i>
433	Jacket-plum*	<i>Pappea capensis</i>
437	Sand-olive	<i>Dodonaea viscosa</i>
438	False-perdepis	<i>Hippobromus pauciflorus</i>

PTAEROXYLACEAE

292	Sneezewood	<i>Ptaeroxylon obliquum</i>
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RHAMNACEAE

447	Buffalo-thorn	<i>Ziziphus mucronata</i>
448	River Jujube	<i>Ziziphus rivularis</i>
449	Brown Ivory*	<i>Berchemia discolor</i>
450	Red Ivory*	<i>Berchemia zeyheri</i>
450.1	Cat-thorn	<i>Scutia myrtina</i>
452	Shiny-leaf	<i>Rhamnus prinoides</i>
453.2	Northern Hard-leaf	<i>Phyllica paniculata</i>

VITACEAE

456.3	Bushveld Grape	<i>Rhoicissus revouilii</i>
456.6	Bushman's Grape	<i>Rhoicissus tridentate</i>

TILIACEAE

458	White-leaves Raisin	<i>Grewia bicolor</i>
459	Climbing Raisin	<i>Grewia caffra</i>

459.1	Velvet Raisin	<i>Grewia flava</i>
459.2	Sandpaper Raisin	<i>Grewia flavescens</i>
460	Giant Raisin	<i>Grewia hexamita</i>
460.1	Large-leaved Yellow Raisin	<i>Grewia inadequilatera</i>
462	Grey Raisin	<i>Grewia monitcola</i>
463	Cross-berry	<i>Grewia occidentalis</i>
463.8	False Grey Raisin	<i>Grewia subspathulata</i>
463.3	Mallow Raisin	<i>Grewia villosa</i>
<u>STERCULIACEAE</u>		
468.1	Pink Dombeya	<i>Dombeya burgessiae</i>
469	Hairless Dombeya	<i>Dombeya cymosa</i>
470.1	Silver Dombeya	<i>Dombeya pulchra</i>
471	Wild-pear	<i>Dombeya rotundifolia</i>
477	Star-chestnut	<i>Sterculia rogersii</i>
<u>OCHNACEAE</u>		
479	Coldbark Ochna	<i>Ochna arborea</i>
480	Red-ironwood	<i>Ochna holstii</i>
480.1	Stunted Ochna	<i>Ochna inermis</i>
481	Showy Ochna	<i>Ochna natalitia</i>
479.1	Carnival Ochna	<i>Ochna serrilata</i>
<u>CLUSIACEAE</u>		
484	Curry-bush	<i>Hypericum revolutum</i>
486	African Mangosteen	<i>Garcinia livingstonei</i>
<u>CANELLACEAE</u>		
488	Pepper-bark Tree	<i>Warburgia salutaris</i>
<u>VIOLACEAE</u>		
489	Narrow-leaved Violet-bush	<i>Rinorea angustifolia</i>
<u>FLACOURTIACEAE</u>		
492	Snuff-box Tree	<i>Oncoba spinosa</i>
494	Wild-peach	<i>Kiggelaria africana</i>
498	Thorn-pear	<i>Scolopia zeyheri</i>
501	Brown-ironwood	<i>Homalium dentatum</i>
503	Wild-mulberry	<i>Trimeria grandifolia</i>
506	Governors-plum*	<i>Flacortia indica</i>
507	Kei-apple	<i>Dovyalis caffra</i>
508	Glossy Sourberry	<i>Dovyalis lucida</i>
509	Sourberry	<i>Dovyalis rhamnoides</i>
511	Apricot Sourberry	<i>Dovyalis zeyheri</i>
<u>THYMELAEACEAE</u>		
517	Poison-olive	<i>Peddiea africana</i>
521	Pompon-tree	<i>Dais cotinifolia</i>
<u>LYTHRACEAE</u>		
523	Galpinia	<i>Galpinia transvaalica</i>
<u>RHIZOPHORACEAE</u>		
529	Onionwood	<i>Cassipourea malosana</i>
<u>COMBRETACEAE</u>		
532	Red Bushwillow	<i>Combretum apiculatum</i>

534	Trailing Bushwillow	<i>Combretum celastroides</i>
541.2	Weeping Bushwillow	<i>Combretum collinum</i> subsp. <i>Suluense</i>
536	River Bushwillow	<i>Combretum erythrophyllum</i>
538	Russet Bushwillow	<i>Combretum hereroense</i>
539	Leadwood*	<i>Combretum imberbe</i>
545	Flame Climbing Bushwillow	<i>Combretum microphyllum</i>
537	Velvet Bushwillow	<i>Combretum molle</i>
545.1	Knobbly Climbing Bushwillow	<i>Combretum mossambicense</i>
546	Large-fruit Bushwillow	<i>Combretum zeyheri</i>
548	Stink-bushwillow	<i>Pteleopsis myrtifolia</i>
549	Lebombo Cluster-leaf	<i>Terminalia phanerophlebia</i>
550	Purple-pod Cluster-leaf	<i>Terminalia prunioides</i>
551	Silver Cluster-leaf	<i>Terminalia sericea</i>

MYRTACEAE

553.4	Hairy Myrtle	<i>Eugenia woodii</i>
555	Waterberry	<i>Syzygium cordatum</i>
557	Bushveld Waterberry	<i>Syzygium guineense</i>

HETEROPYXIDACEAE

455	Lavender-tree	<i>Heteropyxis natalensis</i>
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ARALIACEAE

566	False Cabbage-tree	<i>Schefflera umbellifera</i>
562	Rock Cabbage-tree	<i>Cussonia natalensis</i>
564	Cabbage-tree	<i>Cussonia spicata</i>

APIACEAE

568	Parsley-tree	<i>Heteromorpha arborescens</i>
569	Carrot-tree	<i>Steganotaenia araliacea</i>

SAPOTACEAE

579	White Milkwood	<i>Sideroxylon inerme</i>
581	Stamvrug	<i>Englerophytum magalismsontanum</i>
584	Buh Red-milkwood	<i>Mimusops obovata</i>
585	Red-milkwood	<i>Mimusops zeyheri</i>
587	Lowveld Milkberry*	<i>Manilkara mochisia</i>

EBENACEAE

595	Magic Guarri	<i>Euclea divinorum</i>
597	Hairy Guarri	<i>Euclea natalensis</i>
601	Small-leaved Guarri	<i>Euclea undulata</i>
605	Bluebush Star-apple	<i>Diospyros lycioides</i>
606	Jackal-berry*	<i>Diospyros mespiliformis</i>
610	Hairy Star-apple	<i>Diospyros villosa</i>
611	Bladder-nut	<i>Diospyros whyteana</i>

OLEACEAE

612	Wing-leaved Wooden-pear	<i>Schrebera alata</i>
618.1	Rock Ironwood	<i>Olea capensis</i> subsp. <i>Enervis</i>
517	African Olive	<i>Olea europaea</i>

SALVADORACEAE

622.1	Needle-bush	<i>Azima tetraantha</i>
621	Narrow-leaved Mustard-tree	<i>Salvadora australis</i>

STRYCHNACEAE

624	Cape-teak	<i>Strychnos decussate</i>
626	Black Monkey-orange	<i>Strychnos madagascariensis</i>
629	Spiny Monkey-orange	<i>Strychnos spinosa</i>
631	Blue Bitterberry	<i>Strychnos usambarensis</i>

BUDDLEJACEAE

633	Brittlewood	<i>Nuxia congesta</i>
635	Water Nuxia	<i>Nuxia oppositifolia</i>
636	False Olive	<i>Buddleja saligna</i>
637	Sagewood	<i>Buddleja salviifolia</i>

APOCYNACEAE

639	Bushman's Poison	<i>Acokanthera oppositifolia</i>
640	Round-leaved Poison-bush	<i>Acokanthera roundata</i>
640.1	Common Num-num*	<i>Carissa bispinosa</i>
640.6	Sand Num-num	<i>Carissa tetramera</i>
647.3	Impala-lily	<i>Adenium multiflorum</i>
650	Saddle-pod	<i>Wrightia natalensis</i>

BORAGINACEAE

654	Satin-bark Saucer-berry	<i>Cordia ocalis</i>
656	Sandpaper-bush	<i>Ehretia amoena</i>
656.1	Hairy Puzzlebush	<i>Ehretia obtusifolia</i>
657	Puzzlebush	<i>Ehretia rigida</i>

VERBENACEAE

	Fever-tea	<i>Lippia javanica</i>
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LAMIACEAE

658	Skunk-bush	<i>Premna mooiensis</i>
664	Pipe-stem Fingerleaf	<i>Vitex rehmannii</i>
	Hairy Tinderwood	<i>Clerodendrum eriophyllum</i>
667.1	Cats-whiskers	<i>Rothea myricoides</i>

SOLANACEAE

669.3	Goat Bitter-apple	<i>Solanum aculeastrum</i>
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BIGNONIACEAE

673.1	Cape-honeysuckle	<i>Tecomaria capensis</i>
676	Mopane Rhigozum	<i>Rhigozum zambesiicum</i>
678	Sausage-tree	<i>Kigelia africana</i>

RUBIACEAE

682	Yellow Firebush	<i>Hymenodictyon parvifolium</i>
684	Matumi *	<i>Breonadia salicina</i>
688	Wild-pomegranate	<i>Burchellia bubaline</i>
689	Small Bone-apple	<i>Coddia rudis</i>
691	Bushveld Gardenia*	<i>Gardenia volkensii</i>
694	Woodland Rothmannia	<i>Rothmania fischeri</i>
690	Spiny-gardenia	<i>Hypercanthus amoenus</i>
698.3	Fluffy-flowered Jackal-coffee	<i>Tricalysia junodii</i>
702	Velvet Wild-medlar	<i>Vangueria infausta</i>
702.1	Smooth Wild-medlar	<i>Vangueria madagascariensis</i>
714.4	Porcupine-bush	<i>Pyrostria hystrix</i>
719.3	Sand Brides-bush	<i>Pavetta catophylla</i>
716	Stink-leaf Brides-bush	<i>Pavetta gardeniifolia</i>

717.5	Narrow-leaved Brides-bush	<i>Pavetta gracilifolia</i>
718.1	Weeping Brides-bush	<i>Pavetta lanceolata</i>
721	Poison Brides-bush	<i>Pavetta schumanniana</i>

ASTERACEAE

723.4	Lowveld Vernonia	<i>Vernonia colorata</i>
727	Lowveld Silver-oak	<i>Brachylaena huillensis</i>
733	Camphor-bush	<i>Tarconanthus camphoratus</i>

13. APPENDIX D: HERBIVORE SPECIES OCCURRING IN LION SANDS PRIVATE GAME RESERVE

Species	IUCN Conservation Status	Conservation Actions
African Buffalo - <i>Syncerus caffer</i>	Least Concern	Protected Wild Animal
African Elephant – <i>Loxodonta africana</i>	Vulnerable	Specially Protected
Black Rhinoceros- <i>Diceros bicornis</i>	Critically Endangered	Specially Protected
Bushbuck - <i>Tragelaphus scriptus</i>	Least Concern	Ordinary Game
Bushpig - <i>Potamochoerus larvatus</i>	Least Concern	Problem Animal
Common Eland - <i>Tragelaphus oryx</i>	Least Concern	Protected Game
Common (Blue) Wildebeest - <i>Connochaetes taurinus</i>	Least Concern	Ordinary Game
Giraffe – <i>Giraffa camelopardalis</i>	Least Concern	Protected Game
Grey Duiker - <i>Sylvicapra grimmia</i>	Least Concern	Ordinary Game
Hippopotamus - <i>Hippopotamus amphibius</i>	Vulnerable	Protected Game
Impala - <i>Aepyceros melampus</i>	Least Concern	Ordinary Game
Klipspringer - <i>Oreotragus oreotragus</i>	Least Concern	Protected Game
Kudu - <i>Tragelaphus strepsiceros</i>	Least Concern	Ordinary Game
Nyala - <i>Tragelaphus angasii</i>	Least Concern	Protected Game
Roan Antelope - <i>Hippotragus equinus</i>	Least Concern	Protected Game
Sable Antelope - <i>Hippotragus niger</i>	Least Concern	Protected Game
Southern (Common) Reedbuck – <i>Redunca arundinum</i>	Least Concern	Protected Game
Steenbuck - <i>Raphicerus campestris</i>	Least Concern	Protected Game
Tsessebe – <i>Damaliscus lunatus</i>	Least Concern	Protected Game
Warthog - <i>Phacochoerus africanus</i>	Least Concern	See Section 33 of the MNCA
Waterbuck - <i>Kobus ellipsiprymnus</i>	Least Concern	Protected Game
White Rhinoceros – <i>Ceratotherium simum</i>	Near Threatened	Specially Protected
Zebra - <i>Equus burchelli</i>	Least Concern	Ordinary Game

14. APPENDIX E: CARNIVORES AND OTHER SMALL MAMMALS OCCURRING IN LION SANDS PRIVATE GAME RESERVE

Species	IUCN Conservation Status	Conservation Actions
Aardvark – <i>Orycteropus afer</i>	Least Concern	Protected Game
Aardwolf – <i>Proteles cristatus</i>	Least Concern	Protected Game
African Civet – <i>Civettictis civetta</i>	Least Concern	See Section 33 of the MNCA
African Clawless Otter – <i>Aonyx capensis</i>	Least Concern	
African Striped Weasel – <i>Poecilogale albinucha</i>	Least Concern	
African Wild Cat – <i>Felis silvestris lybica</i>	Not assessed	See Section 33 of the MNCA
African Wild Dog - <i>Lycaon pictus</i>	Endangered	Protected Game
Banded Mongoose – <i>Mungos mungo</i>	Least Concern	See Section 33 of the MNCA
Bat-eared Fox – <i>Otocyon megalotis</i>	Least Concern	
Black-backed Jackal – <i>Canis mesomelas</i>	Least Concern	Problem Animal
Brown Hyaena – <i>Hyaena brunnea</i>	Near Threatened	Protected Game
Cape Fox – <i>Vulpes chama</i>	Least Concern	
Cape Porcupine – <i>Hystrix africaeaustralis</i>	Least Concern	
Caracal – <i>Caracal caracal</i>	Least Concern	Problem Animal
Chacma Baboon – <i>Papio ursinus</i>	Least Concern	See Section 33 of the MNCA
Cheetah – <i>Acinonyx jubatus</i>	Vulnerable	Protected Wild Animal
Common Dwarf Mongoose – <i>Helogale parvula</i>	Least Concern	
Common Genet – <i>Genetta genetta</i>	Least Concern	See Section 33 of the MNCA
Egyptian Mongoose – <i>Herpestes ichneumon</i>	Least Concern	See Section 33 of the MNCA
Greater Cane Rat – <i>Thryonomys swinderianus</i>	Least Concern	
Grivet Monkey (Vervet Monkey) – <i>Cercopithecus aethiops</i>	Least Concern	See Section 33 of the MNCA
Honey Badger – <i>Mellivora capensis</i>	Least Concern	
Jameson's Red Rock Hare – <i>Pronolagus randensis</i>	Least Concern	
Leopard – <i>Panthera pardus</i>	Near Threatened	Protected Wild Animal
Lesser Bushbaby – <i>Galago moholi</i>	Least Concern	Protected Game
Lion – <i>Panthera leo</i>	Vulnerable	Protected Wild Animal
Marsh Mongoose – <i>Atilax paludinosus</i>	Least Concern	See Section 33 of the MNCA
Meller's Mongoose – <i>Rhynchogale melleri</i>	Least Concern	See Section 33 of the MNCA
Pangolin – <i>Manis temminckii</i>	Least Concern	Protected Game
Rock Hyrax – <i>Procavia capensis</i>	Least Concern	See Section 33 of the MNCA
Scrub Hare – <i>Lepus saxatilis</i>	Least Concern	
Serval – <i>Leptailurus serval</i>	Least Concern	See Section 33 of the MNCA
Sharpe's Grysbok – <i>Raphicerus sharpei</i>	Least Concern	
Side-striped Jackal – <i>Canis adustus</i>	Least Concern	See Section 33 of the MNCA
Slender Mongoose – <i>Herpestes sanguineus</i>	Least Concern	
Smith's Bush Squirrel – <i>Paraxerus cepapi</i>	Least Concern	See Section 33 of the MNCA
South African Large-spotted Genet – <i>Genetta tigrina</i>	Least Concern	See Section 33 of the MNCA
Southern African Hedgehog – <i>Atelerix frontalis</i>	Least Concern	Protected Game
Spotted Hyaena – <i>Crocuta crocuta</i>	Least Concern	Protected Wild Animal
Spring Hare – <i>Pedetes capensis</i>	Least Concern	See Section 33 of the MNCA
Thick-tailed Greater Galago (Bushbaby) – <i>Otolemur crassicaudatus</i>	Least Concern	Protected Game
White-tailed Mongoose – <i>Ichneumia albicauda</i>	Least Concern	See Section 33 of the MNCA
Yellow-spotted Hyrax – <i>Heterohyrax brucei</i>	Least Concern	
Zorilla (Striped Polecat) – <i>Ictonyx striatus</i>	Least Concern	



ENVIRONMENTAL MANAGEMENT PROGRAMME

August 2014. DRAFT



PROJECT:

Basic Environmental Assessment
for the Construction of a lodge and
additional staff accommodation,
Lion Sands, Sabi Sand Game
Reserve

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Ref. No: 17/2/3/E-257



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1 SCOPE

The Environmental Management Programme (EMP) provides guidance and proposes viable and suitable mitigation measures for assessed impacts.

The document is a 'living' document in order that it can be adapted to specific environmental concerns and issues as they arise. Changes to the EMP must be in accordance with the conditions stipulated in the Environmental Authorisation (EA).

The EMP must be finalised only after the EA has been issued so that it can take into account any particular requirements of the EA.

Copies of the EMP document, the EA and all Environmental Control Officer (ECO) and audit reports must be available on site at all times.

2 AGREEMENT

It is important to note that the acceptance of the EMP by the relevant environmental authority and the client are governed by legislation and are to be read as a contract between the implementing agent (Contractor), the Client and the environmental authority – Mpumalanga Department of Economic Development, Environment and Tourism (MDALA). It is therefore crucial that the contractor, sub-contractor and developer adhere to its requirements, failure to do so can lead to penalties levied against the contractor, sub-contractor and the developer.

The project manager must institute contractual measurements to ensure that the contractors and sub-contractors adhere to the environmental obligations agreed upon.

3 RESPONSIBLE PERSON

A responsible person/ Environmental Control Officer (ECO) shall be appointed, to ensure full compliance with the requirements of the Environmental Management Programme through a regular audit process. The ECO should familiarise themselves with the contents of this document. The ECO will advise contractors on all environmental issues that are unclear and shall further be responsible for the environmental auditing required for the duration of the projects. A site inspection should be carried out by the ECO regularly during the project to monitor compliance and progress. From this site inspection a compliance report should be submitted to the Client and the MDALA for control and comment purposes. It is recommended that an Environmental Management Inspection Officer (EMI) from MDALA be appointed to monitor the implementation of this EMP.

The ECO may at any time instruct a contractor/subcontractor to leave the site due to non-compliance to the conditions of the EMP.

The ECO will further be responsible for the training of contractor and sub-contractor staff in terms of conveying the contents of this EMP to them through an induction process where after the contractors will sign acceptance and understanding of conditions.

4 INCIDENT REGISTERS AND REPORTING

An incident register must be kept on site at all times. This register must be maintained and any environmental incidents must be recorded in this register. The register must be made available for audits. The contractor will be responsible to ensure that the register is kept up to date. All environmental incidents must be reported to the responsible person (ECO), and the responsible contractor will sign the logging of the incident, to ensure that the information contained in the register is correct. The register must contain the date, time and place of the incident that took place. Remedial measure taken must also be mentioned in the register.

The ECO will audit the construction site, at a frequency not less than that indicated in the authorisation (EA) and will submit a monthly report to the project management team and lead environmental authority.

A complaints register is to be maintained, in the event of the public wishing to comment or complain regarding any construction activity.

5 AUDIT PROCESS

Upon the contractor induction, an audit check-list will be established using this EMP, the EA and any issues identified in the environmental assessment, as a guideline and will be signed by the relevant contractor to indicate understanding of the requirements.

Audits will be conducted with the contractor (or his/her representative) present and the completed audit will be signed by both the auditor and contractor (or representative).

Audit times should be arranged by agreement with not less than 24hours notice.

6 SITE IMPACTS AND MITIGATION

6.1 VEHICLE ACCESS

Vehicle access to the site will be through the reserve entrance gate and from there via the approved site access. New or alternative site access roads are not to be constructed by the contractor. On site the contractor must use only the existing or planned roadways. There must be no driving off road.

The access roads should be closely monitored for signs of potential degradation during the course of the construction. The ECO will advise as to appropriate measures that may need to be taken to mitigate any road degradation should it be required.

All vehicles used by contractors and sub-contractors are to comply with the South African traffic ordinance. All drivers and vehicles shall be licensed and shall be in a road worthy condition and shall be well maintained. Vehicles are to be insured against accidents and third party liability. All vehicles shall undergo regular checks to ensure they are roadworthy and free of oil or other lubricant leaks. The ECO may at any time request the road worthy certificate of a vehicle, or for leaks to be repaired..

Contractors and sub-contractor drivers are to be courteous in all dealings with the public and shall adhere to all roadway signage and speed limits.

6.2 SITE SETUP

The location of the site office, storage areas, ablutions etc. will be indicated by the ECO in conjunction with The Project Manager, it will be attempted to include these within current infrastructure or a previously disturbed site near the development area without creating new impacts. It will be necessary for the contractors to travel to and from the development site on a daily basis. There will be no housing of contractors on site.

Availability of ablution facilities will be assessed by the ECO, if current facilities can be used this would be ideal, if not the most appropriate form of portable toilets will be erected on site at a ratio of 1 toilet per 15 persons. The ECO will monitor the standard of hygiene and maintenance of the facilities throughout the duration of the contract. It will be the contractor's responsibility to keep these facilities clean. Toilet paper is to be provided by the contractor. No pit latrines or septic tanks / soak-aways are permitted on the site. The use of the eco-loo dehydration toilet is permitted.

6.3 PROTECTION OF FAUNA AND FLORA

Protected tree species cannot easily be transplanted and have therefore been incorporated in the development design, where possible. Contractors have no right to trim, damage or destroy fauna and/or flora without the consent of the ECO and project manager. During site layout, shrubs that may be removed will be marked and only these, will be removed. No removal of any other trees or shrubs will be permitted.

If a protected tree (Act 84 of 1998 and/or Act 10 of 1998) needs to be trimmed or impacted in any way, the ECO must be notified immediately so that the appropriate applications can be made to the relevant authorities (DoF). Only upon a letter of authorisation from the authority can the identified action take place.

No foreign materials may be nailed or attached to any trees.

No firewood or any other plant material or animal may be collected, killed or removed from the site. The contractor will be held responsible for any illegal action by any of his staff members e.g. poaching, setting of snares, fishing etc.

6.4 SOCIAL, HERITAGE AND ECONOMIC

Should excavation or large scale earth moving activities reveal any human skeletal remains, broken pieces of 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 may temporarily halt such activities in the particular area until the archaeologist has assessed the situation.

Construction supervisors and contractors should be trained to recognise archaeological or cultural historical 'chance finds' during construction and such finds:

- > Must **NOT** be disturbed, damaged or moved; and
- > Will immediately be brought to the attention of the Environmental Control Officer and an archaeologist.

6.5 POLLUTION POTENTIAL

Cement has a high pH of 13 and cement wash and powder can destroy soil seed banks and aquatic life before it cures.

Noise pollution is likely to be a consideration during construction.

Dust pollution is likely to be associated with the construction.

Light pollution is not likely to be an impact during construction. The building designs should take cognisance of the impact of light pollution and designs should eliminate unshielded lights.

Mitigation:

No **cement** mixing should be allowed on the bare ground. Cement must be mixed on an impervious surface such as a concrete slab or metal or wood sheet. If a cement mixer is used this should be placed on a plastic liner or similar in order to catch potential spills and overflow. Where possible, cement mixing should be undertaken in an area within the building or road footprint. Storm water contamination from cement mixing must be prevented (i.e. no storm water washing into or out of a cement mixing area).

Waste water emanating from the cleaning of tools used for cement mixing and application should be contained and prevented from entering any storm water or river system. A suitable approach would be to store this waste water in drums, or similar suitable container, and use it for mixing cement and for re-wetting cement works. In the situation where wet or raw cement has come into contact with bare ground, the affected earth should be removed to a depth of 50mm and disposed of in either a registered land fill, or used as foundation fill in new construction sites. Topsoil which is removed from within the footprint of a new unit should be used to fill the scraping in again.

A thorough clean-up operation should be instituted to remove all the building debris from all areas of the constructed units. The clean-up should only be considered complete after an inspection by the ECO and MDALA Department officers. All material from this clean-up should be disposed of in a registered land fill site. No construction teams should be allowed to build until they have undergone an environmental induction and have signed an Environmental Management Program contract that will ensure the building sites are maintained in an environmentally sensitive condition.

Noisy machinery (pumps and generators) should have sound levels of less than 45dB or sound proofed through the use of structures such as buildings or berm walls.

Dust should be monitored and roadways should be wetted with water or a dust suppressant. Wetting of roads should not be to the extent that it causes erosion or run-off.

6.6 SERVICES

Electricity is required to be laid to the building sites. The cables for this will be placed underground. The trenching process can impact the surrounding vegetation.

Water is to be sourced from the existing lodge supply. The pipes for this will be placed underground. The trenching process can impact the surrounding vegetation.

Roads can become eroded and dangerous.

Solid waste will be produced during construction.

Sewage is to be led to the existing sewage treatment plant at the existing lodge. The pipes for this will be placed underground. The trenching process can impact the surrounding vegetation.

Mitigation:

Electricity and other services should be buried where possible. The trenching should be conducted by a mini trench digger or a small narrow bucket TLB to minimise the impact on the vegetation. During trenching the top soil must be kept separate from overburden so that these can be replaced correctly in the trench.

Water, sewage and electricity may be combined in one trench where possible to reduce environmental footprint and impacts. Water should be buried at a minimum of one metre, if possible, to avoid elephant damage.

Contractors are to ensure that the cable and/or pipes to be installed in a trench are available on site before excavating the trench. Trenching should only be done for the length of services which can be installed in one day, no trenches should not be left open over night.

Water: The contractor will be responsible for making sure sufficient potable water is available for the workers. The ECO is to train contractors as to correct and safe water usage practises.

Hose pipes must be entire and are to be fitted with nozzles or taps at the discharge end to improve water saving. Watering should be strictly managed by the contractor, to ensure that hose pipes are not left unattended while delivering water.

Roads should have appropriate mitre drains and be maintained regularly.

A **solid waste** collection system is in place and all general waste which is generated will be disposed of in the existing lodge waste disposal system. All bins must be scavenger proof and no waste is to be left on site over night. Plastic refuse liners in the waste bins will assist in the removal of waste. There must be no littering; all refuse must be gathered for disposal. No waste should be buried or burnt on site as the risk of contamination and pollution over time would be high. There will be no building rubble left on site after site hand over. All building rubble and construction wast is to be removed from site by the contractor.

Sewage: is pre processed on site and then led to the existing sewage treatment plant at the existing lodge.

6.7 VISUAL IMPACT

Visual impact of the site will need to be controlled during construction.

Mitigation: All construction buildings should be shielded or clad with shade cloth, or painted to blend into the environment. The construction site should be shielded from any public road and access to the site restricted.

6.8 VEHICLE AND EQUIPMENT FUELLING AND MAINTENANCE

All vehicle fuelling and maintenance is to occur off-site in areas specifically maintained for these activities e.g. workshops and fuelling stations.

In the case of 'on-site' equipment, these may be fuelled on-site with the condition that the fuelling will take place over a suitable concrete or other impervious surface such as a spill tray to prevent fuel spillage onto the soil.

The servicing and repair of equipment is to take place in a workshop 'off site' specifically designed for this. In the event of an on-site emergency repair, the contractor will ensure that all work is conducted over an impervious layer preventing spillage of oils and fuels into the environment.

Sufficient absorbent materials and spill kits must be available to assist with clean-up operations.

6.9 SOIL PROTECTION, CONTAMINATION AND RESPONSE

In all processes where the soil is to be disturbed, it is essential that topsoil is separated from Overburden. In most cases the topsoil is clearly defined from the overburden by a colour change. If in doubt, the top 100mm may be considered as topsoil.

Topsoil removed can be stored in stockpiles not higher than 1.5 meters. This is to prevent anoxic conditions from occurring near the centre. The stock piles should be wetted occasionally, particularly during periods of no rain in order to maintain the micro-organisms.

The topsoil should be used as a primary rehabilitation measure as it contains the seedbank and micro-organisms related to the site. The topsoil, in rehabilitation, should be at least 50mm deep and careful watering as well as physical weed control should be implemented.

Should any soil contamination occur during construction, such contamination is to be reported to the ECO, immediately. The soil shall be removed and stored in an area determined by the ECO and shall be labelled as to the form of contamination to prevent its future use. After consultation with the project manager, the contaminated soil will be disposed of, in the manner determined by legislation.

6.10 PROVISION OF STORAGE FACILITIES FOR TOXIC MATERIALS

It is not anticipated that any such materials will be used for this development, but should the need arise materials must be stored as indicated on the label. The ECO will ensure that hazardous substances are stored in a way that ensures that potential spills will be contained and not generate any increased hazard. Paints, solvents and similar materials should be stored in bunds and within a secure building.

6.11 PROVISION OF STORAGE FOR CONSTRUCTION MATERIAL

The contractor will be responsible for the storage of construction material at a site determined together with the ECO and project management. Cement must be stored off the ground on pallets and under shelter from rain.

6.12 BORROW PITS AND QUARRIES

It is not anticipated that the use of borrow pits and quarries for the sourcing of materials will be necessary. No new borrow pits or quarries are to be created without obtaining the necessary permits from the Department of Minerals and Energy (DME).

6.13 SPOIL MATERIAL

All spoil material shall be disposed of in accordance with legislation. No spoil material will be left on site at completion of the project and the potential reuse of any material (excess crushed stone, sand etc) should be investigated.

6.14 STORMWATER MANAGEMENT

No obstructions of any stormwater system will be allowed and the dumping of water used for the cleaning of equipment will also not be permissible.

Only level areas are to be used for stockpile zones and care is to be taken to prevent the stockpiling of materials in drainage lines. The ECO will assist in determining these areas.

6.15 GROUNDWATER MANAGEMENT

No impact or management requirements are anticipated in terms of groundwater.

6.16 LITTERING

In terms of the Environmental Conservation Act, No 73 of 1989, no littering by the contractors or sub-contractors shall be allowed. The ECO shall monitor the neatness of the work-site for the duration of the project.

6.17 COMMUNICATION

It is essential that communication channels between the contractor, ECO, site manager and client be maintained in good order. It is proposed that fortnightly meetings be had between the relevant parties for the duration of the project.

6.18 SIGNAGE

A single signboard is to be erected on the development site by the relevant lead contractor indicating the details of the project and the contact details of the contractor as well as emergency telephone numbers. This will be required for emergency and control reasons as well as management assistance in cases where problems need to be reported by staff or public not directly involved with the project.

The detail regarding the style, size and information on this sign will be given to the contractor by the ECO in conjunction with the consultant.

6.19 REHABILITATION OF THE DEVELOPMENT

On completion of construction, the development will be rehabilitated, by the contractor, through the removal of all construction facilities introduced, removal of waste and any other feature constructed or established during the use of the site.

6.20 DISASTER MANAGEMENT PROCEDURES

Disasters are a constant treat when working on construction sites.

Fire

No open fires will be allowed on the construction site or in the veld under any circumstances. Any cooking that is to be done on site is to take place on a gas cooker supplied by the contractor at a suitable point close to the site office.

It will be expected by all contractors to indicate their ability to fight accidental fires, through having serviced and fully functional equipment on site in the event of accidental fires. The ECO will determine the level of equipment and training required by the contractors.

Medical disaster

The site is in proximity to medical care for injuries on duty or evacuation in the case of serious illness. The contractor should never the less develop and maintain a medical disaster management procedure that will be communicated to all staff. These procedures will, as a minimum, have evacuation protocols, medical attention detail and a list of necessary contact numbers included. This procedure is to be displayed in the site office and a copy is to be handed to the ECO for inclusion in the audit results. Contractors will be required to have a first aid kit available on site at all times.

