

Van Zyl Environmental Consultants cc

2009/073037/23



Environmental Scoping and Impact Assessment Process Final Scoping Report and Plan of Study

22/2011

The Development of an Eco Estate

on the
Remaining Extent of the Farm Vaalkoppies Nr 40
near

Upington

Khara Hais Local Municipality
ZF Mgcawu (formerly Siyanda) District Municipality
Northern Cape Province

August 2013

NEAS REF No: NCP/EIA/0000126/2012

DENC REF No: NC/EIA/SIY/KHA/UIP2/2012

Applicant:

Deo Gloria Olive Estate (Pty) Ltd



FILE NAME: Deo Gloria Olive Estate
FILE NUMBER: 22/2011
DENC REF: NC/EIA/SIY/KHA/UIP2/2012
NEAS REF: NCP/EIA/0000126/2012
REPORT: FINAL SCOPING REPORT & POS

FOR: PROPOSED CONSTRUCTION AND OPERATION OF AN ECO ESTATE

LOCATION: REMAINING EXTENT OF THE FARM VAALKOPPIES NR 40

DATED: AUGUST 2013

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INVITATION TO COMMENT ON THE FINAL ENVIRONMENTAL SCOPING REPORT

The final environmental scoping report is available for review at the Upington Public Library at the //Khara Hais Local Municipality offices, which was identified to be readily accessible to I&APs:

The availability of the report will be communicated via registered mail and email to all registered I&APs. A review period of 21 days from **30 August to 20 September 2013** will be allowed.

Please submit your written comments, including a declaration of any business, financial, personal or other interest you may have in the approval or rejection of this application, via facsimile, or post to:

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Always cite the reference number on the cover page in order to ensure that your comments are allocated correctly.



EXECUTIVE SUMMARY

Deo Gloria Olive Estate (Pty) Ltd (hereafter Estate) proposes the development of approximately 137 houses, a lodge, a conference centre, and all associated infrastructure and services. The associated infrastructure would include the provision, management and maintenance of internal and bulk services such as potable water, roads, electricity, sewage, general waste, storm water drainage, a game fence and possibly telecommunication. The development will have a footprint of approximately 400 ha.

The Estate is located on the remainder of the farm Vaalkoppies number 40 near Upington in the Northern Cape. The farm is situated approximately 30 km from Upington on the N10 towards Groblershoop. (Coordinates: 28°23'5.45" S 21°21'57.08" E) (Figure 1)

Environmental, technical and economic feasibility must be taken into account and therefore factors such as land availability, land use capability, and costs have been considered by the proponent when the feasibility of undertaking this development was investigated. The purpose of this study would therefore be to investigate the environmental feasibility of using the proposed site for the development in question, with consideration of alternatives with regard to other factors such as technology and design.

The scoping report for the proposed development has been undertaken in accordance with the EIA Regulations published in Government Notices R 543, R 544, R 545 and R 546, in Government Gazette No 33306 (dated 18 June 2010) in terms of Chapter 5 of the National Environmental Management Act, Act No 107 of 1998 (as amended).

The final environmental scoping report aims to identify and evaluate potential environmental impacts associated with all aspects of the proposed project for detailed study, including specialist studies, within the Environmental Impact Assessment phase. It contains a detailed description of the nature and extent of the proposed development. Information and input from the proponent, specialists, the authorities and Interested and Affected Parties (I&APs) are used to identify and evaluate potential environmental impacts (both social and biophysical) associated with the proposed project. No environmental fatal flaws were identified with regard to the proposed project although potential environmental impacts have been identified that requires further in-depth study.

The EIA phase is required to assess these potential impacts and recommend appropriate mitigation measures, where necessary. The EIA will also further identify, discuss and evaluate alternatives. The alternatives identified for consideration in the EIA phase are:

- Alternative technologies;
- Layout/design alternatives:
 - layout of the Eco Estate and design of structures with due consideration for the aspects identified during the scoping and EIA phases; and
 - placement of the associated infrastructure.
- The 'do nothing' alternative: the option not to proceed with the proposed development.

Deo Gloria Olive Estate considers the area as a suitable site for the development of the eco estate. This evaluation was based on the following criteria:

- low grazing and agriculture potential;
- the beauty of the site and the surrounding natural environment;
- close proximity to Upington;
- the envisaged shortage of housing of this nature as well as the rate and type of developments in the area; and
- easy access via the N10 national route.

Impacts that might potentially be associated with the Estate include impacts on water resources (impact of construction, as well as long term water usage and sewage disposal during operational phase); soil and agricultural potential (risk of erosion linked to topography of area, land use potential and restriction of land use); ecology and biodiversity (impacts on ecology, flora and fauna); socio-economic aspects on the macro, meso, and micro level; visual quality and aesthetics; economic impacts (mostly positive); traffic impacts (construction, upgrading and decommissioning phases); noise and air quality (construction, upgrading and decommissioning phases); heritage resources; and tourism activities.

Most of the potential impacts identified are anticipated to be site-specific. No environmental fatal flaws were identified but some 'no-go' areas have been identified by the ecologist that will be included in the EIA and EMP phase.

Potential significant issues related to the **construction** phase include:

- Water use licence application to be submitted to DWA for groundwater usage;
- Recommendations stipulated in the Deo Gloria Olive Estate: Assessment of the Groundwater Resources should be addressed;
- Sewage storage and disposal measures;
- The sensitivity of the hydrology system and the possible erodibility and siltation due to the topography, soil composition and plant cover of the area and the changes that will be caused to it due to construction activities was identified as an area of concern. Mitigation measures were proposed by the respective specialists and should be incorporated in the engineering and town planning of the development;



- Waste storage and disposal;
- The soils in the area proposed for development is highly susceptible to wind and water erosion (Lubbe, 2012) and the resulting dust nuisance;
- Impacts on ecology and biodiversity (including flora, fauna and avifauna) resulting from activities such as vegetation clearing and levelling for the main and associated infrastructure;
- The ecologist identified sensitive areas that should be avoided during the development. These should be mapped as “no-go” areas;
- Protected plants and trees have been identified and mapped on site. These should be avoided where possible and permits and licenses obtained for the plants and trees that would not be possible to avoid and need to be moved or removed;
- Socio-economic impacts, both positive (job creation and skills development) and negative (possible influx of employment seekers and presence of construction workers in the area);
- Traffic impacts due to the transportation of the concrete, components of the infrastructure, construction machinery and vehicles to the study area as well as daily transportation of labour force to and from site;
- Impacts on heritage resources by construction activities that could possibly disturb or destroy these resources.

Potential significant issues related to the **operational** phase include:

- The operator and manager of the eco-estate would have to register as a water supplier as water, complying with the minimum requirements of DWA, would be supplied to water users as well as possibly an application for sewage storage. It is not currently planned to conduct sewage treatment on site, only sewage containment for individual houses and the lodge from where sewage will be removed to the nearest municipal sewage treatment facility;
- Impacts on water resources, which would be used for potable use and other residential related activities;
- Soil erosion and related rehabilitation measures through a sustainable ground cover and the maintenance thereof;
- Impacts on ecology and biodiversity related to the movement of people and vehicles; and
- Socio-economic impacts through employment creation.

With the above information available, Deo Gloria Olive Estate would be able to prepare detailed infrastructure layout plans for consideration within the EIA phase to avoid sensitive areas and integrate mitigation measures.



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GLOSSARY OF TERMS

Alternatives:	different options with regard to site or location, type of activity, design or layout, technology, and operational aspects of the activity that could be considered in order to meet the general purpose and requirements of the activity
Aquifer:	a geological formation of porous rock, such as sandstone, that has the ability to store water and may yield water to wells and springs
Cumulative Impact	an impact that is not necessarily significant in itself, but which may become significant in addition to the existing and potential impacts of other similar or diverse activities in the area
Direct Impact	a generally obvious and quantifiable impact, usually associated with the construction, operation or maintenance of an activity, which is caused directly by the activity and generally occurs at the time and place of the activity
'Do Nothing' Alternative	the option of not undertaking the proposed activity or any of its alternatives, which provides the baseline against which the impacts of other alternatives should be compared
Endangered Species	taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating, including taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction
Endemic	having a distribution restricted to a particular area or region
Environment	all external conditions and factors, living and non-living (chemicals and energy), that affect an organism or other specified system during its lifetime (Miller, 2005: G6)
Environmental Impact Assessment (EIA)	a study of the environmental consequences of a proposed course of action, usually conducted in order to provide information for the consideration of an application for environmental authorisation as defined in NEMA
Environmental Impact	an environmental change caused by a human activity
Environmental Management	addressing environmental concerns in all stages of development, in order to ensure that the development is sustainable and does not exceed the carrying capacity of the environment.
Environmental Management Programme	an operational plan that organises and coordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation
Homogenous	of the same nature; uniform
Hydrology	the science encompassing the behaviour of atmospheric, surface and ground water
Indigenous	having occurred naturally in the area in question before 1800
Indirect Impact	an impact that occurs at a different time or place to the activity that causes it
Interested and Affected Party (I&AP)	a person, group or organisation interested in or affected by a proposed activity, and any organ of state that may have jurisdiction over any aspect of the activity
Parameter	a set of measurable factors such as temperature, pressure and pH that define a system and determine its behaviour
Photovoltaic Cell	a cell that converts solar energy into electrical energy
Photovoltaic Effect	the effect attained when the electrons within a photovoltaic cell are excited by solar radiation
Photovoltaic Module	a packaged unit consisting of interconnected photovoltaic cells
Public Participation Process	a process of involving the public in order to identify needs, address concerns, choose options, plan and monitor in terms of a proposed project, programme or development
Red Data Species	a species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or the South African Red Data List
Scoping	a procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined
Scoping Report	a report describing the issues identified
Significant Impact	an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment
Topography	graphic representation of the surface features of a place or region on a map, indicating their relative positions and elevations



ABBREVIATIONS

BEE	Black Economic Empowerment
BID	Background Information Document
CO₂	Carbon dioxide
CSP	Concentrated Solar Power
CUSEC	Cubic Metres per Second
DENC	Department of Environment and Nature Conservation
DEA	Department of Environmental Affairs
DM	District Municipality
DNI	Direct Normal Irradiation
DoE	Department of Energy
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Programme
ESS	Environmental Scoping Study
F	Fluorides
GDP	Gross Domestic Product
GG	Government Gazette
GHG	Greenhouse Gas
GIS	Geographical Information Systems
GN	Government Notice
GPS	Global Positioning System
GWh	Gigawatt Hour
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
kV	Kilovolt
MAR	Mean Annual Rainfall
MBGL	Metres below Ground Level
ML	Megalitres
MW	Megawatt
NEMA	National Environmental Management Act
NO₃ as N	Nitrates
POL	Petrochemicals, Oils and Lubricants
PV	Photovoltaic
RoD	Record of Decision
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SDF	Spatial Development Framework
TDS	Total Dissolved Solids
ToR	Terms of Reference
UV	Ultraviolet
VAC	Visual Absorption Capacity
WMA	Water Management Area



1. INTRODUCTION

1.1 Background to the Study

The developer of Deo Gloria Olive Estate became aware of the good potential for agricultural development within the Upington area surrounding the Orange River. Subsequently the farm Vaalkoppies was acquired with the intention to develop it as a grape and olive business. Initially an environmental impact assessment was conducted and granted to develop the farm as mentioned. Water irrigation rights were registered and a plough certificate was obtained.

However after an in depth assessment of the soil properties it was decided that the eastern section of the remainder of the farm Vaalkoppies Nr 40 would be better suited if it was utilised as a game camp. (Appendix A)

The housing demand, in and surrounding Upington, increases each year due to economic and population growth as well as social development and upliftment. Upington itself, other smaller towns such as Keimoes and Kakamas, and other settlements such as Olyvenhoutsdrift, Jooste Eiland, Swartkops, Uap, Lambrechtsdrift, Kanon Island, Louisvale and Louisvaleweg etc. have been the preferred areas for people to reside.

It has become apparent to the developer that a certain percentage of people would want to live in a natural and serene area but still with the luxuries, amenities and services that would be available within an established town.

The worldwide awareness of environmental degradation and subsequent climate change also make people aware of their impact on the environment and would want to act through changing their lifestyle. A development such as this would possibly be an answer to their needs.

The viability to develop the game camp area into an eco-estate was investigated and found economically viable. It is planned in the long term that this development is ancillary to the agricultural development and should financially support the development of the primary agricultural activity of Deo Gloria Olive Estate. Thus only this site has been identified for the proposed development.

Environmental, technical and economic feasibility must be taken into account and therefore factors such as land availability, land use capability, and costs have been considered.

The purpose of this study is to investigate the environmental feasibility of using the proposed site for the development in question, with consideration for alternatives with regard to other factors such as technology and design.

1.2 Project Overview

1.2.1 The Site

The proposed area for development is located on a portion of the remainder of the farm Vaalkoppies No. 40 in the Northern Cape. The farm is situated approximately 30 km from Upington on the N10 National Route towards Groblershoop. The site where the eco-estate is proposed to be developed lies to the south of the N10. (Figure 1)

1.2.2 The Development

The proposed development on the approximate 400 ha footprint entails the development of 137 houses, a lodge and a conference centre.

Associated infrastructure would include the provision, management and maintenance of bulk and internal services such as:

- potable water;
- water reservoir and pumps;
- water reticulation;
- access road and internal roads;
- above ground electricity provision and below ground electrical reticulation;
- sewage storage and removal;
- grey water management;
- general waste storage and disposal;
- perimeter game fencing;
- trenches for water and electricity provision;
- storm water management; and
- possible telecommunication.

The proposed site for development is situated in a rural area. Natural grazing surrounds the farm. Along the Orange River, situated to the north some distance from the site, grapes, cotton, lucerne and maize are cultivated under irrigation. Grapes are grown on the neighbouring farm to the west. (Lubbe, 2012) The Vaalkoppies/Ntsikilelo/Straussbrug settlement is located approximately 4 km to the west on the N10 national route towards Upington.

The site is located within the boundaries of the //Khara Hais Local Municipality and the ZF Mgcawu (formerly Siyanda) District Municipality in the Northern Cape and is directly accessible via the N10 national route from Groblershoop in the east and Upington in the west.

The placement of the infrastructure would be done with due consideration for environmental constraints that will be identified during the scoping and EIA phases.



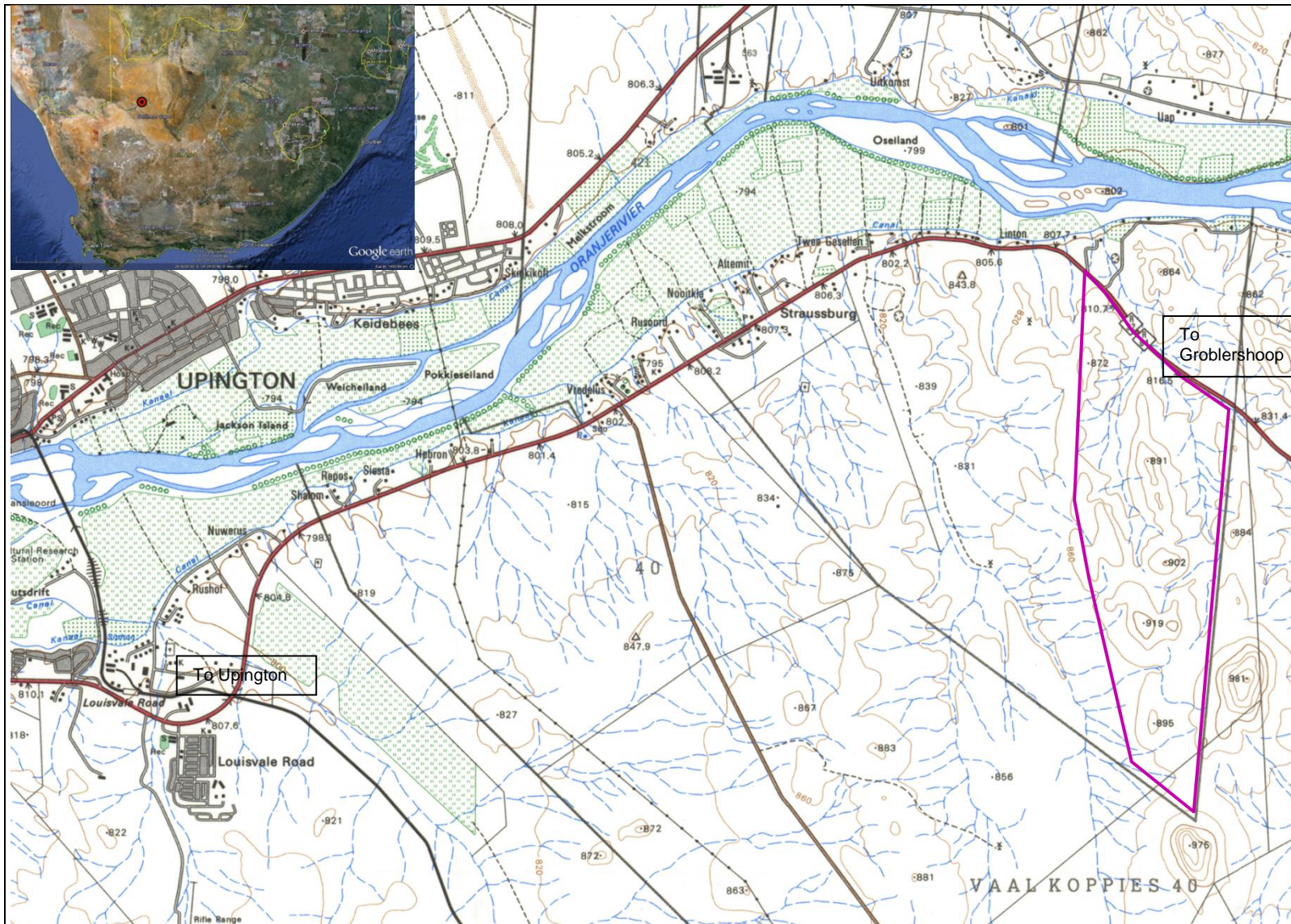
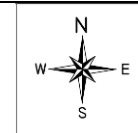


Figure 1: 1:50 000 2821 AD Upington (East)
Location Map of the proposed Eco Estate near Upington.
(Chief Director Surveys and Mapping, 1992)



Study Area:



Done For:

Deo Gloria Olive Estate (Pty) Ltd

Plan No: 22/2011/ Deo Gloria Olive Estate/3

Scale: Not to Scale

Date: September 2012

1.3 Terms of Reference

Van Zyl Environmental Consultants has been appointed by the applicant, Deo Gloria Olive Estate (Pty) Ltd, as the independent Environmental Assessment Practitioner (EAP) to manage the Environmental Assessment Process including the Public Participation Process as stipulated in Government Notice R 543 GG No 33306 dated 18 June 2010 in terms of Chapter 5 of the National Environmental Management Act, Act No 107 of 1998 (as amended) for the proposed project. Neither Van Zyl Environmental Consultants nor any of its specialist sub-consultants on this project are subsidiaries of or are affiliated to Deo Gloria Olive Estate (Pty) Ltd. Van Zyl Environmental Consultants also does not have any interest in secondary developments that may arise from the authorisation of the proposed project.

1.4 Legal Requirements

Environmental Impact Assessments, when conducted with the purpose of obtaining Environmental Authorisation for a development activity, are regulated by legislation. South African Environmental Law is grounded in the Constitution of South Africa (Act No. 108 of 1996). The Bill of Rights states that everyone has a right to a non-threatening environment and requires that reasonable measures are applied to protect the environment. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development.

The National Environmental Management Act (NEMA, Act 107 of 1998) expands on and specifies these principles. The act states that the principles of Integrated Environmental Management (IEM) should be adhered to in order to ensure sustainable development. Accountability to the various parties that may be interested in and/or affected by the proposed development forms an integral part of the IEM procedure. This procedure requires public participation, starting during the scoping phase, when potentially significant environmental impacts have to be identified. The purpose of the IEM procedure is to ensure that the environmental consequences of a development proposal are understood and adequately considered and that negative aspects are resolved or mitigated and positive aspects enhanced.

Government Notices R 543, R 544, R 545 and R 546, in Government Gazette No 33306 (dated 18 June 2010), in terms of Chapter 5 of the National Environmental Management Act, Act No 107 of 1998 (as amended), contain the EIA Regulations, as well as a schedule of activities that may have substantial detrimental effects on the environment and therefore require authorisation from the competent environmental authority. The listed activities that will be associated with the proposed project include the following:

R 544 dated 18 June 2010	10 (i)	The construction of facilities or infrastructure for the transmission and distribution of electricity - outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;	Facilities for the transmission and distribution of electricity will be needed to provide for the electricity requirements of the estate. It is, however, currently not established if more than 33 kilovolts would be required. Currently the farm Vaalkoppies is supplied from the Straussburg 22 kV overhead line feeder, which originates in the Gordonia Substation. According to the engineering plan, it is not foreseen to upgrade this connection but this might become applicable at a later stage.
	11 (vi) and (xi)	The construction of: bulk storm water outlet structures; infrastructure or structures covering 50 square metres or more 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.	Several drainage areas occur on the study area and it is therefore possible that some bulk storm water outlet structures and structures covering 50 square metres or more might be situated within 32 metres from watercourses.
	18 (i)	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from: a watercourse But excluding where such infilling, depositing, dredging, excavation, removal or moving: (a) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or (b) occurs behind the development setback line.	The possibility exists that materials with a volume of more than 5 cubic metres might be infilled or deposited into (a) watercourse(s), or that soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres might be dredged, excavated, removed or moved from (a) watercourse(s). Some of the existing roads, which would possibly be upgraded, pass through watercourses.
	22 (ii)	The construction of a road, outside urban areas, where no reserve exists where the road is wider than 8 metres	New access roads wider than 8 metres would possibly be constructed to reach each of the individual facilities. Firebreaks would be wider than 8 metres (Plans provided by the engineer indicates that roads would be 6 meters wide and reserves would be 10 meters wide.)



R 545 dated 18 June 2010	15	Physical alteration of undeveloped, vacant or derelict land for residential , retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for: (i) linear development activities; or (ii) agriculture or afforestation where activity 16 in this Schedule will apply.	The area of more than 20 ha (size not confirmed yet) proposed for residential and recreational development is currently undeveloped.
R 546 dated 18 June 2010	5	The construction of resorts, lodges or other tourism accommodation facilities that sleep less than 15 people.	It is a possibility that resorts, lodges or other tourism accommodation facilities that sleep less than 15 people would be constructed within 100 metres of a watercourse or wetland.
	(d)	In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape provinces: i Outside urban areas, in: (cc) Areas within 100 metres of a watercourse or wetland.	
	6	The construction of resorts, lodges or other tourism accommodation facilities that sleep 15 people or more. (a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape provinces: ii Outside urban areas, in: (ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined.	It is a possibility that resorts, lodges or other tourism accommodation facilities that sleep 15 people or more would be developed within 100 metres from the edge of a watercourse. No setback lines have been determined in this area.
	14	The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, (a) In Eastern Cape, Free State, KwaZulu-Natal, Gauteng, Limpopo, Mpumalanga, Northern Cape, Northwest and Western Cape: i All areas outside urban areas.	Areas larger than 5 ha, where 75% or more of the vegetation cover is indigenous, would be cleared. The study area is located outside an urban area within the Northern Cape.

An application for environmental authorisation through the execution of a Scoping and EIA is being executed. It will be submitted to and reviewed by the DENC, who is the competent authority in this regard. An application for authorisation has been accepted by the DENC (Appendix B) and the following reference numbers were assigned:

NEAS REF No: NCP/EIA/0000126/2012

DENC REF No: NC/EIA/SIY/KHA/UPI2/2012.

In addition to its function as a decision-making aid in terms of environmental authorisation, an EIA is an effective planning and decision-making tool for the project developer as it allows for the identification and management of potential environmental impacts, as well as the identification of other applicable legislation that must be considered and adhered to.

1.4.1 Other Applicable Legislation and Policies

In terms of the **National Heritage Resources Act, Act No. 25 of 1999, (NHRA)** any person who intends to undertake “any development or other activity which will change the character of a site – exceeding 5000m² in extent” and “the construction of a ...linear development or barrier exceeding 300 m in length” must at the very earliest stages of initiating the development notify the responsible heritage resources authority, viz. the Northern Cape Provincial Heritage Resources Agency (NCPHRA) and/or the South African Heritage Resources Agency (SAHRA). These authorities have been notified about the EIA process. (Appendix E)

A Phase 1 Archaeological Impact Assessment has been conducted during the previous EIA process conducted on the Remainder of the farm Vaalkoppies Nr. 40 (Appendix J) and reviewed by SAHRA (Appendix K).

Section 9 of the **Advertising on Roads and Ribbon Development Act, Act No 21 of 1940**, states that no person shall erect or permit the erection of any structure or any other thing which is attached to the land on which it stands, even though it does not form part of that land, or construct or lay or permit the construction or laying of anything under or below the surface of any land within a distance of **95 meters from the centre line of a building restriction road**, provided that the preceding provisions of this section shall not apply in connection with –

- (d) an enclosure, a fence or a wall which does not rise higher than one comma six metres above the surface of the land on which it stands;



- (e) a water work as defined in Section 1 of the Water Act, 1956 (Act No 54 of 1956) (repealed), a farm dwelling-house or any other structure or thing on a farm intended to be used in connection with bona fide farming operations;
- and provided, further, that any permission granted under this section shall not legalize the doing of anything which is unlawful under any other law.

The development will take place alongside the N10, which is a national road. This restriction applies to the proposed development. The SANRAL is the competent authority in this regard. SANRAL has authorised the application for access to the proposed development from the the N10. (Appendix F)

Section 5 of the **Conservation for Agricultural Resources Act, Act No 43 of 1983 (CARA)**, prohibits the spreading of weeds and Section 6 and Regulation 15 and 15 E of GN R 1048 addresses the implementation of control measures for alien and invasive plant species.

National Forests Act, Act No 84 of 1998 (NFA) and Regulations, Section 7: No person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under Section 7(4) or Section 23; or an exemption from the provisions of this subsection published by the Minister in the Gazette. Sections 12-16 (read with S 62(2)(c)) deal with protected trees, with the Minister having the power to declare a particular tree, a group of trees, a particular woodland, or trees belonging to a certain species, to be a protected tree, group of trees, woodland or species. In terms of Section 15, no person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister. The list of protected tree species was published in GN 716 of 7 September 2012.

The **National Veld and Forest Fire Act No.101 of 1998** regulate Fire Protection Associations and the building of fire breaks. The competent authority is the Department of Agriculture, Forestry and Fisheries.

Section 17 of the **Fencing Act, Act No 31 of 1963**, states that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 meters on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.

Sections 9-11 of the **National Environmental Management: Air Quality act, Act No. 39 of 2004, (NEM:AQA)** regulates national, provincial and local ambient air quality standards. Activities are addressed in Section 21. Section 22 addresses atmospheric emissions licenses.

The **National Environmental Management: Biodiversity Act, Act No 10 of 2004 (NEM:BA)** provides for the MEC/Minister to list ecosystems which are threatened and in need of protection (Section 52) and to identify any process or activity in such a listed ecosystem as a threatening process (Section 53). A list of threatened & protected species has been published in terms of Section 56 (1) GG 29657 GN R 151 and GN R 152, Threatened or Protected Species Regulations.

The act also deals with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to listed invasive species.

The **National Environmental Management Waste Act, Act No 59 of 2008 (NEM:WA)** reforms the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.

The **National Environmental Management Act: Protected Areas Act (Act No. 57 of 2003) (NEM:PAA)** provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith.

In terms of the definitions contained in Section 1 of the **National Water Act, Act No 36 of 1998, (NWA)** a "water resource" includes a watercourse, surface water, estuary, or aquifer. "Aquifer" means a geological formation which has structures or textures that hold water or permit appreciable water movement through them. "Watercourse" means a river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Furthermore, in terms of the definitions contained in Section 1 of the National Water Act, waste "includes any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted".

The Minister of Water and Environmental Affairs is allowed to regulate activities which have a detrimental impact on water resources by declaring them to be controlled activities. No person may undertake a controlled activity unless such person is authorised to do so by or under this Act.

Duty of Care to prevent and remedy the effects of pollution to water resources is addressed in Section 19. Section 20 addresses the procedures to be followed, as well as control of emergency incidents which may impact on a water resource.

Recognised water uses are addressed in terms of Section 21 and the requirements for registration of water uses are stipulated in Section 26 and Section 34.



This EIA study will be used to support the Water Use Licensing Application process for the utilisation of ground water resources.

Section 25 of the **Environment Conservation Act, Act No. 73 of 1989, (ECA)** as well as the National Noise Control Regulations GN R 154 dated 10 January 1992, regarding noise, vibration and shock, is applicable.

Section 8 of the **Atmospheric Pollution Prevention Act, Act No. 45 of 1965, (APPA)** regulating controlled areas, as well as Section 27, with regard to dust control, are still applicable.

Section 28 of the **National Environmental Management Act, Act No. 107 of 1998 (NEMA)** requires duty of care where reasonable measures are taken to prevent pollution or degradation from occurring, continuing or recurring, or, where this is not possible, to minimise and rectify pollution or degradation of the environment. Section 29 addresses the protection of workers refusing to do environmental hazardous work. Procedures to be followed in the event of an emergency incident which may impact on the environment are addressed in Section 30. Section 31 addresses access to environmental information and protection of whistle blowers.

Should the developer wish to obtain sand required for construction rather than outsourcing the supply of sand, the **Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA)** may become directly applicable. If the sand supply is outsourced, the developer has an obligation to ascertain that the contractor supplying the sand complies with the relevant legislation by only sourcing sand from permitted areas.

The **Occupational Health and Safety Act, Act No. 85 of 1993** GN. R. 2281 of 1987 – 10-16: Environmental Regulations for Workplaces are applicable.

The **Northern Cape Nature Conservation Act, Act No. 9 of 2009 (NC NCA)** addresses protected species in the Northern Cape and the permit application processes related thereto.

The Act lists different categories of flora and is addressed in Schedules 1, 2, 3 and 6, and the fauna in Schedules 1, 2, 3, 4, 5 and 6. One of the provisions in the Act is that no person may, without a permit, pick, import, export, transport, possess, cultivate or trade in a specimen of a specially protected plant or a protected plant species.

The **South African Civil Aviation Regulation Act, Act 13 of 2009 (SACARA)** controls markings of structures that may influence aviation through the Civil Aviation Technical Standard, SA-CATS-AH 139.01.33 Obstacle Limitations and Markings outside Aerodrome or Heliports.

It states that any structure exceeding 45 m above ground level, or structures where the top of the structure exceeds 150 m above the MEAN ground level, like on top of a hill, the mean ground level considered to be the lowest point in a 3 km radius around such structure. Structures lower than 45 m, which are considered as a danger or a potential danger to aviation, shall be marked as such when specified. Overhead wires, cables, etc., crossing a river, valley or major roads shall be marked and in addition, their supporting towers marked and lighted if an aeronautical study indicates that it could constitute a hazard to aircraft.

1.5 Details of the Environmental Assessment Practitioner and Expertise to Conduct the Scoping and EIA Phases

Van Zyl Environmental Consultants is an environmental consulting company that provides environmental management services, including environmental impact assessments and planning to evaluate and manage risk and ensure compliance of proposed developments, as well as the implementation of environmental management tools.

Van Zyl Environmental Consultants has experience in environmental impact assessments and environmental management and has been involved in environmental studies for a variety of projects throughout the Northern Cape.

Irmé van Zyl completed a Master's Degree in Environmental Management at the University of the Free State and has been working in the environmental management field for 17 years. She has conducted processes for environmental impact assessment applications, waste licence applications, S24G applications, compilation of EMPs, prospecting applications, mining permit applications, public participation processes, acting as environmental control officer, screenings as well as advice to developers on a wide range of projects in the Northern Cape. These include a butchery, a meat processing plant, residential developments, establishment of a new cemetery and closure of an old cemetery (including management plans for cemeteries), bridges, tourism industry (caravan parks, chalets etc.), wastewater treatment works, a medical care waste treatment facility, illegal disposal of medical waste, a waste site, PV power stations, a runway, pipelines, borrow pits, roads, a reverse osmosis water purification as well as a brine treatment plant. (Appendix R)



2. APPROACH TO THE ENVIRONMENTAL STUDIES

An investigation with regard to the environmental impacts associated with the proposed development is being conducted in compliance with the Environmental Impact Assessment Regulations published in Government Notices R 543 to R 546 of the National Environmental Management Act (Act No. 107 of 1998) (as amended).

The Environmental Impact Assessment Process is being conducted in two phases, *i.e.* an Environmental Scoping Study (ESS) and an Environmental Impact Assessment (EIA), including an Environmental Management Programme (EMP).

2.1 Methodology of the Scoping Study

The ESS describes the preliminary decision-making processes with regard to the project, including the investigation of development alternatives and the selection of preferred alternatives. The specific activities expected to form part of the proposed development is also described.

The study will then provide a description of the receiving environment and investigate how this environment may be directly, indirectly and cumulatively affected by the proposed development. Potential significant impacts (both social and biophysical) that may result from the construction, operation and maintenance phases of the proposed development will be identified. Additional issues for consideration, identified during the first phase of the participatory and transparent Public Participation Process, which has been conducted concurrently with the scoping phase, will also be outlined and supporting documentation provided. This Scoping Study will serve to identify any fatal flaws, gaps in knowledge, alternatives and mitigation alternatives for evaluation and investigation during the EIA phase of the project.

The scoping report is based on the Application for Environmental Authorisation filed with and accepted by the Northern Cape DENC (Appendix B).

2.1.1 Scoping Process

The scoping process involved the following aspects:

- desktop analysis;
- site visits;
- preliminary authority consultation;
- specialist studies;
- identification of further specialist studies to be conducted; and
- Public Participation.

2.1.2 Specialist Studies

A heritage impact study by Dr R.C. de Jong (Cultmatrix CC) (Appendix J) was done on the farm for a previous EIA that was conducted on the farm for an agricultural development. The SAHRA reviewed and authorised the heritage assessment with conditions that should be implemented prior to development on the farm (Appendix K).

It was further identified that a palaeontological impact assessment might have to be conducted. Dr John Almond (Natura Viva CC) was contacted and after investigation of the geological maps he indicated that an exemption from a study would be in order. (Appendix L).

An ecology study has been conducted by Dr Noel van Rooyen (Ekotrust BK) and prepared a desktop assessment from the information obtained during the previous site inspection and subsequent ecology report. (Appendix M). No-go areas should be delineated and will be included in the EI Report.

As this area was previously earmarked for agricultural development, the need for a specialist agriculture impact assessment was identified to confirm the agricultural viability of the area earmarked for the eco estate and it was conducted by Mr C.R. Lubbe (Appendix N).

2.1.3 Impact Identification and Assessment Methodology

An Impact Matrix (Appendix Q) is used to determine any positive and/or negative impacts that the possible activities and development in this area may pose to the environment and people in the vicinity (direct, indirect and cumulative). Proposed mitigation through design and/or operational changes, as well as the significance of the impact thereafter will be investigated during the EIA phase.

The following aspects of the direct, indirect and cumulative identified impacts are assessed:

- nature of the activity;
- extent;
- duration;
- intensity; and
- probability.

These parameters are used to establish the significance of the impact of an activity that will take place or is already taking place. The parameters have been compared to the level of significance in the Significance Rating Scale (Appendix Q).

2.2 Environmental Impact Assessment Phase

The aim of the Environmental Impact Assessment phase would be to provide an overall social and biophysical assessment of the environment surrounding the proposed development, as well as a detailed assessment of the site for development, in terms of environmental criteria. Significant impacts will be rated and appropriate mitigation measures for potentially significant environmental impacts will be identified and recommended in the EMP section. The Public Participation Process will be continued in order to ensure that I&AP issues and concerns are documented and addressed in the EIA process.



3. FEASIBLE AND REASONABLE ALTERNATIVES

This section discusses the project scope, which entails the planning/design, construction, operation and decommissioning phases. It also investigates the site and technology alternatives as well as the “do nothing” alternative.

3.1 The Need for the Proposed Project

The proposed development would provide a lifestyle to persons that want to be surrounded by a natural and serene environment, a sense of space and privacy but still with the luxuries, amenities and services that would be available within an established town.

It will stimulate the local economy and create job and business opportunities during the planning, construction, operational and maintenance phases.

Local resources will be utilised from the planning to the construction, operational and maintenance phases where possible.

3.2 Planning and Design Phase Alternatives

In terms of the EIA Regulations, feasible alternatives must be considered as part of the environmental investigations. An alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity.

This **may** include alternatives with regard to:

- the property on which or location where the activity is proposed;
- the type of activity and land use alternatives;
- the design or layout of the activity;
- the technology to be used;
- the operational aspects of the activity; and
- the ‘do nothing’ alternative, *i.e.* not undertaking the proposed development, must also be investigated.

MVD Kalahari, Consulting Engineers and Town Planners, based in Kimberley, was appointed to conduct the preliminary engineering services report for the proposed development and Macroplan from Upington to conduct the respective applications to the Department of Agriculture, Forestry and Fisheries Land Use and Soil Management office in terms of the Subdivision of Agricultural Land Act, Act 70 of 1970 as well as the land use change application to the local authority (//Kara Hais Local Municipality) in terms of the Northern Cape Development and Planning Act, Act 7 of 1998.

3.2.1 Site Location (Property Location)

The Estate chose the site for the following reasons:

- low grazing and agriculture potential at the site;
- the beauty of the site and the surrounding natural environment;
- close proximity to Upington; and
- easy access via the N10 national route.

Refer to the introduction in section 1.1 on page 1.

The following aspects would be investigated further within this section during the EIA phase:

- Study Area Selection
- Site Access
- Availability and Accessibility of Infrastructure
- Environmental Acceptability

3.2.2 Activity Alternatives (Type of Activity)

The area is not suitable for intensive agricultural development, therefore a game camp and eco-estate are proposed to be developed.

3.2.3 Design and Layout Alternatives

Two possible layout alternatives were tabled for the estate.

One was to cluster the houses into groups that resemble a horseshoe in certain areas on the proposed area. This would enable the developer to provide services more cost effectively. However with this layout the feeling of living on a farm and the related seclusion that many persons are looking for would be lost.

The other option is for the houses to be spread out over the area utilising the natural landscape and topography that this area offers to seclude the houses from each other and provide partial privacy.

The above options would therefore also influence the layout of the internal roads, storm water management, internal networking of water supply, sewage storage and removal, and electrical reticulation.

The main access to this development would be from the N10 National Route between Upington and Groblershoop. SANRAL indicated that it has authorised the planned point of access to the site (Appendix F).



Internal roads would possibly comprise of a gravel road network utilising existing roads where possible. MVD has proposed that the concept of a road reserve be maintained to accommodate services such as water and electricity reticulation along it.

Where new roads would be required, MVD proposed contour planning where all access paths should follow the contours where possible. It is proposed that access loops and cul de sacs that connect to the access roads are routed at right angles to the contours so as to prevent runoff to cross or drain onto it. Storm water would then be routed along the access paths to the natural channels or drainage areas.

The study area identified is larger than the development footprint. Therefore sensitive areas within the study area could be avoided by locating the facilities (mentioned in the development section 1.2.2 on page 1) and its associated infrastructure appropriately within the broader site. The extent of the site allows for layout design and site-specific alternatives.

3.2.4 Technology Alternatives

MVD Kalahari undertook to design the bulk and internal services according to accepted engineering specifications and principles as well as acceptable environmental requirements and specifications that would be stipulated in the scoping and EIA reports.

Current drawings are preliminary layouts of infrastructure and would be finalised during the engineering and detail design phases of the project. The design criteria and specifications are based on the:

- *Guidelines for the Provision of Engineering Services and Amenities in Residential Township Development*, 1994 as amended
- *Guidelines for Human Settlement Planning and Designs* as published by the CSIR and will also refer to the local municipality's guidelines and standards.

Building method

The applicant undertook to investigate the green **building principles** and compare it with conventional building principles.

Access Road

The **access** point within the N10 road reserve would be surfaced with either asphalt or interlocking paving with kerbing on either side and finished with an edge beam at the entrance gate to the Estate (MVD Kalahari, 2012).

Internal Roads

Internal roads would possibly be constructed according to the contour technology briefly discussed within the previous section. Options such as different road gradients, road types and dust palliatives have been investigated by MVD. These options would be informed by the storm water drainage design, geological investigations of in-situ material on the roads, design and layout planning of the roads as well as the topography and climate of the area.

Storm Water Management and Design

Steep slopes dominate the general topography of the Estate and attention should be given to the design of the storm water runoff measures in order to prevent, control and minimise erosion. The natural drainage patterns of the area would be utilised to transport storm water off the site towards natural watercourses and eventually the Orange River.

The objective of the storm water management plan should be to manage the storm water resources of the collective watersheds to:

- prevent flood damage;
- preserve or restore the natural and beneficial functions of the natural drainage system;
- preserve and enhance the quality of water that pass through this drainage system.

Water Supply

Deo Gloria Olive Estate is in possession of irrigation rights for 14.3 ha as well as a licence for the abstraction of 8 400 000m³ water per annum from the Orange River for the planned agricultural development as discussed in the background to the study. A set of boreholes exist on the property and SRK Consulting has conducted an assessment of the groundwater resources. The conclusions of this study will be included in the EIA report but indicates that water to the amount of 1 572.5 m³ can be safely abstracted per day from the identified six (6) boreholes within the Estate.

The developer plans to use the water from these boreholes for the development and operations of the Estate. The developer indicated that another option would be to apply to DWA for an amendment of a portion of the existing irrigation rights for 14.3 ha from the canal and to transfer the portion of the water right from the canal to the river for potable use at the Estate should it be needed. The canal in this area is under pressure and it would be to the advantage to the irrigation board and other users should a portion of this right be transferred to the river from where water is abstracted. An application for a basic environmental impact assessment process has been submitted to DENC for the construction and operation of a pipeline from the Orange River to the Remaining extent of the farm Vaalkoppies No. 40 (NC/BA/SIY/KHA/UPIE/2012, NCP/EIA/0000171/2012). A water purification plant will then be provided for to ensure that water comply with the set standards for potable use.

The boreholes are situated in Drainage Region D73E where any abstraction from groundwater resources constitutes a Water Use Licence Application to the DWA for approval. The Estate will also act as a supplier that would require an application to the DWA to register as a Water Supplier for potable use.



Provision is being made for bulk **water supply**, a reservoir, trunk mains from reservoir to the development, internal reticulation as well as fire hydrants for fire fighting purposes (MVD Kalahari, 2012).

The exact route for the water reticulation network would be determined once a detailed survey has been conducted. It would be endeavoured to place this and other networks such as electricity alongside existing and proposed road network as well as within areas that has already been disturbed to minimise the impact on the environment and also aid maintenance. The different services should share trenches to reduce the amount of excavations. (MVD Kalahari, 2012)

It is planned to implement a 0.4 Mℓ reservoir. The position of the reservoir should be moved according to identified environmental specifications. An indication was made that it would be positioned to prevent it breaking the horizon and would gravitate the water to a large area of the proposed development.

The option exist to replace an elevated water tower, used to achieve the desired water pressure at all the houses, with in line pressure pumps in order to ensure that the water pressure at the houses in the higher lying areas are sufficient. This would have a positive impact regarding visual impact but would have a negative impact on electricity consumption. The possibility of utilising sun powered pumps and the costs involved should be investigated. The significance of the different impacts (perceived and actual), the possible mitigation measures and the relative expected costs should be investigated to establish the best option.

MVD proposes phased development as an option where portions of the development may be serviced from existing infrastructure while the construction of bulk services are in process for the proposed development.

Sewage Removal

Sewage disposal can be managed in several ways. The waterborne on site sanitation sewage systems supplied by New World Sanitation Solutions, NANOSAN, has been proposed for this development. Other systems available are GEM Max Sewage Treatment Plants and the Enviro Loo system that would be investigated during this study.

Grey Water Removal

The following systems for **removal of grey water** have been investigated:

- Garden watering may be tolerated provided that the plants and vegetables that are watered in this manner are not eaten raw to prevent disease transmission.
- Soakaways are a convenient disposal method for grey water in rural areas that is sparsely populated. A grease trap is normally provided for waste from the kitchen. The following should be evaluated to establish if this system could be implemented:
 - Topographical Evaluation
 - Soil profiles
 - Percolation capacity of the site (percolation test)
- Piped systems discharging into rivers and streams after some treatment in facultative ponds.

Electricity Supply

Dihlase Consulting Electrical Engineers has been appointed to conduct the electrical services report. It was established that the proposed development would have a bulk maximum electrical demand of 1,2 MVA. (Jonck, 2012)

Currently Eskom supplies the farm Vaalkoppies from the Straussburg 22kV overhead line feeder that originates at the Gordonia Substation. The substation is already at a 93% capacity and therefore does not have adequate capacity to accommodate the entire development currently. However Eskom is in the process of upgrading and stabilising the said 22kV supply and completion is envisaged by November 2013. (Jonck, 2012)

According to the preliminary electrical report, the current network has adequate capacity to accommodate approximately 25% of the planned development. The electrical engineers therefore propose that the development be executed in phases. (Jonck, 2012)

Internal electrical services would be provided via an underground cable network that would also follow the existing road network where possible. Although the drawings and plans of MVD Kalahari indicate that trenches for electrical and civil services would be shared, the preliminary electrical report in point 4.1 indicate otherwise. Clarity should be provided regarding this point by the relevant engineers involved in the preliminary reports for this study.

The electrical engineering report provided for medium voltage distribution and low voltage distribution and service connections with conventional 3-phase, kWh meters or possibly pre-payment meters as an option.

As an alternative or supplementary to Eskom electricity provision, solar technology could be utilised for solar electricity generation, namely Photovoltaic (PV) technology, more commonly known as solar modules. (Figure 4)

Solar energy power plants use the energy from the sun to generate electricity through a process known as the Photovoltaic Effect. This is achieved through the use of a PV cell that is made of silicone, which acts as a semiconductor. The cell absorbs solar irradiation, which energises the electrons inside the cells and produces electricity. PV cells are linked and placed behind a protective glass sheet to form a PV module. As a single cell produces a small amount of electricity, the proposed activity would require numerous cells arranged in arrays that would be fixed to a support structure (Figures 2 to 3).



CSP technology (Concentrating Solar Power) would not be a viable option in this regard as the concentrating panels are highly reflective. This would not be suitable for this type of development.

Wind energy generation could also be investigated as an option for energy supply but the height of the infrastructure would be a negative aspect and visually obtrusive in this regard.

PV technology is widely used for supplying electricity to single households, but can also be used to generate higher volumes of electricity for distribution by an electricity supplier like Eskom. It is also used to supply electricity for isolated units like boats, motor vehicles, chargers, lampposts, telecommunication towers and billboards. PV technology has lower infrastructure requirements than CSP technology and delivers lower volumes of electricity. It is therefore considered to be suitable for developments such as this with relatively low electricity needs during certain periods of the day which could easily be supplied for by means of PV technology.

As this would be a private development it could, in future, be endeavoured to reach a feed-in tariff agreement with Eskom where the development or individual houses could feed in excess electricity during the day into the local grid. The gross floor area of the houses would be between 300m² and 500m² as it is based on high income households (Jonck, 2012). This would avail enough space on suitably angled rooftops (according to green building principles) to enable home owners to install adequate PV power systems to provide for the average daily energy need. The option to install a battery backup system, depending on the space needed and financial input, could also be investigated.

The feed-in tariff would ensure that renewable power producers are paid a rate for their energy that makes their business feasible. NERSA, the national energy regulator has developed a feed in tariff structure, which provides the national framework for the purchase of renewable power. Currently, only Eskom is permitted to purchase this power, although it makes sense to allow municipalities to purchase power generated inside their area of jurisdiction. The additional cost for the purchase of this power can either be built into the overall end user tariff, or be paid for as a per kilowatt-hour levy to willing end users. Evidence from other countries that have followed this route shows a marked increase in renewable energy generation after a feed in tariff is implemented. (Sustainable Energy Africa, 2009).

With the implementation of larger scale PV power stations in South Africa in the near future the cost of this technology would be further reduced and would become more viable for implementation on a smaller scale.

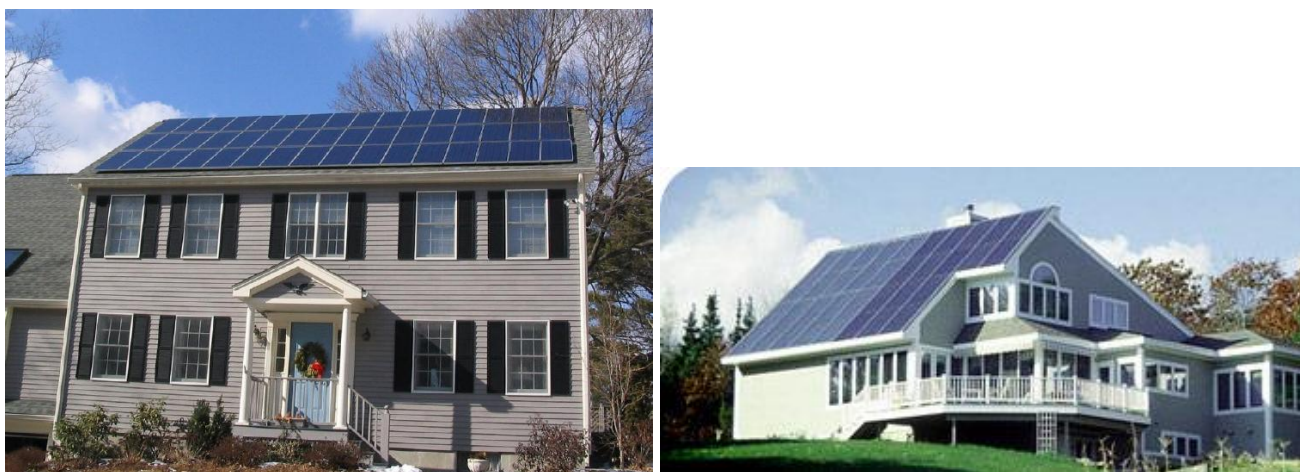


Figure 2-3: PV Solar Panels on roofs of houses



Figure 4: Energy flow between PV power generation facility with fixed modules and Electrical Utility

3.2.5 'Do Nothing' Alternative

The 'do nothing' alternative is the option of not undertaking the proposed Eco Estate development.

The area is currently utilised as grazing for game and this would continue irrespective if the development would take place or not. The game camp would form an integral part of the estate should it proceed.

Commercial agricultural activities would continue in the surrounding area but this particular area identified was found to be unsuitable for commercial cultivation due to the limiting factors such as the steep topography and hilly nature of the area, the stony nature of top and subsoil, shallow soil depth and hard setting carbonate horizons below surface. The low clay percentage results in low water holding capacity and low nutrient availability. (Lubbe, 2012)

The identified site, at a local level, would then not be impacted on from an environmental perspective and would continue to be utilised for the current activities.

The planning, construction and operation of the Estate would offer many potential socio-economic benefits for the area where unemployment and poverty is very high. This would not happen should this development not proceed.

This proposed development would form part of the wider strategic development plan for the farm and the Estate would be ancillary and financially supportive to the larger agricultural development that is taking place on the rest of the farm. Should this proposed development be removed an important financial supportive function that would be needed to develop the agricultural section of the farm would not be available. The financial risk to the agricultural development would be much larger.

3.3 Surveys

The following surveys should be conducted in order to proceed with detailed design and planning of the proposed development.

- **Route and Site Survey**
Detailed surveys and contour data are required to complete detailed design of all pipeline routes and internal services.
- **Geotechnical Investigations**
Geotechnical investigations are required to establish the suitability of in situ materials for foundations and palliatives proposed.
- **Percolation Tests**
Percolation tests would be conducted to establish if the material and the area are suitable for the soakaway alternative proposed to control grey water.

3.4 Construction Phase Activities

Construction of Access Roads to the Site and Internal Roads

The identified site has direct access, via the N10 national route to Upington and Groblershoop and SANRAL has already authorised the access point for the proposed development (Appendix F).

Internal roads would be needed within the site for the construction as well as the operation and maintenance phases. The construction of these tracks would comprise of gravel for filling and higher quality surfacing on top as per the preliminary engineering report. Should the in situ material not conform to the specifications of normal wearing course materials; the gravel is to be sourced from a supplier. The strength and durability of the in situ rock strata at the proposed site are currently unknown and are to be assessed via a geotechnical study to be conducted before detailed planning can be finalised. The results of this study would indicate whether the vegetation and ground surface could be stripped, and the exposed formation levelled, compacted and used as a road surface.

The layout of the roads would be determined by the identification of the environmental sensitivities related to the site.

Site Preparation and Construction Laydown Areas

Suitable areas for the construction camp and laydown areas should be identified prior to site establishment and commencement of the construction phase.

Site preparation activities would include the removal of vegetation and levelling of the laydown and storage areas for the construction equipment as well as the footprint of each project component. The topsoil would be stripped and stockpiled, backfilled and/or spread on the site. Areas where construction would take place would be levelled. A construction camp and offices, as well as an area for the storage and use of petrochemicals, oils and lubricants (POL), and a storage area for construction equipment and infrastructure, machinery and vehicles would be established. Temporary ablution facilities for workers on site would be implemented and a waste storage area would be implemented with bins for recyclable and non-recyclable materials to be removed weekly.



Transportation of Equipment, Infrastructure and Materials to Site

The bulk of the material would be obtained locally to stimulate the local economy and job creation locally. Equipment and materials not available locally would be transported to the area from various parts of the country.

Civil construction equipment would need to be brought to the site. These could include, among other types of equipment, excavators, trucks, graders, compaction equipment, and cement trucks.

Ancillary Infrastructure

Perimeter fencing and roadway lighting with underground cabling along all entrance roads at each house and at the lodge would be implemented. Holes would be dug and fence poles would be concreted into place. The fence would then be erected according to specifications for game fencing.

Main Infrastructure

Vegetation would be required to be cleared and some areas would need to be levelled at the sites where houses and lodge would be located as well as along the internal roads. Excavation and laying of foundations of buildings and other structures would be required. Should the area to be constructed be too far from the construction camp, a laydown area to keep building material and equipment would also be required.

Potable water would be supplied via trucks or small trailers where personnel are working.

During the construction period chemical toilets would be available on site.

A concrete batching plant could be erected on site or pre-mixed concrete could be obtained from an external supplier.

During the construction phase generators would most likely be used for power supply because of the expanse of the construction site.

Only general and emergency maintenance of infrastructure, vehicles and machinery would be done on site. Vehicles and machinery would be moved to the nearest workshop to be repaired.

Civil and Electrical Services

Storm water management would be controlled by implementing infrastructure along the surface along access and internal roads. Internal electrical and water reticulation would be below ground. Vegetation would be removed and trenches dug for the reticulation.

Decommissioning of Construction Areas after Completion of Construction Work

All the clean and solid construction waste would be used in backfill or onsite landscaping where possible. Construction waste that is not appropriate for backfill or for landscaping would be disposed of at the closest municipal waste site.

The construction camp, infrastructure, equipment, machinery and vehicles that would not be used during the operation and maintenance phase would be removed. Compacted areas would be ripped where necessary. Topsoil would be replaced in areas where the operational phase would not continue and rehabilitated.

3.5 Operational & Maintenance Phase Activities

Operation and maintenance of infrastructure and services:

- Water supply
- Electricity supply
- Sewage removal
- Waste removal
- Access and internal roads
- Storm water drainage

3.6 Decommissioning Phase Activities

Should infrastructure be properly implemented, the proposed development would not reach an end of life. However, should any section of the proposed development become redundant or out of use or upgraded, it should be planned and executed according to the stipulations set in the Environmental Management Program. Infrastructure and areas disused should be removed and rehabilitated to an accepted set standard.

Physical Removal of Infrastructure

Infrastructure, including fencing, would be removed and reused at other areas or sold as second-hand material.

Structures would be demolished and rubble removed to the nearest general waste site. It could then be used as cover material or filling for other construction sites. Should corrugated iron structures be used, they could either be moved to other sites or sold.

Rehabilitation

Compacted areas would be contoured and ripped. If plant growth should not establish, active seeding and planting of vegetation would be conducted.



4. THE AFFECTED ENVIRONMENT

This section provides a general description of the study area environment that may be affected by the proposed development. This information will facilitate understanding of the receiving environment. The biophysical, social and economic environment that could be directly, indirectly or cumulatively affected by, or could effect, the proposed development is described.

4.1 Biophysical Environment

4.1.1 Locality

The farm Vaalkoppies 40 is situated in the Northern Cape, about 30 km southeast of Upington on the N10 national route and south of the Orange River. The location is at approximately 28° 27' South, and 21° 20' East (Figure 1). The site covers an area of approximately 400 ha. The topocadastral grid reference is 2821 AD.

4.1.2 Climate

The mean annual rainfall measured at the Upington weather station is 182 mm. The total annual rainfall may vary from 65 mm to 539 mm during dry and wet years respectively, indicating a high variation in the annual rainfall and therefore a rainfall scenario that is highly unpredictable. The rainy season is predominantly from November to April when about 83% of the annual rainfall occurs. The wettest months are February and March and the driest months are from June to September, when less than 5 mm of rain per month is recorded. The maximum rainfall measured over a 24 hour period at Upington was 67 mm in April. The highest monthly rainfall recorded was 228 mm measured in January. (Van Rooyen, 2012)

The mean annual temperature for Upington is 19.1°C. The extreme maximum and minimum temperatures measured over a 25 year period were 42°C and -4.2°C respectively. The mean daily maximum for January is 34.3°C and for June it is 20.7°C. The mean daily minimum for January is 17.4°C and for June it is 2.7°C. Frost may occur from May to September, a period of approximately 150 days. (Van Rooyen, 2012)

The cloud cover is highest from February to April when a mean cloud cover of two eighths or more occurs. The percentage relative air humidity at 08:00 varies from more than 80% in April to July to less than 60% in November and December. The humidity at 14:00 varies from 40% in March and April to 31% in November. (Van Rooyen, 2012)

4.1.3 Topography

The farm occurs on the sandy and rocky undulating plains south of the Orange River at an altitude varying from about 800 m above sea level (a.s.l.) in the north near the Orange River, to 919 m a.s.l. at the highest point in the southeast, a difference of 119 m. (Van Rooyen, 2012)

The terrain in the study area is hilly with a general slope of ~1:125 or 0.8% to the North (Esterhuysen, 2012).

4.1.4 Geology and Soils

The hills on the farm Vaalkoppies 40 consist of quartzite and schist of the Dagbreek Formation, Vaalkoppies Group. The valleys are covered with red-brown wind-blown sand of the Gordonia Formation, Kalahari Group. In the north a narrow band of amphibolite is found, while some dolerite dykes are also conspicuous in the north. (Van Rooyen, 2012)

To the west of the site the substrate consists of banded gneiss and migmatite, migmatite and biotite-rich and aluminous gneisses of the Bethesda Formation. Weakly foliated biotite gneiss occurs in the northwest of Deo Gloria. (Van Rooyen, 2012)

The Orange River bed consists of intrusive rocks (mainly granite) of the Namaqua Metamorphic Complex and alluvium of Tertiary to Recent age. (Van Rooyen, 2012)

Land Types denote areas that display a marked degree of uniformity with respect to terrain form, soil pattern and climate. A terrain unit is any part of the land surface with homogeneous form and slope. Terrain unit 1 represents a crest, 2 = scarp, 3 = midslope, 4 = footslope/plains and 5 = valley bottom. (Van Rooyen, 2012)

The site falls in the Ae Land Type. Land Type Ae covers the eastern and southern parts of the site and consists of red-yellow apedal, freely drained sandy soils with a high base status and deeper than 300 mm. No dunes occur in this land type. The Ae11 Land Type consists of terrain units 1, 3, 4 and 5 with terrain types 3 and 4 covering 30% and 45% of the land type. The slopes of terrain units 1, 3, 4 & 5 range from 12-20%, 8-40%, 0-2% to 0-2% respectively. Rocks cover up to 60% and 50% of terrain types 1 and 3 respectively. In terrain units 1 and 2, the clay content of the fine sandy soils of the Mispah and Hutton soil forms range from 1 – 6% in the A-horizon and from 3 – 8% in the B-horizon. The soil depth ranges from 100 to 300 mm. Locally in terrain units 4 & 5 there are soils of up to 1 200 mm depth. (Van Rooyen, 2012)

4.1.5 Agricultural Potential

An agricultural impact study was commissioned to assess the possible impacts of the project on agricultural activities and potential. The objectives of the study were to evaluate the possibility and significance of the possible temporary and permanent impacts on agricultural production that may result from the construction and operation of the Eco-Estate. Appropriate mitigation measures were recommended to avoid or minimise the severity of the impacts. (Lubbe, 2012)

The site was found unsuitable for commercial cultivation due to limiting factors such as the stony nature of top and subsoil; shallow soil depth and hard setting carbonate horizons below surface. The low clay percentage results in low water holding capacity and low nutrient availability.



Severe climatic conditions further limit commercial cultivation. The proposed project area could be and is utilised as grazing for game, but the grazing potential is very low. (Lubbe, 2012)

The construction and operation of an Eco-Estate would have no high impacts on the agricultural potential of the identified site or the local region, except for increasing the possibility of erosion where soil is disturbed, for which mitigation measures are recommended. Commercial agricultural activities could continue normally in the surrounding area. (Lubbe, 2012)

4.1.6 Hydrology

Towns along the Orange River are exclusively dependent on surface water whilst stock farms away from the river are totally dependent on groundwater for domestic use and stock watering (Esterhuyse, 2012).

The Eco-Estate occurs on the sandy and rocky undulating plains south of the Orange River and drain northwards and towards the Orange River along ephemeral streams. (Van Rooyen, 2012)

The drainage lines are clearly defined and are characterized by open to dense stands of woody species such as *Acacia mellifera*. Tall woodlands of *Acacia erioloba*, *Ziziphus mucronata* and the alien *Prosopis glandulosa* are found in the lower reaches of the streams in the northern parts of the site. The community is differentiated by species such as *Acacia erioloba*, *Ziziphus mucronata*, *Boscia albitrunca* and the grasses *Cenchrus ciliaris* and *Stipagrostis namaquensis*. (Van Rooyen, 2012)

The drainage lines are for most of the year dry and flow for short periods after relatively heavy rains. The upper reaches of these seasonal drainage lines are not considered to be wetlands in the strict sense of the word. The lower reaches of the streams are more defined towards the north. (Van Rooyen, 2012)

4.1.7 Hydrogeology

A set of boreholes exist on the property and SRK Consulting has conducted an assessment of the groundwater resources. The conclusions of this study will be included in the EIA report. It concludes that water to the amount of 1 572.5 m³ can be safely abstracted per day from the identified six (6) boreholes within the Estate.

The developer plans to use the water from these boreholes for the development and operations of the Estate. The developer indicated that another option would be to apply to DWA for an amendment of a portion of the existing irrigation rights for 14.3 ha from the canal and to transfer the portion of the water right from the canal to the river for potable use at the Estate should it be needed. The canal in this area is under pressure and it would be to the advantage to the irrigation board and other users should a portion of this right be transferred to the river from where water is abstracted. An application for a basic environmental impact assessment process has been submitted to DENC for the construction and operation of a pipeline from the Orange River to the Remaining extent of the farm Vaalkoppies No. 40 (NC/BA/SIY/KHA/UPIE/2012, NCP/EIA/0000171/2012). A water purification plant will then be provided for to ensure that water comply with the set standards for potable use.

The boreholes are situated in Drainage Region D73E where any abstraction from groundwater resources constitutes a Water Use Licence Application to the DWA for approval. The Estate will also act as a supplier that would require an application to the DWA to register as a Water Supplier for potable use.

Rivers are carved into the lithological units by water action during rainfall, especially rain storms. They follow areas of least lithological resistance, the direction of flow being controlled by gravity. As a result, they represent the current drainage system on the surface. (Minnaar, 2008)

The direction of flow of groundwater is governed by the same forces of gravity and therefore in general follows the direction of flow of the surface water. However, the flow of groundwater is altered by the geological structures which they encounter in depth, such as faults, joints or lithological contacts between more permeable and less permeable units. (Minnaar, 2008)

Groundwater quality is one of the main factors affecting the development of available groundwater resources. Although there are numerous problems associated with water quality, some of which are easily corrected, total dissolved solids (TDS), nitrates (NO₃ as N) and fluorides (F) are thought to represent the majority of serious water quality problems. The potability evaluation done by DWAF is based on the evaluation of chloride, fluoride, magnesium, nitrate, potassium, sodium, sulphate and calcium using the Quality of Domestic Water Supplies, Volume 1 (DWAF, 1998 as cited in Pretorius, 2004).

Groundwater utilisation is of importance in the area surrounding the study area and it is mainly used for rural domestic supplies, stock watering and water supplies to towns. As a result of the low rainfall, recharge of groundwater is limited and only small quantities can be abstracted on a sustainable basis.

Aquifer Type

Groundwater on the site occurs mainly in semi-confined fractured-rock aquifers, also known as secondary aquifers. These types of aquifers are formed by jointing and fracturing of the otherwise solid bedrock by compressional and tensional forces that operates in the Earth's crust from time to time. The fractures are mainly formed by faulting, folding and, intrusion of igneous rocks such as sills and dykes. (Esterhuyse, 2012)



Unconfined intergranular aquifers (also known as primary aquifers) occur over large areas to the west and south-west of the site. Groundwater levels in these areas are generally shallow and within the unconfined unconsolidated sediments and weathered zone. The unconsolidated deposits and weathered zones in these areas, are, however, limited in vertical extent and consist mainly of clay and silt. These result in a poorly developed, low yielding primary aquifer that is vulnerable to drought. Therefore, the primary aquifer in this area can be regarded as insignificant. (Esterhuysen, 2012)

NGA Data

The geohydrological data of the National Groundwater Archive (NGA) indicate that borehole yields are highly variable. The median yield gives a good indication of the yield that can be expected from a successful borehole in this area. The median yield correlates well with DWA's yield map, which suggests an average yield of 0.1-0.5 l/s for successful boreholes in this area. Average borehole depths for this area are ~66 mbgl whilst the median depth is ~ 61mbgl. (Esterhuysen, 2012)

Hydrocensus Results

SRK surveyed thirteen boreholes on the site and another four boreholes and one dug well on the neighbouring farms. Nine relatively deep (>150 mbgl) boreholes were drilled recently on the site and six of these boreholes have tested maximum immediate yields of > 13 l/s. These deep high yielding boreholes skew both the average borehole depth and yield for this area. The measured groundwater levels of these deep boreholes are also much deeper than the other shallow boreholes. The field measured temperature of discharged groundwater from one of the boreholes was 26.5°C that is significantly higher than the temperature of water from the other equipped boreholes (20 – 22 °C). (Esterhuysen, 2012) According to Mr Esterhuysen it indicates deeper groundwater circulation.

The combination of both the deeper groundwater levels and higher temperature of this aquifer indicates that it is likely not connected to the surrounding shallow aquifers. (Esterhuysen, 2012)

All the high yielding boreholes are drilled on a prominent N-S striking shear zone associated with breccia and vein quartz. This highly transmissive zone allows rain water to rapidly percolate down to the groundwater level with a resultant increase in recharge along this zone. (Esterhuysen, 2012)

Groundwater Resource Potential

The site falls within the western part of the Quaternary Drainage Region D73E that is listed in Zone A of the Groundwater Taking Zones, where no water may be taken except as set out under Schedule 1 and small industrial use. Therefore, if potable water will be supplied from groundwater resources, a Water Use Licence Application will have to be submitted and approved. (Esterhuysen, 2012)

Esterhuysen estimated a Groundwater Resource Unit (GRU) for the proposed well field consisting of the six deep boreholes recently drilled. It was not possible to establish the exact boundaries of this deep circulating GRU as the information was limited.

The site has an estimated average mean annual potential recharge of ~136 900m³/a while the average groundwater exploitation potential for this GRU is ~936 600m³/a. (Esterhuysen, 2012)

The wet season mean annual potential recharge for the site is approximately 950m³/a less than the current annual abstraction. It means that groundwater levels should decline over time. Esterhuysen however indicated that groundwater levels are not excessively declining and correlate well with surrounding groundwater levels and he deduced that it is due to that:

1. The influence of groundwater abstraction is not limited to the boundaries of the site and extends beyond the farm boundaries;
2. The mean annual potential recharge values used may be too conservative and could in fact be higher; and
3. Current abstraction was calculated based on information supplied by the owner, but the true abstraction could be less than this calculated value.

MVD Kalahari calculated the water demand for the proposed development. It was recommended that the operational phase of the proposed development would have an average daily demand of 124.660m³/day i.e. 45 479m³/a, an average summer peak demand of 186.900m³/day, and an average daily sustained peak demand of 323.040m³/day or 117 909.600m³/a. (MVD Kalahari, 2012)

Groundwater Flow Directions

The groundwater elevation generally mimics the surface elevation contours and generally flows from higher lying to lower lying areas. The inferred flows are from the higher lying areas to the south northwards towards the Orange River. The general direction of groundwater flow may locally be diverted by zones of higher permeability such as faults. (Esterhuysen, 2012)

Yield Testing

Yield test data were analysed by means of the flow characteristic (FC)-method and the recovery method. The FC-method indicates a combined sustainable yield of 1 573m³/day or ~574 000m³/a, which is <31% of the calculated average utilisable groundwater resource potential (UGRP) of the Deo Gloria GRU but >23 times the UGRP of the property. However, the GRU of the deep circulating aquifer that has been intersected in these high yielding boreholes likely extends well beyond the boundaries of the mapped GRU. This means that the GRU is actually larger than mapped and the effect of abstraction at the site will be insignificant on neighbouring properties. (Esterhuysen, 2012)



4.1.7.1 Point and Diffusive Pollution

Nitrates are the contaminants of highest concern. They are very soluble and do not bind to soils, and therefore have a high potential to migrate to groundwater. Because they do not evaporate, nitrates/nitrites are likely to remain in water until consumed by plants or other organisms. On a local scale the areas of intense cultivation closer to the Orange River are the major contributors in terms of inorganic nitrates. The primary inorganic nitrates that may contaminate drinking water are potassium nitrate and ammonium nitrate, both of which are widely used as fertilisers. Where feedlots are operated the contribution of organic nitrates to groundwater contamination can be far more problematic. For most farming activities organic nitrate is not a severe problem in South Africa. High-density cultivation at surface water irrigation schemes along the Orange River contributes to the nitrate load of localised aquifers in the WMA. Other contaminants of concern are pesticides and herbicides. (Pretorius, 2004)

4.1.8 Ecology and Biodiversity

The ecological desktop assessment (Appendix M) is based on a previous study done by Ekotrust cc for Deo Gloria Olive Estate (Pty) Ltd on Portion 67 and the Remainder of the farm Vaalkoppies 40. An environmental impact assessment of the eastern portion of the Remainder of the farm Vaalkoppies 40 was commissioned to determine the possible impact that the development of an Eco-Estate will have on the environment. (Van Rooyen, 2012)

The original study was done in 2010 and the methodology involved stratification of aerial images of the farm Vaalkoppies on the basis of terrain morphology and vegetation cover. The vegetation survey consisted of recording all identifiable plant species. The description of the plant communities is accompanied by a vegetation map. Based on a number of parameters, a sensitivity map was compiled. The faunal survey involved a field survey and consulting of available databases and/or relevant literature to determine the diversity, ecological status and distribution of relevant faunal species. Species diversity was mainly attained by means of direct or indirect sighting methods (animal, spoor, burrows, scats) whilst traversing the areas by vehicle or on foot. (Van Rooyen, 2012)

4.1.8.1 Fauna

The ecological study consisted of a desktop study and a superficial field survey of mammals, birds, reptiles and amphibians that are likely to occur at the site (Mills & Hes 1997; Anderson 1998; Van der Walt 2000; Carruthers 2001; Leeming 2003; Friedmann & Daly 2004; Skinner & Chimimba 2005; Branch 2008 as cited in Van Rooyen, 2012). Species presence on site was mainly attained by means of direct or indirect sighting methods (animal, spoor, burrows, scats) whilst traversing the area by vehicle and on foot. (Van Rooyen, 2012)

The proximity of the site to Upington, Straussburg and Linton, and the agricultural activities in the area will contribute to a sparse faunal diversity. Poaching of fauna by means of dogs occur sometimes on site. The grass cover varies from low to medium. However, the grass species composition of the plains makes it suitable for grazing animals. Some shrubs such as *Acacia mellifera*, *Boscia foetida* and *Rhigozum trichotomum*, as well as many dwarf shrub species are common on site and provide some browse for browser species. Browse is particularly abundant along the drainage lines where species such as *Acacia mellifera*, *Boscia foetida*, *Ziziphus mucronata*, *Boscia albitrunca* and *Acacia erioloba* are abundant. The deep sandy soils in certain areas on the plains are suitable for small ground-living animals as well as for large burrowing animals such as the aardvark. The rocky ridges and other outcrops provide habitat for species such as the rock hyrax. (Van Rooyen, 2012)

Large herbivores that historically occurred in the Upington area are the Cape eland, gemsbok, grey duiker, grey rhebok, hippopotamus, klipspringer, red hartebeest, springbok and steenbok. (Van Rooyen, 2012)

In terms of historical distribution, the study area is on the boundary of the distribution of animals such as the black rhinoceros, black wildebeest, blue wildebeest, buffalo, Burchell's zebra, giraffe, kudu, mountain reedbuck, roan antelope, southern reedbuck, warthog and white rhinoceros. (Van Rooyen, 2012)

Wildlife that did not occur in the area historically include the blue duiker, blesbok, bushbuck, bushpig, Cape grysbok, impala, nyala, oribi, red duiker, sable antelope, Sharp's grysbok, suni, tsessebe and waterbuck. (Van Rooyen, 2012)

Species listed in the NCNCA, 2009 that may occur on the site or in the vicinity of the site includes specially protected species, protected species, common indigenous species, damage causing animals, and invasive species. Some birds that were noticed on site were also listed in the ecological report. (Van Rooyen, 2012)

The habitat is not suitable for amphibians. Burrows of scorpions were noticed on site. (Van Rooyen, 2012)

The number of faunal species found in the Augrabies Falls National Park (AFNP) may give an indication of the biodiversity of the region in general (Van der Walt 2000). The lists include species from all kinds of habitats in the region, including the Orange River and surrounds. (Van Rooyen, 2012)

Mammals:	48
Avifauna:	177 All raptor (birds of prey) species are categorized as specially protected species in the Northern Cape
Reptiles:	52

Only the tent tortoise occurs in the AFNP. The sparse karroid vegetation apparently does not provide enough shelter for the wide-ranging leopard tortoise. There are 30 lizard species and it is claimed that the AFNP has the densest lizard populations in the world. Nineteen snake species occur in the AFNP. (Van Rooyen, 2012)



Frogs: 12 species

The frogs occur mostly on the floodplains along the Orange River and other wetlands with standing or slow-moving water. No suitable habitat occurs on site. (Van Rooyen, 2012)

Fishes: 15 species (restricted to the Orange River)

Invertebrates:

One of the scarce insects of the AFNP is the gem beetle (*Augrabies schotophagia*), which was found on *Schotia afra* in 1985. *Schotia afra* does not occur on site but is generally found along dry drainage lines along the Orange River in the region. (Van Rooyen, 2012)

There are 93 scorpion species in South Africa with about 9 species potentially occurring in the AFNP and surrounding region. (Van Rooyen, 2012)

4.1.8.2 Vegetation

Deo Gloria Eco-Estate falls in the Karoo-Namib phytogeographic zone of White (1983 as cited in Van Rooyen, 2012), an extensive region stretching from Namibia into the western interior of South Africa. It is close to the Kalahari-Highveld Transition Zone of White (1983 as cited in Van Rooyen, 2012). The site falls in the Bushmanland Bioregion close to the Kalahari Duneveld Bioregion to the north and northeast (Mucina & Rutherford 2006). Most of the vegetation types in the Orange River valley and surrounds falls in the Nama-Karoo Biome as described by Mucina & Rutherford (2006). According to Acocks (1953 as cited in Van Rooyen, 2012), Mostert et al. (1971 as cited in Van Rooyen, 2012) and Gubb (1980 as cited in Van Rooyen, 2012) the area falls in the Orange River Broken Veld, while Low & Rebelo (1996 as cited in Van Rooyen, 2012) classified the area as part of the Orange River Nama Karoo. Only 1.47% of the latter vegetation type is formally conserved although little of the area is transformed, except along the Orange River (Low & Rebelo 1996 as cited in Van Rooyen, 2012). (Van Rooyen, 2012)

According to Mucina & Rutherford (2006), the site falls in the Kalahari Karroid Shrubland. This vegetation type forms typically belts alternating with belts of *Gordonia* Duneveld. The altitude in the Kalahari Karroid Shrubland varies from 700 – 1 100 m in the region. The mean annual precipitation ranges from about 100-200 mm. (Van Rooyen, 2012)

The geology consists of Cenozoic Kalahari Group sands and small patches of calcrete outcrops and scree on scarps and intermittent rivers. The soils are deep (>300 mm), red-yellow, apedal, freely drained, with high base status, typical of the Ae Land Type. (Van Rooyen, 2012)

The dominant small trees include *Acacia mellifera* subsp. *detinens*, *Parkinsonia africana* and *Boscia foetida* subsp. *foetida*. Tall shrubs include *Rhigozum trichotomum* and *Phaeoptilum spinosum*. The dwarf shrub component is dominated by *Aptosimum* spp., *Barleria rigida*, *Monechma genistifolium* subsp. *australe*, *Hermannia spinosa* and *Limeum aethiopicum*. The forb layer is characterised by *Dicoma capensis*, *Chamaesyce inaequilatera*, *Chascanum garipense*, *Gisekia africana*, *Kohautia cynanchica* and *Tribulus* spp. (Van Rooyen, 2012)

The detailed vegetation, habitat types and plant communities are discussed in detail in the ecological assessment done by Dr Van Rooyen that is attached in Appendix M.

Schedule 2 Protected Species occur on site (NCNCA, 2009). (Van Rooyen, 2012)

Aloe claviflora
Anacampseros cf. filamentosa
Avonia papyracea
Boscia albitrunca
Boscia foetida subsp. *foetida*
Euphorbia avasmontana
Euphorbia decussata
Euphorbia gariepina
Lithops cf. bromfieldii
Psilocaulon coriarium
Sarcostemma viminale

According to the lists of threatened and protected species issued in terms of section 56 of NEM:BA 2004 (as updated in 2008), six Schedule B2 plant species occur on the site. (Van Rooyen, 2012)

Aloe claviflora
Anacampseros cf. filamentosa
Avonia papyracea
Euphorbia avasmontana
Euphorbia decussata
Euphorbia gariepina

According to the National Red List of Plants 2009, *Acacia erioloba* is classified as declining. All other species on site is classified as of 'least concern'. (Van Rooyen, 2012)



CITES classification Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. Families and genera applicable to the study area include all *Aloe* spp. and succulent *Euphorbia* spp. (Van Rooyen, 2012)

Aloe claviflora
Anacampceros cf. filamentosa
Avonia papyracea
Euphorbia avasmontana
Euphorbia decussata
Euphorbia gariepina

Four endemic species to the Gariep Centre of Endemism were also identified on site. (Van Rooyen, 2012)

Aloe claviflora
Anacampseros filamentosa
Avonia papyracea
Zygophyllum spp.

The NFA protected tree species on site are *Acacia erioloba* and *Boscia albitrunca*. (Van Rooyen, 2012)

The above protected and endemic plant species recorded at the Deo Gloria site is listed in Table 5 of the Ecology report attached as Appendix M of this report. Some species were repeated in several lists mentioned above.

Invasive alien species listed in terms of the Amendment to the regulations of the Conservation of Agricultural Resources Act No. 43 of 1983 - Regulation 15, (30 March 2001) and the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), should be controlled and eradicated with an emphasis on urgent action in biodiversity priority areas. In addition to habitat loss due to development pressures, transformation of habitats due to the uncontrolled spread of invasive alien species is a serious concern in all biomes and ecosystems. The Category 2 plants of declared weeds and invader plants are the *Prosopis glandulosa* species recorded on site: (Van Rooyen, 2012)

Disturbed sites include borrow pits, old quarries, residential areas, ruins and watering points. The coordinates for these sites are attached in Appendix C to the Ecological Report.

4.1.8.3 Ecological Sensitivity Analysis

The sensitivity rating for the flora and faunal component is based on the presence of rare and/or threatened flora and fauna on site. The flora and fauna sensitivity on the site is rated as low provided the protected species on site is conserved and adjacent land is available for dispersal of fauna. The impact rating on the habitat at the rocky ridges and drainage lines will be low only if no developments occur near the drainage lines and the buffer zone of 32 m is enforced where no development must occur.

See the Sensitivity map of Deo Gloria Olive Estate (Figure 26) on page 45 of the ecology study. (Van Rooyen, 2012)



5. THE SOCIAL ENVIRONMENT

The study area is located within the borders of the //Khara Hais Local Municipality and the ZF Mgcau (formerly Siyanda) District Municipality (DM).

Next to Kimberley, Upington is the largest town in the Northern Cape Province. Most of the other towns in the Northern Cape, including Kimberley, are situated within a 400km radius of Upington.

5.1 Demographics/Population Dynamics

According to the above-mentioned available information and based on aerial photographs and property maps, the number of inhabitants for the whole //Khara Hais municipal area for 2002 is calculated as follows (//Khara Hais, 2005):

Upington (including Paballelo, Louisvale Road, etc.)	58 847
Lambrechtsdrift, Karos, Leerkrans, Raaswater and Kalksloot	8 911
Farms and irrigation erven	4 718
TOTAL FOR //KHARA HAIS	72 476

According to the December 2002 Socio-economic survey for //Khara Hais, the inhabitants of 72 476 consist of 53,1% women and 46,9% men. 44,84% of the inhabitants are below the age of 21 years, while 8,24% of the inhabitants are above the age of 60 years. Only 25,22% of the inhabitants are economically active. The average gross income per family is R3 943,57, while the average monthly expenditure per family is R3 523,87. (//Khara Hais, 2005)

Over the past ten to twenty years Upington, had a fairly slow population growth rate. In general it seems as if this tendency will continue for the foreseeable future. The natural population growth for the Northern Cape is probably in the region of 1,5 – 2,0% annually. Because the actual population growth for the Northern Cape, and possibly also //Khara Hais, is in the region of 1,0 to 1,5% per year, this means that there is an overall outwards migration of people from the Northern Cape to other parts of South Africa. As long as the economic development of the province is slower than that of the rest of the country, the outwards migration of population will in all probability continue. (//Khara Hais, 2005)

According to calculations the population of //Khara Hais increased during the period from 2002 to 2012 from 72 476 to 88 348 persons, with a further estimated increase of up to 107 696 from 2012 to 2022. These figures represent a growth of 2,0% in the total population. (//Khara Hais, 2005)

The male/female ratio is almost even, i.e. 46,9% as against 53,1% respectively, while 44,84% of the population fall between the ages of 0- 20 years, 43,83% between 21-55 and only 11,32% of the total population is over the age of 55 years. (//Khara Hais, 2005)

5.2 Education

The information obtained from the socio-economic survey and provided in the report gives an indication of the educational level within //Khara Hais. The deduction can be made that the largest portion of the population (26,1%) has an educational level of between standards 6 and 8 (grades 8 – 10), while 18,7% has between standards 9 and 10 and only about 3% has any tertiary education. It must be mentioned that these percentages are around 5% higher than they were in 1997, portraying a growth in the average educational level. The largest portion of the economically active population of //Khara Hais is involved in the private sector, with almost as many employed in the agricultural sector. In the third place is the public service, which represents a fifth of the workforce. (//Khara Hais, 2005)

5.3 Employment

As may be seen from the tables of the Socio-economic Report, 25% of Upington's population is economically active while 23% is unemployed. This unemployment figure is considerably lower than in the case of the rest of the Northern Cape, where as many as 43% of the population are unemployed. Nevertheless this indicates almost one unemployed adult person for every person earning a salary. (//Khara Hais, 2005)

The relevant tables show that the average gross monthly income per family for the area is about R4 000, of which the contribution of the head of the household forms approximately 73%. If the national housing board's maximum income (R3 500) category (qualification level for housing assistance) is taken as the criterion, it will be found that around two thirds of the population of //Khara Hais qualify for some or other form of housing assistance. (//Khara Hais, 2005)

The average gross per capita income per month for Upington is just under R1 000 per month. About 66% of the population has a per capita income of less than R800 per month. If this latter figure is compared with that of the only other city in the Northern Cape, namely Kimberley, it will be found that in the case of Kimberley, 83,29% of its inhabitants earn less than R800 per month. (CUP, Kimberley 1998 as cited in //Khara Hais, 2005).

If the average expenses are considered with regard to the various categories, taxes (municipal income) represent the greatest expenditure, followed by monthly purchases, housing, services fees and transport. The average number of years that a person remains in the region is 15,9 years. (//Khara Hais, 2005)



5.4 Local Economic Development

The //Khara Hais municipal area consists of three sections, namely a ribbon-shaped main town situated along the Orange River (Upington), a narrow intensive agriculture strip on both sides of the river with various satellite communities in the form of settlements about 15 to 20 kilometres apart, and the rest of the area consisting of extensive stock farms. (//Khara Hais, 2005)

There is a well-defined business centre (CBD) for Upington with supplementary individual and residential centres spread out over the rest of the area. Smaller suburban shopping centres are to be found all around the mainly residential areas of the entire region. (//Khara Hais, 2005)

Factors such as home shops and businesses from private residences also have an influence on shopping centres and to a lesser extent also on the CBD. The scheme regulations for //Khara Hais do make provision for guidelines in this regard. (//Khara Hais, 2005)

Informal traders mainly operate within the CBD. (//Khara Hais, 2005)

Both industrial areas on the northern and the south-western sides of the town (Updustria & Laboria) have railway facilities. (//Khara Hais, 2005)

There are 7 smaller rural settlements with a generally agriculturally orientated character. The inhabitants of these settlements are mainly reliant upon agricultural activities for their daily living. Although there are concentrated residential settlements, there are also residential and related usages to be found on some of the agricultural land. Because of the high value per hectare of this agricultural land, future residential developments should be limited mainly to the already existing residential areas and/or to poorer agricultural land. (//Khara Hais, 2005)

The //Khara Hais Council has purchased portions of the farm Olyvenhoudtsdrift South (~ 6610,7327 ha). This land is being used to provide needy, prospective farmers with grazing land. The Council is leasing the portion of commonage known as Hondejag (5 500 ha) in terms of the commonage reform programme of the Government. As the need for grazing land increases, negotiations will be held with the Government regarding the purchase of more land. (//Khara Hais, 2005)

5.5 Health Profile

In this area the biggest social problems are illiteracy and poverty. According to the latest socio-economic survey in 2002, approximately 68% of the inhabitants have a monthly income per household of between R0 and R800. Due to these factors, there is a close correlation between poverty and health. (//Khara Hais, 2005)

Education of people is one of the single most important factors for the health of the individual. (//Khara Hais, 2005)

Tuberculosis and HIV/AIDS are two of the contagious diseases that are on the priority list. (//Khara Hais, 2005)

5.6 Services

Three main traffic routes provide access to other cities such as Cape Town, Johannesburg, Windhoek (Namibia) and Kimberley, together with a rail transport system. (//Khara Hais, 2005)

The large scale street infrastructure consists mainly of the N10 and N14 routes that intersect at Upington, as well as various other main roads and identified heavy vehicle routes. (//Khara Hais, 2005)

Upington has at its disposal rail connections to Karasburg in Namibia and Keimoes and Kakamas in a westerly direction. To the south there is a connection to Prieska, where trains to Johannesburg, Kimberley or Cape Town are available. Upington also has approximately 12 km of internal side-lines connecting a number of industries to the national rail system. Presently the rail system is mainly used for the transport of goods, although there is a private train that delivers a passenger service on a weekly basis between Upington and various centres in Namibia. (//Khara Hais, 2005)

Upington Airport has the longest main runway in the southern hemisphere. It is 4 900 metres long and is tarred. There are a further two runways which give the airport six landing directions. There are daily inland flights from Upington to Cape Town and Oliver Tambo International Airport. (//Khara Hais, 2005) The airport was recently upgraded to cater for the demand in international freight transport of the local table grape industry and others.

5.6.1 Community Facilities

//Khara Hais Municipal Library service consists of a main library and two branch libraries that functions together as a unit. The outlying areas also have depots at their disposal at the following places: Karos, Leerkrans, Louisvale Road, Raaswater and Kalksloot. These depots fall under the control of the Provincial Library Service. (//Khara Hais, 2005)

5.6.2 Electricity

The large scale electricity services consist of the following (//Khara Hais, 2005):

- Three supply stations from where electricity is purchased from Eskom with capacities of 20 MVA, 20 MVA and 15 MVA respectively. Maximum usage of Upington at the time that the report was issued was 28 MVA, which is less than the total available supply.
- A medium voltage network of 135 km overhead lines and 127 km underground cables, which conveys the power to all developed parts of the jurisdictional area as well as to the rural areas on both sides of the river, from Straussburg in the east to Koppies Island in the west. The networks are in a generally good condition, but some parts are very old and replacement programmes will have to be considered in



the next few years, especially for the above-ground networks in the rural and industrial areas, which are very susceptible to bad weather conditions.

- 367 Distribution transformers that serve the low voltage networks to the clients. In general the transformers have sufficient capacity, although in parts of the CBD and residential areas upgrading will become necessary.

The Municipality buys electricity from Eskom and distributes it throughout the municipal distribution area, which is smaller than the municipal area of jurisdiction. The parts of the jurisdictional area that fall outside the municipal distribution area are served by Eskom such as in this proposed development. (//Khara Hais, 2005)

5.6.3 Water and Sanitation

The Orange River is perennial with flows varying between 50 and 1800 cusec (cubic metre per second), depending on the season. The flow of the river is controlled mainly by discharges from upstream dams such as the Bloemhof, Gariep and Van der Kloof dams. The //Khara Hais Municipality is presently the holder of a permit authorising the withdrawal of 25 million cubic metres (m^3) of water per year from the Orange River for urban use. (//Khara Hais, 2005)

The maximum withdrawal in the peak season was 28 000 m^3/day at the time when the study was conducted by the //Khara Hais Local Municipality. ~75 000 people lived in //Khara Hais at that time. The average daily water usage (ADU) in the supply area, including estimated losses of water that could not be accounted for, was about 32 928 m^3/d . (//Khara Hais, 2005)

A number of large scale users within Upington's system are the Kalahari-West Water Board with an average use of ~1 545 m^3/d , the Departments of Defence (1 410 m^3/d) and Correctional Services (870 m^3/d). (//Khara Hais, 2005)

Upington and all other settlements derive their raw water from the Orange River either by direct withdrawal or withdrawal from an irrigation canal. Water is pumped through a rising conduit and various pumps from the inlet in the river, to the purification works. (//Khara Hais, 2005)

The purification works at Upington has a capacity of $\pm 64 \text{ m}^3/\text{d}$ that draws water from the Orange River, and provide water into a clean water pump well of 700 m^3 . Water is drawn from the pump well and pumped into the distribution system. The main pump station is situated at the purification works. The configuration is 4 pumps in parallel, of which three can be operated simultaneously and at least one be kept as standby at all times. The purified water is then pumped via the main water conduits to the clean water reservoirs from where it is then distributed by means of the distribution network to the individual consumers. Purified water is delivered from one reservoir (Upindustria reservoir) to the Kalahari-West stock watering scheme which provides purified water to farms in West Kalahari. (//Khara Hais, 2005)

Some of the smaller settlements outside of Upington are also provided with small purification or "package plants". Lambrechtsdrift, Karos, Leerkrans, Louisvale and Raaswater settlements are examples of these. At the smaller plants there is only one pump per plant providing purified water to a storage reservoir. (//Khara Hais, 2005)

All other inhabitants not living within Upington or one of the formal settlements are responsible for their own water provision (mainly irrigation and stock farmers). (//Khara Hais, 2005)

The quality of the water in the Orange River is becoming poorer. Reasons for this are the increasing agricultural and industrial activities upstream from Upington, as well as the lower inflow of quality water from Lesotho. The quality of the water varies with the seasons and also depends upon which river the main supply comes from. (//Khara Hais, 2005)

Large scale sewage works consists of the main sewage conduits and 11 pump stations conduct sewage effluent to the sewage purification works, which has a capacity of 16 m^3/day . Sewage effluent is returned to the Orange River after purification in terms of the legal standards. The sewage effluent from Louisvale Road, situated south of the Orange River is pumped from one pump station and a main sewage conduit to oxidation dams where it is purified. The capacity of these works is 0,6 m^3/day . None of the other outside settlements at present have sewage plants. The sewage generated in these areas is mainly removed by vacuum tankers, or they have dry systems/"VIP" systems. (//Khara Hais, 2005)

The Kameelmond sewage works are situated on the south western side of Upington on the northern bank of the Orange River. The purification works have a purification ability of 16 m^3/day , but can handle a peak flow of up to 48 m^3/day . (//Khara Hais, 2005)

5.6.4 Refuse Removal

Households in Upington are provided with plastic bags that are removed on a weekly basis. In certain areas garden refuse in manageable containers are also removed weekly. Periodic removal of refuse dumped in unauthorised places also takes place. Special removals are done at request. Refuse from newly incorporated residential areas is removed every second week. There is one temporary disposal site (transfer station) for garden refuse and it is removed to the waste site from there as necessary. Refuse from business premises are removed weekly or more as needed. Business premises provide their own refuse containers. A private contractor removes recyclable waste from business premises. (//Khara Hais, 2005)

Refuse disposal is done at the Dunes general waste disposal site, situated on the Keimoes road south west of Upington and one smaller waste site at Leerkrans, for the rural area outside Upington.



5.7 Land Use

5.7.1 Current Land Use and Ownership

Remaining extent of the farm Vaalkoppies No. 40, Kenhardt District, belongs to the Deo Gloria Olive Estate and is zoned for agricultural use.

5.7.2 Surrounding Land Use

The surrounding land is primarily used for irrigation, stock farming and game farming throughout the district.

5.8 Aesthetics

Visually the affected environment is predominantly of a rural nature. The site is located on agricultural land where irrigation and game farming is practised. It is a semi-arid region with low land capabilities; development is concentrated along the river where most of the anthropogenic activities occur. The river banks are transformed by agricultural activities and smaller towns occur along the river.

The farm occurs on the sandy and rocky undulating plains south of the Orange River and falls in the Kalahari Karroid Shrubland (Van Rooyen, 2012) (Appendix A).

The aesthetic problems in the region are waste, litter and general poor housekeeping of farming practices. In some rural areas the poor waste collection system has resulted in indiscriminate dumping, particularly along the main roads and in river dongas, which give many of these areas an air of neglect.

5.9 Air Quality

Air quality monitoring has not been conducted in the region; therefore it would be difficult to determine the extent to which the air is polluted.

The most likely local sources of air pollution are dust storms, burning of waste at refuse disposal sites, household burning of coal, , medical facilities (coal powered heating systems and/or incinerators), agricultural activities (ploughing and field cultivation activities that cause dust nuisance and wind erosion, as well as burning of crop residues), and veld management or accidental fires.

5.10 Noise

The N10, which passes the study area, links Groblershoop with Upington and is mainly used by residents, businesses and tourists to the area. The noise levels along this road are relatively low as traffic volumes are relatively low compared to other national routes.

The residential, educational and recreational land uses at the towns, conservancies and dams are considered to be noise sensitive receptors (NSR).

5.11 Heritage and Historical Background

The affected area consists of mostly vacant farm land located in a typical Lower Orange River environment. This land displays features that occur in the Orange River Broken Veld, such as fences, tracks numerous dry gullies, sandy and gravelly areas, undulating and irregular plains and low scattered shrubs. The site is characterised by hilly features rising approximately 100 meters above the surrounding irregular plains that gently slope down towards the Orange River valley in the north. To the north west of the proposed development on the remainder of the farm Vaalkoppies other noteworthy features include olive orchards, workshops, sheds, houses and hangar, a network of farm roads, pipelines, boreholes, two abandoned amethyst quarries (on the northern periphery of the farm) and a memorial dedicated to JC Strauss near one of the two quarries. The farm borders on the Strausburg and Ntsikelelo settlements in the north and two cemeteries (located outside the farm) are associated with these settlements. (De Jong, 2010)

As a cultural landscape this environment can be classified as relic farmland and to a lesser extent an archaeological landscape with reference to Stone Age artefacts that are known to occur in the broader region, examples of which were identified at the two quarries where Late Stone Age artefacts were manufactured as well as scatters of artefacts. (De Jong, 2010)

The proposed development area is underlain by unfossiliferous Precambrian basement rocks (Vaalkoppies Group) as well as locally by thin superficial sediments (geologically young stream and river alluvium, surface gravels, aeolian sands) of low palaeontological sensitivity. Potentially fossiliferous Tertiary river gravels are not mapped in this area. (Almond, 2013)

5.12 Safety and Security

Even though crime in the region is very low compared to other areas in South Africa, the issues that need to be addressed include visibility of the SAPS, accessibility of SAPS stations, shortage of resources, insufficient SAPS stations, shortage of human resources in courts, high levels of domestic violence and rape, a high level of unemployment, juvenile delinquency, substance and alcohol abuse, theft and other illegal activities. These issues could be addressed by proper training of SAPS members, visual presence in the form of patrols, forming crime prevention partnerships with all relevant stakeholders, establishing effective child protection units, establishing and promoting victim support centres, an effective disaster management plan, and appointing more human resources to the courts and disaster management units.



6. THE PUBLIC PARTICIPATION PROCESS (PPP)

Consultation with the public and stakeholders forms an integral component of this investigation and enables interested and affected parties (I&APs) to identify the issues and concerns, relating to the proposed activity, which they feel should be addressed in the scoping report.

6.1 Identification of Key Stakeholders

The Public Participation Process was started by identifying key stakeholders and obtaining their contact details in order to inform them about the EIA Process. Key stakeholders that were identified included:

- *National Government Representatives:*
 - Department of Agriculture, Forestry and Fisheries;
- *Provincial Government Representatives (Northern Cape):*
 - Department of Environment and Nature Conservation;
 - Department of Agriculture, Land Reform and Rural Development;
 - Department of Water Affairs;
 - Department of Forestry;
 - Department of Energy;
 - Department of Labour; and
 - Department of Mineral Resources;
- *Local and District Authorities:*
 - ZF Mgcawu (formerly Siyanda) District Municipality; and
 - //Khara Hais Local Municipality (contacted Municipal Manager and Ward Councillor);
- *Other authorities:*
 - South African Heritage Resources Agency; and
 - Northern Cape Provincial Heritage Resources Agency;
- *Environmental Non-Governmental Organisations:*
 - Endangered Wildlife Trust; and
 - Wildlife and Environment Society of South Africa (Northern Cape)
- *Parastatals:*
 - SANRAL;
 - Telkom; and
 - Eskom;
- *Community-based organisations:*
 - Straussburg Agricultural Society; and
- *Surrounding landowners.*

All I&AP contact details have been listed (Appendix G) and details of I&AP consultations, including dates, methods of communication and content of consultations, have been recorded in a comments and response report (Appendix F). I&AP consultations will be recorded in this manner throughout the course of the project.

6.2 Notification of I&APs

Identified stakeholders were notified of the proposed development by means of a notification letter and a Background Information Document (Appendix E) which was sent to them by email and registered mail (proof attached in Appendix E). The Background Information Document gave a brief outline of the proposed project. Stakeholders were invited to register as I&APs and submit their comments with regard to the proposed development to the EAP. A response form (Appendix E) was included with the notification letter and Background Information Document.

As required by the EIA Regulations, the initiation of the environmental investigation was advertised to the public by means of a press advertisement in the *Gemsbok* (English and Afrikaans, Appendix C), the most widely read newspaper of the area, on 7 March 2012. The most important aspects of the proposed development, such as its nature and location, as well as the applicable listed activities, were stated in the advertisement. The contact details of the EAP were supplied and I&APs were invited to submit their comments with regard to the proposed development. The purpose of the newspaper advertisement was to inform the widest possible group of potential I&APs of the proposed development and related EIA.

Posters (Onsite Notices, Appendix D) were mounted at the entrance gate to the site proposed for development, and also at the Straussburg General Store on 7 March 2012. These posters supplied basic information about the proposed development and the environmental process, and extended an invitation to I&APs to register with the EAP and submit their comments regarding the proposed development. The response period expired on 29 March 2012.

All government departments mentioned in the key stakeholders section 6.1 on page 24 have been informed regarding the proposed development and the relevant reports will be made available to them. Proof is attached in Appendix E.



6.3 Public Participation Process related to the Final Scoping Report

The final environmental scoping report is available for review at the Public Library next to the //Khara Hais Local Municipal offices that was identified as readily accessible to I&APs.

The availability of the report will be communicated via email and registered mail to all registered I&APs. The public and government departments will be allowed a review period of 21 days.

6.4 Comments and Response Report

All the issues and concerns raised by I&APs during the first phase of public consultation and responses to it are contained in the comments and response report (Appendix F).

The major issues raised by I&APs can briefly be summarised as follows:

- Grazing rights of other farmers that are registered to this property for proposed for development (Straussburg Farmers Association: Mr. J.S. Strauss, Mr David van der Merwe);
- Sustainability of the ground water resource, impact of the water use on the water users of the same water resource on adjacent properties and how the impact will be addressed (Mr van der Merwe and Mr N.S. Strauss representing Newhaven Trust);
- How sewage, general waste, storm water drainage and water provision will be managed (Mr van der Merwe);
- Safety services to the eco estate and management of social issues of/due to inhabitants of the eco estate (Mr van der Merwe);
- How the proposed development would affect adjacent farming and other businesses and the possible resulting job losses due to the following (Mr van der Merwe):
 - Drainage; and
 - Social problems such as theft.
- Elaboration of the applicable activities as listed in regulations 544, 545 and 546 (Mr van der Merwe); and
- Potential impact on protected trees and plants to be properly assessed and ecology report, EIA and EMP to be provided (Department of Forestry).

Grazing Rights

A meeting was held with the respective farmers that indicated that they had grazing rights on the said property. Find the Agenda and Minutes attached in Appendix H.

During this meeting it was requested that farmers claiming grazing rights should submit the requested information to Louw Kotzé & van Zyl Incorporated Attorneys, the legal representative of Deo Gloria Olive Estate at that time. Only Mr van der Merwe submitted the requested documents.

The legal opinion of Louw Kotzé & van Zyl Attorneys is as follow (Appendix I):

The point in law was researched and an excerpt from *Juta & Kie*, writers *Mrrs. NJO Olivier, GJ Pienaar and AJ van der Waldt* attached. It specifically refers to pages 263 & 264, i.e. **Amendment and Expiry of Servitudes* [Louw Kotzé & van Zyl Attorneys' translation].

“(1) A servitude shall be extinguished by prescription if it has not been exercised for an uninterrupted period of thirty years” [Prescription Act 68 of 1969, Section 7(1)]

Louw Kotzé & van Zyl Attorneys formally placed on record and confirmed that none of the neighbouring premises exercised their right on the property for fifty years and therefore the servitude prescribed.

Also take note that the servitude was a conditional servitude subject to rent per head of livestock as well as being restricted to 10(ten) Large Livestock Units.

Groundwater Resource

A study on the groundwater resources was conducted by SRK Consulting is attached in Appendix O. The main findings of the report was summarised in section 4.1.6 on page 15 of this report.

Other issues raised by I&APs

The remainder of the issues such as rendering of municipal services, security and safety services, related socio-economic and ecological impacts raised by I&APs is being and will be addressed in the scoping and EIA reports.

The comments raised by registered I&APs on the Draft Scoping Report (second phase) has been included in the Comments and Response Report (Appendix I2).

Grazing Rights

(Refer to grazing rights discussed above)

The issues raised by Mr van der Merwe have been included in the comments and response report. For his convenience the legal opinion has been provided to him again via email. Mr van der Merwe requested to be put into contact with the applicant regarding the grazing rights issue.



Therefore all communication thus far between Mr van der Merwe and the EAP was forwarded to the applicant. After the provision of the legal opinion to Mr van der Merwe no further communication has been received from him.

6.5 Review of Final Reports

6.5.1 Public Review of Final Environmental Scoping Report

The final environmental scoping report is available for review at the Uppington Public Library which was identified as readily accessible to I&APs.

The availability of the report will be communicated via email and registered mail to all registered I&APs. A 21-day period is allowed for this review process from 30 August 2012 to 20 September 2013.

This report will be submitted to the Northern Cape DENC for authority review and decision-making and/or comments.

6.5.2 Public Review of Draft Environmental Impact Report

When the environmental scoping report has been finalised, compilation of the draft environmental impact report will follow. This report will be made available for public review in a similar way to the final environmental scoping report. All relevant comments on this report will be included in the draft environmental impact report, which would be made available for a period of 40 days.



7. IMPACT ASSESSMENT

The following possible positive and negative environmental issues have been identified through the impact matrix for the planning, construction, operation and maintenance, and decommissioning phases:

- water resources;
- soil and agricultural potential:
 - risk of erosion linked to topography of area; and
 - degradation of the agricultural potential
- impacts on ecology and biodiversity:
 - habitat transformation & fragmentation;
 - ecology & corridor function;
 - invasion of alien flora & fauna
 - vegetation destruction including red data/threatened flora spp. and protected trees spp.;
 - depletion of natural resources such as grazing;
 - floristic spp. changes;
 - threatened fauna spp.; and
 - faunal interactions with structures & people.
- social aspects on the meso, and micro level;
- visual quality and aesthetics;
- economic impacts (mostly positive);
- traffic impacts (construction & operational phases);
- noise (construction -, operational -, upgrading - and decommissioning phases);
- air quality;
- heritage resources; and
- tourism activities.

The identified possible impacts and possible cumulative effects will be discussed in detail in the environmental impact report. Regulatory and mitigatory measures with regard to these impacts will also be stipulated in a comprehensive environmental management programme (EMP), which will form part of the EIA report.

7.1 Construction Phase Impacts

Many impacts associated with the project would only be effected during the construction phase and would thus be temporary in duration. However, actions performed during the construction phase may cause pollution that would have longer lasting effects on the environment. Construction phase impacts would therefore be investigated further during the EIA and EMP phase, especially with a view to limit and mitigate lasting effects.

7.1.1 Water Resources

Construction-related activities that could have an impact on the water resources of the study area include:

- Implementation and operation of construction camps and storage of materials required for construction;
- land clearing;
- construction of access roads;
- operation and maintenance of construction vehicles and machinery; and
- construction of infrastructure, associated infrastructure and services.

Potential impacts associated with these activities include:

- surface water pollution/quality degradation;
- groundwater pollution/quality degradation; and
- hydrology:
 - impact on infiltration;
 - change in storm water drainage;
 - change in catchment areas;
 - siltation;
 - ponding; and
 - change in amount and velocity of runoff.

Groundwater from existing boreholes on the farm would most probably be used for construction purposes. The site falls within the western part of the Quaternary Drainage Region D73E for which the amount of water available under General Authorisation is listed under Zone A of the Groundwater Taking Zones, where no water may be taken from these drainage regions except as set out under Schedule 1 and small industrial users (DWAf, 2004 as cited in Esterhuyse, 2012).

The sustainable yield rate of aquifers within the study area has been established through a study done by Esterhuyse (Appendix O) and the amount of water that would be available was determined, taking into account other possible uses of these aquifers.



Detailed information on the water requirements is included in the MVD engineering report (Appendix P).

Fractured aquifers are more vulnerable to pollution than aquifers where the storage and transmission of groundwater is primarily intergranular, due to the higher rates of groundwater movement and lower attenuation potential. Once polluted, such aquifers are difficult and expensive to remediate. Soluble pollutants are likely to travel downwards to the water table together with recharging water, and then move with the water in the direction of regional groundwater flow. Recharge mechanisms in this area are not fully understood, but are thought to be episodic, following sporadic heavy rainfall. (Pretorius, 2004).

The following possible risks to the groundwater have been identified:

- leaching of herbicides that might be needed for alien plant control into the subsurface;
- contamination from nearby stock watering points;
- migration of hydrocarbon fuel spillages (chemical contamination) by construction vehicles and machinery into the subsurface; and
- sewage storage and disposal.

In all instances the spatial scale of contamination is likely to be localised, i.e. encompassing the zone between the source and the Orange River. The duration of this impact is likely to be either long-term (between 15 and 30 years) or permanent. Mitigation (other than natural mitigation) is likely to be difficult, expensive and time-consuming.

7.1.1.1 Gaps in Knowledge and Recommendations

Geohydrology

The potential for exploitation of groundwater exists. The gaps in knowledge associated with this resource are:

- a lack of reliable hydrological and geo-hydrological information; and
- a lack of knowledge and research on groundwater pollution in this area.

To address the gaps identified and for the purpose of a groundwater license it is required that the Groundwater Management Units (GMUs) of the area surrounding the farm be identified and a hydrocensus conducted that covers the adjacent farms (Esterhuyse, 2012).

SRK Consulting was appointed to conduct an assessment of the groundwater resources including the following (Appendix O):

- Collate all available groundwater data and reports for the study area from the National Groundwater Archive (NGA), the DWA and other resources.
- Conduct a hydrocensus of the farm and its surrounds at a 2 km radius. During this survey all relevant geohydrological data are collected and noted (borehole depth, yield, water strikes, equipment, installation depth, use and abstraction rate). Water levels, Electrical Conductivities (EC) and pHs are also measured where possible.
- The data collected are used to characterise the aquifers and their exploitation potential.
- Analyse the yield test data of five newly drilled, high yielding boreholes to determine the sustainable yield thereof.
- Compile a final report in which the results and recommendations are summarized.

Sewage storage and disposal measures during the construction phase and the proposed mitigation measures will be addressed during the EIA and EMP phase and would most probably entail the use of chemical toilets.

Hydrology (Surface Water)

Not any gaps have been identified regarding the surface water drainage but the sensitivity of this system and the possible erodibility and siltation due to the topography, soil composition and plant cover of the area and the changes that will be caused to it due to construction activities was identified as an area of concern. The ecology (Van Rooyen, 2012) and agricultural (Lubbe, 2012) studies that were commissioned addressed these areas of concern and mitigation measures were proposed by the respective specialists that will be addressed and incorporated in the EIA and EMP reports that will have to be incorporated in the engineering planning of the development.

7.1.2 Soil and Agriculture

Construction-related activities that could have an impact on the soil and agricultural potential of the study area include:

- Implementation, operation and maintenance of construction camps, construction vehicles and machinery;
- land clearing/vegetation removal;
- construction of access roads;
- excavation activities for electricity -, water -, sewage -, and grey water reticulation, and foundations for buildings;
- construction of storm water drainage systems;
- stockpiling (spoil, gravel for road building, sand and stone for buildings, bedding sand for electricity and other reticulation);
- batching plant and batching activities; and
- dust suppression.



Potential impacts associated with the construction phase include:

- soil degradation such as:
 - soil pollution;
 - soil erosion (related to topography, soil composition, vegetation cover, climate);
 - soil displacement (from one area to another that contains different types of soil or different soil zones in one area)
 - soil forming properties;
 - compaction of soils;
- change of topography or slope;
- agriculture or land use:
 - land use potential or capability;
 - agricultural potential or capability; and
 - restriction of land use.

7.1.2.1 Soils

Soil pollution could take place due to spillage of hazardous chemicals such as petrochemicals, cement dust etc. that would be stored and used on the construction site.

Soil degradation takes place through the removal, alteration or damage to soil and soil forming processes by land clearing, excavations, dust suppression and compaction of soil at roads and development footprints. The direct impact of degradation and accelerated wind and water erosion of soil during and after the land clearing activities are considered.

Soil erosion is when the natural ground level is lowered by wind or water and could occur due to chemical processes and physical transport of the soil on the land surface, which causes siltation in other areas such as drainage areas. The potential for soil to erode is the likelihood that erosion will take place when soils are exposed to water and/or wind due to construction activities. The potential for erosion is increased in areas with low-plasticity, fine-grained soils. Soil properties are also changed due to construction activities such as continuous vehicle/machinery movement.

The soils in the area proposed for development is highly susceptible to wind and water erosion (Lubbe, 2012).

The proposed activities would cause dust nuisance and limit visibility in areas directly surrounding it. Dust suppression will suffice as a mitigation measure during the construction phase. Other mitigation measures have also been proposed by the agriculture and ecological specialists that would mitigate the possible impacts identified here. This will be addressed in the EIA and EMP reports that is to follow this report.

7.1.2.2 Agriculture

The impact matrix indicates that the development would possibly cause a loss of land that could have been used for agricultural activities, restrict the use of land, and might reduce the agricultural potential or capability of the land due to structures such as fencing, roads, buildings etc.

The agricultural impact study indicated that the site was found unsuitable for commercial cultivation due to limiting factors such as the stony nature of top and subsoil; shallow soil depth and hard setting carbonate horizons below surface. The low clay percentage results in low water holding capacity and low nutrient availability. Severe climatic conditions further limit commercial cultivation. The proposed project area could be and is utilised as grazing for game, but the grazing potential is very low. (Lubbe, 2012)

7.1.2.3 Gaps in Knowledge and Recommendations

The construction and operation of an Eco-Estate would not cause high impacts on the agricultural potential of the identified site or the local region, except for increasing the possibility of erosion where soil is disturbed, for which mitigation measures are recommended. Commercial agricultural activities could continue normally in the surrounding area. (Lubbe, 2012)

The possibility of soil erosion will be addressed and mitigated during the EIA and EMP phase of this project.

7.1.3 Ecology and Biodiversity

Construction-related activities that could have an impact on the ecology and biodiversity of study area include:

- Implementation, operation and maintenance of construction camps, construction vehicles and machinery;
- storage and use of materials and chemicals such as petrochemicals required for construction;
- land clearing/vegetation removal;
- construction of access roads;
- excavation activities for electricity -, water -, sewage -, and grey water reticulation, and foundations for buildings;
- construction of storm water drainage systems;
- construction of 22kV overhead power supply line;
- construction of infrastructure, associated infrastructure and implementation of services;
- stockpiling (spoil, gravel for road building, sand and stone for buildings, bedding sand for electricity and other reticulation);
- batching plant and batching activities; and
- dust suppression.



Potential impacts associated with the construction phase include:

- habitat transformation and/or degradation;
- loss of sensitive/pristine local habitat types;
- increase in fragmentation, isolation and corridor functioning of local habitats and ecosystems due to fencing, roads and other infrastructure (long term impact);
- aquatic habitat transformation due to sediment loading;
- invasion of alien flora and fauna on disturbed land;
- flood zones alteration;
- vegetation destruction (loss of economic use of vegetation);
- depletion of natural resources (e.g. grazing, ground cover, water purification/cleaning services);
- destruction of red data/threatened flora spp. (high ecological value);
- floristic species changes;
- destruction of protected tree spp.;
- impacts on threatened faunal spp.;
- impacts on common faunal spp.;
- impacts on predator-prey interaction;
- faunal interactions with structures, servitudes and personnel;
- impacts on surrounding habitats and spp.;
- impacts on South Africa's conservation obligations and targets;
- impacts on avifauna:
 - disturbance;
 - roosting/nesting;
 - perching;
 - nuisance (faeces);
 - collisions;
 - electrocutions; and
 - issues with regard to associated infrastructure.

A desktop ecological assessment was done by Dr Noel van Rooyen of Ekotrust CC as an ecological assessment, including a site inspection, was conducted in 2010. The desktop study assessed the sensitivity of the site and evaluated the significance of impacts on the site.

7.1.3.1 Flora

Areas that are considered to be sensitive are:

- untransformed natural vegetation;
- high diversity or habitat complexity;
- areas containing Red Data species; and
- systems that is vital to sustain ecological functions.

Areas that have low sensitivity are transformed areas that are of little or no importance for the functioning of ecosystems.

Development (or change in land use) usually contributes to habitat loss and degradation in many biodiversity important areas. Much of the impact can be minimized through careful planning and **avoidance** of sensitive areas. In many areas it is not the direct use of biological resources such as subsistence harvesting (especially of medicinal plants) and illegal collection for commercial trade (particularly of groups such as succulents) that is threatening their sustainability, but rather indirect pressures such as changing of land use, land degradation, clearing of indigenous vegetation, overgrazing, invasion of land by alien species, informal settlements, urban development, industrial and agricultural pollution, mining, impoundments, cultivation, water abstraction and climate change. Loss of habitat is regarded as the foremost cause of loss of biodiversity. (Van Rooyen, 2012)

A Category 2 plant, *Prosopis glandulosa*, was recorded on the site. Alien invaders should be controlled by mechanical and/or chemical means. (Van Rooyen, 2012)

Sensitivity is the vulnerability of a habitat to any impact, for example a dune, wetland or ridge system would be more vulnerable to development than would a sandy plain. Several sensitivity categories may be identified and assessed depending on the location of a development site. The flora and fauna sensitivity on the site is rated as low provided the protected species on site is conserved and adjacent land is available for dispersal of fauna. The significance assessment of impacts on the terrestrial ecosystems (ridges and plains), aquatic ecosystems, rare and protected plant species and fauna were assessed. (Van Rooyen, 2012)

The impact rating on the ridges and drainage lines will be low only if no developments occur near the drainage lines and the buffer zone of 32 m is enforced where no development must occur. (Van Rooyen, 2012)

The final significance rating of low for all five parameters means that the development impacts will have little real effects on the ecology and it should not have an influence on the decision to proceed with the project. However, some mitigation measures are proposed that should be implemented and monitored. (Van Rooyen, 2012)



The mitigation measures stipulated in the ecology assessment will be incorporated in the EIA and EMP report to ensure strict implementation so that the impacts identified are lowered to the acceptable levels mentioned in the report.

7.1.3.2 Fauna

The proximity of the site to Upington, Straussburg and Linton, and the agricultural activities in the area will contribute to a sparse faunal diversity. Poaching of fauna by means of dogs occur sometimes on site. The grass cover varies from low to medium. However, the grass species composition of the plains makes it suitable for grazing animals. Some shrubs such as *Acacia mellifera*, *Boscia foetida* and *Rhigozum trichotomum*, as well as many dwarf shrub species are common on site and provide some browse for browser species. Browse is particularly abundant along the drainage lines where species such as *Acacia mellifera*, *Boscia foetida*, *Ziziphus mucronata*, *Boscia albitrunca* and *Acacia erioloba* are abundant. The deep sandy soils in certain areas on the plains are suitable for small ground-living animals as well as for large burrowing animals such as the armadillo. The rocky ridges and other outcrops provide habitat for species such as the rock hyrax (Van Rooyen, 2012).

As faunal species are able to migrate away from the area of impact, the probability of direct impacts on threatened, near-threatened and common faunal species may be lower. However, consideration must be given to possible impacts on extremely localised habitat occupied by threatened species, as well as impacts that may render the remaining habitat of threatened or common species inadequate. The farm's outer boundary is enclosed with fencing that will allow migration of smaller species to adjacent farms but will restrict larger species. The Eco Estate will also be enclosed and migration to the rest of the farm will be restricted. This section will be managed as a game camp while the farming section to the west will be developed entirely as an olive and grape farm. After the construction phase of the development of the Eco Estate is completed fauna will return if not restricted by the fencing.

Indirect impacts on fauna would occur due to loss of habitat and faunal interactions with the structures, servitudes and personnel.

Contact would inevitably occur between people and animals, during the construction and operational phase. Although larger faunal species would tend to move away from the site and avoid contact with humans, encounters with snakes, scorpions, spiders and possibly larger predators would remain likely. The likelihood of animals being killed by means of snaring, poaching, poisoning, trapping and vehicles would inevitably increase due to the presence of humans in areas of natural habitat and measures should be taken to prevent and mitigate these impacts.

Consequences of the construction phase may be the fragmentation of populations, reduction of area of occupancy and loss of genetic variation of affected species.

7.1.3.3 Avifauna

Birds could be affected by the proposed development in various ways, involving their nesting and territorial habits, as well as collisions with the structures. Most of the long-term direct impacts would occur during the operational phase and will be addressed in section 7.2.3.3 on page 39.

Measures should be taken to prevent nesting on structures used during the construction phase, as they could create seemingly favourable nesting conditions for several species, including sociable weavers, crows, various raptor species and rock pigeons.

Disturbance of resident birds such as Kori Bustard, especially whilst breeding, could occur due to construction activities. Habitat loss would also occur and could affect protected species such as Martial Eagle, which may forage and even breed in the area. However, these impacts are not expected to be significant.

7.1.3.4 Gaps in Knowledge and Recommendations

Fauna & Flora

Not any gaps have been identified due to the fact that an ecology study has been done on the study area. It is necessary that the ecologist map the sensitive areas as no go areas to ensure implementation of recommendations stipulated in the ecology study.

7.1.4 Social Environment

The main social challenges experienced within the district include:

- low economic growth rate that limits the material needs of communities;
- negative population growth rate due to urbanisation;
- lack of job creation and training institutions in the province resulting in high unemployment rates;
- poor or lack of primary education;
- a desperate need for social activities, services, and youth development; and
- availability of basic social services including sanitation.



Potential impacts associated with the construction phase include:

- **Macrosystem:** Impacts on the country, economic growth & long term social benefits on a national scale, as well as interest from the public is not foreseen due to the small scale and local nature of the project.
- **Mesosystem:**
 - Safety and security;
 - Daily movement patterns;
 - Socio-economic impacts (social investment, job creation, job seekers, population increase, increased services demand, social problems);
 - Impact on urban expansion;
 - Impact on tourism and recreation;
 - Economic impact; and
 - Distance to residential areas.
- **Microsystem** (physical presence of infrastructure):
 - Health and safety of workers and public;
 - Sense of place (tourism and recreation);
 - Land use impacts (cultivation and grazing); and
 - Traditional/cultural conflicts.

The sphere of influence of the proposed development has been assessed within the macrosystem, the mesosystem and the microsystem.

Social impacts at the macrosystem level are not foreseen due to the small scale and local nature of the proposed development.

Social impacts at the mesosystem level include all or part of the district or local municipality's area of responsibility. The impacts from the effects of the project on employment opportunities and demand for infrastructure etc. will be assessed.

Impacts at the microsystem level are caused by the physical presence of the development and ancillary infrastructure, and are confined to the occupants on the study area or directly adjacent to this infrastructure.

7.1.4.1 Meso-level Impacts

Employment opportunities created by the construction phase would have short-term positive impacts that in turn would improve the lives of individuals and families. The magnitude of this impact would depend on the number of construction workers to be employed, either by the developer itself or by contractors. Contractors would possibly import only their core teams of management and specialist skilled staff. This could have some economic benefits for surrounding communities, although only of a temporary nature.

The construction phase is expected to last approximately two to three years. In addition to creating employment opportunities for construction workers, the project might also offer other sources of temporary employment and other ancillary works.

The construction and the operational phase would possibly result in a slight increase in traffic volumes that, depending on the intensity of construction, could possibly impact on the safety and daily movement patterns of commuters of surrounding communities utilising the N10. The magnitude of this impact would depend on current traffic volumes and the increase in traffic volumes that would be associated with construction and operational activities. MVD Kalahari indicated that a Traffic Impact Assessment would be conducted. The findings and recommendations of this study should be included in the EIA and EMP report.

7.1.4.2 Micro-level Impacts

The physical presence of the construction plant and construction activities would possibly cause some direct impacts to the area immediately surrounding the study area. The extent of these impacts might be experienced by landowners and residents in the immediate area surrounding the study area.

The construction phase might impact on the safety and security of surrounding communities by the increase in traffic volumes depending on the intensity of the construction activities.

7.1.4.3 Gaps in Knowledge and Recommendations

The number, type and period of employment opportunities during the construction phase will be assessed by the engineering team and included in the EIA report. It has to be established whether skilled labour is available in the communities surrounding the study area, and what types of skilled labour are available in these communities. The possible influx of employment seekers could be controlled by making reliable information available to the local area through advertisements in local papers, local radio (Radio Riverside) and communication with municipalities regarding the proposed development and the type of employment opportunities available.

The impacts associated with the higher traffic volumes could be accommodated by proper site management, e.g. controlling the size of orders that would be transported to the site at any given time.



7.1.5 Visual and Aesthetical Impacts

Construction-related activities would only have an immediate impact on the visual and aesthetical aspects of the study area. The low height of the development, the hilly topography of the immediate area and the sparse population of the surrounding area (not any potentially sensitive receptors such as landowners and homesteads located within areas of potential visual exposure) ensure that the impact is either very low or no impact at all on the surrounding area. Impacts on observers close to the study area, especially those travelling along the N10 directly adjacent to the study area will be considered. Due to the hilly topography where the proposed development will be situated, the view would be less than 4 km to either side of the N10.

Potential impacts associated with the construction phase include:

- visual impacts;
- reduction in aesthetic properties;
- littering and housekeeping on construction sites;
- light pollution due to security lighting of the facility at night, which could especially impact on observers traveling past the construction area;
- dust nuisance and other impacts related to the construction phase.

The key aspects of any development determining visual impact include its physical dimensions, colour and texture.

Construction infrastructure is mostly yellow and mostly stands in contrast with the surrounding environment. This impact however would be of a temporary nature.

Residential infrastructure might be reflective depending on the type of building material used as well as the orientation of the infrastructure to the sun relative to the road users. Roofing material and windows would be the main contributors to reflection. The types of roofing material would be galvanized zinc, that is highly reflective, roof tiles, and thatched roofing that would blend into the environment. Thatched roofs however are environmentally and economically expensive as grass is not obtainable locally and have to be imported from other areas of the country and also have a high fire risk and therefore also a high financial outlay in the long term to insure. Light colours such as white and bright painting colours are also very visible. Earthy colours would be less visible. Walls, using face brick or firebricks would blend in with the environment and would exclude the use of painting that is expensive to maintain and would also have a lower impact on the environment due to paint residue, tins, and cleaning lacquers. The orientation and covering of windows (utilising either shutters or correct or bigger overhang of roofing) could address reflection.

The possible area of influence is calculated by determining the maximum distances to establish a line of sight, based on the curvature of the earth. These distances are used to conduct a landscape evaluation for the study area and are mainly influenced by topography and vegetation. Typically, a flat landscape with grass and shrubs would give rise to a high degree of exposure, as opposed to hilly terrain with high trees or dense bush, which may effectively screen a development from being visible.

The landscape around the study area is very hilly, with grass, low shrubs and trees. The visual absorption capacity of the natural vegetation is therefore low and would serve only partly to mitigate the visual impact of the development. The hilly topography of the study area and the area immediately surrounding the study area on the other hand has a high visual absorption capacity and would ensure that the development would only be visible to the viewer on the N10 within very short distances, less than 4 km in radius.

Visual impact is mainly associated with the occurrence of sensitive viewers who would experience a new development as an intrusion of the views they are accustomed to, with associated adverse impacts. Alternatively they might experience it as an acceptable feature in the landscape, which is absorbed by similar developments in the surrounding area. A viewer might see the infrastructure as an engineering and economic attribute. This might account for both permanent residents and occasional visitors to the area, especially tourists.

Areas where sensitive viewers are concentrated can include the following:

- residential areas, parks and public open spaces in towns;
- dwellings on farms;
- nature reserves and tourist attractions; and
- roads.

Residents in towns and on farms, as well as road travellers, would be sensitive to views of a residential development such as the eco estate during both the construction and operational phases. However, sensitivity is influenced by the character of the landscape and the sense of place at a specific location, as experienced by a viewer. The same person might experience different visual impacts of the same feature depending on his/her location, movement and perception.

The proposed site for development is situated adjacent to the N10. The comparative lack of human structures in the surrounding landscape could be considered as one of the area's attractions for city-dwelling tourists. The visual impact on road users and farm dwellers must therefore be investigated and mitigated where possible.

7.1.5.1 Gaps in Knowledge and Recommendations

Due to the topography of the area it is clear that the development would only be visible in the direct vicinity and on a very small section of the N10. Not any farm dwellings are visible from the area identified for development. The need for a visual impact assessment or a viewshed analysis is not foreseen in this case. Building material would need to be chosen carefully to mitigate possible reflection of infrastructure.



7.1.6 Economic Impacts

Potential impacts associated with the construction phase include:

- financial and economic impacts;
- stakeholder interest (including regulatory scrutiny);
- business risk/benefit; and
- damage to property (owner and developer).

Positive economic and financial impacts have been sufficiently addressed in section 7.1.4 of this report, where the impacts on the social environment have been discussed.

Stakeholder and business risk vs. benefit is very high (positive and negative) for this development as a lot of planning and applications are currently in process. There is thus a high level of financial input, while the developer is not at all assured that leave would be granted to implement the proposed development.

This impact could only be mitigated by internalising the externalities and clearly identifying and defining aspects related to this development. The purpose of the EIA as a whole is to assist in addressing these aspects very early in the planning phase. The EIA will continue to do so as the project planning (critical project timeline) of the proposed development progresses.

The risk of physical damage to infrastructure belonging to the landowner and the developer is moderate and has been taken into consideration in the EIA matrix. Mitigation measures would include good management control, housekeeping and safety and security infrastructure and personnel. This will be addressed in the EIA and EMP report.

7.1.6.1 Gaps in Knowledge and Recommendations

The expected long-term capital value of this proposed project must be included in the EIA report to enable the authorities to establish the economic injection and growth that is expected to result from the proposed development within the Northern Cape.

7.1.7 Traffic Impacts

During the construction phase trucks would be needed to transport infrastructure to the study area with the N10 from either Upington or Groblershoop as access point. All the parts of the infrastructure needed for the proposed development, ancillary infrastructure, as well as machinery must be transported to and from the study area. The extent and intensity of traffic would be of a moderate nature while the probability would be high. The duration of the impact would be low. Should the entire development be conducted over a short period of time and not be phased an overall expected significance of impact would be high for this construction phase.

Possible impacts of traffic on the immediate communities have been discussed in the social environment section (7.1.4) and traffic noise will be discussed in the section on noise (7.1.8) that is to follow.

MVD Kalahari indicated that a Traffic Impact Assessment would be conducted. The findings and recommendations of this study should be included in the EIA and EMP report.

A traffic management plan for the construction and operational phases will have to be compiled and implemented by the developer and access to the development from the N10 has been granted by SANRAL (Appendix F2). Illustrations and plans have been submitted to SANRAL by BVi Consulting Engineers as part of the application.

7.1.7.1 Gaps in Knowledge and Recommendations

Traffic to and from the study area would have to be monitored and controlled by the project manager to ensure that congestion and blocking of roads would not occur. Further mitigation measures will be stipulated in the EMP.

7.1.8 Noise

Potential impacts associated with the construction phase include:

- nuisance;
- health and safety of workers and public;
- traffic volumes; and
- noise sensitive areas.

Noise associated with the proposed development would mostly be generated during the construction phases and, to a lesser extent, during the decommissioning phase, and would be limited to noise levels generally associated with construction that would be of a temporary nature. Being situated next to a national route that carries moderate traffic volumes between Upington, Groblershoop and other smaller settlements en route, noise generated by the development during the operational phase is not expected to have a significant impact on the noise levels in the area.

The main noise sources currently occurring at the study area and the additional sources that would affect the area during the operational phase are road traffic from the N10, noise from general farming operations and the planned eco estate (future). Not any farm residences are situated near the study area that might potentially be affected by the development during the construction phase.



The residual (existing) noise climate of the areas surrounding the study area is typical of a rural/agricultural noise environment. The noise climate in areas close to the N10 carries a noise nuisance factor when vehicles pass.

The construction phase of the eco estate and ancillary infrastructure would alter the noise climate and increase the noise footprint of the study area in the short term. The construction activities would have an offset of approximately 2 500m (daytime) to 4 000m (night time), depending on the intended periods of operation.

The total volume of traffic generated during the operational phase will be comparative to the volume of traffic on the N10.

7.1.8.1 Gaps in Knowledge and Recommendations

Noise impacts and subsequent possible mitigation measures will be addressed during the EIA and EMP phase.

7.1.9 Air Quality

Impacts on air quality would mostly occur during the construction and decommissioning phases and could involve dust nuisance and emissions by vehicles and construction equipment. Air quality impacts during the operational phase would be limited to vehicle emissions. Mitigation measures, especially dust mitigation, will be included in the EIA and EMP.

7.1.10 Heritage Resources

Construction-related activities which could impact on the heritage resources of the study area include land clearing and excavation activities.

Potential impacts could include the disturbance and/or destruction of unique and non-renewable heritage resources. The destructive impacts would be direct, once-off events occurring during the initial construction period.

In the long term, the proximity of operations in a given area could result in secondary indirect impacts resulting from expansions, the movement of people or vehicles in the immediate or surrounding vicinity.

In accordance with the Heritage Resources Act (No. 25 of 1999), the potential heritage impacts, including archaeological and palaeontological impacts, have been and will be further investigated. The results of these studies will be discussed in the EIA report.

A Heritage Impact Assessment (HIA) Phase 1 has been conducted by a heritage specialist for the adjacent agricultural development on the farm (Appendix J) and reviewed by the South African Heritage Resources Agency (SAHRA) (Appendix K). A follow-up study at the specific area identified for development, might be conducted by a Stone Age specialist should it be needed and included in the EIA report. Should any artefacts be found, the archaeologist, in conjunction with SAHRA, will consider the possibility of conserving the artefacts in situ vs. removing the artefacts in an AIA Phase 2, during which the artefacts would be removed, dated and stored at a museum.

The palaeontologist, Dr John Almond indicated that this area would not contain any palaeontological material and provided an exemption letter attached in Appendix L.

7.1.11 Impacts on Tourism

The potential impacts on tourism would include but not be limited to the following:

- visual impact on established tourism areas and products as well as potential tourists;
- proximity to roads;
- impact on traffic flow to the area; and
- potential for tourism development – the impact that the development would have on the growth of tourism in the area (positive and negative).

There are no known established tourism facilities or guesthouses in the area other than within and directly surrounding Upington.

Most of the land surrounding the study area is privately owned and is currently being used for intensive grape, lucerne, cotton and upcoming olive farming as well as livestock and game farming purposes. Ntsikilelo (Vaalkoppies), a small settlement, where mostly farmworkers and their families reside, are located nearby. The small size of the population means that relatively few people would see the development daily at this site. Traffic to the area would increase during the construction phase that is temporary of nature. The impact of the development on tourism would be low in this instance.

7.1.12 Borrow Pits

To date the proponent has indicated that gravel and sand for concrete and other batching would be obtained from existing sources and suppliers in the surrounding area of Upington (ZF Mgawu [formerly Siyanda] District Municipality). The need for large amounts of gravel and sand would have a direct impact on the lead time of this project.

Should the need arise for this proponent to register borrow pits, a mining permit application/s would need to be filed to the Department of Minerals. The lead time of such an application and associated studies, such as testing of gravel, delineation of suitable areas for possible borrow pits and specialist studies that would be needed to inform the application process, would have an impact on the possible delivery time of the development.



7.2 Operational Phase Impacts

Due to their long-term nature, impacts effected during the operational phase would be closely investigated during the EIA phase. Impacts were identified and evaluated through specialist studies and recommendations for mitigation measures have been made. The specialist studies also inform the operational EMP, which will be attached to the EIA report.

7.2.1 Water Resources

Operation-related activities that could have an impact on the water resources of the study area include:

- maintenance activities;
- presence of impermeable surfaces;
- potable water use, as well as water for general cleaning purposes, gardening etc.;
- sewage storage and removal;
- grey water management; and
- storm water management.

Potential impacts associated with these activities include:

- surface water pollution/quality degradation;
- groundwater pollution/quality degradation;
- impact on sustainability of aquifers/groundwater of the area; and
- hydrology:
 - impact on infiltration;
 - change in storm water drainage;
 - catchment areas;
 - erosion; and
 - change in amount and velocity of runoff.
- Nuisances such as smell from sewage storage and grey water management.

The water demand for the proposed development was calculated by MVD Kalahari (Appendix P) and is stipulated in the hydrogeology section 4.1.7 on page 15 of this report.

As stipulated in water resources section of the construction phase in the water resources section 7.1.1 on page 27 a water use licence application would need to be submitted to DWA for the use of groundwater in this area. The developer would then also need to be a registered water supplier as water, complying with the minimum requirements of DWA, would be supplied to water users as well as an application for sewage storage. The developer indicated that when sewage systems (currently the Nanosan system are proposed by engineers) are full, the sewage be removed from site to the nearest municipal sewage treatment facility.

The developer plans to operate the sewage and grey water systems separately and it is investigated to re-use grey water for gardening as well as soakaways depending on certain aspects that has been mentioned in the technology alternatives in section 3.2.4 on page 9.

It is not currently planned to conduct sewage treatment on site, only sewage containment for individual houses and the lodge from where sewage will be removed to the nearest municipal sewage treatment facility.

7.2.1.1 Geohydrology

Potential impacts on the groundwater, due to possible defects in the sewage systems and grey water management, as well as leaks from vehicles etc. will be investigated and mitigation measures proposed.

7.2.1.2 Hydrology (Surface Water)

Potential impacts associated with the operational phase of the development include the following:

- Change in storm water drainage and related erosion;
- Impact on infiltration; and
- Surface water pollution due to sewage and grey water management.

The development would create some impervious areas such as buildings, infrastructure and roads. This would cause local changes to infiltration and storm water drainage patterns that could give rise to soil erosion. Due to the steep topography, vegetation growth and erodibility of soils, it is highly likely that it could have an impact outside the study area should it not be managed and mitigated properly.

Other aspects of infiltration are disturbance and sealing. Activities such as vehicular movement might disturb the soil surface, could lead to compaction, also reducing infiltration and causing more storm water runoff.

Runoff that can be generated by a soil surface and rainfall is dependent on the intensity and duration of the rainfall, combined with the infiltration capacity of the soil. Due to the low infiltration rates of the soils at the study area and the topography of the area, surface runoff would drain north towards the Orange River especially for long return period heavy rainfalls. When runoff occurs in this arid environment, it occurs as storm flow that subsides quickly and the stream channel reverts to its normal dry condition.



MVD Kalahari has provided for storm water management and design as stipulated the technology alternatives section 3.2.4 on page 9 of this report as well as the attached plans in Appendix P.

7.2.1.3 Gaps in Knowledge and Recommendations

Geohydrology

To a lesser extent the aspects related to the operational phase would be the same as those related to the construction phase, addressed in section 7.1.1.1 on page 28.

Hydrology (surface water)

Refer to the hydrology section 7.1.1.1 on page 28.

Sewage and waste storage and disposal measures during the operational phase will be further addressed during the EIA and EMP phase. An application will be submitted to the //Khara Hais Local Municipality for removal and disposal of sewage from the site should sewage removal not be conducted by the developer itself.

7.2.2 Soil and Agriculture

Operation-related activities that could have an impact on the soil and agricultural potential of study area include:

- Operation and maintenance of
 - access roads;
 - infrastructure including ancillary infrastructure; and
 - movement of vehicles.

Potential impacts associated with the construction phase include:

- soil pollution;
- soil degradation;
- soil erosion;
- compaction of soils;
- impacts on land use potential or capability;
- impacts on agricultural potential or capability; and
- restriction of land use.

7.2.2.1 Soil

Soil pollution could occur due to:

- spillage of hazardous chemicals such as petrochemicals or other chemicals such as paints, herbicides etc., that will be stored and used during the operational phase;
- sewage or grey water leakage; and
- improper waste storage or littering.

After the rehabilitation of construction areas at the onset of the operational phase the potential for wind and water erosion would be high due to the low precipitation of this area vs. rainstorms that deposit a large volume of water in a short period of time, but as rehabilitation and the establishment and succession of the plant communities commence and storm water management be implemented correctly and maintained, the potential for erosion would be lower.

7.2.2.2 Agriculture

The proposed development would imply a loss of agricultural potential on the development site. However, as the development would not necessitate total clearing of vegetation, grazing for game would be maintained during the construction and operational phases. Game should be actively managed due to the small size of the grazing area that would be less than 400 ha.

7.2.2.3 Gaps in Knowledge and Recommendations

Soils

Mitigation measures should be stipulated to address possible erosion and aid the rehabilitation of disturbed areas so as to ensure that a sustainable ground cover is established. Measures to maintain this cover must be stipulated in the EMP.

Agriculture

Proper operation and maintenance practices, correct farming and land use practices are crucial to ensure that the rehabilitation progresses and the environment is not further degraded. Due to the low agricultural potential of the soils and the limits placed on agriculture by climatic conditions in this area, detailed soil investigations would be unnecessary and further studies regarding agricultural potential in the EIA phase are not recommended. Mitigation measures for veld management will be addressed in the EMP.



7.2.3 Ecology and Biodiversity

Operation- and maintenance-related activities that could have an impact on the ecology and biodiversity of the study area include:

- operation and maintenance of main and associated infrastructure and activities;
- movement of people on site, either by foot or vehicle;
- use of access roads;
- presence of the overhead transmission line;
- presence of impermeable surfaces; and
- maintenance of vegetation in the area (veld management).

Potential impacts associated with the operation and maintenance phase include:

- habitat transformation and/or degradation;
- loss of sensitive/pristine local habitat types;
- increase in fragmentation, isolation and corridor functioning of local habitats and ecosystems due to fencing, roads and other infrastructure (long term impact);
- continuing local and regional fragmentation;
- isolation of habitat (long-term impact);
- aquatic habitat transformation due to sediment loading;
- invasion of alien flora and fauna on disturbed land;
- flood zones alteration;
- continuing destruction of vegetation (loss of economic use of vegetation);
- depletion of natural resources (e.g. grazing, ground cover, water purification/cleaning services);
- destruction of Red Data/threatened flora spp. (high ecological value);
- floristic species changes;
- destruction of protected tree spp.;
- impacts on threatened faunal spp.;
- impacts on common fauna spp.;
- faunal interactions with structures, servitudes and personnel;
- impacts on surrounding habitats and species;
- impacts on South Africa's conservation obligations and targets;
- impacts on avifauna:
 - disturbance;
 - roosting/nesting;
 - perching;
 - nuisance (faeces);
 - collisions;
 - electrocutions; and
 - issues with associated infrastructure.

Impacts that relate to the operational phase and the surrounding environment include potential floristic species changes in the development area, faunal interactions with all components of the development, and impacts on surrounding habitats and species. Cumulative impacts include impacts on national conservation obligations and targets, increases in or continuation of local and regional fragmentation or isolation of habitats, as well as increases in or continuation of environmental degradation.

7.2.3.1 Flora

Floristic species changes would inevitably occur in the development area, as vegetation would be removed and replaced by infrastructure, resulting in changes in habitat conditions, such as shade, competition and germination success. Therefore it is expected that the species composition of the development area would change and the establishment of habitat types that are not representative of the region is probable. Changes in habitat conditions could also facilitate invasion by exotic and invasive species as well as increases in the populations of encroacher species that are not currently abundant in the area. While this effect is more easily perceived in the floristic component of habitats, faunal occupation of changed habitats would inevitably be affected.

This risk could result in habitat decreases, as well as increased competition which could, in turn, decrease the numbers of endemic biota. The genetic pools of species might be changed by the introduction of non-endemic species.

Depending on the sensitivity of surrounding habitats these impacts could also occur as indirect impacts on the surrounding environment.

Local and regional fragmentation and isolation of habitats, as well as environmental degradation, are inevitable when development occurs. These effects are regarded as cumulative impacts, as they contribute to the regional and national state of the environment. The specific effects of the proposed development should therefore be viewed together with those of existing and possible future developments in the area and the overall effect on the national conservation obligations and targets should be assessed.

Refer to sections 7.1.3.1 on page 30 and 7.1.3.4 on page 31



7.2.3.2 Fauna

Refer to sections 7.1.3.2 and 7.1.3.4 on page 31.

7.2.3.3 Avifauna

Birds could be affected by the proposed development in various ways, involving their nesting and territorial habits, as well as possible collisions with the infrastructure.

Measures should be taken to prevent nesting on infrastructure, as they could create seemingly favourable nesting conditions for several species, including sociable weavers, crows, various raptor species and rock pigeons.

Furthermore, special attention should be given to the prevention of bird deaths, which could occur due to electrocution on the transmission line, and collision with structures or associated infrastructure. Deaths due to these factors could not only be detrimental to species populations in the area, but could also provide food for terrestrial carnivores and carrion feeders and could therefore draw other problem-causing animals to the site.

The disturbance of resident birds, especially whilst breeding, could occur due to maintenance activities.

Although large congregations of birds are not expected in the arid habitat surrounding the proposed site for development, the occasional presence of surface water in areas surrounding the study area and the irrigation schemes surrounding the study area, could attract larger numbers of birds at certain periods of time, heightening the risk of the abovementioned impacts.

7.2.3.4 Gaps in Knowledge and Recommendations

Fauna & Flora

Not any gaps have been identified due to the fact that an ecology study has been done on the study area. It is necessary that the ecologist map the sensitive areas as no go areas to ensure implementation of recommendations stipulated in the ecology study.

Measures to prevent and mitigate the likelihood of animals being killed by means of snaring, poaching, poisoning, trapping and vehicles will be addressed during the EIA and EMP phase.

Avifauna

Mitigation measures to prevent nesting on infrastructure and structures during the operational phase, to prevent or minimise bird deaths related to this phase, and to minimise other impacts on birds and their habitats will be addressed during the EIA and EMP phase.

7.2.4 Social Environment

The main social challenges experienced within the district have been discussed in section 7.1.4 on page 31 as well in section 5 on page 20.

Potential impacts associated with the operational phase include:

- Mesosystem:
 - Safety and security;
 - Daily movement patterns;
 - Socio-economic benefits (social investment, job creation, job seekers, population increase, increased services demand, social problems);
 - Impact on urban expansion;
 - Impact on tourism & recreation;
 - Economic impact; and
 - Distance to residential areas.
- Microsystem (physical presence of infrastructure):
 - Health and safety of workers and public;
 - Sense of place (tourism and recreation);
 - Land use impacts (cultivation and grazing); and
 - Traditional/cultural conflicts.

Social impacts at the **macrosystem** level are not foreseen due to the small scale and local nature of the proposed development.

Social impacts at the **mesosystem** level include a section of the district and local municipality's area of responsibility. The impact of the project on employment opportunities will be assessed.

The operational phase of the development would result in the creation of employment opportunities in the management and maintenance of the eco estate, domestic and possibly gardening services as well as security services. Whether the benefits of these employment opportunities would accrue to surrounding communities would depend on whether the necessary skills are available these communities. Local procurement of goods, materials and services would occur, which would result in positive indirect socio-economic impacts.



Should workers and contractors be situated in Upton and surrounding settlements, transportation of workers and delivery of goods would have a low impact as distances are relatively short, and it would have a minimal and intermittent impact on the workers' and communities' daily living and movement patterns.

Communication with the local and district municipalities, in the local newspapers and other media such as Radio Riverside would keep the population informed about the proceedings of the project and the type and number of contracts and employment opportunities that would be available.

Impacts at the **microsystem** level would be caused by the physical presence of the development and ancillary infrastructure, and would be confined to people living at the study area or directly adjacent to it.

7.2.4.1 Gaps in Knowledge and Recommendations

The impacts of the project on employment opportunities are to be assessed.

Communication should be maintained with the local and district municipalities, and with the public through the local newspapers and other media, to keep the surrounding communities informed about the proceedings of the project as well as the type and number of contracts and employment opportunities that would be available. It would also keep the municipalities informed and enable them to amend and address changes in the LED, IDP, SDF, and Disaster Management Plan, which includes emergencies and responses, as well as other relevant management procedures. Possible ways to mitigate the various impacts associated with the small possibility of influx of people to the area will be addressed in the EIA and EMP phase.

A literature review and analysis has been done and demographic and socio-economic information with regard to the receiving environment is included in this report. This information is used to assess the impact of the proposed development on the local and surrounding communities. The weighing of the initial impacts, before mitigation, is attached in Appendix Q and weighing after mitigation will be done during the EIA phase of this project.

7.2.5 Visual and Aesthetical Impacts

The presence of the proposed development, including its ancillary infrastructure, would have an impact on the direct (less than 4 km) visual and aesthetical aspects of the study area and surrounding areas. Impacts on observers close to the study area, especially those travelling along the N10 directly adjacent to the study area must be considered.

Other potential impacts associated with the operational phase include impacts of off-site ancillary infrastructure such as the power line (transmission line) on visual receptors such as residents and road users, aesthetic impacts that is influenced by topography and vegetation and the related reduction in aesthetic properties, littering and housekeeping, and light pollution.

The aspects that need to be taken into consideration in the assessment of visual impacts have been discussed in the construction phase section (Section 7.1.5) on page 33.

The proposed site for development is situated adjacent to the N10. The comparative lack of human structures in the surrounding landscape could be considered one of the area's attractions for city-dwelling tourists. The visual impact on road users must therefore be investigated and mitigated where possible.

The presence of the eco estate would have a low or no visual impact at all on surrounding communities. The area considered for development is situated in a rural area that is relatively sparsely populated. Therefore little impact is expected. The eco estate would possibly have an impact on people's sense of place – a term used to denote the personal emotions and memories that persons or communities associate with a landscape, as well as the sense of connectedness that they feel towards it.

7.2.5.1 Gaps in Knowledge and Recommendations

Refer to section 7.1.5.1 on page 33.

7.2.6 Economic Impacts

The study area has a low grazing capacity and is best suited for low to medium density grazing activities. The economic gains for the developer and surrounding community and businesses on the same land would be higher, with more employment opportunities than would be afforded by solely using it for agricultural purposes. The area would still be operated as a game camp.

Refer to section 7.1.6 on page 34 that would also be relevant in the operation phase.

7.2.6.1 Gaps in knowledge and recommendations

Refer to section 7.1.6.1 on page 34.

7.2.7 Traffic Impacts

During the operational phase traffic would be higher when the eco estate has been developed to full capacity with approximately 137 houses, lodge and conference centre as well as the related maintenance and upgrading activities taking place on site.

The presence of the development might also impact on the safety and security of surrounding communities by possibly giving rise to crime as well as an increase in traffic volumes.



MVD Kalahari indicated that a Traffic Impact Assessment would be conducted. The findings and recommendations of this study should be included in the EIA and EMP report.

A traffic management plan will have to be implemented by the developer and an application for access to the development from the N10 should also be done to SANRAL. Depending on the requirements set by SANRAL, it might be a requirement to enlarge the road at the entrance to make provision for access and turn off lanes to ensure traffic safety.

Mitigation of traffic impacts would be necessary during the operational phase and is to be addressed in the EIA and EMP phase.

7.2.8 Noise

Potential impacts that have been investigated with regard to the operational phase include:

- nuisances;
- health and safety of employees and the public;
- traffic volumes; and
- noise sensitive areas.

The impact of noise during the operational phase would be consisting of traffic noise and should be addressed in the EIA and EMP phase.

7.2.9 Air Quality

Air quality impacts during the operational phase would be limited to vehicle emissions. This impact could be mitigated to acceptable standards by ensuring that all vehicles and machinery complies with set standards and legislation. Dust nuisances emanating from roads and other areas that are to be rehabilitated may still be prevalent and will be further addressed during the EIA phase. A positive aspect of the proposed development is that it does not produce any significant atmospheric emissions.

7.2.10 Heritage Resources

Indirect impacts during the operational phase would be the disturbance and/or destruction of unique heritage resources resulting from movement by people or vehicles. Section 7.1.10 on page 35 is also relevant to the operational phase.

7.2.11 Impacts on Tourism

Refer to section 7.1.11 on page 35.



8. PLAN OF STUDY FOR EIA

The submission of a Plan of Study for EIA is required under Section 29(1) of the EIA Regulations. The Plan of Study sets out how an EIA will be conducted.

The scoping report aims to identify and evaluate potential environmental impacts associated with all aspects of the proposed project for detailed study including specialist studies within the Environmental Impact Assessment phase. It contains a detailed description of the nature and extent of the proposed eco estate. Information and input from the proponent, specialists, the authorities and Interested and Affected Parties (I&APs) were used to identify and evaluate potential environmental impacts (both social and biophysical) associated with the proposed project. No environmental fatal flaws were identified with regard to the proposed project, although potentially significant environmental impacts requiring further in-depth study have been identified.

The EIA is required to be conducted in order to assess these potential impacts and recommend appropriate mitigation measures where required. The EIA will also further identify, discuss and evaluate alternatives.

8.1 Aims of the EIA Phase

The EIA will aim to adequately investigate and address all environmental aspects identified in order to provide the competent authority with sufficient information to make an informed decision regarding the proposed project.

The aims of the EIA phase will be to:

- further investigate all identified potentially significant social and biophysical environmental impacts associated with the proposed eco estate and associated infrastructure;
- conduct further specialist studies to investigate the above identified issues should there be any;
- assess the significance of the issues of these impacts;
- identify and recommend appropriate mitigation measures, where required; and
- undertake a comprehensive Public Participation Process to ensure that I&APs have the opportunity to participate, and that the issues and concerns raised are recorded.

8.2 Authority Consultation

Consultation with the regulating authorities has been undertaken and will continue throughout the EIA process and will include the following:

- submission of a final scoping report, following the 40 day public review period of the draft scoping report including the consideration of the comments received;
- site inspection;
- submission of a final EIA report following a 30 and 40 day public review period of the draft EIA report; and
- a possible consultation meeting with the competent authority in order to discuss the findings and conclusions of the EIA report should it be needed.

Consultation with all relevant authorities and **registered** I&APs initiated during the scoping phase will continue throughout the duration of the project. The authorities to be consulted include:

- *National Government Representatives:*
 - Department of Agriculture, Forestry and Fisheries;
- *Provincial Government Representatives (Northern Cape):*
 - Department of Environment and Nature Conservation;
 - Department of Agriculture, Land Reform and Rural Development;
 - Department of Water Affairs;
 - Department of Forestry;
 - Department of Energy;
 - Department of Labour;
 - Department of Mineral Resources;
 - Department of Town & Regional Planning & Co-operative Governance, Human Settlements & Traditional Affairs: Spatial Planning; and
- *Local and District Authorities:*
 - ZF Mgcawu (formerly Siyanda) District Municipality; and
 - //Khara Hais Local Municipality;
- *Other authorities:*
 - South African Heritage Resources Agency; and
 - Northern Cape Provincial Heritage Resources Agency;
- *Environmental Non-Governmental Organisations:*
 - Endangered Wildlife Trust; and
 - Wildlife and Environment Society of South Africa (Northern Cape)
- *Parastatals:*
 - SANRAL;
 - Telkom;



- Eskom;
- ACSA Upington; and
- South African Civil Aviation Authority;
- *Community-based organisations:*
 - Straussburg Agricultural Society;
- *Surrounding landowners.*

8.3 Consideration of Alternatives

The alternatives to be considered in the EIA phase for the eco estate development:

- alternative technologies for infrastructure such as buildings, access and internal roads, sewage removal/storage, grey water management and electricity supply;
- layout/design alternatives:
 - clustering of houses for cost effective service delivery; and
 - spreading of houses and lodge utilising the natural landscape and topography to seclude infrastructure from each other;
- The 'do nothing' alternative: The option not to proceed with the proposed development.

8.4 Conclusions drawn from the Evaluation of the Proposed Study Area

The study area covers an area of approximately 400 ha. It would be possible to adjust infrastructure to make provision for the identified environmental constraints.

Impacts that might potentially be associated with the PV power station include impacts on water resources; soil and agricultural potential (risk of erosion linked to topography of area, land use potential and restriction of land use); ecology and biodiversity (impacts on ecology, flora and fauna, as well as avifauna); social aspects on the macro, meso and micro level; visual quality and aesthetics; economic impacts (mostly positive); traffic impacts (construction & operational phases); noise (construction -, operational -, upgrading - and decommissioning phases); air quality; heritage resources; and tourism activities.

Most of the potential impacts identified are anticipated to be site-specific. No environmental fatal flaws were identified but some 'no-go' areas have been identified by the ecologist that will be included in the EIA report.

8.4.1 Potential Significant Issues Related to the Construction Phase

Impacts on Water Resources

- Geohydrology
 - All gaps in knowledge associated with the ground water resource have been addressed by the study conducted by SRK;
 - The site falls within the western part of the Quaternary Drainage Region D73E for which the amount of water available under General Authorisation is listed under Zone A of the Groundwater Taking Zones, where no water may be taken from these drainage regions except as set out under Schedule 1 and small industrial users. Therefore if any groundwater is to be abstracted from the groundwater resources in this area, a Water Use Licence Application will have to be submitted to the DWA for approval;
 - Recommendations stipulated in the Deo Gloria Olive Estate: Assessment of the Groundwater Resources should be addressed in the EIA and EMP phase; and
 - Sewage storage and disposal measures during the construction phase are to be addressed during the EIA and EMP phase.
- Hydrology (surface water)
 - The sensitivity of this system and the possible erodibility and siltation due to the topography, soil composition and plant cover of the area and the changes that will be caused to it due to construction activities was identified as an area of concern. The ecology (Van Rooyen, 2012) and agricultural (Lubbe, 2012) studies that were commissioned addressed these areas of concern and mitigation measures were proposed by the respective specialists that will be addressed and incorporated in the EIA and EMP reports that will have to be incorporated in the engineering planning of the development.
 - Sewage and waste storage and disposal measures are to be addressed during the EIA and EMP phase.

Soil and Agriculture

The soils in the area proposed for development is highly susceptible to wind and water erosion (Lubbe, 2012). The possibility of soil erosion and dust nuisance will be addressed and mitigated during the EIA and EMP phase of this project.

The agricultural impact study indicated that the site was found unsuitable for commercial cultivation due to limiting factors such as the stony nature of top and subsoil; shallow soil depth and hard setting carbonate horizons below surface. The low clay percentage results in low water holding capacity and low nutrient availability. Severe climatic conditions further limit commercial cultivation. The proposed project area could be and is utilised as grazing for game, but the grazing potential is very low. (Lubbe, 2012)



Impacts on Ecology and Biodiversity (including flora, fauna and avifauna)

Environmental regulations pertaining to minimum requirements for biodiversity assessments require full surveys on all biodiversity data and mitigation measures to manage the possible impacts. In order to compile detailed information on the biodiversity of the study area the following aspects should be included as part of the EIA investigation. An ecology study was conducted to address it. The ecologist identified some areas that should be avoided during the development. These should be mapped as “no-go” areas and included in the EIA & EMP report.

- Flora
 - Conduct site visit and flora survey during the growing season.
 - Map the location and extent of all plant communities, indicating size and ecological sensitivity, as well as areas of disturbance.
 - Compile a comprehensive list of all plant species, potential near threatened, threatened and protected flora species (Red Data Book) that might occur in the study area.
 - Tree species included in the National List of Declared Protected trees.
 - Identify plant species that may be of conservation importance.
 - Provide locality, date surveyed, GPS location, distribution of plant species that may be of conservation importance.
 - Provide a list of alien plant species occurring on the property, considering eradication programmes of alien vegetation.
 - Provide relocation plans for plants of conservation importance, including species endemic to the province, Red Data Book listed plants, protected plants, threatened plants and near threatened plants.
 - A specialist report has been compiled addressing the environmental issues, potential impacts and mitigation measures for input in the EIA and EMP.
 - It is necessary that the ecologist map the sensitive areas as no go areas to ensure implementation of recommendations stipulated in the ecology study.
- Fauna
 - The presence of threatened species could be identified by establishing whether the preferred habitat types of these species occur within the study area.
 - Sensitive areas or biodiversity hotspots should be mapped in the study area or areas surrounding the study area.
 - The presence of threatened species.
 - These were addressed in the specialist ecology report.
 - Measures to prevent and mitigate the likelihood of animals being killed by means of snaring, poaching, poisoning, trapping and vehicles will be addressed during the EIA and EMP phase.
- Avifauna
 - The specialist should conduct a site survey to identify possible avifaunal diversity of common and Red Data Book avifaunal species.
 - Issues relating to the habitat of these avifaunal species should be addressed.
 - Mitigation measures that will be addressed during the EIA and EMP phase are to:
 - prevent nesting on structures utilised during the construction phase,
 - prevent or minimise bird deaths related to the construction phase,
 - minimise other impacts on birds, especially threatened species identified on the study area, and
 - minimise habitat loss of threatened and near threatened species.

Socio-economic Impacts

- A literature review has been done and included in this report. It has to be analysed and the social impacts identified will be addressed and enhanced or mitigated in the EIA and EMP phase.
- The number, type and period of employment opportunities during the construction phase will be assessed by the engineering team and included in the EIA report.
- It has to be established if and what types of skilled labour is available in the communities surrounding the study area.
- Employment seekers can be controlled by making reliable information available to the area through advertisements in local papers, local radio stations such as Radio Riverside and communication with municipalities about the proposed development and the type of employment opportunities available.
- Possible safety and security impacts identified need to be addressed in the EIA phase.

Visual and Aesthetical Impacts

- Due to the topography of the area it is clear that the development would only be visible in the direct vicinity and on a very small section of the N10. Not any farm dwellings are visible from the area identified for development. The need for a visual impact assessment or a viewshed analysis is not foreseen in this case.
- Building material would need to be chosen carefully to mitigate possible reflection of infrastructure.

Economic Impacts

The expected long-term capital value of this proposed project must be included in the EIA report to enable the authorities to establish the economic injection and growth that is expected to result from the proposed development within the Northern Cape.



Traffic Impacts

- MVD Kalahari indicated that a Traffic Impact Assessment would be conducted. The findings and recommendations of this study should be included in the EIA and EMP report.
- The impacts associated with the higher traffic volumes could be accommodated by proper site management, e.g. controlling the size of orders that would be transported to the site at any given time.
- Further mitigation measures will be discussed during the EMP phase.

Air Quality

Impacts on air quality would involve dust nuisance and mitigation measures will be included in the EIA and EMP.

Impacts on Heritage Resources

- An Heritage Impact Assessment (HIA) Phase 1 has been conducted by a heritage specialist for the adjacent agricultural development on the farm (Appendix J) and reviewed by the SAHRA (Appendix K). A follow-up study at the specific area identified for development, might be conducted by a Stone Age specialist and included in the EIA report.
- Should any artefacts be found the archaeologist, in conjunction with SAHRA, will consider the possibilities of conserving the artefacts in situ vs. removal of the artefacts in an AIA Phase 2 where the artefacts would be removed, dated and stored at a museum.
- A Palaeontological exemption letter was provided by Dr John Almond that negates any further specialist investigation regarding palaeontological artefacts.

8.4.2 Potential Significant Issues Related to the Operational Phase

Impacts on Water Resources

- Geohydrology
 - The same aspects addressed in the construction phase would relate to the operational phase.
 - A water use licence application would need to be submitted to DWA for the use of groundwater in this area.
 - The developer would then also need to be a registered water supplier as water, complying with the minimum requirements of DWA, would be supplied to water users as well as an application for sewage storage.
 - It is not currently planned to conduct sewage treatment on site, only sewage containment for individual houses and the lodge from where sewage will be removed to the nearest municipal sewage treatment facility.
- Hydrology (surface water)
 - Sewage and waste storage and disposal measures during the operational phase will be further addressed during the EIA and EMP phase. An application should be submitted to the //Khara Hais Local Municipality for removal and disposal of sewage from the site should sewage removal not be conducted by the developer itself.

Impacts on Soil and Agriculture

Mitigation measures should be stipulated to address possible erosion and aid the rehabilitation of disturbed areas so as to ensure that a sustainable ground cover is established. Measures to maintain this cover must be stipulated in the EMP.

Proper operation and maintenance practices, correct farming and land use practices are crucial to ensure that the rehabilitation progresses and the environment is not further degraded. Due to the low agricultural potential of the soils and the limits placed on agriculture by climatic conditions in this area, detailed soil investigations would not be unnecessary and further studies regarding agricultural potential in the EIA phase are not recommended. Mitigation measures for veld management will be addressed in the EMP.

Impacts on Ecology and Biodiversity

Investigations to address the operational phase impacts on ecology and biodiversity are expected to be similar to those in the construction phase. The results of the investigation will inform the operation mitigation measures to be addressed in the EIA and EMP Reports.

Socio-economic Impacts

- The impacts of the project on employment opportunities and demand for infrastructure are to be assessed.
- Communication with the local and district municipalities and in the local newspapers would keep the population informed about the proceedings of the project and the type and number of contracts and employment opportunities that would be available. These requirements will be addressed in the mitigation phase. This type of communication would also keep the municipalities informed and enable them to amend the LED, IDP, SDF and Disaster Management Plan, which includes emergency and response procedures, and other relevant management procedures.
- A literature review and analysis has been done and demographic and socio-economic data with regard to the receiving environment has been included in this report. This information is used to assess the impact of the proposed development on the local and surrounding communities. The weighing of the initial impacts, before mitigation, is attached in Appendix Q and weighing after mitigation will be done during the EIA phase of this project.



8.5 Methodology for the Assessment of Potential Impacts

The following aspects of the direct, indirect and cumulative identified impacts will be assessed:

- nature of the activity;
- extent;
- duration;
- intensity; and
- probability.

These parameters are used to establish the significance of the impact of an activity that would take place or is already taking place. The parameters have been compared to the level of significance in the Significance Rating Scale (Appendix Q).

8.6 Public Participation Process for the EIA Phase

8.6.1 On-going Consultation with all I&APs

Consultation with key stakeholders (e.g. local authorities, relevant government departments, local business), and other identified and registered I&APs will ensure that I&APs are kept informed regarding the EIA findings and proposed mitigation measures. Liaison with I&APs will continue throughout the duration of the project until the closure of the EIA phase. Key stakeholders and I&APs will be engaged on an individual basis where required. The database and comments and response report will be continually updated throughout the process.

8.6.2 Public Involvement

If the need for a public meeting should be identified, it would be advertised 10 days prior to the event. I&APs registered on the project database would then be notified of this public meeting by registered mail. Key stakeholders would be personally invited to attend a separate key stakeholder workshop should it be needed, as well as the public meeting should it be needed, in order to encourage continued participation in the process. Formal minutes of the public meeting and key stakeholder workshop would then be compiled and distributed to the attendees. These proceedings would also be included in the EIA report.

8.6.3 Comments and Response Report

A comments and response report with all issues and concerns raised during the public participation process of the EIA phase will be compiled. Proceedings of meetings and comments received (should any meetings be held) will also form part of the document. A consolidated list will be provided in order to ensure that all issues and concerns raised by I&APs are considered within the EIA process.

8.7 Compilation of the Environmental Impact Report

The EIA report will include and address the following:

- a project description (including a description of the proposed activity, plans illustrating the study area and proposed site, and detailed technical details regarding the proposed project);
- a description of the pre-construction environment;
- a description of the public participation process, including the identification of I&APs, a record of the procedures followed, and the perceptions and views of the I&APs regarding the activity;
- a description of environmental (biophysical and social) issues identified and potential impacts of the proposed project on these aspects (i.e. how the environment may be affected as a result of the proposed activity);
- an assessment of the nature, extent, duration, intensity and occurrence probability of impacts identified as significant during the scoping study; and
- conclusions and recommendations regarding the presence of any environmental fatal flaws as well as recommendations, including mitigation and management measures, regarding the proposed project.

The EIA report will comply with Regulation 32 of GN 385 and other applicable regulations/guidelines insofar as content and issues addressed are concerned. The specialist studies will be integrated into the report. To evaluate the significance of the identified impacts, the abovementioned mitigation measures will be utilised.

8.8 Environmental Management Programme

The Environmental Management Programme (EMP) will be based on the implementation of all the relevant environmental and other legislation, requirements and procedures regarding the proposed development of an eco-estate.

All mitigation measures for the potentially significant impacts that can be introduced by the project will be described for the construction, and operational and maintenance phases.

The primary objectives for impact mitigation would be to:

- prevent or avoid;
- contain; and/or
- reduce or minimise the impacts.



8.9 Work Programme

The programme for the Environmental Impact Study and the key dates relevant to the project are outlined in the table below:

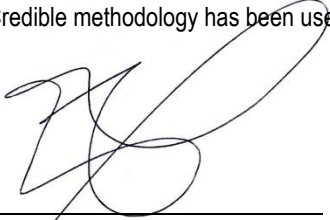
Key Milestone Activities	Proposed Timeframe
Finalise scoping report	July – August 2013
I&AP review on final scoping report	August – September 2013
Submit final scoping report to competent authority	August 2013
Authority acceptance of the final scoping report (30 days from notice of receipt of report)	End of October 2013
Undertake further specialist studies	September - October 2013
Compile draft EIA and EMP report	August – September 2013
Submit draft EIA and EMP report to competent authority after acceptance of final SR	Beginning of November 2013
40 days I&AP review period for Draft EIA and EMP report	October to November 2013
Finalise EIA and EMP report	November 2013 to January 2014
I&AP review period for Final EIA and EMP report	January to February 2014
Submit Final EIA and EMP report to competent authority	February 2014
Competent authority confirm receipt	Beginning March 2014
Competent authority review report and accept or request further information	March to beginning May 2014
Should competent authority accept report, the permit documentation is drafted and signed.	May to June 2014
Decision issued to applicant	Beginning July 2014
Inform I&APs regarding decision made by competent authority	July 2014



9. CONCLUSION

The following objectives have been met during the scoping exercise:

- The correct application procedure has been followed for a development of this magnitude and scope.
- The relevant legal requirements have been complied with.
- Adequate information has been made available to the responsible persons giving input and those making decisions.
- There has been adequate opportunity for consultation for this phase of the application process.
- The relevant issues and concerns have been identified.
- Credible methodology has been used in identifying and provisionally assessing the impacts of the development.



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Appendix A:

Photographs of Proposed Area for Development
Map with Locations from where Photographs were
taken



Appendix B:

Correspondence from DENC



Appendix C:

Proof of Advertisement: Gemsbok

Dated 9 March 2012



Appendix D:

Posters & Onsite Notices



Appendix E:

- Appendix E1: Notification Letters and Response Form Sent to Registered I&APs
- Appendix E2: Background Information Document
- Appendix E3: Proof of Distribution of BID and Notification Letters
- Appendix E4: Notification Letters to Registered I&APs – Availability of Draft SR
- Appendix E5: Proof of Letters & Draft SR Made Available to Registered I&APs



Appendix F:

Appendix F1:	Comments and Response Report on Notification Letters and BID
Appendix F2:	Proof of Comments and Responses
Appendix F2a:	Comments from I&APs to Developer
Appendix F2b:	Straussburg Farmers Ass
Appendix F2c:	E.A. Goussard
Appendix F2d:	D vd Merwe
Appendix F2e:	//Khara Hais
Appendix F2f:	D. Strauss
Appendix F2g:	L to B
Appendix F2h:	N.S. Strauss
Appendix F2i:	SACAA
Appendix F2j:	SAHRA
Appendix F2k:	SANRAL
Appendix F2l:	NC Spatial Planning Dept.
Appendix F2m:	TELKOM
Appendix F2n:	WESSA
Appendix F2o:	Dept. of Agriculture, Forestry and Fisheries
Appendix F2p:	Dept. of Land Reform & Rural Development



Appendix G:

List of Registered I&APs



Appendix H:

Communication and Meeting with I&AP's regarding grazing rights issue



Appendix I:

Legal Opinion (lawyer)



Appendix J:

Appendix J1: Final Heritage Impact Assessment

Appendix J2: Archaeological Impact Study



Appendix K:

SAHRA Review Comment



Appendix L:

Palaeontology Letter of Exemption



Appendix M:

Ecology Desktop Study



Appendix N:

Final Agriculture Specialist Study



Appendix O:

Assessment of the Groundwater Resources



Appendix P:

Appendix P1: Preliminary Engineering Services Report

Appendix P2: Plans & Maps Water & Electrical Reticulation

Appendix P3: Plan & Map of Roads

Appendix P4: Storm Water Management & Erosion Control

Appendix P5: Photographs



Appendix Q:

Significance Rating Scale Impact Matrix



Appendix R:

Curriculum Vitae – Irmé van Zyl

