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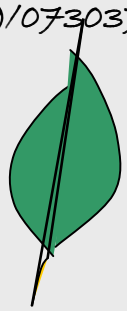

Environmental Impact Assessment Process
Draft Basic Assessment Report

&

Environmental Management Programme

25/2011

Proposed Development
in
Goegap Nature Reserve

Namakwa District Municipality
Northern Cape Province

14 May 2012

NEAS REF No: **DEA/EIA/0000512/2011**
DEA REF No: **12/12/20/2414/1**

Applicant:

Northern Cape Department
of
Environment and Nature Conservation

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

(For official use only)

File Reference Number:	
Application Number:	
Date Received:	

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

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2010 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.

2. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.

3. Where applicable **tick** the boxes that are applicable in the report.

4. An incomplete report may be returned to the applicant for revision.

5. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.

6. This report must be handed in at offices of the relevant competent authority as determined by each authority.

7. No faxed or e-mailed reports will be accepted.

8. The report must be compiled by an independent environmental assessment practitioner.

9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.

10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.

11. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.

PROJECT DETAILS

FILE NAME:	**GOEGAP NATURE RESERVE DEVELOPMENT**
FILE NUMBER:	**25/2011**
DEA REFERENCE:	**12/12/20/2414/1**
NEAS REFERENCE:	**DEA/EIA/0000512/2011**
REPORT:	**DRAFT BASIC ENVIRONMENTAL IMPACT ASSESSMENT REPORT & ENVIRONMENTAL MANAGEMENT PROGRAMME**
FOR:	**PROPOSED DEVELOPMENT AT GOEGAP NATURE RESERVE**
LOCATION**:**	**PORTION 21 OF THE FARM 132 (GATE, GROUP CAMP, FAMILY CAMP)** **PORTION 3 OF THE FARM 132 (CONFERENCE VENUE)** **PORTION 1 OF FARM KAREHOUTE KLOOF NO. 221 (TRAIL CAMP)** PORTIONS 3, 5, 8, 9 AND 19 OF THE FARM 132 PORTION 4 OF THE FARM KAREHOUTE KLOOF NO. 221 PORTION 1 AS WELL AS REMAINING EXTENT OF THE FARM 131
DATED:	**MAY 2012**
WRITTEN BY:	**VAN ZYL ENVIRONMENTAL CONSULTANTS CC**
Consultant**:**	**I.B. Van Zyl**
Mobile:	**072 222 6194**
Telephone:	**054 338 0722**
Facsimile:	**086 624 0306**
Email:	**ibvanzyl@telkomsa.net**
Address:	**P.O. Box 567, UPINGTON, 8800**
Sub-Consultants:	**McGregor Museum (Archaeological Study)** **Simon Todd Consulting (Ecological Study)**
APPOINTED BY:	**ZAMISANANI PROJECTS JV (2004/ 092981/23)**
Contact Person**:**	**Mr Songezo Mjali**
Mobile:	**073 410 3176**
Telephone:	**027 712 1774**
Facsimile:	**027 712 2807**
Email:	**songezo@kamva.co.za**
Physical Address:	**1B Anla Building, 18 Luckhoff Street, Springbok, 8240**
Postal Address:	

Should this report be used as a reference, it should be cited as follows:
Van Zyl Environmental Consultants, 2012. **Draft Basic Environmental Impact Assessment Report for the Proposed Development at the Goegap Nature Reserve, Northern Cape.** Upington

PUBLIC PARTICIPATION PROCESS

INVITATION TO COMMENT ON THE DRAFT BASIC ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The draft basic environmental impact assessment report is available for review at the following venues:

- Springbok library; Namaqua Street, Springbok, Contact: Ms Sarie Victor (027 7188 136)
- Goegap Nature Reserve; Contact Maxie Jonk (027 718 9906)

A digital copy can also be requested from the EAP below.

The availability of the report will be communicated to all registered I&APs. They will be allowed a review period until 11 July 2012**.**

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:

FOR ATTENTION:	**I.B. van Zyl**
Mobile:	**072 222 6194**
Telephone:	**054 338 0722**
Facsimile:	**086 624 0306**
Email:	**ibvanzyl@telkomsa.net**
Address:	**P.O. Box 567** **UPINGTON** **8800**

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

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APPENDICES

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 when considered 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 nonliving (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 ongoing maintenance after implementation
Homogeneous	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
Laydown area	An area that has been cleared for the temporary storage of equipment and supplies. Laydown areas are usually covered with rock and/or gravel to ensure accessibility and safe maneuverability for transport and off-loading of vehicles

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
Sky glow	illumination of the night sky when light reflects off particles in the atmosphere such as moisture, dust, or smog
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
CLO	Community Liaison Officer
CO_2	Carbon dioxide
DENC	Department of Environment and Nature Conservation
DEA	Department of Environmental Affairs
DM	District Municipality
DNI	Direct Normal Irradiation
DoE	Department of Energy
DR&PW	Provincial Department of Roads and Public Works, Northern Cape
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Programme
EPWP	Expanded Public Works Programme
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
LED	Local Economic Development
MAR	Mean Annual Rainfall

MW	Megawatt
NEMA	National Environmental Management Act
NO_3 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
SDF	Spatial Development Framework
TDS	Total Dissolved Solids
ToR	Terms of Reference
UV	Ultraviolet
VAC	Visual Absorption Capacity
WMA	Water Management Area

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?	~~YES~~	**NO**

If YES, please complete the form entitled "Details of specialist and declaration of interest" for appointment of a specialist for each specialist thus appointed:
Any specialist reports must be contained in Appendix D.

1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail[1]:

The Northern Cape Provincial Department of Environment and Nature Conservation proposes the following activities in order to upgrade and develop facilities at various locations within Goegap Nature Reserve:

- The demolition of the existing trails camp hut, guardhouse and group camp
- The renovation and/or construction of structures and associated infrastructure for:
  - A guardhouse
  - Additions to the guardhouse,
  - Reconfiguration of the entrance gate with associated parking including paving and ablution facilities
  - A tourism building, adjacent to the guardhouse, including an information centre, curio shop, public ablution facilities and a parking area
  - Two new family camps
  - A new group camp with ablution facilities (8-sleeper)
  - A new trails camp hut with ablution facilities (2 units)
  - A conference venue
- The reticulation of the required electricity and water supplies as well as all other engineering services
- The implementation of storm water management structures

2. FEASIBLE AND REASONABLE ALTERNATIVES

"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

Describe alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different

[1] Please note that this description should not be a verbatim repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description.

processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Paragraphs 3 – 13 below should be completed for each alternative.

2.1 Planning and Design Phase Alternatives

XCF Consulting (Quantity Survyoers & Construction Project Managers) conducted an Implementer's Final Assessment at Goegap Nature Reserve and their approach to addressing the feasibility of the proposed developments involved reviewing the previous work done by other consultants as well as operational and management requirements of the reserve.

The identification of the demand defined the proposed activities and facilities. The process involved a site visit and engaging the management as well as DEA and DENC on their requirements.

2.1.1 Site Location

Goegap Nature reserve is 10km outside Springbok in South Africa's Northern Cape Province. The total size of the reserve is 7500 hectares; the whole area is surrounded by low mountains. This area is also situated close to the two mining towns of Kopperberg and Carolusberg.

Goegap is a Nature reserve that is renowned for its ecological beauty and has a variety of eco-tourism attractions along with rare and endangered bird and mammal species present.

Its proximity to Springbok via the R 355 allows it access from main centres such as Cape Town, Windhoek, Gauteng via a well-established road network. Thus the transportation of any materials that cannot be found in the immediate area will not be a problem. Over and above that, there is an airfield that borders on the reserve and a railway line link to Port Nolloth.

Site Access

All the sites proposed for development within Goegap Nature Reserve has internal access roads and is located off the R355 provincial road that gives access to Springbok (Appendices A 1-8).

Availability and Accessibility of Infrastructure

XCF Consulting came to the conclusion that the reserve is very well established and does not require any significant architectural intervention. As such, the bulk of the work envisaged is of a refurbishment nature. The scope however is quite extensive given the vast area of the reserve. (Appendix A 8.2, 8.3)

Environmental Acceptability

The zone impact map (supplied to the EAP by the Management of Goegap Nature Reserve) (Appendix A 8.2) are as follows:

- Exclusive use zone (Green) - only management and researchers are allowed in the area - therefore very limited impact on area
- Limited use zone (Orange) - only 4X4 users, mountain bikers and horse riders make use of this trail - therefore limited impact on area
- Intensive use Zone (Red) - high volumes of visitors make use of this area - ie high impact on area.

An Ecology Specialist Study was conducted to inform this study (Appendix D1).

Study Area Selection

No alternative sites have been identified, as the development is proposed within the borders of the Goegap Nature Reserve. The selection of the sites that were identified for development was informed by a study conducted by Van Riet and Louw Landscape Architects. These areas were determined to be the most suitable development areas on the reserve, as they were either disturbed or of lesser conservation value than the remainder of the reserve. (Appendix A 8) This study was conducted with high level engagements with the local stakeholders.

The following development constraints and general preferences, set by DENC and DEA, are as follows:

- Minimal tourist footprint
- No new roads
- Keep existing access points (no new access points)
- Provide access for disability
- Provide alternative source of energy
- High capital cost but all items should have lowest possible maintenance costs
- Maintenance budget not to increase thus priority should be given to low maintenance proposals
- Erosion control to be planned and implemented
- Existing stone theme to be matched by new construction

2.1.2 Infrastructure, Technology & Process

The following aspects was considered by XCF Consulting in the infrastructure planning at the request of the Goegap Nature Reserve Management:

- The use of environmentally friendly, non-toxic materials
- Use of recycled material
- As far as possible the use of natural material such as stone and timber
- As far as possible use locally available material
- Labour components of design

Demolitions

Certain portions of the existing structures would require partial or whole demolishing. Serviceable materials, taken down during the demolitions, would be reused in the construction of the new facilities.

Trail Camp

The existing, very dilapidated trail camp consists of a group dormitory with communal facilities that can sleep 10 people. This facility is not currently in use as it is unsafe to house people. The communal facilities include:

- Wooden structures with thatched roof
- Water abstracted from the nearby borehole and pumped into a jo-jo storage tank on a stand (Appendix A 1.2)
- Toilet and showers connected to a septic tank

Works would include the demolishing of existing structures. Construction of a new brick and mortar structure with stone cladding and thatched roof. The new trail camp would consist of:

- 5 units each accommodating 2 people;
- An ablution block with water closets (wc – flush toilet with a wash basin including the plumbing) and showers;
- Storage/Service Room
- A boma/lapa area

Water Supply

The existing trail camp is supplied with water from the nearby borehole into a jo-jo storage tank on a stand. It is proposed that the existing status quo with regard to water supply be maintained to ensure water supply to the facility is maintained. The following alterations to the water supply system are proposed:

- The size of the on-site storage tank be increased to accommodate new facilities
- A filter be installed to ensure drinking water is potable
- A new supporting structure be constructed for the storage tank and/or incorporated into the new building structure
- A draining pipe be installed that can be operated manually to occasionally drain the storage tank to ensure water remain potable

Waste-Water Disposal

Currently waste water is drained into a septic tank connected to a French drain soak-away.

A waterborne sewage system or dry Enviro Loos were considered for use during the operational phase. Grey and sewage water would be contained in closed-cell tanks. To prevent groundwater contamination the GEM Max Sewage Treatment Plant, an on-site treatment plant capable of producing an effluent that comply with the General Effluent Standard, were considered to be implemented as an alternative to the septic tank.
Figure 1 depicts a general layout of the GEM Sewage Treatment Plant.

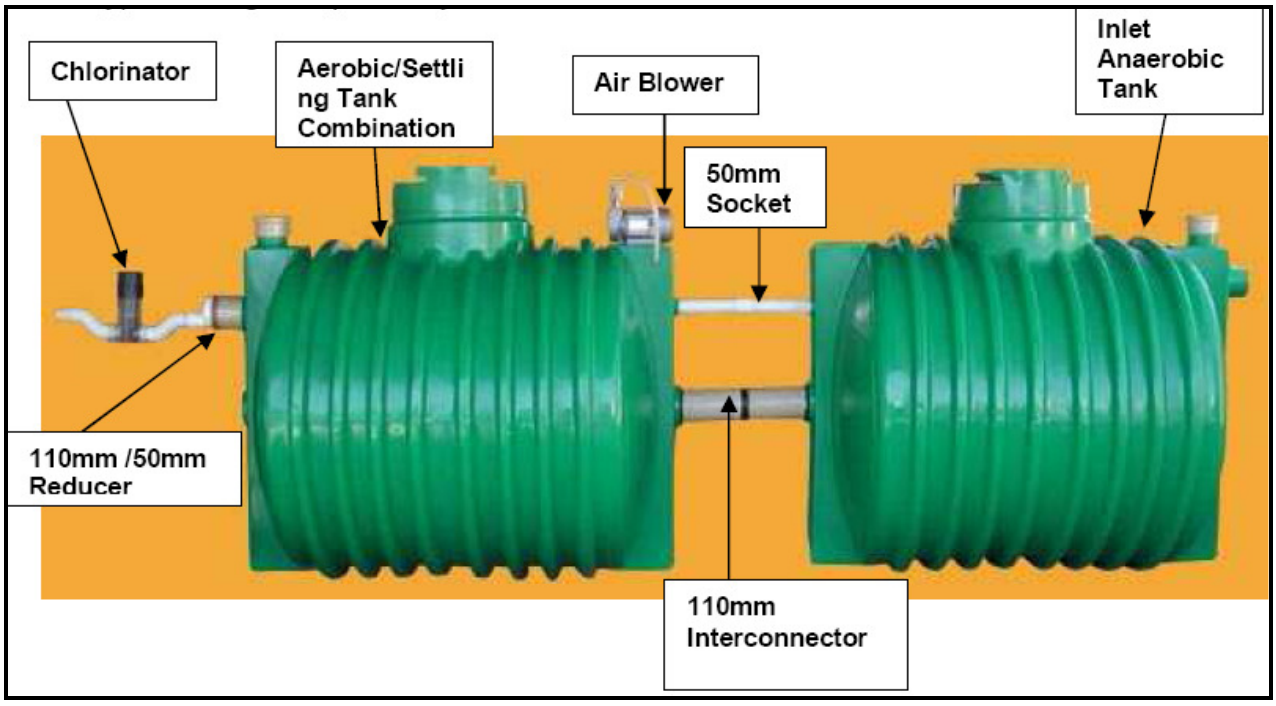

Figure 1: General layout of the GEM Sewage Treatment Plant

The GEM Sewage treatment plant is a miniature version of a municipal sewage treatment plant and has the following advantages:

- The compact unit is All-In-One Package
- Pre-fabricated (Quick and easy to install)
- Modular –Additional units can be installed as required if demand increases,
- Takes up a small space
- Un-obstructive
- No unsightly tanks or slime dams - normally buried in the ground

- Simple to Operate - Can be operated by non-technical staff
- No Chemicals required
- Low Maintenance
- Simple maintenance functions
- Low operational cost
- Low Sediment- Virtually no sludge or sediment build up
- Low Odour - Virtually no odour is emitted from the unit
- Re-locatable- can be moved to another site at a later stage if necessary
- Prevents groundwater pollution
- Effluent water produced comply with the General Effluent Standard
- Grey water can be used according to the stipulations of the National Water Act, Act No 36 of 1998.

The Enviro Loo (Figures 2-3) is a waterless, onsite, closed-circuit, dry sanitation toilet system. No sewage treatment is required. It is odourless, does not attract flies, has minimum monthly operating costs; and allows for indoor installation, which requires the addition of a low wattage electrical fan. It does not require chemicals or electricity, but only radiant heat and wind to evaporate and dehydrate waste matter, turning it into a safe, stabilised and odourless dry material. It is built from tough, linear, low density, UV-treated polyethylene. It is supplied with a ceramic bowl and has no internal moving parts. As it is a sealed system, waste cannot leak out and, conversely, storm water cannot penetrate and flood the container. It can be assembled and installed within hours.

The maintenance schedule depends largely on the volume of usage and climatic conditions. While high usage units may need to be serviced and waste removed more often, lower usage units may need attention less frequently. Safety clothing must be worn when conducting maintenance work.
The Enviro Loo system should be serviced through the rear external inspection cover. It is to be ensured that the liquid level is below the drying plate and that the system is in an aerobic state of operation i.e. liquid and solid wastes are separated by the drying plate. The solid waste should be raked from under the pan section towards the open rear-end section of the drying plate. Debris such as bottles, cans, plastics etc. should be removed from the unit and safely disposed of at the general waste disposal site with the rest of the general solid waste. The dried waste can be deposited in a bucket or bag and safely disposed of at the local authority sewage works with the dried sludge from the sewage works.

The remaining waste should be lightly covered with normal garden compost. Approximately three handfuls of new compost should be added to the front section of the unit via the ceramic toilet bowl. Ensure free operation of the wind turbine on top of the external vent pipe and free air flow to side inlet pipes.

Daily cleaning procedures includes the cleaning of the ceramic toilet bowl using a damp toilet brush with only organic cleaners. Chemical detergents should not be used. The toilet seat can be cleaned with detergents ensuring that no excess enters the ceramic toilet bowl. The toilet lid should always be left in the closed position after cleaning the toilet bowl.

Figures 2-3: Enviro Loo System

The GEM Max Sewage Treatment Plant were chosen to be used at the trail camp. The use of this system poses a very low risk of impacting on the environment through groundwater and surface water pollution and requires little environmental resources.

Energy Supply

The existing electricity network at the Goegap Nature Reserve is confined to the Arrival Centre. The electricity is not reliable especially during the rainy season due to strong winds. It is very expensive and visually obtrusive to extend the grid to the various points within the nature reserve. Generators are not allowed in certain areas of the reserve, therefore wind and/or solar energy are proposed.

Wind Energy

Advantages:

- No water requirements during operation
- Cost of electricity cheaper than solar energy
- Possibility of increasing power output
- No CO_2 emissions
- Construction time is relatively low
- Proven technology installed in numerous different areas worldwide

Disadvantages:

- Topography is important as it affects wind resource
- Higher dependence on wind resource than solar energy on solar irradiation
- Higher operational and maintenance costs
- Deep foundation for wind turbines
- Much higher visual impact than solar panels

Photovoltaic Technologies

Solar panels use 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. Only the parallel sunrays normal to the receiving surface of the PV panel can be concentrated. Irradiation received from these parallel sunrays is termed Direct Normal Irradiance (DNI). Sites that receive high levels of DNI, typically more than 1 800 kWh/m^2/year of direct solar irradiation, are suitable for the construction of PV panels. Goegap Nature Reserve has one of the higher DNI levels.

Insolation is a term for incident solar radiation from sunrays. It is the amount of solar radiation energy received on a given surface during a given time, usually measured in kWh/m^2/day or kWh/m^2/year. Vapour or dust particles in the air can scatter the sunrays before reaching the earth's surface (diffuse irradiation).

Advantages:

- Low operational and maintenance cost
- No water requirements during operation
- Variability in size and installation possible on rooftops
- Simple and fast construction
- Topography is not important
- Does not need advanced technical skills to operate and maintain
- Low visual impact
- No CO_2 emissions

- Established technology installed in numerous areas worldwide
- No noise
- Does not interfere with aircraft operations
- Feasible
- Safe technology and no hazardous materials

PV technology is safe. If a disaster should occur there would be no negative effects emanating from the panels itself and it would not affect the quality of life of local inhabitants.

Disadvantages:

- Need storage area for batteries
- Cost of technology
- No production at night time
- Suitable only in sunny areas

Preferred Alternative

Solar power is not boundless. It is limited to the amount of power stored in the batteries.

PV technology has been chosen by the developer due to the following reasons:

- The structures for the PV technologies can be constructed on the roof or adjacent to the trail camp building.
- The irradiation of the area is high.
- PV technology is easier and faster to implement.
- The commissioning period is short.

Solar power has a wide range of technologies that can be considered for incorporation into the system. These include the PV module manufacturer, the capacity of the modules, the support structure type, the manufacturer and the inverter type. These alternatives are discussed in more detail below.

Structures

Structures are required to support the PV modules. The materials commonly used in support and PV structures are:

- galvanized steel;
- stainless steel; and
- anodized aluminium.

PV Modules

There are various types of PV modules defined according to the materials used (Figure 14):

- Monocrystalline silicon
- Polycrystalline silicon
- Thin-film
- High-concentration

Figure 4: Example of PV Modules

Tenesol PV modules are manufactured in South Africa and the use of these PV modules would therefore boost the local economy and local job creation and benefit the local communities. Tenesol modules are slightly less efficient than Trina Solar modules, but more efficient than those from BP Solar and FiveStar.

Inverters

There are various types of inverters defined according to their technology:

- Multi power stages
- One power stage
- Multi controlled power stages
- Low voltage output
- Medium voltage output
- String inverter
- Central inverter

Figure 5-7: Different Inverters

No choice has been made yet between the different inverters available on the market.

Most of the household electrical items required at the trail camp can be operated from a solar power system. In this particular case it is recommended that the design of building structures should be energy efficient (XCF Consulting). Things like a good north facing roof area for harvesting solar energy, roof overhang and efficient insulation in walls and ceilings for cooler summer and warmer winter temperatures also helps with power saving.

Many nature reserves have thatch roofs and so will the building structure proposed for the trail camp in Goegap Nature Reserve. This mean that the solar panels need to be free standing as placing solar panels on top of the thatching can cause the thatch beneath the solar panels to rot. This has lead to the development of what we commonly refer to as a solar power station.

It is proposed that a small localised solar power station be built at the trail camp to cut down the cost on long cabling. The total number of solar panels required to power a particular structure within the pack are placed together in solar panel arrays on special mounting brackets, placed on poles in a sunny, open clearing as close to the building structure as possible. (XCF Consulting)

A suitable room or storage area inside the large structure building must be allocated to allow for the placement and storage of all the batteries, the solar regulators and inverter. From the inverter, the AC power output becomes the 'mains' supply of electricity for the building structures, providing power for the lighting, fridge, stove, microwave, kettle, cell phone and camera battery charging etc.

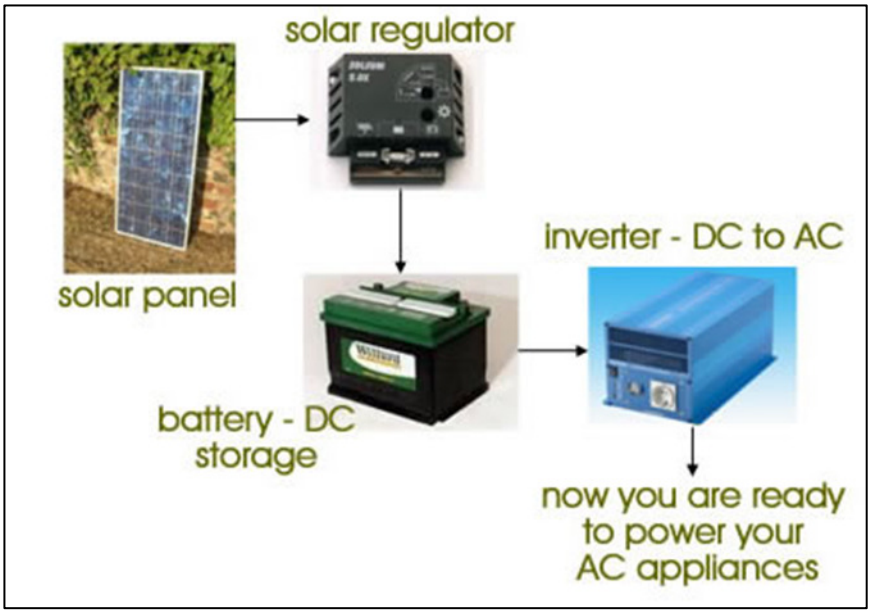

Figure 8: Typical Complete Small Solar System

The trail camp is small and would not require much electricity since not many appliances that utilise electricity will be used. It is expected that the visitors may need to heat or boil water for tea and charge cell phones. It is therefore estimated that the requirements for camping site will be as follows (XCF Consulting):

Table1: Solar System Requirements for the Trail Camp

Item	Size & Quantity	Description
1	1 x 80W	PV Solar Panel
2	10A	Solar regulator
3	600W	12V Modified Sine-wave Inverter
4	102Ah	Calcium deep cycle batteries
5	Set	Cabling, connectors and mounting brackets
6	Set	Lamps, appliance and other electrical fittings

Hot water could be provided by gas or solar geysers hybrid or dual systems. Solar geysers can reduce costs and efficiently heat water. Solar geysers, when installed by professionals, are virtually maintenance free. Figure 7 shows a typical solar panel.

Figure 9-10: Typical solar geyzers

Communication

Telecommunication is limited to the administration building on Goegap Nature Reserve. Mobile phone services coverage are also very limited in the area. Wireless Extenders could be installed to strengthen the signal of mobile phones. Each site could have one antenna installed centrally or as may be influenced by the coverage.

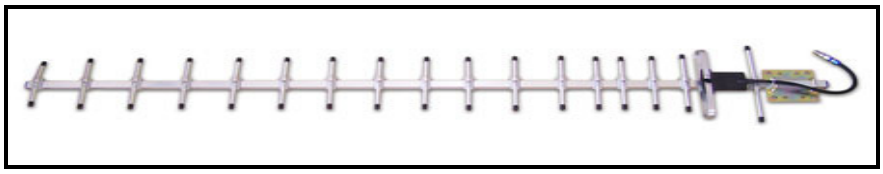

Figure 11 Wi-Ex YX500 Yagi Antennas

Conference Venue

The conference venue would include the following structures (Appendix A 3.1, Appendix C 1.1-1.3):

- Terraced seating
- Acoustic finishes
- Quality audio visual system
- Large projector screen
- Able to cater for ±150 people

The same infrastructure as for the trail camp was considered during the planning phase and would be implemented.

Family Camps

Presently, there is only one fully serviced self-catering guest house with 6 beds. It is proposed that two self-catering, fully serviced family camps with 6 sleeper/ 3 bedrooms and 8 sleeper/4 bedrooms with kitchen/food preparation areas be constructed. (Appendix A 4 and 5, Appendix C 4 and 5) The proposed buildings are proposed to be constructed as brick and mortar structures with stone cladding and thatched roofs to match existing structures on Goegap Nature Reserve as well as blend into the environment.

Water Supply

Water to the existing guest house is supplied from the existing municipality water main through an elevated storage tank. The existing water reticulation system would therefore be extended to accommodate the proposed family camps after upgrading the system to cater for the additional load.

Water reticulation upgrade envisaged will include:

- Upgrading the storage capacity of the on-site elevated tanks including using material that would blend with the surrounding environment
- Construct appropriate supporting structures for the elevated storage tanks
- Upgrade internal water reticulation to support the proposed layout
- Install a returning value to ensure that water in the storage tanks is continuously circulated

Waste-Water Disposal

As previously indicated, the existing self-catering guest house is fully serviced and waste-water is disposed via a septic tank. It is proposed that GEM Max Sewage Treatment Plants, on-site treatment plants, be constructed as an alternative to septic tanks. A new treatment plant should also be installed at the existing guest house.

Energy Supply

The power from the existing grid is confined to the Arrival Centre. Due to the proximity of the proposed family camps to the existing electricity network, it would be possible to extend the grid to the sites. Due to the unreliability of electricity provision especially during the rainy season due to strong winds and the fact that generators are not permissible to be used on the reserve solar and/or wind energy could be implemented.

Similar to the trail camp, XCF Consulting has proposed the building of localised solar power stations at the family camps to power the buildings. Hot water would be provided using solar geysers similar to the proposal for the trail camp.

Group Camp Site Alternatives

Currently, there are six existing group camp sites that consist of communal facilities and house 6 people per site. The communal facilities include:

- Brick structures with thatched roofs
- Water supplied from the municipality water main into raised storage tanks
- Toilet and showers are connected into a septic tank

Two alternative sites have been identified for the new group camps. The ecological study (Appendix D1) has identified the group camp alternative 2 as the preferred site. (Appendix A 6.1 - 6.4)

Group Camp Alternative 1

According to Simon Todd Consulting Group Camp Alternative 1 is located near to a drainage line fairly close to the current access gate. The soil is silty and vegetation typical of floodplain habitats in Namaqualand. Overall this should be viewed as a sensitive area and may be prone to flooding on an occasional basis. Given the proximity of the this development to the river and the taller structure of the vegetation, this site is viewed as being the less preferred option in terms of the Group Camp Alternatives. (Appendix D1)

Group Camp Alternative 2

Group Camp Alternative 2 is located at the base of the rocky ridge, in the vicinity of where a drainage line exits the ridge. Although the drainage line and rocky ridge are sensitive habitats that should be avoided, the remainder of the adjacent plain is not highly sensitive. Provided that these sensitive habitats are avoided, this site is seen as the preferable option in terms of the Group Camp Alternatives. (Appendix D2)

Works envisaged on the existing camp include demolishing of the existing structures. A new brick and mortar structure with stone cladding and thatched roof are proposed with (Appendix C 3.1-3.3):

- 2 units each accommodating 8 people
- Ablution block with wc's and showers
- Paving of walkway areas and driveways

Water Supply

Water supply to the existing camp site is through the municipality water main via on- site elevated storage tanks. The existing tanks will have to be upgraded to support the proposed development. The works proposed would include:

- Upgrading of the storage capacity of the on-site elevated tanks including using material that would blend with the surrounding environment
- Construct appropriate supporting structures for on-site storage tanks
- Upgrade internal water reticulation to support the proposed layout
- Install a returning value to ensure that water in the storage tanks is continuously circulated

Waste-Water Disposal

Presently, wastewater is being disposed using septic tanks. The GEM Max Sewage Treatment Plant is proposed as an alternative to septic tanks.

Energy Supply

As previously discussed, the power from the existing grid is only confined to the Arrival Centre. Currently, hot water to the camp is provided by gas system.

Based on the location of the existing camp in relationship to the existing electricity network, it is possible to extend the grid to provide electricity the site. However, the electricity is not very reliable especially during the rainy season due to strong winds. Generators are not allowed on the reserve therefore solar and/or wind energy would be proposed.

Similar to the trail camp, it is proposed that a small localised solar power station be built at the trail camp to power the buildings. Wind energy could still be considered at a later stage, should the need arise, as the area is suited for wind energy but currently solar energy is viewed as less visually obtrusive than wind energy due to the lower height of the structures.

Hot water would be provided using solar geysers combined with gas geysers similar to the proposal for trail camp.

Guard House and Tourism Building

Currently the existing Guard house at the entrance gate to Goegap Nature Reserve (Appendix A 7.1-7.2) consists of a stone and mortar structure to blend with the environment. The new guard house and tourism building would also be constructed from brick and mortar with stone cladding and thatched roof. The facilities proposed at the entrance gate (Appendix C 4.1-5.3) includes:

- Paved Parking for 6 cars and one bus
- Office
- Information and visitor's centre
- Small display/exhibition area
- Ablution facilities
- Kiosk

2.1.3 Layout Alternatives

The restriction of areas available for development due to the sensitive areas identified within the reserve as a meso-environment as well as at the identified sites as a micro-environment would be the chief determinant in the layout of the infrastructure and alternatives for change in layout and placement of the proposed developments are very limited.

2.1.4 Ancillary Facilities

The following infrastructure is also proposed for upgrade.

Internal Road Network

The Goegap Nature Reserve has direct access to the R355 provincial road that passes by the site to Springbok to the north. (Appendix A 1.1)

To promote self-drive game / flower viewing (for all vehicles) and access to the facilities provided on the nature reserve, XCF Consulting proposes that a portion of the existing road network be upgraded.

According to XCF Consulting the geometry of the existing routes would not be changed significantly. Visually, the existing geometry of the section of roads under consideration would be adequate. Any geometric improvements would be limited to extreme cases where safety is being severely compromised.

Different types of surfacing for roads are available. Roads can either be maintained as gravel roads or surfaced with tarmac, bituminous products, concrete, hyson cells etc.

The roads that are and would accommodate high volumes of traffic should rather be surfaced due to high erosion potential of the soil type within this area. Erosion prevention measures should also be implemented at other roads and also areas of activity.

XCF Consulting Proposes upgrading using Hyson cells with concrete infill. Hyson cells are flexible mats comprising square, hollow geo-cells fabricated from thin plastic film. These mats are equipped with integral laced rigging supplied ex-factory. Cells are anchored to the underlying material by means of the integral laced rigging. The cell walls are flexible that would tolerate limited inaccuracy of levels. Speed bumps could also be constructed, if required, without additional material.

The following are the advantages which are associated with the use of hyson cell paving:

- Cost effective - less expensive than industrial paving blocks, black top or conventional concrete.
- No maintenance required
- Long life cycle
- May be pigmented to tone in with architecture. The pigment is only surface deep and so is a cost effective option.
- Minimum preparation. The in-situ material need only be levelled and compacted.
- No need for layer-work

Disadvantages of tarmac, bituminous products and concrete:

- Expensive
- Maintenance required
- Extensive preparation
- Extensive layer-work and earthwork
- Possible pollution and waste products caused by batching and spraying of products
- Registering of borrow pits in areas with suitable soil type and quality

Advantages of tarmac, bituminous products and concrete:

- Well known accepted construction and engineering type
- Long life span should layer work, compaction and top layers be done correctly and layers of a good soil type and quality/standard be used
- Prevent erosion caused by maintenance of gravel roads

Soil Erosion Protection

Due to the highly erodible soil type occurring within this area erosion has been caused by activities such as vehicular movement, hiking, biking, previous farming and mining activities conducted previous to the proclamation of the reserve, etc. Different types of soil protection measures can be implemented to contain and prevent further erosion and rehabilitate areas where erosion has taken place.

One of the soil protection measures in more severe cases of possible erosion includes the use of gabion structures. (Figure 12)

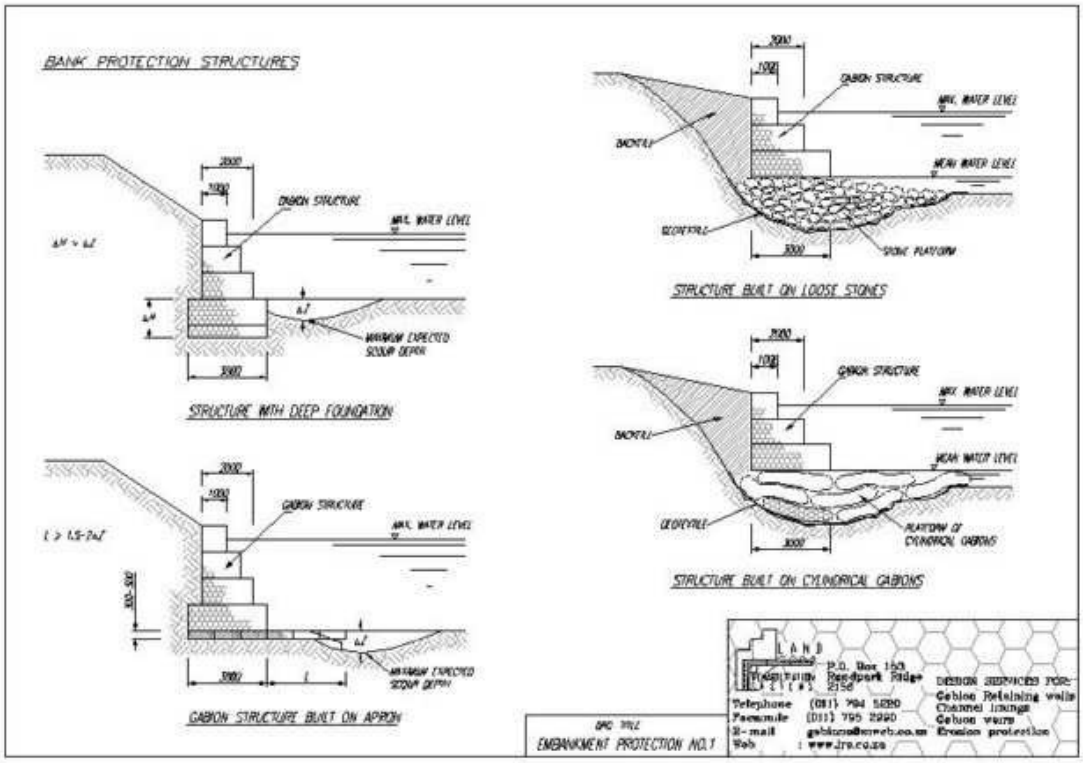

Figure 12: Typical Soil Protection with Gabion Structures

Paving

The covered parking areas are to be paved using environmentally suitable paving mechanisms and structures. (Figure 13)

Figure 13: Paving proposed at Goegap Nature Reserve

2.1.5 Timing

Should the application be authorised, the management of Goegap Nature Reserve plan to have all the planning and permitting completed by the end of September 2012 to be able to implement the infrastructure before the commencement of the next flowering season.

2.1.6 Technical Competence

Technical competence is needed from the planning to the operational and maintenance phases of the project. In some cases it might be viable to import competent technicians in the short term especially during the construction phase. The project could, especially during the operational phase, add future socio-economic value to the area as it could be regarded as an opportunity for further training and education. Local or regional construction companies could be involved in the construction process.

2.1.7 Demand

Nature conservation and tourism forms an integral part of development and progress and, as communities in South Africa is uplifted, their social and recreational demands are growing. A decrease in demand is therefore not foreseen in any part of the country and could therefore not be considered as an alternative in this study.

2.1.8 Activity/Land Use

Goegap Nature Reserve is zoned for conservation and tourism use. The proposed development is associated with the conservation activities and it would also create much needed revenue to enable the reserve to practice and implement more conservation activities on the reserve and operate more independently from state funding. The development would be legally bound to the EMP (Appendix F) which would be enforced by an independent ECO, in consultation with the different government departments such as the DAFF, DEA and DENC.

It is stipulated that vegetation shall be disturbed as little as possible, and this condition would be enforced by the ECO.

2.1.9 Scheduling Alternative

Should the EIA be authorised, it is envisaged that the proposed development is envisaged to take place in the latter part of 2012 and 2013 to be operational by 2014. The EIA therefore needs to be completed by September 2012.

2.1.10 'Do Nothing' Alternative

The 'do nothing' alternative is the option of not undertaking the developments at Goegap Nature Reserve. Should this alternative be selected, it would have local and broader impacts.

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

The current infrastructure at the reserve is old and in some cases such as at the trail camp it is disused due to unsafe structures. The sewage treatment at the different locations are outdated and with increasing tourism demand and load possible contamination of groundwater resources could occur as all these sites are located in the vicinity to drainage areas. It is therefore imperative that this infrastructure be upgraded and in some cases replaced.

Deciding not to proceed with the development would have a negative impact on the socio-economic development of the immediate area surrounding the reserve. The job creation and poverty alleviation that would have occurred due to the development, would not take place.

The development of responsibly developed small-scale tourism facilities, such as at Goegap Nature Reserve, is strategically important for the diversification of tourism and improving conservation value to prevent losses in tourism revenue in the future.

The 'do nothing' alternative is not a preferred alternative in this application.

3. ACTIVITY POSITION

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

List alternative sites, if applicable.

Alternative:	**Latitude (S):**		**Longitude (E):**	
Trail Camp: Alternative S1[2] (preferred or only site alternative)	29°	37,775‘	18°	03,570‘
Conference Venue: Alternative S1 (preferred or only site alternative)	29°	39,912‘	17°	59,928‘
Family Camp 1: Alternative S1 (preferred or only site alternative)	29°	40,975‘	17°	56,968‘
Family Camp 2: Alternative S1 (preferred or only site alternative)	29°	40,931‘	17°	57,017‘
Group Camp Site Alternative 2: Alternative S1 (preferred or only site alternative)	29°	41,112‘	17°	56,704‘
Group Camp Site Alternative 1: Alternative S2 (if any)	29°	41,125‘	17°	57,012‘
Guard House and Tourism Building: Alternative S1 (preferred or only site alternative)	29°	41,164‘	17°	56,911‘

In the case of linear activities:

Alternative:	**Latitude (S):**		**Longitude (E):**	
Alternative S1 (preferred or only route alternative)				
• Starting point of the activity	°	‘	°	‘
• Middle/Additional point of the activity	°	‘	°	‘
• End point of the activity	°	‘	°	‘
Alternative S2 (if any)				
• Starting point of the activity	°	‘	°	‘
• Middle/Additional point of the activity	°	‘	°	‘
• End point of the activity	°	‘	°	‘
Alternative S3 (if any)				
• Starting point of the activity	°	‘	°	‘
• Middle/Additional point of the activity	°	‘	°	‘
• End point of the activity	°	‘	°	‘

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

[2] “Alternative S..” refer to site alternatives.

4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	**Size of the activity:**
Trail Camp: Alternative A1[3] (preferred activity alternative)	~12 000m^2
Conference Venue: Alternative A1 (preferred activity alternative)	~17 200m^2
Family Camp 1: Alternative A1 (preferred activity alternative)	~12 900m^2
Family Camp 2: Alternative A1 (preferred activity alternative)	~12 900m^2
Group Camp Site Alternative 2: Alternative A1 (preferred activity alternative)	~5 000m^2
Group Camp Site Alternative 1: Alternative A2 (if any)	~5 000m^2
Guard House and Tourism Building: Alternative A1 (preferred activity alternative)	~9 000m^2

or, for linear activities:

Alternative:	**Length of the activity:**
Alternative A1 (preferred activity alternative)	m
Alternative A2 (if any)	m
Alternative A3 (if any)	m

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:	**Size of the site/servitude:**
Trail Camp: Alternative A1[4] (preferred activity alternative)	~21 600m^2
Conference Venue: Alternative A1 (preferred activity alternative)	~34 400m^2
Family Camp 1: Alternative A1 (preferred activity alternative)	~25 800m^2
Family Camp 2: Alternative A1 (preferred activity alternative)	~25 800m^2
Group Camp Site Alternative 2: Alternative A1 (preferred activity alternative)	~15 000m^2
Group Camp Site Alternative 1: Alternative A2 (if any)	~18 000m^2
Guard House and Tourism Building: Alternative A1 (preferred activity alternative)	~18 000m^2

[3] "Alternative A.." refer to activity, process, technology or other alternatives.
[4] "Alternative A.." refer to activity, process, technology or other alternatives.

5. SITE ACCESS

Does ready access to the sites exist?	**YES**	~~NO~~
If NO, what is the distance over which a new access road will be built	m	

Describe the type of access road planned:

The existing road infrastructure at Goegap Nature Reserve consist of surfaced roads, gravel roads, farm roads and 4x4 tracks (trail camp).

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

6. SITE OR ROUTE PLAN

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

The site or route plans must indicate the following:

6.1 the scale of the plan which must be at least a scale of 1:500;
6.2 the property boundaries and numbers of all the properties within 50 metres of the site;
6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
6.4 the exact position of each element of the application as well as any other structures on the site;
6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
6.6 all trees and shrubs taller than 1.8 metres;
6.7 walls and fencing including details of the height and construction material;
6.8 servitudes indicating the purpose of the servitude;
6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):
- rivers;
- the 1:100 year flood line (where available or where it is required by DWA);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or invested with alien species);

6.10 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
6.11 the positions from where photographs of the site were taken.

Note: The positions from where photographs were taken is shown in Appendix A 1.3 Topographic Map.

7. SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this form**.** It must be supplemented with additional photographs of relevant features on the site, if applicable.

8. FACILITY ILLUSTRATION

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

9. ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 47 779 942.00	
What is the expected yearly income that will be generated by or as a result of the activity? **Note: This information was not provided to the EAP**	R	
Will the activity contribute to service infrastructure?	**YES**	~~NO~~
Is the activity a public amenity?	**YES**	~~NO~~
How many new employment opportunities will be created in the development phase of the activity?	391	
What is the expected value of the employment opportunities during the development phase?	R18 000 000.00	
What percentage of this will accrue to previously disadvantaged individuals?	60%	
How many permanent new employment opportunities will be created during the operational phase of the activity?	20	
What is the expected current value of the employment opportunities during the first 10 years? **Note: This information was not provided to the EAP**	R	
What percentage of this will accrue to previously disadvantaged individuals? **Note: This information was not provided to the EAP**	%	

9(b) Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

NEED:			
1.	Was the relevant provincial planning department involved in the application?	**YES**	~~NO~~
2.	Does the proposed land use fall within the relevant provincial planning framework?	**YES**	~~NO~~
3.	If the answer to questions 1 and / or 2 was NO, please provide further motivation / explanation:		

DESIRABILITY:			
1.	Does the proposed land use / development fit the surrounding area?	**YES**	~~NO~~
2.	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	**YES**	~~NO~~
3.	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	**YES**	~~NO~~
4.	If the answer to any of the questions 1-3 was NO, please provide further motivation / explanation:		
5.	Will the proposed land use / development impact on the sense of place?	~~YES~~	**NO**
6.	Will the proposed land use / development set a precedent?	~~YES~~	**NO**
7.	Will any person's rights be affected by the proposed land use / development?	~~YES~~	**NO**
8.	Will the proposed land use / development compromise the "urban edge"?	~~YES~~	**NO**
9.	If the answer to any of the question 5-8 was YES, please provide further motivation / explanation.		

BENEFITS:			
1.	Will the land use / development have any benefits for society in general?	**YES**	~~NO~~
2.	Explain:		
	Nor the development, nor the resulting higher amount of tourists would have a detrimental impact on critical biodiversity of the area. More people would be able to experience the reserve and its splendour during flowering season. This in turn would create a better income for the management of the reserve.		
3.	Will the land use / development have any benefits for the local communities where it will be located?	**YES**	~~NO~~
4.	Explain:		
	The surrounding businesses in Springbok would be influenced positively due to spending by tourists. Job opportunities would be created during the construction and operational phase that would accrue to communities surrounding Goegap Nature Reserve.		

10. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline:	Administering authority:	Date:
Constitution of the Republic of South Africa (Act No 108 of 1996)	National Government	1996
National Environmental Management Act (Act 107 of 1998)	National and Provincial Department of Environmental Affairs	1998
National Environmental Management: Waste Act (Act No 59 of 2008)	Department of Environmental Affairs	2008
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Department of Environmental Affairs	2004
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	Department of Environmental Affairs	2004
Environment Conservation Act (Act No 73 of 1989)	Department of Environmental Affairs	1989
National Water Act (Act No 36 of 1998)	Department of Water Affairs	1998
National Heritage Resources Act (Act No 25 of 1999)	South African Heritage Resources Agency	1999
National Veld and Forest Fire Act (Act No 101 of 1998)	National Department of Agriculture, Forestry and Fisheries (DAFF)	1998
National Forests Act (Act No 84 of 1998)	DAFF	1998
Northern Cape Nature Conservation Act(Act No 9 of 2009)	Northern Cape Department of Environment and Nature Conservation	2009
Promotion of Access to Information Act (Act No 2 of 2000)	National Department of Environmental Affairs	2000
Fencing Act (Act No 31 of 1963)	DAFF	1963
South Africal Civil Aviation Regulation Act (Act 13 of 2009)	SACAA	2009

11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

11(a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	**YES**	~~NO~~
If yes, what estimated quantity will be produced per month?	3m^3	

How will the construction solid waste be disposed of (describe)?

Solid waste will be separated at source. Different bins will be used to accept waste materials such as glass, plastic, cans/tins, paper & cardboard and domestic waste. The waste will be kept in scavenger and weather proof litter bins. Waste can be temporarily kept at a central storage container within the project area and be transported out of the nature reserve at least once a week with a truck.

Where will the construction solid waste be disposed of (describe)?

Springbok Municipal Waste Disposal Facility

Will the activity produce solid waste during its operational phase?	**YES**	~~NO~~
If yes, what estimated quantity will be produced per month?	~ 32 m^3	

How will the solid waste be disposed of (describe)?

Normal household waste would be produced. Waste calculated at full capacity of proposed facilities that would not be the case throughout a year. Waste would be temporarily kept at the scavenger proof waste bins at the sites. The waste should be taken out of the sites preferably once a week with a truck.

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

The household waste will be removed to the Springbok Municipal Waste Disposal Facility

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?	~~YES~~	**NO**

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?	~~YES~~	**NO**

If yes, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	~~YES~~	**NO**
If yes, what estimated quantity will be produced per month?	m^3	
Will the activity produce any effluent that will be treated and/or disposed of on site?	~~Yes~~	**NO**

Note: During the construction phase the current septic tanks would be used that is being sucked by the Nama Kho Local Municipality. During this phase chemical toilets could possibly also be used that would be removed to the local municipal sewage works.

During the operational phase, GEM Max Sewage Treatment Plant or the Enviro-Loo systems might be implemented. Should it be needed to remove the sewage sludge or dry composted sludge, it would be removed to the local municipal sewage works.

The applicant would endeavour and it is not foreseen that sewage is to enter the environment.

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?	**YES**	~~NO~~

If yes, provide the particulars of the facility:

Facility name:	Springbok Sewage Works		
Contact person:	Mr Brandt		
Postal address:	P.O. Box 17, Springbok		
Postal code:	8240		
Telephone:	027 718 8100	Cell:	
E-mail:	Mbrandt@namakhoi.org.za	Fax:	0277121635

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

Currently the proponent does not plan to reuse or recycle waste water.

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	~~YES~~	**NO**
If yes, is it controlled by any legislation of any sphere of government?	~~YES~~	**NO**

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If no, describe the emissions in terms of type and concentration:

During construction the only emissions would be that from vehicles and machinery. That is controlled by legislation. During operational phase emissions would be that from vehicles of tourists that is also controlled by legislation.

11(d) Generation of noise

Will the activity generate noise?	~~YES~~	**NO**
If yes, is it controlled by any legislation of any sphere of government?	~~YES~~	**NO**

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If no, describe the noise in terms of type and level:

During construction noise will be generated by vehicles and construction machinery during working hours. During operational phase not any noise will be generated.

12. WATER USE

Note: At the trail camp groundwater is utilised (existing use) and at all the other camps municipal water would be available as the existing facilities are serviced by the municipality.

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)

municipal	water board	**groundwater**	river, stream, dam or lake	other	the activity will not use water

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate

the volume that will be extracted per month: **Trail Camp: Construction phase**	~ 420 000 litres	
Trail Camp: Operational phase	~ 45 000 litres	
Does the activity require a water use permit from the Department of Water Affairs?	**YES**	~~NO~~

If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

Note: The borehole is currently in use and therefor falls under existing use regarding the mentioned act. Should it not be registered with Water Affairs, the management of Goegap Nature Reserve is to ensure that it is registered. The use of water for construction purposes (industrial use) would be of a temporary nature and the Department of Water Affairs should indicate what application should be lodged, if any.

13. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

During the construction phase labour intensive methods would be used to demolish and build infrastructure and the large scale use of machinery is not foreseen.
During the operational phase it is proposed by the proponent that electricity would be supplied via Solar Energy such as small PV Power Stations at each element of application. Also solar geyzers have been proposed in conjunction with gas geyzers as backup at the different localities.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

Thatched roofs would be constructed that would conserve energy as the interiors would be cool in summer and warm in winter. The upkeep of thatch however is high. The proponent should also look into the green building principles such as orientation of buildings, roof angle and overhang.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No. (e.g. A):	**A: Trail Camp**

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section?

~~YES~~	**NO**

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:
All specialist reports must be contained in Appendix D.

Property description/physical address:	Goegap Nature Reserve, Springbok, Northern Cape Province

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

PORTION 1 OF FARM KAREHOUTE KLOOF NO. 221 (TRAIL CAMP)

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning:	Conservation

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to , to this application.

Is a change of land-use or a consent use application required?	~~YES~~	**NO**
Must a building plan be submitted to the local authority?	**YES**	~~NO~~

Locality map: An A3 locality map must be attached to the back of this document, as **Appendix A.** The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.) The map must indicate the following:

- an indication of the project site position as well as the positions of the alternative sites, if any;
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection)

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

~~2.1 Ridgeline~~
~~2.2 Plateau~~
~~2.3 Side slope of hill/mountain~~
~~2.4 Closed valley~~
2.5 Open valley
~~2.6 Plain~~
~~2.7 Undulating plain / low hills~~
~~2.8 Dune~~
~~2.9 Seafront~~

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:		**Alternative S2 (if any):**		**Alternative S3 (if any):**	
Shallow water table (less than 1.5m deep)	~~YES~~	**NO**	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	~~YES~~	**NO**	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	~~YES~~	**NO**	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	~~YES~~	**NO**	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	~~YES~~	**NO**	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	~~YES~~	**NO**	YES	NO	YES	NO
Any other unstable soil or geological feature	~~YES~~	**NO**	YES	NO	YES	NO
An area sensitive to erosion	**YES**	~~NO~~	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4. GROUNDCOVER

Indicate the types of groundcover present on the site:

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition[E]	**Natural veld with scattered aliens[E]**	Natural veld with heavy alien infestation[E]	Veld dominated by alien species[E]	Gardens
Sport field	Cultivated land	Paved surface	**Building or other structure**	**Bare soil**

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

5. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that does currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

5.1 Natural area
5.2 Low density residential
5.3 Medium density residential
5.4 High density residential
5.5 Informal residential[A]
5.6 Retail commercial & warehousing
5.7 Light industrial
5.8 Medium industrial [AN]
5.9 Heavy industrial [AN]
5.10 Power station
5.11 Office/consulting room
5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam[A]
5.14 Quarry, sand or borrow pit
5.15 Dam or reservoir
5.16 Hospital/medical centre
5.17 School
5.18 Tertiary education facility
5.19 Church
5.20 Old age home
5.21 Sewage treatment plant[A]
5.22 Train station or shunting yard [N]
5.23 Railway line [N]
5.24 Major road (4 lanes or more) [N]
5.25 Airport [N]
5.26 Harbour
5.27 Sport facilities
5.28 Golf course
5.29 Polo fields
5.30 Filling station [H]
5.31 Landfill or waste treatment site
5.32 Plantation
5.33 Agriculture
5.34 River, **stream** or wetland
5.35 Nature conservation area
5.36 Mountain, koppie or ridge
5.37 Museum
5.38 Historical building
5.39 Protected Area
5.40 Graveyard
5.41 Archaeological site
5.42 Other land uses (describe)

If any of the boxes marked with an "N "are ticked, how will this impact / be impacted upon by the proposed activity?

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity?
If YES, specify and explain:
If YES, specify:

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain:
If YES, specify:

6. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including	~~YES~~	**NO**
Archaeological or palaeontological sites, on or close (within 20m) to the site?	Uncertain	
If YES, explain:		
If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.		
Briefly explain the findings of the specialist:	An Archaeological Impact Assessment Phase 1 has been conducted by Dr David Morris (McGregor Museum). Not any findings were stipulated in the report. (Appendix D2). Dr John Almond, Palaeontologist, has indicated that the geology would not support preservation and therefore do not expect any findings (Appendix D3).	
Will any building or structure older than 60 years be affected in any way?	~~YES~~	**NO**
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	~~YES~~	**NO**

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

Section C Copy No. (e.g. A):	**B: Conference Venue**

4. Paragraphs 1 - 6 below must be completed for each alternative.

5. Has a specialist been consulted to assist with the completion of this section?

~~YES~~	**NO**

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:
All specialist reports must be contained in Appendix D.

Property description/physical address:	Goegap Nature Reserve, Springbok, Northern Cape Province

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

PORTION 21 OF THE FARM 132 (GATE, GROUP CAMP, FAMILY CAMP)
PORTION 3 OF THE FARM 132 (CONFERENCE VENUE)

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning:	Conservation

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to , to this application.

Is a change of land-use or a consent use application required?	~~YES~~	**NO**
Must a building plan be submitted to the local authority?	**YES**	~~NO~~

Locality map: An A3 locality map must be attached to the back of this document, as **Appendix A.** The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.) The map must indicate the following:

- an indication of the project site position as well as the positions of the alternative sites, if any;
- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection)

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat	**1:50 – 1:20**	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline
2.2 Plateau
2.3 Side slope of hill/mountain
2.4 Closed valley
2.5 Open valley
2.6 Plain
2.7 Undulating plain / low hills
2.8 Dune
2.9 Seafront

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:		**Alternative S2 (if any):**		**Alternative S3 (if any):**	
Shallow water table (less than 1.5m deep)	~~YES~~	**NO**	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	~~YES~~	**NO**	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	~~YES~~	**NO**	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	~~YES~~	**NO**	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	~~YES~~	**NO**	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	~~YES~~	**NO**	YES	NO	YES	NO
Any other unstable soil or geological feature	~~YES~~	**NO**	YES	NO	YES	NO
An area sensitive to erosion	**YES**	~~NO~~	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4. GROUNDCOVER

Indicate the types of groundcover present on the site:

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition[E]	Natural veld with scattered aliens[E]	Natural veld with heavy alien infestation[E]	Veld dominated by alien species[E]	Gardens
Sport field	Cultivated land	Paved surface	**Building or other structure**	**Bare soil**

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

5. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that does currently occur within a **500m radius** of the site and give description of how this influences the application or may be impacted upon by the application:

5.1 Natural area
5.2 Low density residential (staff housing)
5.3 Medium density residential
5.4 High density residential
5.5 Informal residential[A]
5.6 Retail commercial & warehousing
5.7 Light industrial
5.8 Medium industrial [AN]
5.9 Heavy industrial [AN]
5.10 Power station
5.11 Office/consulting room (administration buildings)
5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam[A]
5.14 Quarry, sand or borrow pit
5.15 Dam or reservoir
5.16 Hospital/medical centre
5.17 School
5.18 Tertiary education facility
5.19 Church
5.20 Old age home
5.21 Sewage treatment plant[A]
5.22 Train station or shunting yard [N]

5.23 Railway line [N]
5.24 Major road (4 lanes or more) [N]
5.25 Airport [N]
5.26 Harbour
5.27 Sport facilities
5.28 Golf course
5.29 Polo fields
5.30 Filling station [H]
5.31 Landfill or waste treatment site
5.32 Plantation
5.33 Agriculture
5.34 River, stream or wetland
5.35 Nature conservation area
5.36 **Mountain, koppie** or ridge
5.37 Museum
5.38 Historical building
5.39 Protected Area
5.40 Graveyard
5.41 Archaeological site
5.42 Other land uses (describe)

If any of the boxes marked with an "N "are ticked, how will this impact / be impacted upon by the proposed activity?

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity?
If YES, specify and explain:
If YES, specify:

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain:
If YES, specify:

6. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or palaeontological sites, on or close (within 20m) to the site?	~~YES~~	**NO**
	~~Uncertain~~	
If YES, explain:		
If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.		
Briefly explain the findings of the specialist:	An Archaeological Impact Assessment Phase 1 has been conducted by Dr David Morris (McGregor Museum). Not any findings were stipulated in the report. (Appendix D2). Dr John Almond, Palaeontologist, has indicated that the geology would not support preservation and therefore do not expect any findings (Appendix D3).	
Will any building or structure older than 60 years be affected in any way?	~~YES~~	**NO**
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	~~YES~~	**NO**

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

Section C Copy No. (e.g. A):	**C: Family Camps, Group Camp Alternative 2**

6. Paragraphs 1 - 6 below must be completed for each alternative.

7. Has a specialist been consulted to assist with the completion of this section?

~~YES~~	**NO**

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:
All specialist reports must be contained in Appendix D.

Property description/physical address:	Goegap Nature Reserve, Springbok, Northern Cape Province

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

PORTION 21 OF THE FARM 132 (GROUP CAMP, FAMILY CAMP)

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning:	Conservation

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to , to this application.

Is a change of land-use or a consent use application required?	~~YES~~	**NO**
Must a building plan be submitted to the local authority?	**YES**	~~NO~~

Locality map: An A3 locality map must be attached to the back of this document, as **Appendix A.** The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.) The map must indicate the following:

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- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection)

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat	**1:50 – 1:20**	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline
2.2 Plateau
2.3 Side slope of hill/mountain
2.4 Closed valley
2.5 Open valley
2.6 Plain
2.7 Undulating plain / low hills
2.8 Dune
2.9 Seafront

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:		**Alternative S2 (if any):**		**Alternative S3 (if any):**	
Shallow water table (less than 1.5m deep)	~~YES~~	**NO**	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	~~YES~~	**NO**	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	~~YES~~	**NO**	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	~~YES~~	**NO**	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	~~YES~~	**NO**	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	~~YES~~	**NO**	YES	NO	YES	NO
Any other unstable soil or geological feature	~~YES~~	**NO**	YES	NO	YES	NO
An area sensitive to erosion	**YES**	~~NO~~	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4. GROUNDCOVER

Indicate the types of groundcover present on the site:

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Sport field	Cultivated land	Paved surface	**Building or other structure**	**Bare soil**

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5.6 Retail commercial & warehousing
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5.8 Medium industrial [AN]
5.9 Heavy industrial [AN]
5.10 Power station
5.11 Office/consulting room
5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam[A]
5.14 Quarry, sand or borrow pit
5.15 Dam or reservoir
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5.17 School
5.18 Tertiary education facility
5.19 Church
5.20 Old age home
5.21 Sewage treatment plant[A]
5.22 Train station or shunting yard [N]

5.23 Railway line [N]
5.24 Major road (4 lanes or more) [N]
5.25 Airport [N]
5.26 Harbour
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5.28 Golf course
5.29 Polo fields
5.30 Filling station [H]
5.31 Landfill or waste treatment site
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5.36 Mountain, koppie or ridge
5.37 Museum
5.38 Historical building
5.39 Protected Area
5.40 Graveyard
5.41 Archaeological site
5.42 Other land uses (describe)

If any of the boxes marked with an "[N] "are ticked, how will this impact / be impacted upon by the proposed activity?

If any of the boxes marked with an "[An]" are ticked, how will this impact / be impacted upon by the proposed activity?
If YES, specify and explain:
If YES, specify:

If any of the boxes marked with an "[H]" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain:
If YES, specify:

6. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or palaeontological sites, on or close (within 20m) to the site?	~~YES~~	**NO**
	~~Uncertain~~	
If YES, explain:		
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Will any building or structure older than 60 years be affected in any way?	~~YES~~	**NO**
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	~~YES~~	**NO**

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

Section C Copy No. (e.g. A):	**D: Group Camp Alternative 1, Guard House and Tourism Building**

8. Paragraphs 1 - 6 below must be completed for each alternative.

9. Has a specialist been consulted to assist with the completion of this section?

~~YES~~	**NO**

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:
All specialist reports must be contained in Appendix D.

Property description/ physical address:

Goegap Nature Reserve, Springbok, Northern Cape Province

(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.

PORTION 21 OF THE FARM 132 (GATE, GROUP CAMP, FAMILY CAMP)

In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.

Current land-use zoning:

Conservation

In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to , to this application.

Is a change of land-use or a consent use application required?	~~YES~~	**NO**
Must a building plan be submitted to the local authority?	**YES**	~~NO~~

Locality map:

An A3 locality map must be attached to the back of this document, as **Appendix A.** The scale of the locality map must be relevant to the size of the development (at least 1:50 000. For linear activities of more than 25 kilometres, a smaller scale e.g. 1:250 000 can be used. The scale must be indicated on the map.) The map must indicate the following:

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- road access from all major roads in the area;
- road names or numbers of all major roads as well as the roads that provide access to the site(s);
- all roads within a 1km radius of the site or alternative sites; and
- a north arrow;
- a legend; and
- locality GPS co-ordinates (Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection)

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline
2.2 Plateau
2.3 Side slope of hill/mountain
2.4 Closed valley
2.5 Open valley
2.6 Plain
2.7 Undulating plain / low hills
2.8 Dune
2.9 Seafront

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:		**Alternative S2 (if any):**		**Alternative S3 (if any):**	
Shallow water table (less than 1.5m deep)	~~YES~~	**NO**	YES	NO	YES	NO
Dolomite, sinkhole or doline areas	~~YES~~	**NO**	YES	NO	YES	NO
Seasonally wet soils (often close to water bodies)	~~YES~~	**NO**	YES	NO	YES	NO
Unstable rocky slopes or steep slopes with loose soil	~~YES~~	**NO**	YES	NO	YES	NO
Dispersive soils (soils that dissolve in water)	~~YES~~	**NO**	YES	NO	YES	NO
Soils with high clay content (clay fraction more than 40%)	~~YES~~	**NO**	YES	NO	YES	NO
Any other unstable soil or geological feature	~~YES~~	**NO**	YES	NO	YES	NO
An area sensitive to erosion	**YES**	~~NO~~	YES	NO	YES	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4. GROUNDCOVER

Indicate the types of groundcover present on the site:

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

~~Natural veld - good condition~~[E]	**Natural veld with scattered aliens**[E]	**Natural veld with heavy alien infestation**[E]	~~Veld dominated by alien species~~[E]	~~Gardens~~
~~Sport field~~	~~Cultivated land~~	~~Paved surface~~	**Building or other structure**	**Bare soil**

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

5. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that does currently occur within a **500m radius of the site** and give description of how this influences the application or may be impacted upon by the application:

5.1 Natural area
5.2 Low density residential
5.3 Medium density residential
5.4 High density residential
5.5 Informal residential[A]
5.6 Retail commercial & warehousing
5.7 Light industrial
5.8 Medium industrial [AN]
5.9 Heavy industrial [AN]
5.10 Power station
5.11 Office/consulting room
5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam[A]
5.14 Quarry, sand or borrow pit
5.15 Dam or reservoir
5.16 Hospital/medical centre
5.17 School
5.18 Tertiary education facility
5.19 Church
5.20 Old age home
5.21 Sewage treatment plant[A]

5.22 Train station or shunting yard [N]
5.23 Railway line [N]
5.24 Major road (4 lanes or more) [N]
5.25 Airport [N] (Tarred Airstrip – not any buildings)
5.26 Harbour
5.27 Sport facilities
5.28 Golf course
5.29 Polo fields
5.30 Filling station [H]
5.31 Landfill or waste treatment site
5.32 Plantation
5.33 Agriculture
5.34 River, **stream** or wetland
5.35 Nature conservation area
5.36 **Mountain, koppie** or ridge
5.37 Museum
5.38 Historical building
5.39 Protected Area
5.40 Graveyard
5.41 Archaeological site
5.42 Other land uses (describe)

If any of the boxes marked with an "[N] "are ticked, how will this impact / be impacted upon by the proposed activity?
The activities that SACAA would be concerned about surrounding the airstrip would be the impact of birds that may cause bird strikes on approaching aircraft or aircraft taking off and the height of structures within or nearby the approaching and taking off routes.
The proposed developments on Goegap Nature Reserve would practice the same activities that is currently practiced on the reserve and would not have a further direct, indirect or cumulative impact on the activities on and surrounding the airstrip.
Habitat, that would attract birds, would not be generated to attract birds by the proposed developments and the structures would also not be near the approaching or taking off routes off the aircraft. The structures would comply with the South Africal Civil Aviation Regulation Act (Act 13 of 2009) stipulations.

If any of the boxes marked with an "[An]" are ticked, how will this impact / be impacted upon by the proposed activity?
If YES, specify and explain:
If YES, specify:

If any of the boxes marked with an "[H]" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain:
If YES, specify:

6. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or palaeontological sites, on or close (within 20m) to the site?	~~YES~~	**NO**
	~~Uncertain~~	
If YES, explain:		

If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist:	An Archaeological Impact Assessment Phase 1 has been conducted by Dr David Morris (McGregor Museum). Not any findings were stipulated in the report. (Appendix D2). Dr John Almond, Palaeontologist, has indicated that the geology would not support preservation and therefore do not expect any findings (Appendix D3).

Will any building or structure older than 60 years be affected in any way?	~~YES~~	**NO**
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	~~YES~~	**NO**

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

(a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the competent authority) at a place conspicuous to the public at the boundary or on the fence of—
  (i) the site where the activity to which the application relates is or is to be undertaken; and
  (ii) any alternative site mentioned in the application;

Note: Notice boards were fixed at the entrance gate to the Goegap Nature Reserve as well as at the Nama Khoi Local Municipality and the Goegap offices (admin building).

(b) giving written notice to—
  (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  Note: The land owner and person in control (manager) is the applicant, however the person in control has been notified.
  (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken ;
  Note: The manager, notified, is the occupier and this person has also been requested to inform all staff members residing on the reserve.
  (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken; **(done)**
  (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area; **(done)**
  (v) the municipality which has jurisdiction in the area; **(Nama Khoi Local Municipality, Namakwa Local Municipality)**
  (vi) any organ of state having jurisdiction in respect of any aspect of the activity; **(done)** and
  (vii) any other party as required by the competent authority; **(done)**

(c) placing an advertisement in—
  (i) one local newspaper; **(Gemsbok)** or
  (ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;

(d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in subregulation 54(c)(ii); and

(e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to—
  (i) illiteracy;
  (ii) disability; or
  (iii) any other disadvantage.

2. CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:

(a) indicate the details of the application which is subjected to public participation; and

(b) state—

- (i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;
- (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
- (iii) the nature and location of the activity to which the application relates;
- (iv) where further information on the application or activity can be obtained; and
- (iv) the manner in which and the person to whom representations in respect of the application may be made.

3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

4. DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to this application. The comments and response report must be attached under **Appendix E**.

6. AUTHORITY PARTICIPATION

Please note that a complete list of all organs of state and or any other applicable authority with their contact details must be appended to the basic assessment report or scoping report, whichever is applicable.

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input.

List of authorities informed:

Find a complete list of authorities informed (with contact details) attached in Appendix G 2.7

- *National Government Representatives*:
  - Department of Environmental Affairs;
- *Provincial Government Representatives (Northern Cape)*:
  - Department of Environment and Nature Conservation;
  - Department of Forestry (DAFF);
  - Department of Roads and Public Works;
  - Department of Water Affairs;
  - Department of Mineral Resources; and
  - Department of Sports, Arts and Culture;
  - Department of Tourism
- *Local and District Authorities*:
  - Namakwa District Municipality;
  - Nama Khoi Local Municipality and Ward Councillor; and
- *Other authorities*:
  - South African Heritage Resources Agency;
  - Northern Cape Provincial Heritage Resources Agency; and
  - South African Civil Aviation Authority;
- *Environmental Non-Governmental Organisations*:
  - Endangered Wildlife Trust; and
- *Parastatals*:
  - SANRAL;
  - Eskom; and
  - Telkom;
- *Community-based organisations*:
  - Community Development Worker: Fonteintjie Community;
- *Surrounding landowners*.

List of authorities from whom comments have been received:

Department of Environment and Nature Conservation, Research & Development Support Section, Goegap Nature Reserve
Northern Cape Department of Roads and Public Works
SANRAL
TELKOM
DAFF

The comments received are attached in Appendix G 2.8.

7. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that subregulation to the extent and in the manner as may be agreed to by the competent authority. Proof of any such agreement must be provided, where applicable.

YES	~~NO~~

Has any comment been received from stakeholders?
If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

Note: Copies of correspondence and proof thereof is attached in Appendix G 2.8

11 January 2012, Email: Conrad Geldenhuys, Senior Nature Conservation Scientist: Botanist, Research and Development Support Section, **Northern Cape Department of Environment and Nature Conservation, Goegap Nature Reserve**
Requests to be registered as an I&AP. Mr Geldenhuys is a vegetation specialist of Namaqualand and is residing on the reserve.
The plant phytosociological study and plant growth map that has been developed by Dr Helga van der Merwe (previously Rosch) for the Goegap Nature Reserve should form an important base for the evaluation.
Response from EAP:
Mr Geldenhuys has been listed as a registered interested and affected party.
He will in future be notified of all reports and documentation.
The specialist appointed to conduct the ecological specialist study is Simon Todd Consulting and the information would be made available to him for consideration in his study. (The specialist did use the information in his study.)
Dr Helga van der Merwe (then Rosh) has been contacted regarding the study. It was an article placed in the Koedoe. It has been supplied and is attached to the environmental basic assessment report in Appendix G 3.

2 February 2012, Fax & 09 March 2012 Letter: **Department of Roads and Public Works**
Acknowledge receipt of the notification letter dated 5 December 2012.03.19 The letter is receiving attention and the EAP will be informed of any objections, should there be any. No objections or comments.

7 February 2012 & 8 February 2012, Email: **SANRAL**
Request to be listed as an I&AP & BAR to be made available.
Eap will inform SANRAL when Draft and later, Final BAR, is available for review.

20 February 2012 Letter via Email: **Telkom**
No telecommunication infrastructure owned by Telkom SA is affected. Telkom has no comments/objections to the proposal.

10 April 2012, Fax: DAFF (Forestry)
DAFF is mainly concerned about the potential impact on protected tree species. The developer to assess the possible impact on protected tree spp. & endeavour to minimize such impact through careful planning.
All documents to be sent via postage.

23 January 2012, Letter: F.W. van Niekerk – Neighbour
In principle Mr Van Niekerk does not have an objection to the upgrading of facilities.
It is concerning that Goegap is located within an area that produces sheep.
Should the aim of the facilities be of such a nature that the park would be managed to attract, harbour and pamper vermin (jackal, caracal and leopard) without control, he as neighbour have serious objections. In fact, it would create severe conflict.

Request Goegap Nature Reserve management to respond.
Ms Jonk, Manager at Goegap Nature Reserve responded (15 February 2012):
The response was sent to the I&AP on 23 February 2012 stating the following:

- The comment of Mr van Niekerk that is pertaining to the proposed upgrade of the facilities is that it could affect the management of vermin.
    - The management of the reserve responded that none of the Reserve's ecological management principles are in any way affected by the proposed upgrading or the facilities.
    - Mr van Niekerk was informed that the remainder of the comments were not pertaining to the proposed upgrade and therefore need to be addressed and debated on the appropriate forum. The management of the Goegap Nature Reserve requested that Mr van Niekerk can present the issue to them in writing after which it will receive the needed attention.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2010, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

1. The plant phytosociological study and plant growth map that has been developed by Dr Helga van der Merwe (previously Rosch) for the Goegap Nature Reserve should form an important base for the evaluation.
2. The possible impact on protected tree spp. to be assessed & to endeavour to minimize such impact through careful planning.
3. The aim of the facilities should not be of such a nature that the park would be managed to attract, harbour and pamper vermin (jackal, caracal and leopard) without control.

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report as Annexure E):

1. Simon Todd Consulting conducted the ecological specialist study and made use of the information in his study.
2. The above mentioned specialist addressed this aspect in his study.
3. The management of the reserve responded that none of the Reserve's ecological management principles are in any way affected by the proposed upgrading or the facilities.

2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

List the potential **direct, indirect and cumulative property/activity/design/technology/operational** alternative related impacts (as appropriate) that are likely to occur as a result of the **planning and design phase, construction phase, operational phase, decommissioning and closure phase**, including impacts relating to the **choice of site/activity/technology alternatives** as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

2.1 IMPACT ASSESSMENT

An environmental impact matrix (Appendix G4) was used to identify possible positive and negative environmental issues for the planning, construction, operation and maintenance, and decommissioning phases. The following aspects were assessed:

- water resources;
- soil and agricultural/conservation potential (soil pollution, risk of erosion linked to topography of area, land use & conservation potential and restriction of land use);
- ecology and biodiversity (impacts on ecology, flora and fauna);
- socio-economic aspects on the macro-, meso-, and microlevel;
- visual quality and aesthetics;
- noise (construction, upgrading and decommissioning phases);
- air quality;
- heritage resources; and
- tourism activities.

The identified possible impacts and possible direct, indirect and cumulative effects are being discussed in detail in the Report. Regulatory and mitigatory measures with regard to these impacts have also been stipulated in a comprehensive Environmental Management Programme (EMP) (Appendix F), which forms part of the Report.

During the planning and design phase the proponent (DENC) studied the alternatives regarding the site locations and access, infrastructure planning and design, technologies and processes, layout alternatives and ancillary facilities such as road surfacing, paving, erosion protection measures/infrastructure. This has been addressed sufficiently in Section A point 2.1.

Should the proper planning not have been conducted the subsequent impacts (direct, indirect and cumulative) that could occur on water resources, soils, fauna and flora, existing infrastructure and aesthetic amenity of the Goegap Nature Reserve during the construction, operations and subsequent closure phases could be very high (Appendix G 4).

The mitigation measures to these would be proper planning, specialist input by experienced engineers, project managers, landscape architects ecologists, heritage specialists etcetera that resulted in the proposed alternatives such as been done in Section A point 2.1. The EMP, attached in Appendix F, address the measures that need to be implemented from pre-construction through construction, operations to closure phases to ensure that possible direct, indirect and cumulative impacts are prevented, contained, and mitigated to environmentally acceptable levels.

2.1.1 Construction and Operational 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 are therefore investigated further during this phase, especially with a view to limit and mitigate lasting effects.

2.1.1.1 Water Resources

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

- land clearing;
- upgrading of access roads;
- operation of construction camps and storage of materials required for construction;
- operation and maintenance of construction vehicles and machinery (petrochemicals, oils and lubricants [POL]);
- construction of planned infrastructure (water use – construction & potable); and
- sewage storage and disposal measures.

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

- maintenance activities and maintenance of vehicles;
- presence of bare and impermeable surfaces; and
- operational water use activities such as potable use.

Potential impacts (direct, indirect and cumulative) associated with these activities include:

- surface water pollution/quality degradation;
- groundwater pollution/quality degradation;
- impact on sustainability of aquifers/groundwater at the trail camp (direct); and
- hydrology:
    - impact on infiltration;
    - change in storm water drainage;
    - catchment areas; and
    - change in amount and velocity of runoff.

At the trail camp the only reliant source of water is from the existing borehole nearby (29°37'45.98"S 18° 3'37.17"E, Appendix A 1.2 & B). It would be used during the construction and operational phases.

At the other locations proposed for development, water would be sourced from the existing municipal water supply for the construction and operational phases as it is the only reliable water resource available in that area of the reserve.

The bulk of the water is required for concrete and cement batching in the construction phase in conjunction with the continued operational use by the reserve. During the operational phase water would be needed for potable use by mainly the tourists on a continuous basis.

Geohydrology

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.

Groundwater use is extensive. Some farming communities are solely dependent on groundwater for potable and livestock watering supply.

Salinity of water used for concrete and cement batching must be low to ensure that the strength and compaction complies with set standards.

Point and Diffusive Pollution

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.

The following possible risks to the groundwater have been identified:

- leaching of herbicides that might be needed for alien plant control into the subsurface;
- migration of hydrocarbon fuel spillages (chemical contamination) as well as oils and lubricants by construction vehicles and machinery into the subsurface;
- sewage storage and disposal during the current tourism and management activities through the use of septic tanks; and
- sewage storage and removal during the construction and subsequent operational phase.

In all instances the spatial scale of contamination would likely be localised. 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. Prevention would be better than cure.

Groundwater gradients at the study area are not known with any certainty, but it is assumed that they slope in the direction of the surface drainage areas in the area. Any contaminants in the groundwater would therefore form a plume from the source towards the R355 West South West.

The likelihood of such an impact actually occurring as a result of the proposed infrastructure (construction and operation) is improbable should all the measures, as stipulated in the EMP, be implemented.

Hydrology (Surface Water)

The trail camp is situated within the F30B quaternary catchment area of the Lower Orange River Water Management Area (WMA) and episodically drains towards the Jaapleegte to the South of the Goegap Nature Reserve. The other areas earmarked for development is situated within the F30C quaternary catchment area also of the Lower Orange River (WMA) and episodically drain towards the Drodab River to the West of the Goegap Nature Reserve.

The developments would create some impervious areas such as buildings and infrastructure. This would cause local changes to infiltration at the scale of the building, but storm water drainage would disperse this on site. It might cause small-scale change in storm water drainage and in amount and velocity of runoff in the event of a very heavy storm, but it is highly unlikely that any such effect would have an impact outside the study area. Erosion could quickly manifest in the very erodible soils if not controlled closely. This in turn would cause siltation of the riverine habitat directly downstream.

Infiltration is also affected by disturbance and sealing. Activities such as vehicular movement might disturb the soil surface that could lead to compaction, which would further reduce infiltration. Sands however are particularly resistant to compaction and sealing.

The runoff generated by rainfall on a soil surface is dependent on the intensity and duration of the rainfall, combined with the infiltration capacity of the soil. It is not likely that the development of the infrastructure would have any significant impact on runoff should the soil and vegetation cover be maintained properly. When runoff occurs in this arid environment, it occurs as storm flow, subsiding quickly, with the stream channel reverting to its normal dry condition. Thus it is also likely that there would be little effect on stream flow should siltation not be caused due to erosion in the catchment areas.

Mitigation Measures

The sustainable yield rate of the aquifer at the trail camp should be established to ascertain the amount of water that would be sustainably available to this development, taking into account other possible uses within the aquifer (cumulative impact). This would establish the rate of construction (including the potable use during construction) and would also be the limiting factor during the operational phase regarding the maximum amount of tourists that would be sustainably accommodated per day during the operational phase.

The DWA manages the use of groundwater and therefore the existing borehole, as well as its current and expected use, should be registered with it and water use applications (WUA) submitted should it not have been done already. The DWA should also indicate if an application for an industrial water use should be lodged for the construction phase as it would be only of a short and temporary nature.

The borehole water at the trail camp should be tested for salinity and potable use standards. Should it not comply, the proper treatment facilities should be implemented or tourists should provide for own potable use at the trail camp. Goegap Nature Reserve should also be registered as a water services provider with DWA and comply with the set standards for water provision.

Although municipal water is available to the other areas proposed for development, the amount of water needed per month for construction as well as the maximum amount of water needed per day during peak season during the operational phase should be established and provided to the local authority. This is to establish if the current infrastructure and pipelines are sufficient for the expected maximum peak season usage and if the water allocation to the reserve is sufficient. The local authority should indicate if the additional water would be available to the Goegap Nature Reserve. This, together with the sustainable tourist capacity rate (cumulatively), would be the limiting factor to the proposed developments.

The septic tanks connected to French drains presently used on the reserve as well as the proposed sewage storage facilities at the different areas would be replaced by GEM Max Sewage Treatment Plants. The enviro-loo option has also been assessed as an alternative and may still be implemented. Both these systems do not have any impact on the geohydrology. It is totally contained as raw sewage do not come into contact with the environment.

Hydrology, water resources and soil stability has direct influence on each other and it is imperative that soil is stabilised and a soil cover established immediately when the rehabilitation phase commence after construction completes. During the construction phase soil stability should be ensured by appropriate means. Signs of erosion should be addressed immediately.

One site or construction camp should be established at an area used for this purpose previously. Should there not be any such areas a flat area well away from any drainage lines should be chosen that is already disturbed. It should be allocated in coordination with the reserve management that is to ensure that it is outside any sensitive areas identified by specialists.

Mitigation measures pertaining to water resources are contained in the following sections of the Environmental Management Programme (Appendix F)

- Preconstruction phase
    - Planning of layout
- Construction and operational phase
    - handling stockpiles
    - oil and chemicals
    - cement and concrete batching
    - provision of storage facilities for dangerous and toxic materials
    - bulk storage of fuels and oils
    - use of dangerous and toxic materials
    - toilets and ablution facilities
    - waste management
    - workshop equipment, maintenance and storage
    - erosion and sedimentation

- no-go/sensitive areas
- access road
- internal service roads
- hydrology
- soil

2.1.1.2 Soil and Conservation

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

- land clearing;
- upgrade of internal roads;
- excavation activities for foundations of infrastructure;
- operation and maintenance of construction camps, construction vehicles and machinery;
- stockpiling;
- batching plant; and
- dust suppression.

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

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

Potential impacts associated with the construction and operational phases include:

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

Soils

Wind and water erosion are the major natural causes of soil degradation in the Northern Cape, while changes in species composition, loss of plant cover, and bush encroachment are the most frequent forms of vegetation degradation. (DEAT, 2006)

Soil pollution could take place due to spillage of hazardous chemicals such as petrochemicals 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, dust suppression and compaction of soil at roads and development footprints. The direct impacts of degradation and accelerated wind erosion of soil during and after the land clearing activities have been considered.

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.

After the rehabilitation of construction areas at the onset of the operational phase the potential for wind erosion would be high due to the low precipitation of this area, but as rehabilitation and the establishment and succession of the plant communities commence, the potential for erosion would be lowered accordingly.

Conservation

The areas visited could be and are utilized for conservation, but the grazing potential is low and the proposed development would thus not have a severe impact on available land for conservation.

The construction and operation of the camps, in general, would have no high impacts on the conservation potential of the identified sites or the local region, except for increasing the possibility of wind and water erosion where soil is disturbed, for which mitigation measures are recommended. Otherwise, conservation activities could continue normally in the surrounding areas.

Mitigation Measures

The construction and operation of the proposed infrastructure would, in general, not impact on the conservation potential of the surrounding area.

Land loss for conservation: Although low in potential, the areas are currently used for conservation. Any vegetation removed during construction should be re-established once construction is complete.

Storm water: Should runoff directions be disturbed by construction activities or by the footprint of the infrastructure, the necessary control measures should be implemented to prevent erosion.

Water erosion: Should soil and gradient be disturbed and vegetation removed during construction, soil should be compacted and vegetation re-established.

Wind erosion: Should soil and gradient be disturbed and vegetation removed during construction, soil should be compacted and vegetation re-established. Windblown dust should be prevented by watering down the working areas.

Construction rubble and other waste may spill into drainage areas or be carried onto neighbouring areas by runoff water. Rubble and waste should be removed from the construction site regularly.

Degradation of roads due to heavy construction vehicles: Maintenance of roads should be undertaken throughout the construction and operational phases.

Increased heavy vehicle traffic due to construction: Truck drivers and other heavy machinery operators should be made aware of their impact on the environment and that they are to remain on established and identified roads for movement.

Security risks: All possible measures should be implemented to prevent construction workers from entering neighbouring areas.

Mitigation measures pertaining to soil and conservation resources are contained in the following sections of the Environmental Management Programme (Appendix F):

- Preconstruction phase
    - Site demarcation and development
    - Planning of layout
- Construction and operational phase
    - handling stockpiles
    - oil and chemicals
    - provision of storage facilities for dangerous and toxic materials
    - bulk storage of fuels and oils
    - use of dangerous and toxic materials
    - dust
    - erosion and sedimentation
    - no-go/sensitive areas
    - access roads
    - internal service roads
    - hydrology
    - soil

2.1.1.3 Ecology and Biodiversity

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

- land clearing;
- upgrade of internal roads;
- implementation of associated infrastructure:

    - internal water and electrical reticulation approximately 500 mm below ground;
    - small PV power stations at each camp; and
    - 22 kV evacuation power line from the distribution centre to the buildings at the camps.
- soil and/or water contamination through the use and storage of petrochemicals.

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

- use of internal roads;
- operation and maintenance of main and associated infrastructure;
- presence of the main and associated infrastructure;
- presence of impermeable surfaces; and
- maintenance of vegetation in the area (veld rehabilitation management).

Potential impacts associated with the construction and operational phases include:

- habitat transformation and/or degradation;
- loss of sensitive/pristine local and regional habitat types;
- increase in local and regional fragmentation;
- isolation of habitat (long-term impact);
- invasion of alien flora and fauna on disturbed land;
- vegetation destruction (loss of economic use of vegetation);
- depletion of natural resources (e.g. grazing capacity and quality loss);
- 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.

Areas that are considered to be sensitive are:

- untransformed natural vegetation;
- high diversity or habitat complexity;
- areas containing Red Data species; and
- systems that are 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.

An ecological specialist study has been conducted on the study area (Appendix D1). Simon Todd Consulting (STC) identified five major risk factors associated with the development of the new facilities. These are

- Disturbance of sensitive plant communities
- Increased erosion risk
- Faunal habitat loss and disturbance
- Avifaunal habitat loss and mortality related to collisions with transmission lines
- Invertebrate habitat loss and habitat degradation

The majority of potential impacts associated with the development can be mitigated to a low level (Summary Impact Table on page four and five of the ecology specialist study). Some permanent vegetation loss and faunal disturbance during the construction phase are inevitable and cannot be fully mitigated. However, the disturbance of the fauna will be temporary

and the loss of vegetation will amount to less than 2 ha. The loss of habitat would not result in significant ecological impact and loss of biodiversity as the affected habitats are widely available and are not likely to harbor an abundance of species which are not found elsewhere. (Todd, 2012)

Although some of the sites occur in close proximity to ecologically sensitive environments such as drainage lines and rocky outcrops, with appropriate mitigation and avoidance measures, impacts to these environments could be minimized and reduced to a very low level. Provided that the mitigation measures as described in the report are implemented, the development of the new facilities would not lead to a significant environmental impact or degradation of the receiving environment. (Todd, 2012)

Direct impacts especially relate to the construction phase and the development footprint and include the destruction of threatened and protected flora species, as well as sensitive/pristine regional habitat types, and direct impacts on common as well as threatened fauna species.

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.

Flora

Uninterrupted habitat is a highly valued commodity, especially in areas that are characterised by moderate and high levels of transformation. Loss of natural habitat, even of small areas, means that biological attributes have permanently lost the ability of occupying that area. A higher premium is then placed on available food, water and habitat resources in the immediate area. In some cases the loss of habitat would cause a proportional decrease in the size of plant or animal populations that can be sustained by the habitat, eventually decreasing beyond a viable population size. The danger of this type of cumulative impact is that its effects are not known or visible with immediate effect. Normally when these effects become visible the damage is beyond repair.

Floristic species changes would inevitably occur in the development area, as vegetation would be removed resulting in changes in habitat conditions, such as shade, competition and germination success. Therefore it is expected that the species composition of the immediate development areas 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 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 local and regional 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 (Strategic Environmental Assessment).

The disturbance associated with the construction phase may result in the establishment of alien or indigenous invader plants that might cause a loss of indigenous vegetation, changes in and fragmentation of habitat structures and characteristics, changes in plant species composition, changes in the chemical properties of soil and hydrological impacts due to changes in soil cover and runoff. Some invader species are highly flammable and therefore increase the risk of veld fires.

STC studied the broad scale as well as fine-scale vegetation patterns. In terms of the national vegetation map, (Mucina & Rutherford 2006) three different vegetation types fall within the study area. These are Bushmanland Arid Grassland which projects slightly into the reserve in the vicinity of the Trails Camp, Namaqualand Klipkoppe Shrubland which constitutes the majority of the reserve and represents the rocky hills and uplands of the reserve and Namaqualand Blomveld which represents the sandy lowlands and plains. All of these vegetation types are classified as Least Threatened and have been

little transformed by intensive agriculture or other activities. Namaqualand Blomveld has been the most impacted by intensive agriculture and an estimated 6% has been transformed and a large proportion of this vegetation type within Goegap has been historically ploughed with the result that the current composition represents a disturbance community. Despite their presence within the reserve, all of these vegetation types are poorly conserved; only 1.5% of Namaqualand Blomveld is conserved, 6% of Namaqualand Klipkoppe Shrubland and less than 1% of Bushmanland Arid Grassland, compared to their targets of 28, 28, and 21 % respectively.

Rosch (2001) identified different management units within the reserve based on vegetation surveys and divided the reserve into ten different management units which are depicted below in Figure 2. The sites near to the entrance gate fall within the Fonteintjie and Slimes Plain units while the Conference Venue can probably be best associated with the Goegap Plains unit and the Trails Camp with the Witsand unit. Rosch provides descriptions of these units and identifies characteristic and dominant species present within each unit. These descriptions are not repeated here as a description of the actual vegetation present at each site is described in the next section below.

Although the sites fall within different vegetation units, there was a large degree of similarity in vegetation composition between many of the sites. This can be ascribed to the disturbed nature of most of the sites, which has resulted in a preponderance of disturbance-adapted species at the sites. The main distinguishing feature between the sites is related to their proximity to drainage courses, with those sites in close proximity to drainage lines having a composition which could clearly be distinguished from those away from the drainage lines. Alien species were common at some of the more disturbed sites with *Salsola kali* and *Atriplex lindleyi* subsp. *inflata* fairly abundant, particularly at the Conference Venue and the Trails Camp. No listed species were observed during the site visit and as the sites are already fairly disturbed it is not likely that any of the listed species occur within the development footprints. However as the site visit took place during the summer, geophytes were not visible at the time and so the presence of the listed geophytes species cannot be entirely ruled out. (Todd, 2012)

Critical Biodiversity Areas & Broad-Scale Processes

The site falls within the planning domain of the Namakwa Biodiversity Sector Plan (Desmet & Marsh 2008 as cited in Todd, 2012). This biodiversity assessment identifies Critical Biodiversity Areas (CBAs) which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to meet national biodiversity objectives. When incorporated into municipal SDFs and bioregional plans, such fine-scale plans are recognized under NEMA and the various activities listed under the act as described in Section 2.4 come into effect. The CBA map for Goegap and the surrounding area is depicted in the ecology study (Appendix D1). The map illustrates that the development sites do not fall within Critical Biodiversity Areas, but that most of them fall within Ecological Support Areas. These are areas which provide important ecological services and should be kept in a natural to near-natural state. Since the developments are highly localized, they would not result in the large-scale loss of habitat or ecological function, and can therefore be seen to be compatible with this desired goal. In addition, there do not appear to be any broad-scale processes that are likely to be disrupted by the developments.

The SKEP Expert Maps for Goegap and the surrounding area contained in the ecology specialist study (Appendix D1) suggests that the Reserve is an important area for Amphibians, Mammals and Insects, but has not been rated by experts as an important area for plants or reptiles. However, it is important to recognise that Goegap may not have been identified as a priority area by experts as it is already conserved and there is no risk to biodiversity associated with it. Nevertheless, as Goegap is a conservation area and contains poorly conserved vegetation units, it should be viewed as a significant area for all aspects of biodiversity.

Fauna

Mammals

A total of 52 terrestrial mammals and ten bat species potentially occur in Goegap. A relatively large proportion of these is associated with the rocky outcrops and although they may feed on the adjacent plains, is not likely to be greatly impacted by the developments. Those species which favour sandy pediments and lowlands would potentially be the most impacted by the new developments. This includes rodents such as Gerbils, Bush Vlei Rats *Otomys unisulcatus* and Whistling Rats *Parotomys* spp. Mitigating factors that reduce the overall impact such species are likely to experience include the fact that the lowlands within Goegap are extensive and the developments are each of a very small extent. (Todd, 2012)

The majority of bat species which occur in the area require caves or rock crevices for roosting sites. Such roosting sites are likely to occur within the larger outcrops as well as the abandoned mine shafts that occur in the area. The presence of new buildings would create additional potential roosting sites for species which utilize such structures. (Todd, 2012)

Larger antelope and carnivores are likely to migrate away from the areas of impact, the probability of direct impacts on threatened, near-threatened and common faunal species are regarded as low. It is estimated that habitat loss and transformation resulting from non-invasive and often overlooked impacts, such as overgrazing, infestation by invasive shrubs and selective culling could probably contribute more to impacts on most threatened fauna species than tourist accommodation developments.

The tolerance levels of common animal species occurring in the study area are of such a nature that surrounding areas would adequately supply for the habitat requirements of species forced to move from the areas of impact. Indirect impacts on fauna could occur due to loss of habitat and faunal interactions with the structures, servitudes and personnel. It is however less likely that the conservation status of common animal species would be affected as a result of direct and/or indirect impacts of the operational phase on these species and their habitats, should proper management and control measures be in place to control tourist behaviour (security measures).

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

Contact would inevitably occur between personnel and animals, during the construction phase when a large number of people would be required on the site, and personnel, tourists and animals during the 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 (security measures). Change in behaviour could also be effected through feeding of animals (construction and operational phases).

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

While animals generally avoid contact with humans and human structures, they do grow accustomed to structures, and some species even to humans, after some time.

The Conference Venue, Guard House, Family and Group Camps are all within areas that already experience significant levels of human activity and so the additional impact created by the improvements and new accommodation facilities would be small (Todd, 2012).

Reptiles

The site lies in or near the distribution range of at least 58 reptile species (Appendix 3 attached to the ecology specialist report in Appendix D1). This is a comparatively high total indicating that the area has a rich reptile assemblage. Based on distribution maps and habitat requirements, the composition of the reptile fauna is likely to comprise 3 tortoises, 21 snakes, 21 lizards and skinks, 12 geckos and 1 chameleon. The reptile assemblage in the area includes quite a large number of range restricted species and Namaqualand endemics. (Todd, 2012)

A large proportion of these restricted and specialized reptiles which occur in the area are associated with the granitic outcrops which provide habitat in the form of abundant cracks, fissures and exfoliating rock sheets. As such these species would not be directly impacted by the development which would be restricted to the sandy pediments. The majority of species which occur on the sandy lowlands are relatively widespread species. Exceptions include the Thin-tailed Legless Skink *Acontias gracilicauda namaquensis* which is a localized endemic and the Namaqua Plated Lizard *Gerrhosaurus typicus* which is listed as Near Threatened. However, there is nothing to suggest that the development sites are located within unique habitats that would be of above-average significance for such reptiles and given the relatively homogenous nature of the lowlands within Goegap, the amount of habitat loss that would occur is minimal. The construction of the new buildings will however create additional habitat which will attract species which utilize such structures such as tubercled geckos (*Chondrodactylus* spp.) and agamas (*Agama* atra). (Todd, 2012)

Amphibians

The site lies within or near the range of seven amphibian species, indicating that the area has relatively low amphibian diversity. However, several of these are Namaqualand endemics with restricted ranges. As the Trails Camp and both Group Camp alternatives are in close proximity to drainage lines the development of these could potentially impact the local amphibian populations. No specific breeding habitats were however observed at these sites and it is not likely that important breeding sites occur in the immediate vicinity of the developments. Furthermore, as the developments should strive to avoid direct impacts on the nearby drainage systems, the impacts on breeding habitats could be maintained at a very low level. The greatest threat to amphibians associated with the developments is probably chemical and fuel/oil spills related to the construction activities, rather than the presence of the developments in the long-term. Provided that suitable precautions are followed to avoid impacts on amphibians and their habitats during the construction phase, it is not likely that the development of the new facilities would have a significant long-term impact on local amphibian populations. (Todd, 2012)

Avifauna

According the checklist obtained from Reserve staff, ninety-nine bird species have been recorded from Goegap Nature Reserve. According to the SANBI SIBIS database which is based on SABAP 1, five listed bird species are known from the area, four of which have been observed within the reserve. Only the Black Stork has not been recorded from the reserve, probably because it is usually associated with wetlands and dams, which are not common within the Reserve. The listed species are all wide-ranging species with a wide distribution across the semi-arid of South Africa, and are not known to be specifically concentrated within the study area. The reserve is also not listed as an Important Bird Area. The development sites do not impinge on any specific or rare breeding habitats and are within areas that already have a human presence and as such the additional impact created by the upgrade of facilities would be very small and localized. (Todd, 2012)

With any proposed project it is likely that there would be a number of direct and indirect impacts on the fauna occurring in the area. While direct impacts include the death of individuals, removal/destruction of nests, nesting or roosting sites etc., this would be largely experienced at the construction phase and then later during routine monitoring to remove problem species (e.g. semi- or permanently nesting or roosting on the PV panel supporting structures). The extent to which the electrical infrastructure has already impacted on the resident birds in terms of collisions and electrocutions is indeterminable. Indirect effects such as disturbance and displacement may be less significant, and probably limited to common species in the area.

Invertebrates

More than 300 insects have been identified as pollinators in Goegap Nature Reserve. According to the SABCA database, 79 butterfly species are known from the two quarter degree squares which encompass the Reserve. Species of the recently described insect order Mantophasmatodea are also likely to occur within the Reserve. Although currently little-known, the arid species are quite widespread and are not likely to be highly impacted by the development. (Todd, 2012)

There are no listed invertebrate species which are known to occur within or near Goegap Nature Reserve. (Todd, 2012)

All Rock, Creeping & Burrowing Scorpions, Baboon Spiders (*Mygalomorphae*) and several orders of Ground and Stag are however listed as protected species under the Northern Cape Nature Conservation Bill (2009). Baboon spiders are common in arid areas and are likely to occur within the development sites and should be removed to safety when encountered during construction. Scorpions were also observed (by their characteristic burrows) to be common at several of the development sites. These should also be removed to safety when encountered. (Todd, 2012)

Most invertebrates are however little-known and impacts on invertebrates are best assessed at the habitat level. Since the habitats impacted by the development are widespread in the area and the total area lost is very small, the impact on invertebrates can be assumed to be very low. (Todd, 2012)

Apart from the direct loss of habitat, a potential indirect negative impact of the developments is the effect of night-lighting on moths and other night-flying insects. Artificial lighting interferes with the navigation of nocturnal insects and attracts them to the lights. This can be countered by turning on outside lights only when necessary and by using yellow-coloured “bug lights” which are usually more energy-efficient as well as environmentally friendly. (Todd, 2012)

Mitigation Measures

All impacts can be reduced to a low level except for faunal disturbance during the construction phase. This impact results from human presence and the operation of noisy machinery at the sites during the construction phase. This impact is

however transient and fairly localized and would not result in a long-term negative impact. Overhead electrical transmission lines may pose a risk of collisions for some species such as Ludwig's Bustard *Neotis ludwigii*, but the extent of this risk would depend on the extent and location of the transmission lines. This risk would be significantly lowered by fitting bird flappers to the lines in high-risk locations. Overall, the majority of mitigation measures are simple measures that should accompany construction and development activities within nature conservation areas as standard practice and should not be very difficult to implement. (Todd, 2012)

STC produced an ecological sensitivity map of the different sites by integrating the information collected on-site with the available ecological and biodiversity information available in the literature and various spatial databases as described in the ecology study (Appendix D1). As the developments near to the entrance gate are in close proximity to one another, a sensitivity map for the area was produced which included the location of the Guard House and Group Camp Alternative 1 on a single map. The two Family Camps are also adjacent to one another and included on a single map. Individual sensitivity maps were produced for the Conference Venue adjacent to the reception, Trails Camp at Witsand and the Group Camp Alternative 2. The sensitivity maps identified those areas which are deemed to be ecologically sensitive and should not be developed as well as those areas where development would have the least ecological impact. It is however important to recognize that although the area of least ecological impact exceeds the requirements of the planned developments, this is to ensure that the final location of the buildings can be appropriately located within this space according to the other requirements such as visual impact. The extent of the area of least ecological impact in no way implies that a larger structure or alternative facility than what has been proposed can be accommodated. In all cases, a minimum impact is obtained by ensuring that the amount of natural vegetation lost is kept to the minimum possible. (Todd, 2012)

The most conspicuous features of the **trails camp** are the *Acacia* trees and the proximity of the current building to the drainage line. The vegetation in the immediate vicinity of the camp is highly disturbed, probably as a result of years' of disturbance in the area and possibly disturbance present before the camp was built. The disturbed area is however quite restricted in extent and is bounded by the river on the one side and the access road on the other. Any development at the site should be restricted to the already disturbed area bounded by the road and river and effort should be made to ensure that areas of more intact vegetation are not impacted. (Todd, 2012)

In terms of development options at the site, the proximity of the current building to the river is clearly a concern. However, as the site, where the current building is located, may be difficult to effectively rehabilitate, building a new structure at the same location may produce the lowest overall visual and ecological impact as no new vegetation would need to be disturbed. A second building is planned for the site and it is recommended that it is situated within the trees, even if this requires that a few of the trees are cut down to accommodate the structure. The trees at the site are not natural and have been planted and although they provide habitat for various animals, the loss of a few of the trees cannot be viewed as a significant impact in light of their anthropogenic origin. (Todd, 2012)

The development of the **conference venue** would impinge on the current car park as well as the vegetation between the car park and the access road. This area is largely highly disturbed. The quartzitic outcrop east of the reception area contains several tourist trails and numerous plant species which have been cultivated within a semi-natural environment. This area is nevertheless a biologically rich environment compared to adjacent highly disturbed plain and should be avoided by the development. Provided that the development is restricted to the area between the outcrop, the access road and the car park, it would not have significant impact as this area is already highly disturbed. The expansion of the current facilities in this area would possibly impinge on the current car park area as well as require a larger car park to accommodate the greater number of tourists that might be expected. Therefore any expansion or relocation of the car park area should also be appropriately located within areas of low impact. (Todd, 2012)

The two **family camps** are both on the plains below the rocky hills, each on one side of a koppie. The environment of the two camps is similar and given their proximity they are considered together. The vegetation consists of low shrubs typical of the open plains habitat. Although the vegetation in this area is not particularly sensitive as it is fairly homogenous and composed of widespread species, this area appears to be particularly vulnerable to erosion. Development within this area will need to pay specific attention to addressing water movement at the site and structures to direct flow and reduce erosion risk will be required. (Todd, 2012)

Group camp alternative 1 occurs adjacent to the drainage line near the entrance gate. There is currently a small building at this location. The site lies within the floodplain of the river and consists of fine silty soils dominated by halophytic shrubs typical of the floodplain environment in Namaqualand. The site should be considered sensitive due to its proximity to the river as well as the relatively dense and taller structure of the vegetation which forms a riparian corridor which is vulnerable to disruption. There is also a risk of occasional flooding with associated erosion potential at the site. This site is viewed as being the less preferred option in terms of the Group Camp Alternatives. (Todd, 2012)

Group Camp Alternative 2 occurs at the base of the rocky ridge west of the entrance gate. The site is in a gap between outcrops of the ridge and a small drainage line occurs along the base of the ridge along the western side. The vegetation of the plain is dominated by low and medium shrubs. The vegetation of the drainage line is fairly dense and consists of trees and large shrubs. The site should be considered reasonably sensitive due to the proximity of the site to the drainage line and the generally higher diversity of the site. Although the drainage line and rocky ridge are sensitive habitats that should be avoided, the remainder of the adjacent plain is not highly sensitive. Provided that these sensitive habitats are avoided, this site is seen as the preferable option in terms of the Group Camp Alternatives. (Todd, 2012)

The proposed location of the **guard house and tourism building** is adjacent to the current entrance and lies between the access road and river. As the space between the road and the river is quite narrow, there is limited scope for moving the final location of the structure. Due to the presence of the airport runway on the other side of the road, the structure must be located to the north of the road. The vegetation is in many respects similar to that of Group Camp Alternative 1, to which it is very near. The high-sensitivity drainage line should be avoided, while the area against the road (Figure 15 of the Ecology Study, Appendix D1) indicates the preferred development area where development would result in least ecological impact. (Todd, 2012)

Feasible and practical management proposals for avifauna and *Chiroptera* include:

- reducing the impact on the ecology of the area with appropriate management practices as recommended by ecological specialists;
- preventing the unnecessary destruction of vegetation in areas prone to soil erosion;
- monitoring the area and associated ecosystems for significant negative changes such as pollution, erosion etc. and taking immediate action to rectify these changes;
- minimising and limiting the destruction or disturbance of vegetation within the areas of activity, as well as in the surrounding areas, thus circumventing the need for an offset area;
- staying clear of drainage areas and sensitive areas and maintaining an appropriate buffer zone between these areas and the erected structures;
- reducing noise, air, soil and water pollution as far as possible;
- prohibiting the intentional killing of birds and bats through onsite supervision and worksite rules;
- educating employees to minimise accidental killings of birds and bats during routine construction and maintenance activities;
- monitoring all electrical infrastructures weekly for bird mortalities (collisions and electrocutions);
- modifying any bird-unsafe electrical pylon structures to insulate dangerous live components, cutting a gap in the earth wire and installing perch deterrents can also be installed to keep birds away from the dangerous areas on the structure;
- minimising bird collisions on newly constructed electrical features by implementing the standard anti-collision devices and diverters currently in use by Eskom
- giving preference and consideration to underground cabling rather than any new overhead structures;
- discouraging nesting, either by removing nests as they are built, or by supplying suitable alternative structures, and by avoiding infrastructure construction designs such as flat or trellised surfaces near key structures; and
- discouraging roosting bats by closing any roosting sites at night once the bats have left for foraging, and by avoiding infrastructures that encourage roosting.

The management proposals listed here are aimed at preventing unnecessary habitat destruction and the subsequent disturbance and displacement of birds and bats in the area, and maintaining suitable habitat and resources where possible. Passive and active discouragement measures are suggested. Emphasis is placed on the safety of conservation-worthy species regarding possible interactions with the various types of electrical infrastructure. Many of the bird species are in fact on the Red Data List due to these fatal contacts.

Furthermore, given the size and scope of this project, no cumulative effect greater than what is already being experienced in the local areas is envisaged. Any of the proposed locations are deemed. Relocation and rescue measures of existing avifauna and *Chiroptera* are considered unnecessary.

Despite the use of anti-collision devices and bird diverters, and insulated wires, there can be no guarantee that isolated avifaunal incidents can be totally avoided. With adequate monitoring, these incidents can be identified and remedied as far as possible.

Mitigation measures pertaining to ecology and biodiversity aspects are contained in the following sections of the Environmental Management Programme (Appendix F):

- Preconstruction phase
    - Site demarcation and development
    - Planning of layout

- Construction and operational phase
    - Fires
    - Erosion and sedimentation
    - Fauna
    - Flora
    - No-go/sensitive areas
    - Access routes/haul roads
    - Ecological specialist findings

During the pre-construction phase delineation need to be conducted in collaboration with reserve management and a suitably qualified ecologist that would ensure that any environmental sensitive aspects identified during the EIA investigation is taken into consideration.

2.1.1.4 Socio-Economic 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; and
- a need for social activities, services, and youth development.

Potential impacts associated with the construction and operational phases include:

- Macrosystem
    - impact on country
    - economic growth
    - long-term social benefits
    - development/transfer of technology
- 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
    - 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)
    - traditional/cultural conflicts
    - financial and economic impacts
    - stakeholder interest
    - business risk/benefit
    - damage to property (landowner and developer)
    - traffic volumes

The sphere of influence of the proposed developments within Goegap Nature Reserve has been assessed within the macrosystem, the mesosystem and the microsystem.

Social impacts at the macrosystem level derive from the interest of potential national and international tourists that would be created by the new facilities that would be available within the reserve especially during the spectacular flowering season. The macro-economic benefits would be to cater for peak tourism demand during the flowering season.

Social impacts at the mesosystem level include all or part of the district or local municipality's area of responsibility. The impacts of the project on employment opportunities and demand for this type of tourism facilities have been assessed.

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

Macrolevel Impacts

The project is likely to have medium long-term, indirect positive impacts that would extend to a regional and possibly a national scale. The availability of more tourism facilities to cater for the different types of tourists, would contribute to the growth of the tourism sector in South Africa.

Mesolevel Impacts

The unemployment rate of this district is very high. Unfortunately most unemployed people in this district are unskilled. Poverty is a widespread problem in the Northern Cape.

Employment opportunities created by the construction phases 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. Sourcing of construction workers from the local labour pool is likely as the construction would be relatively uncomplicated and therefore the majority of employment opportunities created during the construction phases would be offered to local workers. This could have some economic benefits for surrounding communities, although only of a temporary nature.

A void would be left in the local community after the construction phase when workers have departed, but skills development might partially mitigate this impact.

The operational phase of the facilities might result in the creation of some employment opportunities in fields such as cleaning and maintenance services. Whether the benefits of these employment opportunities would accrue to surrounding communities would depend on the availability of the necessary skills in these communities. The development would thus not substantially reduce the unemployment rate of the area but it could still help some households to recover from dire financial situations. Some local procurement of goods, materials and services could occur, which would result in positive indirect socio-economic impacts.

Should workers and contractors be situated in Fonteintjie, Carolusberg or Springbok, transportation of workers and delivery of goods would have a low impact, as distances are relatively short, and a minimal and intermittent impact would be effected on the workers' and communities' daily living and movement patterns.

Communication with the local and district municipalities and in the local newspapers would keep the population informed about the proceedings of the project as well as the type and number of contracts and employment opportunities that would be available.

Microlevel Impacts

The physical presence of the construction plant and construction activities would cause direct visual impacts to the area immediately surrounding the study area. These impacts might be experienced by landowners and residents in the area immediately surrounding the study area. The construction phase might impact on the safety and security of surrounding communities by giving rise to crime as well as an increase in traffic volumes.

Direct impacts at the **microsystem** level during the operational phase would be caused by the physical presence of the buildings and ancillary infrastructure, and would be confined to people living at the study area or directly adjacent to the study area.

Goegap Nature Reserve is situated in a rural area close to Springbok, which is relatively sparsely populated. Therefore little impact is expected.

Indirect impacts could be experienced in the area immediately surrounding the study area due to peak tourism seasons. This could include the presence of foreigners and traffic volumes. These impacts might extend to landowners and residents in the area immediately surrounding the study area.

The new infrastructure could possibly have an impact on people's sense of place – a term used to denote the personal emotions and memories that individuals or communities associate with a landscape, as well as the sense of connectedness that they feel towards it.

By establishing, setting and implementing a sustainable tourism carrying capacity (day and overnight visitors) at the reserve for peak season, impacts such as traffic volumes may be effectively controlled.

Mitigation Measures

It is recommended that the percentages of local labour as prescribed by EPWP be considered and included in the contract between the developer and the contractor. It is important to establish the number of skilled labourers in the area, as well as the types of skills they have, through liaison with the municipality. This can be conducted through the appointment of a community liaison officer (CLO) through consultation with the local authority.

Information could be made available to the region through advertisements in local papers 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, and by notifying the public through local and regional radio stations when larger numbers of freight-carrying vehicles would be on the roads.

Communication should be maintained with the local and district municipalities, and with the public through the local newspapers, 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. There will be local people employed for security and maintenance roles in the operational phase.

The risk to the landowner and the developer with regard to physical damage to infrastructure is moderate and has been taken into consideration in the EIA matrix. Mitigation measures would include good management control and housekeeping, as well as safety and security infrastructure and personnel.

Mitigation measures pertaining to the socio-economic environment are contained in the following sections of the Environmental Management Programme (Appendix F)

- Preconstruction phase
    - Communication with stakeholders and I&APS
    - Project contract and programme
    - Appointments and duties of project team
- Construction and operational phase
    - Cognisance of other developments
    - Employment opportunities for local communities
    - Capacity building in local communities
    - HIV/Aids education
    - Crime, safety and security

2.1.1.5 Visual and Aesthetical Impacts

Construction-related activities would have an immediate impact on the visual and aesthetical aspects of the study area and surrounding areas. Impacts on observers close to the study area, especially those travelling along the internal roads of the reserve adjacent to the study areas, as well as impacts on potentially sensitive receptors such as landowners and homesteads located within areas of potential visual exposure, have been considered. The expected sudden increase in heavy vehicles utilising the roads to the study area might also cause a visual nuisance to other road users and landowners in the area. Dust nuisance could add to the visual impact during construction.

The presence of the proposed buildings, including its ancillary infrastructure, would have an impact on the visual and aesthetical aspects of the study area and surrounding areas especially during the construction phase.

Potential impacts associated with the construction and operational phases include:

- visual impacts;
- reduction in aesthetic properties;
- littering and housekeeping on the construction site; and
- dust nuisance related to the construction phase.

The key aspects determining the visual impact of any development include its physical dimensions, colour and texture. The planned main infrastructure would not stand in contrast with the surrounding environment.

The planned infrastructures would be situated far from the provincial road. The visual absorption capacity of the natural vegetation between the roads and the proposed locations of the buildings of the group and family camps would further mitigate visibility.

Due to the distance from the road, the low height of the structures, the small surface area of the infrastructure, and the visual absorption capacity of the natural vegetation it is not expected that the planned activity would cause any impact on road users. The planned infrastructure was designed to conform to the environment and to reflect as little light has possible.

Brick and mortar structures with stone cladding and thatched roofs would be used at all the locations applied for.

Due to some of the proposed locations' proximity to the runway, the South African Civil Aviation Regulation Act, Act 13 of 2009 is applicable. It 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. The mean ground level is considered to be the lowest point in a 3 km radius around such structure. Structures lower than 45 m that are considered to be dangerous or potentially dangerous to aviation shall be marked as such if specified. Overhead wires, cables, etc., crossing a river, valley or major road shall be marked, and their supporting towers marked and lighted if an aeronautical study indicates that it could constitute a hazard to aircraft.

The highest structures that would be constructed at the proposed development would possibly be the lightning conductors, which would have a height of 25 m. Cabling would not cross any rivers, valleys or major roads.

Mitigation Measures

In most cases, the landscape and visual impacts occurring during the construction phase can be mitigated relatively effectively. Rehabilitation of the disturbed areas would prevent the exposure of soil, which may cause a reduction in the visual quality of the study area. Sensitive positioning of the construction camps and laydown yards should take advantage of the natural screening capacity of the study area by locating the camps outside of the views of sensitive visual receptors.

Mitigation measures pertaining to the visual impacts are contained in the following sections of the Environmental Management Programme (Appendix F):

- Preconstruction phase
    - Site demarcation and development
    - Planning of layout
    - Visual impacts
- Construction and operational phase
    - Dust
    - Crew camps
    - Traffic impacts
    - Visual impact
    - Ecological specialist recommendations
    - Visual specialist recommendations

2.1.1.6 Noise

Potential impacts associated with the construction and operational phases include:

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

The impact of noise during the operational phase would be negligible and would be limited to noise generated by tourists staying or moving on the reserve.

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. All the proposed camps would be situated well away from the provincial road carrying low traffic volumes within a sparsely populated area; noise generated by the development during the construction phase is expected to have a very low impact

on the noise levels on the areas outside the reserve. It might have a higher direct impact on persons traveling inside the reserve as it is a noise sensitive area. It would be of a short and temporary nature.

The main noise sources currently affecting the study area are road traffic from the R355, the airstrip and general farming operations. The construction and operation of the planned infrastructure at the reserve would constitute very low additional sources of noise. The reserve are considered to be noise sensitive and might potentially be affected 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 R355 carries a noise nuisance factor when vehicles pass.

The construction phase would alter the noise climate and increase the noise footprint of the study area in the short term. The noise offset area would depend on the intended periods and intensity of operation of the construction phase.

The total volume of traffic generated during the operational phase would be negligible and would not significantly increase.

Mitigation Measures

Tourists should be informed about the construction activities, the location of it and the purpose at entrance to the reserve. If possible construction activities should be limited to normal working hours should any construction take place during the peak flowering season. Mitigation measures pertaining to the noise impacts are contained in the construction and operational phase noise section of the Environmental Management Programme (Appendix F).

2.1.1.7 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 are included in the dust section of the construction and operational phase section of the EMP.

2.1.1.8 Heritage Resources

Archaeological Aspects

A Phase 1 Archaeological Impact Assessment was conducted by Dr David Morris of the McGregor Museum, Kimberley in February 2012 (Appendix D2). Dr Morris is an archaeologist accredited as a Principal Investigator by the Association of Southern African Professional Archaeologists. His previous experience includes research and impact assessments in the Northern Cape. (Morris, 2012)

The sites were examined in detail on foot by Dr Morris on 7 February 2012. Few and often zero heritage traces were found on the specific sites intended for upgrade and no mitigation at those particular places is regarded as necessary (Morris, 2012).

However, close to the camp site development locales near the entrance to the reserve, and immediately adjacent to the day visitor picnic site, there is a shelter in the hillside with potentially significant Later Stone Age material. It is recommended that some measure of access control and/or protection of this site should be built into the management plan for this part of the Reserve. (Morris, 2012)

Secondly, the Veepos site which is situated just under 2 km from the camp trail hut and close to the trail itself, is a significant colonial era site which also requires a management plan, but is probably less exposed to frequent visits. It is unlikely to be affected in any direct way by the proposed upgrade – although the latter could result in increased numbers of visitors. (Morris, 2012)

In the unlikely event of any further site/feature (such as an unmarked grave or an ostrich eggshell cache) being found in the course of the proposed upgrading, SAHRA should be contacted immediately (021-4624502: Mrs Colette Scheermeyer), so that the find can be investigated and mitigation measures recommended. The Northern Cape PHRA (Ngwao Boŝwa ya Kapa Bokone), to which a copy of this report is also being sent, will assume responsibility for archaeological resources in the province when it is accredited to deal with this aspect of heritage. Boŝwa (053-8312537: Mr Ratha Timothy) should be contacted in respect of the built environment. (Morris, 2012)

The Phase 1 Archaeological Impact Assessment is attached in Appendix D2 of this report.

Palaeontological Aspects

A Palaeontological Impact Assessment was not necessary (see correspondence with specialist in Appendix D3).
Mitigation measures pertaining to the heritage impacts are contained in the construction and operational phase heritage section of the Environmental Management Programme (Appendix F).

2.1.1.9 Impacts on Eco-Tourism

The Northern Cape Province is a sparsely populated and relatively isolated semi-desert area of South Africa. The area is therefore considered to be suitable for tourism activities.

The potential impacts on tourism would include but not be limited to:
- 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 (positive).

There is a need for economic and tourism injections by the business sector to the district to facilitate economic growth and employment opportunities.

The overall impact of the development at the reserve would be positive in this area, as the new infrastructure would be able to cater not only for campers. The new facilities would result in an increase in tourism in the area, which would have a positive impact on Springbok and surrounds.

All of the land surrounding the reserve is privately owned and is currently being used for livestock farming purposes. The small size of the population means that relatively few people would be influenced by the construction activities. Traffic to the area is currently very limited and would not increase dramatically during the construction phase, which would be of a temporary nature.

A sustainable tourism carrying capacity (day and overnight visitors) should be established and implemented at the reserve for peak season. It would, together with safety and security control, would assist to address long term tourism related impacts on the reserve.

Mitigation measures addressed within the EMP are as follows (Appendix F):
- Pre-construction phase: Site demarcation and development;
- Construction and operational phase: Visual impact.

3. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to **types** of impact, **duration** of impacts, **likelihood** of potential impacts actually occurring and the **significance** of impacts.

3.1 Consideration of Alternatives

These selection criteria, done by DENC before commissioning the EIA, filtered out alternative sites which were not suitable for the development of tourism infrastructure.

Due to the environmental sensitivity and limitations of the Goegap Nature Reserve, the possible sites identified for development were limited to the areas identified. The purpose of this study would therefore be to investigate the environmental feasibility of using the proposed sites for the development in question, with consideration for alternatives with regard to other factors such as technology and design.

The following alternatives were considered:

- Alternative technologies:
  - Different types of structures
  - Sewage Removal
  - Energy Supply
    - Structures
    - Modules
    - Inverters
    - Concentrator boxes
  - Water heating
  - Ancillary works
    - Types of road surfacing
    - Soil erosion protection
    - Paving
- Timing
- Technical competence
- Demand
- Activity/Land use
- Scheduling alternative
- The 'do-nothing' alternative (the option not to proceed with the proposed development)

3.2 Conclusions drawn from the Evaluation of the Proposed Study Area

Impacts that might potentially be associated with the proposed development include impacts on water resources; soil and conservation 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); social aspects on the macro-, meso- and microlevel (including economic impacts - mostly positive; traffic impacts of the construction, upgrading and decommissioning phases) ; visual quality and aesthetics; noise (construction, upgrading and decommissioning phases); air quality; heritage resources; and tourism activities.

Find attached the environmental impact matrix in Appendix G4 indicating the extent, duration, intensity, probability and significance of impacts after mitigation has been taken into consideration.

Most of the potential impacts identified are anticipated to be site-specific. No environmental fatal flaws were identified. 'No-go' areas have been delineated by the ecologist (Appendix D1).

Alternative A (preferred alternative)

3.3 Potentially Significant Issues Related to the Construction and Operational Phase after Mitigation

3.3.1 Impacts on Water Resources

Geohydrology

Groundwater in the wider study area is mainly used for stock watering with some potable use at homesteads on farms. Abstractions are generally low and water quality range from moderately potable to poor. The proposed development would probably have a negligible impact on the groundwater quality, as large quantities of petrochemicals would not be stored on site either during the construction or operational phase and this storage and use would be controlled by the correct implementation of measures of the Environmental Management Programme.

The use of groundwater at the trail camp cannot be avoided as it is the only water source available. It is imperative that the sustainable yield rate of aquifers within this area be established and strict management measures implemented (such as a meter) to ensure that it is not exceeded. The significance of this impact could then be brought down to a medium impact. The adjacent agricultural usage of groundwater, that is probably from the same aquifer, and over which the reserve does not have control, prevents the impact to be brought down to a low level.

Hydrology (surface water)

The impacts on the surface hydrology can be mitigated to a low level should erosion control be implemented effectively and erosion prevented at all stages of the proposed development.

3.3.2 Impacts on Soil

Erosion risk is a problem at some of the sites that will need to be addressed as a matter of priority but can be mitigated to a low level should immediate management prevention and control measures be implemented.

3.3.3 Impacts on Ecology and Biodiversity (Appendix D1)

From an ecological perspective, the threats to biodiversity associated with the development of the new facilities within Goegap Nature Reserve are largely related to indirect impacts rather than the direct loss of habitat as a result of the presence of the facilities themselves. (Todd, 2012)

Furthermore, the presence of a large construction crew within an area with abundant fauna and flora poses a poaching risk to certain species such as tortoises. (Todd, 2012)

The construction activities themselves also pose a risk as sensitive areas may be inadvertently impacted and construction vehicles and activities pose a pollution risk as a result of chemical spills that may occur. (Todd, 2012)

Some faunal disturbance during the construction phase of the project is inevitable as a result of the operation of noisy machinery at the site and the presence of a large construction crew. This impact will be temporary and most fauna are likely to return to the area once construction has been completed. (Todd, 2012)

In the long-term, the presence of humans (tourists) in close proximity to rare and endangered animals may pose a poaching risk for desirable species. (Todd, 2012)

However, if properly managed, such risks can be minimized and the overall impact of the development within the reserve kept to a low level. Overall, there is little to suggest that the developments would have a significant ecological impact provided that appropriate mitigation and monitoring measures are put in place. Provided that the mitigation measures as described are implemented, the development of the new facilities would not lead to a significant environmental impact or degradation of the receiving environment. (Todd, 2012)

3.3.4 Socio-economic Impacts

The impacts related to this aspect are mostly positive due to work and associated business oportunities and effective implementation and management may enhance it.

3.3.5 Visual and Aesthetical Impacts

The development would possibly have a visual impact on users of the roads, farm homesteads in the vicinity, and tourists using the internal roads. It would however be contained to the construction phase and of a temporary nature if managed properly and bare areas eliminated en vegetation cover re-established as soon as possible.

The type of material that are proposed to be used for the infrastructure would blend into the environment be aesthetically peasant to the viewer. This would therefore have a low impact during the operational phase if maintained properly.

3.3.6 Impacts on Heritage Resources

Few and often zero heritage traces were found on the specific sites intended for upgrade and no mitigation at those particular places is regarded as necessary.

3.3.7 Tourism

A sustainable tourism carrying capacity (day and overnight visitors) should be established and implemented at the reserve for peak season. It would, together with safety and security control, would assist to address long term tourism related impacts on the reserve.

3.4 No-go alternative (compulsory)

The 'do nothing' alternative is the option of not undertaking the developments at Goegap Nature Reserve. Should this alternative be selected, it would have local and broader impacts.

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

The current infrastructure at the reserve is old and in some cases such as at the trail camp it is disused due to unsafe structures. The sewage treatment at the different locations are outdated and with increasing tourism demand and load possible contamination of groundwater resources could occur as all these sites are located in the vicinity to drainage areas. It is therefore imperative that this infrastructure be replaced.

Deciding not to proceed with the development would have a negative impact on the socio-economic development of the immediate area surrounding the reserve. The job creation and poverty alleviation that would have occurred due to the development, would not take place.
The development of responsibly developed small-scale tourism facilities, such as at Goegap Nature Reserve, is strategically important for the diversification of tourism and improving conservation value to prevent losses in tourism revenue in the future.
The 'do nothing' alternative is not a preferred alternative in this application.
Without the implementation of this development, renewable options for future power supply would be compromised and fossil fuel-based energy would possibly be used to supply for the growing demand. This could have significant negative environmental and social impacts.

The 'do nothing' alternative is not a preferred alternative in this application.

SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?	**YES**	~~NO~~

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

All recommendations and mitigation measures that should be included in the authorisation is addressed in the basic assessment report, specialist studies and environmental management programme. Should the BAR and EMP be accepted and authorised, all aspects that have been discussed within the report, specialist studies and programme would be addressed.

Of particular importance is the:

- Sustainable use of borehole water at the trail camp;
- Control and management of construction activities and crew behaviour according to stipulations in the EMP;
- Control of erosion risk as a matter of priority; and
- Establishing a sustainable tourism carrying capacity for the reserve.

It is imperative that the implementation of the EMP during pre-construction, construction and operational phase and continued compliance to it be ensured.

Is an EMPr attached?	**YES**	~~NO~~

The EMPr must be attached as Appendix F.

REFERENCES

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Todd, S. 2012. **Specialist Ecological Assessment. Proposed Upgrading of Tourism Facilities at Goegap Nature Reserve**. Simon Todd Consulting.

SECTION F: APPENDIXES

The following appendices must be attached as appropriate:

APPENDICES

Appendix A: Locality & Site plan(s)
Appendix A 1.1: Locality Map Overview
1.2 Satellite Image Overview
1.3 Topographic Map Overview
2.1 Locality Map Trail Camp
2.2 Site Plan Trail Camp
3.1 Locality Map Conference Venue
3.2 Site Plan Conference Venue
4.1 Locality Map Family Camp 1
4.2 Site Plan Family Camp 1
5.1 Locality Map Family Camp 2
5.2 Site Plan Family Camp 2
6.1 Locality Map Group Camp Alternative 1
6.2 Locality Map Group Camp Alternative 2
6.3 Site Plan Group Camp Alternative 1
6.4 Site Plan Group Camp Alternative 2
7.1 Locality Map Tourism Building and Guardhouse
7.2 Site Plan Tourism Building and Guardhouse
8 Conservation Value

Appendix B: Photographs
Photographs 1-2: Storage tank & solar pump at the trail camp
Photograph 3: Photograph of the two family camps
Photograph 4: Guard House at entrance to Goegap NR
Photograph 5: Entrance Gate to Goegap NR
Photograph 6: View to the North outside the Entrance Gate to Goegap Nature Reserve
Photograph 7: View to the South towards the Entrance Gate
Photo series 1: Panoramic view of the trail camp
Photo series 2: Panoramic view of the trail camp from the North East
Photo series 3: Panoramic view of the trail camp from the koppie
Photo series 4: Panoramic view of the conference venue, parking area and the administrative offices
Photo series 5: Panoramic view of the area where the conference venue and parking areas are proposed
Photo series 6: Panoramic view of the two family camps taken from the road to the East (red ovals) to gain an overview of the said study area
Photo series 7: Panoramic view of family camp 1 from the South through West to North
Photo series 8: Panoramic view of family camp 2 from the South to West
Photo series 9: Panoramic view of group camp alternative 1

Appendix C: Facility illustration(s)
- C 1.1-1.3: Conference Venue
- C 2.1-2.2: Family Camp
- C 3.1-3.3: Group Camp
- C 4.1-4.3: Tourism Building
- C 5.1-5.3: Gate

Appendix D: Specialist reports (including **terms of reference**)
Appendix D1: ToR Ecology
Specialist Ecological Assessment
Appendix D2: ToR AIA
Phase 1 Archaeological Impact Assessment
Appendix D3: ToR Palaeontology
Email from the Palaeontologist

Appendix E: Comments and Responses Report

Appendix F: Environmental Management Programme (EMP)

Appendix G: Other information

Appendix G1: Communication from DEA
Appendix G2: Public Participation Process Phase 1
- G2.1: Distribution of Notification Letters to identified I&APs, stakeholders and government
- G2.2: Response Form
- G2.3: Background Information Document (BID)
- G2.4: Proof of Distribution of Notification Letters, Response Form, and BID
- G2.5: Advertisement (Gemsbok) dated 13 January 2012
- G2.6: On Site and other Notices
- G2.7: List of Stakeholders and Registered I&APs
- G2.8: Comments Received & Responses

Appendix G3: Koedoe Article by Dr Helga van der Merwe (then Rosch)
Appendix G4: Significance Rating Scale Impact Matrix
Appendix G5: Curriculum Vitae – I.B. van Zyl

Appendix A:
Locality & Site Plans

- 1.1: Locality Map Overview
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- 1.3 Topographic Map Overview
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- 2.2 Site Plan Trail Camp
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- 6.3 Site Plan Group Camp Alternative 1
- 6.4 Site Plan Group Camp Alternative 2
- 7.1 Locality Map Tourism Building and Guardhouse
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- 8 Conservation Value

Appendix B:

Photographs

Appendix C:

Facility Illustrations

- C 1.1-1.3: Conference Venue
- C 2.1-2.2: Family Camp
- C 3.1-3.3: Group Camp
- C 4.1-4.3: Tourism Building
- C 5.1-5.3: Gate

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Appendix G3:

Koedoe Article by Dr Helga van der Merwe (then Rosch)

Appendix G4:

Significance Rating Scale Impact Matrix

Appendix G5:

Curriculum Vitae – I.B. van Zyl