SPITZKOPPE LODGE PROPOSAL
ENVIRONMENTAL ASSESSMENT

FINAL REPORT

N089-1

July 2005
N089-1

16 August 2005

The Namibia Nature Foundation
Kenya House
Namibia

For the attention of Dr. Chris Brown

Dear Chris,

Spitzkoppe Lodge Environmental Assessment: Final EA Report

We are pleased to supply you with the final Environmental Assessment report for the proposed Spitzkoppe Lodge. A few small changes have been made to the text in response to comments from John Kinahan and Antje Burke, and Peter Tarr (as the external reviewer). To save paper, and the costs of colour photocopying, only the updated text and cover is provided herewith. Therefore, please update the bound draft copy that you received in April 2005 with this final version of the text. The figures, maps, photosheets, and appendices have not changed.

We did not receive any comments from the National Monuments Council, and the NMC has still not given us the opportunity to meet with them.

A copy of the EA report has been submitted to MET (DEA) for a Record of Decision about the project.

Yours sincerely,

Colin Christian

Manager / Environmental Scientist
Eco.plan (Pty) Ltd.
ACKNOWLEDGEMENT RECEIPT OF:

The Environmental Assessment (Draft final report) for the Spitzkoppe Lodge

DATE: 13/04/2005

NAME: Jhonna Swartbooi

SIGNATURE: Jhonna Swartbooi
SPITZKOPPE LODGE PROPOSAL
ENVIRONMENTAL ASSESSMENT
FINAL REPORT
SPITZKOPPE LODGE PROPOSAL:
ENVIRONMENTAL ASSESSMENT

EXECUTIVE SUMMARY

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1 INTRODUCTION

Project proponent

Spitzkoppe Lodge cc is a private company initiated by Mr Melt Hugo. This company has entered into a joint venture agreement with the Spitzkoppe Community Development Association (SCDA), a registered Conservancy. The project is thus conceived in terms of Namibia’s Community-Based Tourism Policy.

Eco.plan (Pty) Ltd was appointed by Spitzkoppe Lodge cc to undertake an Environmental Assessment (EA) and Environmental Management Plan (EMP) for the project. Since the Spitzkoppe is already impacted by activities such as camping and communal grazing, Eco.plan suggested that an Area Management Plan (AMP) should be compiled in parallel with the EA for the lodge. The Namibia Nature Foundation (NNF) and World Wildlife Fund (WWF) agreed to fund the AMP and Eco.plan was appointed for this work by NNF. This report, however deals with the EA for the lodge, whereas the AMP will be completed in due course.

Location

The Spitzkoppe is a number of granite inselbergs about 52 km west-north-west from Usakos (refer Figure 1, p.5a of the main EA report). The proposed site is north of the highest peak, the Gross Spitzkoppe (refer Figure 2, p.5b of the main report).

An earlier site closer to that peak had originally been proposed by the SCDA and a PTO was obtained. However, that site was rejected during the course of the EA study because it would have impacted on important archaeological sites and rock art. Therefore a new site was found that would not impact on archaeological sites.

The proposed site has a number of advantages over the original site, and is the only site that satisfies the important selection criteria, namely:

- It meets the needs of the development for good views, seclusion, sufficient space and access that is not within the view area,
- It has relatively minor impacts on the bio-physical environment,
- It results in little loss of amenity to other tourists and campers,
- It is more secluded than the original site and will be less visually intrusive,
- It avoids significant impacts on rock art or archaeological sites.

The exact positions of individual buildings will be pegged on site to ensure that important species of plants are not destroyed unnecessarily.

Details of the proposed lodge

The proposed layout of the site is shown in Figure 3 (p.5c). An “Exclusive Use Zone” of approximately 30 ha is also shown, but the actual footprint of the lodge will be small.

The lodge will be comprised of 15 units (30 tourist beds), 4 units for managers and guides (8 beds), the main reception.restaurant/lounge building (about 450m²), and carpports. The lodge is expected to cost N$ 10,2 million.

The buildings will be designed to blend in with the natural surroundings and be as unobtrusive as possible. Floors will be elevated to allow for the passage of rainfall runoff beneath them. Roofs will reflect the form of the rock outcrops and will be thatched.
Water will be piped from proven boreholes to the north of the Spitzkoppe. Power will be supplied by generator (noise-insulated), gas for the kitchen, and solar energy.

**Methodology for the EA**

The EA study followed the Environmental Assessment Policy of Namibia.

A public participation programme was conducted, and the relevant authorities were consulted.

Two field investigations by the Environmental Scientist from Eco.plan. Four specialist studies were also commissioned by Eco.plan. The most important of these proved to be the archaeological study by J.Kinahan. Although his assessment for the original site suggested that a lodge should not be built within 2km of the granite inselbergs, Kinahan's report for the new proposed site recommended buffer zones of 100m from a few archaeological / rock art sites nearby. A botanical study was carried out by A.Burke who mapped the vegetation types for the area. Studies were also carried out on birds (R.Simmons) and animals (M.Griffin).

Finally this EA Report and an EMP for construction were compiled.

## 2 PUBLIC PARTICIPATION PROGRAMME

The project was advertised and written submissions were invited. Two public meetings were held – one in Windhoek and one at Spitzkoppe. The Environmental Scientist also attended a Workshop on Rock Art at the Spitzkoppe, where the issues relating to the lodge and existing campsites were discussed.

The authorities were consulted, particularly the National Monuments Council. Several attempts were made to hold a meeting with the NMC but without success. The draft EA Report was submitted to NMC for comment in April 2005. However, by the end of July, no comment had been received. The Traditional Authority in the Erongo Region had no problem, and the Erongo Communal Land Board (MLRR) was prepared to approve the lodge development subject to a satisfactory Environmental Assessment.

Responses from the public were varied. The Spitzkoppe Community was strongly in favour of the lodge for economic reasons. The SCDA agreed to the new proposed site.

The general public, through the public meetings, expressed some concerns, which are detailed in the report. Some were opposed to the project, while others felt that if the lodge provided money for the improved management of the area, and economic benefits to the community, then it would be a good thing. The Mountain Club of Namibia and others were concerned to avoid significant visual impacts and to maintain access to the area for camping and climbing.

The greatest opposition to the lodge proposal was from some archaeologists and some members of the NMC. Their concerns focused on the potential for impacts on archaeological sites and rock art near the proposed site, and on the intrusion of the lodge into the “archaeological landscape” surrounding the granite inselbergs. These people agreed that uncontrolled camping was already having a significant impact on these heritage sites.

A number of NGOs are involved in promoting Community Based Natural Resource Management projects. The NNF, WWF and NACOBTA all support the lodge proposal.
All parties agreed that the Spitzkoppe was currently poorly managed. This was partly, or perhaps mainly due to a lack of funds.

3 LEGAL & POLICY FRAMEWORK

The main EA Report, provides a brief review of laws and policies that are relevant to the Spitzkoppe and the lodge proposal. The most relevant laws and policies include:

- the Constitution of Namibia,
- the EA Policy of Namibia,
- the Nature Conservation Ordinance (No.4 of 1975) and Nature Conservation Amendment Act (No.5 of 1996), which deal with Conservancies on Communal Land,
- the National Monuments Act (No.28 of 1969) and its successor, the National Heritage Act (No.27 of 2004), which deal with heritage issues,
- the North-West Region Tourism Master Plan recommends that lodges and not campsites should be established in the areas that are zoned as the most environmentally sensitive areas – which includes the Spitzkoppe.

4 DESCRIPTION OF THE PROJECT ENVIRONMENT & ASSESSMENT OF IMPACTS

4.1 Climate

The Spitzkoppe is situated on the inland edge of the Namib Desert and its climate is one of extremes. Mean maximum daily temperatures range from the highest (in February) 36°C to the lowest (in August) 10°C. Rainfall is low and extremely unreliable. Mean annual rainfall lies between 50mm and 100mm for different parts of the area. Evaporation is high, about 3100mm per annum, and intense sunshine prevails.

Prevailing winds are from the south and can be very strong at times. Hot dry “Berg winds” blow for a few days in the year from the interior, and can cause severe dust storms.

The design of the lodge will take these extreme conditions into account.

4.2 Geology, soils, topography and drainage

The lodge site is at the foot of some of the lower outcrops of massive granite. These outcrops are surrounded by coarse sand derived from weathering of the rock. Runoff from the bare granite is considerable when it rains. The coarse sand is able to absorb much of the runoff, with the result that there are few well-defined drainage courses. The most prominent is just west of the site and is marked by a line of trees and bush visible in Figure 3.

The buildings will be elevated to avoid disrupting the natural drainage. The alignment and design of the access track will have to reflect the need to avoid concentrating rainfall runoff.

Provided that materials (rock and sand) are not taken from the Spitzkoppe and drainage is managed as above, there should be no significant impact on rock or soil. Sources of construction materials exist at disturbed sites not far from the Spitzkoppe.
4.3 Hydrogeology & Water Resources

BIWAC (Aug 2003 & Oct 2003) was appointed by Spitzkoppe Lodge cc to undertake exploration for water for the lodge. There is no groundwater on or near the lodge site.

The Spitzkoppe Community desalinates water from a borehole south of the mountain for their own use and the campsite. The lodge proposes to pipe water from an established borehole at Houdini to the north of the mountain, or a drill a new borehole about 6km north of the site.

Water is scarce in the area and recommendations have been made in the EA for management of this resource. It will be essential to monitor all boreholes used and ensure that they are managed sustainably to prevent damage to the aquifers. Grass lawns are not recommended.

Sewage will be treated by conventional means in underground tanks and the semi-treated water disposed of to soakaways or a created reedbed. There will be no risk of contaminating groundwater as there is no groundwater near the site. Small quantities of semi-treated sewage can be used for natural indigenous gardens.

4.4 Flora

Burke (June 2003) mapped the vegetation types in the Spitzkoppe. The affected plant communities, which she describes as:

- *Zygophyllum cylindrifolium* dwarf shrubland,
- *Stipagrostis uniplumis-Boscia foetida* grassland, and
- *Stipagrostis uniplumis-Stipagrostis hochstetteriana* grassland.

Variations occur at the foot of the granite outcrops where plants receive extra water. Here the number and variety of small trees and large shrubs increases.

All of the vegetation in the Spitzkoppe must be regarded as sensitive as it will not easily recover if damaged. However, there are no species that are unique to the Spitzkoppe. The Namibian endemic species that do occur there also occur elsewhere in the Namib.

At the lodge site, the woody vegetation is fairly sparse. However, it is recommended that A.Burke should assist in the pegging of the positions of buildings so that the most important plants can be avoided. This will also be in the lodge’s interest.

The EA report recommends that only locally indigenous plants be used, and that grass lawns should not be made as they use too much water. Measures are also recommended to prevent the establishment of alien invasive plants.

Provided the recommendations in the EA and EMP are implemented, the impacts of the project on vegetation should be of low significance.

4.5 Fauna

Griffin (June 2003) undertook an inventory of the species of mammals, reptiles and amphibians that occur or are likely to occur in the Spitzkoppe. The area supports numerous faunal species but there are no species that are exclusive to the Spitzkoppe massif. Most species, even leopard which occur there, are not affected by lodges elsewhere (e.g.
Hobatere). The few species that may be of general conservation concern were judged by Griffin as not being significantly affected due to the small extent of the lodge.

No pets shall be permitted at the lodge (e.g. cats). Wild animals must not be fed. Stocking of wildlife (e.g. springbok) is not proposed and must not be permitted, as grazing is unreliable.

4.6 Birds

Simmons (July 2003) undertook a report on birds in the Spitzkoppe. About 151 species have been recorded in the area. The concern about birds focused on a few endemic species that may breed there, and a few raptors that roost or may breed on the peaks. However Simmons judged that the lodge would have no impact on raptors – which use sites high on the mountain well over 1km from the lodge. Smaller birds, such as Herero chats are known to breed over 1km from the site and will not be affected.

 Lodges generally attract birds, even nesting birds, due to the presence of water. Some existing trees will be watered and will grow larger, therefore providing shelter and nest sites for birds. Therefore only positive impacts on birds are expected.

4.7 Archaeology

On the recommendation of Kinahan (June 2003) the original site was rejected for archaeological reasons. A new site was then found and surveyed by Kinahan (Nov 2003). Although rock art and archaeological sites were found, it was possible to design the layout to avoid impacts on these sites. Kinahan recommended buffer zones of at least 100m from these heritage sites. It is recommended that J.Kinahan should be present when the positions of buildings and access tracks are pegged to ensure that his recommendations are implemented.

Camping will no longer be allowed within the 30 ha “Exclusive Use Zone”. Guests will be taken by guides to the archaeological & rock sites that fall within that area. Therefore these sites will be better protected than before. Moreover, it will be in the interests of the lodge to ensure that heritage sites are well looked after as they are part of the tourist attraction.

Furthermore, if funds from the lodge make it feasible for the SCDM to close those campsites that are in rock art shelters, then these sites should be better protected than at present.

Despite the lack of direct impacts on heritage sites, J.Kinahan and some other archaeologists are concerned about the intrusion of the lodge into the concept of an “archaeological landscape”.

4.8 Socio-economic environment

The Spitzkoppe Community was established in the 1960’s when a group of Damara people was moved there as a result of the Odendaal Commission. The population of the Spitzkoppe is now said to be about 600 people, who are very poor. The people survive mainly on their goats, sale of cheap gemstones, and government pensions. The USAID website assumes the average annual income to be US$150 – US$300 per person. In 2004 the campsite provided jobs for 16 people and brought in N$ 214,000. This is not enough to manage the area properly.

The proposed lodge joint venture will provide substantial benefits to the Spitzkoppe Community through the lease of the lodge site from the Community, a bed levee, direct
employment of at least 14 members of the community, goods and services from the community, opportunity for sales of curios and stones, and training.

The contract between Spitzkoppe Lodge cc and the SCDA extends for 15 years. At the end of that time, the community will receive a 25% equity share in the lodge. At that stage these two parties will have the opportunity to review their business relationship for an extended period.

The estimated payments to the SCDA are projected to be N$ 90,000 in Year 1, N$ 550,000 by Year 5, and N$ 723,000 by Year 10. Estimated wage earnings will be N$290,000 in Year 1, building up to N$460,000 in Year 5 and N$660,000 by Year 10 (R. Barnard, pers comm).

The only negative impacts of the lodge on the Community will be the loss of a few campsites, and 30ha of ephemeral grazing.

It is recommended that some of the revenues accruing to the Community must be used for the management of the Spitzkoppe area.

4.9 Tourists & climbers

The numbers of vehicles and tourists on foot due to the lodge will be low, but better management of their activities will be necessary than is evident at present.

Except for the small 30 ha “Exclusive Use Zone” for the lodge, the public will still have access to the rest of the Spitzkoppe area. The loss of amenity in respect of traditional rights will therefore be minimal.

Apart from a minor visual impact from the main peak, the lodge will have no impact on climbers.

4.10 Other matters

- **Laundry** will be done by the Community in the Spitzkoppe village south of the mountain.
- Recommendations are made in the EA for **solid waste** management – emphasizing recycling, use of kitchen waste to feed pigs and goats, and removal of other waste to an approved landfill in one of the towns.
- **Power supply** has the potential for noise and visual impacts. However, no overhead cables will be used, and the generator will be housed in a noise-insulated structure. Recommendations are made for solar water heating and design to keep interiors of rooms cool. There will be no overhead telephone lines.
- **Housing for staff** will be in the existing Spitzkoppe village and not at the lodge – except for the managers and guides.
- A number of recommendations are made in the EA concerning the mitigation of **visual impacts** in the design of the lodge.
- There is potential for **cumulative impacts** together with campers in the area, and this will need to be managed through the Area Management Plan (AMP). People may also be attracted to the Spitzkoppe Community in the hope of improving their economic status. If that happens it will be difficult to discourage, and it would place an additional burden on the already scarce resources such as water.
CONCLUSION

The new lodge site has been selected to avoid impacts on archaeological sites and rock art. Moreover, the layout has been designed with buffer zones around the archaeological / rock art sites so that there will be no direct impact on these sites at all. As camping in rock art shelters will be stopped within the "exclusive use zone" the current impacts on these sites should be greatly reduced. Despite these measures there will still be an intrusion into the general Spitzkoppe area which is regarded by archaeologists as an "archaeological landscape".

It is possible to design the layout with little impact on vegetation. It is recommended that A.Burke should also be present when the exact positions of the buildings are pegged out.

A number of recommendations have been made in the EA (Chapter 5) for the management of potential impacts on the bio-physical environment of the lodge and its related activities. It is recommended that the recommendations of the EA are enforced as a condition of an Environmental Clearance by MET. Provided these recommendations are implemented and enforced during construction and operation of the lodge in the short, medium and long term, the impacts on the bio-physical environment should be of low significance. It will also be in the lodge's own interests to comply with these recommendations.

The provision of water from boreholes should have no significant impact, provided that the recommendations of the geohydrologist with regard to the sustainable yield are complied with. Ongoing monitoring and recording of groundwater levels is essential in order to ensure that the water resource is managed sustainably.

The lodge will have a direct and significantly positive economic impact on the Spitzkoppe Community. It is also expected to have a secondary positive impact by attracting more people to the Community Campsite, and providing opportunities for the Community to offer services to the lodge and the sale of gemstones and curios to tourists. Any minor negative impacts (e.g. loss of grazing area and a few campsites) will be insignificant.

The potential exists for two types of cumulative impacts as a result of the lodge and campsite in combination. Additional people may be attracted to the Spitzkoppe in the hope of benefiting from the development. A second cumulative impact could occur in the medium to long term. As the area becomes more popular, the numbers of tourists are expected to increase substantially in this small area with low tourist carrying capacity. It is therefore recommended that the lodge should not be permitted to expand beyond the proposed capacity (30 tourist beds) at any future stage. It is also recommended that no other lodges should be permitted in the Spitzkoppe area. Otherwise there would be a significant risk of destroying the natural "wilderness" appeal and beauty of the area that attracts tourists to it in the first place. The Area Management Plan will need to address the question of limiting the total number of tourists in the long run.

The Spitzkoppe with its natural beauty, flora, fauna and heritage sites, is a national asset to all Namibians. It is therefore recommended that the future of this area cannot be left simply to the Spitzkoppe Community and the Lodge to ensure its sound management. Clearly the status quo is not sustainable and will not ensure the protection of the natural and heritage resources of this area. It is therefore recommended that the Ministry of Environment and Tourism should take an active role in ensuring that the Spitzkoppe area is managed wisely to the benefit of present and future generations. The Spitzkoppe can only be an economic asset to the extent that its natural and heritage resources are managed sustainably in the long term.
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1 INTRODUCTION

1.1 Background to the lodge proposal & project proponent

The potential for a tourism lodge to be established in the Spitzkoppe has been recognised for at least 20 years. For example, a workshop was organised and run by the University of Stellenbosch in 1985, in relation to small mining and tourism in the Spitzkoppe.

In May 1995, the Ministry of Environment and Tourism (MET) approved Namibia’s Community-Based Tourism Policy. Then followed the Nature Conservation Act of 1996, which allowed for the formation of communal area conservancies. The Act granted communities who formed conservancies the authority to manage and utilise wildlife, and to grant certain rights in relation to tourism and to benefit from tourism activities within their conservancy area.

The Spitzkoppe Community Development Association (SCDA) is a legally constituted and elected body that was already running a community campsite in the area since the late 1990s.

In November 1999, the SCDA solicited bids from developers who wished to build a tourism lodge, adjacent to the Spitzkoppe mountain, as a joint venture with the community. There were sixteen enquiries and four bids were submitted (www.usaid.org.na/success.asp?prid=3). The SCDA sought advice from two NGOs within USAID’s CBNRM programme. These were the World Wildlife Fund (WWF) and Namibia Community Based Tourism Association (NACOBTA) who assisted the SCDA in evaluating the tenders. Two applicants were eliminated by the SCDA for financial reasons. Of the remaining two Melt Hugo’s Spitzkoppe Lodge cc was successful, largely due to his childhood association and attachment to the area. Spitzkoppe Lodge cc then entered into a Joint Venture Agreement with the Spitzkoppe Community Development Association. The Joint Venture Agreement was signed in October 2001, but needs to be updated in the light of the change of site for the lodge.

The SCDA is responsible for acquiring the necessary lease from the Ministry of Lands, Resettlement and Rehabilitation. On 06 September 2004 they submitted an “Application for right of leasehold” to the Ministry for the new site of approximately 30 hectares.

Spitzkoppe Lodge cc now has four members: -

- Mr Melt Hugo, the initiator and founder of Spitzkoppe Lodge cc is a Namibian citizen. He will be the future lodge manager.
- Mr Ronnie Barnard is the Architect and Project Manager for the lodge. He is also a Namibian citizen, and runs a lodge near Gobabis.
- Mr Nicolaas Jacobus Botha is a businessman and advocate from Johannesburg.
- Mr Benjamin Burger is a businessman from Pretoria.

The majority of the shares (52%) are held by the two Namibian shareholders - Mr Hugo & Mr Barnard.

Mr Melt Hugo is a Namibian who grew up and lived in Usakos for 18 years from 1968 to 1986. He and his wife Rene Hugo are currently running a 12-bed guesthouse in the Strand, South Africa. He has long had a dream to come back to Namibia and develop a lodge in the area where he grew up. He and his wife intend to live at the lodge and manage it themselves.
The following NGO's have also played a role in facilitating the agreement between Spitzkoppe Lodge cc and the SCDA: -

- Namibian Community Based Tourism Association (NACOBTA)
- The World Wildlife Fund (WWF)
- The Legal Aid Clinic (LAC)

1.2 The Environmental Consultants for the Environmental Assessment and the Area Management Plan

In 2002 Eco.plan was approached by Ronnie Barnard, representing Spitzkoppe Lodge, to undertake an Environmental Assessment (EA) for the proposed lodge. In the discussions that followed, it soon became apparent that an EA for the lodge only would not ensure sound environmental management for the area because there were many other activities in the area that were already having significant environmental impacts. These included camping, damage to rock art and archaeological sites, grazing by goats and donkeys owned by the local community, and in the Klein Spitzkoppe, small diggings for gemstones. The lodge could have no control over these other activities. The community, on the other hand, does not have the financial resources to manage the area adequately. Effective conservation of the area (including its wildlife, rock art and archaeological treasures) was considered essential to the success of the lodge. The lodge, through the mechanisms available in terms of the CBNRM programme, was seen as a way to bring increased revenue into the area – to the benefit of the local community and the improved conservation and management of the environment. Thus a symbiotic relationship between the lodge, the community and the needs of conservation and heritage sites was envisaged.

Eco.plan therefore suggested that an Area Management Plan (AMP) should be developed that would go hand-in-hand with the EA for the lodge development. Eco.plan approached the Namibian Nature Foundation (NNF) for advice about possible funding for the AMP as it could not be expected of the lodge developer to fund the AMP, which would cover a much wider area and set of activities than the lodge itself.

A joint Terms of Reference was drawn up by Ed Humphries from NACOBTA for the EA and AMP to be conducted by one environmental consultancy. The TOR is presented in Appendix A. Eco.plan submitted a tender that was successful. Eco.plan was then appointed in April 2003 by Spitzkoppe Lodge cc to undertake the EA for the lodge, and was appointed by the NNF (with funding by NNF and WWF) to undertake the AMP in tandem with the EA for the lodge.

Eco.plan's team is led by Mr. Colin Christian, a registered professional Environmental Scientist. Eco.plan, in turn, appointed the following specialist sub-consultants: -

- Dr. John Kinahan Archaeologist
- Ms. Antje Burke Botanist and Landscape Ecologist
- Mr. Mike Griffin Zoologist
- Dr. Robert Simmons Ornithologist
1.3 Location of the Lodge Site

The Spitzkoppe are a number of spectacular granite inselbergs rising from the proto-Namib plains and situated within the Erongo Region of Namibia. They are situated about 28 km off the tar road connecting Windhoek and Swakopmund – the two cities most visited by tourists in Namibia. The nearest town is Usakos about 52 km to the east, and the peaks are close to the gravel road between Usakos and Henties Bay (D1916) – refer Figure 1.

The Spitzkoppe area has two main granite inselbergs – the Gross Spitzkuppe and the Klein Spitzkuppe, which is further to the west. The proposed lodge site is about 1,8km from the peak of the Gross Spitzkuppe. The diggings for semi-precious gemstones occur mainly around the Klein Spitzkuppe. Refer to Figure 2.

Approaching the area from Henties Bay or from Usakos, one passes through the community settlements on the south side of the mountains. The north side is completely undeveloped although a few campsites exist there with no facilities. The north side, with its uninterrupted views across the plains towards the Brandberg, and its backdrop of the granite domes is a highly attractive setting for a lodge.

A site was originally selected by the SCDA (and offered to the developer) adjacent to the highest peak, the Gross Spitzkuppe and on the north side of it (see the blue stars in Figure 2). A PTO (“Permission to Occupy”) was issued to the SCDA for that site by the Ministry of Lands, Resettlement & Rehabilitation in 1996 (refer to Appendix O). However, at an early stage in the EA study, it became apparent that this site had a number of disadvantages, and indeed was fatally flawed:

- Most importantly, the proposed location included five sites that contained rock art and/or important archaeological sites,
- Road access to the site had to be through the view afforded by the site,
- The site was at the foot of the highest peak, which is used by climbers, not only from Namibia but from all over the world. Part of the attraction is the vast open landscape to the north with no sign of human habitation. It would have been impossible to conceal the site from climbers aspiring to reach the summit.
- There may be raptors’ nests on the cliffs above the site.

Alternative sites were therefore sought, following advice from the specialist team, especially the Archaeologist. Three alternatives were identified and considered:

- A site on the western side of the Gross Spitzkuppe adjacent to grassy slopes was rejected by the developer because it lacked the ambiance of the massive granite domes,
- A site at the extreme north-east of the mountains was found to contain San rock art, and was also sensitive with respect to vegetation.
- The third alternative was found to contain some rock art & archaeological sites but these could be avoided in the layout. The site was also less sensitive, from a botanical point of view than the original site. The location of this site is shown in Figure 2. A detailed layout of the proposed lodge site and the archaeological / rock art sites are shown in Figure 3. The co-ordinates of the exclusive use zone are shown in the table below. Photo Sheets are provided at the end of this report.
The above co-ordinates define the area that will be “exclusive” to the lodge. The northern boundary of the exclusive zone is defined by an existing fence separating the Spitzkoppe area from privately owned farmland. The southern side of the main site is defined by the break of slope where the granite outcrops enter the talus slope of coarse sand. The site is approached from the south between the Gross Spitzkuppe and other high peaks to the east of it. The track passes through a narrow gap between high granite outcrops. On passing through the “Gap” the scene opens up into a broad vista over the plains to the north. A small area at the “Gap” will also be reserved for the exclusive use of the lodge.

The total area that is proposed for exclusive use by the lodge is approximately 30 ha. However, the area required for buildings, parking etc will be very much smaller – only a few hectares. The buildings will be spaced out around the base of the outcrops. Most of the chalets will be on the north side so that they will enjoy privacy from other users of the wider area, while at the same time creating a minimal intrusion into the natural beauty of the area.

The proposed site has a number of advantages over the original site, and indeed is the only site that satisfies the important selection criteria, namely: -

- It meets the needs of the development for good views, seclusion, sufficient space and access that is not within the view area,
- It has relatively minor impacts on the bio-physical environment,
- It results in little loss of amenity to other tourists and campers,
- It is more secluded than the original site and will be less visually intrusive.
- It avoids significant impacts on rock art or archaeological sites.

The SCDA has approved this new site and has submitted an application to the Ministry of Lands, Resettlement and Rehabilitation (MLRR – Erongo Office) for a lease to be issued. The Traditional Authority, Chief IGaseb, has supported the development. Approval from the Ministry of Environment & Tourism, in response to this Environmental Assessment, is required before the lease can be granted. Documents supporting these statements are contained in Appendix G.

Details of the lodge proposal and layout are provided in the following section.

1.4 The Project Proposal

Spitzkoppe Lodge cc proposes to develop the lodge in two phases:

Phase 1: 20 beds in 10 units + main buildings.

- 16 tourist beds, and a 2-bed facility for guides and a 2-bed facility for management.
- Kitchen / dining / lounge & bar facility with a reception and public toilets. This complex will also accommodate the management and administrative areas as well as guides’ office and curio shop. The total area would be approximately 450m².
Phase 2: 18 beds in 9 units.

- 12 tourist bed luxury accommodation with an additional 2-bed guide and a 2-bed manager's facility.
- One 2-bed VIP chalet.

In summary, the total capacity of the lodge when fully developed will be 30 tourist beds (15 units), 8 beds for managers & guides (4 units) plus the main reception / restaurant building of 450m². The total capital investment in the lodge and infrastructure is expected to be N$ 10,2 million.

The lodge will be designed to blend in with the natural surroundings - its colours, textures and forms.

The floors will be elevated above the normal ground level to allow for the passage of rainwater that comes off the granite slopes and would normally sink into the coarse sand fairly quickly. All roofs will reflect the surrounding rock shapes in order to minimise the visual impact on the landscape. Care will be taken not to "break" the horizon line above the natural rock formations. All elements will be kept as low as possible so as not to compete with the ambiance of the surrounding rock formations. The units will be designed individually to reflect the adjacent forms and setting.

The walls will be plastered with a matrix of coarse aggregate that occurs naturally on the site and tinted to resemble the granite outcrops.

It is proposed to pipe water from proven boreholes or possibly from new boreholes to be drilled to the north of the site.

Electrical power will be supplied by a generator, which will be suitably noise-insulated, and will run for limited hours. An opportunity also exists for the use of solar power as well. Gas will be used for cooking.

Activities at the lodge

- Guided walks
- Self-guided walks /trails (It is recommended that these be confined to specific routes, and that guide pamphlets be prepared for environmental interpretation)
- Swimming pool
- Daytime vehicle tours
- Self-drive tours should be restricted to certain routes, discouraged or even forbidden. This needs to be addressed in the Area Management Plan.

Access to/from the lodge for construction and operations

There are three possible approaches to the lodge which are recommended.
- Route 1: The main access will be via the existing community office on the south side of the mountain, then northwards between the Gross Spitzkuppe and the peaks to the east of it. Finally this route passes through the "Gap" and ends at the parking area and main lodge buildings. This route already exists as a sandy track. This is the preferred route for guests because it is very scenic, and it arrives at the lodge reception area.
- Route 2: An existing track passes around the west side of the Gross Spitzkuppe. This route is less used by other visitors to the area, but it is a useful alternative for people arriving from the Henties Bay side. It may also provide the best route for construction-related traffic, depending on the source of materials.
- Route 3: Access is also possible off the road that links the Spitzkoppe to Uis. At present, the existing track is blocked by a fence, but this route is probably the easiest route for construction-related traffic.

**Water for construction**

In order to avoid the need for trucking in water during construction, it is recommended that the pipeline from the preferred borehole should be connected first, and a storage tank installed prior to the commencement of construction.

### 1.5 Approach & Methodology for the EA

The process of site selection was outlined briefly in section 1.3 above.

The EA followed the requirements laid out in the Environmental Assessment Policy of Namibia. The EA process included a public participation programme (refer section 2 below), site investigations and assessment by Eco.plan – including a photographic analysis of possible site layouts aimed at minimising the visual intrusion of the lodge into the surrounding area. Specialist studies of the flora, fauna, avifauna, and archaeology were carried out. The terms of reference for these studies included field investigations for the wider area in order to meet the requirements of the Area Management Plan as well as the lodge. The specialists were required to identify any species or sensitive sites that may be threatened by the lodge and/or other activities in the area, which would therefore require special management.

Eco.plan also provided input to the terms of reference for the hydrogeological investigations, so that the impacts of abstraction of water could also be considered.

Following the public participation programme, specialist studies, and two site investigations (original and new site) by Eco.plan, this EA report was written.

To ensure comprehensiveness in the identification of potential environmental impacts, the DEAT (1992) Checklist of Environmental Characteristics was used.

An Environmental Management Plan (EMP) has also been devised by Eco.plan. The EMP will include recommendations for the design and management of the lodge, as well as Environmental Specifications for inclusion in Construction Contracts. The need to minimise the impacts of construction is as important for the aesthetic appeal of the lodge as it is for the conservation of the natural and heritage environment.
2 PUBLIC PARTICIPATION PROGRAMME

2.1 Description of the Public Participation Programme (PPP)

2.1.1 Advertisements and notifications to potential Interested & Affected Parties

The EA process commenced with advertisements in the press. Known Interested and Affected Parties (I&APs) were also notified directly by email, fax or postal letter. For example, the Mountain Club, National Monuments Council, interest groups, relevant government authorities, and individuals who were assumed to be interested, were directly invited to attend the public meetings. The advertisement publicised the meetings and invited people to register as Interested and Affected Parties (I&APs). The press advertisement is contained in Appendix B.

2.1.2 Public & Community meetings

A public meeting was held at the Scientific Society in Windhoek on 21 May 2003. The meeting was attended by 19 members of the public, plus 7 consultants who were connected with the project.

A second public meeting was held at the Spitzkoppe in the restaurant run by the community. This meeting was mainly for the benefit of the Spitzkoppe Community but it was also open to others. It was attended by 20 people including a few from Swakopmund, plus 2 consultants from Eco.plan

The minutes and attendance lists are contained in Appendix C.

2.1.3 Written submissions / correspondence with I&APs

In the newspaper advertisement, and at the public meetings people were also invited to make written submissions in order to present any issues and concerns about the project. Written submissions received are contained in Appendix D.

2.1.4 Consultations with National Monuments Council (NMC)

Consultations were also held with the NMC through two written submissions to them, correspondence, and telephonic conversations – particularly with the director, Mr Andjamba. The NMC, however declined requests from Eco.plan and the Developer to meet and discuss the proposed project. This led to a number of misunderstandings and delays. The NMC eventually wrote a response that rejected the original site due to the archaeological sites and rock art there. Their rejection of the first site was in response to an archaeological report by Kinahan (June 2003).

A second site was then sought, together with the Archaeologist, Dr J.Kinahan, which would not have an impact on archaeological or rock art sites. Kinahan (November 2003) submitted a report on the new site. This report was included in a further submission to the NMC on 25 November 2003. This submission is contained in Appendix E. It includes a section by Eco.plan, a section by the Architect (R.Barnard), and the archaeological report by Kinahan (November 2003).
On 13 April 2005 the Draft Environmental Assessment Report was submitted to the NMC for comment with a further request for a meeting to discuss the project. However, by the end of July 2005, Eco.plan had received no response to that report, and it had still not been possible to secure a meeting with the NMC or their Scientific sub-committee to discuss the matter.

2.1.5 Conference on rock art sites

The National Monuments Council held a conference from 20–24 October 2004 concerning sustainable tourism and rock art sites in Namibia. The conference was funded by the European Development Fund. Part of that conference included a visit to Spitzkoppe, amongst other sites. Although the Conference was not held because of the lodge proposal it did provide an opportunity for discussion, particularly the session at the Spitzkoppe. This further publicised the proposed lodge and therefore contributed to the public participation programme.

The concept of a buffer zone around the mountain was discussed at that workshop. Kinahan (June 2003, p.11), in his report on the original site, recommended that “the lodge should be positioned outside a buffer zone of at least 2km from the inselberg itself”. That report is contained in Appendix L. At the workshop there was substantial but not universal support for this view. It was also widely acknowledged at the workshop that current camping activities were the main cause of damage to the rock art and archaeological sites.

2.2 Results of the Public Participation Programme

2.2.1 Responses to the public participation programme

A number of people registered as Interested & Affected Parties. A full list of I&APs is contained in Appendix F.

Responses from the public were very variable. An attempt is made below to summarise the views of the various groups.

The Spitzkoppe Community were strongly in favour of the lodge development because it would provide employment opportunities and other economic benefits that would benefit the community as a whole. Their specific issues and concerns are summarised as follows:

- The local community was keen for the lodge to be built as soon as possible. The delays experienced so far were of great concern to them.
- They wanted to know how people would be selected from the community for employment at the lodge.
- They wanted to know whether the “exclusive” area for the lodge could still be used for grazing.
- The area experiences strong winds at times, which may be discomfiting to tourists.
- Concern about the water resources nearby.
- Motor biking groups impact on the Spitzkoppe area.
- They were aware of the concern of the National Monuments Council that rock art sites should not be affected.
- Concern about the noise from an electricity generator.
- What environmental impacts would result from activities outside of the lodge?
- How will the site be accessed – for construction and operation?
- How would waste be disposed of, as the community landfill was too small to take extra waste?
In summary, the concerns of the Spitzkoppe community focused on the economic needs of the community, how the lodge would affect the community campsite, and some management issues such as services.

The Spitzkoppe Community Development Association (SCDA), which represents the community, unanimously agreed to the new site for the lodge as evidenced in a letter signed by all members of the SCDA – refer to Appendix G.

The Traditional Authority indicated that they had no objection to the proposed lodge development. This letter is also contained in Appendix G. The Erongo Communal Land Board (Ministry of Lands, Resettlement and Rehabilitation) required that an EA Report should be approved by MET before they would issue a lease for the land.

The general public, as represented by those who attended the Public Meeting in Windhoek and discussions with individual Namibian citizens, expressed concern about the lodge but not outright opposition. They were mainly concerned about environmental degradation in the Spitzkoppe in general and loss of amenity to the general public. Specific concerns focused on the following issues: -

- The area had always been accessible to the public for camping and eco-tourism, and the lodge may restrict access.
- If water had to be trucked in to the lodge, it would create noise, disturbance, fumes and dust.
- Transport of staff, laundry, and waste would also generate more traffic, dust, and disturbance.
- How would waste be disposed of?
- Development could attract more local people to live at the Spitzkoppe, which would exert further pressure on scarce resources.
- The "sense of place" and "wilderness" appeal of the area could be degraded.
- What kind of activities would be taking place outside the lodge precinct?
- Would unsightly powerlines be constructed?
- It was suggested that the Area Management Plan should be carried out before the EA so that the wider management issues could be addressed.
- Had a baseline study been conducted on the local community? Does the Conservancy represent these people?
- Do the local people attach spiritual values to the area?
- Concern was also expressed about rock art and archaeological sites – this is dealt with separately below.

A group of people comprised of archaeologists, the National Monuments Council, and individuals were concerned about matters of cultural heritage. The Spitzkoppe is acknowledged as an important area for rock art and archaeological remains - the scattered but numerous rock art and archaeological sites, together with their surroundings, comprise an "archaeological landscape" (Kinahan, 1991). Some of the professional archaeologists and NMC members were of the opinion that a lodge should not be built anywhere in the Spitzkoppe outcrops as the whole mountain area represents a cultural heritage site. Others felt that it was acceptable to build a lodge here, provided that it did not affect any rock art or archaeological sites.

The Mountain Club of Namibia expressed the following concerns: -

- The Gross Spitzkuppe was a world renowned site for rock climbing, which attracted climbers from overseas as well as being regularly used by the Mountain Club in Namibia.
• The Club had invested money in climbing infrastructure on the peak and were concerned that the peak should not lose its appeal – which lay, not only in the climb itself, but also in the vast "wilderness" landscape to the north with no sign of human structures. The lodge had the potential for visual intrusion.

• The concern was also expressed that access to the peak, and to camping sites used by climbers, should not be obstructed.

A number of NGOs are involved in promoting community based tourism in line with Namibia’s Community Based Natural Resources Management (CBNRM) programme. Representatives of the NNF, WWF and NACOBTA were of the opinion that the Spitzkoppe was not adequately managed at present, and that a lodge would help to conserve the area in the following ways:

• By providing a watchful eye on the state of this environment,

• By creating an incentive to conserve the area, as a lot of money would be invested in the lodge and its success would depend on the quality of the environment, and

• Most importantly, by injecting money into the community, some of which could be used for the better management of the area.

Thus, this group of people believed that the lodge would benefit the community as well as the environment.

2.2.2 Summary of the results of the PPP

The public response to the lodge proposal was mixed. The local community and supporting NGO’s were strongly in favour of the lodge.

For the public in general the response varied. There were some people who were opposed to any development right up against the granite outcrops of the Spitzkoppe. Others found the development acceptable provided that it did not impact any archaeological or rock art sites. Many others were concerned about specific environmental impacts of the lodge, but felt that if these impacts were adequately managed, then the lodge would be acceptable.

The need for improved management of the area, and the economic needs of the community, were acknowledged by all parties.
3 LEGAL & POLICY FRAMEWORK

A review of legislation by a legal specialist was not considered necessary. However, some of the most relevant legal and policy documents relating to the lodge proposal are mentioned in this section.

3.1 Constitution of Namibia

The 1990 Constitution of Namibia is the supreme law of the land. It contains environmental provisions in Chapter 11, which deals with Principles of State Policy. Article 95: “Promotion of the Welfare of the People” provides that:

“the State shall actively promote and maintain the welfare of the people by adopting…policies aimed at the following:
(I) maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilisation of living resources on a sustainable basis for the benefit of all Namibians, both present and future…”

Article 95 does not create legally enforceable rights but acts as a guide to Government policy regarding the enactment and application of legislation (Article 101 of the Constitution).

3.2 Legislation Relating to Conservancies

Historically, traditional authorities managed wildlife populations by declaring hunting seasons under certain conditions. Most hunting was done on a subsistence level and certain animals (eg elephant were classified as Royal Game). During the modern era, traditional communities were deprived of traditional rights to game, which became “state property”. In 1967, rights over certain species of wildlife were given to those commercial farmers who met certain criteria. The same rights were not, however extended to communal area farmers. In 1990, the new Namibian Government began to address this issue by establishing a community game guard network and working with NGO’s and traditional authorities to establish a new approach to the involvement of people and wildlife.

The legislation arising from this new approach is contained in two Government Notices, the relevant content of which is briefly explained below. This legislation allows for the establishment of communal conservancies and provides for increased rights and responsibilities for communities in relation to wildlife.

The Nature Conservation Amendment Act (Act No.5 of 1996) was promulgated in terms of Government Notice No.151 in Gazette No.1333. This Act amends the Nature Conservation Ordinance of 1975 to provide for “an economically based system of sustainable management and utilisation of game in communal areas…”. It provides for the establishment and registration of Conservancies on Communal land, the details of which are set out in the regulations mentioned below.

The Amendment of Regulations Relating to Nature Conservation was promulgated in terms of Government Notice No. 304 in Gazette No. 1446. This regulation is made under Section 84 of the Nature Conservation Ordinance (Ordinance 4 of 1975). These regulations provide for issues such as:

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• Procedures and requirements for declaration of an area as a Conservancy (including constitutional matters, community representation, and administration and distribution of funds),

• Establishment of Wildlife Councils in terms of a certificate issued by MET and copied to the Ministry of Lands and Resettlement. The Minister of MET must be satisfied that the Community, together with the Wildlife Council has the ability to manage and utilise in a sustainable manner the game in the area in which it resides.

It is also current policy that the developers of Tourism Projects including lodges are required to enter into an agreement with the Government, represented by the Ministry of Environment & Tourism (MET) and the Ministry of Lands, Resettlement & Rehabilitation (MLRR).

Spitzkoppe Community Development Association holds a PTO from Namibia’s Ministry of Lands, Resettlement and Rehabilitation (MLRR). The PTO system is in the process of being abolished and replaced with a lease system. The SCDA has applied for a lease from MLRR for an area of 30 ha for the lodge. The duration of the lease will be 9 years and 11 months.

3.3 The National Monument’s Act (Act No.28 of 1969)

The National Monuments Act currently has a bearing on the lodge proposal in two ways, although it is soon to be replaced by the National Heritage Act: -

• Certain areas / sites may be proclaimed as National Monuments, which affords these sites protection under the act.

In the case of the Spitzkoppe, only the area called "Bushman’s Paradise Cave" is specifically proclaimed as a National Monument. This is a rock art site in the southeast portion of the Spitzkoppe mountains, more than 3 km from the proposed lodge site. The lodge will have no direct impact on that site, although it will lead to an increased number of tourists visiting the Bushman’s Paradise on foot.

• The Act makes it an offence to destroy or deface any archaeological site or rock art site.

Any other archaeological or rock art site that is not specifically designated as a National Monument is also protected under the Act. This was the reason for the opposition of the National Monuments Council to the original proposed site.

Near the new site there are six archaeological / or rock art sites, but none of these need be directly affected by the lodge. Their positions have, however, influenced the layout of the lodge precinct.

3.4 The National Heritage Act (Act No.27 of 2004)

The National Heritage Act was signed by the President of Namibia on 19 December 2004 but it will only come into effect on a date yet to be determined by the Minister in the Gazette. This Act will repeal the National monuments act and the Amendments thereto. The Act will: -

• establish a National Heritage Council with specified duties and responsibilities,
• require the Council to establish and maintain a Register of places and heritage objects,
require the Council to nominate to the Minister concerning places to be declared heritage sites. Certain processes and notices are required to be followed in regard to such recommendations.

require certain procedures involving the owner of the land upon which a notice has been served that a site is nominated for declaration as a heritage site. “Owner” includes anyone who has certain rights in respect of that land.

make provision for “protection orders” and “permits” and procedures that must be followed in relation thereto.

In the case of designated Conservation areas, and Archaeological sites, the Council will have the power to prohibit development.

The Council will be required, for each protected place, to introduce and maintain a “site management plan in accordance with the best cultural, environmental, ecological, scientific and education principles that can reasonably be applied…”

Certain provisions are also made in respect of implementing site management plans, heritage inspectors, and education.

3.5 The Water Act of 1956

The Ministry of Agriculture, Water and Rural Development is responsible for the administration and control of water resources. However, the proposed site is not within a Water Controlled Area and no permit is required at present to establish and operate a borehole.

However, the Water Act of 1956 is under review, and a new Water Act will be promulgated in due course. It is understood that the new Water Act will require that a permit be obtained to operate a borehole anywhere, and not just in a Water Controlled Area.

3.6 Namibia's Environmental Assessment Policy

Namibia’s Environmental Assessment Policy was approved in August 1994 by Cabinet Resolution 16.8.94/002. This Policy provides guidelines for Environmental Assessments (EA’s) and is being widely used to encourage sound environmental management throughout the country. Furthermore, the Draft Environmental Management Bill anticipates that requirements for EA’s will become law in the near future.

Included in the aims of the EA Policy are the following:

- "Maintaining ecosystems and related ecological processes, in particular those important for water supply, food production, health, tourism and sustainable development;
- Maintaining maximum ecological diversity by ensuring the survival and promoting the conservation in their natural habitat of all species of flora and fauna, in particular those which are endemic, threatened, endangered, and of high economic, cultural, educational, scientific and conservation interest." (p.2)

The EA procedure sets out to (inter alia):

- “Better inform decision makers and promote accountability of decisions taken,
- Consider a broad range of options and alternatives when addressing specific policies, programmes and projects,
- Strive for a high degree of public participation and involvement by all sectors of the Namibian community in the EA process,
• Take into account the environmental costs and benefits of proposed policies, programmes and projects;
• Take into account the secondary and cumulative environmental impacts of policies, programmes and projects;
• Promote sustainable development in Namibia, and especially ensure that a reasonable attempt is made to minimise anticipated negative impacts and maximise the benefits of all developments." (P.3-4)

3.7 Environmental Management Bill

Although this is not yet law, a final draft of the Environmental Management Bill has been prepared by the Ministry of Environment & Tourism. It is intended, amongst other thing to: -
• Give effect to the provisions in the Constitution
• Regulate Environmental Assessments
• Contain provisions on environmental rights and duties of Namibians
• Establish binding environmental principles.

3.8 Waste Management

There is no National legislation that regulates waste management in Namibia, and there is no uniform policy or practice concerning waste disposal. The controls that do exist are contained in the Public Health Act, and Section 23 of the Water Act, which prohibits the pollution of water including groundwater. This would also be relevant to the treatment and disposal of sewage.

3.9 Pollution Control and Waste Management Bill

This Bill has not yet been enacted, but it anticipates the following provisions: -
• Provision for Integrated Pollution Control (IPC) Licenses
• Regulation of the storage, transport, management and disposal of waste.

3.10 The Convention on Biological Diversity

The Convention on Biological Diversity was ratified by the Namibian Government in 1992. Thus Namibia has an obligation under international law to protect its endemic species (ie species for which most of the world population lives or breeds in Namibia). This Convention can be expected to give rise to regulations in future.

3.11 The North-West Region Tourism Master Plan

A planning document entitled “Namibia: North-West Region Tourism Master Plan” was compiled by Urban Dynamics (2000) for the Ministry of Environment & Tourism. This document covers the Erongo and Kunene Regions of Namibia.

The Master Plan recognises that the north-west of Namibia is a fragile environment that is being impacted by uncontrolled tourism, which needs to be guided, while at the same time meeting the needs of communities living in the area.

“Good planning should ensure sustainable tourism development that is in line with the policies and strategies of the Ministry of Environment and Tourism which: -
“respects and actively involves local communities in planning and management,
creates social and economic incentives for sustainable natural resource management,
maintains the natural environment, and
“delivers and continues to deliver a quality visitor experience.” (p.2)

The Master Plan emphasises the establishment of Community Based Tourism (CBT) as a key strategy to protect the natural environment as well as a key strategy for income generation through tourism by local communities.

The Erongo and Kunene Regions are divided into zones of high, medium or low sensitivity, with guidelines applicable to each zone. The Spitzkoppe, although not specifically dealt with in the Master Plan, is located within “Zone 1” a zone of high sensitivity. In that category, lodges are considered appropriate but campsites are not recommended. The Spitzkoppe community campsite is, however, already in existence and people have been camping there for decades – long before the establishment of the community campsite.

The recommendations of the Master Plan (Urban Dynamics, March 2000 Volume 1) for Zone 1 that are relevant here are the following:

- Upmarket small (less than 20 beds) to medium sized tented camps and lodges,
- No off-road driving permitted,
- Self-drive tours should be allowed on designated routes only and guided tours should be promoted.
- Campsites are not promoted since they require high volumes of traffic to sustain them,
- a visitor “Code of Conduct” should be prominently displayed at all tourist facilities to educate visitors concerning the environmental sensitivity of the area.

Of less direct relevance to the lodge in question, the Master Plan also recommends the following in Zone 1:

- Overlanders and motorbikes should be limited to proclaimed roads only,
- Dry camps (e.g. tents) with no facilities should be erected where necessary for the use of overnight campers.
- Walking and pack animal trails should be promoted but attention must be given to the impact of backup vehicles supporting these activities,
- Fixed-wing aircraft should be limited to direct flights to and from camps and micro lights and choppers should be avoided.

The Master Plan recommends that monitoring of the impacts of tourist developments should be based on the technique of “Limits of Acceptable Change (LAC)”. This technique will need to be further developed and applied in the Area Management Plan for the Spitzkoppe.

The Master Plan’s “hypothetical economic impact assessment comparing the economic returns of a community campsite, mid-market lodge and upmarket lodge clearly indicate that mid-or upmarket lodges provide significantly greater economic returns to the community and regional economy than a community campsite…” (Volume 1 p.42). The report goes on to say, however, that community campsites nevertheless have a place and “should not be outlawed” (Volume 1 p. 46).
4 DESCRIPTION OF THE PROJECT ENVIRONMENT

4.1 Climate

The Spitzkoppe lies on the inland edge of the Namib Desert and its climate is extremely arid. There is little climatic data available close to the site, so the data in this section is derived from generalised data by Mendelsohn (2002), and Burke (June 2003).

4.1.1 Temperatures

The Spitzkoppe is about 100km inland - far enough to limit the cooling influence of the sea, which is enjoyed by places nearer the coast. The hottest month is February, when the maximum daily temperature averages 34°C to 36°C, with the daily maximum often reaching over 40°C. The coldest month is August, when the minimum daily temperature averages 10° – 12°C. Frost does not occur here.

4.1.2 Rainfall & Evaporation

The annual rainfall in the Spitzkoppe area is highly variable and unreliable. The mean annual rainfall ranges from 50mm in the west to 100mm in the east of the Spitzkoppe (Burke, June 2003). Most of the rain falls between January and March. The granite slopes are impermeable, except for cracks and fissures, so the areas immediately adjacent to the granite outcrops receive extra runoff, which enables a variety of trees and shrubs to grow in these otherwise very dry conditions.

Fog occasionally reaches the study area from the sea, bringing some moisture to the vegetation.

Annual average potential evaporation is high - about 3100 mm (BIWAC, August 2003).

4.1.3 Solar radiation

Solar radiation is intense, with average values of approximately 5.8 – 6.0 kWh/m²/day, and cloud cover is infrequent. This makes the use of solar energy an attractive option.

4.1.4 Winds

There is no wind data available for the Spitzkoppe, so the information below has been interpolated from records at Walvis Bay and Windhoek, and experience of the area.

The prevailing wind at the coast is dominantly from the south – over 50% of the time, but with increasing distance from the sea the frequency and strength of this wind diminishes. It is inferred that the wind direction at the Spitzkoppe is still predominantly from the sea (southerly to north-westerly), with the southerly wind being most common. Easterly winds are infrequent – occurring mainly during the winter and spring months as "Berg Winds". These are warm dry winds that result from descending air over the interior of the country. Easterly 'berg winds'
occur for about 10-15 days per year at the coast. These winds are very dry (relative humidity less than 5%) and can increase to sandstorm proportions on a few days a year.

Wind can occur at any time of day or night, but the highest average annual wind speeds can be expected in the afternoon hours 12h00-20h00. The strongest winds are experienced in summer as a result of increased temperature differential between the hot desert and the cold sea.

The influence of wind on the lodge site is expected to be as discussed below, but the absence of site-specific data makes predictions difficult. Units 3-15 on the north side of the granite ridge (refer to Figure 2), should be fairly well protected from the southerly wind. Units 8-15 and Unit 1 are expected to be exposed to the occasional “berg winds” from the east. Units 3-6 (especially units 4 – 5) may be very hot due their very sheltered situation. At a very local level, wind directions are strongly influenced by the shape of the granite outcrops. Thus, the main building / restaurant area in the “gap” is likely to be exposed to winds that are funnelled through the “gap” from the south, west or east. The design of these buildings will need to take into account the likelihood that wind speed and direction could be variable and unpredictable.

4.2 Geology, Soils, Topography & Drainage

The Spitzkoppe were formed many millions of years ago by the intrusion of molten magma into the overlying sedimentary layers. These intrusions occurred some kilometers below the earth’s surface. The molten magma cooled and crystallized to form medium to coarse-grained granite. Subsequent erosion exposed the resistant granite to form the inselbergs that are seen today.

The mountain takes the form of very steep sided domes. In places these massive granite outcrops are cracked and fissured. The convex bases of these domes disappear into either talus slopes of large boulders that have fallen from above, and/or coarse gravel and sand that has weathered from the granite. At the proposed lodge site there are few loose boulders, and the steep granite slopes disappear into very low-gradient foot slopes comprised of weathered granite. This material tends to be coarser at the foot of the granite slopes as most of the finer sand and clay particles have been carried further away by water.

Water that runs down the granite slopes forms tiny ephemeral watercourses at the base of the granite (refer Figure 2). However, these small watercourses fade out within a few meters or a few hundred meters. This is because the water is able to infiltrate into the coarse gravel and sand.

Some 150 – 200m downslope from the base of the granite at the lodge site are some patches of calcrete on the surface. These deposits are formed by evaporation and precipitation of the carbonate minerals that were in solution. It is assumed that these calcrete layers are underlain by coarse gravel and sand. Shallow calcrete horizons may also occur elsewhere just below the ground surface.

Water from the area near the lodge drains northwards across extensive grassy plains, but there are no major drainage lines on, or near the lodge site.

On those occasions when sufficient rain falls to generate and sustain surface flow for hours or days, all the surface drainage flows to the Omaruru River north of the Spitzkoppe or the Spitzkoppe River south of these mountains. These two rivers converge just upstream of the Omdel Dam near the boundary of the National West Coast Recreation Area.
4.3 Hydrogeology

There is no groundwater on or near the site. The Spitzkoppe Community draws brackish water from a borehole at the ephemeral Spitzkop River to the south of the mountains. This water has to be desalinated for human consumption. About 3 m$^3$/day of fresh water is made available to the Spitzkoppe community and campsite.

BIWAC (August 2003) carried out a desk-top study and hydrocensus for Spitzkoppe Lodge cc with the aim of supplying about 8 m$^3$/day of fresh water to the lodge. This study revealed that all existing boreholes south or west of the Spitzkoppe yielded brackish or salty water. Therefore it was recommended that attention should be given to boreholes north of the Spitzkoppe.

BIWAC (October 2003) undertook test pumping in October 2003 of several existing boreholes to the north, east and south of the Spitzkoppe Mountains. A map of the boreholes considered is contained in Figure 4. BIWAC’s key findings for the potential water sources are summarised in the table below.

<table>
<thead>
<tr>
<th>Location</th>
<th>Borehole WW30881</th>
<th>Borehole WW35153</th>
<th>Unnumbered Rural Water Supply (RWS) Borehole at Houdini</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5km south of the lodge site, in the Spitzkoppe River</td>
<td>9.6km north-east of the lodge site, on the farm Nelsrus/Langsrus</td>
<td>14.5km north of the lodge site, at Houdini</td>
<td></td>
</tr>
<tr>
<td>Geology of aquifer</td>
<td>marble</td>
<td>marble</td>
<td>pegmatite (granitic)</td>
</tr>
<tr>
<td>Open depth of borehole</td>
<td>60m</td>
<td>50m</td>
<td>51m (pump inlet depth)</td>
</tr>
<tr>
<td>Rest Water Level (metres below surface)</td>
<td>13m</td>
<td>20m</td>
<td>19m</td>
</tr>
<tr>
<td>Water quality based on TDS Namibian water quality standards – but requiring further chemical analysis</td>
<td>Very saline – requiring to be desalinated</td>
<td>Good: Class A – drinking water</td>
<td>Good: Class A – drinking water</td>
</tr>
<tr>
<td>Sustainable yield (estimated from 24 hr pump test)</td>
<td>20 – 30 m$^3$/day. This is sufficient for the lodge’s requirements.</td>
<td>10 – 15 m$^3$/day</td>
<td>20 m$^3$/day maximum, but only about 10 m$^3$/day for export to the lodge, as the water level recovery was incomplete.</td>
</tr>
<tr>
<td>Potential conflict with other water users</td>
<td>No other party would use the water, which is therefore all available for the lodge.</td>
<td>The local demand uses at least half of the sustainable yield, and the RWS also draws water from this borehole. There is no spare water for the lodge.</td>
<td>Houdini community would need to share water for people &amp; goats, and a proposed gardening project.</td>
</tr>
<tr>
<td>BIWAC’s recommendations</td>
<td>The option of desalinating this water should be further investigated – e.g using a mobile reverse-osmosis plant.</td>
<td>The distance from the source is not in favour of this option. But the cost of a pipeline needs to be weighed up against the ongoing cost of</td>
<td></td>
</tr>
<tr>
<td>BIWAC's preferred option</td>
<td>Not a viable source for the lodge</td>
<td>BIWAC's second option</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td>Environmental considerations</td>
<td><em>Acacia erioloba, Faidherbia albida and Tamarix usneoides</em>, trees in the riverbed. The trees probably use water from the alluvium – not from the deeper groundwater in the marble aquifer.</td>
<td>Trees occur along the riverbanks close to the boreholes. However, the borehole is in the marble aquifer, so there is unlikely to be any impact on the trees, which derive water from the alluvium that is overlying the marble.</td>
<td>No big trees in the river bed.</td>
</tr>
</tbody>
</table>

No other potentially good yielding boreholes exist in the area. BIWAC (October 2003) suggested that drilling should be carried out within a “half-radius of 6 km north of the Spitzkoppe Mountains”. A solar powered pump could be used.

**In summary, there are three potential water sources for the lodge:**

- The saline water from WW30881 at the Spitzkoppe River,
- The unnumbered RWS borehole at Houdini, or
- Potential new boreholes within 6km to the north of the lodge site.

Flexible HDPE pipes would be used to convey the water from the source to the lodge. These would be buried in a trench not exceeding 300mm wide and just deep enough to keep the water cool.

Solar powered pumps could possibly be used to pump the water from the source to the lodge. In the case of desalination by a reverse-osmosis plant, a head of some 10 – 15m is required from the storage tank to the plant. Again a solar pump may be adequate.

The report by BIWAC (October 2003) is contained in Appendix H.

### 4.4 Flora

This section draws on the specialist study by Burke (June 2003) undertaken for the lodge and Area Management Plan (refer to Appendix I) as well as her earlier studies of this area. Burke undertook a detailed study of the flora for the original site, which was not repeated for the new site. However, her fairly detailed survey of the whole area for the Area Management Plan was used for the new site (refer to Appendix I).

The Spitzkoppe inselbergs are situated in the central Namib at the interface of Savanna, Nama Karoo and Desert biomes. As a result this area is characterised by high botanical diversity (Burke, 2003b). The vegetation of this area has been well studied by Burke (2001 and 2002) amongst others.

Burke (June, 2003) mapped the various vegetation types for the entire quarter degree square 2115CC (Figure 5). Eco.plan overlaid this mapped information on a map of the lodge site. Only three of the vegetation types are directly affected by the lodge. A fourth type – which is on
the granite outcrops themselves – will be affected to a negligible extent, as the granite slopes at the site are almost free of any vegetation. These four types are summarised in the table below, and an indication of the sensitivity and recovery potential of each vegetation type, if disturbed, is provided.

Vegetation types 1 & 2 are the most affected by the footprint of the lodge. However, only a very tiny portion of these habitats will be affected by the footprint of the lodge.

The area of vegetation that is of greatest concern is that which will be affected by the Reception/Restaurant/Lounge area (refer to the site layout in Figure 3). This area supports more bush and small trees than any other location that is directly affected by the lodge. It was not mapped in detail. The drainage line to the west of that position also supports a lot of trees and bush but that will be avoided by the layout and access track.

<table>
<thead>
<tr>
<th>Vegetation type 1: <em>Zygophyllum cylindricolium</em> dwarf shrubland</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of vegetation type &amp; Diversity</strong></td>
</tr>
<tr>
<td>Low shrubs and grasses on gravel plains with subsurface or surface calcrite.</td>
</tr>
<tr>
<td>Depending on the growing season, 5 to 30 species may be found in this habitat type.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vegetation type 2: <em>Stipagrostis uniplumis– Boscia foetida</em> grassland</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>(Silky bushman grass - smelly shepherds tree grassland)</em></td>
</tr>
<tr>
<td><strong>Description of vegetation type &amp; Diversity</strong></td>
</tr>
<tr>
<td>Grasslands dominate on the coarse sands/gravels derived from the granite. This type is limited to the plains surrounding the Gross Spitzkuppe group of mountains.</td>
</tr>
<tr>
<td>In the drainage lines, a number of small trees and bushes also occur.</td>
</tr>
<tr>
<td>In a good season 30 – 50 species may be found in this habitat type.</td>
</tr>
</tbody>
</table>
### Vegetation type 3: *Stipagrostis uniplumis – Stipagrostis hochstetteriana* grassland
(Silky bushman grass – gemsbok tail grassland)

<table>
<thead>
<tr>
<th>Description of vegetation type &amp; Diversity</th>
<th>Characteristic species</th>
<th>Conservation importance, Sensitivity, and Recovery potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasslands dominate on sandy drainage areas north of the Gross Spitzkuppe – interspersed with occasional shrubs. The sands are derived from the granite. Depth of sand affects which of the two <em>Stipagrostis</em> grass species predominate. On calcrite patches, <em>Monsonia umbellata</em> and <em>Xerophyta humilis</em> prevail. About 20 - 30 plant species may be found in this vegetation type.</td>
<td>In addition to the two dominant grasses <em>Stipagrostis uniplumis</em> and <em>Stipagrostis hochstetteriana</em>, other important grasses are <em>Eragrostis nindensis</em>, <em>Schmiditia kalahariensis</em>. Frequent shrubs are: <em>Acacia reficiens</em>, <em>A. senegal</em>, and <em>Boscia foetida</em>. The common herbs are: <em>Monsonia umbellata</em>, <em>Limeum argute-carinatum</em>, and <em>Indigofera auricoma</em>. Bulbs are also expected to occur in this vegetation type.</td>
<td>There may be endemic bulb species in this habitat type – which may only be visible after very good rains. This vegetation type is used for grazing. It is considered to be of medium sensitivity to disturbance, with medium potential for full recovery if disturbed. This vegetation type is almost completely unaffected by the lodge itself but the “exclusive use zone” will slightly encroach on it, which will help to protect a small part of this area from overgrazing.</td>
</tr>
</tbody>
</table>

### Vegetation type 4: *Barleria lancifolia – Commiphora virgata* shrubland
(Granite outcrop shrubland)

<table>
<thead>
<tr>
<th>Description of vegetation type &amp; Diversity</th>
<th>Characteristic species</th>
<th>Conservation importance, Sensitivity, and Recovery potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tall <em>Commiphora</em> species and other stem succulents are prominent in this vegetation type where it occurs on the Gross Spitzkuppe. The steep slopes hold soils only where rockfalls and cracks provide the opportunity for soil formation or collection of weathered granite material. The description provided by Burke for this vegetation type as a whole is not typical of the granite outcrops adjacent to the lodge – which are mainly very bare,</td>
<td>Of the species listed by Burke for this vegetation type, only a few isolated specimens occur close to the lodge site: e.g. <em>Commiphora</em> spp, <em>Euphorbia</em> spp, <em>Euclera undulata</em>, and <em>Cyphostemma currori</em>. Occasional fig trees (<em>Ficus</em> species) also occur – growing out of cracks in the granite but these will not be affected.</td>
<td>The <em>Euphorbia</em> species are considered to be of conservation importance. Protected species that may be found growing out of cracks in the rock near the site are <em>Boscia albitrunca</em>, <em>Cyphostemma currori</em>, <em>Euclera pseudoebenus</em>, and <em>Sterculia africana</em>. <em>Commiphora</em> species are also of interest. This vegetation type is not well represented near the lodge site as the granite outcrops here are very bare. Moreover, the granite will not be affected by the</td>
</tr>
</tbody>
</table>
hold little or no soil at all, and are low in height. The “affected” outcrops have little vegetation except for occasional small trees growing out of a cracks in the granite or small patches of soil in depressions in the granite (e.g. at the VIP suite – No.1 in Figure 2)

Although diversity is high for this type as a whole, it is very low for the area of the lodge site.

will not be affected by the footprint of the lodge.

All the vegetation communities in the Spitzkoppe area are considered to be of “medium” to “high” sensitivity to disturbance. Moreover their potential for recovery fully if disturbed, is low. Due to the arid climate, the growing season is very short (For grasses, the growing season averages only 10-20 days per year – in response to rain.)

Trees and larger shrubs that have been recorded on the lodge site include:

- *Acacia hebeclada*
- *Acacia reficiens*
- *Acacia senegal*
- *Adenolobus garipensis*
- *Boscia albitrunca*
- *Boscia foetida*
- *Cataphractes alexandri*
- *Commiphora spp.*
- *Croton gratissimus*
- *Dombeya rotundifolia*
- *Euclia pseudobenus*
- *Euclia undulata*
- *Euphorbia spp.*
- *Ficus cordata*
- *Maerua schinzii*
- *Salvadora persica*

Inselbergs in the Namib are generally important centres of plant endemism. Many plant species of conservation significance occur in the Spitzkoppe. Most of the species with limited distributions occur on the higher slopes if there is sufficient depth of soil, in gullies, and around the base of the outcrops.

The density of vegetation in the vicinity of the lodge site is fairly sparse, particularly on the north side of the rocky ridge. Nevertheless, every effort will be made to protect the existing trees and shrubs, because these are very important to the ambience and aesthetic appeal of the lodge surroundings. Therefore, the exact position of each building will be determined on the ground (not on paper) in order to avoid removing significant trees and shrubs. Someone with a good knowledge of the plants will be present to supervise the layout of each building before construction.
4.5 Fauna

This section is based on the specialist study by M. Griffin undertaken for the lodge and Area Management Plan and existing data on the distribution of faunal species in the Namib and the Spitzkoppe area.

Based on available database records and a site investigation, Griffin (June 2003) estimated that there are 139 species of animals that used to occur or still occur in and around the wider Spitzkoppe area. Griffin’s report and a list of species is contained in Appendix J. The species list includes 4 amphibians, 69 reptiles, and 66 mammals. However, many of the larger mammals such as elephant, lion, zebra, and giraffe are included in the list but no longer occur there. Leopards have been been seen recently in the granite mountains, where they play an important ecological role in keeping the population of dassies from exceeding the carrying capacity of the vegetation (C.Christian).

The rare Black mongoose has been recorded in the Spitzkoppe (C.Christian, and RE Simmons) but it adapts well to lodge environs. It also occurs in the Brandberg and as far north as the Ombonde River (C.Christian).

Of the total number of species, 56 are of national conservation concern. However, the majority of these have broad western-Namibian distributions including the Brandberg and the Erongo mountains. There are no species exclusively endemic to the Spitzkoppe massif or surrounding area. A possible exception of the Spitzkoppe Marico Gecko (Pachydactylus mariquensis latirostris) but a lodge of small extent would not have any impact on gecko species. Therefore development in the Spitzkoppe will not affect the Namibian populations of any animals – amphibians, reptiles or mammals (Griffin, June 2003). Even leopard co-exist happily in close proximity to lodges (S.Braine – Hobatere Lodge, pers comm).

4.6 Birds (avifauna)

A specialist study was undertaken for the lodge EA and for the Area Management Plan by R.E. Simmons (July 2003). This included a desktop study of Bird Atlas records and a site investigation. The site investigation for the lodge site was focussed mainly on the original site that was rejected. However the new site is less than 1km away and the habitat is quite similar – although the new site has less vegetation and is less diverse in terms of habitat. It is therefore considered that the species recorded by Simmons at the original site will be similar but less diverse. Simmons did not consider that another site investigation was necessary for the new site (Simmons pers comm) as the area had been covered in general for the AMP, and he knew the Spitzkoppe area very well.

During a site investigation 29-30 May 2003, after good rains in the area, Simmons (July 2003) recorded 60 species of birds including 26 species at the original lodge site, 38 species on the granite slopes elsewhere, and 39 species along the Spitzkoppe River and plains areas. The list is contained in Simmons’ full report in Appendix K. His report also contains the results of a review of literature and bird atlas data. About 151 species of birds have been recorded in the Spitzkoppe inselberg, and this number increases after good rains. These birds are dominated by arid-adapted Karoid species, especially larks and chats (16 species), raptors (17 species) that nest high on the cliffs.

The following species occur in the Spitzkoppe area and are near-endemic to Namibia; Ruppell’s korhaan, Rosy-faced lovebird, Monterio’s hornbill, Damara red-billed hornbill, Benguela longbilled lark, Gray’s lark, Herero chat, and White-tailed shrike. Other near-endemics that are very seldom found in the Spitzkoppe are - Rockrunner, Chestnut weaver and Carp’s tit. The Southern Booted Eagle (a subspecies which is endemic to southern Africa)
was the only red-data listed species found in the area. Although this species is known to roost in the inselberg area, breeding has not been recorded. There are no roost sites close to the lodge because the lodge backs up against outcrops that are much lower than the main peaks. Raptors usually prefer to nest high up on cliffs. Black eagle and Peregrine falcon are also red-data listed in Namibia. These two raptors probably breed but nest sites were not found anywhere near the lodge site. In any event they also nest or roost high on the mountain and would not be affected by the lodge. None of these species will be significantly affected in the Spitzkoppe. Moreover, all of them have wide ranges elsewhere in Namibia. In the case of the Herero chat, there are a few breeding sites on the grassy / rocky slopes on the west side of the Gross Spitzkuppe (Simmons, July 2003). However, this is almost 1km west of the lodge site and similar habitat does not occur at the lodge site. Moreover, based on experience at other lodges -Erlongo, Etendeka, and Hobatere Lodges, Herero chats and White-tailed shrikes adapt well to lodge environs, and even breed there.

4.7 Archaeology

A site for the lodge had originally been chosen by the SCDA prior to Eco.plan's involvement in the project. The original site was at the foot of the Gross Spitzkuppe and on the north side of it. Eco.plan commissioned J.Kinahan to undertake an archaeological survey of that site. Kinahan's report (June 2003) is contained in Appendix L. The survey identified five sites with rock art and/or archaeological deposits. Some of the deposits were stratified - containing deposits of possibly up to 400 years old. Such stratified deposits are uncommon in the Spitzkoppe, and are extremely valuable. Since it would not have been possible for the lodge development to be built without direct impacts on these archaeological sites, this site was rejected.

A new site was then sought which would not affect any rock art or archaeological sites. Several sites were looked at but only one site offered the necessary ambience required by the Developer as well as offering a layout that could avoid impacts on archaeological/rock art sites. The new site was located about 500-600m from the original site at its nearest point, and to the north-east of it. Kinahan (November 2003) made a detailed report on the area of this new lodge site. This report is contained in Appendix M.

Six archaeological or rock art sites were found within the area proposed for "exclusive use" by the lodge. However, it was possible to design the layout of the lodge such that none of these sites would be affected by any buildings or infrastructure related to the lodge. The reader is referred to Figure 3, which shows the proposed layout of the lodge in relation to the sites identified by Kinahan. The green circular buffer zones in Figure 3 are the buffers recommended by Kinahan around each site. A summarised description of these sites is given in the table below. Kinahan (November 2003) recommended that a buffer of 50m should remain undisturbed around site QRS 50/3. Around all the other sites, a buffer zone of 100m was recommended for each site (QRS 50/1, 2, 4, 5&6).

<table>
<thead>
<tr>
<th>Site</th>
<th>Summary Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QRS 50/1</td>
<td>Site about 10x10m. Scatter of artifacts in primary context but not significant and unlikely to be affected by the development.</td>
</tr>
<tr>
<td>QRS 50/2</td>
<td>A frieze of indistinct paintings extending over about 12m. Floor area about 4m x 3m. Worthy of protection, but it does not appear that it would be affected by the lodge.</td>
</tr>
<tr>
<td>QRS 50/3</td>
<td>A polished rock surface - possibly the result of the working of animal hides. This is within the core development area.</td>
</tr>
<tr>
<td>QRS 50/4</td>
<td>Small group of <strong>indistinct paintings</strong> in a crevice with no overhead shelter. Unlikely to be affected by the lodge.</td>
</tr>
<tr>
<td>QRS 50/5</td>
<td><strong>Two paintings</strong> (rhino?). Dense scatter of <strong>stone artifacts</strong>. May be stratified deposits.</td>
</tr>
<tr>
<td>QRS 50/6</td>
<td>A passage 16m long x 6m wide at northern end. <strong>Paintings &amp; scatter of stone artifact debris.</strong> The deposit is most likely well stratified - 4m x 5m, and expected to be 1.2m deep. This site is significant and worthy of protection. The site is unlikely to be affected by the lodge.</td>
</tr>
</tbody>
</table>

The proposed layout will avoid impacts on these sites. It will be in the interests of the lodge to ensure that these sites are properly managed. This should result in better protection of these sites than at present – because the sites at the base of the granite outcrops have been used by campers, which has resulted in some degradation of the rock art, for example by smoke from fires, abrasion, and fat from cooking.

### 4.8 Socio-economic environment & land use

Forty years ago there was no community resident in the vicinity of the Spitzkoppe. After the San people died out or left the area, the mountain remained uninhabited until the late 1960’s when a small community of Damara people was moved there as a result of policies under the former apartheid government – specifically the Odendaal Commission. The community was thus established on the south side of the mountain. These people make a living from a few goats and cattle, selling low-value gemstones and curios, and more recently from the community-run Spitzkoppe Community Camp. Government pensions no doubt also contribute to the local income.

Cattle, goats and a few donkeys graze around the base of the granite massif, but the grazing/browsing capacity is very limited, and the area is not suitable for permanent pasture. In some years there is very little growth due to lack of rain. Domestic livestock degrades the grasslands by eating the seed that would otherwise produce more grass the next time the rains are sufficient.

Due to the dryness of the Spitzkoppe area, the cultivation of crops is not possible. It should also not be considered due to the lack of water. Moreover, the policy of DWA is that groundwater should not be used for crops because the value added is so low and there are more important uses for groundwater.

Thus the community is poor, and their economic opportunities are very limited in this harsh environment. Tourism affords the greatest potential for these people to improve their income and living conditions.

The Spitzkoppe Community Development Association (SCDA) runs a community campsite around the mountain. They charge an entrance fee and camping fee. According to figures supplied by MET, the campsite provide jobs for 16 people and the economic benefits to the community amount to approximately N$ 214,000 /year (October 2003 – September 2004). This income is not sufficient to manage the Spitzkoppe area adequately. There are very few facilities. Near a few of the campsites pit latrines and/or rubbish bins are provided, and the SCDA is responsible for the removal and disposal of refuse, and the maintenance of the sandy access tracks. The community also sells firewood and water to campers. Some of the designated campsites are in rock shelters that contain San rock art or archaeological deposits. This has led to some damage to the rock art as a result of smoke from cooking fires or abrasion.
Thus the area has suffered a number of human impacts in recent years. The SCDA needs help in the form of management skills and improved financial resources in order to run the campsites and manage the area more effectively.

There is little data available on the population or socio-economic status of the Spitzkoppe community that can be used as suitable baseline data. Data from the latest census is provided for the seven constituencies that comprise the Erongo Region.

For the Erongo Region as a whole, the following data is probably relevant:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>107,663</td>
</tr>
<tr>
<td>Rural population</td>
<td>20% of the total i.e. about 21,000.</td>
</tr>
<tr>
<td>Population growth rate</td>
<td>1.3%</td>
</tr>
<tr>
<td>Average number of children per woman</td>
<td>3.2</td>
</tr>
<tr>
<td>Percentage under 15 years in age</td>
<td>29%</td>
</tr>
<tr>
<td>Sex ratio: male/female</td>
<td>115/100</td>
</tr>
<tr>
<td>Average size of household</td>
<td>3.8 people</td>
</tr>
<tr>
<td>Literacy rate, 15 years+</td>
<td>92%</td>
</tr>
<tr>
<td>Life expectancy at birth (males / females)</td>
<td>54/59 years</td>
</tr>
<tr>
<td>Percentage with a disability (includes deaf, blind, speech, hands, legs, mental)</td>
<td>4%</td>
</tr>
</tbody>
</table>

Information supplied by USAID indicates that the population of the Spitzkoppe Community is currently about 600 people. However, there are no statistics available on the income of the Community. USAID assumes that the total income of the community is likely to be between US $90,000 - $180,000 (i.e. US $150 - $300 per person) per annum, but they do not state how this figure was arrived at (www.usaid.org.na/success.asp?proid=3). These figures presumably exclude the income from the Community Campsite, which was mentioned earlier in this subsection.

According to figures provided by the Ministry of Environment & Tourism, Joint Venture Tourism projects bring in a total of over N$3.8 million per annum to seven Conservancies in Namibia.

The campsite currently charges N$35/person per night, plus a charge per vehicle (N$5 / sedan car, N$10 / 4x4 vehicle, and N$15 / truck or bus.

The proposed lodge is seen by the Community, the lodge Developer and NGO’s (NACOBTA, NNF and WWF) as an opportunity to improve the income of the community. This can be achieved through direct employment, a bed levy (to the benefit of the SCDA) and increased sale of curios and gemstones. In particular the bed levy will provide the SCDA with improved financial resources – some of which should be used for the better management of the area. In this way the resources that attract tourists can be conserved.
5 ENVIRONMENTAL ASSESSMENT

5.1 Introduction

5.1.1 Site selection and layout considerations

The most important step towards ensuring that the lodge was environmentally acceptable was to select the right site. As mentioned earlier, the original site at the foot of the Gross Spitzkuppe peak had been selected by the Community without environmental or archaeological input. This site was rejected for archaeological reasons. The details of the archaeological deposits and rock art are explained by Kinahan (June 2003).

A new site was then sought through co-operation between the Archaeologist (J. Kinahan) the Lodge Developer, with discussion from the Environmental Scientist and the other specialists subcontracted to Eco.plan. The new site was then approved by the Spitzkoppe Community Development Association (SCDA) – refer to their letter of approval in Appendix G. The new site was subjected to further scrutiny. In the end it was evident that this site had several advantages over the previous site, and that the environmental impacts would be lower. In fact, in the author’s opinion, there is probably no other site at the base of the Spitzkoppe massif that satisfies the diverse criteria that were considered important by all parties:

- It was acceptable to the Spitzkoppe community and did not take out many campsites,
- it avoided impacts on archaeological and rock art sites,
- the most sensitive areas of vegetation could be avoided, and the chalets could be spaced out in between stands of vegetation,
- access by other visitors to archaeological sites and around the mountain, would not be unreasonably obstructed, yet the accommodation units would enjoy seclusion,
- visual intrusion, particularly to other visitors to the area, and mountain climbers, could be minimised through careful layout and design,
- the developer’s requirements for suitable views, and an attractive ambiance, could also be satisfied.

The next step in minimising the environmental impacts was to design a suitable layout within the chosen site. This was done by the Architect, R. Barnard, taking into account all the above factors. The result is the proposed layout shown in Figure 2. It was not possible to avoid all impacts entirely, but the proposed layout and design represents a reasonable compromise between the needs of the development, the needs of the natural environment, and the needs of other visitors to the area. Further details of layout and design considerations are contained in section 5.2 below.

Having identified a suitable site and determined a suitable layout, the specific environmental impacts were then assessed in detail as explained in the next sub-section.

5.1.2 The approach to the identification and assessment of environmental impacts

The potential impacts of the lodge development and related infrastructure were identified by considering a number of sources:

- The issues and concerns raised during the public participation programme,
- The specialist reports on flora, fauna, avifauna and archaeology,
• The DEAT (1992) Checklist of Environmental Characteristics,
• Two site visits to the new site, and
• The professional experience of the author / Environmental Scientist.

Each identified impact was then assessed on the basis of the criteria that are set out in the Environmental Assessment Policy of Namibia. These criteria are explained in Table 1 below.

<table>
<thead>
<tr>
<th>Table 1: Assessment Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>♦ The <strong>nature</strong> of the impact,</td>
</tr>
<tr>
<td>♦ The geographical <strong>extent</strong> of the impact,</td>
</tr>
<tr>
<td>♦ The <strong>duration</strong> of the impact (short: 0-5 years, medium: 5-15 years, long term: lifespan of the project, or permanent)</td>
</tr>
<tr>
<td>♦ The <strong>intensity</strong> of the impact (low, medium or high)</td>
</tr>
<tr>
<td>♦ The <strong>probability</strong> of the impact actually occurring (unlikely, probable, highly probable or definite)</td>
</tr>
<tr>
<td>♦ Where there is uncertainty about certain impacts, the <strong>level of confidence</strong> that the author places on his assessment is stated (low, medium or high)</td>
</tr>
<tr>
<td>♦ The <strong>significance</strong> of the impact is determined as a synthesis of the above assessment criteria where: -</td>
</tr>
<tr>
<td>- <strong>Low</strong> significance means that the impact will not have an impact on the decision to approve the project or the particular alternative,</td>
</tr>
<tr>
<td>- <strong>Medium</strong> significance means that the impact should have an impact on the decision unless it is effectively mitigated,</td>
</tr>
<tr>
<td>- <strong>High</strong> significance means that the decision should be influenced regardless of any mitigation. A high significance would suggest a potential fatal flaw in the proposed development.</td>
</tr>
</tbody>
</table>

For convenience, the impacts on the **bio-physical environment** are assessed in section 5.2, while the impacts on the **socio-economic environment** are dealt with in section 5.3. Both positive and negative impacts are considered.

Section 5.4 deals with the ambient environmental conditions that could have an adverse impact on the lodge and which therefore need to be taken into account in the design of the buildings.

5.2 Impacts on the Bio-physical Environment

5.2.1 Impacts on archaeological sites

A survey of the new site for the lodge was undertaken by the Archaeologist, Kinahan (November 2003), in order to establish whether there were any sites with rock art or archaeological deposits that could be affected by the lodge. This report is contained in **Appendix M**. Kinahan found 6 sites with rock art or artifacts within the "exclusive use zone" of the lodge. However it was possible to design the lodge layout in such a way that impacts on these sites could be avoided, and certain mitigation measures were also recommended.
Kinahan (November 2003) concluded that:

"On the basis of the observations presented here it is recommended that the proposed lodge development should be approved for the alternative site, provided that:

- Plans for the development are submitted showing that construction will not impact on the sites or encroach within 100m of the sites.
- If future expansion of the lodge facilities encroaches on the sites appropriate mitigation should be carried out.
- The sites must be clearly flagged (eg with "danger tape") during construction to prevent inadvertent disturbance.
- Warning notices should be placed at the sites to inform lodge guests concerning the vulnerability of the rock art in particular.
- A small information board/display should be erected in the lodge reception explaining how the development has been sited with respect to the archaeological remains." (p.8)

In response to these recommendations the Architect, R.Barnard, proposed the layout shown in Figure 2. This allows for the recommended 100m buffer zone that will remain undeveloped around the five sites with rock art or artifacts (QRS 50/1, 2, 4, 5 & 6). Site QRS 50/3, is less vulnerable to human impacts, being a "polished" rock surface that appears to have been a place where hides were tanned by the San people. Here a 50m buffer zone was recommended and will be complied with.

The lodge will therefore have no direct impact on any sites with rock art or archaeological remains or rock art. In fact the lodge will encourage better management of these sites than at present as it will be in the lodge’s interest to conserve these sites. At present, the sites are completely unprotected and people camp and make fires in these sites. Camping in the "exclusive use zone" will not be allowed. However the public will still be able to access the rock art sites on foot. It is recommended that people should only be allowed to access these sites in the company of a trained guide. Kinahan also recommended other measures to protect these sites as quoted above. These recommendations must be complied with.

Thus, although the lodge will bring more people to these sites, their activities will be better controlled, and therefore, the impacts on the rock art and artifacts within the "exclusive use zone" should be greatly reduced compared with the present situation.

It is in the interests of the lodge to protect the rock art and archaeological sites because they add to the attraction of the place. Therefore, there is a strong incentive for these sites to be well managed.

Nevertheless, J.Kinahan (pers comm.) remains concerned about the intrusion of the lodge into the "archaeological landscape" even though the lodge would not impact directly on the nearby archaeological sites.

<table>
<thead>
<tr>
<th>Potential Impacts on rock art / archaeological sites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nature of impact</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Mitigation</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
5.2.2 Protection of existing plants

The current situation is that the natural vegetation is relatively undisturbed, except for grasses, which are heavily grazed by domestic livestock from time to time. Some evidence of firewood collection exists – possibly by the community or campers. The species affected in this way are mainly small Acacia trees. By preventing grazing of domestic animals and harvesting of firewood, the lodge will have a minor positive impact on vegetation within the “exclusive use zone”.

Some vegetation will however be adversely impacted by the lodge development. The affected vegetation consists mainly of small trees, low bushes and ephemeral grasses. Taller bushes and trees occur mainly at the base of the granite outcrops and along drainage lines. These include both evergreen and deciduous species. Impacts on vegetation could occur in several ways:

- Removal of plants to make space for buildings,
- Excavation of trenches for water pipes and electrical cables can damage roots temporarily,
- Compaction of soil, particularly under the road, could theoretically cause damage to roots – although the nature of the ambient material, weathered granite, is such that it will not compact very much.

Only the following vegetation types occur on the site which are considered highly sensitive by Burke (June 2003) although there are no unique species present:

- Granite outcrop vegetation (i.e. on the outcrops in cracks and fissures). This will be avoided in the layout design.
- Shrublands surrounding the granite outcrops (mitigation as explained below).
- Shallow drainage line vegetation (mitigation as explained below).

It is in the interests of the lodge to minimise damage to vegetation. In order to achieve this, the Developer has proposed the following measures:

- All buildings, roads, pathways and trenches will be positioned on site (not just on a drawing such as Figure 2 which shows only the approximate positions) with the help of an
environmental scientist who knows which plants are the most worthy of conservation. Therefore there should be very little destruction of vegetation.

- Buildings will be positioned to avoid the best vegetation near the base of the rock and near drainage lines, where the conditions are most suitable for trees.
- The floors of all buildings will be elevated off the ground on small concrete footings or pillars made to look like the natural rock.
- The road and some of the footpaths will be aligned to avoid root zones as far as possible, and made of permeable material such as weathered granite so that water can still penetrate the ground. However, in areas close to vegetation that could be endangered by compaction related to paths, wooden walkways will be constructed off the ground.

The above approach to the layout and design will ensure that the impacts on vegetation will be minimal.

<table>
<thead>
<tr>
<th>Potential impacts on existing vegetation</th>
</tr>
</thead>
</table>
| Nature of impact | - Potential negative impacts as a result of removal of plants, trenches or compaction of ground.
| | - Minor positive impact by preventing domestic grazing and firewood collection. |
| Mitigation | - Buildings positioned on site with environmental input.
| | - Floors (and paths near important vegetation) to be elevated off the ground.
| | - Alignment of roads & paths to avoid root zones, & use permeable materials. |
| Rating criterion | Without mitigation |
| Extent | Footprint of buildings, roads and paths |
| Duration | Long term |
| Intensity | Potentially high |
| Probability of occurrence | Highly probable |
| Confidence in this assessment | Confident |
| Significance in this assessment | Medium |
| Further investigation required | - Location of buildings, roads, paths on site with an environmental scientist prior to construction. |

Some discussion was held with the Developer concerning the possible establishment of a small stock of wildlife such as springbok. It must be emphasized that grazing in the area is not available every year. Animals such as Springbok would originally have used the area, but only in years of good rainfall with abundant grazing. If such animals were re-introduced and confined by fencing, they would not be able to survive on the available vegetation in dry years. They would also denude the veld, even if provided with imported fodder. Bringing in fodder creates a serious risk of introducing the seed of alien invasive plant species. Elimination of invasive aliens would represent a new management problem and ongoing cost to the Spitzkoppe area. For all these reasons, it is strongly recommended that the introduction of animals should not be permitted. This recommendation is made by Griffin (June 2003) in his specialist study on fauna for this project, and is supported by Eco.plan.

If a watering point is provided for wildlife, e.g. from the treated sewage water, this may attract animals, which could also lead to local denudation of the veld nearby. It is difficult to predict the magnitude of this impact.
5.2.3 Cultivation of indigenous plants

Some planting is desirable with an absolute minimum of artificial landscaping. It is essential that only species that occur naturally in the Spitzkoppe should be used. This should be one of the conditions of approval of the project. The reason for this recommendation is that plants from other areas e.g. broad-leaved evergreen species, use more water – thus depriving other natural plants, and would be visually more intrusive. Non-local plants would also degrade the ecological and aesthetic integrity of the area.

It is also recommended that grass lawns should not be permitted – for the following reasons:

- Lawns require large volumes of water, and the water supply will be limited,
- There are no locally indigenous species of grass that are suitable for lawns, and
- Bright green grass would look completely out of place, and would be visually intrusive from the mountain.

Instead of grass lawns, places for people to lie in the sun or relax in deck chairs can be made as wooden decks, and / or small pebbled areas.

Enhancement of the positive impacts of planting locally indigenous species could be achieved by leading a small amount of the water from showers to soak pits near planted trees. This would enable the trees to grow larger. But this should only be done in summer – to avoid artificially green trees being visually intrusive in winter. Planting of trees should be limited to areas near the base of the rock and drainage lines to emulate the natural conditions.

Another opportunity for planting trees would be downslope from the sewage soak aways. Species such as *Acacia erioloba* and *Faidherbia albida* are attractive to wildlife (which eat the pods) and birds.

### Impacts of cultivation of non-local and exotic plants, and grass lawns

| Nature of impact | Exotics use more water and degrade the ecological and aesthetic integrity.  
|                 | Lawns use a lot of water, and bright green patches would be unnatural and visually intrusive. |
| Mitigation      | Use only plants indigenous to the Spitzkoppe, and no lawns |
| Rating criterion| Use of non-local plants and grass lawns |
| Extent          | The immediate lodge surroundings |
| Duration        | Long term |
| Intensity       | Highly negative |
| Probability of occurrence | N/A |
| Confidence in this assessment | Very confident |
| Significance    | High – negative |

Refer separate table below
Impacts of using only local indigenous plants and no lawns

<table>
<thead>
<tr>
<th>Nature of impact</th>
<th>• Judicious use of indigenous species occurring naturally in the Spitzkoppe can enhance the natural beauty and character of the area and attract birds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhancement</td>
<td>• Plant species in the habitats in which they would naturally occur.</td>
</tr>
<tr>
<td>Rating criterion</td>
<td>Judicious use of Spitzkoppe species in their correct habitats</td>
</tr>
<tr>
<td>Extent</td>
<td>In and around the lodge site and buildings</td>
</tr>
<tr>
<td>Duration</td>
<td>Long term</td>
</tr>
<tr>
<td>Intensity</td>
<td>Highly positive</td>
</tr>
<tr>
<td>Probability of occurrence</td>
<td>This is a desirable option for the Developer as it will enhance the appeal of the lodge.</td>
</tr>
<tr>
<td>Confidence in this assessment</td>
<td>Some of these species are easy to cultivate, but for some species, little is known about how to cultivate them.</td>
</tr>
<tr>
<td>Significance</td>
<td>Medium – positive</td>
</tr>
</tbody>
</table>

An initial list of species of Spitzkoppe trees and shrubs that could be planted includes:

- Acacia hebeclada
- Acacia reficiens
- Acacia senegal
- Adenolobus garipensis
- Boscia albitrunca
- Catophractes alexandri
- Commiphora virgata
- Cordia sinensis
- Croton gratissimus
- Dombeya rotundifolia
- Euclea pseudebenus
- Euclea undulata
- Euphorbia viroso
- Euphorbia spp.
- Maerua schinzii
- Monechma spp.
- Mundulea sericea
- Parkinsonia africana
- Salvadora persica
- Sterculia africana

Also, in fissures and earth-filled depressions on the granites, the following could be grown:

- Cyphostemma currori
- Ficus species
- Hoodia currori
- Moringa ovalifolia
- Sterculia africana
5.2.4 Potential impacts of invasive alien plants

Any kind of development creates an opportunity for the introduction of alien invasive plants. Some of the plants that could become invasive in the Spitzkoppe area are listed below. These are mostly non-indigenous species (except where otherwise indicated) which multiply and spread in the absence of their natural pests, and which therefore have a competitive advantage against the local indigenous plant species.

- *Cyperus esculentus* (Yellow nutsedge) where water is provided
- *Melia azedarach* (Syringa tree)
- *Nicotinia glauca* (Wild tobacco bush or small tree)
- *Ricinus communis* (Castor-oil plant)
- *Prosopis glandulosa* (Mesquite tree)
- *Lantana camara* (Common lantana bush – potential where water is provided)
- *Atriplex lindleyi* subsp. *inflata* (Sponge-fruit salt bush – a low greyish bush)
- *Datura spp.* (Thorn-apple – has a white trumpet-shaped flower and spikey pods)
- *Cereus jamacara* (Queen of the night – a tall straight cactus, superficially resembling some species of Euphorbia in terms of its form)
- *Harrisia martini* (Moon cactus – a sprawling cactus)
- *Opuntia ficus-indica* (Sweet prickly pear – bush with large oval thorny, succulent leaves)
- *Opuntia imbricata* (Imbricate prickly pear – thorny bush)

The above are just some of the invasive alien plants that are known to the author to be a problem in Namibia. Further details are provided Bromilow (2001) for identification and control of these plants.

Invasive species can be introduced deliberately or unintentionally in a number of ways. The table below shows the possible routes and preventative measures.

<table>
<thead>
<tr>
<th>Potential manner of introduction of invasive plants</th>
<th>Preventative measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed or plant material may adhere to car tyres or animals.</td>
<td>Inspect all vehicle tyres – not practical, and unlikely to be carried out effectively.</td>
</tr>
<tr>
<td>Seed or plant material may be imported to site in building materials if the source of the materials is contaminated.</td>
<td>Ensure that the source of materials e.g. borrow pits for sand or gravel, are free of these weeds.</td>
</tr>
<tr>
<td>Some species may be planted in ignorance of their invasive properties (e.g. syringa, cactuses or prickly pear).</td>
<td>Do not permit any non-local plant species. Involve a knowledgeable person in the selection of plants.</td>
</tr>
<tr>
<td>Some seed is spread by birds (e.g. bulbuls) from infestations not far away.</td>
<td>Eradicate alien plants in terms of an Area Management Plan.</td>
</tr>
<tr>
<td>Seed or plant material can also be introduced in fodder brought in for animals.</td>
<td>Do not permit any fodder to be brought in at all.</td>
</tr>
</tbody>
</table>

If alien plants are inadvertently introduced, they need to be eradicated before they set seed, using an appropriate method for the species concerned (refer Bromilow, 2001) and followed up to ensure that they do not re-establish.
Potential impacts of alien invasive plants

| Nature of impact | • Stands of invasive alien plants can out-compete and therefore be a threat to indigenous vegetation.  
|                  | • These plants can be unsightly – detracting from the aesthetic experience of an unspoiled area with a “wilderness” ethos. |

| Mitigation       | • See Preventative measures in the table above.  
|                  | • Refer to Bromlow (2001) for eradication measures.  
|                  | • Regular monitoring and follow-up eradication. |

<table>
<thead>
<tr>
<th>Rating criterion</th>
<th>Without mitigation</th>
<th>With mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>Almost unlimited</td>
<td>Confined to the site of activity</td>
</tr>
<tr>
<td>Duration</td>
<td>Long term to permanent</td>
<td>Short term if eradicated timeously</td>
</tr>
<tr>
<td>Intensity</td>
<td>Low-high : depends on the species</td>
<td>Low</td>
</tr>
<tr>
<td>Probability of infestation occurring</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Confidence in this assessment</td>
<td>Very confident</td>
<td>Very confident</td>
</tr>
<tr>
<td>Significance</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>
| Further investigation required (prior to construction) | • Check all borrow pit sites prior to use.  
|                  | • Do not permit any non-local plant species.  
|                  | • Do not permit any fodder to be brought in at all.  
|                  | • Eradicate alien plants from wider area in terms of an Area Management Plan.  
|                  | • Involve a knowledgeable person in these matters. |

5.2.5 Rainfall runoff & erosion prevention

Rain falls mostly in heavy storms. On the steep impermeable granite slopes the runoff is rapid. Although much of the runoff infiltrates the coarse sand at the base of the bedrock, on some occasions water will flow briefly on the surface along the drainage lines. This fact creates the potential for erosion of the coarse sand if not managed properly.

The layout and design will ensure that the flow of water is not concentrated more than the ambient flow. This will prevent increased erosion. The existing drainage lines are usually marked by increased density of low bushes and small trees. These drainage lines need to be avoided in the layout of the lodge buildings, and taken into account in the design of pathways and roads.

Elevating the floors of buildings above the ground surface (as proposed by the Developer) will help a great deal to avoid concentrating the flow of water.

Potential impacts on surface flow of water, and erosion

<table>
<thead>
<tr>
<th>Nature of impact</th>
<th>Potential concentration of surface runoff causing erosion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation</td>
<td>Layout to avoid drainage line / or concentrating flows, and elevation of floors.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rating criterion</th>
<th>Without mitigation</th>
<th>With mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>Within 50m of the lodge buildings, road and paths</td>
<td>No problem.</td>
</tr>
<tr>
<td>Duration</td>
<td>Long term</td>
<td>Short term</td>
</tr>
<tr>
<td>Intensity</td>
<td>Potentially medium</td>
<td>Low</td>
</tr>
<tr>
<td>Probability of occurrence</td>
<td>Possible</td>
<td>Very unlikely</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------</td>
<td>---------------</td>
</tr>
<tr>
<td>Confidence in this assessment</td>
<td>Confident</td>
<td>Very confident</td>
</tr>
<tr>
<td>Significance</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Further investigation required</td>
<td>During the layout on site, the drainage lines need to be avoided.</td>
<td></td>
</tr>
</tbody>
</table>

5.2.6 Impacts on rock and soil at the lodge site, sources of materials, and roads

In the area affected by the lodge there are two types of substrates – either outcrops of the granite bedrock, or coarse sand (typically 5-10mm) which is weathered from the granite. The bedrock is impermeable but the coarse sand is highly permeable. For this reason the small drainage lines that radiate from the foot of the granite outcrops mostly disappear into the sand within a few meters to about 100m from the rock outcrop. There is no topsoil horizon present. Because of the high permeability, there is little risk of erosion – provided that the flows are not concentrated as a result of the lodge and related infrastructure.

Impacts on soil and rock can arise from the following activities:

- Foundations and fixings of buildings,
- Constructed pathways,
- The movement of vehicles,

The steep, bare granite faces of the Spitzkoppe massif are a major part of the attractive ambiance of the site area. It is therefore in the lodge’s interest to ensure that these are not defaced in any way. For this reason, the Developer has chosen not to attach buildings to the rock faces. The buildings will be free standing, with concrete foundations in the sand. The only exception in this regard may be the VIP suite, where the sand is only a shallow layer on top of bedrock. Here the concrete foundations will have to be placed on the granite.

Footpaths will lead guests and staff from the reception / restaurant area to the chalets. These paths should be as inconspicuous as possible. Where these traverse granite bedrock, they should be concealed – e.g. a path from the managers houses to the north side of the ridge, and a path up to the VIP suit. Footpaths on sand should be made from materials such as the ambient weathered granite, compacted and stabilized, so that they have minimal visual impact. It is recommended that footpaths be made with edging stones of granite, with the coarse weathered granite sand forming the pathway in between. Footpaths and roads should be curving – reflecting the contours of the rock outcrops – in order to minimize the visual impacts from the mountain.

It is proposed that guests’ vehicles will not proceed beyond the parking area shown in Figure 3. The access road will need to be improved with weathered granite – which makes good gravel road surfaces. This will need to be maintained by the addition of material from time-to-time as the softer components of the granite will break down under regular traffic. A borrow pit for weathered granite material will need to be identified outside the Spitzkoppe area.

Paths and roadways must not be permitted to obstruct the natural drainage and the normal infiltration into the coarse sand surrounding the bedrock outcrops. The drainage is not confined to distinct drainage lines. Culverts under the roadway are recommended at the larger drainage lines. It is recommended that the road be made from weathered granite in the same way as the paths mentioned above. This material may need to be stabilised in a manner that will not be visually intrusive.
Sources of increased runoff will be limited to roofs, and any impermeable paved areas. The design will need to ensure that this runoff is distributed over the surface in a manner that is similar to the pre-construction conditions.

Small **borrow pits** for construction sand will be needed. These can be sourced from disturbed areas elsewhere. Granite stone can probably be sourced from several quarries for dimension stone situated near the **Klein Spitzkuppe** to the west. There are also large volumes of waste granite at the Rössing mine. Building stone should **not** be sourced from within the Spitzkoppe mountain area or the greater Management Area (Griffin, June 2003).

Building stone is available from the dolerite dykes north and south of the Spitzkoppe, but this stone is black and is not visually compatible with the pale coloured granite on site. Gathering this stone would also disturb the sensitive vegetation there. The use of dolerite is therefore **not** recommended.

Provided the above recommendations are followed, there should be no significant impacts on the soil or rock at the site, access routes or sources of materials.

### Potential impacts of exploiting rock and weathered granite for building material

<table>
<thead>
<tr>
<th>Nature of impact</th>
<th>Mitigation</th>
<th>Rating criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual impacts at excavations</td>
<td>Source materials from existing quarries, or previously disturbed areas</td>
<td>Without mitigation</td>
</tr>
<tr>
<td>Damage to vegetation</td>
<td></td>
<td>With mitigation</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>--------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td><strong>Extent</strong></td>
<td>At the site of excavation and access to it</td>
<td></td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Long term</td>
<td>At the site of excavation and access to it</td>
</tr>
<tr>
<td><strong>Intensity</strong></td>
<td>Variable depending on conditions</td>
<td>No impact</td>
</tr>
<tr>
<td><strong>Probability of occurrence</strong></td>
<td>Possible</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Confidence in this assessment</strong></td>
<td>Confident</td>
<td>Unlikely</td>
</tr>
<tr>
<td><strong>Significance</strong></td>
<td>Medium</td>
<td>Very confident</td>
</tr>
<tr>
<td><strong>Further investigation required</strong></td>
<td>Sources of materials should be approved by an environmental scientist prior to construction.</td>
<td>Low</td>
</tr>
</tbody>
</table>

5.2.7 **Impact of increased traffic and sightseeing**

The proposed access to the Lodge is via the existing track from the Community entrance south-east of the **Gross Spitzkuppe**, and then between the mountains – emerging at the "Gap" (see **Figure 3**) before it opens out to the main lodge site and the open plains beyond. It is this route that is expected to carry significantly extra traffic as a result of the lodge. The assessment of impacts in this subsection relates mainly to this route.

An alternative approach, which is more direct for people travelling from Henties Bay, is via the western Community entrance – just to the west of the **Gross Spitzkuppe** – and then moving round to the north side of that peak. This route is likely to be used less often, but the same issues will apply.
Additional traffic will be generated by the following activities – the figures below are based on 100% occupancy (which will seldom be the case):

- **Guests of the lodge coming and going daily.** Since the total number of guests will be limited to 30 in 15 units – the **maximum** number of vehicles arriving and leaving per day is taken to be 15 vehicles / day.
- Traffic generated by the need to fetch supplies, carry out maintenance activities etc. This is assumed to be one or two vehicles / per day.
- A vehicle will be used to carry laundry to and from the lodge to the Spitzkoppe Village to be laundered.
- Since staff who work at the lodge will commute daily, they will need to be transported to and from the village each day. It is assumed that this will generate an extra 2 trips to the village per day.
- Removal of waste from the lodge will also generate trips, which would probably be combined with trips for the other purposes mentioned above.
- The lodge will provide drives during the day and early evening. This will generate between 1 and 4 trips per day anywhere in the Spitzkoppe area.
- Guests will also do self-drive trips anywhere they fancy in the wider area. If each vehicle undertook 1 trip per day on average, this would lead to as many as 15 trips in the wider area.

Based on the above, it is roughly estimated that the lodge will generate a maximum of about 20 trips to and from the lodge (mainly via the route between the mountains) plus another 1 to 20 trips for sightseeing (guided and self-drive). Thus a total of up to 40 additional trips could be generated per day as a result of the lodge. This is the estimated worst-case scenario. In reality, there should be less because:

- The lodge will not always be fully occupied
- Families of 4 or 5 will sometimes arrive in one vehicle,
- Some guests will prefer to walk than drive,
- The lodge could discourage self-drives and provide guided walks and drives instead.

However, it is evident that the number of vehicle trips per day will have a significant negative impact on the peaceful surroundings. Amongst the negative impacts will be:

- The existing sand roads will become deeply incised by vehicle wheels and will need constant maintenance. Alternatively, the roads will need to be hardened with gravel. The gravel derived from the granites may be suitable but it may break down under regular wear. Any other type of gravel would have negative visual impacts, and is therefore not recommended. The use of granite “cobbles” may be the long term solution which has the least negative visual impact.
- Unless something like coarse granitic gravel or cobbles are used (tar roads would **not** be acceptable), a large amount of dust will be generated. Dust is harmful in many ways. It reduces the aesthetic experience for sight-seeing. It reduces the palatability of plants for animals. It also clogs the leaf stomata of plants and is therefore detrimental to plant growth – which is already slow in this area.
- Noise will disturb lodge guests, campers, and birds and wildlife to some extent. Birds and animals, however tend to habituate to such disturbance if people are in vehicles.

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1 An indication of possible occupancy rates is given by the Hospitality Association, HAN, which states that the average occupancy rates for lodges in 2004 was 30.2% for Namibia as a whole. For the Coastal areas, this figure was 21.0%.

Eco.plan. July 2005
Potential mitigation measures could include:

- Most importantly, the total volume of traffic needs to be minimised. Self-drive sight-seeing trips should be discouraged. This can be done by including lodge drives in the tariff, and then taking several people in one vehicle. Functional trips need to be organised as efficiently as possible. If some of these can be done in the middle of the day - when people and animals are not “out and about” - then the impact could be slightly reduced.
- The Lodge traffic itself could use an alternative route eastward from the lodge – linking to the Uis road. This will leave the more scenic route between the mountains free for tourists.
- Granite “cobbles” could be used to harden surfaces. This material may not be excavated within the area – but should be sourced from existing granite quarries or from Rössing.

<table>
<thead>
<tr>
<th>Nature of impact</th>
<th>Dust</th>
<th>Noise</th>
<th>Visual disturbance</th>
<th>Break-up of sand roads</th>
<th>Need to improve roads with natural materials that have low impacts and are permeable to rain water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation</td>
<td>Discourage self-drives, and encourage walking and lodge-operated drives</td>
<td>Alternative route for lodge (functional) traffic</td>
<td></td>
<td></td>
<td>Appropriate road materials.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rating criterion</th>
<th>Without mitigation</th>
<th>With mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>All main routes in the Spitzkoppe area</td>
<td>All main routes in the Spitzkoppe area</td>
</tr>
<tr>
<td>Duration</td>
<td>Long term</td>
<td>Long term</td>
</tr>
<tr>
<td>Intensity</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Probability of occurrence</td>
<td>Definite</td>
<td>Highly probable</td>
</tr>
<tr>
<td>Confidence in this assessment</td>
<td>Very confident</td>
<td>Confident</td>
</tr>
<tr>
<td>Significance</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Further investigation required</td>
<td></td>
<td>Appropriate road materials to be investigated by the Developer.</td>
</tr>
</tbody>
</table>

5.2.8 Impacts of water abstraction

A background to the potential water sources was provided in section 4.3, above. Three boreholes were test pumped and only two were found to be viable for the lodge. These were WW30881 in the Spitzkoppe River, and RWS borehole at Houdini. A third possibility was to drill further boreholes within 6km to the north of the lodge site. No decision has yet been taken regarding the best source. Therefore only two proven sources can be assessed here. However, if new boreholes are drilled, they will need to be assessed and in that case a short addendum to this EA report is recommended.

Various impacts could arise from the abstraction of water as follows:

- Overexploitation of any borehole can result in groundwater reserves becoming depleted, resulting in permanent damage to the aquifer. It is therefore essential that any borehole must be operated (a) in compliance with the abstraction limits recommended by the
specialist geo-hydrologist, and (b) that ongoing monitoring of groundwater level in the borehole and any nearby boreholes be carried out to confirm that the abstraction rates are in fact sustainable. The potential impact of groundwater depletion can therefore be managed to prevent this impact from occurring.

- If a borehole is shared with a local community (e.g. RWS borehole at Houdini), the potential arises for conflict over the available water resources. Potential conflicts need to be anticipated, and agreements between users regarding allocations should be established from the beginning. This would also apply in the case of separate boreholes within the same aquifer in cases where one borehole could affect another. Depending on the particular boreholes to be used, it may be advisable for the lodge and community to use separate boreholes that are not geohydrologically connected. A counter argument would be that the lodge may help the community to gain access to water resources – and therefore enhance the benefits of the lodge to the community. The community at Houdini, for example are reported by Bittner (pers comm) to be interested in growing vegetables and fresh produce for the lodge. The opportunity for mutual benefits would depend on the sustainable yield of the borehole in question. Once again, the potential for conflicts can be entirely managed.

- Potential impacts on trees and bushes need to be considered, especially if the borehole is sited next to a river (e.g. from Borehole WW30881 in the Spitzkoppe River.) If trees (usually Faidherbia albida, Acacia erioloba, and Tamarix usneoides in that area) are using the same groundwater, then it is likely that they will die if the groundwater level is significantly lowered. Here, specific conditions need to be considered.

  - Borehole WW30881 is situated in the marble aquifer at depths of 13m below the surface. While these trees can be more deeply rooted than that, in this case it is unlikely that they tap into the saline aquifer as this would be detrimental to their growth. It is likely that these trees are rooted only in the alluvium that overlies the marble aquifer, where they will get fresh water.

  - The RWS borehole at Houdini is far from any big trees in river beds and no impacts on vegetation are expected. The water level is 19m below the surface.

Large trees near any borehole should be monitored for any sign of water stress, and abstraction reduced or alternative water sources found if necessary.

- In the case of desalination (e.g. from Borehole WW30881), a small volume of saline residue will be left as waste. This is normally led to an evaporation pan. The volume of salts that crystallises out is small and can be disposed of to the sea or to the hazardous waste disposal site (Kupferberg) at Windhoek once a year or so. The evaporation pan needs to be constructed such that no saline effluent can leak out into the ground, in order to eliminate any possibility of groundwater contamination.

- Whatever the source of water, conservation of this scarce resource needs to be emphasised, and any wasteful activities need to be prevented. Wasteful practises such as cultivating lawns, and wasteful use on gardens, or leaking plumbing should be eliminated. Evaporation from a swimming pool should be addressed in some way.

The following measures are recommended to save water:

**Appliances and plumbing:**

- Even though laundry will be washed in the village, appliances for laundry should be selected with water economy in mind. Some appliances use considerably less water than others. The same is true for dishwashers at the lodge.
Shower nozzles should be selected which have lower delivery rates, and nozzles should produce a narrow cone of spray.

Toilet cisterns can be obtained that have high- or low-flush options for the user.

Prompt maintenance of plumbing and water installations is important.

Formal gardens and lawns are not proposed. However some of the water from showers, or some of the treated sewage water could be used to enhance the growth of the natural vegetation in summer.

User education:

- Signs and pamphlets should be used to explain to guests and staff that excessive water use could have ecological consequences and therefore they should use water sparingly.
- Hotel chains in Europe and South Africa have found that the following approach has saved them up to 20% of their water and energy consumption: Place a sign in each bathroom that reads: -

  "In the interests of saving water, if you are happy to use your towel more than once, please place it on the rail. If you would like a fresh towel, please leave it on the floor and we will replace it"

Grass lawns & gardens:

- Lawns require a large amount of water in this harsh climate with high evaporation. Green lawns would also be visually intrusive and "unnatural". Therefore lawns are not proposed and should not be permitted.
- Formal gardens will be limited to the use of a few local indigenous plants, but in general the approach will be to enhance the ambient vegetation. Some water from showers, and/or some treated sewage water should be used for this purpose – not "new" water.
- Watering of gardens should be done at night to minimise evaporation.
- Only local indigenous species should be used, as they are adapted to the dry conditions.

Swimming pool:

- A cover is recommended when the pool is not in use as this helps to minimise evaporation and also reduce the amount of chemicals required.

### Impacts of water abstraction (WW30881 in the Spitzkoppe River & RWS borehole at Houdini)

<table>
<thead>
<tr>
<th>Nature of impact</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential overexploitation and depletion of the aquifer</td>
<td>Geohydrological assessment and borehole monitoring</td>
</tr>
<tr>
<td>Potential conflicts with community if shared water resources (Houdini only)</td>
<td>No mitigation is possible if trees are affected but monitoring should detect signs of water stress in trees if affected.</td>
</tr>
<tr>
<td>Potential impacts on trees (WW30881 only)</td>
<td>Engineer an evaporation pond (and pipes) to prevent leakage into ground (WW30881 only).</td>
</tr>
<tr>
<td>Management and disposal of saline residue if desalination (WW30881 only)</td>
<td>Actively practise water demand management / prevention of wastage.</td>
</tr>
<tr>
<td>Potential wastage of water</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rating criterion</th>
<th>Without mitigation</th>
<th>With mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent</td>
<td>The aquifer</td>
<td>The aquifer</td>
</tr>
<tr>
<td>Duration</td>
<td>Long term</td>
<td>Long term</td>
</tr>
<tr>
<td>Intensity</td>
<td>Unknown</td>
<td>Low</td>
</tr>
<tr>
<td>Probability of occurrence</td>
<td>Probable if not monitored and managed as recommended</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Confidence in this assessment</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td><strong>Significance</strong></td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>
| Further investigation required | • Possible drilling of new boreholes 6km north of site.  
• Environmental assessment of these newly drilled boreholes must follow. |

5.2.9 **Impacts of a water supply pipeline to the lodge**

A pipeline will be constructed from the relevant borehole. This will consist of flexible HDPE pipe, which will be buried in a trench no more than 30cm wide and 1m deep (just deep enough to keep the water from being warmed by the sun).

In sandy soils, pipeline construction is very simple and the impact is negligible. Clumps of bushes and trees can be avoided, as the pipeline is flexible and can take slight bends.

Over rocky surfaces e.g. over dolerite, it may be necessary to cover the pipe on the surface. In that case, rocks should be gathered and concreted over the pipe to conceal it. The pipeline route should be selected to minimise impacts on any vegetation.

In any event, the impacts of pipeline construction should be negligible, provided that the work is carefully supervised by a responsible person.

Solar pumps may be used to pump the water. The small solar panels should have no visual impact form a distance of 500m or so.

The impacts of a pipeline from a selected borehole to the lodge are considered to be of low significance. Nevertheless, this should be addressed in the Environmental Management Plan in order to minimise any impacts.

5.2.10 **Trucking of water to the lodge**

The option of trucking water to the lodge has been considered by the Developer. This activity would have significant negative impacts as detailed in section 5.2.8 above, namely: dust, noise, disturbance, and most importantly perhaps serious negative impacts on the roads within Spitzkoppe due to the heavy weight of the vehicle. It would be very difficult, and expensive to mitigate the impact on roads.

Trucking of water is therefore **not recommended**. The only exceptions to this should be as a short-term emergency measure e.g. if a pump fails.

5.2.11 **Sewage and waste water disposal**

A number of options are available for the treatment and disposal of sewage (Batchelor...CSIR). These mostly consist of a combination of anaerobic and aerobic processes. Very simply, the system consists of an underground digestion tank where anaerobic bacteria function to break down the sewage. The second stage, aerobic treatment is normally achieved in oxidation ponds or simply soakaways into the soil. Created wetlands have also been shown to be very efficient for the aerobic treatment stage. These are shallow ponds containing *Phragmites* reeds and other hydrophyllc vegetation. The vegetation provides large surface areas that support the necessary bacteria that purify the water and release the nutrients into solution (refer to **Appendix N**).
In the case of Spitzkoppe Lodge, the treatment system will probably take the form of an underground tank (for anaerobic decomposition) followed by a soakaway for the clear water. In these very dry conditions with coarse sand it is possible that the clear water will just soak away in the top few metres of sand. However, if it seeps to the surface downslope, an artificial wetland will be possible. This may happen if the water encounters granite bedrock or a layer of calcrete.

A pond with reeds would attract many species of birds and is therefore an added attraction for tourists. However, it may also have some negative impacts that are to be avoided. Domestic livestock tends to gather around watering points, which leads to denudation – resulting in a “dust bowl”. Griffin (June 2003) recommended that a pool for animals to drink should not be provided. Alternatively the pond should be fenced off so that domestic animals cannot get to it.

Bird baths near the lodge, however, would not only attract birds but possibly small mammals such as genets, which would be a point of interest for lodge guests.

A soakaway would provide a source of water for some large trees: *Acacia erioloba*, *Faidherbia albida*, and the small *Tamarix usneoides*. The first two of these provide large quantities of pods that are suitable for livestock, wildlife, and even crafts. These trees will also provide nesting sites and food for birds, and perhaps small mammals and reptiles.

The siting of the sewage disposal plant needs to take into account:

- Wind direction: Probably the best site would be to the north-west of the lodge and 1km away so that the plant is normally downwind from the lodge and far enough away to prevent odours reaching the lodge.
- If more boreholes are drilled 6km to the north of the lodge, then the geohydrologist should be asked to determine whether there is any risk of contaminating the groundwater resource. At this stage this is considered to be very unlikely as the area near the lodge is known to be underlain by granite at a depth of a few metres and is not permeable.
- The visual impacts of establishing large trees in this context should be considered. Part of the great appeal of the view to the north is the unbroken landscape of vast extent.

Provided these issues are taken into account, the treatment and disposal of sewage should have no significant impact.

5.2.12 Impacts on fauna

Animals generally habituate well to the presence of lodges and no significant impacts on animals are expected (Griffin, June 2003). Experience from other lodges has shown that even leopards become used to the presence of lodges (S Braine, Hobatere Lodge, pers comm).

It will be important to ensure that a few leopards remain in the area to keep the dassie and hare populations under control – otherwise these rodents will eat all the vegetation.

Two important issues must be made a condition for approval of the lodge:

1. Wild animals must not be fed at the lodge or anywhere in the Spitzkoppe area. Feeding animals can lead to population imbalances, which can have serious ecological consequences. Feeding potentially dangerous animals, such as leopards and baboons will cause these animals to lose their natural fear of people. These animals can then become a threat to human safety and end up having to be shot. The local people report that there are between 4 and 8 leopards in the Spitzkoppe. So far, these have sometimes taken goats or donkeys, but they have not attacked people. Feeding them could, however lead to these
animals starting to attack people. Therefore feeding of wild animals should absolutely not be permitted.

2. Domestic animals, especially cats, must be forbidden at the lodge. Domestic cats kill many small mammals, reptiles and birds (Simmons and Komen 2003), and have no place in this natural environment. Moreover, domestic cats have often bred with the African wildcat (Felis lybica). The result is "pollution" of the natural gene pool of that species. Griffin (June 2003) and Simmons (July 2003) have both recommended that domestic cats should be absolutely prohibited everywhere in the Spitzkoppe.

Provided these prohibitions are strictly applied, there should be no significant impacts on animals, large or small.

5.2.13 Impacts on birds

Apart from the recommended prohibition on domestic cats, the lodge should have no significant impact on birds. In fact it is more likely to have a positive impact in a number of ways:

- Provision of water in bird baths will attract species that may not otherwise be present,
- If a pond is used for the disposal of treated sewage water, it may attract species such as sandgrouse from far afield. It will also attract raptors that eat other birds. A pond would therefore have a positive impact on birds and tourist pleasure in viewing birds.
- Some trees can be expected to grow larger and bear more fruit if they are given a little water. These trees will therefore attract more birds.
- While no raptor nests were found near the lodge site, walking and climbing trails must be designed to avoid all raptor nest sites as disturbance leads to breeding failure.

Overall, there should be a positive impact on the number and diversity of birds recorded at the site. However, domestic cats must not be permitted, and trails must not be allowed to venture near to roosts or nests of any birds of prey. If these conditions are enforced, there should be no negative impacts on birds.

5.2.14 Solid waste disposal

There is no adequate waste disposal facility near the Spitzkoppe as the existing disposal site used by the Community is not able to cope with additional waste. Therefore the following approach is recommended:

1. The first priority should be to keep the various types of waste separate at the lodge.
2. Cans, bottles, packaging and plastic make up most of the volume of waste from a lodge. These materials are recyclable and should be returned to Windhoek for recycling.
3. Organic waste from the kitchen (vegetable peels and waste food) should be fed to goats and pigs at a site near the Community village south of the mountain.
4. Small volumes of paper and plastic may be landfilled at a site south of the mountain. A site will need to be found where a small pit can be dug. Wind dispersal of paper and plastic will need to be prevented. This can be done by covering a waste pit with a cargo net, and by regular burning. Burning is still considered the best practice for small volumes of dry waste, as it prevents wind dispersal and vermin (e.g. rats and flies)
5. An alternative could be to remove waste to the municipal waste site at Usakos or Swakopmund.
Waste will require careful management as outlined above. However, provided it is properly managed, there should be no significant impact on the Spitzkoppe area.

5.2.15 Impacts of power supply

There will be no connection of the lodge to the national power supply grid. There will therefore be no powerlines to the lodge.

Power / energy may be generated in a number of ways. The following options should be considered and evaluated by the Developer: -

- A generator plant will need to be run to supply power for fridges, freezers and other vital equipment. The generator can also be used for charging batteries for providing light at night.
- Gas will be used for cooking in the kitchen.
- Water heating is one of the greatest consumers of electrical energy. The energy required can be reduced by means of a system of black polythene pipes, exposed to the sun, and connected to geysers. Water circulates through these pipes and is pre-heated by direct solar energy rather than electricity. Electrically or gas is then used to “top up” to the desired temperature if necessary. This cost-effective system is used on a number of farms in Namibia, even without electricity. A solar water heater on the roof of a building can have a visual impact and therefore needs to be situated where that impact is minimised.
- Solar panels, which generate electricity, can also be used to charge batteries for lighting at night. However they need to be quite large and therefore have a negative visual impact. For this reasons they are not proposed. However, solar lights can also be used for lighting along paths and walkways. These are small and inconspicuous. They store solar energy in batteries by day for use at night.
- Solar powered pumps are recommended for pumping water from boreholes and transporting it via pipelines to the lodge.
- Instead of conventional air-conditioning, a ground-cooled air system should be investigated. This is a system of large pipes about 1.5m below ground underneath the building to be cooled. The underground parts of the pipe have a system of fins (rather like the back of a fridge). A fan system draws air from the interior of the building through the underground pipes, where it cools. The air is then re-circulated back into the building. This system is in operation at the Gobabeb Desert Research Centre in the Namib and is very effective.
- Air can also be cooled by humidifiers, which spray a fine mist of water into the air indoors. Evaporation of this mist reduces the temperature. The power requirements of humidifiers, will, however need to be considered.

The potential environmental impacts of these alternatives are minimal, but the following will need to be considered: -

- Noise from a generator can be dampered by means of a suitably designed generator house – in which the door and air vents have special baffles to suppress noise. Noise would otherwise echo around the granite cliffs.
- Direct solar water heaters and solar cells can be unsightly, and they will need to be carefully designed to prevent visual impacts.
- Cooling systems that use water will need to be evaluated in relation to the available water resources.

Provided these issues are managed, there should be no significant impact arising from the provision of power. Every effort should be made to find cost-effective clean energy solutions.
5.2.16 Impacts of telephone lines

The existing telephone lines to the Community campsite office will need to be extended to the lodge. Overhead lines would be unsightly, and the telephone line should therefore be run underground.

5.2.17 Housing for staff

The lodge will employ mostly people from the community, and the staff will be housed in the Community "village" on the south side of the mountain. Any workshops will also be located in the village. Therefore staff housing and workshops will not be provided at the lodge site – with the exception of two units for managers as mentioned in section 1.4 and shown in Figure 2.

5.2.18 Construction camp & materials storage.

It is recommended that construction staff be housed in the village, with only security guards being on site overnight. However, the construction manager could be accommodated on site if the two management units are constructed first and also used as the site office.

A small area for storage of materials will be required e.g. timber, stockpiles of thatch and weathered granite etc. The storage area must be carefully planned so that it occupies a position that will be used for building later – e.g. the car park. Thus the storage will not lead to additional / unnecessary disturbance of natural vegetation. This is important as the growth rate of plants is slow in this area, and it will be very difficult to rehabilitate any areas that are damaged.

5.3 Impacts on the Socio-economic Environment

5.3.1 Economic benefits to the community

The proposed lodge joint venture will provide the following direct benefits to the Spitzkoppe Community.

- Lease of the lodge site from the Community for N$ 3,000/ month.
- 10% Of bed revenues from the lodge. This will increase to 12% in the third year of operation.
- Direct employment of at least 14 members of the community as staff and guides at the lodge. The selection of employees from the Community will be carried out on a skills basis.
- Goods and services will be sourced from the community where possible e.g. baked goods, handicrafts, laundry services, and possibly vegetables (although water is a key constraint here).
- Training of community members, including costs of certificate programmes in tourism or management for an individual intended to assume a management role in the lodge.

It is projected that by year six of operation, the lodge will generate in excess of N$550,000 for the community from bed revenues and rent for the site. Not included in this figure are a number of additional benefits, namely:

- Increased revenues to the Community campsite as it becomes more attractive due to the availability of food and drinks from the lodge,
Community services and goods such as bakeries, handicrafts, and laundry services.
Those not employed at the lodge may have increased opportunity to provide goods and services to those who are employed,
Increased sales of gemstones and curios to tourists,
By gaining experience, in service training, and confidence, employees will also be in a better position to move elsewhere to find employment should they choose to do so.

The contract between Spitzkoppe Lodge cc and the SCDA extends for 15 years. At the end of that time, the community will receive a 25% equity share in the lodge. At that stage these two parties will have the opportunity to review their business relationship for an extended period.

The estimated payments to the SCDA should be N$ 90,000 in Year 1, building up to over N$ 550,000 by Year 5, and N$ 723,000 by Year 10. Estimated wage earnings will be N$290,000 in Year 1, building up to N$460,000 in Year 5 and N$660,000 by Year 10 (R.Barnard, pers comm).

5.3.2 Impact on existing grazing areas

The area designated for the exclusive use of the lodge would exclude grazing of livestock (refer to Figure 3). The affected grazing area is roughly 30 ha in extent. This represents an extremely small portion of the total grazing area immediately surrounding the Spitzkoppe Mountains.

Since the area is so small, this loss of grazing land to the Community is considered to be completely insignificant.

5.3.3 Loss of a few campsites

The SCDA runs a Community Campsite and charges N$35.00 per person / night plus a vehicle fee of N$5/car, N$10/4x4 bakkie, or N$15/truck or bus. The campsites are scattered all around the mountain and the area in between the main peaks and the outlying granite outcrops. Although 25 campsites are recognised and numbered by the SCDA (Ryan Gariseb, Camp Manager, pers comm) there is in fact no restriction at present on where people may camp. Thus the actual number of campsites is far greater than the numbered sites.

The “exclusive use zone” required by the lodge will prevent the use of 2 or 3 numbered campsites for camping.

Initially, this will have no impact at all on the earnings of the camp as the 25 available sites have never been filled. If the camp reached a stage where all 25 sites were filled, then the 2 or 3 campsites lost to the lodge could, theoretically, represent a small loss of revenue. In practise, however, there are many other places that could be used for camping, so there would be no real loss to the Community Campsite as a whole.

Moreover, as part of the Area Management Plan, it will be necessary to revisit the use of some of the existing campsites which contain rock art or archaeological deposits. Some of these sites should not be used for camping and alternatives should be found. This issue will need to be addressed during the development of the AMP in consultation with the SCDA.

In short, the Community Campsite will suffer no noticeable loss of revenue as a result of the 2 or 3 formal sites that will be lost to the lodge. The economic benefits will far outweigh any perceived adverse impacts in this regard.
5.3.4 Impacts on cultural and spiritual values

The Spitzkoppe was a place of great cultural and spiritual value to the original San people. As mentioned earlier, the Damara Community was only established in the Spitzkoppe in the late 1960's and then only as a result of the policies of the apartheid government. Although the Damara people had a certain affinity for the San people the Spitzkoppe does not have a deeply rooted spiritual or cultural significance for the Damara Community as it did for the San people.

Thus there should be no adverse impact on the spiritual or cultural values of the local Community. Moreover, the Spitzkoppe Community is fully in support of the lodge development for economic reasons.

5.3.5 Impact on existing rights of access

Historically, there has been free access around the mountain with no restrictions. There are two sand tracks that will be affected by the “exclusive use zone” of the lodge: -

- The more important of these tracks is the “Gap” where the main lodge buildings will be. The Developer has stated that the volume of traffic passing through the gap is so small that it will not be a problem for the lodge, and therefore the “Gap” will not be closed to other visitors. A sign could just be put up indicating the presence of the lodge there. It will be in the lodge’s interest to allow other visitors to pass through the “Gap” as they may stop for tea or drinks or a meal.
- The second track affected is the one around the northernmost granite outcrops where most of the chalets will be situated. This track will be closed to the public for about 900 metres.

However there are other access tracks to the eastern end of the “exclusive use zone”, and the north side of the Gross Spitzkoppe can also be accessed from the west, so the restriction on other tourists will be very minor indeed.

Concerning access to the rock art sites that are within or close to the lodge’s “exclusive use zone” the following assessment is made. The rock art sites (QRS 50/2, 50/4, 50/5, and 50/6) are all valuable from a heritage point of view but they do not contain any spectacular rock art and are therefore unlikely to be of great interest to the average tourist. By comparison, there are far more interesting and clearer images at sites to the east outside of the “exclusive use zone”. For example, the Golden Snake paintings and others are further east, and the Bushman’s Paradise is near the far eastern end of the granite massif. For this reason it is expected that there will be little demand from the average visitor to the area to see the sites above-mentioned. If, however, there is a particular interest group who wishes to do so, they will be able to get permission from the Lodge office to visit these sites on foot. The same would apply to any archaeologist who is authorized by the National Monuments Council to undertake bona fide research at these sites.

Thus the lodge will not significantly or unreasonably restrict access to the rock art or archaeological sites within the “exclusive use zone”. It will have no influence at all on the more interesting rock art sites as these lie well outside the “exclusive use zone”.

Access around the north side of the mountain will not be cut off, except for a section of about 900m past the lodge chalets on the far north side. Access through the “Gap” will not be closed to the public.

In summary, the lodge will have only a minor negative impact on access issues. This impact is considered to be of low significance.
5.3.6 Impact on mountain climbing

The Gross Spitzkuppe is an important site for rock climbing and is internationally recognized. Climbers come from many overseas countries to tackle this challenging climb and enjoy the wilderness appeal of the area – particularly the view to the north as far as the Brandberg, which is completely uninterrupted by any visible human structures. The Mountain Club of Namibia climbs there regularly, and has invested money in climbing infrastructure on the peak. Therefore concerns were expressed by the club regarding access to the peak and their traditional camping sites at the base of the peak, visual impacts, and general degradation of the area.

The lodge will have no impact on the access to the peak. It can still be reached from the west, or through the "Gap" shown in Figure 3. The campsites on the north and west sides of the main peak will also not be affected at all by the lodge as they lie well outside the "exclusive use zone".

The lodge will, however have some visual impacts for climbers. The main lodge buildings in the "Gap" will be visible from the summit, and from part of the climb up to the peak. However, the scale of the view is so vast that, from the saddle on the west side of the peak (less than half way up) the lodge site appears very small. Moreover, most of the units will be out of site on the north side, and the rest will be tucked in close to the foot of the rocky slopes. The design and materials used will also make the lodge as inconspicuous as possible.

The visual impact for climbers is considered to be of medium significance. Mitigation of this impact will be addressed by means of the measures that are explained in section 5.3.7 below.

5.3.7 Aesthetic impacts & visual intrusion: building form, layout, and materials

The lodge has the potential for negative visual impacts, particularly for climbers on the Gross Spitzkuppe peak, but also for other visitors moving around the mountain. The Developer is sensitive to this issue and has indicated a commitment to designing the lodge in a manner that will minimise its visual intrusion into the landscape.

The following aspects of the lodge and related infrastructure have the potential for significant visual impacts: -
- All buildings,
- Roads – particularly if it becomes necessary to hardened these surfaces in any way,
- Parking lots are usually large bare areas and cars are particularly distracting in a landscape as they are often bright colours, and highly reflective (sun on windows),
- Swimming pool could be conspicuous, depending on the colour of the finishes,
- Green lawns would "stick out like a sore thumb" and be uncharacteristic in this landscape of subtle colours,
- If exotic evergreen trees were used these would also be conspicuously out of place,
- Lighting has the potential to be visually intrusive at night,
- Even signboards announcing the presence of the lodge could be unsightly and will need to be carefully considered.

The first way in which the visual impacts can be minimised is in the layout of the lodge. The layout shown in Figure 3 is designed to provide the lodge with a high degree of seclusion, while also putting most of the chalets out of sight on the north side of a low granite ridge. Thus only the managers units and the main lodge (restaurant etc) will be visible to most people moving around the mountain or climbing the peak.
The second way to address visual impacts is through the choice of building form and materials.

It is proposed that the roofs of buildings and car ports will take the form of oval domes with a sloping “ridge” as shown in the Architect’s drawings (p.6a – 6b). The form will resemble the shapes of the granite outcrops so that the form of the buildings blends in with the rock.

Similarly the materials used will blend in with the surroundings. Thatched roofs soon become a neutral grey colour. The car shadeports will have roofs made of thin gum poles, which also weather to a neutral colour. The ground in the car park should be covered with weathered granite, or possibly granite cobbles for a more durable wear surface if this is affordable.

The walls of the buildings will be finished with weathered granite material (gravel) so they will be the same colour and texture as the ground.

Any large glass doors and windows should be shaded by deep overhangs in order to prevent unsightly reflections on glass that could make the lodge visually intrusive. This will also reduce the “greenhouse effect” of sun heating up the interiors. (Solar radiation passes through glass as shortwave radiation and heats up the interior. The interior then emits long wave radiation which cannot pass through the glass. The net result is excessive warming of the interior.)

The swimming pool should be somewhat concealed and the finishes should be the colour of the granite – or at least subdued (not bright blue!) so that it is also not visually intrusive from the mountain above.

Curved lines, which reflect the contours of the rock outcrops that form the backdrop, are preferable to straight lines. For example, roads and paths should be curved rather than straight. The road should be laid out on a curving line (not straight) so as to reflect the contours of the granite outcrops and be less eye-catching from the peak. The road should be surfaced with weathered granite or granite cobbles as well. Refer also to section 5.2.6 concerning materials for roads that are visually unobtrusive.

The design of the buildings, carports, road, and paths will therefore blend well with the ambient surroundings in both form and colour.

The car park area has the potential to become a “dust bowl” as a result of many vehicles churning up the sandy surface. Here coarse weathered granite, or granite cobbles may be required. Hardening of surfaces with tar, or any material with a high visual impact would not be acceptable.

Cars have a highly negative visual impact in this environment. Car ports should therefore be provided for all vehicles. It is proposed to make car ports using thin gum poles to hide vehicles – especially from viewpoints at a higher level, because people wander all over the granite domes at higher levels than the site.

<table>
<thead>
<tr>
<th>Nature of impact</th>
<th>• The “wrong” materials and forms have the potential for high visual impacts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation</td>
<td>• Appropriate forms and materials, as proposed by the Developer, will minimise the visual impact.</td>
</tr>
<tr>
<td>Rating criterion</td>
<td>Without mitigation</td>
</tr>
<tr>
<td>Extent</td>
<td>As far as the top of the Gross Spitzkuppe</td>
</tr>
<tr>
<td></td>
<td>With mitigation</td>
</tr>
<tr>
<td></td>
<td>The lodge should be visible only from relatively close.</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Duration</th>
<th>Long term</th>
<th>Long term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity</td>
<td>Potentially high</td>
<td>Low</td>
</tr>
<tr>
<td>Probability of occurrence</td>
<td>Highly probable</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Confidence in this assessment</td>
<td>Confident</td>
<td>Confident</td>
</tr>
<tr>
<td>Significance</td>
<td>Potentially high</td>
<td>Low</td>
</tr>
<tr>
<td>Further investigation required</td>
<td>Details to be addressed by the Architect at the design stage.</td>
<td></td>
</tr>
</tbody>
</table>

5.3.8 Noise

Noise can be very disturbing in these tranquil surroundings. This impact will be aggravated by the fact that the bare granite slopes reflect sound. Low frequency sounds travel further than high frequencies. Noise attenuation under normal conditions is rapid over the first short distance but less and less as the distance increases.

The likely sources of noise will be electrical generators (noise & vibration), pumps for water supply, and vehicles. To a lesser extent music (from the restaurant) and voices may also contribute to noise impacts.

The most intrusive noise is likely to come from generators and pumps. These impacts will need to be addressed through the choice of equipment, and by installing generators and pumps in soundproof concrete structures with absorbent inner linings. Doors and air vents will need to have special baffles to prevent noise from being emitted. The mountings of generators and pumps need to be considered as well because vibrations travel very efficiently through solid rock and can lead to irritating noise impacts some distance from the source. Mountings that absorb vibrations should be considered.

Solar pumps could be used, rather than diesel. Water pumps could also be run only during the middle of the day, when sound does not travel so far and there is usually a breeze that will make any sound less noticeable.

Nothing can be done to mitigate noise from guests' vehicles. The lodges own vehicles must be well maintained, especially with regard to exhausts and silencers.

Provided that appliances such as generators and pumps are properly enclosed and silenced, noise is not considered to be a significant issue during the operation of the lodge. During construction, however, for a few months there will inevitably be hammering and vehicle noises – which cannot be mitigated. This is however a short term impact.

5.3.9 Sense of place

For several decades, Namibians have enjoyed visiting the Spitzkoppe to camp, to enjoy nature, and climbers have scaled the peaks – enjoying the vast open wilderness beyond the granite massif. Although the area has been occupied on the south side since the 1960's it still has a "wilderness" appeal. The view to the north is still one of pristine open space. Grazing and some collection of firewood have had very little ecological impact and no impact on the magnificent scenery to the north of the mountains. Even collection of gemstones in the Klein Spitzkuppe has not had a major impact on scenery, and this is somewhat far removed from the main attraction – the Gross Spitzkuppe.
Thus, for four generations of Namibians who have explored this area, the Spitzkoppe is imbued with a profound "sense of place". It is this emotional attachment to the Spitzkoppe that will be adversely affected by any development around the base of these mountains.

This impact can only be mitigated to a limited degree by designing the lodge and its surroundings to blend in with the natural environment and be as inconspicuous as possible (refer sections 5.3.7 and 5.3.8 above). It is concluded that, for many Namibian's who have camped and climbed here, the lodge will have a negative impact on their "sense of place". This impact is considered to be of medium significance because it affects a relatively small area, and the impact can be mitigated to a small degree.

5.3.10 Demographic factors

According to census data, the population growth rate in the Erongo Region is currently 1.3%. If one assumes that this rate also applies to the Spitzkoppe Community, then without any immigration to the area, the population would take about 55 years to double from roughly 600 to 1,200.

However, in Namibia, there is a tendency for any development to attract more people to the area than can be supported by that development. This is true in any country where poverty prevails and economic opportunity is very limited. People move in with the hope of finding some economic advantage from the development.

The lodge will supply direct employment for a minimum of 12 people, and indirect economic opportunities for many more. Although there can be no doubt that it will bring a significant benefit to the community, those benefits will be very limited – even given the present population. If more people are attracted to the area, it will place greater stress on the scarce resources of water, grazing for domestic livestock, fuel wood etc. It is impossible to predict the magnitude of this impact. However, the economic benefits of the lodge to the community, although substantial, should not be exaggerated. They will not be sufficient to eliminate poverty in this area.

To the extent that more people are attracted to the area because there is "something happening", this will be an indirect impact of the lodge which cannot be mitigated.

5.3.11 Potential for cumulative impacts

The Spitzkoppe is a relatively small area. A rough oval drawn around the perimeter of the granite outcrops of the Gross Spitzkoppe area has a perimeter of roughly 18km.

The vegetation of the area is sensitive to disturbance, with slow recovery time if it is significantly disturbed - e.g. by trampling off paths.

The area therefore has a low carrying tourist capacity. There is a considerable risk that to many tourists would end up destroying the "wilderness" feel of the area. Tourists to such "wild" places do not want to bump into other tourists around every bend.

Estimating the likely numbers of tourists in the area at any one time. However an attempt is made here to do just that. If one considers a "worst-case" scenario whereby the lodge is full and all 25 of the Community Campsites are occupied, then the following estimate can be made.
<table>
<thead>
<tr>
<th>Lodge</th>
<th>Maximum number of tourist vehicles</th>
<th>Maximum Number of tourists</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15 (based on 2 people / vehicle)</td>
<td>30 (based on available accommodation)</td>
</tr>
<tr>
<td>Campsites</td>
<td>50 (based on an assumed average of 3 people per vehicle, and excluding possible busloads)</td>
<td>150 (based on an assumed maximum of 6 per campsite x 25 campsites, excluding possible bus loads of tourists)</td>
</tr>
<tr>
<td>Totals</td>
<td>65 vehicles</td>
<td>180 people</td>
</tr>
</tbody>
</table>

While this is a very crude estimate, based on an assumed worst-case scenario, it indicates the serious potential for the area around the Gross Spitzkuppe to become "overpopulated" by tourists. The cumulative impacts of lodge and campsite development could ultimately lead to the Spitzkoppe becoming "overpopulated" from an aesthetic point of view, and even from an ecological point of view. For example if too many people result in predators being unduly disturbed (leopards, raptors, small wild cat species etc), then ecological imbalances could occur. For example prey species such a dassies, mice etc could become too large and could deplete the slow-growing vegetation.

It is a common tragedy in tourist areas, that the cumulative impacts of too many tourists ends up destroying the natural ambiance which attracted people there in the first place.

In the medium to long term, it will probably become necessary to limit the number of tourists allowed into the area at any one time. The tourist carrying capacity of the area needs to be addressed in more detail in the AMP. However, it is recommended that the ultimate size of the lodge should be limited to the current proposed size (refer section 1.4). A condition of approval should be made - that no future expansions of the lodge will be permitted.

It is further recommended that no other lodges should be permitted to establish at or near the base of the Spitzkoppe.

Failure to impose limits to tourism is very likely to result in the cumulative impacts of becoming seriously negative in the medium to long term.

5.3.12 Enhancement of positive impacts

The following suggestions have been put forward by specialists and I&APs with regard to enhancing the benefits of any developments in the Spitzkoppe:

- There is a need for a "Namib Desert Interpretation Centre" which caters for school groups, tourists and members of the public. Deserts are often seen as wastelands by people who are not educated in matters such as biodiversity, and who have not had an opportunity to know and appreciate the unique adaptations of desert flora and fauna. Such a centre would concentrate on communicating both information and values aimed at changing behaviour and attitudes towards the unique Namib environment. It would probably need to be part of a national education programme under state management and not under private ownership and control. Such a facility would be likely to attract donor funding.

- An opportunity exists to add value to the various gemstones that are dug from the area and sold to tourists in their rough form. Some of these stones could be polished by the local community. Such an enterprise does not require a large amount of capital, but it requires electricity, and training to acquire the necessary skills.

- Cultivation of desert medicinal plants, e.g. hoodia, has been suggested, but there is probably not enough water to carry out any cultivation at all.
Training of field guides from the local community could add value to the experience of tourists to the Spitzkoppe, and should be encouraged. Quite a high level of knowledge is required by tourists on the following subjects:
- the more common and more interesting plants,
- birds,
- reptiles, mammals, amphibians,
- rock art,
- the historical and archaeological aspects of the area.

5.4 Climatic considerations in the design of the lodge

Climatic conditions are extreme at times (refer section 4.1 above). Daytime temperatures are often very high, but at night, or when the southerly wind blows, it can become fairly cold. Conventional airconditioning is not feasible as it requires too much power. Ways to deal with the heat are:
- Thatched roofs,
- Big overhangs to shade the walls from direct sun,
- Ground-cooled air system (This is a system of pipes under the ground below the buildings with an impeller fan to move air from the room interior through the pipes underground. A system like this is in use at Gobabeb Desert Research Station next to the Kuiseb River.
- Humidifiers (which spray a fine mist of water into the air in rooms) have a marked cooling effect through evaporation.

Wind is variable, but the strongest and most frequent winds have a southerly component. Moreover, the wind direction and speed is influenced by the mountain topography. The infrequent but unpleasant "Berg winds" also need to be taken into account. Ways to design for wind are:
- Roof structures that come low to the ground, and have a domed shape (to be aerodynamically efficient).
- Openings, that can be opened or closed to adapt quickly to changing wind directions.

5.5 Relationship of the Lodge EA to the wider Area Management Plan (AMP)

At the public meeting in Windhoek it was suggested that the AMP should perhaps be carried out before the EA for the lodge. However, for the following reasons the EA was carried out first:
- The presence or absence of a lodge would have made some fundamental differences to the nature of an Area Management Plan.
- Ecoplan was appointed simultaneously to undertake the lodge EA and the AMP. Therefore the issues that needed to be addressed in the AMP were constantly borne in mind during the EA process.
- The selection of a second site – after the first site had been rejected – took into account issues such as archaeological & rock art sites, access, community campsites, water supply, and aesthetic impacts - which were all issues pertaining to the wider management of the area.

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• The Spitzkoppe area is currently not adequately managed, despite the committed efforts of the Spitzkoppe Community Development Committee (SCDA). For example, campers often use sites with rock art, firewood is sometimes collected where it should not be, and there are too many tracks – which are not always adequately maintained. One of the main reasons for the sub-standard management is a shortage of revenue. Without additional income the SCDA simply does not have the economic resources to manage the Spitzkoppe adequately. For this reason, an AMP was likely to be inadequately implemented without the additional funding that a lodge would attract.

• It is recommended that part of the proceeds of the lodge to the SCDA should be required to be used for improved management of the Spitzkoppe in general and camping in particular.

• Further ways to enhance the benefits of the lodge and the campsites will be explored during the development of the Area Management Plan.
6 SUMMARY & CONCLUSIONS

6.1 Summary of Environmental Assessment

After the original site was rejected, mainly for reasons of archaeology and rock art, a new site was selected with input from the Archaeologist. The new site is also less sensitive in terms of impacts on vegetation, and proximity to the main Gross Spitzkoppe peak that is used by climbers – where large birds of prey also nest or roost.

In Chapter 5, the potential environmental impacts of the lodge at the new site were assessed. Activities that are generated by the lodge – beyond the "exclusive use zone" of the lodge were also assessed.

The following table summarises the issues that have been assessed:

- In the first column, the number of the relevant section in Chapter 5 is provided for reference.
- The second column states the environmental impact in question and the most important mitigation measure. (Please note, however, that the significance rating in the fourth column is based on all the recommendations for mitigation in Chapter 5 being properly implemented.)
- In the third column, the significance given to each impact is stated without mitigation. I.e. the worst-case scenario - which must not be permitted.
- In the fourth column, the significance rating is given after implementing the mitigation measures that are recommended in the section referenced. The symbols + or - indicate a positive or negative impact respectively.

<table>
<thead>
<tr>
<th>Section reference</th>
<th>Environmental impact or issue: &amp; Key mitigation measure</th>
<th>Significance rating if not mitigated</th>
<th>Significance rating after proper mitigation as recommended in the section referenced</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2.1</td>
<td>Archaeological / rock art sites: Site layout &amp; buffer zones around rock art / archaeological sites.</td>
<td>- Potentially High</td>
<td>Low Reduced impact cf status quo.</td>
</tr>
<tr>
<td>5.2.2</td>
<td>Protection of existing plants: Layout on site with specialist input on plants</td>
<td>- Medium</td>
<td>Low</td>
</tr>
<tr>
<td>5.2.3</td>
<td>Cultivation of non-local &amp; exotic plants Cultivation of local indigenous plants only and no grass lawns</td>
<td>- High + Medium</td>
<td>Must not be permitted</td>
</tr>
<tr>
<td>5.2.4</td>
<td>Potential impacts of alien invasive plants</td>
<td>- Medium</td>
<td>Low</td>
</tr>
<tr>
<td>5.2.5</td>
<td>Rainfall runoff and erosion: Layout of buildings, road and paths, and elevated floors</td>
<td>- Medium</td>
<td>Low</td>
</tr>
<tr>
<td>5.2.6</td>
<td>Impacts on rock &amp; soil at lodge site, roads &amp; borrow pits: Alignment, layout, and selection of borrow pits in non-sensitive sites outside the area.</td>
<td>- Medium</td>
<td>Low</td>
</tr>
<tr>
<td>5.2.7</td>
<td>Increased traffic &amp; sightseeing: Discourage self-drives, alternative route / lodge service road, granite gravel or cobbles on main road surfaces</td>
<td>- Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Impact</td>
<td>Notes</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>5.2.8 Water abstraction from borehole WW30881 in Spitzkoppe River, or Houdini</td>
<td>Medium</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Possible new boreholes within 6km north of the lodge site</td>
<td>To be assessed</td>
<td>To be assessed</td>
<td></td>
</tr>
<tr>
<td>All boreholes require ongoing monitoring to detect over-exploitation before damage is done. Ongoing water demand management required. No grass lawns.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2.9 Water supply pipeline to the lodge: Routing to take into account vegetation</td>
<td>Low but requiring EMP</td>
<td>Low if managed under an EMP</td>
<td></td>
</tr>
<tr>
<td>5.2.10 Trucking water to the lodge</td>
<td>High</td>
<td>Should not be permitted except in real emergencies for very short-term supply</td>
<td></td>
</tr>
<tr>
<td>5.2.11 Semi-treated sewage / waste water disposal to underground soak-away or created reedbed. Siting to take into account wind direction, and water source if within 6km.</td>
<td>No significant impact</td>
<td>No significant impact</td>
<td></td>
</tr>
<tr>
<td>5.2.12 Impacts on fauna: No feeding of animals. No domestic animals, especially cats.</td>
<td>Medium</td>
<td>No significant impact if no domestic animals permitted</td>
<td></td>
</tr>
<tr>
<td>5.2.13 Impacts on birds: No domestic cats. Reeds or large trees should provide habitat.</td>
<td>Medium</td>
<td>Low positive impact if no domestic cats.</td>
<td></td>
</tr>
<tr>
<td>5.2.14 Solid waste disposal: Remove recyclable materials to Windhoek. Burn paper and plastic at pit near village or remove to formal waste disposal site. Organic waste to pigs and goats.</td>
<td>Medium</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>5.2.15 Impacts of power supply: No overhead lines. Recommended mitigation of noise from generators. Optimise use of solar water heating, solar pumps and solar cells.</td>
<td>Medium</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>5.2.16 Impacts of telephone lines: No overhead lines</td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>5.2.17 Housing for staff: Housed in village</td>
<td></td>
<td>No significant impact</td>
<td></td>
</tr>
<tr>
<td>5.2.18 Construction camp – housing of construction staff in the village. Materials store – on ground that will be disturbed anyway.</td>
<td>Medium</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

**Potential socio-economic impacts**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Impact</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3.1 Economic benefits to the Community: as per the joint venture agreement</td>
<td>High</td>
<td></td>
<td></td>
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<tr>
<td>5.3.2 Loss of grazing for domestic livestock in &quot;exclusive use zone&quot;</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3.3 Loss of a few campsites in &quot;exclusive use zone&quot;</td>
<td>Low</td>
<td>Further rationalisation of campsites needed under AMP to prevent impacts on rock art / archaeological sites</td>
<td></td>
</tr>
<tr>
<td>5.3.4 Impacts on cultural &amp; spiritual values</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3.5</td>
<td>Impacts on existing rights of access</td>
<td>- Low (refer to qualifying statements in section 5.3.5)</td>
<td></td>
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<td>-------</td>
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<td>------------------------------------------------------</td>
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<tr>
<td>5.3.6</td>
<td>Impact on mountain climbing- visual impacts</td>
<td>- Medium - Low</td>
<td></td>
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<tr>
<td>5.3.7</td>
<td>Aesthetic impacts &amp; visual intrusion: Layout &amp; design: building form &amp; materials</td>
<td>- Medium - Low</td>
<td></td>
</tr>
<tr>
<td>5.3.8</td>
<td>Noise impacts</td>
<td>- Medium - Low</td>
<td></td>
</tr>
<tr>
<td>5.3.9</td>
<td>Sense of place</td>
<td>- Medium - Medium</td>
<td></td>
</tr>
<tr>
<td>5.3.10</td>
<td>Demographic factors: attraction of additional population that cannot benefit from the lodge and secondary benefits to the area</td>
<td>- Cannot be quantified - No mitigation possible</td>
<td></td>
</tr>
<tr>
<td>5.3.11</td>
<td>Potential for cumulative impacts</td>
<td>- High - Low if appropriate limits imposed on tourist numbers through an AMP</td>
<td></td>
</tr>
<tr>
<td>5.3.12</td>
<td>Enhancement of positive impacts: Namib Desert Interpretation Centre Polishing of gemstones Medicinal plants (e.g. hoodia) if water is sufficient Training of field guides.</td>
<td>Recommendations made.</td>
<td></td>
</tr>
</tbody>
</table>

Climatic considerations in lodge design

5.4 | Recommendations made for design to manage air temperature indoors, and winds. |

Relationship of lodge to Area Management Plan (AMP)

5.5 | The need for the lodge and campsite to comply with an AMP which is to be developed in consultation with the Community. |

6.2 Conclusion

The new lodge site (shown in Figures 2 and 3) has been selected to avoid impacts on archaeological sites and rock art. Moreover, the layout has been designed with buffer zones around the archaeological / rock art sites so that there will be no direct impact on these sites at all. As camping in rock art shelters will be stopped within the "exclusive use zone" the current impacts on these sites should be greatly reduced. Since all archaeological and rock art sites are protected by law, these sites must be demarcated prior to construction and must be completely out of bounds to all construction activities and personnel. It is recommended that J.Kinahan should be present when the positions of buildings are pegged out to ensure that these positions comply with the recommendations contained in the archaeological report (Kinahan, Nov 2003), which are also reflected in Figure 3.

Despite these measures there will still be an intrusion into the area which is regarded as an "archaeological landscape".

It is also recommended that A.Burke should also be present when the exact positions of the buildings are pegged out, in order to ensure that damage to plants is minimised, and that the more common plants only are removed where necessary.
A number of recommendations have been made in Chapter 5 with respect to the management of potential impacts on the bio-physical environment. These recommendations apply not only to the lodge site itself, but also to the various activities generated by the lodge but beyond the lodge site. The lodge and its associated activities has the potential for significant negative impacts and it is therefore essential that the recommendations of this EA are enforced as a condition of an Environmental Clearance by MET. Provided these recommendations are implemented and enforced during construction and operation of the lodge in the short, medium and long term, the impacts on the bio-physical environment should be of low significance. The Spitzkoppe area has no species of flora, fauna or avifauna that are unique to this group of inselbergs and which are also vulnerable to the development of the lodge. While the area does support a number of endemic species, these species are also represented elsewhere in the central Namib and are not confined to the Spitzkoppe. The Spitzkoppe environment is, however, sensitive to disturbance, particularly because of its low rainfall and resultant very short growing season. It is therefore essential that no damage to vegetation or soil should be permitted beyond the immediate footprint of the lodge – i.e. its buildings, roads, and paths. The likelihood of acceptable rehabilitation to areas of vegetation that get unnecessarily damaged (particularly during construction) is very low. It is, however, in the lodge’s own interest to ensure good management during construction and operations to safeguard the environment.

The provision of water from the proposed borehole in the Spitzkoppe River or the RWS borehole at Houdini should have no significant impact, provided that the recommendations of the geohydrologist with regard to the sustainable yield are complied with. Moreover, ongoing monitoring and recording of groundwater levels is essential in order to confirm the safe yield and ensure that the water resource is managed sustainably. If further boreholes are drilled within 6km to the north of the lodge site, then a further geohydrological and environmental assessment of those boreholes is recommended as an addendum to this EA report.

The lodge will have a direct and significantly positive economic impact on the Spitzkoppe Community. It is also expected to have a secondary positive impact by attracting more people to the Community Campsite, and providing opportunities for the Community to offer services to the lodge and the sale of gemstones and curios to tourists. Any minor negative impacts (e.g. loss of grazing area and a few campsites) will be more than compensated for by the increased income to the community.

The potential exists for two types of cumulative impacts as a result of the lodge and campsite in combination. Additional people may be attracted to the Spitzkoppe in the hope of some benefit from the development. More people would place an increased burden on the already scarce natural resources and would therefore detract from the economic benefits of the lodge and campsite developments. However, this could be true for any type of development. A second cumulative impact could occur in the medium to long term. As the area becomes more popular, due to improved facilities, the numbers of tourists are expected to increase substantially. The Spitzkoppe is a small area with a low tourist carrying capacity. It is therefore recommended that the lodge should not be permitted to expand beyond the proposed capacity stated in Section 1.4 at any future stage. It is also recommended that no other lodges should be permitted to establish in the Spitzkoppe area. Otherwise there would be a significant risk of destroying the natural “wilderness” appeal and beauty of the area that attracts tourists to it in the first place. The Area Management Plan will need to address the question of limiting the total number of tourists to the area in the long run – in order to set limits on the cumulative impacts that would otherwise occur.

The public participation programme indicated that to many Namibians – campers, climbers, photographers, and nature-lovers - the Spitzkoppe is highly valued as having a special “sense of place”.

Concern has been expressed about the loss of this unique but rather intangible quality of the area. Some of the critics of the lodge proposal have argued that lodges should not be located close to the main attraction, but should be set some distance off looking onto the area. The Developer, however, considered that the ambiance afforded by a site close to
the granite outcrops was necessary to the appeal and therefore the ultimate success of the lodge. There can be no doubt that the lodge would have some negative impact on the "sense of place" that the Spitzkoppe holds for many Namibians. However in so far as a site against the granites was required by the Developer, the proposed site represents a relatively low degree of intrusion upon the rest of the area. It affords the lodge a fairly high degree of seclusion. Impacts on the "sense of place" can therefore be mitigated to some degree and will be further mitigated through the design and materials used - making the lodge as unobtrusive as possible.

The Spitzkoppe Community is strongly in favour of the lodge for economic reasons. Others, who are not part of the community but who represent NGO's involved in CBNRM activities, have argued that the Spitzkoppe is something of a special case as there is already environmental degradation going on here as a result of inadequate management of the area. One of the main reasons for inadequate management is lack of funds. The lodge should certainly bring in a substantial amount of money to the benefit of the Spitzkoppe Community. How this money will be channelled and used for the management and conservation of the area will need to be worked out between the joint venture partners and made public through the Area Management Plan. However, it is essential that some of this money should be used to ensure the proper management of the area and of camping activities.

The Spitzkoppe with its natural beauty, flora, fauna and heritage sites, is a national asset to all Namibians. It is therefore recommended that the future of this area cannot be left simply to the Spitzkoppe Community and the Lodge to ensure its sound management. Clearly the status quo is not sustainable and will not ensure the protection of the natural and heritage resources of this area. It is therefore recommended that the Ministry of Environment and Tourism should take an active role in ensuring that the Spitzkoppe area is managed wisely to the benefit of present and future generations of all Namibians. The Spitzkoppe can only be an economic asset to the extent that its natural and heritage resources are conserved and managed sustainably in the long term.
REFERENCES


