

AFRICAN DEVELOPMENT BANK



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**NAMIBIA: SKORPION ZINC 400kV POWER TRANSMISSION LINE
PROJECT**

ENVIRONMENTAL IMPACT ASSESSMENT SUMMARY

THE REPUBLIC OF NAMIBIA

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ENVIRONMENTAL IMPACT ASSESSMENT SUMMARY

1 INTRODUCTION

Skorpion Zinc Mine (SZM) lies in the southwest corner of Namibia. The zinc oxide ore was first discovered in 1976. A full feasibility study for the SZM undertaken in November 1998, determined the project to be financially feasible and economically viable. Construction is expected to commence towards the end of 1999, with plant commissioning planned for 2001. An estimated 100 MW of power, one third of Namibia's current usage, will be required for the mine, smelting factory and mine village by the year 2001.

At present there is insufficient reliable power available from the existing power grid in the south of Namibia. Skorpion Zinc therefore needs to link into the main Namibian power grid as soon as possible. The closest source of sufficient and reliable power is at the 400 kV Kokerboom sub-station near Keetmanshop, which will be linked to the South African grid via the new 400 kV interconnector co-financed by the Bank.

The objective of the project is to provide 400 kV power supply to the Skorpion Zinc Project from the Kokerboom 400/220 kV Substation. The project will ultimately benefit the Namibian power grid and so contribute to Namibia's power demands for the future.

This EIA summary contains a brief description of the project area, project alternatives, corridor selection, and the major findings of the EIA undertaken on the proposed project and recommendations to mitigate adverse environmental impacts. The scope of the study complies with the ADB environmental policy. The EIA study was also reviewed and cleared by the Namibian Ministry of Wildlife, Tourism and Environment. The full EIA report is available and may be obtained from OCDS upon request.

2 PROJECT AREA

The proposed line will start at Kudu Power Plant at Oranjemund, some 290 km from the Kokerboom Substation just north of Keetmanshoop. A straight line between the two centers would cross the Fish River near where it joins the Iwen River and would cross the highest parts of the Huns Mountains and pass through the Huns-Ai-Ai Nature Reserve. Although this would be the shortest route, it is technically and environmentally non-feasible.

The eastern half of the project area is characterized by fairly flat topography. Between Keetmanshoop and the Fish River there is a step off a shallow escarpment onto undulating topography, that becomes progressively more rugged as the incised tributaries of the Fish River are encountered. West of the river, there is a rugged ± 200 m escarpment, which slopes gently westward into the gently undulating sandy plains and dune fields of the Namibia desert that formulates the western part of the project area.

The entire project area may be described as arid to semi-arid, with mean rainfall and evaporation figures increasing steadily north-eastwards from the coast at Oranjemund to Keetmanshoop (50 to 168 mm and 2600 to 3900 mm respectively). Rainfall near the west coast and over the Huib-Hock Plateau generally falls during the winter months of May to August, whilst the areas east of the project area experience rain during the summer months between November and April. Fog occurs regularly along the west coast.

As a result of the semi-arid to arid climate, the vegetation cover is poorly developed and the soils consist primarily of wind blown sands and thin lithosols. Land Properties therefore tend to be large, and many are uninhabited or used only for recreational hunting. Two vegetative biomes are represented in the area. The Nama Karoo Biome covers most of the eastern area, from the edge of the Huib-Hock Plateau, the Fish River Canyon and up to Keetmanshoop. This vegetation type consists mainly of dwarf shrubs and grasses with only few species of conservation concern. This perception may be, however, due to the lack of knowledge on this particular biome.

The succulent Karoo Biome has a much greater number of endemic, endangered and rare species, especially amongst the succulents. This biome, which consists mainly of low perennial succulent shrubs with few grasses, covers the area on top of the Huib-Hoch Plateau, westwards to the coast and south to the Orange River. This biome is also not well researched, and it is likely that several new and endemic species could be found on the Huib-Hoch Plateau, the pristine Obib and the Schakalsberg Mountains in the southeastern Sperrgebiet. In addition, the rocky inselbergs around the Skorpion mine are considered by the Namibian Directorate of Environmental Affairs to be environmentally sensitive areas.

Associated with the unique vegetation habitats are a large number of animal species that are of conservation importance or that are endemic to the region. Much of the project area consists of proclaimed National Parks or nature conservatories. Although it is proclaimed as Diamond No 1, the Sperrgebiet is included under this category as it has remained relatively untouched by man for over 80 years, with most

mining activities being restricted to the coastline and along the Orange River.

Although tourism is not well developed in the southern region of Namibia, areas with high tourist potential abound. With the opening up of the Orange River road from Noordoewer to Rosh Pinah, and the future de-proclamation of the Sperrgebiet, tourism could become a major source of revenue for the Karas Region. Historical sites are not well documented, but the potential for further archaeological and palaeontological finds along the Fish River, the Orange River and in the southern Sperrgebiet is high. Areas such as the Schakalberg Mountains, Obib Dunes, Gomtsawibberg, Rooilepel Fossil deposits are known sites of archaeological interest and could well be developed for future tourism.

The karas region infrastructure is not well developed. Both the villages of the Oranjemund and Rosh Pinah belong to mining companies, and access to Oranjemund is restricted. A tarred national road parallels the rail link between Keetmanshoop and Ludertis, and a relatively good calcrete district road connects Rosh Pinah and Aus. The rest of the roads through the area are secondary gravel roads.

3 DESCRIPTION OF PROJECT ALTERNATIVES

The proposed line, passing by the Skorpion Zinc Mine, will start at Kudu Power Plant at Oranjemund, some 290 km from the Kokerboom Substation just north of Keetmanshoop. The following alternatives were identified and evaluated to supply the Skorpion Mining Project:

- Alternative A** 220 kV power supply to the Skorpion Zinc Project from Oranjemund 220/66 kV Substation (Cost N\$ **198,626**);
- Alternative B** Either 220 kV or 400 kV power supply to the Skorpion Zinc Project from Kokerboom 400/220 kV Substation. Design the Kokerboom-Skorpion transmission line for 400 kV operation(Cost N\$ **301,728**);
- Alternative C** 220 kV power supply to the Skorpion Zinc Project from Kokerboom 400/220 kV Substation. Design the Kokerboom-Skorpion transmission line for 220 kV operation(Cost N\$ **159.269**);
- Alternative D** 400 kV power supply to the Skorpion Zinc Project from Aggeneis 400/220 kV Substation(Cost N\$ **393.375**);
- Alternative E** Construct a 400 kV transmission line from Kokerboom substation to the site that has been identified for the future Kudu 400/220 kV substation (in the vicinity of Oranjemund) and provide 220 kV power supply to the Skorpion Zinc Project from Kudu 440/220 kV Substation (Cost N\$ **509.259**).

From the technical point of view, Alternatives A and C were not considered, as they don't satisfy long term objectives. Alternatives B and E were thought of as the technically workable ones, where Alternative D was discarded as having the largest impacts on the environment. Further, Alternatives D and E were discarded because of their high cost compared to others. Finally, Alternative B was selected as it matches future plans to connect the potential Kudu Gas project to the National Grid.

4 ROUTE CORRIDOR SELECTION

A potential route corridor from Keetmanshoop to Oranjemund was selected from the various route options identified. Financial considerations were restricted to the distance covered, the number of turns required, and slope classes. The technical considerations were based on accessibility to the route from the current infrastructure, slope class and sites for river crossings.

Environmental considerations included tourism potential, sensitivity to disturbance, archaeological sites, etc. Currently, proclaimed and known conservation areas were avoided, except for the route section beyond Skorpion Zinc where the Kudu Power Plant cannot be reached without traversing some parts of the Sperrgebiet. Although Kudu Gas Project is not part of this particular project, this was considered as it is part of the overall purpose of the project. Areas of potential tourism along roads in the Karas region, particularly from a visual aspect, were avoided as much as possible. Areas with high bio-diversity and endemic species were also avoided as much as possible.

The proposed route has been developed using GIS and then fined tuned through consultations with key authorities, local inhabitants and farm owners, relevant experts, and other stakeholders. Comments were limited to the following:

- Route options through Sperrgebiet
- Visual impacts
- Archaeological, flora and fauna surveys of the section from the east side of the Huib-Hoch Plateau to Oranjemund

Final route parallels the existing 132 kV power line from the Kokerboom Substation where it crosses the Fish River. It then swings slightly to the southwest over hilly terrain to cross the National B4 road about 20 km west of Seeheim Village. The line then heads in a southwesterly direction for about 75 km towards the Huns area, with a short step out of the Nukaneb River valley, over and down a plateau to cross the Konkiep River. From Huns, the line runs past Kwaggaspoort before climbing steeply up the Huib-Hoch Plateau on Abos. The power line route then crosses the most environmentally interesting section of the route through the mountains to emerge into the eastern edge of the Namib desert. From Skorpion, the route traverses the sandy plains of the desert to Oranjemund.

5 POTENTIAL AREAS OF INFLUENCE AND IMPACTS

The power line route was divided up into nine sections that differ in characteristics. Impacts of the line on 9 relevant environmental aspects were assessed as follows.

a River Banks, Drainage Channels, Pans, Groundwater Resources

Route clearing and access roads at river crossings and on drainage channels will disturb rivers' banks. In addition, groundwater resources in much of the project area are very poor and subject to local depletion due to intensive abstraction by contractor's camps.

b Towns and Villages, Farms Homesteads, Farms, Agriculture and Grazing, and Employment

The impact of the power line on the human population is high because of its proximity to some farm homesteads. Further, the construction of substations will cause loss of grazing lands. In addition, potential areas of conflict would arise due to poor gate operation, noise and dust, fence destruction, safety and security issues, stock disturbance and other negative aspects. On the other side, positive impacts include promotion of economic and employment opportunities, and farm benefits from new access tracks and fences across farms.

c Wildlife (Rare Terrestrial Species and Birds)

Bird movement may be impacted by the power line, especially, along major drainage systems such as the Fish, Nukaneb and Konkiep Rivers, and air currents utilized by birds along the edge of the Huib-Hoch escarpment. On land, route clearing could disturb/destroy habitats of rare terrestrial fauna, and wildlife may be subject to illegal poaching. On the positive side, animals and birds may benefit from the temporary water supplies at the various construction camps.

d Water Quality

Risks arise from non-standard operation such as accidental spillage of diesel, oils and greases, and inappropriate disposal of waste materials that could lead to serious water quality and other pollution problems.

e Natural Vegetation and Soil Erosion

Endemic and protected plant species are sensitive and could be subject to disturbance and illegal collection. However, these are found mainly on the rock outcrop and inselbergs that have been avoided by the line. Moreover, access roads and track clearing would destroy or disturb protected and endemic plants and increase erosion potential by wind. In addition, the same access tracks will be subject to wind erosion as a result of the loss of stabilizing vegetation cover.

f Tourism and Existing and Future Conservation Areas

The power line will have general negative visual impact on all existing and future tourist activities in its vicinity. The route utilizes a natural corridor through the mountains that provides one of the few routes from the Namib to the western edge of the Fish River Canyon. Together with the archaeological sites in the vicinity, that route has a strong tourism potential that could be affected by the visual impact of the power line. Beyond Skorpion Zinc, the route traverses pristine land that may become a conservation area in the future.

g Archaeology and History

The relative abundance of water in the numerous pans/channels in certain reaches of the power line has provided watering points for early inhabitants and later colonial traders and thus numerous archaeological and historical sites are expected in the area. Further, the old trails and colonial routes that crossed the Huib-Hoch mountains are paralleled by the route, where numerous remnants of archaeological and historical interest have been recorded and may still be found.

h Infrastructure (Railway, Airfields, and Existing and Future Mines)

The highest negative impact is the potential interference of the power line with the current airfield at Rosh Pinah and the possible new airfields at Skorpion and Tschaunaup Mission. On the positive side, the power line represents a strong base for developing and promoting mining activities in the region and will also provide some minor benefits for the railway and the economies of the towns and villages

along the routes through the provision of services, such as fuel, accommodation and meals.

6 PROPOSED MITIGATION MEASURES

The following are recommended mitigation measures to minimize the anticipated negative environmental impacts.

1. To reduce visual impacts, maximum possible distance should be maintained between the power line and any farm houses and other residences, the servitude should not cross hills or other high points at the crest with natural features which may camouflage the line;
2. Minimum clearance of 9.3 meters should be maintained over roads. The route alignment near air strips at existing and future airports needs to be finalized in consultation with the Department of Civil Aviation;
3. River crossings should be as close to perpendicular as possible, where the channel is narrowest and where there is less vegetation to be disturbed. Pylons should be placed well out of any drainage lines and be at least 10 meters above bankfull levels to avoid flash floods;
4. *Aloe dichotoma* forests should be avoided and individual trees and other conspicuous species of conservation importance preserved where possible. Vegetation should be crushed or cut rather than grading or uprooting;
5. Increased erosion and riverbanks disturbances will be reduced as the line avoids most of the larger pans and crosses rivers where they are relatively narrow. In addition, during excavation of the foundations for the pylons or guy ropes, the top 20-30 cm of soil should be carefully removed and stored to one side for later rehabilitation;
6. An archaeologist and a botanist should be consulted regarding the route alignment and tower positions with valuable sites marked and well preserved;
7. An environmental Code of Conduct should be incorporated into the contractor's contract, so that matters of environmental management can be enforced and violators penalized where necessary;
8. Maximum use should be made of local contract labor and supplies;
9. The number of construction camps should be limited and commercially acquired firewood be provided. Garbage and other refuse material (especially those that could be ingested by game or livestock) should be removed daily and disposed of in an environmentally safe manner;
10. Rehabilitation of the construction camps, pylon sites and access roads should take place as soon as possible after implementation;
11. Maximum use must be made of existing roads and tracks and new roads must be kept to a minimum. Vegetation removal along new access tracks and the servitude should also be minimized, especially along river banks;
12. The type of towers being considered for the line construction and the nature of climate and vegetation in this part of Namibia means that the level of maintenance required on the line is expected to be very low, as Namibians usually use helicopter services in construction work. The impact of land-based

- maintenance activities will also be low so long as the teams follow similar codes of conduct as specified for the contractor;
13. Power line should be well marked with closely spaced deflectors to prevent bird collisions when crossing pans, rivers and tributaries;
 14. Procedures for the containment of any accidental spillage of fuels, oils or other toxic materials should be readily available, with contaminated ground suitably treated;
 15. Magnetic field distribution from the power transmission should be limited to IEC standards; and
 16. NamPower should fully compensate the respective owners of private farms along the servitude for any loss of lands, crops and trees due to line construction;
 17. Contacts should be maintained with various landowners throughout the construction period in order to facilitate operations and improve work environment.

7 ENVIRONMENTAL MANAGEMENT AND TRAINING

NamPower will bear the full responsibility for environmental management of the project and will ensure that the following programs are set and implemented:

1. It will be the genuine responsibility of the construction company to provide fuel and food for labor to prevent wildlife hunting and unnecessary woodcutting;
2. Traffic management plan that addresses problems arising from truck movement and waste disposal need to be designed and tested with staff trained ahead of the project;
3. It is necessary to ensure that contractor's workers and involved local labor are trained to properly handle non-standard operation conditions including among others: accidental spillage and heavy rainstorms or floods.

8 ENVIRONMENTAL MONITORING

It is recommended that construction activities should be monitored to ensure that the environmental management recommendations set out in the EIA are implemented. NamPower will have the overall responsibility of supervising and monitoring the environmental aspects of the project. In addition, the Directorate of Environmental Affairs, as part of its regular activities, will also be involved in the monitoring of the construction activities in order to ensure that proper environmental mitigation measures are employed. The Bank environmental guidelines together with the Namibian ones will be used to evaluate compliance. It is necessary that monitoring visits take place on a two-month basis for the duration of the construction period. Aspects to be monitored should include:

- The contractor's main camp;
- Waste disposal issues at camp and along the route section built since the last monitoring visit;
- Access routes and tracks used by the construction teams;

- The construction and routing of new tracks;
- Off road driving;
- Erosion problems;
- Vegetation clearance issues;
- River crossings;
- Any issue raised by the farmers or land owners; and
- Line marking across bird flight paths.

Finally, the supervision missions of the Bank and the co-financiers will also supervise and monitor environmental aspects of the project as part of the overall implementation/supervision of the project.

9 CONCLUSIONS, RECOMMENDATIONS AND REMAINING ISSUES

9.1 Conclusions

- 1 The Skorpion Zinc Mine is highly dependent upon the timely supply of power from the 400 kV line to be build from Kokerboom Substation near Skorpion. On the other hand, the project will provide Namibia with additional foreign exchange and create a number of employment opportunities that will ultimately benefit the Namibian power grid and so contribute to Namibia's power demands for the future;
- 2 The final route selected is the shortest possible that has minimized the environmental and engineering costs. The environmental impacts of the route were initially minimized through the process of selection of a route corridor with the aid of GIS. Different sources of information were utilized to build up a comprehensive and relevant data base as much as possible. Further consultation and field investigations were used to fine-tune the route, especially, at the identified possible sensitive areas;
- 3 Interested parties and key authorities were involved in a public participation program. The issues and concerns raised have been addressed;
- 4 The presence of the power line could have an impact on airfields and landing strips, on protected and endemic plants and on birds, especially if the lines are not marked at river and pan crossings and along the Huib-Hoch escarpment;
- 5 The construction activities that will have the greatest impact on the environment will be the access road and route clearing operations and possible non-standard operating conditions. Contractor's camps, water supply, pylon erection and line stringing could cause moderate impacts, while minor negative impacts could result from the importation of construction materials, waste disposal and concrete mixing. On the other side, construction activities are likely to have a positive, but temporary impact on the socio-economic structures of several small towns and villages through the provision of labor and services to the construction team;
- 6 The aspects of the environment that could be most affected by the power line construction if recommended mitigation measures are not implemented, are the impacts on sensitive vegetation and potential archaeological sites. Erosion of

the servitude and tracks in high wind velocity areas, along river banks and drainage channels and the visual impact and disruption on farm homesteads are also potential major impacts. Otherwise, the power line construction will only have small to moderate impacts on the biological environment, on water quality, groundwater resources, rare terrestrial fauna, future conservation areas, grazing and existing tourist routes.

9.2 Remaining Issues

- Servitudinal agreements were not yet finalized with land owners, which should be completed and required compensations calculated for inclusion into the project budget prior to the start of the project. The Bank will ensure the settlement of the compensation for those people affected by the project before construction by including a relevant condition in the loan agreement.

Finally, while the proposed project will have long term benefits on the country at large, there are adverse impacts which will need to be offset; potential impacts are likely to be minimized by adhering to the environmental management and monitoring plan. The processing of the project should proceed, as the relevant institutions have agreed to implement the environmental management and monitoring plan; and the executing agencies to comply with national and international environmental requirements.

10 REFERENCES

- 1 Walmsley Environmental Consultants Ltd., Environmental evaluation report of the 400 kV Power Line Route to link Kokerboom Substation, Skorpion Zinc Mine and the Proposed Kudu Gas Power Plant, Walmsley Environmental Consultants Ltd., Report No. W343/3, Rivonia, South Africa, April 1999.
- 2 NamPower, System Planning Study for the transmission supply to the Skorpion Zinc Project, Windhoek, Namibia, July 1998.