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ENVIRONMENTAL IMPACT ASSESSMENT
TREKKOPJE ROAD
NON-TECHNICAL REPORT
AREVA RESOURCES NAMIBIA

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1 INTRODUCTION

AREVA Resources Namibia has appointed Turgis Consulting (Pty) Ltd. of South Africa, acting in collaboration with other independent consultants in South Africa and Namibia to undertake an Environmental Impact Assessment (EIA) for a tarred access road from Arandis to the Trekkopje mine. This EIA study seeks to predict the impacts of the proposed project on the human and natural environment, and to determine the optimal management measures for these impacts.

1.1 Project Objectives

The main objective of the project is to provide the Trekkopje mine with a tarred access road that optimizes relevant biophysical, social, technical and economic parameters. At present the mine access road is from the Trekkopje siding on the B-2 from Swakopmund to Windhoek. The proposed route follows the existing temporary water pipeline that supplies the mine from the Rössing Terminal Reservoirs near Arandis. TABLE 1.1 shows the distance from Arandis to the Trekkopje mine main gate along the current roads and along the proposed mine access road.

TABLE 1.1 – DISTANCE CHART

From	To	Approximate km
Swakopmund	Arandis	37
Arandis	Trekkopje rail siding	19
Trekkopje rail siding	Mine main gate	40
	Total	**59**
Arandis	Mine main gate via pipeline	30

1.2 Project Justification

The project aims to optimize travelling time, reduce fuel consumption and therefore carbon emissions and lower the incidence of road accidents involving employees and the general public.

1.3 Benefits for and Impacts on the Region

Areva's proposed new mine access road from Arandis to the Trekkopje mine will make a substantial contribution to economic development in Namibia as a whole and specifically to the Erongo Region, where the operation will be located. Project liabilities have been identified and will be addressed through management plans.

2 BACKGROUND

2.1 Location

The Trekkopje mine is situated 70 km north-north-east of Swakopmund, and lies within an area covering 37,000 ha. Figure 2.1 shows the project setting. The Trekkopje Mine is situated in the Swakopmund and Usakos Magisterial Districts. The regional services council authority that supports the Trekkopje Mine is the Erongo Regional Council. The mining tenement and the proposed road traverses land under the jurisdiction of the Arandis Municipality and communal land which forms part of the //Gaingu Conservancy, under the authority of the Oe#Gan Traditional Authority. No settlements occur on the proposed road route, which will traverse what can be considered as wilderness lands, only rarely used for temporary grazing.

Mining activities, together with communal and commercial farming and tourism account for the majority of land-use in the Erongo Region.

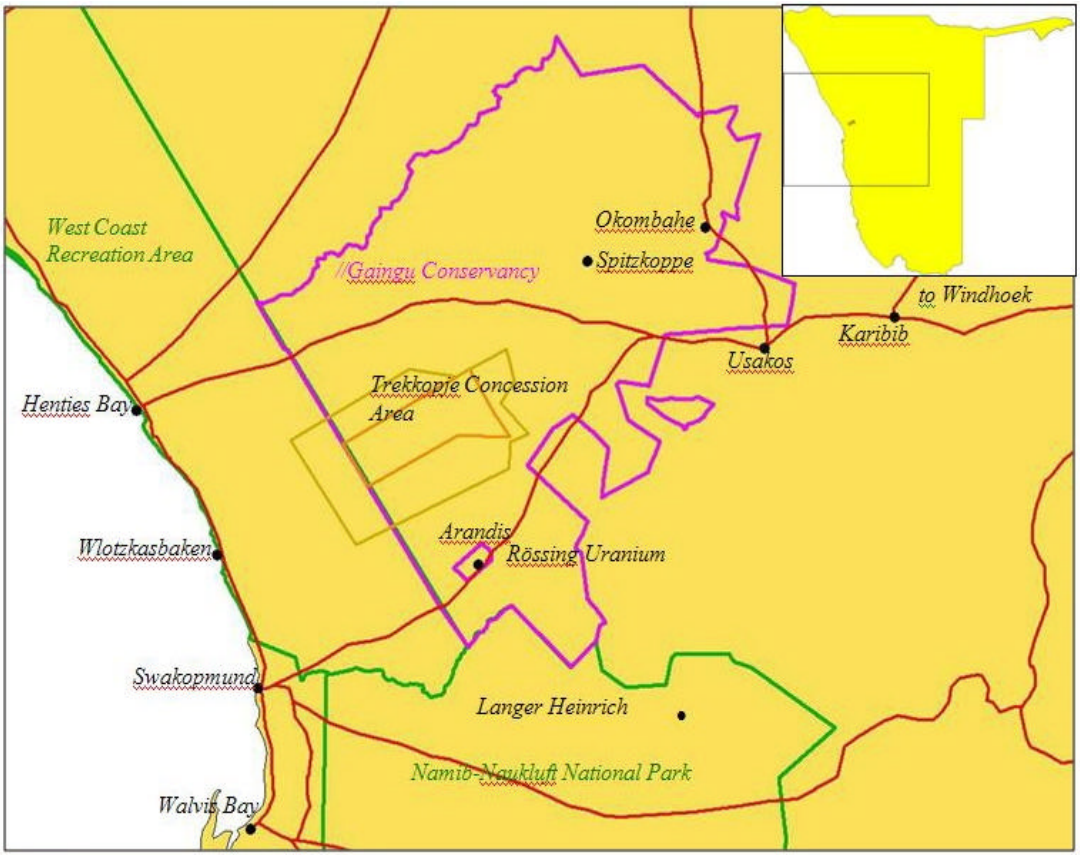

FIGURE 2.1 – PROJECT SETTING

3 REGULATORY SETTING

3.1 Key Legislative and Administrative Requirements

The Ministry of Environment and Tourism (MET) is the custodian of Namibia's natural environment and discharges this duty via environmental regulations. The MET is thus the lead agent for EIA studies. This EIA is being undertaken in accordance with the Environmental Management Act (No. 7 of 2007) and the Draft Procedures and Guidelines for Environmental Impact Assessment and Environmental Management Plans (No. 1 of 2008). AREVA also subscribes to the Equator Principles in its environmental and social undertakings.

4 METHODOLOGY

4.1 Specialist Studies

The following specialist studies were commissioned as part of the EIA process to validate the previous assessment, to identify if any changes have taken place, to determine the additional impacts the proposed road may have and to make recommendations for mitigation:

- Biodiversity (fauna & flora)
- Heritage
- Noise
- Social Impact Assessment
- Detailed road design

4.2 Alternatives Assessment and Trade-Off Study Predictive Methods

The multiple accounts methodology was used in the assessment and trade-off of various project components is detailed in the EIA report.

4.3 Impact Assessment Predictive Methods Employed

The methodology used in the assessment of impacts is detailed in Appendix III. A detailed description of impacts is provided in Appendix III.

5 PROJECT DESCRIPTION

5.1 The New Access Road

The proposed new access route will be a tar surfaced two-lane road starting from Arandis rail siding and ending at the Maxi pad at Trekkopje Mine. The road will closely follow the current temporary water supply pipeline that supplies the mine with water from Rössing reservoir. The new road will be a private road for mine vehicles only, with a security check point at Arandis – no public access will be allowed as Areva will be operating large "road-train" transport vehicles.

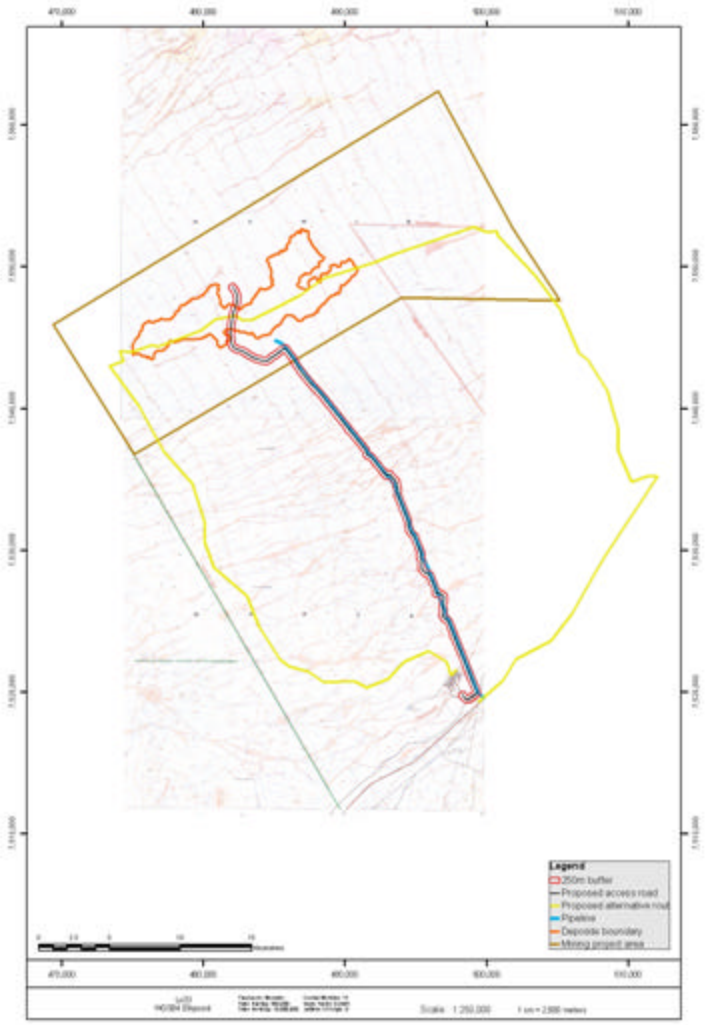

FIGURE 5.1 – THE NEW ACCESS ROAD ROUTE

5.2 Road Design

The proposed road will have a tar surface and be 7.6 m wide (with a 1.5 m gravel shoulder on either side). Each driving lane will be 3.5 m wide with 300 mm allowed for painting of yellow lines. The road may at certain locations, where required, be raised to between 1 and 1.5 m above ground level

in order to remain within the road profile. The road will be constructed to Namibian and international standards and will be designed to carry heavy vehicle traffic at speeds of up to 80 km/h.

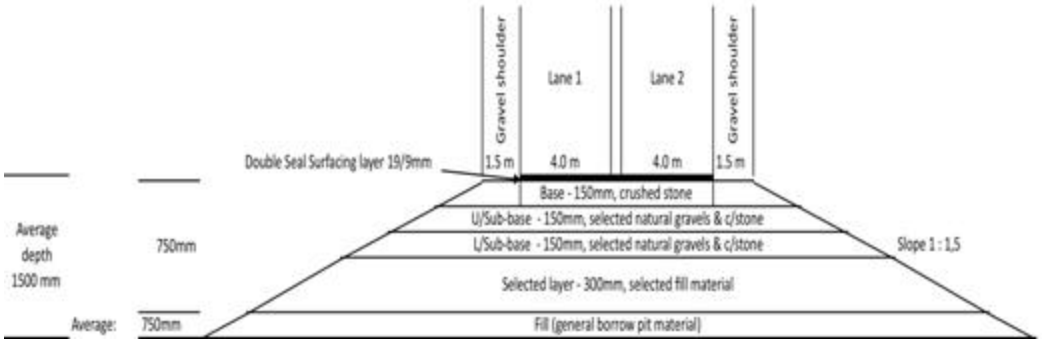

FIGURE 5.2 – ROAD DESIGN

The machinery to be used will include compaction equipment, graders, bulldozers, tipper trucks, front-end loaders, rollers and concrete and bitumen mixers.

5.3 Water Supply and Reticulation

Water requirements for the road construction will come from the existing temporary mine pipeline. This temporary pipeline extends from Rössing Reservoir in Arandis to Trekkopje Mine.

5.4 Landfill

It was intended that the first borrow pit needed for fill material be excavated relatively close to Arandis, so that it could be used in future as a landfill site for general waste. However, a more detailed investigation is required to fulfil this aspect as the surface material suitable for fill in that area is very shallow (approximately 20 - 50 cm deep) and would therefore serve no purpose.

5.5 Infrastructure

The Arandis rail siding will be upgraded and developed to accommodate the transport and handling of all mine related materials and products. The intention is to transport material by rail to Arandis where it will be cross-loaded onto road trains and transported via the new road to Trekkopje Mine.

5.6 Borrow Pits

Fill material is needed for the construction of the road. It is estimated that up to 4 borrow pits may need to be excavated for the required amount of fill material. The pits will be located where they will have the least possible environmental impact.

FIGURE 5.3 – BORROW PIT ON CURRENT ACCESS ROAD

5.7 Road Transport

The main chemicals to be transported to Trekkopje consist of reagents for ore processing, explosives and fuel:

- Soda ash and sodium bicarbonate
- Soda ash and sodium bicarbonate
- Caustic soda liquid.
- Caustic soda
- 70% hydrogen peroxide liquid
- 98% sulphuric acid liquid
- 30% hydrochloric acid liquid

Figure 5.4 shows a typical road train to b e used on the Trekkopje project. These vehicles may only be used on private roads due to safety considerations.

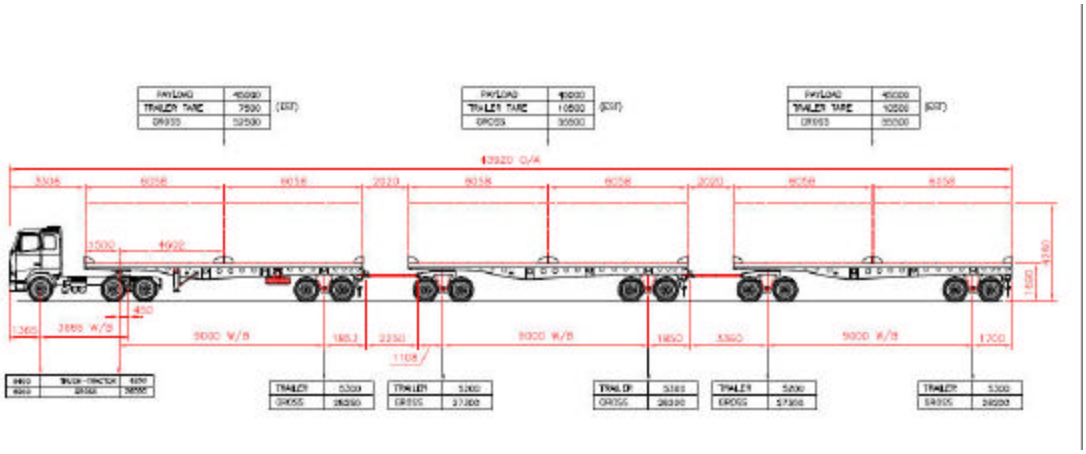

FIGURE 5.4 – ROAD TRAINS

At present the Trekkopje operation is in construction phase, therefore no product is being exported off the mine site. Busses are used to transport mine personnel on a 24-hour shift basis from Swakopmund and Arandis and travel both directions with a full compliment.

5.8 Schedule

On completion of the regulatory process, when a positive record of decision is received to continue with the development of the road the detailed design phase will commence. This phase will entail the following aspects:

- Surveying the route for setting out and establishing the construction beacons.
- Detailing the borrow pits which will include material testing for suitability and availability.
- Geological and geotechnical investigations on the proposed route.
- Preparation of final designs inclusive of all calculations, drawings, specifications, engineering schedules of quantities and proclamation sketches in accordance with the requirements of current appropriate codes, manuals and guidelines.
- Designing of the road based on guidelines in terms of speed, loads , and traffic volumes.
- The internationally recognised COLTO Standards Specifications will be used.

On completion of the detailed design phase the tender and physical construction phases will commence. It is expected that the entire process will take approximately 14 to 18 months to complete.

6 OVERVIEW OF SCOPING PHASE

6.1 Introduction

The scoping process of the Trekkopje Mine Access Road EIA included a review of the biophysical and social baselines. These reviews highlighted a number of potential impacts that may occur as a result of the construction of the mine access road.

6.2 Review of Biophysical Baseline

The central Namib has many rare and protected species (e.g. Larryleachia and lithops) which are indigenous to the region. The region is also of archaeological importance, with many well preserved sites representing key periods in the Pleistocene-Holocene sequence.

FIGURE 6.1 – VEGETATION DIVERSITY ON A TOPOGRAPHIC HIGH POINT (Aloe Asperifola and Commiphora Spp. Visible)

6.2.1 Climate

There are no pronounced seasons in the Namib and the average temperature and humidity do not vary significantly throughout the year. The annual mean rainfall of the Namib Desert ranges from 5 mm in the west to about 85 mm in the east. Winds with speeds greater than 2 m/s prevail for 70 - 80 per cent of the time and can occur at any time of day. Coastal fog can extend up to 110 km inland from the coast, providing life-supporting moisture to a high diversity of fauna and flora in this arid environment.

6.2.2 Potentially threatened habitats [1] – Fauna and flora

Namibia is home to a remarkably high biodiversity, notably among its plant species. Many of these indigenous plant species have restricted distribution or habitat, making them extremely vulnerable to disturbance. The north-west escarpment area, which includes the Trekkopje area, is also rich in insect, reptile, mammal and bird species diversity.

[1] This section is based on field data gathered by Henschel, Pallett, & Seely (2007)

6.2.3 Air quality

At present there are no significant human activities in most of the area traversed by the proposed access route. Air quality is affected by dust (during construction) and by exhaust fumes. The proposed route is shorter than the existing access route which may ultimately result in reduced volumes of exhaust fumes

6.2.4 Geology

The Trekkopje area is underlain by a thick sequence of schist that is almost 10,000 m thick and has undergone strong metamorphism.

6.2.5 Topography

As the Trekkopje area is located on a flat coastal plain, the area traversed by the access road corridor is essentially flat. The plains are dissected by many areas that carry water infrequently and that drain towards the coast.

6.2.6 Soils

Soils that form in the Namib are predominantly mineral soils. Repeated accumulation of water on soils close to the ocean, cause salt layers to form. This being a desert region, water is kept close to the surface and is prone to evaporation.

6.2.7 Surface and groundwater

Surface water is only present on site during and immediately after heavy rainfall. Low rainfall in the region reduces the possibility for substantial ground water resources. The groundwater level is between 10 m and 25 m deep and the groundwater flow is directed towards the west.

6.2.8 Visual characteristics

The project is located in a sensitive area with high eco-tourism value and many, long, unobstructed views. Any change in local view sheds, through the introduction of new developments and infrastructure, can be considered as a visual impact.

6.2.9 Land/tenure and capability

Mining activities account for a significant portion of land-use in the Erongo Region. There are a number of recreation areas in the region and here, the land-use is tourism and conservation. Communal and commercial farmers are also active in the region. There are currently no farming activities along the proposed road access route, but the area is communal land and, as such, available for seasonal grazing and settlement with the approval of the Traditional Authority.

All of the land located on the lower portion of the escarpment/desert transition is considered totally unsuited to any intensive farming practice.

6.2.10 Traffic and transport

Traffic counts received from the Namibian Roads Authority for the section of road between Swakopmund and Arandis (i.e. the B-2) show that the average, daily traffic volumes in 2007 were 3,684.

It is intended that the rail network be used to deliver chemicals , fuel, and miscellaneous materials needed for the mine, to the Arandis siding. Thereafter it will be transported by road to the mine.

6.2.11 Background noise levels

The area is sparsely inhabited and the impact of transport and traffic noise is unlikely to be significant.

6.3 Review of Social Baseline

6.3.1 Demographic processes

The total population of the town of Arandis is estimated at around 5,200 people[2]. It is unclear how many households Arandis consists of and what the profile of a typical Arandis household looks like.

6.3.2 Geographical processes

Parts of the region (Omaruru, Karibib, and Okombahe/Uis/Tubusiss) fall within a semi-arid farming region, which is mostly characterised by stock farming, in the form of both communal (subsistence) and commercial farming. Various mining operations are also active within the region.

6.3.3 Economic processes

The economy of Arandis is mostly dependant on the mining sector, particularly Rössing Uranium. In 2005, the employment rate was estimated at around 64%. Recent developments in the mining industry may have created additional employment opportunities but it is unclear if local residents would be able to make use of these new opportunities given the possibility of skills constraints.

6.3.4 Institutional and empowerment processes

At present, there are approximately 260[3] people on the waiting list for housing in Arandis. Existing households have access to sufficient municipal services such as water, electricity, sanitation and refuse removal.

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[2] ***Based on the Polio vaccine campaign - 2005***
[3] ***CEO Arandis Town Council (Personal communication June 2009)***

6.3.5 Socio-cultural processes

There is not enough information availabl e to determine the level of cultural and place attachment that residents have to the area.

7 CONSIDERATION OF ALTERNATIVES

7.1 Selection of Project Alternatives – Objective

The main objective of the study is to conduct a robust alternatives assessment and trade-off study using a Multiple Accounts Analysis methodology to determine the most appropriate route taking into consideration environmental, social, economic and technical aspects.

7.2 Multiple Accounts Analysis

The Multiple Accounts Analysis (MAA) methodology is based on four main accounts; namely, environmental, technical, social and project economics. These main accounts are broken down into a list of sub-accounts followed by a of list indicators which determine the parameters on which the assessments are made. The sub-accounts can be defined as the broader issue on which the resulting impact (benefit or loss) has a material influence on the alternatives being evaluated. The methodology and determination of weighting factors used for environmental and social impacts is described in detail in Appendix II.

7.3 Brief Description of Alternatives

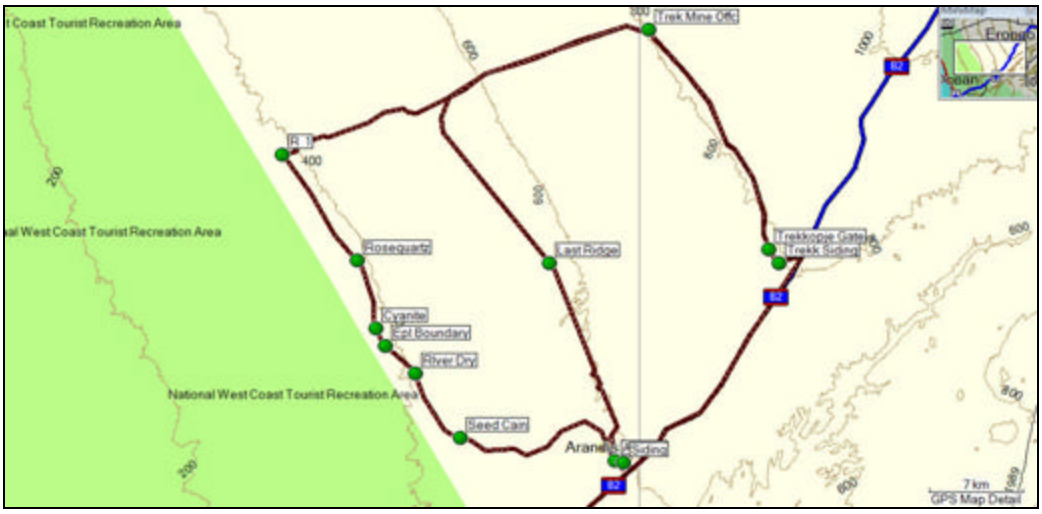


FIGURE 7.1 – ALTERNATE ROAD ACCESS ROUTES

7.3.1 The No-go Option

Trekkopje Mine currently uses the existing gravel road that links the Annaberg Tin Mines to the B 2. The road is currently maintained by Areva through regular grading and is passable for general traffic. This is therefore the no-go option (Alternative 1).

FIGURE 7.2 – TREKKOPJE CURRENT ACCESS ROAD

7.3.2 Description of alternative 2 – temporary pipeline route

A temporary water pipeline was established from Arandis to Trekkopje mine in order to supply the initial requirements of the mine. A service track was established adjacent to the pipeline for routine maintenance checking. The road is not regularly maintained and is not passable for regular traffic other than 4 x 4 vehicles. The proposed route would require substantial design and route relocation in order to avoid sensitive areas.

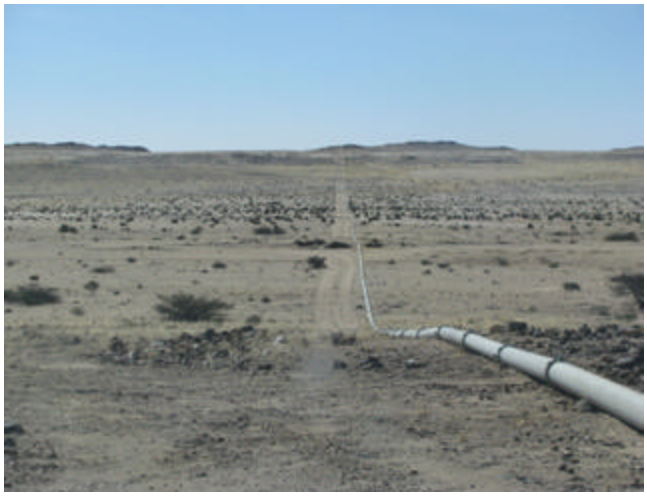


FIGURE 7.3 – TEMPORARY PIPELINE ROUTE

7.3.3 Description of alternative 3 – quarry road

The quarry road provides access from Arandis to the stone quarry owned by Dr. Green. The road is not passable for general traffic. This road passes through numerous sensitive areas including deep washes and many braided flood plains with high biodiversity.

FIGURE 7.4 – QUARRY ROAD ACCESS FROM ARANDIS

7.4 Accounts

The Multiple Accounts Analysis used in the evaluation of the three alternative road access options for Trekkopje mine allocated four main accounts, namely, environmental, technical, social, and project economics.

7.5 Preferred Alternative

7.5.1 Environmental

The current access road provides the best alignment for avoiding landscape dissection and potential biodiversity losses. However, the substantial impacts associated with services (high tension lines for power supply to the siding, new siding construction, waste disposal from the siding) and the significantly greater carbon footprint (through greater fuel consumption over the life of the project), result in the pipeline route achieving a higher overall score.

7.5.2 Technical

The pipeline route scores as the most favourable option. An important consideration to be taken into account is that at present the pipeline route does not haveany borrow pits en route.

7.5.3 Social

The current access road emerged as the preferred option and therefore a detailed social impact assessment and management plan was com missioned.

7.5.4 Project economics

The shortest route provides the greatest benefits in terms of capital expenditure and operating cost, therefore the pipeline route is the preferred choice.

7.6 Summary

Alternative 2 (pipeline route) received the highest score and merit rating and is therefore the preferred option, followed by Alternative 1 (current road), with the least preferred option being Alternative 3 (quarry road).

8 ENVIRONMENTAL IMPACT ASSESSMENT

8.1 An Evaluation of the Overall Effect on the Total Ecosystem and Surroundings

Road construction and operation through ecologically sensitive areas has the potential to negatively affect the surrounding ecosystem.

The most significant impacts on the biophysical and socio-economic environments include the following:

- Dust dispersion as a result of construction activities.
- Residual impacts potentially arising from borrow pits and un-rehabilitated surfaces on closure.
- Direct loss of habitat and animal species as a result of the road infrastructure and additional road kill due to vehicle movement.
- Disruption of established surface water channels.
- Continued fragmentation of the desert habitat.
- Expansion of the local, regional and national economies through economic multipliers (procurement, services, salaries, taxes, royalties).
- Increased employment through the creation of jobs.
- Potential disruption of the existing social order.

8.2 Criteria Used in the Evaluation

Impacts can be ranked according to their significance. The main elements for assessing significance of an impact are the level of public concern, scientific and professional judgement, the extent of the disturbance to ecosystems and the degree of impact.

Best practice requires that an impact assessment must:

- Link impacts to project components;
- Describe how a particular element of the project may give rise to the impact;
- Describe the probability of the impact occurring; and
- Describe the magnitude of the impact and its extent over space and time.

(Thomas & Elliot, 2005)

8.2.1 Social

Social significance can be determined by considering:

- Effects on human health and safety.
- Potential loss of species or resources (including land) with current or potential value.
- Recreational/aesthetic value.
- Demands on public resources and services.
- Demands on public infrastructure.
- Demographic effects.
- Creation of livelihoods.
- Support of social services.
- Stimulation of development in general.

8.2.2 Ecological

Ecological significance can be determined by considering:

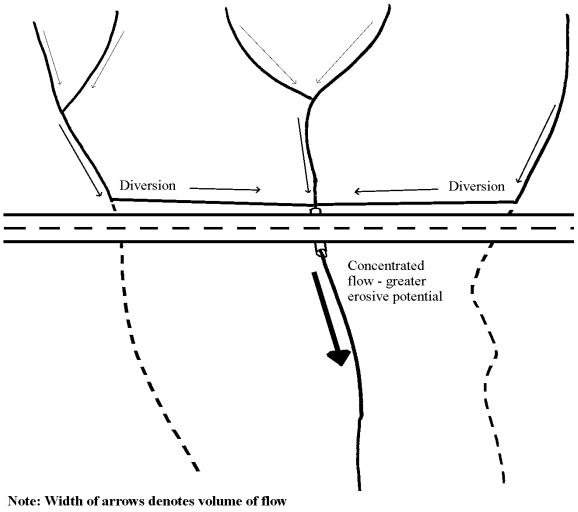
- Effects on plants and animal behaviour.
- Presence of rare and endangered species.
- Ecosystem resilience, sensitivity, biodiversity and carrying capacity.
- Variability of local species populations.

8.3 Description of Water Impacts

Where road developments intersect drainage basins, the alteration of local hydrology is inevitable.

Direct Impacts

- *Surface water flow modification*: Roads that intersect drainage basins alter the natural flow of surface water by concentrating flows at certain points. See Figure 8.1.



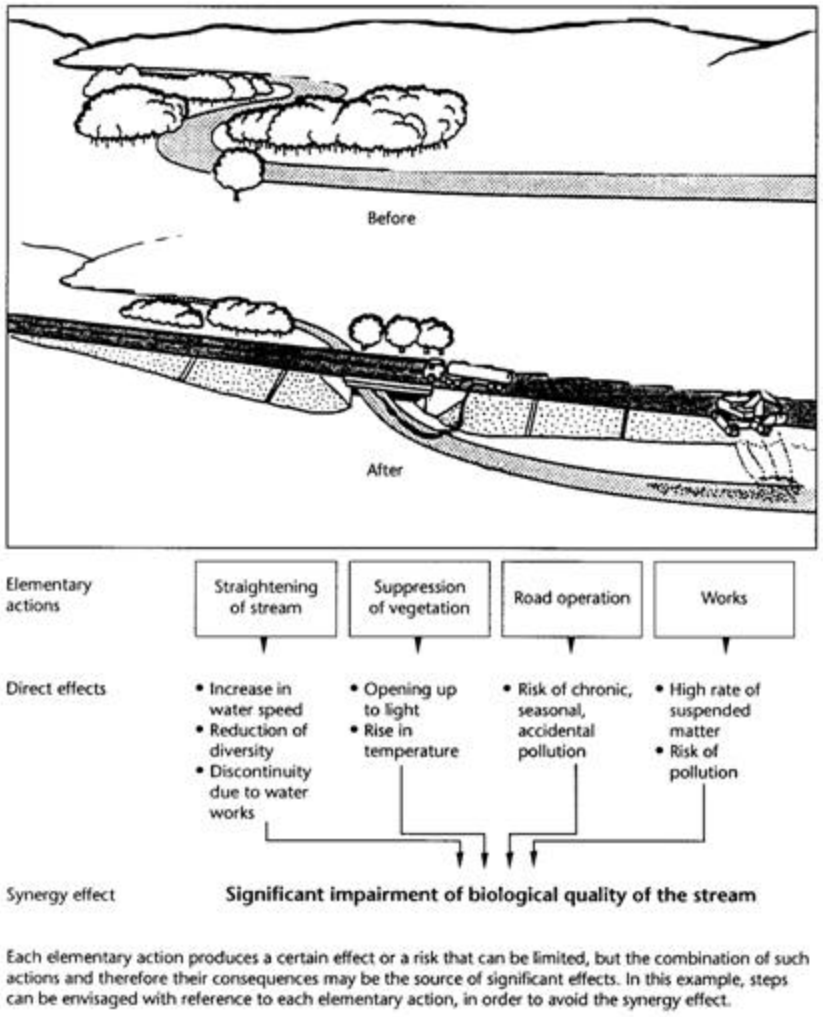
Source: World Bank – Roads and the Environment: A Handbook

FIGURE 8.1 – CONCENTRATION OF SURFACE WATER FLOW

- *Water quality degradation (surface & ground water)*: Sedimentation, changes in biological activity in watercourses and on their banks, uncontrolled construction activities, and spills of chemicals and pollutants can all affect road-side water quality.

Indirect impacts

- *Ground water flow modification* : Road drainage and excavation can lower the water table in surrounding areas, while embankments and structures can raise the water table by restricting flow. See Figure 8.2.



Each elementary action produces a certain effect or a risk that can be limited, but the combination of such actions and therefore their consequences may be the source of significant effects. In this example, steps can be envisaged with reference to each elementary action, in order to avoid the synergy effect.

FIGURE 8.2 – WATER RELATED CUMULATIVE IMPACTS

Cumulative impacts

- Cumulative impacts that may arise from the proposed route include damage to local vegetation and concentration of stream flow through channelling resulting in erosion and downstream siltation of washes and watercourses. See Figure 8.2.

8.3.1 Impact assessment

The most important water related impacts associated with the road will be surface destruction through construction activities and the channelling of the many dry riverbeds and washes.

Through effective design and alignment of the road and with the placement of adequate drainage points, the impacts related to the water regime can be mitigated. Adequate

drainage points will also allow for the continuous movement of fauna (and flora through stream flow activity) to continue relatively undisturbed.

8.4 Evaluation of Flora & Fauna Impacts

Desert ecosystems are characterized by extreme temperature fluctuations, low annual rainfall, and high evaporation. As a result, species diversity tends to be low (and indigenous). Due to the climate in the area, recovery or re-colonization of damaged areas tends to be slow, therefore the Trekkopje area's ecological sensitivity has been rated as high. Due to the ecosystem sensitivity and habitat specific genetic adaptation the Trekkopje area has also been rated as high for conservation importance.

8.4.1 Impact assessment

Direct Impacts

- *Habitat loss:* The consumption of land, and the consequent loss of natural habitat, is inherent in road development.
- *Habitat fragmentation:* Roads tend to fragment an area into weaker ecological sub-units, thus making the whole more vulnerable to invasions and degradation.
- *Corridor restrictions:* When a road intersects or blocks a corridor, animals become reluctant to cross the road, there is an increase in mortality because of collisions with vehicles, or a delay in migration can occur, which may result in the weakening or disappearance of an entire generation of the population.
- *Erosion - habitat damage:* Erosion from poorly constructed and rehabilitated sites can lead to downstream siltation.
- *Interruption of biogeochemical cycle:* Road development can easily disrupt the flow of nutrients and minerals within ecosystems.

Indirect impacts

- *Accessibility:* Roads increase contact between humans and the natural environment, which in most cases leads to ecosystem modification.
- *Ecological disequilibrium:* Native species face competition for resources from new arrivals, and predator-prey relationships can be altered. The result is usually a simplified ecosystem which is more vulnerable to further impacts.
- *Contamination of the biota:* The presence of motor vehicles introduces the potential for contamination of the soil, air, and water adjacent to the road and in the case of surface water, well beyond the immediate surroundings.
- *Fires:* Increases in human activity are associated with more frequent incidents of fires, which can have sudden, severe, and wide-ranging impacts.
- *Transmission of disease:* Carriers of diseases, both floral and faunal, can gain easy access to wilderness areas along new road corridors.

Cumulative impacts

- The conversion of large tracts of land in the Erongo region for mining purposes and access routes increases regional habitat fragmentation. This can potentially result in a shrinking of the natural habitat available to fauna, an increase in ambient dust levels, and greater impacts on surface and ground water.

Summary

Through road construction activities the impacts related to the loss of fauna and flora and fragmentation of the habitat will occur. For these impacts not to remain permanent the recommendation from a biophysical point of view is to remove the road on mine closure and rehabilitate the disturbance corridor to allow the habitat to return to its pre-mining state. In the construction and operations phases, effective mitigation measures must be applied, to minimise the predicated impacts.

8.5 Evaluation of Air Quality Impacts

At present, dust in the area only occurs under strong wind conditions. Future air impacts will be primarily due to road construction. These will be temporary creation of dust, during the construction period and carbon emissions and fume pollution from traffic activities.

8.5.1 Impact assessment - dust

Direct impacts

- The construction of the road will result in increased dust levels, which will increase the potential for erosion.

Cumulative Impacts

- The construction of the road may be a catalyst for the development of an industrial development zone in Arandis. Impacts on air pollution will then include dust during construction, fumes and emissions from increased traffic and pollutant emissions from industrial operations.

Summary

With sufficient application of water to working surfaces, dust related impacts should not be significant beyond that of nuisance value. The adequate supply of water is a potential constraint to effective dust management.

8.5.2 Evaluation of vehicle emission factors

The emission of pollutants by vehicles has worldwide impacts and contributes greatly to the total atmospheric pollution generated by people.

Air mass Contaminants

The main products of the combustion of motor fuels are carbon dioxide and water, but inefficiencies and high temperatures inherent in engine operation encourage the production

of many other pollutants of varying effect. The major pollutants of significance to roadside air quality in vehicle emissions are:

- Nitrogen oxides (NOx)
- Hydrocarbons (HC)
- Carbon monoxide (CO)
- Sulphur dioxide (SO^2)
- Particulates
- Lead (Pb)
- Aldehydes
- Secondary pollutants

Movement of pollutants

Pollutants, specifically those generated by the use of motor vehicles, affect the lives of humans through emission, dispersion and reception.

Human health impacts

Evidence strongly suggests that exposure to several of the major emission constituents is responsible for certain health conditions. However, at present there are no significant human activities or communities in most of the area traversed by the proposed new access route.

Flora impacts

Plants are affected both physically and chemically by air pollutants. Dust settles on leaves and can interfere with pollination and photosynthetic function if the accumulation is significant. Plants that absorb toxic pollutants from the air are hazardous when consumed.

Fauna impacts

Some faunal health problems have been connected to air pollution.

Summary

As the new access road is considerably shorter, it will have fewer impacts related to vehicle emissions, than the current road.

8.6 Evaluation of Noise Impacts

Noise related to road development results from:

- *Vehicle noise*: Vehicle noises originate mainly from the engine, transmission, and exhaust brakes.
- *Road noise*: Friction caused by contact between the tyres and the road surface.
- *Driver behaviour*: Drivers using hooters, playing loud music or spinning their tyres.
- *Construction and maintenance*: These activities require the use of heavy machinery.

8.6.1 Environmental Impacts of Road Noise

- [4]*Human welfare*: Chronic exposure to road noise can affect human welfare in varying degrees, both physiologically and psychologically.
- *Vibration*: Vibration induced by the resonance of traffic noise can have a detrimental effect on structures standing near the road.
- *Wildlife disturbance*: Noise may prevent many animal species from approaching or crossing the road corridors. The road corridors then become barriers to regular wildlife travel routes.
- *Environmental factors*: Weather conditions such as temperature, humidity, wind speed, and prevailing wind direction can play a role in determining how individual sites are affected by road noise. Temperature and humidity determine air density, which in turn affects the propagation of sound waves.
- *Spatial relationships* : The closer the road to receptors, the greater the impact.
- *Traffic stream*; vehicles tend to be noisier in stop-and-go traffic; and the speed of traffic flow - noisiest at high speeds.

8.6.2 Impact assessment

The noise measurement methods used are compliant with internationally accepted good measurement practice as described in the guidelines provided by the World Health Organisation (WHO) and the r equirements of ISO 10103 and ISO 1966. Noise emissions were calculated for both the construction and the operation of the road.

Direct impacts

- *Arandis and surrounds:* An increase of ambient noise levels, as a result of construction activities and road operational activities can detrimentally affect human health, particularly at the hospital.
- *Desert environ:* An increase in ambient noise levels can have an impact on animal movement and migration activities.

Summary

The road has been designed to be further west of the temporary pipeline. This is to accommodate future expansion in Arandis and to minimise the impact of operational noise.

8.7 Evaluation of archaeological impacts

A field survey identified eleven a rchaeological sites of which nine are associated with harvester ant seed caches. These sites are not archaeological occupation sites but indicators of such sites that possibly occur within a 4 km radius. Sites located in the path of the access road will be destroyed, and there may be further indirect impacts resulting from a lateral disturbance on either side of the route itself. However, according to the scales employed in Namibian archaeological assessments, the significance of the sites is very low.

[4] ***Roads and the Environment: A Handbook***

8.7.1 Impact assessment

Direct impacts

- The construction of the road will result in the destruction of the sites within the disturbance corridor.

Indirect Impacts

- Impacts resulting from lateral disturbance on either side of the route may result in disturbance of sensitive sites.

Summary

Due to the relatively low significance of the sites on the proposed route detailed mitigation measures are not required.

8.8 Land Surface Impacts – Borrow Pits

The land surface is the substrate on which the majority of ecological processes occur. Physical disturbance of this surface and the underlying soil, whether surface (e.g. scarification) or fundamental (e.g. excavation) can dramatically affect ecosystems.

8.8.1 Local Conditions

Tar surfaced roads require large amounts of fill material in various layers and thicknesses. These layers are required to provide a stable platform to carry the intended loads and for the integrity of the road to remain intact under such loads and use conditions. Where the road crosses over drainage lines, washes and dry riverbeds concrete structures are placed to divert and channel the water. Borrow pit material is required to fill the voids in order to remain within the profile of the road.

The proposed road from Arandis to Trekkopje Mine would require an estimated total of 608,000 m^3 of various forms of fill material.

Two site visits were undertaken to determine appropriate borrow pit sites. The route between Arandis and Trekkopje mine was divided into three zones. See Figure 8.3.

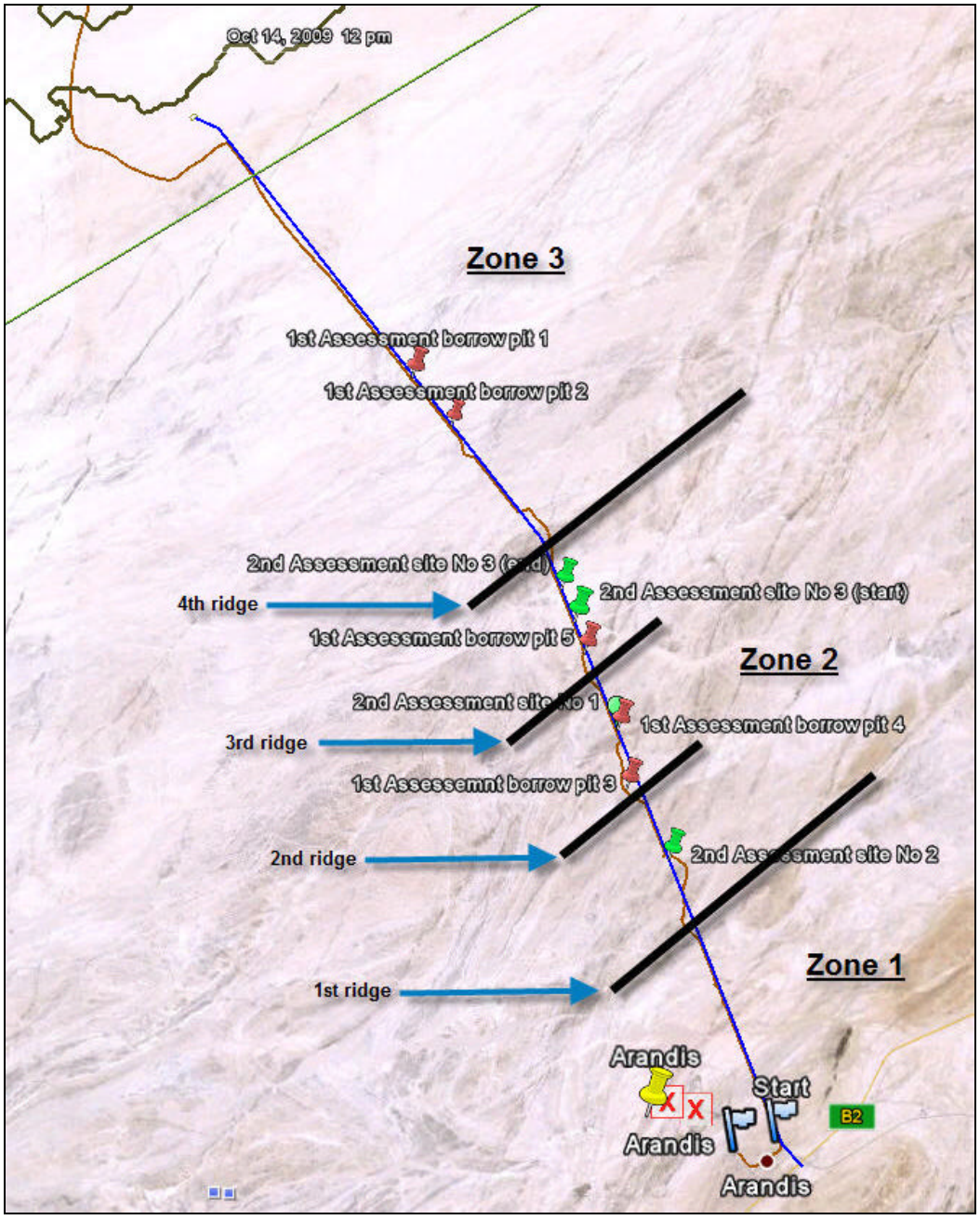


FIGURE 8.3 - ROAD ROUTE SHOWING ZONES & BORROW PIT SITES

Zone 1

The availability of a suitable borrow pit site in this area is limited due to the limited depth of the required deflation gravels. On average the depth of the surface gravels is between 20 and 50 cm before striking bedrock. See FIGURE 8.4. As such, borrow pits in this area and in close proximity to the road route and Arandis town would require a large area of

excavation. The excavation will result in the loss of a large area of natural habitat, as well as stream-flow disruption of numerous washes and drainage lines.

FIGURE 8.4 - DEPTH OF GRAVELS IN ZONE 1

Zone 2

This area falls between the first and fourth (last) ridge and is characterised by numerous larger drainage channels and washes in an east to west direction which contain sufficient, suitable fill material. Second assessment site 3 (see FIGURE 8.3) has the largest volume of available material. It is 1- 1.5 m deep and covers a large area of approximately 2 km² (depicted in FIGURE 8.5). The second assessment site 2 also has large volumes of available material. Excavation in the washes will result in loss of fauna & floras as well create a disruption in stream -flow with possible erosion implications.

FIGURE 8.5 - WASH IN ZONE 2

Zone 3

The area determined as zone 3 is located north of the last ridge and ends at Trekkopje mine. The excavation of borrow pits in this area will impact highly on the diversity of fauna and flora found in this area.

8.8.2 Impact assessment

Borrow pit facilities can have substantial environmental impacts on soils, water, and the natural environment. Significant environmental problems can develop if these sites are not rehabilitated appropriately. Impacts range from chronic erosion, siltation, visual and aesthetic intrusion, air quality, and loss of habitat and stream-flow alteration.

Indirect impacts

- The disturbance of the land surface on the road reserve corridor may result in unstable soils, increasing the potential for dust generation.
- The disturbance can also result in the loss and disturbance of habitat for fauna that require large ranges.
- The road route also bisects a numerous washes.

Cumulative impacts

- Due to the number of mining and prospecting activities taking place in the region, the possibility exists that individual operations may require unrelated access roads, increasing the potential cumulative impacts in the region.

Summary

Road construction requires the construction of borrow pits for fill material. Due to the availability of suitable material in these areas, washes and drainage channels will be compromised. However, the use of suitable mine overburden material can decrease the impact on the environment by minimising the number of borrow pits.

8.9 Pollution risk

Spillage from storage areas, re-fuelling tanks, tar mixing, storage, other road construction infrastructure and during transportation can lead to contamination of surface soils and water. Pollutants can degrade habitat, disrupt biological processes, reduce biodiversity and reduce utility of landscapes.

Chemicals to be transported to Trekkopje Mine:

The main chemicals to be transported to Trekkopje consist of reagents for ore processing, explosives and fuel.

Human health – toxicity and exposure potential

The reagents proposed for the Trekkopje project are bulk chemicals. Such chemicals present low hazard levels and are generally rated in the lower quartile of chemicals assessed for hazardous characteristics using the Indiana Relative Chemical Hazard Score (IRCH). Notwithstanding this, there are a number of suspected health hazards associated with these chemicals.

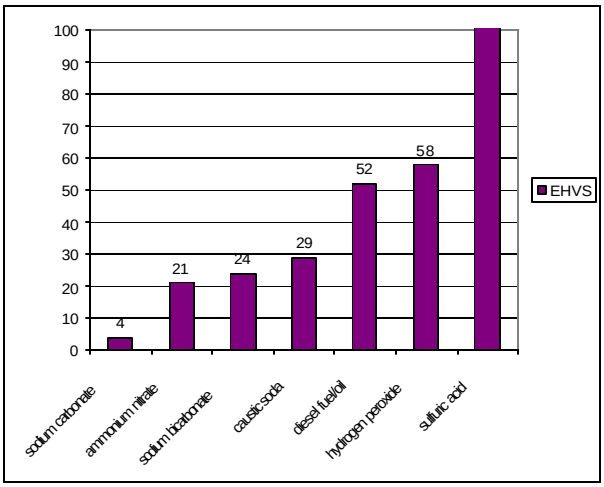


FIGURE 8.6 - ENVIRONMENTAL HAZARD VALUE SCORE (EHVS) FOR CHEMICALS PROPOSED FOR TREKKOPJE MINE[5]

Integrated environmental rankings – combined human and ecological scores

This indicator is based on toxicity and exposure considerations and integrates ecological and occupational human health impacts into a single statistic. THVS values for the Trekkopje suite of chemicals are shown in FIGURE 8.7. On the basis of this assessment, the most hazardous chemicals are sulphuric acid, hydrogen peroxide and ammonium nitrate. Diesel is also environmentally hazardous requires pollution avoidance and mitigation measures.

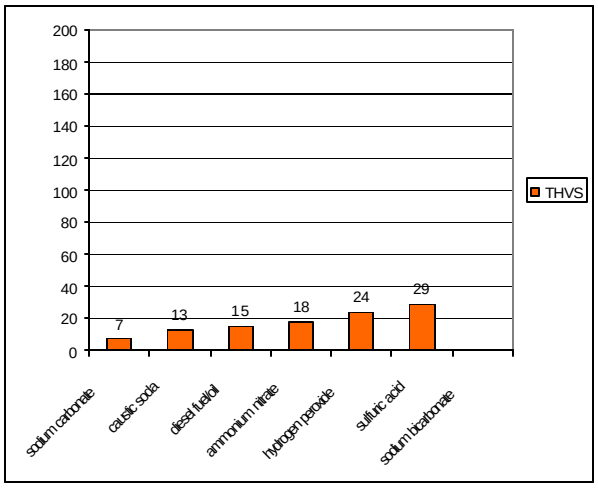


FIGURE 8.7 - TOTAL HAZARD VALUE SCORE (THVS) FOR CHEMICALS PROPOSED FOR TREKKOPJE MINE

[5] ***Data: Pollution Information Scorecard, 2007***

8.9.1 Impact assessment

Direct impacts

The most important impacts due to possible chemical spills are:

- The loss of fauna and flora
- Impact on human health

Cumulative impacts

- Slow and incremental accumulation of chemicals over an extended period continuously raises the risk pollution to communities and the biophysical environment in close proximity.
- The accumulation of diesel and oils on roads surfaces can lead to higher levels of ground water contamination.

Summary

Transport and use of hazardous chemicals in most instances carries an inherent risk. Through effective management, the identification of the risks and an efficient emergency response plan, the risks associated with the Trekkopje operation can be managed to pose a minimal threat to the environment and humans in the area.

8.10 Closure

International best practise requires that closure related issues be taken into project planning throughout the life of the mine. Closure related aspects for this project are related to the permanency of the road infrastructure. The relationship between the closure of the road and the closure of the mine is particularly important. Currently, the road is planned as a “dead-end” destination ending on the mine tenement. Should the authorities decide to extend the proposed new road to link with the Henties Bay access road, the road infrastructure and corridor will remain a permanent feature. The closure of the mine will then become important in terms of reflecting the surrounding topography, addressing the related environmental impacts and minimising the risks associated with large earthen excavations. The recommendation is to remove the road corridor and rehabilitate the corridor to restore it to its current state.

9 SOCIAL IMPACT ASSESSMENT

9.1 Introduction

The social team made a clear distinction between change processes and impacts. Social impacts refer to the impacts that are actually experienced by humans on physical and/or cognitive level, whereas an impact variable is a change process that could lead to impacts. Impacts are therefore the difference between the current and future development of the affected human environment with vis-à-vis without the project.

9.2 Approach and Methodology

Primary and secondary data collection methods were used. Primary data collection included a site visit, personal interviews, an observational study and focus group meetings. Secondary data collection centred on a desktop study.

Information that was relevant to the project was identified and assessed from these sources, within the context of the construction, operational, and decommissioning phases of the proposed project.

9.3 Regional Overview

The Population and Housing Census of 2001 indicated that the Erongo region had a total population of approximately 107,663 people, of which more than half was male. The expected population growth rate was estimated at around 3.2% per annum. Assuming this growth rate was predicted correctly, the total population in 2009 could stand at approximately 138,517 people, which represents a total increase of 30,854 people over the 8-year period between 2001 and 2009 (at an average increase of approximately 3,857 people per annum).

In 2001, the majority of the population lived in urban areas (estimated at around 80% of the total population). Two thirds of the total population are within the adult age range (between the ages of 15 and 59), which means that the majority of the population are within the working age category. In 2001, the employment rate of the region stood at approximately 66%. The majority of households had access to basic municipal services, such as water and electricity.

Arandis is a constituency of the Erongo region.

9.4 Social Change Processes and Impact Assessment

A change process can only result in an impact once it is experienced as such by an individual/community on a physical and/or cognitive level.

Demographic, geographic, economic, institutional and empowerment, and socio-cultural change processes were assessed.

9.4.1 Demographic Processes

Demographic processes relate to the characteristics of a population and include an overview of the population size and the composition of an affected community. Arandis is located approximately 1 km south-west of the turn-off onto the proposed access road.

Baseline Demographic Profile

The estimated population of Arandis is 6,500[6]. People who had left Arandis have started to return to the town in the hope of securing employment at one of the many nearby mines. This has resulted in a severe accommodation shortage with a waiting list of 260 people.

Demographic Change Processes and Resultant Impacts

The demographic change process that are expected to arise, as a result of the construction of the proposed access road, are the influx of construction workers and the influx of unemployed job seekers

It is estimated that the contractors may be able to employ up to 170 locals from Arandis, for a 2-year unskilled labour contract period. The remaining 80 team members who make up the professional/highly skilled portion of the team would most probably come from outside of Arandis. Any development creates with it the expectation of employment opportunities and with it comes the influx of unemployed job seekers. An influx of job seekers can lead to an increased demand on local services and will not necessarily lead to a boost in the local economy, as these job seekers are mostly unemployed and therefore have no money to spend.

TABLE 9.1 – SUMMARY OF IMPACT: INFLUX OF JOB SEEKERS

Criteria	Without Mitigation	With Mitigation
Nature	Negative	Neutral to Positive
Intensity	High	Moderate
Duration	Short	Short
Extent	Local	Local
Phase	Construction, possibly extending to Operation	Construction
Probability	Probable	Probable
Significance	Low	Low
Potential for Mitigation or Optimisation	Moderate	N/A
Confidence	Sure	Sure

6The next official census in Namibia will be conducted in 2011 and therefore this number is unconfirmed (i.e. not supported by any official statistical data).

9.4.2 Geographic Processes

Geographic processes relate to land use patterns and infrastructure in the area.

Baseline Geographic Profile

Arandis is a small rural town, approximately 75 km north-east of Swakopmund. The town has the legacy of being a mining township and no large-scale agricultural activities were observed in and around Arandis.

The majority of the streets in Arandis are tarred. Street lighting, recreational facilities and business amenities such as shops are still lacking, so residents in Arandis still prefer to shop and do business in Swakopmund. Arandis has three schools, a number of churches, sports fields, a tertiary education facility (NIMT), a few businesses such as a clothing factory, a small cemetery on the outskirts of town, and a hospital that had its status reduced to that of a state clinic.

The town is an Export Processing Zone (EPZ), with a railway line (rail sidings and a passenger station) passing to the south of town. A shopping mall and a number of residential developments are at various stages of the planning and implementation process. The current alignment of the proposed access road traverses through the area earmarked for all these developments. The road passes approximately 670 m from the closest point of the town, but is only 340 m from the hospital/state clinic. Construction noise and passing traffic could be detrimental to the patients recovering in hospital. FIGURE 9.1 shows the current road alignment relative to existing and future land uses.

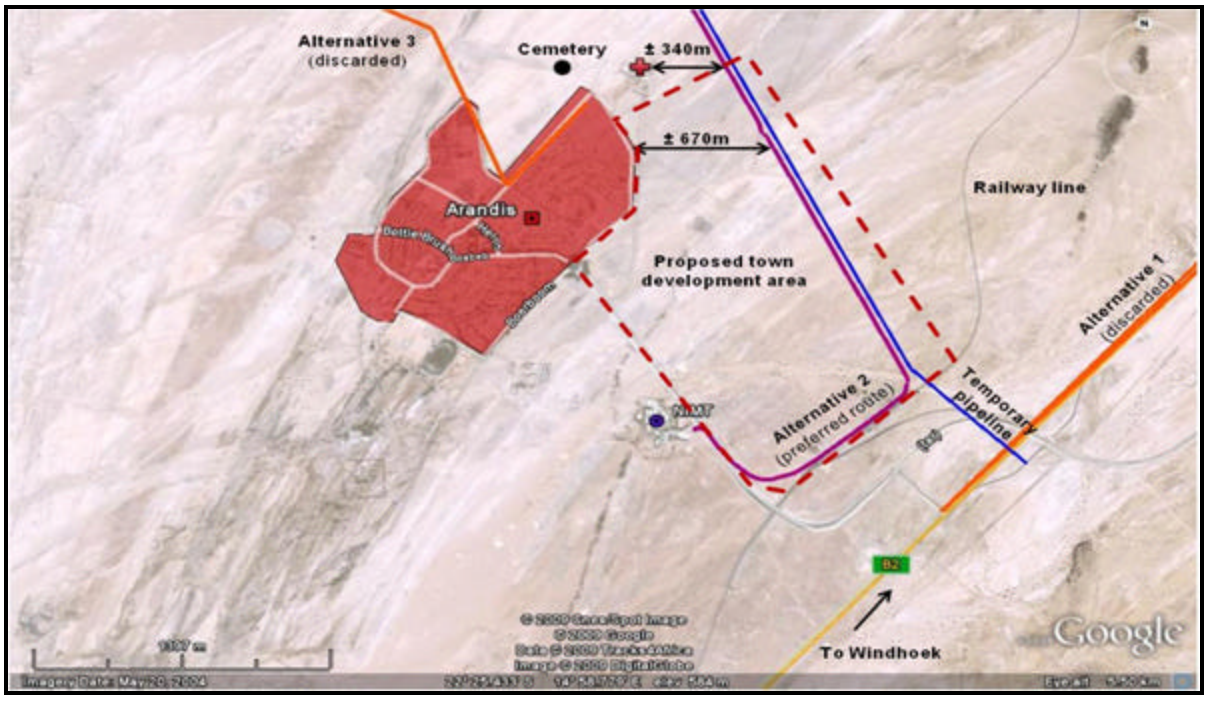


FIGURE 9.1 – ROAD ALIGNMENT RELATIVE TO CURRENT AND FUTURE LAND USES

Geographic Change Processes and Resultant Impacts

Potential geographic change processes from a social perspective have been considered within the context of changes in existing and future land uses. A land use change is often a gradual process and in the case of the proposed access road, it might create expectations or set a precedent for further land use changes. The geographic change processes that are expected include a change in access to resources that sustain livelihoods and changes in land acquisition and disposal, including availability of land.

The proposed access road will traverse the //Gaingu Conservancy. The access road will be located on communal land, which is under the traditional leadership of the !Oe#Gan Traditional Authority (TA). The !Oe#Gan community members have lifetime residential and farming rights within the boundaries of the conservancy, including seasonal grazing rights. The land within the conservancy is not fitting for agricultural activities, but it does have the potential to become a source of revenue for the local community in terms of tourism.

The proposed mine access road lies in very close proximity to the Arandis community. Areva must ensure that the community's standard of living is not affected, and that temporary job opportunities during the construction phase, are not the only benefit.

TABLE 9.2 – SUMMARY OF IMPACT: A CHANGE IN LAND USE, IMPACTS ON LOCAL COMMUNITIES' ACCESS TO RESOURCES THAT SUSTAIN THEIR LIVELIHOODS AS PART OF LAND ACQUISITION AND DISPOSAL, INCLUDING AVAILABILITY OF LAND

Criteria	Without Mitigation	With Mitigation
Nature	Negative	Neutral
Intensity	Moderate	Low
Duration	Medium term	Short term
Extent	Local	Local
Phase	Construction and Operation	Construction and Operation
Probability	Probable	Probable
Significance	Moderate	Low
Potential for Mitigation or Optimisation	Moderate	N/A
Confidence	Sure	Sure

9.4.3 Economic Processes

Economic processes relate to the way in which people make a living and the economic activities within that society.

Baseline Economic Profile

The town of Arandis has to a large degree always been dependent on the mining industry. The town was established in the 1970s for the specific purpose of housing mine workers from the Rössing Uranium Mine. In 2005, the employment rate in Arandis was estimated at

around 64%. Recent developments in the mining industry have created additional employment opportunities. Because mine closure would have a detrimental effect on the town the ATC has implemented a Sustainable Development Project Strategic Plan (SDPSP).

Arandis is ideally placed for industrial development. The town has a small airport approximately 6 km to the south of town, on the road to Windhoek and Walvis Bay, a railway line runs to the south of town, the area has good weather conditions, it lies outside the rust belt, and the town has been awarded EPZ-status by national government.

About a third of the economically active population is unemployed and in Arandis, there is a significant relationship between unemployment and various other social ills. Alcohol abuse is seen as the biggest social ill in Arandis with many people becoming more indebted.

Economic Change Processes and Resultant Impacts

The economic change processes and impacts that are expected to result from the proposed access road are the enhancement/reinforcement of economic equities, a change in the employment equity of vulnerable groups and a change in occupational opportunities.

It is foreseen that the construction of the road will lead to enhanced economic opportunities in the form of 170 direct employment opportunities. It is expected that salary packages will differ between skilled and unskilled work labour.

The construction of the proposed access road can also lead to indirect employment opportunities, e.g. domestic services, and food stalls, etc. While the employment opportunities created by the construction of the proposed road will only be temporary, approximately 2 years approximately 170 people will have acquired new skills and have gained 2 years' worth of experience.

TABLE 9.3 – SUMMARY OF IMPACT: THE CONSTRUCTION AND MAINTENANCE OF THE PROPOSED ACCESS ROAD WILL ENHANCE ECONOMIC EQUITIES; BRING ABOUT A CHANGE IN THE EMPLOYMENT EQUITY OF VULNERABLE GROUPS AND A CHANGE IN OCCUPATIONAL OPPORTUNITIES

Criteria	Without Mitigation	With Mitigation
Nature	Negative	Neutral
Intensity	Moderate	Low
Duration	Medium term	Short term
Extent	Local	Local
Phase	Construction and Operation	Construction and Operation
Probability	Probable	Probable
Significance	Moderate	Low
Potential for Mitigation or Optimisation	Moderate	N/A
Confidence	Sure	Sure

9.4.4 Institutional and Empowerment Processes

Institutional and Empowerment processes relate to the role, efficiency and operation of government sectors and other organisations within the area in terms of service delivery.

Baseline Institutional Processes

There is a large shortage of housing, in Arandis, which has resulted in overcrowding and the spread of informal settlements. The water reticulation system can only handle a maximum capacity load of up to 10,000 people. The state clinic in town falls under the auspices of the Ministry of Health and Social Services and does not offer a 24-hour service or overnight facilities (although an after-hour emergency service is available). The clinic has limited capacity to deal with medical emergencies e.g. motor vehicle accidents. Although Arandis has a police station, it does not have an ambulance service, an emergency/trauma room, or fire and rescue services.

Baseline Empowerment Processes

People who live in poverty because of high unemployment rates, low-income levels and a poor education are more focused on basic needs. These people are more focussed on the immediate benefits of a project such as job creation, irrespective of the negative and/or longer term impact that a development could have on their natural and/or human environment. These people are in a sense disempowered to fully participate in the process.

Institutional and Empowerment Change Processes and Resultant Impacts

The institutional and empowerment change processes and impacts that are expected to result from the construction and operation of the proposed Trekkopje Mine access road include a change in community infrastructure, a change in housing needs/demands and the potential for social mobilisation or attitude formation against the project.

Additional municipal services (such as water, sewage and waste removal) will be required at the construction site(s) and the construction camp during the construction phase. It is the contractor's responsibility to install and remove the (temporary) infrastructure required to access these services. The changes brought about by the construction camp to community infrastructure will only be temporary in nature.

The houses in Arandis do not have building foundations. This means that blasting activities in the area could potentially damage the houses in town, endangering the occupants' safety. Reparation costs would have an economic impact.

The potential in-migration of a construction team consisting of approximately 250 people would severely exacerbate the existing situation of overcrowding and lack of accommodation in Arandis. Therefore, it is vitally important the local labour be utilised. The 80 skilled people that will reside in Swakopmund will not have a detrimental effect on the receiving environment, but this may lead to a cumulative impact if more people, who are working on other developments in the area, take up residence in the town.

If the use of a residential construction camp is unavoidable, it is recommended that such a camp be located at the mine. Failing that, the camp should be located on the outer edges of Arandis. To ensure support for the project by the residents of Arandis and to reduce the risk of social mobilization, Areva should at all times be seen to care about the residents of Arandis. The undertakings and mitigation/enhancement measures stipulated in the Environmental Management Plan (EMP) should be implemented effectively and with due diligence to show local residents and affected populations that their needs are being taken into account. Where social mobilization does occur, it could not only severely delay the construction process, but also lead to intense situations of conflict that ultimately impact on social well being.

TABLE 9.4 – SUMMARY OF IMPACT: ACTIVITIES ASSOCIATED WITH THE CONSTRUCTION PROCESS COULD BRING ABOUT A CHANGE IN COMMUNITY INFRASTRUCTURE AND A CHANGE IN HOUSING NEEDS. SOCIAL MOBILISATION CAN OCCUR IF THE LOCAL COMMUNITY OF ARANDIS IS DISREGARDED

Criteria	Without Mitigation	With Mitigation
Nature	Negative	Neutral
Intensity	High	Low
Duration	Short term	Short term
Extent	Local	Local
Phase	Construction, possibly extending to Operation	Construction
Probability	Probable	Unlikely
Significance	Moderate	Low
Potential for Mitigation or Optimisation	Moderate	N/A
Confidence	Certain	Sure

9.4.5 Socio-cultural Processes

Socio-cultural processes relate to the way in which humans behave, interact and relate to each other and their environment, as well as the belief and value systems, which guide these interactions.

Baseline Socio-Cultural Profile

The residents of Arandis are still divided in how they view the town today. Older residents still refer to Arandis as a mining town, for the youth, the town's identity is not vested in the mine anymore. The ATC is hard at work through its SDPSP to ensure the self-reliance and sustainability of the town beyond the life of any mine in the area but one of the key problems hampering Arandis is the town's legacy, not only as a mining town but also as that of a township.

The people in Arandis have a definite sense of camaraderie, with a strong sense of place attachment. Most of the youth see their future in Arandis. Most people recognize each other and get along and those who complain, complain about the same things. In Arandis, most people who frequent shebeens do so out of boredom. Although the town has many sporting venues, there is not much in the way of entertainment and recreational facilities. Despite complaints, residents indicated that they do not intend relocating away from Arandis.

Socio-Cultural Change Processes and Resultant Impacts

The following changes processes are expected; dissimilarity in social practices, alteration in family structure, conflict, safety and crime impacts and change in sense of place.

Dissimilarity in social practices refers to the different values, social standards and religious beliefs that might exist between a large group of newcomers to town (such as a construction team) and that of its residents.

If the majority of the construction or maintenance team were to come from outside of Arandis, it is possible, that the separation from their homes, traditional norms, prevailing cultural traditions and support systems may lead them to engage in more risky sexual behaviour. Apart from the obvious health implications, HIV infection in particular has an economic impact, not only on the local area, but also within a regional and national context.

Although it is highly unlikely that the presence of the road itself will threaten family cohesiveness, or impact on immediate or extended family networks, or the traditional roles played by members of the family, it is expected that the human element that forms part of the construction process could influence or alter family structures to some extent.

Conflict can occur within a community or between the community and the project proponent. In the case of the proposed mine access road, this is not apparent.

Sense of place goes hand in hand with place attachment, which is the sense of connectedness a person/community feels towards certain places. Residents appear to have a strong place attachment to Arandis.

Potential negative impacts include the visual impact and the resultant intrusion on sense of place, which does not seem to be a point of concern to the residents of Arandis. This project is perceived as having a positive impact in terms of job creation and as an infrastructural and/or economic development.

TABLE 9.5 – SUMMARY OF IMPACT: THE CONSTRUCTION AND OPERATION OF THE PROPOSED ACCESS ROAD CAN ALTER HUMAN INTERACTIONS AND RELATIONSHIPS BY BRINGING ABOUT A CHANGE IN THE SOCIO-CULTURAL ENVIRONMENT		
Criteria	**Without Mitigation**	**With Mitigation**
Nature	Negative	Neutral to Positive
Intensity	High	Moderate
Duration	Short term	Short term
Extent	Local	Local
Phase	All phases	All phases
Probability	Probable	Unlikely
Significance	Moderate	Low
Potential for Mitigation or Optimisation	Moderate	N/A
Confidence	Sure	Sure

9.5 Conclusion and Recommendations

The construction phase of the project is characterised by a number of negative social impacts, mainly due to the nature of the activities that take place during this phase. However, these impacts are only temporary in nature, lasting over the construction period. There are also a number of positive impacts, which can be enhanced if managed effectively.

A huge benefit that the construction of the proposed access road can bring to the local community is that of employment, albeit on a temporary basis. The use of local labour, i.e. people who already reside in Arandis, will also circumvent further overcrowding in Arandis and additionally, negate other potential social impacts associated with the influx of construction workers, by preventing conflict over scarce resources, or because of dissimilarities in social practices.

Overall, based on the conclusions and findings of this report, the construction and operation of the proposed access road does not pose any social impacts that are deemed irreversible, fatally flawed, or severely detrimental to the social environment.

10 PUBLIC PARTICIPATION PROCESS

10.1 Public Review of this Report

The public is invited to review this EIA report and to provide comment to be included in the Final EIA Report prior to submission to the MET authorities. The public review period is three weeks from the date of availability.

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11 CONCLUSION

11.1 Biophysical

It is inevitable that road construction activities will impact on the biophysical environment. In the Erongo region, these impacts will principally be related to the loss of fauna and flora and the fragmentation of the desert habitat. For these predicted impacts not to remain permanent, it is recommended that, on mine closure, the road be removed and rehabilitated to allow the habitat to return to its pre-mining state.

Culverts need to be designed into the alignment of the road, for the predicted water related impacts to be minimised and to allow for the undisturbed movement of fauna (and flora through stream flow activity).

During the construction phase, water needs to be applied to working surfaces to minimise the potential nuisance value dust impact. The adequate supply of water remains a potential constraint to effective dust management.

The new access road will reduce vehicle emissions. The linear relationship between length of road and emissions makes the shorter route the optimal choice.

The road construction will require fill material, which will result in the excavation of borrow pits. Suitable fill material is found in the washes and drainage channels in the Trekkopje area. There is a possibility that suitable mine overburden material can be used to supplement the required fill material, which will decrease the predicted impact on the environment by minimising the number of required borrow pits.

The transport and use of hazardous chemicals carries an inherent risk. However through effective management, the identification of the risks and an efficient emergency response plan the associated risks involved with the Trekkopje operation can be managed to the extent that they will pose a minimal threat to the environment and humans in the area.

The current access road will experience additional impacts through the provision of power, water and infrastructural services to accommodate the project. The post closure use of such infrastructure will not offset the environmental impacts associated with them as there are at this stage no planned uses for them.

11.2 Socio-economic

The possible economic benefit that Arandis will accrue through post Trekkopje use of the infrastructure associated with the road & rail terminal holds tremendous potential. The presence of the terminal at Arandis will possibly act as a catalyst for further development thereby enhancing economic opportunity for the community.

The construction phase of the project is characterised by a number of negative social impacts, mainly due to the nature of the activities that take place during this phase. However, these impacts

will only last over the construction period. There are a number of positive impacts, which can be enhanced if managed effectively.

A huge benefit that the construction of the proposed access road can bring to the local community is that of employment, albeit on a temporary basis. The use of local labour, i.e. people who already reside in Arandis, will also circumvent further overcrowding in Arandis and additionally, negate other potential social impacts associated with the influx of construction workers, by preventing conflict over scarce resources, or because of dissimilarities in social practices.

Overall, based on the conclusions and findings of this report, the construction and operation of the proposed access road does not pose any social impacts that are deemed irreversible, fatally flawed, or severely detrimental to the social environment.

11.3 Assumptions & Limitations

The most important limitation with regard to biophysical impacts is the availability of information on the suitability and quantity of fill material required for the road. A substantial amount of investigation is required that will entail the excavation of test trenches to determine depth and chemical composition of the local material. Only on the completion of such testing will the exact location and size of the borrow pits be determined. The same applies for the suitability of mine overburden material. There is also a possibility that the mine overburden material contains radioactive material, making it unsuitable for use.

The EIA recommends that on closure of the mine, the road be removed and the corridor be rehabilitated. However, the circumstances at closure are currently unknown and it may be that regional authorities or other mines wish to make use of or even extend the road.