

## ENVIRONMENTAL & MANAGEMENT PROGRAMME TREKKOPJE MINE ACCESS ROAD

**Prepared for:**

AREVA RESOURCES – NAMIBIA

**Contributors:**

Daniel Limpitlaw  
MasterQ Research

**Compiled by:**

Peter Roux

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## **1 ENVIRONMENTAL MANAGEMENT**

An environmental management plan is an integrated plan for addressing potential environmental and social impacts arising from a project. EMPs cannot provide explicit guidance on all aspects of a project, but should provide the basis for addressing the impacts identified in the EIA. The EMP must be developed and elaborated as the project progresses towards construction and operation.

This EMP must be made available to contractors and site personnel before the start of each activity. An environmental and social impact management induction session must be conducted for all employees and contractors prior to commencement of duty. The EMP should be included in all tender documents to ensure that environmental and social compliance is achieved

This EMP provides a link between company policy and site implementation. The relevant AREVA policy statements are presented in Sections 1.1, 1.2 and 1.3.

### **1.1 AREVA Environmental Policy**

- Our operations will comply with the appropriate Namibian policies, regulations and guidelines, and with the AREVA group policies and objectives in terms of environmental management. We will apply international good practice in areas where there is no local legislation.
- We acknowledge that our operations have environmental, social and economic impacts and are committed to the implementation of an integrated management system, which addresses significant issues in all of these areas.
- We will put in place management action plans for all significant issues and set targets in key areas. Progress towards these targets will be monitored and reported to the group's management regularly.
- We aim for continual improvement in the areas of resource consumption (water and energy), greenhouse gas emission, effluent and waste reduction. Our data will be reported and evaluated quarterly.
- We will engage with our internal and external stakeholders, keeping them informed of our environmental performance. We will share experience and best practices within the AREVA group and with local companies.
- We will promote co-operation and improvement in the field of environmental protection and management. We will engage in dialogue with local, regional and national bodies as well as other companies to work towards a shared goal of continual improvement.
- We will adequately train our staff and contractors to give effect to this policy. They will be provided with relevant knowledge, skills and qualifications to work in an environmentally responsible way.

- We will carry out baseline studies and assess the impact of major projects changes. We strive to protect and manage biodiversity on our project sites.
- We will integrate risk reduction and future decommissioning plans from the start of mine development and will adequately fund our rehabilitation and closure commitments.
- ARN's suppliers and contractors are required to meet our standards of environmental management and to assist us in managing our collective environmental impact.

## 1.2 Business Unit Environmental Policy

TABLE 1.1 – BUSINESS UNIT ENVIRONMENTAL POLICY	
PRINCIPLES	OBJECTIVES
<p><b>1. Environmental management:</b></p> <p>Reinforce the participation of everyone in the environmental management</p>	<ul style="list-style-type: none"> <li>• Respect and anticipate the evolution of local regulations and AREVA standards</li> <li>• Implement an integrated management system on all sites</li> <li>• Raise awareness of all employees and contractors to environment protection</li> <li>• Reinforce internal communication, up down and transverse, and in particular experience sharing and best practices between sites and departments</li> <li>• Promote our environmental performance and respond to expectations of stakeholders in terms of transparency</li> </ul>
<p><b>2. Risk prevention:</b></p> <p>Prevent risks and liabilities</p>	<ul style="list-style-type: none"> <li>• Integrate risk reduction and future decommissioning of sites from the early stage of planning</li> <li>• Systematically carry out complete initial baseline studies</li> <li>• Map and master all our environmental risks: technological risks, chronic and accidental pollution, health risks, impact of our activities on biodiversity</li> <li>• Develop and harmonize the environmental monitoring networks (chemical and radiological) around all our sites</li> <li>• Maintain a decommissioning plan for all our exploration and production sites, with cost estimates, reviewed and validated on a regular basis, and anticipate decommissioning works during the operations phase</li> </ul>
<p><b>3. Environmental performance:</b></p>	<ul style="list-style-type: none"> <li>• Perform an eco -concept approach for each new project or major modification of existing facilities</li> <li>• Implement on the sites and within the purchasing and technical</li> </ul>

Reduce our environmental footprint	processes, programmes for rational use of resources, water and energy, and for the reduction of greenhouse gas emissions and other effluents and wastes
<b>4. Research and development:</b>  Be proactive in the field of environmental innovation	<ul style="list-style-type: none"> <li>• Reduce our consumption of non-renewable resources</li> <li>• Develop advanced technologies for the treatment of our waste and effluent</li> <li>• Improve our modelling in terms of long-term contaminant behaviour and transport</li> </ul>

### 1.3 Sustainable Development Policy

The aim of this policy is to identify and promote actions that will enhance the sustainability of the Trekkopje mine operation and to improve socio-economic conditions in Namibia and the Erongo region.

- The Trekkopje deposit will be developed into a medium-term, efficient mine that yields strong returns on investment. Through this project, natural capital is efficiently transformed into financial capital, social services, training and state revenue – essential ingredients for development.
- Environmental, social and sustainability considerations are key aspects that will be integrated in the planning and optimisation of ARN's projects. This promotes equitable and sustainable use of the environment and natural resources for the benefit of present and future generations.
- While no mine is without environmental impact, such impacts are avoided wherever possible. Where avoidance is not possible, we minimise and then mitigate the impact of our projects on the environment by applying best practice rehabilitation and pollution control, meeting or exceeding standards set by the state.
- ARN is sensitive to the impact that its operations may have on neighbouring communities who are frequently poor and underdeveloped. Communities affected by our activities should receive direct benefits from the development of mineral deposits in their area and such benefits should be sustainable. The benefits relate to health, income, training and living conditions.
- We support community-based projects intended to make a difference in a sustainable way without creating dependency.
- Our ultimate goal is that, on closure, the communities within which we have operated will be in a better position to pursue sustainable livelihoods than before we started mining, and that some of the profits of our venture have been converted to physical, social, human and intellectual capital for the benefit of our neighbours.
- Sustainable development must be supported by good governance. Our project is developed in an accountable and transparent manner and information is regularly communicated to our stakeholders. ARN is committed to high standards of corporate governance.

- We require our partners and major suppliers to subscribe to our sustainable development standards.

The construction of roads can have a major impact on the environment. It is thus imperative that precautions be taken to ensure that environmental damage is minimised. This will take concerted effort from contractors, management, and proper planning is of the utmost importance. The Environmental Control Officer shall remain in contact with the local role players. The Environmental Control Officer shall convey the contents of this document to contractors' site staff and discuss the contents in detail with the project managers.

Lines of communication should always be open to ensure proper and timeous reaction to complaints. The contact numbers of the ECO and Contractor shall be made available to all.

During the construction period Environmental Audits should be conducted on a three monthly basis to determine compliance with the recommendations of the EIA, EMP and conditions of the Record of Decision (ROD). These audits must be external by an independent consultant.

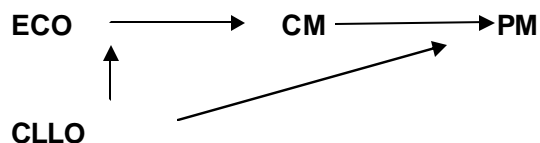
#### 1.4 Scope

The scope of this document is to give guidelines to management and contractors constructing the road and rail terminal development, with regard to the environment.

**The management programme has a long-term objective to ensure that:**

- 1) Environmental Management considerations are implemented from the start of the project.
- 2) Precautions against damage and claims arising from damage are taken timeously.
- 3) Take into consideration landowners and neighbours.
- 4) Always behave professionally on and off site.
- 5) Ensure quality in all work done, technical and environmental.
- 6) Immediately resolve problems arising from damage.
- 7) To preserve the natural environment by limiting destructive actions on site.

##### 1.4.1 Reporting Structure



ECO: - Environmental Control Officer  
C: - Contractor

- CM: - Contract Manager
- CLLO: - Contractor Liaison Officer (Dedicated person)
- PM: - Project Manager

<b>TABLE 1.2 – RESPONSIBILITY MATRIX</b>		
<b>Function</b>	<b>Name / Cell No</b>	<b>Responsibility</b>
Project Manager		Overall management of project and EMP implementation
Site Supervisor/ Contract Manager (CM)		Oversees site works, liaison with Contractor, PM and ECO
Environmental Control Officer (ECO)		Implementation of EMP and liaison between, Contractor and Community / Landowner
Contractor		Implementation and compliance with recommendations and conditions of the EMP, Appoints dedicated person (CLLO) to work with ECO
Contractor Landowner Liaison Officer (CLLO)		Implementation of EMP, landowner / community interaction, environmental control of site actions, re-mediation and rehabilitation work.

#### **1.4.2 Phases**

The development build-out and operation will occur over a series of phases that expected to be concluded in an approximate 20 year life of mine time span. The construction phase for the proposed new road is approximately 14– 18 months. The EMP principles will be relevant to the whole construction and operational phase and may be amended as required by the environmental control officer.

## 2 EMP: GENERAL REQUIREMENTS (ALL PHASES)

The mitigation measures required to address the environmental and social impacts identified are set out in the tables below.

TABLE 2.1 – GENERAL MITIGATION MEASURES					
Activity	Impact	Responsibility & Partners	Mitigation measure	Start	Finish
All	Employee environmental awareness	AREVA site manager,  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Workers must be trained in good environmental practices and such areas as the surrounding desert areas are to be off limits to them.</li> <li>Damage to existing flora and fauna is to be a punishable offence.</li> <li>Off-road 4 x 4 driving into the surrounding areas is to be strictly forbidden and controlled.</li> <li>Toilets are to be provided and used by the workers and not the surrounding bush.</li> <li>Litter is to be strictly controlled.</li> </ul>	Site mobilisation	Demobilisation
All	Contractor environmental performance	AREVA site manager,  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Contractually set penalties for environmental transgressions should be in place during all phases of the road construction. Contractors should be held responsible for damages, regardless of whether the damage was done by a subcontractor.</li> <li>Simple environmental guidelines are required for contractors coming to site, especially with regard to off-road driving, camping in designated places only, collecting firewood, rubbish disposal, dumping of engine oil and all the usual things that can and should be avoided.</li> </ul>	Site mobilisation	Demobilisation
All	<b>Water</b> consumption	AREVA site manager, Contractors, sub-contractors  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Given the shortage of water in the area contractors must reduce, reuse and to recycle as much water as is possible.</li> </ul>	Site mobilisation	Demobilisation
All	<b>Waste</b> Management	AREVA site manager,  Verification: ECO to audit compliance	<p>A waste materials management hierarchy can be considered for the road construction phase. In order of preference, options selected should be:</p> <ol style="list-style-type: none"> <li>waste avoidance – good housekeeping, substituting materials with less hazardous ones, equipment redesign, process modification, alternative processes or non-production of material,</li> <li>waste reduction – practices which reduce waste,</li> <li>waste reuse – direct reuse of waste materials for the same grade of use,</li> <li>waste recycling or reclamation – using valuable components of waste in other processes, including reuse of drums, glass and paper, the recovery of used solvents and oil, alternative uses of materials such as sawdust and metal shavings and reuse of process or storm water,</li> <li>waste treatment – to reduce the hazard or nuisance, preferably at the site of generation (this should only occur after minimisation, recycling and reuse options have been applied</li> </ol>	Start of construction	Demobilisation

TABLE 2.1 – GENERAL MITIGATION MEASURES					
Activity	Impact	Responsibility & Partners	Mitigation measure	Start	Finish
			and 6. Waste disposal – the last option and one which generally requires approval from regulatory authorities. (Australian EPA, 1997).		
All, particularly operation phase activities	<b>Visual Impacts:</b> Visual intrusion by mine structures – finishes and textures	AREVA site manager,  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>• As in the requirements for Trekkopje mine all painted surfaces are to use a range of muted earth tones or in the case of large surfaces such as roofs, storage tanks and the stacks, medium grey chosen for its ability to blend in to the background. Bright colours are not to be used except for the safety markings as required by the industry. Reds, greens, whites and blues must be avoided. Recommended colours are:               <ul style="list-style-type: none"> <li>○ Walls and surfaces – RAL 1020, RAL6003, and RAL7008.</li> <li>○ Roofing – RAL6013</li> </ul> </li> </ul>		
All	All	Site Manager	Site register of complaints by interested and affected parties to be maintained	Site mobilisation	Closure

A method statement is required from contractors' that includes the layout of any ablation facilities and wastewater management. The contractors' site shall have the necessary ablation facilities with chemical toilets in the event of such facilities not being available at commencement of construction.

Where development facilities are available the contractor shall make use of such facilities where it is viable and possible. The contractor shall inform all site staff to use supplied ablation facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.

The contractor shall supply waste collection bins where such is not available and all solid waste collected shall be disposed of at a registered waste dump. A certificate of disposal shall be obtained by the contractor and kept on file. Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may solid waste be burned on site unless a suitable incinerator is available.

## 2.1 Workshop and Maintenance Storage Areas

Where possible and practical all maintenance of vehicles and equipment shall take place in a dedicated workshop area. During servicing of vehicles or equipment, a suitable drip tray shall be used to prevent spills onto the soil, especially where emergency repairs are affected outside the workshop area. Leaking equipment shall be repaired immediately or be removed from site to facilitate repair. All potentially hazardous and non-degradable waste shall be collected and removed to a registered waste site.

Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediated to the satisfaction of the ECO. To this end a method statement is required from the contractors' to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillages. The contractors' shall be in possession of emergency spill kits that must be complete and available at all times on site.

***The following shall apply:***

- All contaminated soil / yard stone shall be removed and be placed in containers.
- Contaminated material can be taken to one central point where bioremediation can be done.
- A specialist contractor shall be used for the bioremediation of contaminated soil where the required remediation material and expertise is not available on site or the material can be remediated at the Trekkopje site with the required permission.
- All spills of hazardous substances must be reported to the ECO and project manager

## **2.2 Storage areas of hazardous substance**

All hazardous substances shall be stored in suitable containers and storage areas shall be bunded either by either cement or impervious PVC liners for temporary bunding. This includes all carbon substances like fuel and oil as well as herbicides and battery acid. A register shall be kept on all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately. Any leaking containers shall be repaired or removed from site (See above for actions after spills).

Storage areas shall display the required safety signs depicting "No smoking", "No naked lights" and "Danger". Containers shall be clearly marked to indicate contents as well as safety requirements. **The contractors' shall supply a method statement for the storage of hazardous materials at construction sites.**

### **2.2.1 Management measures**

- Hazardous material includes all potentially corrosive (acidic or basic), toxic, explosive or flammable materials. Specific materials include chlorine gas bottles, sulphuric and hydrochloric acid containers, paint, explosives, oxyacetylene bottles, welding equipment and fuels.
- Areas for the storage of potentially hazardous material, or of any containers that could potentially burst or leak, will be lined with suitably impervious material (such as PVC), and will be bunded.
- The lined and bunded areas will be sloped so as to direct any spillages into an impermeably lined sump, of adequate size to contain 110% of the

maximum sized container in the bunded area. This includes the fuel storage and transfer areas.

- Corrosive, explosive, toxic and flammable material will be separated appropriately to reduce the chance of mixing. Corrosive products will not be stored close to metals or plastics.
- Explosive material will be stored under suitably protected conditions, including in the shade for containers under pressure.
- A hazardous materials register will be developed and maintained on site.
- Material Safety Data Sheets (MSDS) will be available, and kept on site for all hazardous materials.
- If a spill of any liquid other than clean water occurs, it must be cleaned up immediately. In the case of any oils or fuels, this will require that the affected area is excavated, the contaminated sand placed in plastic containers or PVC bags, and transported away for disposal at a registered hazardous waste disposal site. Disposal certificates and spill incidents will be documented as an environmental incident. The on-site spill kit will be used as appropriate.
- Shut-down valves will be linked to the use of high -risk substances such as chlorine.

## **2.3 Concrete Batching**

### **2.3.1 Management measures**

- Concrete batching and mixing activities shall take place at all time on protected ground. Mixing trays and impermeable sumps shall be used at all mixing and supply points.
- Concrete transportation shall not result in spillage. To prevent spillage onto roads, ready-mix trucks shall rinse off the delivery shoot into a suitable sump prior to leaving site.
- All visible remains of excess concrete and aggregate shall be physically removed on completion of each plaster or concrete pour section, and disposed of. Dumping or washing the remains into the ground will not be permitted.
- Concrete batching activities will take place from 08h00 to 17h00 on weekdays only.
- Cement bags are to be covered at all times with a tarpaulin.
- No open bags are to be stored. They must be used at mixing.

## **2.4 Bitumen Batching**

#### **2.4.1 Management measures**

- Bitumen batching and mixing activities shall take place at all time on protected ground. A layer of crushed gravel should be placed on the area used for mixing in order to prevent any contamination of natural soils.
- Bitumen transportation shall not result in spillage.
- All visible remains of excess bitumen and aggregate shall be physically removed on completion of each mixing run, and disposed of. Dumping or washing the remains into the ground will not be permitted.
- Bitumen / creosote drums are to be stored in a fenced off area and on an impermeable surface.

### 3 SOCIAL MANAGEMENT PLAN

The mitigation measures required to address the social impacts identified are set out in the tables below.

<b>TABLE 3.1 – LOCAL STRUCTURES</b>				
<b>Project Component 1: Support for local structures</b>				<b>Impacts 1, 3, 6, 9,</b>
What should be managed?	Why should it be managed?	Management activities	Responsibility	Phase
Influx of job seekers	<ul style="list-style-type: none"> <li>An influx of job seekers will lead to a change in dynamics and functioning of the local areas and impact on health, social well-being, and economy.</li> </ul>	<ul style="list-style-type: none"> <li>Preferential treatment should be given to job seekers who are from Arandis.</li> <li>Contractors must make use of the Arandis Town Council (ATC) Employment Committee as an established and recognised body that aims to find employment for local residents</li> </ul>	<b>Areva</b>  <b>ATC</b>	Con

<b>TABLE 3.2 – LAND USE</b>				
<b>Project Component 2: Land Use</b>				<b>Impacts:</b>
What should be managed?	Why should it be managed?	Management activities	Responsibility	Phase
A change in land use impacts on local communities' access to resources that sustain their livelihoods as part of land acquisition and disposal, including land availability	<ul style="list-style-type: none"> <li>A loss of land implies reduced land available for other ('original') land uses such as residential development and agricultural activities.</li> <li>The road will open up the possibilities for further land use changes.</li> </ul>	<ul style="list-style-type: none"> <li>Strategic consultation between the ATC and Areva might be beneficial to both parties in terms of the location and use of the segments of road.</li> <li>The area surrounding the road should be rehabilitated upon completion of the construction activities to ensure that the land is returned in the same condition as prior to the construction activities.</li> <li>Once a final route alignment has been decided on, the alignment should be communicated with the //Gangu Conservancy Management Committee to ensure that the road does not pose a detrimental impact on any planned tourism initiatives for the area.</li> </ul>	<b>Areva / ATC</b>  <b>Areva</b>  <b>Areva / //Gangu CMC</b>	Con, O

<b>TABLE 3.3 – EMPLOYMENT</b>				
<b>Project Component 3: Employment</b>				<b>Impacts: 5, 7, 13</b>
What should be managed?	Why should it be managed?	Management activities	Responsibility	Phase
The construction and maintenance of the proposed access road will enhance economic equities; bring about a change in the	<ul style="list-style-type: none"> <li>The creation of direct and indirect, formal and informal employment opportunities creates a source of income, which in turn has an economic impact on the individual and his/her family or immediate social network.</li> </ul>	<ul style="list-style-type: none"> <li>Unskilled labour must be sourced from Arandis.</li> <li>The Employment Committee at the ATC must be utilised to assist with the recruitment process to ensure that a fair and transparent process is followed.</li> <li>Preferential treatment must be given to local entrepreneurs or sub-contractors to supply goods and services.</li> <li>Equal opportunities for employment should be created to ensure that the local female population also have access to these opportunities.</li> <li>Individuals with the potential to develop their skills further should be afforded training opportunities, where possible.</li> <li>Mechanisms should be developed to provide alternative solutions for creating job security upon</li> </ul>	<b>Contractors</b> <b>Contractors / ATC</b>  <b>Areva</b>  <b>Areva</b>	Con, O, C

employment equity of vulnerable groups and a change in occupational opportunities.		<ul style="list-style-type: none"> <li>completion of the project.</li> <li>Payment should comply with applicable Labour Law legislation in terms of minimum wages.</li> <li>Where required, workers must be registered with any and all official bodies as required by law, e.g. Income Revenue Services, Unemployment Insurance Fund.</li> </ul>	<p>Areva</p> <p>Areva</p> <p>Areva / Workers</p>	
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**TABLE 3.4 – SOCIO-CULTURAL ENVIRONMENT**

<b>Project Component 4: Socio-cultural environment</b>				<b>Impacts:</b>
What should be managed?	Why should it be managed?	Management activities	Responsibility	Phase
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	<ul style="list-style-type: none"> <li>The arrival of a large group of 'foreigners' (i.e. people who are not from the area) can potentially lead to conflict if there is dissimilarity in social practices and if such differences are not respected.</li> <li>The arrival of 'foreigners' could influence or alter family structures to some extent in case s of HIV transmission with a health and economic impact.</li> <li>Breadwinners may leave families behind if they secure permanent employment with the contractor.</li> <li>If the project changes the way residents (families) relate to each other, it may affect sense of place.</li> </ul>	<ul style="list-style-type: none"> <li>Employing local labour can again largely minimise and in some cases even negate the impact on the socio-cultural environment.</li> <li>Ideally, the contractor must develop and implement a Skills Development Plan that entails portable skills training so that local labour gain a wider range of skills (that are not confined to road construction work only), thereby enabling individuals to secure employment on other projects in the more immediate area.</li> <li>Launch a STI and HIV/AIDS awareness campaign to educate construction team members and the local community on this issue.</li> <li>Avoid potential conflict situations that can arise from limited employment opportunities by using a fair and transparent recruitment process that actively involves the Employment Committee of the ATC.</li> <li>Do not allow idle loitering from job seekers, or other individuals who are not involved with the project, at either the construction site or the construction camp to prevent a potential increase in opportunistic crimes.</li> <li>Implement a project information centre at the site offices where local residents can obtain information on the progress of the construction process and on what to expect in future.</li> </ul>	<p>Areva / Contractors</p> <p>Contractors</p> <p>Areva / Contractors</p> <p>Areva / Contractors / ATC</p> <p>Areva / Contractors</p> <p>Areva / Contractors</p>	<p>Con, O, C</p>

**TABLE 3.5 – ACCOMMODATION**

<b>Project Component 5: Accommodation - construction workers</b>				<b>Impacts: 4, 14</b>
What should be managed?	Why should it be managed?	Management activities	Responsibility	Phase
Social mobilisation can occur if the local community of Arandis is disregarded.	<ul style="list-style-type: none"> <li>Overburdening the municipal service network can weaken the system or cause it to breakdown resulting in insufficient treatment of water and sanitation,</li> </ul>	<ul style="list-style-type: none"> <li>Contractors to supply and install, at their own cost, infrastructure needed to access municipal services, e.g. water and sewerage pipelines.</li> <li>On site, sufficient portable services must be available (e.g. portable toilet facilities) and services regularly to prevent contamination.</li> <li>Residents must be informed if any blasting is going to take place.</li> <li>Contractors must have their own trained first aid officers and fire wardens who will be able to provide</li> </ul>	<p>Contractors</p> <p>Contractors</p> <p>Contractors</p>	<p>Con</p>



#### 4 CONSTRUCTION PHASE

**TABLE 4.1 – ENVIRONMENTAL MANAGEMENT PLAN FOR CONSTRUCTION.**

Activity	Environmental issue	Responsibility & Partners	Mitigation measure	Start	Finish
Site Access & Construction	<p><b>Surface disturbance</b></p> <p><b>Soils</b> Construction of the access corridor could expose soils to erosional forces, compact soils, affect soil fertility, cause mixing of soil horizons, and facilitate the dispersal and establishment of weeds.</p>	<p>AREVA site manager, contractor</p> <p>Verification: ECO to audit compliance</p>	<ul style="list-style-type: none"> <li>Limit the size of the disturbance corridor to not exceed 500 meters in width.</li> <li>Restrict grading and crushing or cutting of vegetation where possible, leaving rootstock and minimizing soil disturbance,</li> <li>Topsoil dumps must be covered to avoid dust generation.</li> <li>Rehandling of topsoils is to be avoided</li> <li>With rehabilitation of disturbed surfaces, watering of the disturbed surfaces should be undertaken in order to help the seeds in the seedbed to germinate and re-establish themselves,</li> <li>Stockpiled topsoil should be covered to prevent wind erosion,</li> <li>Stockpiles must not be greater than 2 m in height to avoid compaction,</li> <li>Only remove / disturb soil in the dedicated and demarcated road corridor</li> <li>No off-road driving outside road corridor</li> </ul>	Site mobilisation	Demobilisation
Site Access & Construction	<p><b>Pollution of water resources</b> due to construction and operational activities</p>	<p>AREVA site manager, contractor</p> <p>Verification: ECO to audit compliance</p>	<ul style="list-style-type: none"> <li>Pollution control measures must include bunding of areas that contain chemicals and oils.</li> <li>Periodic checks for leaks from the storage tanks should be undertaken.</li> <li>An oil separation system should be established in the workshops and wash bays and vehicles should be regularly serviced to reduce oil leaks etc.</li> </ul>	Site mobilisation	Demobilisation
Site Access & Construction	<p><b>DUST</b></p> <p><b>Soils</b> Construction of the Project could result in fugitive dust, which is a visible indication of soil loss through wind erosion.</p> <p><b>Fauna</b> Dust settles on the adjacent environment and Progressively</p>	<p>AREVA site manager, contractor</p> <p>Verification: ECO to audit compliance</p>	<p>The measures that should be implemented include:</p> <ul style="list-style-type: none"> <li>take every reasonable precaution to minimize fugitive dust emissions from construction activities,</li> <li>apply water one or more times per day to all affected unpaved access roads,</li> <li>vehicle speeds on all unpaved roads should not to exceed 50 km/h,</li> <li>cover all haul truck loads, or maintain at least 20 cm of freeboard space in each cargo compartment when dispersible materials are being transported,</li> <li>ensure that all haul truck cargo compartments are constructed and maintained to minimize spillage and loss of materials,</li> <li>apply water to open and/or un-</li> </ul>	Site mobilisation	Commencement of operation

	renders it less suitable as invertebrate habitat.		<p>vegetated areas to limit visible emissions,</p> <ul style="list-style-type: none"> <li>For temporary surfaces during periods of inactivity, restrict vehicular access.</li> </ul> <p><u>A Project-wide Dust Control Plan should be drawn up to include the following:</u></p> <ol style="list-style-type: none"> <li>detect and identify all significant emissions</li> <li>monitor ground-level concentrations</li> <li>identify the individuals with authority to determine if/when water needs to be reapplied for dust control,</li> <li>identify the individuals with authority to stop work if the contractor does not comply with dust control measures</li> <li>ensure that airborne emissions are kept within regulatory requirements and national guidelines</li> </ol>		
Site Access & Construction	<p><b>Noise</b></p> <p>Increase in noise in the immediate vicinity of construction activities</p>	<p>AREVA site manager, contractor</p> <p>Verification: ECO to audit compliance</p>	<ul style="list-style-type: none"> <li>noise associated with construction and mining activities would be both temporary and intermittent</li> <li>construction personnel to have protective apparatus available</li> <li>construction close to Arandis to be undertaken in daylight hours</li> </ul>	Site mobilisation	Demobilisation
Site Access & Construction	<p><b>POLLUTION</b></p> <p><b>Soils</b></p> <p>Contamination from spills or leaks of fuels, lubricants, and coolant from construction equipment could have an impact on soils.</p> <p><b>Fauna &amp; Flora</b></p> <p>Construction activities could result in the introduction of contaminants to soils and potentially adversely affect the potential for re-vegetation.</p>	<p>AREVA site manager, contractor</p> <p>Verification: ECO to audit compliance</p>	<ul style="list-style-type: none"> <li>remove all contaminated soil to a dedicated sealed pad for in-situ bioremediation or disposal</li> <li>pollution control measures include regular inspection and servicing of monitoring equipment, examination of the figures and trend analysis, and a policy of continuous improvement</li> <li>hydrocarbon contaminated soil must be collected every week and stored in drums for bioremediation or hazardous waste disposal at registered and controlled site</li> <li>do not change oil on uncovered ground. Drip trays must be used to catch oil when vehicles are repaired in the field.</li> <li>used oil and hydraulic fluids must not be discarded on the soil or buried. It must be removed from site and taken back to an appropriate dump</li> <li>in the event of a hazardous spill: <ul style="list-style-type: none"> <li>immediately implement actions to stop or reduce the spill,</li> <li>contain the spill,</li> <li>arrange implementation of the necessary cleanup procedures,</li> <li>collect contaminated soil, water and other materials for bioremediation or</li> </ul> </li> </ul>		

			<p>dispose it at an appropriate waste dumpsite,</p> <ul style="list-style-type: none"> <li>hazardous substances should be stored in a well ventilated area and behind lock and key</li> <li>emergency spill kits with appropriate absorbents to be kept on site at each workshop and where oils &amp; hydrocarbons are being used</li> <li>at least 2 contractor personnel should be trained in hazmat spill response</li> <li>Used solvents and grease should be stored in drums or other suitable containers. It should be sealed and recycled or disposed at an appropriate and dedicated waste disposal site</li> </ul>		
<p>Site Access &amp; Construction (road construction Site Clearance Contractors camp Site preparation Servitudes Infrastructure)</p>	<p><b>Flora Disturbance</b> Destruction of all plants within the road corridor.</p>	<p>AREVA site manager, contractor</p> <p>Verification: ECO to audit compliance</p>	<ul style="list-style-type: none"> <li>no clearing of vegetation outside road corridor</li> <li>Grader operators maintaining the main access road must have clear instructions to re-use existing scrapes and borrow-pits and not create new ones ad lib.</li> <li>no collecting of firewood</li> <li>no off-road driving</li> <li>roads and turning points clearly marked</li> <li>strict access control</li> <li>no removal of lichens</li> <li>collect seed pods of Parkinsonia plants and Aloe capsules</li> <li>rescue missions for: <ul style="list-style-type: none"> <li>Larryleachia marlothii and Lithops sp. in the Central Stipagrostis plains</li> <li>Commiphora saxicola, C. dinteri, Blepharis gigantea in large drainage lines</li> <li>Commiphora saxicola, C. dinteri, Blepharis gigantea B. Grossa, Larryleachia marlothii, Ornithogalum stapfii in the rocky/gravel outcrop</li> <li>Sarcocaulon marlothii, Commiphora virgata, C saxicola, Aloe Namibensis in the boulder/ridges koppies</li> </ul> </li> <li>temporary laydown areas only in already disturbed road corridor</li> <li>topsoil to be prestripped from all excavations, and stockpiled for future use (see soil impacts mitigation measures)</li> <li>disturbance in the boulder ridges/koppies should be avoided</li> <li>Inspect route for possible endemic or rare fauna and flora.</li> <li>erosion control measures should be put in place</li> <li>Rare, endemic or protected fauna species that occur in the area should be rescued.</li> <li>Remove unique habitats and features and relocate these to a</li> </ul>	<p>Site mobilisation</p>	<p>Commencement of operation / demobilisation</p>
<p>Site Access &amp; Construction</p>	<p><b>Fauna: Surface disturbance</b> Construction and operation will</p>	<p>AREVA site manager, Contractor</p>	<ul style="list-style-type: none"> <li>Rare, endemic or protected fauna species that occur in the area should be rescued.</li> <li>Remove unique habitats and features and relocate these to a</li> </ul>	<p>Site mobilisation</p>	<p>Commencement of operation</p>

	<p>directly impact wildlife through disturbance, displacement, mortality, and alteration of available habitats.</p> <p>Construction will reduce wildlife habitat and diversity by removing desert flora and altering the ecology.</p>	<p>Verification: ECO to audit compliance</p>	<p>less sensitive/disturbed site if possible.</p> <ul style="list-style-type: none"> <li>• The erection of fences, except for bitumen batching areas, must not be undertaken as impact on faunal species, through the restriction of their movement, will occur. No poaching and setting of snares must be undertaken.</li> <li>• Avoid siting excavations and associated infrastructure in sensitive habitats such as rocky outcrops and ridges, drainage lines and unique vegetation zones and ecotone areas.</li> <li>• Avoid driving randomly through the area (i.e. impose "track discipline") but use permanently placed roads and tracks. This will minimise the effect on localised potentially sensitive habitats in the area.</li> <li>• Implementation of the precautionary principle (road bumps, speed limits and limitations on night driving) will decrease the incidence of road kill.</li> <li>• Do not hurt, kill or unnecessarily disturb birds or animals.</li> <li>• Rescue of rare, endemic or protected fauna species is to be made if they occur in the area.</li> </ul>		
<p>Site Access &amp; Construction</p>	<p><b>Traffic</b></p> <p>Increased traffic can result injury and/or mortality.</p> <p>Increased traffic on the dirt roads can result in compaction of soils.</p> <p>Increased traffic can cause dust which reduces visibility and can lead to human and faunal injury or mortality.</p>	<p>AREVA site manager, contractor</p> <p>Verification: ECO to audit compliance</p>	<p>In addition to mitigations for fauna dust and pollution management described under site access &amp; construction, the following mitigations apply:</p> <ul style="list-style-type: none"> <li>• Contractors must ensure that their drivers are competent and law abiding.</li> <li>• Driver education for employees must be undertaken.</li> <li>• Compliance with safety standards and measures for accidents or spillages along the route will be the responsibility of the contracting company.</li> <li>• A sufficient number of culverts should be provided if roads must be constructed across rivers, so that there is no negative impact on water flow.</li> <li>• Prevent the cutting of corners.</li> <li>• Erect signage to warn drivers about construction activities and heavy vehicle movement where appropriate.</li> <li>• Use 3-point turns and not u-tums; confine turning to the road.</li> <li>• No operator will operate any equipment when he is under the influence of alcohol.</li> <li>• Use markers to delineate the roadway.</li> <li>• The area to be cleared for road construction should be as small as possible.</li> <li>• Drivers must keep their headlights on when driving on gravel roads.</li> <li>• Keep to the speed limits.</li> <li>• Ensure that all drivers are licensed.</li> <li>• Exercise care when overtaking.</li> <li>• Roads no longer in use should be</li> </ul>		

			<ul style="list-style-type: none"> <li>rehabilitated.</li> <li>The ground surface should be rehabilitated to its original contour.</li> <li>Level the roads and scatter rocks and pebbles to improve the visual impact.</li> <li>Topsoil from new roads must be stored on stockpile.</li> </ul>		
Site Access & Construction	<b>Archaeology</b> Construction can impact on the historical and cultural value of areas adjacent to the access road	Contractor	<ul style="list-style-type: none"> <li>Contractors should be informed that any disturbance of archaeological sites documented in this report will require prior approval in the form of a permit, issued by the national heritage council.</li> </ul>	Site mobilisation	Commencement of operation
Site offices	<b>Flora Disturbance</b>  <b>Fauna</b> Disturbance & Mortality	AREVA site manager, contractor  Verification: ECO to audit compliance	In addition to mitigations for flora & fauna described under Site Access & Construction, the following mitigations apply: <ul style="list-style-type: none"> <li>Fencing of site offices</li> <li>Code of conduct re. littering and collection of plants</li> <li>All construction rubble should be removed. Concrete foundations to be broken and removed.</li> </ul>	Site mobilisation	Commencement of operation
Hazardous Materials use and storage	<b>Pollution</b>	Contractor	Pollution control measures detailed under Site Access & Construction apply	Site mobilisation	Commencement of operation
Infrastructure (workshops, plant & offices)	<b>Flora Disturbance</b>  <b>Fauna</b> disturbance, displacement, mortality, alteration or destruction of available habitats. Dust	AREVA site manager, civil contractor  Verification: ECO to audit compliance	In addition to mitigations for flora & fauna described under Site Access & Construction, the following mitigations apply: <ul style="list-style-type: none"> <li>All construction rubble should be removed</li> <li>Remove all temporary buildings, concrete slabs etc when construction is completed</li> </ul>	Site mobilisation	Commencement of operation
Heavy mobile equipment use  Transport	<b>Air quality:</b> <b>Dust</b>  <b>Flora: Dust</b>  <b>Fauna:</b> disturbance, displacement, mortality,	AREVA site manager, contractor  Verification: ECO to audit compliance	Dust control measures detailed under Site Access & Construction apply Driving restrictions (speed, off-road and night driving) detailed under Site Access & Construction apply <ul style="list-style-type: none"> <li>All vehicles should have (vehicle) hydrocarbon spill kits.</li> </ul>	Site mobilisation	Commencement of operation
Plant and vehicle	<b>Flora: Pollution</b>	AREVA site manager,	Pollution control measures detailed under Site Access & Construction apply <ul style="list-style-type: none"> <li>Do not change oil on uncovered</li> </ul>	Site mobilisation	Commencement of operation

maintenance		contractor  Verification: ECO to audit compliance	ground. Drip trays must be used to catch oil when vehicles are repaired in the field. <ul style="list-style-type: none"> <li>Used oil and hydraulic fluids must not be discarded on the soil or buried. It must be removed from site and taken to an appropriate waste site.</li> <li>Used solvents and grease should be stored in drums or other suitable containers. It should be sealed and recycled or disposed at an appropriate disposal site</li> </ul>		
Transport (commute & import)	<b>Flora:</b> <b>Disturbance</b>  <b>Fauna:</b> disturbance, displacement, mortality, Note: Reptiles Mortality	AREVA site manager, contractor  Verification: ECO to audit compliance	Flora & fauna disturbance control measures detailed under Site Access & Construction apply <ul style="list-style-type: none"> <li>Avoid excessive vehicle speed to, from and in the construction area.</li> <li>Remove and/or relocate endemic species from areas to be mined before commencing operations</li> </ul>	Site mobilisation	Commencement of operation
<b>Activity</b>	<b>Environmental issue</b>	<b>Responsibility &amp; Partners</b>	<b>Mitigation measure</b>	<b>Start</b>	<b>Finish</b>
Development of borrow pits	Habitat loss, dust, stream flow alteration	AREVA site manager, contractor  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Minimize disturbed area by limiting size to what is necessary.</li> <li>Use dust suppression techniques such as sprinkling of water.</li> <li>Prior to pit excavation an ecologist must determine the presence of rare species and rescue them.</li> <li>Rehabilitation of the borrow pit must commence immediately after use.</li> <li>Topsoil must be removed and stockpiled prior to excavating.</li> <li>Pit must be shaped to reflect pre-excavation topography</li> <li>Washes must not be blocked</li> <li>Natural streamflow characteristics must be re-designed.</li> <li>Area must re-seeded and watered</li> </ul>	Excavation	End of use
Placement of culverts	Streamflow alteration, sedimentation, erosion	AREVA site manager, contractor  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Adequate numbers of culverts must be placed in the washes and drainage channels.</li> <li>Channelling of watercourses must be avoided</li> <li>Water dissipating structures must be used</li> <li>Loose material must be removed</li> <li>Culvert must be removed on closure and the streambed shaped to the natural relief.</li> </ul>	Construction	Closure
Creosoting yard	Carcinogenic contamination, pollution	Contractor  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Fence off to ward animals and people.</li> <li>Creosote drums should be placed on an impervious layer.</li> <li>All contaminated soils must be placed in drums and removed weekly to a hazardous disposal facility.</li> <li>Avoid spillages as much as</li> </ul>	Construction	Demobilisation

			<ul style="list-style-type: none"> <li>possible.</li> <li>A materials balance must be kept.</li> </ul>		
Asphalt plant and application of wearing course	Pollution	Contractor  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Limit application and spillages to road surface,</li> <li>Spillages must be immediately removed</li> </ul>	Construction	Demobilisation
Agregate stockpiles	Habitat loss, introduction of alien species	Contractor  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Locate as close to road as possible.</li> <li>Locate on less vegetated areas.</li> </ul>	Construction	Demobilisation

## 5 OPERATION PHASE

**TABLE 5.1 – ENVIRONMENTAL MANAGEMENT PLAN FOR OPERATION.**

Activity	Impact	Responsibility & Partners	Mitigation	Start	Finish
Loading & hauling	<b>Noise</b>	AREVA site manager,  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Maintaining all roads in good conditions to reduce vehicle noise. Vehicle noise is exacerbated by high speeds and by deceleration and acceleration, and these should be avoided (reduce corrugations and bumps).</li> <li>Limiting hours of operation. Noise impacts are less significant during the day-time and this is when the noisiest operations should be scheduled to occur.</li> <li>Avoid the use of hooters.</li> <li>Maintain speed limits.</li> <li>Apply gentle braking techniques.</li> </ul>	Commencement of operations	Commencement of closure
Loading & hauling	<b>Flora:</b> Dust, fumes, spillage	AREVA site manager,  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>Exhaust gases: ensure that diesel vehicles are well maintained</li> <li>Use pollution control technology such as diesel particulate filter systems</li> </ul> Regular maintenance, tailpipe monitoring programme for: <ul style="list-style-type: none"> <li>oxides of nitrogen (NO and NO<sub>2</sub>, collectively known as NO<sub>x</sub>); use NO<sub>x</sub> absorbers where required,</li> <li>sulphur dioxide (SO<sub>2</sub>): apply regular maintenance and use low sulphur diesel</li> <li>carbon monoxide (CO): apply Regular maintenance</li> </ul>	Commencement of operations	Commencement of closure
Yellowcake transport (export)	<b>Traffic</b>	AREVA site manager, environmental manager  Verification: ECO to audit compliance	Safety signage to be displayed and all IAEA requirements regarding transport of yellowcake to be met.  Develop an Emergency Response Plan	Commencement of operations	Commencement of closure
Reagents/fuel/explosives (on site)	<b>Pollution</b> Soil and groundwater contamination Flora	AREVA site manager, environmental manager  Verification: ECO to audit compliance	The waste management approach described under General Requirements applies.  Provide bunding at fuel storage and transfer sites. The bunded area should be large enough to contain 110% of the volume of the tank. Where a bund wall encloses a group of tanks, the bund wall must be able to contain 110% of the volume of the largest tank in the group. Tanks must	Commencement of operations	Commencement of closure

**TABLE 5.1 – ENVIRONMENTAL MANAGEMENT PLAN FOR OPERATION.**

Activity	Impact	Responsibility & Partners	Mitigation	Start	Finish
			stand on a concrete slab, or otherwise have a sealed, base in order to prevent the leakage of contaminants into the soil.		

## 6 CLOSURE PHASE

Closure of the Trekkopje Mine relates to the removal of the infrastructure, bitumen surface and culverts, and the rehabilitation of the corridor. Furthermore, closure will be linked to the mine closure and will be undertaken as part of the overall closure process. The detailed mine closure plan will include the access road as a project component.

An overview of the specific closure aspects related to the road is presented in the table below. It is recommended that a detailed closure plan study be undertaken prior to development of the plan.

Structures	Fate		Rehabilitation required	Habitat name*	Land capability	
	Remain	Removed			Pre-mining / road use	Post-closure
Borrow pits		Yes	Backfill, re-contouring, topsoil spreading, re-vegetation	Gravel and Sand Plains	Wilderness / occasional limited grazing	Wilderness
				Washes	Wilderness / occasional limited grazing	Wilderness
				Coarse Gravel Plains	Wilderness	Wilderness
Road and culverts		Yes	Rip and landscape, re-contouring, topsoil spreading, re-vegetation, remove structures	Fine Gravel and Sand Plains, Washes	Wilderness / occasional limited grazing	Wilderness
Road & rail terminal	Yes		None		Industrial development	Re-use

### 6.1 Closure Criteria

#### *Physical Environment*

##### Land Surface and Soils

- Post-road soil properties should ensure vegetation establishment and resistance to erosion.
- Stability of landforms and hydrology must be ensured.
- Impacts on land, water and biotic resources adjacent to the road corridor must be avoided. Examples include sedimentation and dust.

##### Pollution

- Pollution in rehabilitated areas must be managed in accordance with regulatory requirements.
- Rehabilitation programmes must curb pollution of soils, ground - and surface water.
- All polluted areas must be remediated.

#### Ecological Environment

- Restoration and sustainable use of ecosystems must be undertaken for the shared benefit of stakeholders.
- Natural energy and matter flow conditions should be restored where feasible.
- Ecological function must be restored.
- Auditable measures of the species richness of local native plants are required.
- Specific targets for rare endemics should be considered.
- Permanent photographic monitoring points should be established.
- Diversity of indicative groups of animal species (e.g. birds, reptiles, invertebrates etc.) should be included as a criterion.
- Rehabilitation programmes should allow for the return of appropriate structural components such as rocks, dead wood etc.
- Relative cover of minor weeds must be low, stable or declining
- Invasive aliens capable of becoming dominant must be absent

#### Visual Environment

- Visual amenity must be defined by stakeholder expectations (future land owner, the Government, and future land users).
- On completion of the closure and rehabilitation programme, ecologically functional and stable landforms which are visually acceptable should be returned to the community.

Some of the specific activities required are listed in TABLE 6.2.

<b>TABLE 6.2 – ENVIRONMENTAL MANAGEMENT PLAN FOR CLOSURE.</b>					
<b>Activity</b>	<b>Impact Addressed</b>	<b>Responsibility &amp; Partners</b>	<b>Actions</b>	<b>Start</b>	<b>Finish</b>
Road infrastructure removal	<b>Flora &amp; fauna</b>	AREVA site manager, environmental manager  Verification: ECO to audit compliance	<ul style="list-style-type: none"> <li>• All road infrastructure including culverts and bitumen surfaces need to be removed</li> <li>• The cut and fill areas need to be regraded to resemble the original landscape forms and hydrological patterns.</li> <li>• Topsoil needs to be uniformly spread over the site and the defined rehabilitated plan implemented.</li> </ul>	Commencement of closure	Commencement of post closure phase
Site Rehabilitation	<b>Land surface</b>	AREVA site manager,	<ul style="list-style-type: none"> <li>• The road corridor must be landscaped to resemble the original landscape as closely as possible:</li> </ul>	Commencement of closure	Commencement of post closure

		<p>environmental manager</p> <p>Verification: ECO to audit compliance</p>	<ul style="list-style-type: none"> <li>• Reinststate the natural drainage patterns where they have been altered or diverted.</li> <li>• Erosion by wind and water must be minimised.</li> <li>• Indigenous vegetation must be re-introduced.</li> <li>• The introduction of noxious weeds and pests must be prevented.</li> <li>• Rehabilitated areas must be monitored and managed until they are self-sustaining or are in a satisfactory and acceptable condition.</li> </ul>		phase
Site Rehabilitation	<b>Soils</b>	<p>AREVA site manager, environmental manager</p> <p>Verification: ECO to audit compliance</p>	<ul style="list-style-type: none"> <li>• Dampen topsoil prior to replacing on area to be rehabilitated.</li> <li>• Wet soil should be avoided and should not be moved as this increases compaction and destroys the structure of the soil.</li> <li>• Compact topsoil lightly to prevent wind erosion.</li> <li>• Lightly rake area prior to re-seeding.</li> <li>• Re-seed rehabilitated area with indigenous plant species.</li> <li>• maintain optimal moisture regime to ensure germination</li> <li>• make sure all polluted soil is removed from site</li> </ul>	Commencement of closure	Commencement of post closure phase

## **7 POST-CLOSURE PHASE**

Post-closure occurs once the closure plan has been implemented and the objectives of the social and environmental management plans have been met. At this stage, project activities are scaled back. Limited ongoing monitoring may be required. This monitoring programme should be similar to monitoring undertaken for the Trekkopje Mine of decommissioning of the mine but only focus on those aspects of the site that relate to a potential ongoing pollution hazard or provide an indicator for rehabilitation success.