

REPUBLIC OF BOTSWANA



# **GUIDELINES FOR PREPARING ENVIRONMENTAL IMPACT ASSESSMENT REPORTS FOR MINING PROJECTS**

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## **PREFACE**

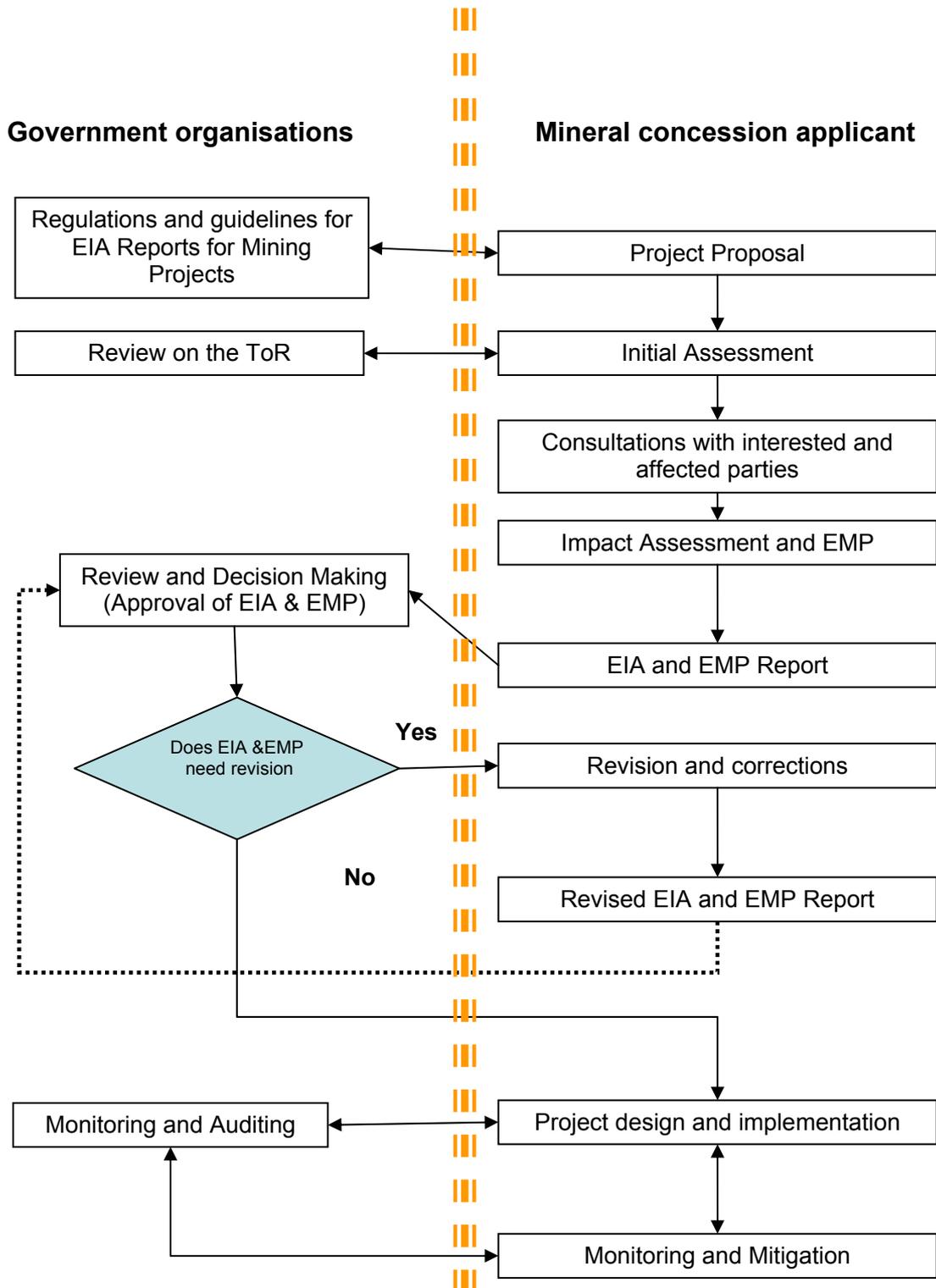
**This document has been prepared along the EIA Guidelines of neighbouring countries such as South-Africa to maintain uniformity within the region. However, EIA's From Australia, Canada and India have also been consulted.**

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## FLOW DIAGRAM FOR PREPARING ENVIRONMENTAL IMPACT ASSESSMENT REPORTS FOR MINING PROJECTS



## **INTRODUCTION**

### **Purpose of the EIA Guidelines**

To develop guidelines for use by mining project proponents in the preparation of Environmental Impact Assessment reports to meet the requirements of the Mines and Minerals Act and other statutory and legislative instruments dealing with the environment.

### **What is an Environmental Impact Assessment (EIA) Report?**

It is a document that achieves the following overall objectives:-

1. To meet the environmental requirements and directives under the Mines and Minerals Act No. 17 of 1999 and other statutory and legislative instruments.
2. To provide a single document that will satisfy the various authorities that are concerned with the regulation of the environmental impacts of mining.
3. To give reasons for the need for, and the overall benefit of, the proposed project.
4. To describe the relevant baseline environmental conditions at and around the proposed site.
5. To describe briefly the mining method and associated activities so that an assessment can be made of the significant impacts that the project is likely to have on the environment during and after mining.
6. To describe how the negative environmental impacts will be managed and how the positive impacts will be maximised.

7. To set out the environmental management criteria that will be used during the life of the project so that the stated and agreed land capability and closure objectives can be achieved and a closure certificate issued.

8. To indicate that resources will be made available to implement the Environmental management programme set out in Part 6 of the EMP.

### **How to use these EIA Guidelines?**

The guidelines provide a list of items to be considered in drawing up an EIA. All items should be considered and if a particular item does not apply to the project, that item should be marked "not applicable" in the EIA document and where practicable a brief reason given as to why it is not applicable. If an item has been considered, but its impact is insignificant, that item should be marked "no significant impact" in PART 5 of the EIA and where practicable a brief reason given as to why there is no significant impact. The item then need not be considered further in PART 6. It is advisable to consult with the Director Of Mines before starting to compile the EIA so as to examine with him/her which items of the guidelines need to be completed and in what format. This pre-planning briefing can assist in avoiding unnecessary work. The items that are applicable should be written up as concisely as possible so that non-specialists can understand the nature of the EIA.

### **New Projects**

For proposed mining projects, it is necessary to address the potential environmental impact issues that may arise due to proposed mining activities i.e. an assessment of the potential impacts of a project on the pre-mining environment. The plans required for the EIA must be at appropriate scales to show the level of detail required for the particular project or aspect described. **As a guide**, 1:50 000 scale plans may be suitable for regional and catchment descriptions and 1:10 000 scale plans may be suitable, if available, for surface infrastructure layouts, mining layouts, pre-mining environmental conditions, water and waste management facilities and the plans for the environmental management programme. However, larger scale plans (at a scale of 1:2 000 or even 1:1 000) may be needed to show the details of river diversion and

water reticulation aspects such as pollution control dams, return water dams, seepage collection and clean water diversion works and evaporation facilities.

### **Operating mines**

For operating mines the emphasis changes from an assessment of the potential impacts of a project on the pre-mining environment to that of establishing actual impacts of an operating mine on an environment in which development has already taken place.

## **EXECUTIVE SUMMARY OF THE EIA**

The executive summary should summarise the overall benefits of the project, highlight the major environmental findings and how these will be managed to prevent, reduce or rehabilitate adverse impacts. The overall closure and post-mining land capability objectives should be state clearly.

## **TABLE OF CONTENTS OF THE EIA REPORT**

### **PART 1. BRIEF PROJECT DESCRIPTION**

1.1 Name and address of the applicant for, or holder of, prospecting/ retention/ waiver/ mining licence of mineral concession.

1.2 Prospecting/ retention/ waiver/ mining Licence number or Waiver of Prospecting

1.3 Name of Mineral(s) covered by the Prospecting/ retention/ waiver/ mining Licence.

1.4 Name and Address of the Owner of the Land and The Title Deed Description of the Land

1.5 Regional Setting (Plan or Aerial Photograph Required)

1.5.1 District and relevant Regional Services Council Authority

1.5.2 Direction and Distance of neighboring towns or major settlements

- 1.5.3 Surface Infrastructure (such as roads, railway lines and power lines in the vicinity) within 2 km radius of the lease area.
  - 1.5.4 Presence of servitudes
  - 1.5.5 Land tenure and use of immediately adjacent land (plan required) (provide a list of names and addresses of these land owners where available).
  - 1.5.6 The name of the river catchment in which the mine is situated
  - 1.6 Description of the proposed project
- A very brief description of the project is required here 1.6.1
- 1.6.1 Mineral Deposit
  - 1.6.2 Mine product(s) or prospecting target mineral(s)
  - 1.6.3 Estimated reserves or extent of target area
  - 1.6.4 Proposed prospecting or mining method(s) (e.g. open cast, underground, long wall, extensions to existing mine, etc)
  - 1.6.5 Estimated life of the project, planned production rate, estimated capital employed and Expected employment.

## **PART 2: MOTIVATION OF PROPOSED PROJECT**

### **2.1 Benefits of the project**

A brief indication of the following is required for the project:

- 2.1.1 Where it is intended that the product(s) will be sold.
- 2.1.2 An estimate of the expenditure to bring the project into production.
- 2.1.3 An estimate of the total annual expenditure at full production.
- 2.1.4 An estimate of the employee strength at full production.
- 2.1.5 An estimate of the multiplier effect on the local, regional and national economy.

Note: Since some of the benefits will be unknown before prospecting, only items 2.1.2, 2.1.3 and 2.1.5 may be relevant for a prospecting EMP.

### **2.2 Consideration of project alternatives**

The major project alternatives and their impact on the environment that were considered prior to the compilation of the EMP should be recorded. Such alternatives may include:

- 2.2.1 Mining method.
- 2.2.2 Mineral processing method.
- 2.2.3 Transport, power and water supply routes.
- 2.2.4 Sources of water.
- 2.2.5 Mine infrastructure sites.
- 2.2.6 Mine residue disposal sites.
- 2.2.7 Domestic and industrial waste disposal sites.
- 2.2.8 Housing sites.
- 2.2.9 Land use options after rehabilitation.
- 2.2.10 Alternatives to river diversions.
- 2.2.11 The "No project" option.

### **PART 3 DESCRIPTION OF THE PRE-MINING ENVIRONMENT**

The approach for this section should be to describe in general the regional setting and then describe in detail the project area or site. For instance,

#### **3.1 Geology**

- 3.1.1 describe in general the regional geology of the project area.
- 3.1.2 describe in detail the study area, geological structures and formation, and mineralogical evaluation
- 3.1.3 Identify the position of the ore body, the tenement boundaries, and alternatives for location of mining infrastructure
- 3.1.4 Geology (include where appropriate representative borehole logs, a section through the ore body and surface mapping. Identify and characterise overburden material that will be disturbed and which, once disturbed, may adversely affect water quality).
- 3.1.5 Presence of dykes, sills and faults that extend beyond the property boundary (Plan required).
- 3.1.6 Describe surface material and bedrock characteristics of the development area.

## **3.2 Climate**

3.2.1 A brief description of the regional climate.

3.2.2 Mean monthly and annual rainfall for the site and number of days per month with measurable precipitation.

3.2.3 Maximum rainfall intensities per month - 60 min, 24 hrs, 24 hrs/50 yr and 24 hrs/100 yr storm events for the past five years.

3.2.4 Mean monthly, maximum and minimum temperatures for the past three years.

3.2.5 Monthly mean wind direction and speed - where appropriate hourly wind direction and speed, with the maximum one minute speed in each hour for the past three years, may be required.

3.2.6 Mean monthly evaporation for the past three years.

3.2.7 Incidence of extreme weather conditions - frost, hail, drought, high winds for the past five years.

Since it is often unusual to have a weather station on a proposed mine site, data for the site may have to be deduced from stations around the site.

## **3.3 Topography**

Provide a topographic map of the development area at an appropriate scale with surface contours at an appropriate interval and describe topographic patterns and landforms with regard to elevation, relief, and aspect.

## **3.4 Soil (Plan required)**

A description of the soil types to be disturbed, their fertility, erodibility and depth should be provided and the soils should be mapped according to a recognised soil classification system. The dry land production potential and the irrigation potential of these soils should also be described.

3.4.1 A cross-section of the mineralised area showing soil profile from surface to the mineralised zone.

## **3.5 Pre-mining land capability (Indicate in the Plan)**

3.5.1 Provide inventories and evaluations of land capabilities in the proposed lease area, including, as appropriate, the following categories: agriculture, forestry, wildlife, fisheries, recreation, Archaeological and cultural sites.

3.5.2 For the various land capabilities describe, document the area and location of the capacity classes to be disturbed by the project.

### **3.6 Land Use within 2 km radius of the proposed area (Plan required)**

3.6.1 Pre-mining land use.

3.6.2 Historical agricultural production.

3.6.3 Evidence of misuse.

3.6.4 Existing structures.

3.6.5 Post mining land use capability

### **3.7 Ecology (Natural Vegetation/Plant Life Within 2 km Radius of the Proposed Lease Area)**

3.7.1 Describe the regional vegetation

3.7.2 Dominant species.

3.7.3 Endangered or rare species.

3.7.4 Intruder or exotic species.

3.7.5 Illustrate the location and document the area of the various vegetation types and forest types that will be disturbed by the project

Note: In an undisturbed area, a vegetation map should be prepared.

### **3.8 Animal Life**

3.8.1 Provide an inventory of wildlife resources in the development area, including items such as species, composition, distribution and abundance

- Rare or endangered species
- Migration route and staging areas
- Habitat evaluation, distribution, and utilization; critical habitat
- Regional and local significance of populations
- Sensitivity to disturbance

3.8.2 Document the type, location, quantity and capability of habitat that will be disturbed or lost as a result of the project.

### **3.9 Old and Current Mining in the Lease Area.**

Describe the current and old mining operations in the lease area

### **3.10 Surface Water**

3.10.1 The following to be indicated on a plan:

- (i) Water courses
- (ii) Streams
- (iii) Rivers
- (iv) Dams
- (v) Pans
- (vi) Position of the estimated maximum flood-line for the 1 in 50 year flood event
- (vii) Water rights in the affected area

#### **3.10.2 Surface Water Quantity**

The catchment in which the mine is to be located should be described up to the point where the affected catchment discharges into the receiving water body. This description should include the following information:

3.10.2.1 A map at an appropriate scale indicating the catchment boundaries, the boundaries of the subcatchment occupied by the mine and the water course which would be followed by water emanating from the mine (the affected water course).

3.10.2.2 The mean annual runoff from the catchment upstream of the point of discharge to the receiving water body and from the subcatchment upstream of the mine.

3.10.2.3 Normal dry weather flow in the affected watercourse.

3.10.2.4 Flood peaks and volumes for recurrence intervals of 1:20 and 1:50 years and the regional maximum flood.

3.10.2.5 For river diversions only.

An estimate of the contribution of mean annual runoff normally entering the river over the affected section and the total mean annual runoff entering upstream of the proposed diversion.

#### 3.10.3 Surface water quality

An analysis of surface water samples in sufficient detail to characterise the water quality in the affected water course(s).

#### 3.10.4 Drainage density of areas to be disturbed.

Record as kilometres of drainage path per square kilometre of land area.

#### 3.10.5 Surface water use

Identify where possible who uses the surface water along the route of the affected water course(s), down to the receiving water body, for what purpose and how much in cubic metres per day.

#### 3.10.6 Water authority

Identify the authority concerned, if any.

#### 3.10.7 Wetlands

Location of wetlands on the property, the extent thereof and an indication of the significance and the biological diversity of the wetland.

### **3.11 Ground Water**

#### 3.11.1 Depth of water table(s).

3.11.2 Presence of water boreholes and springs and their estimated yields (Plan required).

#### 3.11.3 Ground water quality.

Analyse water in boreholes and springs in the affected zone so as to be able to characterise the water quality.

#### 3.11.4 Ground water use.

Identify, where possible, ground water and spring water users in the study area and the quantities used.

#### 3.11.5 Ground water zone.

The ground water zone which is likely to be affected by the mining operation (the affected zone) should be identified. Its importance as a regional resource should be described. If available, maps at appropriate scales should be provided indicating the

ground water zone boundaries. Stratigraphic sections, in sufficient detail to indicate the conceptual ground water model, the nature and location of significant aquifers and aquacultures and relevant physical properties, should be provided.

**Note:** These sections may not be required for deep mines.

#### 3.11.6 For river diversions only.

An estimate of the contribution of the stream or river to ground water recharge and an estimate of the contribution of ground water to surface water over the diverted section should be made.

### **3.12 Air Quality**

A survey of the air quality and existing sources of air pollution in the area should be made including fallout dust, suspended dust and gaseous emissions (only if the project includes a scheduled process, as defined in the Atmospheric Pollution (Prevention) Act).

### **3.13 Noise and Vibration**

Existing noise levels on and around the property should be identified as well as potential noise impact sites. If the potential impacts warrant it, pre-mining noise monitoring may be required. Similar exercise should be done for vibration.

### **3.14 Archaeological and Cultural Aspects (Sketch plan required)**

3.14.1 Conduct a baseline survey to identify and describe archaeological sites in the study area.

3.14.2 Examine monuments and site records held by National Museum, Monuments And Art Gallery (NMMAG)

3.14.3 Consult literature and affected parties as well as exploitation of local knowledge.

3.14.4 Sites of recognised archaeological and cultural interest should be described and shown on a plan.

### **3.15 Sensitive Landscapes and Protected Areas**

If specially sensitive landscapes enjoying statutory protection occur on the site these should be described and shown on a plan.

### **3.16 Visual Aspects**

Describe the visibility of the project site from scenic views, tourist routes and existing residential areas. This should include the visibility of dust and other air borne pollutants.

### **3.17 Regional and Socio-Economic Structure**

Local or national regions could be considered depending on the nature of the project.

3.17.1 Population density, growth and location.

3.17.2 Major economic activities and sources of employment.

3.17.3 Unemployment estimate for the area.

3.17.4 Housing - demand, availability.

3.17.5 Social infrastructure - schools, hospitals, sporting and recreational facilities, shops, police, civil administration.

3.17.6 Water supply.

3.17.7 Power supply.

### **3.18 Public Consultations**

3.18.1 Identify and list known interested and affected parties and their representatives.

This may be done in consultation with the relevant authorities.

3.18.2 Conduct public consultations with interested and affected parties as well as key stakeholders to establish the following;

- Dissemination of project information to all the affected communities and interested parties, updating them on progress made and eliciting their views on the project.
- To establish environmental issues of public concern

## **PART 4 DETAILED DESCRIPTION OF THE PROPOSED PROJECT**

### **4.1 Surface infrastructure (Plan required)**

The proposed major surface infrastructure required for the mine should be described briefly and shown on a topographical plan. This should include:

4.1.1 Roads, railways power lines and access routes to and within the plant.

4.1.2 Solid waste management facilities.

4.1.2.1 Industrial and domestic waste disposal sites.

4.1.2.2 Mine residue disposal sites. Give or show on the plan the type of residue, final extent of the dumps, construction method and water reticulation layout.

4.1.3 Water pollution management facilities.

4.1.3.1 Sewage plant location, its design capacity and the process to be used.

4.1.3.2 Pollution control dams, paddocks and evaporation dams. Indicate if these are to be lined or not.

4.1.3.3 Polluted water treatment facility, its design capacity and process to be used.

4.1.4 Potable water plant location, its design capacity and the process to be used.

4.1.5 Process water supply system, its design capacity and the process to be used.

4.1.6 Mineral processing plant.

4.1.7 Workshops, administration and other buildings.

4.1.8 Housing, recreation and other employee facilities.

4.1.9 Water balance diagram.

A schematic diagram, which links up the flow of water to and from the facilities described in 4.1.2 to 4.1.8 above and the mine, is required. The diagram should also show the water supply source(s), the water discharge point(s), evaporation areas and potential seepage points. Each step in the diagram should indicate the estimated flow, in m<sup>3</sup>/day, into and out of the facility, whether it is pumped or gravity fed, piped or an open channel flow, clean or dirty water and, where appropriate e.g. dams, the storage capacity.

4.1.10 Disturbances of water courses.

Give details of any of the facilities described in 4.1.1 to 4.1.8 and mining layouts which are proposed within or beneath an area defined by the 1:50 year flood lines for any water course - unless the facility or mine layout is unlikely to disturb the natural flow or alignment of the water course in any way (e.g. deep level mining).

#### 4.1.11 Storm water.

Indicate the storm water diversion measures designed to separate clean from contaminated water.

NB: The items described above may require more than one plan.

### **4.2 Construction phase**

4.2.1 A brief description of the activities during this period is required, including a plan if necessary.

4.2.2 Direct employment during construction possible influx of labours and stress on public utilities and services

4.2.3 Use of water and power and its source during construction, proposed earth moving, dredging and drilling operations

4.2.4 Proposed plan for transportation and storage of construction material.

4.2.5 Detailed schedule of activity and resource requirements.

4.2.6 Disposal of solid waste/dredged material.

### **4.3 Operational phase**

4.3.1 Soil utilisation guide (Provide plan if necessary).

Based on the soil map, for disturbed areas, this should show the depths of usable soil which will be utilised during mining. It should also show soil stockpile positions.

4.3.2 The proposed mine surface layout (Plan required).

This section requires a brief, illustrated description of the items below. Using the topographical plan as a base, this should give:

For all mines -

4.3.2.1 Access to the workings (vertical and incline shaft positions or adits, ramps and haul roads). For prospecting projects the working sites should be indicated if possible.

4.3.2.2 All structures that may be affected by blasting vibrations.

4.3.2.3 Anticipated location, extent and depth of surface subsidence.

4.3.2.4 All structures and drainage paths that may be affected by surface subsidence.

4.3.2.5 The mining plan, box cut and final void positions.

4.3.3 Mineral processing.

A brief description of the mineral processing method is required. This description should highlight areas in the plant that could generate air, water and noise pollution.

4.3.4 Plant residue disposal.

A brief description of the disposal method(s) giving tons disposed per day at full production for each type of residue.

4.3.5 Transport.

A brief description of how the raw material and final products will be transported (to their point of sale inland or port of export) is required.

4.3.6 Proposed river diversions.

A permit to alter the course of a stream may be requested before the environmental management programme is approved. Depending on the importance and timing of the diversion and its potential impact on the environment, the following information may be requested. This information must relate to the final situation upon closure since approval for temporary diversions, not showing the final situation, will not be given.

4.3.6.1 Topographical plans covering the original alignment, the new alignment and sufficient of the areas upstream and downstream of the proposed diversion so as to extend beyond the influence of the diversion.

4.3.6.2 Plans, cross-sections and long-sections showing the full scheme and nearby infrastructure.

4.3.6.3 Details of any linings, armouring or erosion control measures.

4.3.6.4 Details of hydraulic structures forming part of the diversion.

4.3.6.5 Details of the beginning and end of the diversion showing the transition to the original natural watercourse.

4.3.6.6 Details of points where storm water is expected to enter the diversion and the associated erosion control measures.

4.3.6.7 A detailed description, including plans to the same level of detail as for the final diversion, of any intermediate or temporary steps which may be necessary to reach the final aim.

4.3.6.8 Measures to maintain the long-term alignment (such as may be required where a diversion is located on unstable ground).

4.3.6.9 Stratigraphic sections and engineering properties of the materials through which the diversion is to be constructed.

4.3.6.10 Flood lines for recurrence intervals of 1:20, 1:50, 1:100 years and the regional maximum flood for both the pre-diversion and post-diversion situation.

## **PART 5 ENVIRONMENTAL IMPACT ASSESSMENT**

The mining proponent will be expected to demonstrate that he has considered and understood the potential or anticipated impacts of the project on the environmental components described in Part 2. Therefore an estimate of the nature of these impacts should be given for the construction, operational and decommissioning phases.

When describing the impacts, an estimate of magnitude, timing and duration of impacts is required, e.g. very significant, immediate and temporary impact; low probability, delayed, long-term impact.

### **5.1 Construction phase**

Describe the impacts on the environment to be expected during the construction phase of the project. The following impacts of the project should be assessed.

#### **5.1.1 Geology**

Potential dilution and sterilisation of the ore reserves

#### **5.1.2 Topography**

Some facilities such as waste dumps and tailings storage facilities are major permanent changes to the landscape and the design, and location of these structures requires special consideration. The impact the project will have when viewed from scenic views, tourist routes and existing residential areas should be assessed as well.

#### **5.1.3 Land**

Special consideration should be considered to changes in land use, drainage pattern, soil, land quality including effects of waste disposal, riverbanks and their stability.

#### **5.1.4 Biological (Natural Vegetation, Plant and Animal Life)**

Deforestation/tree-cutting and shrinkage of animal habitat, impact on fauna and flora due to contaminants/pollutants, impact on rare and endangered species, endemic species, and migratory path/route on animals and impact on breeding grounds should be assessed.

#### 5.1.5 Surface Water.

When assessing surface and ground water impacts, two overriding questions must be asked: Will the project significantly change either the catchment yield or the water quality in the catchment? If the answer to one or both questions is yes, an effort must be made to determine the magnitude and nature of the impact. Include an estimate of all dewatering volumes and discharges of polluted water and the impact of these on the receiving water body. For river diversions estimate the long and the short-term water tightness, structural stability and quality and quantity of water seeping into and out of the diversion and the consequences of failure, particularly where the proponent intends to mine, or has already mined, under the diversion or where the diversion is to be constructed on unstable ground and/or where the water table is likely to change its position after mine closure.

#### 5.1.6 Ground water.

Include an assessment of the impacts in the affected zone of mining activities on ground water, the impact on boreholes and the impact on ground and surface water users.

#### 5.1.7 Air quality.

. Air quality prediction should go up to a distance where the ambient air quality standards are not compromised. The predictions should identify the areas of maximum pollution impact.

Assess the likelihood of air pollution from the plant, dumps, materials handling facilities, vehicles or blasting and the impacts this could have on the potential impact sites described in 3.12.

#### 5.1.8 Noise.

The noise that can be potentially generated by the project should be assessed against existing noise levels at possible noise impact sites and its effects on fauna and human health described in 3.13.

#### 5.1.9 Sites of archaeological and cultural interest.

Describe impacts and indicate locations (sketch plan required).

#### 5.1.10 Socio-Economic

Impacts on the local community including demographic changes, economic status, human health, and increased traffic should be assessed.

#### 5.1.11 Interested and affected parties.

Identify and list known interested and effected parties and their representatives. This may be done in consultation with the relevant authorities.

5.1.12 Any other.

## **5.2 Operational phase**

Describe the environmental impacts of the project on the items 5.1.1 to 5.1.12 during the phase when the mine is producing (or prospecting is underway) up to when decommissioning activities begin.

## **5.3 Decommissioning phase**

When a mine, or part of a mine, ceases production (or prospecting activities cease) decommissioning activities start. This phase continues until closure. If the environmental management programme for the construction and operational phases, described in Part 6, has been implemented successfully, there should be only a few outstanding impacts left to manage. The possible nature of these impacts should be assessed and the potentially significant impacts described here, using the list of headings in 4.1, 4.2 and 4.3 and the environmental impacts described in 5.1, to assist in their identification.

### **5.3.1 Partial closure.**

If it is intended to apply for a closure certificate in respect of a portion, part or section of a mine, then the environmental impact assessment should describe the impacts associated only with that portion, part or section of the mine likely to be the subject of such an application. Furthermore, the assessment should concentrate on those aspects that may have significant impacts on, or be impacted by, the remainder of the mine, so that measures to mitigate such impacts can be identified and described in Part 6.

## **5.4 Residual impacts after closure**

There may be some significant residual impacts, resulting from the construction, operational or decommissioning phases, which persist after these activities have ceased and a closure certificate has been issued.

Where possible, these impacts should be identified at least qualitatively so that they can be accommodated when the closure objectives are being defined and when the environmental management programme, described in Part 6, is being devised.

The environmental impact assessments done in accordance with paragraphs 5.1 to 5.3 of Part 5, will have highlighted the major issues on which to focus. However, the potential impacts resulting from the closed operation, listed below, should be considered in any event. It is recognised, nevertheless, that quantification of these impacts could be imprecise, or even not feasible.

5.4.1 The potential for acid mine drainage or poor quality leachates emanating from the mine or residue deposits.

5.4.2 The long-term impacts on surface & ground water.

5.4.3 The long-term stability of rehabilitated ground and residue deposits.

Consider the use to which the land will be put when considering long-term stability.

5.4.4 The long-term impacts arising from river diversions.

## **PART 6 ENVIRONMENTAL MANAGEMENT PROGRAMME**

Whenever a significant impact has been identified in part 5, the proponent must describe how the impact will be managed. Once approved, the environmental management programme set out in this Part will be legally binding in terms of the Mines and Minerals Act and its Regulations. Once the approved programme has been complied with, Director Of Mines may issue a closure certificate.

### **6.1 Construction Phase**

Using the checklist of items set out in 6.2.1 to 6.2.17, describe how each significant impact identified in pre-construction phase will be managed. It is not necessary to detail any particular point if it is to be detailed fully under the operational phase.

## **6.2 Operational Phase**

Describe how significant impacts, identified in construction phase, will be managed during the operational phase up to when decommissioning activities begin.

### 6.2.1 Geology

### 6.2.2 Topography

Plan required of anticipated post-mining topography. Include what slopes will be achieved during rehabilitation and dump construction.

### 6.2.3 Soils

Include depths of soil that will be used and how fertility and erosion will be managed.

### 6.2.4 Land capability

Plan required of anticipated post-mining land capability

### 6.2.5 Land use

Include what type of land use is planned.

### 6.2.6 Natural vegetation/plant life.

For river diversions emphasise aquatic plant life. If possible, include a description of the plant life that will be used during rehabilitation and how the vegetation will be managed.

### 6.2.7 Animal life

For river diversions, emphasise aquatic animal life

### 6.2.8 Surface water.

Indicate the strategies for managing.

#### 6.2.8.1 The water balance described in 4.1.10.

#### 6.2.8.2 Storm water.

#### 6.2.8.3 Surface rehabilitation (insofar as this affects surface water).

#### 6.2.8.4 The legitimate requirements of surface water users on the affected watercourse.

#### 6.2.8.5 For river diversions only.

Indicate how the significant impacts identified in 5.1.3 will be managed paying particular attention to erosion control, structural stability and surface drainage into and out of the diverted section.

### 6.2.9 Ground water

Indicate the strategies for:

6.2.9.1 Optimising surface rehabilitation in order to minimise adverse ground water impacts.

6.2.9.2 Meeting the requirements of legitimate ground water users in the affected zone.

6.2.9.3 For river diversions only.

The control of seepage into and out of the diverted section of the river

6.2.10 Air quality

Include an air pollution control plan if the assessment reveals significant potential impacts on air quality at potential impact sites.

6.2.11 Noise

Include a noise reduction plan in significant impacts are expected at receptor sites.

6.2.12. Sensitive landscapes.

6.2.13. Visual aspects.

6.2.14. Regional socio-economic structure.

6.2.15. Interested and affected parties.

6.2.16. Submission of information.

The proponent will have to establish the extent to which information on measures, taken to comply with statutory requirements, require submission.

6.2.17 Maintenance

Some of the measures described in this Part will require maintenance after they have been implemented and up to the time decommissioning activities begin. Again, this will be site-specific but the proponent should consider where appropriate, the maintenance of at least the following:

6.2.17.1 Rehabilitated land.

6.2.17.2 Water pollution control structures.

6.2.17.3 Rehabilitated residue deposits.

6.2.18 Climate

### **6.3 Decommissioning phase and closure**

Every effort should be made during the life of the project to minimise the cost and amount of work required for this phase. This Part should briefly describe how the project will be decommissioned and closed. It should address the management of the

potentially significant impacts identified in paragraphs 5.3 and 5.4 of Part 5 the conceptual outline of the planned decommissioning strategy and the closure objective.

#### 6.3.1 Closure objectives

#### 6.3.2 Infrastructure areas

Demolition or disposal of structures and buildings, removal of foundations and debris and rehabilitation of the surface subject to Mines and Minerals Act (Act No. 17 of 1999).

#### 6.3.3 Mine residue deposits

6.3.3.1 Disposal facilities (pipes, solution trenches, return water dams etc).

6.3.3.2 Ongoing seepage, control of rainwater

6.3.3.3 Long-term stability

6.3.3.4 Final rehabilitation in respect of erosion and dust control

6.3.4 Sealing of underground workings and rehabilitation of dangerous excavations.

6.3.5 Final rehabilitation of opencast mine haul ramps and roads, final voids.

6.3.6 Submission of information.

The proponent's obligation in this regard, for the period after decommissioning activities have ceased, up to the time closure is approved, is described in paragraph 6.2.16.

#### 6.3.7 Maintenance

If aspects of the decommissioned site require maintenance up to the time that closure is approved, these should be described. The aspects to consider are those listed in 6.2.17.1 to 6.2.17.3.

### **6.4 Proposed timetable, duration and sequence**

These dates are estimates and are dependant on the economic conditions pertaining from time to time during the life of the project.

#### 6.2.1 Prospecting projects.

6.4.1.1 Submission of prospecting EMP, where appropriate, and Prospecting application.

6.4.1.2 Proposed start, duration and completion dates for prospecting.

6.4.1.3 Proposed rehabilitation programme and rehabilitation completion date.

#### 6.4.2 Mining projects

6.4.2.1 Submission of mining EMP and applications for mining

## Permissions

- 6.4.2.2 Start and duration of construction period.
- 6.4.2.3 Proposed start of mining, full production and cessation of production dates.
- 6.4.2.4 Proposed rehabilitation programme
- 6.4.2.5 Proposed dates for progressive or partial closure applications.
- 6.4.2.6 Proposed decommissioning and aftercare programme.
- 6.4.2.7 Proposed date for closure application.

## **6.5 Financial provision**

Particulars should be given about the project's and proponent's ability to make the necessary provision to implement the measures described in Part 6.

## **PART 7 CONSULTATION PROCESS**

The applicant should provide details of the hearings and meetings with relevant authorities and individuals. At this stage the proponent is obliged to respond to issues raised during the meetings.

In reviewing the adequacy of the consultation process, together with the incorporation of its results into the detailed EIA, the Applicant should examine whether the procedure has been followed and

- An overview of the issues discussed
- How the concerns raised were responded to by the project proponent
- How these responses were conveyed back to those consulted
- What are the public hearing panel's observations?

## **PART 8 CONCLUSION**

Assuming that the closure objectives are met give the general overall net impact of the project on the environment.

## **PART 9 STATUTORY REQUIREMENTS**

A list of permissions already granted under other statutes concerning the environment should be provided, giving permit or registration number, date and place of issue. If applications have been made but not yet granted, these should be included.

## **PART 10 AMENDMENTS TO EMP**

This part is intended to accommodate amendments to the document so that it remains dynamic and complete.

## **PART 11 REFERENCES AND SUPPORTING DOCUMENTATION**

References to back-up information/reports.

## **PART 12 CONFIDENTIAL MATERIAL**

Should the proponent wish to keep certain business (including technical innovations and/or processes) or financial information confidential and to exclude this from the EMP document, reference to this should be made in this part.

## **BIBLIOGRAPHY**

*Aide Memoire for Environmental Management Programme Reports for Proposed Prospecting and Mining.* Ministry of Minerals and Energy, Republic of South Africa accessed at <http://www.dme.gov.za/>

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*Environmental Impact Assessment.* Ministry of Environment and Forest Impact Assessment Division, Government of India accessed at <http://164.100.10.135/iass/eia>.