



## **MINISTRY OF ENERGY AND ENERGY INDUSTRIES**

### **GUIDELINES**

#### **MINE DESIGN PLANS**

##### 1. **DEFINITION:**

A Mine Design Plan is defined as the layout and operation of the entire mine, it comprises:

- a) Topographic profile
- b) Geological interpretation
- c) Layout of the mine
- d) Pit design or benched slope model
- e) Scheduling

##### a) **Topographic Profile:**

This section of the Mine Design Plan should depict the slope, gradient, drainage and general land use of the property using contour maps and topographic cross sections, generated either from the survey data presented in the data package, or a private

surveyor. A three dimensional (3D) drawing of the topography or a digital terrain model of the area is also required. All drawings must be done to the same scale as that provided in the data package, or at a scale of 1:25000 if the data is derived from a private source.

**b) Geological Interpretation:**

This section of the Mine Design Plan should contain a geological interpretation, primarily concerning the mineral of interest, of the mine, derived from either the bore hole or survey data provided in the data package, or from data derived from a private survey and should contain:

- A geological map of the mine in plan view.
- Geological cross-sections in the N-S and E-W directions.
- A geological block-model displayed in 3D.
- Isopach Maps of the thickness of the overburden and available resource.

All drawings must be done to the same scale as that provided in the data package or at a scale of 1:25000 if the data was derived from a private source.

**c) Layout of mine:**

This section of the Mine Design Plan should provide detailed drawings of the entire mine in accordance with the geological interpretation of the site showing the exact location of:

- Mine boundaries with entrance, position of berms and set back distances from public roads and watercourses.
- Areas under forest cover unaffected by the proposed mining.
- Areas under forest cover to be affected by the proposed mining.
- The pit/s or benched slopes.

- The Processing Plant/s.
- The Water well or Intake Pond/s and Settling Pond/s.
- The Stock Pile/s of topsoil, overburden, pit-run, processed material, spoil and fill.
- The Office/s Lunch Room/s Road/s and related infrastructure.

All drawings must be done to the same scale as that provided in the data package or at the scale of 1:25000 if the data was derived from a private source.

d) **Pit Design or Benched Slope Model:**

This section of the Mine Design Plan should provide detailed drawings of each Pit or Benched Slope Model in accordance with the geological interpretation and contour map of the site in Plan View and Cross Sections in the N-S and E-W directions and in 3D showing:

- All benches with their heights, widths and slope angles clearly indicated.
- All ramps with their widths and gradients clearly indicated.
- All berms with their heights, widths and taper distances clearly indicated.

All drawings must be done to the same scale as that provided in the data package or at the scale of 1:25000 if the data was derived from a private source.

e) **Scheduling:**

This section of the Mine Design Plan should give detailed descriptions on:

- The procedure and schedule for the felling, storage and disposal of timber in areas to be mined.
- The type, size and capacity of all plant and equipment to be used in the wining, transportation and processing of minerals.

- The method and rate of removal, storage and disposal of topsoil and overburden.
- The method and rate of mine de-watering.
- The method of construction of benches, ramps, berms and haulage roads.
- Method and rate of extraction, storage, processing and disposal of aggregate.
- The source and rate of extraction of water for processing operations.
- The method and rate of operation of the processing plant.
- The method of treatment of water for use in processing operations.
- The method and schedule for the clearing, storage and disposal of fill from settling ponds.

### **ENVIRONMENTAL IMPACT ASSESSMENTS**

An environmental impact assessment for mining must be prepared as a minimum according to the following terms of reference:

- 1) The Environmental Impact Assessment (E.I.A.) should contain an executive summary, which would cover the proposed and current activity, its purpose, the location of the area affected, the duration of the activity, the Trinidad and Tobago Regulatory status, special environmental conditions e.g. native flora and fauna, likely significant impacts and mitigation and management requirements.
- 2) An introduction should be included as part of the report which would essentially summarize the objectives of the EIA, its intended use, as well as identify the reports conformance to such guidelines as the “World Bank Environmental Assessment Guidelines.”
- 3) The EIA should contain a description of the entire project vis-à-vis exploration, mobilization, and operation and close out. Staffing and employment details would be included, as well as a full description of the mining and processing equipment utilized. The description of the project would include a detail of all the resources (inputs) required as well as all the products and by-products (outputs) generated.

- 4) The EIA should contain a thorough description of the Trinidad and Tobago regulatory framework and international treaties ratified e.g. "RAMSAR", as well as a statement on the company's environmental policy.
- 5) The EIA should describe the affected environment and should include but not be limited to, a description of the general setting and physical conditions, atmospheric resources e.g. climate and meteorology, air quality, geologic resources, terrestrial resources e.g. biological, physical and chemical, river and estuarine resources e.g. physical, biological, chemical and socio-economic resources e.g. land and water use, employment, infrastructure as well as archeological and historical sites.
- 6) The EIA should contain details and results of the public participation programme for persons in the affected area, as well as from Government and Local Authorities, non-governmental organizations, experts and other industrial and commercial interest groups, particularly as regards to significant environmental impacts and concerns.
- 7) The report should then go on to evaluate in detail, the significant environmental impacts, it should outline the methodology for determining these significant environmental impacts, as well as include a detailed evaluation of these impacts (potential and current).
- 8) The report should contain a comprehensive risk analysis component, which would include, a hazard analysis, risk estimation, risk evaluation and risk management sub-component. The hazard analysis should be conducted so as to identify the hazards, the receptors and consequences with respect to raw materials winning, processing and storage operations.
- 9) The report should contain a thorough environmental management and monitoring

plan, for the significant impacts, which should include an analysis of mitigation requirements and techniques, waste management, safety and health procedures, training requirements, monitoring inspection and reporting requirements, emergency plans and operational standards and guidelines.

- 10) Finally the EIA should have a list of appendices, which should include but not be limited to; references, study team credentials, equipment specifications, documented baseline data etc.

## ENVIRONMENTAL IMPACT ASSESSMENT REPORT CHECKLIST

### 1) DESCRIPTION OF THE PROJECT PROPOSAL

- Executive summary
- Introduction
- Location, existing land use and vegetation
- Housing and settlement
- Access roads and public utilities
- Mobilization, site preparation and disposal/storage of spoil
- Deforestation and disposal of timber
- Plant site offices and related facilities
- Road and drainage design and layout
- Slope stability and erosion
- Landscaping
- Solid waste, operations and maintenance
- Pit and ramp excavation
- Materials Stockpiles
- Processing and material handling operations
- Settling pond and septic system maintenance
- Air, water and noise pollution
- Legislative and Regulatory Control
- Environmental Quality Standards

### 2) ENVIRONMENTAL SETTING

- Climatic Conditions
- Temperature
- Wind Speed
- Rainfall
- Extreme Climatic Events
- Drainage
- Surface runoff

- Stream Discharge and Sediment Load
- Water quality
- Domestic/Agricultural and Recreational Potential
- Ground Water
- Flooding and Erosion
- Topography and Geology
- Relief and Gradient
- Slope Stability
- Erosion
- Soils
- Geology
- Subsurface Conditions
- Biological Environment
- Flora
- Avifauna
- Aqua fauna
- Socio Economic Environment
- Employment

### 3) IMPACTS OF THE PROJECT

- General
- Air Quality
- Noise
- Water Quality
- Solid Waste
- Access Road
- Socio Economic Factors
- Interest Groups

### 4 RISK ASSESSMENT

- General



- Methodology
- Hazard Identification
- Scenario Identification
- Consequence Analysis
- Computation of RISK

## 5. MITIGATION PLAN

- General
- Mitigation of Risk
- General Measures
- Safety Policy
- Quality Control
- Accident Investigation
- Operating procedures
- Emergency Planning and Training
- Occupational health and Safety
- Environmental Impacts
- Pollution Control

## 6. ENVIRONMENTAL MANAGEMENT PLAN

## REFERENCES

## APPENDIX

- Study Team Credentials
- Methodology
- Equipment
- Baseline Data
- Reference Standards
- Maps and Diagrams

## **REHABILITATION PLAN**

Definition:

A detailed assessment of alternative land uses and development of a strategic option for rehabilitation of the site in consideration of the preferred mine design plan, which should consider the following:

a) **Engineering and land development activities:**

A plan of the area at 1:25000 indicating: -

- The outer boundaries of the areas to be mined.
- The outer boundaries of the total site.

This section should further contain:

- Details of any existing topsoil and subsoil stockpiles to be used in rehabilitation including their location on the site, type (soil) and quantities available.
- Details of the type and depth of proposed workings and volumes of material to be removed and replaced.
- Projected plan of final contours and levels of the site.
- Information about the rehabilitated area's slope stability, gradient, drainage, water table height and replacement depths for soil making materials, subsoil, top soil and overburden in the form of target restoration profiles.
- Areas to be restored and or rehabilitated to agriculture, forestry, recreation, built development etc.
- Proposed access roads to restored land.
- Details of retained existing land uses and land cover.
- Details of the overall existing drainage characteristics of the site including any known field drainage system, main outfall, ditches, rivers, streams and other surface water courses.

b) Soil Management Plan:

- Methodology for the removal, handling, transporting, storage, and replacement of topsoil and overburden.
- Use and application of soil conditioners/ enhancers.
- Proposed drainage, outfalls and measures to mitigate against soil erosion;

c) Business Plan:

- Feasibility analysis of proposed rehabilitation plan paying attention to capital and recurrent costs, marketability of product / service to be provided, rate of return on investment, proposed funding whether external or from revenue generated from mining operation.
- Details of any terms of any lease agreement, which may affect rehabilitation plan.

d) Human Resources:

- Details of the organizational and management requirements necessary for the development, implementation and monitoring of the rehabilitation plan.
- Potential socio-economic and environmental impact involving stakeholders of sub sector or residents from neighbourhood.
- Safety and public access to and from site.

e) Implementation and monitoring:

**N.B.**

**THESE GUIDELINES ARE SUBJECT TO REVISION BY THE MINISTRY OF ENERGY AND ENERGY INDUSTRIES AT ANYTIME WITHOUT NOTICE.**

## A Sample Business Plan Outline



Remember, use this outline as a general guide only. Some parts may not apply to your business, some items important to your particular business might be missing.

**The Executive Summary** - The Executive Summary appears at the beginning of the business plan and gives the reader a quick, but informative overview of who you are as a person, what your business is all about and a brief, but convincing argument as to why you will be successful. The executive summary is never longer than two pages. One page is preferable.

### Description of the Business

1. Name of business, Location, Facility Description
2. Three or four top level goals
3. At least one strategy to go with each goal

### Product(s)/Service(s)

1. Briefly describe what you will offer and why it is unique
2. Introduction to your market: The market being served (The Target Market)
3. Customer demand situation, Competitive Situation
4. Sales & Marketing - Where is the market going?

### Management

1. Type of Organization, its culture, how it will be operated
2. Who are the people in charge?

### Financial Requirements

1. For what purpose is external financing required (if any)
2. Financial History of the business

### Organization Description

1. Division of Responsibility, authority of each person and measurements of effectiveness
2. Organization chart (if applicable)
3. General Description of the Business, Historical Development

#### 4. Legal Structure

### **The Product, Service or Product Line**

Describe the present or planned product or service including:

1. Relative importance of various products
2. Comparison of competitors' products
3. Current demand situation and the factors that affect demand
4. Product Life cycle analysis
5. Plans for new products or services in the future

### **Description of the Industry**

1. Industry outlook overall, not just locally
2. Industry size - Nationwide, Statewide, Locally
3. Major Factors that affect this industry
4. Market share analysis
5. Social, Economic Technological or Regulatory trends
6. Principal markets - Where and to whom products will be sold
7. Description of the market and its major segments
8. Principal market participants and their past performance
9. Customer requirements and how you meet those requirements
10. Buying habits of customers and how you meet them
11. Description of your prospective customer - The Target Market
12. Description of the Competition
13. What do you do better?
14. How do you win customers?
15. What are your major competitive problems?
16. Why is competition good? What advantages does that give you?
17. Chart showing competitor strengths and weaknesses

### **Description of Major Customers**

1. Percentage of total business
2. Duration and terms of major contracts

### **Description of your overall marketing strategy**

1. Pricing Policy
2. Method of selling, distributing and servicing your product(s)
3. Advertising, Promotion, Public Relations
4. Geographic penetration - field support
5. Technology
6. Identify and describe any technological advantages your product has over competitors

7. Patent, Trademarks, Copyrights, trade secrets or other intellectual assets

### **Production/Operations Plan**

1. Explain how you will produce, process and deliver your product or service
2. Physical facilities-own or lease?, size, is expansion possible?, are improvements needed?
3. Key suppliers
4. Labor/employee situation
5. Proprietary Manufacturing Processes
6. Cost breakdown and margin analysis
7. What advantages do you have over the competition
8. External analysis - present legal situation, pending legislation

### **Management**

Personal Resume(s) of the principals - In a small business, the personal background of the principals is extremely important. Emphasize skills and accomplishments.

### **Ownership**

Names, addresses, and other business affiliations of all owners, active or not

### **Key Personnel**

1. Responsibilities
2. Brief job descriptions(one paragraph or so), resumes (if applicable)
3. Planned staff additions

### **Other Personnel**

1. Number of employees, compensation plan
2. Planned additions

### **Accounting and Record keeping**

1. Accounting Methods
2. Record keeping systems and who is responsible

### **Financial Backup Information**

1. Historical - Balance sheet(s), Income statement(s) of cash flow, including balance sheet, income statement, cash flow history, and cash flow pro-forma.
2. Future Projections - Sales Plan-Where will sales come from? How will they grow over time? Cost of Goods, Margins Break-even

analysis

3. Capital Investment Plan-What equipment will you need?
4. Source and Use of Funds - Identify ALL sources and major uses of financing
5. Pro-forma Cash Flow Statement - Minimum of two years forward on a monthly basis as well as up to five years forward on a quarterly basis
6. Any other documentation that might be pertinent

## **Appendices**

1. Identify bank and name of loan officer, CPA Counsel, Legal Counsel, Outside Management or Directors
2. Background financial information (previous years' tax forms and supporting documents)
3. Attach resumes of principals (if applicable)
4. Catalogs, Sales Brochures or other collateral information
5. Relevant public relations material, newspaper articles about your business
6. Aged Accounts receivable
7. Current customer lists
8. Letters of commitment from present or potential customers
9. Market research data
10. Photographs of your facilities and / or plans for modification
11. Reference letters, Customer feedback letters