

Annex 2 - Guidelines and Formats for Final Mines Feasibility Study (Section 41)

The report shall include at least the information listed below:

1. Salient features

It shall be the summary of the project and includes,

- Background of promoter;
- Location of mine;
- Leasehold area;
- Total geological and mineable reserve; and
- Summary of the report.

2. Market analysis

- Size of market and specifications;
- Competition in the market;
- Import substitution/export potential;
- Value addition potential;
- Quality control of products; and
- Legal and regulatory considerations.

3. Geology and reserve

- Brief description of the exploration programme to determine the reserve and quality of the mineral and the geology;
- Geological plans and sections showing necessary geological features; and
- Detailed findings of the exploration, geological parameters, reserves, quality of mineral, etc.

4. Mine development planning

- Determination of pit boundary and the area required for establishment of infrastructural facilities and waste disposal area;
- Access road to the mine area and the mining benches;
- Pre-production development works including jungle & bush clearance, initial cut and bench preparation to expose the deposit;
- Establishment of infrastructure which include plant and machinery, office and residential buildings; and
- Provision of ancillary facilities such as power, water, transport facility with and beyond the mine etc.

5. Mine design parameters

- Giving justifications for the selection of chosen parameters for,
 - Bench dimensions;
 - Blast hole drilling;
 - Blasting;
 - Haul road and ramp;
 - Waste dump;
 - Final pit configuration etc.

- A mine plan and design including the bench parameters, for operation and abandonment of a mine shall take into consideration of the following geotechnical aspects:
 - The geological structure and its impact on wall stability;
 - Shear strength of the rock mass and its geological structure; and
 - Analysis of rain water inflow, surface drainage and groundwater pattern and their impact on wall stability over time;
 - The maximum vertical height of any quarry bench face is determined with regard to the measures set out above and that an adequate margin of safety is provided for persons working on the bench below the face;
 - If a bench is, or a series of benches are, left unworked in a quarry operation, the height of the bench faces and the width of the benches is such that so far as is practicable localized failures of such benches can be contained to prevent a hazard to persons working deeper in the pit and that equipment is available to persons at the benches to enable them to make the area safe;
 - A quarry face shall not be drilled or otherwise worked in a manner, which will create an overhang of the face, and if unconsolidated rock is mined the face and sides must be battered to prevent a collapse;
 - A quarry face shall not be undercut by the excavation of a slot at the toe or in any other part of the face.
- 6. Mine production planning.**
- Year-wise and bench-wise working and production plan giving details of quantity, quality and specification of mineral/rejects/sub-grade mineral and all the consumables; and
 - Description of the method of operation.
- 7. Mine plan drawings**
- Location map in an appropriate scale showing pre-mining landuse in and around the mining lease area and demarcation line of private and state land within the lease-hold boundary;
 - Topographic map showing the demarcation boundary of the leased area with Geo-Demarcation Pillars coordinates in National Coordinate System (Drukref03);
 - Layout plans (in a scale not less than 1:5000) showing lease boundary, pit boundary, infrastructure set-up, access road, locations of top soil/reject rocks/sub-grade dumps, explosives magazine, public facilities such as school, hospital etc. and the index map showing the location of the proposed mine in the region;
 - Pre-production development plan;
 - The mine plan shall contain all the following features:
 - Title of the map;
 - North arrow;
 - Legend with clear colour coding;
 - Index map;
 - Map scale;

- Geo-Coordinates of Demarcation Pillars in National Coordinate System (Drukref03);
- Map grid with appropriate intervals;
- Details of the drawing in a table;
- Name of the mine;
- Drawing No. and date;
- Name of the Lessee;
- Lease/demarcated area in acres;
- Name of the Geologist (Geology by:);
- Name of the demarcating mining engineer (Demarcated by:);
- Name of the surveyor (Surveyed by:);
- Name of the mining engineer who prepared the plan (Prepared by:) and sign & seal; and
- A column with *Verified and Approved by-* for sign and seal by DGM.
- Sections of the plans (at least two sections for each plan including for overburden dumpsite) should be provided in a separate sheet and not with the plans;
- Pre-mining cross-sections at suitable intervals not exceeding 100 meters, along the actual slope of topography with clear plotting of different litho-types
- Bench-wise slice plans clearly demarcating different litho-types and grade of mineral in different mining benches;
- Year-wise configuration of the mining pit shown on plans and all X-sections clearly marking the litho-types for five years, for the end of lease period and for end of the mine life;
- Year-wise configuration of the waste disposal site for five years, for the end of lease period and for end of the mine life;
- Ultimate pit configuration on plan and different X-sections;
- The scale should be the same as that of plans;
 - Title of the sheet;
 - Name of the sections;
 - Legend with clear colour coding;
 - Name of the mining engineer who prepared the section (Prepared by:) and sign & seal; and
 - A column with *Verified and Approved by-* for sign and seal by DGM.

8. Waste Disposal planning

- Select most suitable site giving justification and due consideration to the cost involved; and
- Describe in detail the management of waste & tailings, configuration of waste dump and its stability.

9. Manpower

- Details of manpower requirement in executive, supervisory, technical and workers category stating their duties, including organisation charts; and
- Type of contract work and the contract workers proposed to be involved.

10. Project implementation schedule

- It includes the implementation schedule of various activities in the mine starting from project concept to signing of lease agreement to the production stage and closure.

11. Capital cost

- It includes pre-production and preliminary costs, cost of equipment and machinery, infrastructure and mine development costs, utilities costs, working capital, etc.

12. Operational cost:

It shall include cost for unit operations such as;

- Transportation;
- Fuel, water and power;
- Labour, health, safety and sanitation;
- Service, marketing and promotion;
- Land compensation, acquisition;
- Government and mineral levies;
- Waste disposal, environment management and restoration activities;
- Financing, depreciation cost;
- Corporate Social Responsibility (CSR);
- Other cost.

13. Financial Analysis:

- Revenue from sales;
- Profitability statement;
- Cash-flow analysis;
- Rate of return;
- Payback analysis; and
- Break-even analysis.

14. Environment Management Plan

- Include Environmental Management Plan approved in the EIA Report by NECS as a Chapter in the FMFS Report; and
- Include the estimation of Environmental Restoration Bond (ERB) based on the ERB Estimation Formula (Annex 4 of this Regulations).

15. Additional documents required to be attached

- Copies of all the sectoral clearances shall be attached as an annexure to the report.
- Undertaking of the Mining Engineer who has prepared the FMFS report.