



Mongolia:  
Enhancing Resource  
Management through  
Institutional Transformation

# Lifecycle of a Mine

## Stage 2: Mine Development and Construction

September-October 2018, Dornod

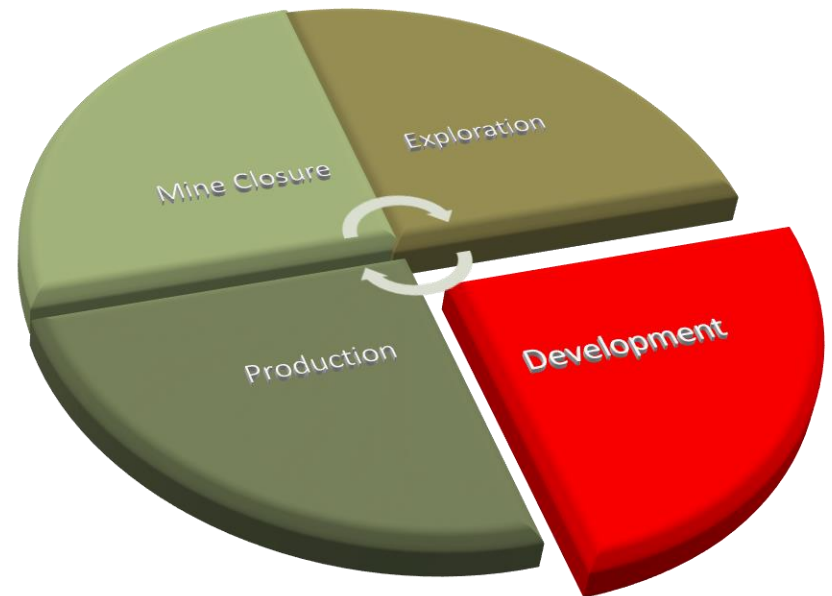
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## Section 2: Mine Development and Construction

### About Mine Development

Mine development is the second phase of the mining cycle. The purposes of this phase are to learn about the potential value of a mineral deposit, determine if it can be mined profitably, and if so, to build a mine.

In order to build a mine, the ore deposit must be large and valuable enough to pay for the costs of construction (**capital costs**) and for the costs to operate the mine (**operating costs**).



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Factors that determine if a resource is economical to mine include:

- Location of the resource
- Type of mineral and access to **infrastructure** (roads, airstrips, etc.)
- Accessibility of the resource
- Size of the resource
- Value of the resource
- Market prices
- Distance from markets and supply points
- Ability to recover the resource in an environmentally safe and socially responsible way
- Regulatory regime; and
- Availability of a qualified workforce.

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The Development Stage of the mine cycle includes:

- 1) **Deposit Evaluation and Mine Planning** - collecting and analyzing more technical, environmental and socio-economic information and developing the mine plan.
- 2) **Obtaining permits and licences** – obtaining the approvals required to build, operate and close the mine.
- 3) **Government/Community Engagements**– engagements with mining companies, governments and communities often take place to ensure communities and governments have input into mines in their areas.
- 4) **Construction** – constructing the mine and the required facilities such as camps in order to start operations.

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### Time Frames

Mine development can take anywhere from 5 to 10 or more years.

The time needed depends on where the mine is located, how large and complex the development is (including infrastructure needs and availability), and the regional regulations and review processes.



2-3 years for test work and studies such as environmental baseline studies and feasibility studies

1-3 years for environmental assessment and permitting;

2-4 years to build the mine infrastructure

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### Costs

It generally costs a large amount of money in Stage 2 of Mine Development:

The cost depends on:

- Type of mine; type of mineral, figuration
- Size of the mine - surface vs. underground (or both)
- Location of the mine
- Amount of work and time required to do the test work, collect the data, and complete environmental and engineering studies and obtain permitting.

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### 1) Deposit Evaluation and Mine Planning

If initial exploration leads to positive results, the project moves from exploration to the deposit evaluation and mine planning stage.

During this stage, the mining company will increase its activities and investment to determine if the mineral deposit is worthwhile (viable) and if a mine can be developed.

It is in this stage that the mining company will prepare the design of the mine.

Once evaluation and planning are completed and a decision on building a mine has been taken, construction can start.

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Depending on the location and the type of mineral, mine development activities may include:

### **Detailed Drilling**

The drilling extracts drill core (cylindrical samples of the rock) for analysis.

Detailed drilling (drill holes spaced at close intervals) is required to precisely define the shape and size of the deposits.





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### **Detailed Analysis and Evaluation**

Samples are analyzed to find out the grade (the quantity of metals, diamonds or other commodities) and to assess the value of the deposit.

### **Bulk Sampling**

Bulk sampling gives large and representative mineralized samples.

It is used to determine the characteristics of the material.

The sample is tested in a testing plant that recovers the minerals.

A test mine may be built to identify new technologies needed to recover the minerals.

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### 2) Permitting

Both land permits and water licenses are generally required in order to construct and operate a mine.

The mining company will submit a project description to governments and/or Land and Water Boards if feasibility studies are encouraging and show that there is a potential to build and operate the mine.

Land permission is first. The company submit the application to use land to soum governor. The governor get approval from aimag governor, then soum governor make resolution to give land permission to the company.

The company get approval of size of water they use for mining from Ministry of Environment. Then the company make contract with Regional Water Administration office and get permission to use water.

Aimag Governor gave permission to start construction upon request of the company.

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### Permits in Dornod:

In December 2017, there are 69 sites covering 61.9 thousand hectares, 115 sites covering 543.1 thousand hectares in 14 Soums of Amaig. These make up 4.9 percent of the total land area of Dornod.

Of the total operational special licenses, 39.9 percent is gold, 22.6 percent is coal, 8.3 percent zinc and mixed metal, 7 percent fluorspar, 6 percent iron, and 16.8 percent other minerals. Bayandun Soum has the highest number of operational special licenses.



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### Mine Closure and Reclamation Plan

An important step in planning is the mine closure and **reclamation** plan.

This plan is a detailed report on how the mine site will be cleaned up and restored once mining operations are completed.

This includes:

- Removal of the structure
- How to handle tailings
- How to dispose of chemicals and hydrocarbons
- Waste rock slope stability
- Pit shut down
- Re-vegetation of the terrain

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### Environmental Assessment

An environmental assessment (EA) is mandated by government and is used to examine the potential impacts that a project may have on the environment during its lifetime. Companies are required to submit an environmental assessment as part of the process of obtaining a mining license.

EA's include land, water and wildlife studies and an assessment to determine the possible impacts of the mine on the environment.



*Before and after obtaining mining license, a body who will have or had the mining license through selection procedure is liable to have environmental impact assessment done and annual environmental management plan developed.*

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### Feasibility Studies

Feasibility studies are a series of planning studies and evaluation reports of the geological, engineering, economic, legal, and site data undertaken by the company. The purpose of feasibility studies is to evaluate the financial viability, technical and financial risks, and robustness of the project. Feasibility studies usually include:

- Geology and resources determination
- Mine planning
- Process plant test work and plant design
- Infrastructure planning
- Water and waste management planning
- Environmental and socio-economic planning
- Community agreements
- Mine closure and reclamation
- Operating cost estimates
- Capital costs and financial analysis

*A feasibility study to mine any deposit shall be conducted by the authorized entity and shall be submitted to the Ministry within a year from obtaining the mining license.*

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### Bonds

Governments now usually insist that companies provide a financial assurance (e.g., a **bond**) to cover unexpected closure problems or failures.

This financial assurance can be required before the start of construction.

If mine closure and reclamation costs are too expensive, the proposed mine may not move to production.



*An amount equal to 50% of the rehabilitation expense reflected in the Annual Environmental Management Plan shall be collected to a special offset account. If the rehabilitation work is not performed, a professional organization shall be hired for this purpose, using the money accumulated in this account.*

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Assessment and approval of a mine, and obtaining permits, is a complicated and highly technical process.

It involves highly technical assessments of the land, water, wildlife and air - and the potential impacts of a mine.

It not only includes an assessment of the mine, but may also require an assessment of such things as:

- mine camps
- waste rock
- tailings,
- and even roads and other transportation methods to allow people to access the mine and allow the materials produced to be transported from the mine.



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The assessment also usually includes an analysis of the socio-economic impacts of the mine and how the mine may affect people living in the impacted area.

This process must be completed before moving to final feasibility and the start of construction.

The process can take several years and cost millions of dollars.



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### 3) Community Engagement

As part of the Assessment and Approval Process, mines will often hold community engagement sessions to advise “affected” communities about the mine and the potential impacts, and to get input and feedback from the communities.

Mines may also enter into agreements with the Government (Socio-economic Agreements) and Local Communities (such as Impact and Benefits Agreements, Memoranda of Understanding, or Participation Agreements).

Community consultations generally take the form of:

- Public meetings
- Workshops and information sharing sessions
- Focus groups
- Interviews
- Meetings and consultations regarding environmental assessment and license and permit applications

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### Project Financing

Once a final cost is known, the mining company needs to secure project financing. The final or bankable feasibility is used to demonstrate a project's viability and to help secure investment. Companies may need to borrow the money from a bank or raise money by issuing shares on the stock market. Large companies may be self-funding due to revenue generated from other mining operations.



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### Investment Decision by the Mining Company

The final investment decision – whether to build the mine – happens when the final feasibility study is finished, project financing is arranged, and permits are received. The Board of Directors of the mining company will make the final decision on whether to move ahead with construction of the mine.

Although it is hard to imagine, given how much work, money, and time have been invested to get to this point, the decision could be to cancel or postpone the project because of uncertainty in the markets.

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### 4) Construction

Construction refers to the development of the entire facility, including the mine, processing plant (mill), and all related infrastructure.

Infrastructure development includes all facilities needed to support the operation, other than the mine and process plant (mill): i.e. power plant, water treatment plant, roads, runway, etc...

A company does not usually commit to construction until the details of all permitting and regulatory requirements have been confirmed.

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Common activities during construction include:

- Site preparation
- Clearing and initial preparation for mining (i.e., overburden removal)
- Construction of accommodations
- Construction of process and site facilities (i.e., processing plants, offices, camp facilities, etc.)

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- Building roads and airstrips and installation of power lines and, in some cases, even railways
- Training programs for personnel, and
- Installation of environmental protection equipment.



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**How can local community members be involved in this phase of the mining cycle?**

Environmental assessment

Traditional knowledge – sacred sites, traditional land use, knowledge of wildlife

Negotiating Impact Benefit Agreements

Employment

Businesses

Training

Service and labor

Project-agreement oversight



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### Economic Opportunities

Communities can experience significant economic development opportunities during mine development and construction. These opportunities include infrastructure development and the provision of utilities. Some of the key potential business opportunities are:

- Contract mining (bulk samples)
- Equipment operation and construction services
- Supply of goods (oil, gas, safety equipment, concrete)
- Catering and housekeeping
- Site services
- Surveying, trucking, skilled trades
- Waste disposal
- Aircraft support and airport maintenance
- Road maintenance, laboratory services, consulting, goods and services
- Joint ventures

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### **Impact Benefit Agreements or Participation Agreements:**

Impact benefit agreements generally include provisions for:

- Preferential hiring practices for local workers
- Training
- Educational and trades apprenticeship opportunities
- Economic development and business opportunities
- Social, cultural, and community support programs
- The protection of areas of spiritual or cultural significance
- Compensation for adverse environmental effects
- Reporting requirements
- Revenue-sharing arrangements or financial participation in project
- Scholarships
- Payments to offset the costs associated with administering the agreement
- Tendering process for local community businesses