

भिष्य भेद भिर्मुमा मुल् मिर मिद्द मुका भेद भिर्मा रुप मे मा मिर भाषा मिर भाषा मिर भेद मिर भेदा मिर Department of Geology and Mines Ministry of Economic Affairs Royal Government of Bhutan Thimphu



MDD-31/DGM/2022/1589

## 24th August, 2022

## NOTIFICATION

The Department of Geology and Mines (DGM) would like to notify the public that the *Guidelines for Leasing of Mines and Quarries 2022* is hereby adopted for implementation w.e.f. 24<sup>th</sup> August 2022. The Guidelines is prepared in line with the provisions of Mines and Minerals Management Act (MMMA) 1995 and the Mines and Minerals Management Regulations (MMMR) 2022, and it shall repeal the Guideline for Leasing Mines 2019.

The Guidelines shall streamline the leasing process for mines and quarries, and bring clarity in the application processes, standards, rights and obligations of the applicants. It shall also delineate the role of the different stakeholders involved in the leasing processes.

Therefore, all the individuals/firms/companies are hereby notified to comply with these Guidelines. Henceforth, the lease of mines and quarries shall be processed and carried out strictly in line with the Guidelines. The Guidelines may be downloaded from the download section of the Ministry's website, <u>www.moea.gov.bt</u>

(Phuntsho Namgyal) Director

Copy to:

- 1. Hon'ble Tengye Lyonpo, MoEA, Thimphu, for kind information;
- 2. Dasho Secretary, MoEA, Thimphu, for kind information;
- 3. Chief Geologist, GMD, DGM for information;
- 4. Offtg. Chief Engineer, Mining Division, DGM for information;
- 5. Offtg. Chief Engineer, MDD, DGM for information.

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# **Guidelines for Leasing of Mines and Quarries 2022**

Department of Geology and Mines

Ministry of Economic Affairs

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## 1. Introduction

The Guideline for Leasing of Mines and Quarries is prepared in line with the provisions of Mines and Minerals Management Act (MMMA) 1995 and the Mines and Minerals Management Regulations (MMMR) 2022. The procedure is adopted to streamline the mine and quarry leasing and inform the interested applicants on the processes involved. The procedure shall also delineate the role of the Mineral Development Division, Geosciences and Mineral Division and Mining Division in the leasing process. The lease of mines and quarries shall be carried out strictly in line with this Guidelines.

## 2. Eligibility for Mining and Quarrying Lease

#### 2.1 Eligibility as per the MMMA 1995

- 2.1.1 The MMMA 1995 broadly outlines the eligibility to obtain a mining lease. Following sections are relevant provision from the MMMA 1995:
  - The section 17 of the MMMA 1995 which states "any individual or organization may apply for a mining lease to the head of the department"; and
  - (2) The section 21 of the MMMA 1995 which states that "A mining lease shall be given, provided the applicant:
    - (a) is able and willing to comply with all the terms and conditions as prescribed in this Act and the mining lease agreement;
    - (b) has adequate financial resources, technical competence and experience to carry out the mining operations effectively;
    - (c) has not been disqualified by the Government to apply for a mining lease.
- 2.1.2 Based on the power conferred by the MMMA 1995 to the Ministry of Economic Affairs to make regulations for carrying out the provisions of the MMMA 1995, additional eligibility criteria were prescribed in the MMMR 2022. Following are the eligibility for any type of mining and quarrying lease:

#### **2.2 Eligibility for Exploration Permit**

- 2.2.1 The applicant intending to apply for a captive mine should start with the exploration of the deposit by applying for an Exploration Permit to the Department. The applicant for the exploration permit shall fulfil the following eligibility criteria:
  - the applicant shall be a Bhutanese citizen, proprietor of a licensed firm or a company (Section 11 of the MMMR 2002);

- (2) the mineral of interest is listed under Annex 7 of MMMR 2022;
- (3) the proposed value addition of the applicant meets the minimum requirement of value addition under Annex 7 of MMMR 2022;
- (4) the applicant as a Bhutanese citizen as an individual or a proprietor of a licensed firm, or a household, or a company has:
  - (a) no two valid mining or quarrying leases;
  - (b) no two valid surface collection or exploration permits;
  - (c) no two applications under process for exploration or mining or quarrying or surface collection;
  - (d) not been granted a lease or permit and has an application under process.
- (5) other eligibility criteria under the Mineral Exploration Guidelines 2022.
- 2.2.2 Eligibility criteria under subsection (2), (3) and (4) shall not apply to a state-owned mining agency.

#### **2.3 Eligibility for Mining Lease**

- 2.3.1 The applicant intending to apply for a mining lease shall fulfil the following eligibility criteria:
  - an applicant shall be a company to be eligible to obtain a mining lease for captive mine to supply raw materials to their processing industry (Section 24 of the MMMR 2022);
  - (2) an applicant shall be a Bhutanese citizen, proprietor of a licensed firm or a company to obtain a mining lease for a captive mine to supply critical additives to multiple domestic industries (Section 25 of MMMR 2022);
  - (3) an applicant shall not be eligible for application under subsection (2) where minerals are leased to state owned mining agency;
  - (4) has been issued exploration permit and the report is approved by the Department;
  - (5) the mineral of interest is listed under Annex 7 of MMMR 2022;
  - (6) the proposed value addition of the applicant meets the minimum requirement of value addition under Annex 7 of MMMR 2022;
  - (7) the applicant as a Bhutanese citizen as an individual or a proprietor of a licensed firm, or a household, or a company has:
    - (a) no two valid mining or quarrying leases;
    - (b) no two valid surface collection or exploration permits;

- (c) no two applications under process for exploration or mining or quarrying or surface collection;
- (d) not been granted a lease or permit and has an application under process.

## 2.4 Eligibility for Quarrying Lease

- 2.4.1 The applicant intending to apply for a quarrying lease shall fulfil the following eligibility criteria:
  - an applicant shall be a Bhutanese citizen, proprietor of a licensed firm or a company to obtain a quarrying lease (Section 33 of MMMR 2022);
  - (2) the applicant as a Bhutanese citizen as an individual or a proprietor of a licensed firm, or a household, or a company has:
    - (a) no two valid mining or quarrying leases;
    - (b) no two valid surface collection or exploration permits;
    - (c) no two applications under process for exploration or mining or quarrying or surface collection;
    - (d) not been granted a lease or permit and has an application under process.
- 2.4.2 For lease of Short Term Quarries, the Guidelines for Short Term Quarries shall be implemented (section 35 of MMMR 2022)

#### 2.5 Other eligibility criteria

- 2.5.1 The applicants should meet the following additional eligibility criteria:
  - The applicant has operated the earlier mining or quarrying leases satisfactorily (Section 90 of MMMR 2022) and is rated average and above in the performance evaluation of the mine operated (section 91 of MMMR 2002);
  - (2) The applicant should not have been disqualified to apply for a mining lease (section 21 (iii) of the MMMA 1995) by the Department or a court of law;
  - (3) The applicant has adequate financial resources, technical competence and experience to carry out the operations effectively (section 21 (ii) of the MMMA 1995):
    - (a) Financial Eligibility : produce a bank statement or a bank guarantee of the applicable amount.
    - (b) Technical Manpower and experience : submit the list of technical manpower to be employed as required in the MMMR 2022.

## 2.6 Interpretation of Section 22 of MMMR 2022 on eligibility of number of leases

- 2.6.1 The legal interpretation of section 22 as it stands today in MMMR 2022 is to be read as follow:
  - (1) A Bhutanese citizen as an individual or a proprietor of a licensed firm, or a member of a household; and
  - (2) A company as a separate legal entity in itself (without imposing the leasehold restriction on its shareholders) shall not be eligible to obtain or operate more than two mining or quarrying leases at any point of time.

#### 3 Lease Processing

## **3.1 Exploration Permit**

3.1.1 The eligible applicant for exploration permit shall apply to the Department in Form EP-1 and the Department shall process the application in line with the Mineral Exploration Guidelines 2022.

## 3.2 Mining or Quarrying Lease

## 3.2.1 Submission of application for the lease of mine or quarry

- 3.2.1.1 Application for the lease of a mine or quarry shall be made in Form A of Annex 1 of the MMMR 2022. The Form shall be filled in accordance with the "Guide to fill Form A" (Annexure I).
- 3.2.1.2 The application for the lease of mine and quarry shall be submitted in person to the Mineral Cadastre Officer under Mineral Development Division (MDD) of the Department and the person or authorized person shall countersign the register authenticating the submission of the application.
- 3.2.1.3 Only complete applications shall be received and registered.
- 3.2.1.4 The applicant shall be acknowledged in writing by the Mineral Cadastre Officer and an application identification number shall be designated against the application which shall be used as a reference throughout the lease processes and mining tenure. The application identification number shall be unique, in sequential order and non-repeatable.
- 3.2.1.5 The registered application shall be submitted to the Head of the Department for appraisal before further processing by the MD.
- 3.2.1.6 The register for recording the application shall be closed at the end of every day countersigned by the Mineral Cadastre Officer and the Head of the MDD.
- 3.2.1.7 Once the online application system is adopted, all application has to be submitted using the system and no hard copy application shall be entertained.

## 3.2.2 Scrutinization of application

- 3.2.2.1 Application for the lease of mine or quarry shall be entertained to only qualified applicants.
- 3.2.2.2 The MDD shall study the application and scrutinise in line with the requirement under MMMA 1995 and MMMR 2022 based on the eligibility requirements spelled out under eligibility above.
- 3.2.2.3 The MDD may directly reject the application in writing under the following cases:
  - (1) If the required supporting documents are inadequate;
  - (2) If the applicant has more than 2 mines/quarries/permits/applications in hand;
  - (3) The proposed site has been already processed for another applicant; and
  - (4) Any other reason required by the MMMA 1995 and the MMMR 2022.

## 3.2.3 Pre-feasibility Study

- 3.2.3.1 The MDD shall ask the eligible applicants to conduct the Pre-Feasibility Study (PFS) and submit the report to the Department within two months after which the application would be cancelled.
- 3.2.3.2 The applicant may also submit the PFS report along with the application without any liability to the Department.
- 3.2.3.3 The PFS report shall be carried out by mining engineer and geologist as per Guidelines for Pre-feasibility Study (Annexure II).
- 3.2.3.4 The PFS report shall be scrutinized mining engineer and a geologist of the Department with reference to the Guidelines for Pre-feasibility Study (Annexure II).
- 3.2.3.5 A mining engineer and a geologist of the Department may visit the proposed site to validate the prefeasibility study report submitted, if necessary. Travel allowance and daily subsistence allowance of the officials for the site visit shall be borne by the applicant.
- 3.2.3.6 A mining engineer and the geologist shall submit the verification report to the Head of the MDD.

## 3.2.4 Review of application

- 3.2.4.1 The MDD shall convene a Project Proposal Review Committee (PPRC) meeting to discuss the application. The MDD shall present the application, the PFS report and technical views of feasibility of the project along with the site validation report, if applicable.
- 3.2.4.2 The PPRC shall review and accord in principle approval to further process the lease of the mine or quarry if everything is observed to be in order and the proposed site is feasible for

mining. The PPRC may also direct the MDD to furnish additional information or carry out further site validation, if required.

- 3.2.4.3 The Department shall write to the concerned Dzongkhag Land Leasing Committee seeking Land Lease Certificate for SRF land based on in principle approval to further process the lease of mine or quarry.
- 3.2.4.4 The Department shall also seek other clearances considered required by the PPRC.
- 3.2.4.5 The Department shall issue a regret letter for those applications which are not approved for further processing.

#### 3.2.5 Sectorial clearances

- 3.2.5.1 The land lease process shall be as per the Chapter 5 of the Land Lease Rules and Regulations 2018.
- 3.2.5.2 The applicant in coordination with the concerned DLLC shall conduct public consultation as per the Public Consultation Guidelines.
- 3.2.5.3 The National Land Commission Secretariat shall accord Preliminary Approval to the concerned DLLC.
- 3.2.5.4 The applicant shall produce clearances from the concerned authorities as required under section 3.2.4.4 of this Guidelines.

#### 3.2.6 Clearance for mining and quarrying in private registered land

- 3.2.6.1 The applicant shall produce written consent for operation of mine or quarry in a private registered land from the owners.
- 3.2.6.2 The Department shall seek approval from dzongkhag administration and public clearance from the local community for operation of the mine or quarry in the private registered land.

#### 3.2.7 Geological assessment

- 3.2.7.1 The MDD shall communicate to the applicant of a quarrying lease to carry out detailed geological assessment of the proposed site.
- 3.2.7.2 The geological assessment for quarrying shall be carried out by a geologist and shall prepare the report as per the requirement under Annexure III.
- 3.2.7.3 The applicant shall submit the geological report to the Head of the MDD.
- 3.2.7.4 The MDD shall request the GMD to review the geological report.
- 3.2.7.5 The GMD shall review the report as per the Standards for Geological Assessment of Quarry and present the findings to the Head of the GMD. The geologist may visit the site for verification, if necessary.

- 3.2.7.6 The Head of GMD shall approve or reject the report and forward a copy of the report to the Head of MDD.
- 3.2.7.7 The application for mining lease resulting from exploration permit shall not be required to carry out geological assessment.

## 3.2.8 Final Mine Feasibility Study and Environmental Clearance

- 3.2.8.1 Upon obtaining Preliminary Approval and approval of geological assessment/mineral exploration report, the MDD shall forward the application to the Mining Division for further processing of the lease.
- 3.2.8.2 The Mining Division shall ask the applicant to prepare and submit Final Mine Feasibility Study (FMFS) report and Terms of Reference (ToR) for the Environmental Impact Assessment (EIA) of the proposed mine or quarry.
- 3.2.8.3 The FMFS shall be carried out by a mining engineer in line with the Guidelines and Formats of Final Mine Feasibility Study (Annex 2 of the MMMR 2022).
- 3.2.8.4 The Mining Division shall forward the ToR for EIA to the National Environment Commission Secretariat (NECS) for approval.
- 3.2.8.5 The applicant shall submit the FMFS to the Mining Division for review and approval.
- 3.2.8.6 The Mining Division shall review the report and carry out site validation, if necessary.
- 3.2.8.7 The applicant shall undertake EIA of the proposed mine or quarry as per the approved ToR.
- 3.2.8.8 The Mining Division shall convene a Mine Leasing and Technical Committee (MLTC) meeting for presentation of the final draft FMFS report by the consulting mining engineer for approval.
- 3.2.8.9 The committee may provide additional comments for incorporations in the FMFS report and once the comments are incorporated, the Mining Division shall process for approval of the report by the Head of the Department.
- 3.2.8.10 A copy of the approved FMFS report shall be forwarded to the NECS and seek Environmental Clearance.
- 3.2.8.11 The applicant shall submit 5 copies of approved FMFS report to the Mining Division upon obtaining environmental clearance from the NECS for sign, seal and distribution.

## 3.2.9 Land Lease Certificate

3.2.9.1 The Mining Division shall forward a copy of the Environmental Clearance and the FMFS approval letter to the National Land Commission Secretariat (NLCS) and request for issuance of Land Lease Certificate (LLC).

3.2.9.2 The NLCS shall issue LLC to the applicant through the concerned Dzongkhag Administration.

## 3.2.10 Lease Agreement

- 3.2.10.1 The Department shall seek approval from the Ministry for lease of the mine or quarry (section 10 of MMMA 1995).
- 3.2.10.2 Upon approval, the Department shall execute the Mining Lease Agreement with the applicant as per the format prescribed under Form B of Annex 1 of MMMR 2022.

## 3.2.11 Commencement of Mining Operation

- 3.2.11.1 The Department shall ask the lessee to deposit the upfront Environmental Restoration Bond (ERB) into the joint ERB account maintained with the Bank of Bhutan.
- 3.2.11.2 The lessee shall fulfil the following requirements prior to issuance of work order for commencement of operation:
  - (1) produce evidence of the upfront ERB payment;
  - (2) produce a Business Licence from the concerned Regional Office of Economic Affairs and submit the TPN number; and
  - (3) notify the Department on the employment of the required technical manpower.

#### 3.2.11.3 The Mining Division shall issue work order for commissioning of mining operations.

#### 4 Area Extension

- 4.1 The lessee shall apply to the Department for any extension of the area contiguous to the approved boundary. The application shall be accompanied by a prefeasibility study report carried out by mining engineer and geologist.
- 4.2 The MDD shall process the application following all the steps discussed above.

#### 5 Renewal of Mining Lease

- 5.1 An application for renewal of a mining or quarrying lease shall be made to the Department at least one year prior to expiry of the lease in Form F of Annex 1 of MMMR 2022 along with geological reassessment and mine feasibility report prepared by mining engineer and geologist.
- 5.2 The renewal of the mining or quarrying lease shall be subject to feasibility and the rating of the Performance Evaluation under section 89 and 90 of MMMR 2022.

- 5.3 The Mining Division shall scrutinise the application and convene a MLTC meeting for in principle approval to further process the lease renewal.
- 5.4 The rejection of lease renewal shall be communicated in writing stating the decision of the MLTC.
- 5.5 The Department shall write to the concerned Dzongkhag Land Leasing Committee seeking renewal of Land Lease Certificate for SRF land to further process the lease of mine or quarry.
- 5.6 The Department shall process the renewal of the environmental clearance from NECS by forwarding the environmental clearance compliance report submitted by the lessee.

#### **6** Annexures

- Annexure I : Guide to Fill Application for Mining and Quarrying Lease (Form A of MMMR 2022);
- (2) Annexure II : Guidelines for Prefeasibility Study;
- (3) Annexure III : Standards and Formats for Geological Deposit Assessment of Quarry;

71-2-2-2-1-2-1-1-1-1-2-2-2-2-2-2-2-2-2-2	2)

For official use							
DGM	Application No						
Other	Date received						
Other	Responsible						
Other	Officer						

## Annexure I - Guide to Fill Form A (Application for Mining and Quarrying Lease)

APPLICANT DETAILS												
a. INDIVIDUALS (If you are a lone applicant and want to apply in your name)												
Title (tick)*	tle (tick)* Mr.		Ars.		Ms.		Dash	asho			Others	
Name*	Name of the individual. Only lone individual applicant can apply.											
Postal Address	Proper postal address. One can change the postal address later but need to update the Department											
Telephone No.	Fixed li	ine			Mobi	le No.*	k					
CID No.*				Emai	l ID*							
b. LICENSED F	<b>IRMS O</b>	R CON	<b>IPA</b> I	NY (if	you ar	e a reg	istere	d com	pany o	r firm	ı)	
Name*	Name o	of the c	omp	any or	<sup>,</sup> name	of esta	blishı	nent ir	ı busir	iess lie	cense	
Postal Address*	Proper update	postal a the Dep	ddre: oartm	ss. One ent	e can cl	nange t	he pos	tal add	lress la	ter but	t need to	
Telephone No.	Fixed li	ine			Mobi	le No.*	k					
License No.*					Emai	l ID*						
SHORT DESCRIPTION OF THE PROPOSED MINING ACTIVITY												
Type of mine	Type of mine based on projected investment. Small if investment is ≤Nu. 10 million, Medium if investment is Nu. 10-100 million, Large if investment is □Nu 100 million					is ≤Nu. 10 restment is						
Type of minerals/products*	Mentio	n the m	inera	l(s) an	d the p	roducts	after	value a	addition	1.		
Required investment (Nu.)*	Project the approximate investment required, total of loan and equity amount						ity amount					
Source of Finance*	Loan		Loa	in amo	unt req	uired	Eq	uity	Equ	ity am	ount	
Technical competence & experience	al The technical competence must be based on the proposed mine class and in line with the requirement under Chapter 8 of MMMR 2022. Provide eviden of the past operations.						ass and in ide evidences					
Work force requirement & recruitment*	Mention the workforce requirement based on the mine class. Attach the list of existing employees, where applicable											
Proposed lease period*	Proposed lease period in years											
Land ownership	SRF (ad	cres)	Nur of a	nber cres	Priva (acres	te s)	Nu of	mber acres	Total (acres	area 5)	Number of acres	
No. of mining lease in hand* Number of valid mining or quarrying lease or permits in hand in the name of the applicant. Include valid mining or quarrying lease or permits by other household member if the applicant is not a registered company.					he name of by other							

No of application	Number of application mining or quarrying lease or permits under process in
weder process*	the name of applicant. Include application by other household member if the
under process.	applicant is not a registered company.

LOCATION OF THE PROPOSED MINING ACTIVITY										
Place*	Specific location			Near	est vil	lage*				
Gewog*				Dzongkhag*						
Geographical Coordinates*	Latitude:	0	,	"	N	Longitude:	0	,	"	Е

## DECLARATION

I hereby declare that the information provided herewith are true to the best of my knowledge and in the event of false or misleading information, I shall be liable for any action under the Mines and Minerals Management Act and Regulations thereof.

SIGNATURE*							
	Applicant	Witness					
	Affix legal stamp						
Signatura*		Name*					
Signature		CID No. *					
		Contact no. *					
Date:							
Place:							

#### **Required documents to be attached:**

Sl. No.	Appendices (fields with * signs are mandatory)	Appendix No.	Tick ( $\checkmark$ ) mark if enclosed		
1	A copy of CID in case of individuals/license/company registration certificate*	Α	Copy of CID or business license or company registration certificate, where relevant		
2	Location map with proposed boundary*	В	Need to be a polygon with minimum of four coordinates. Soft copy in kml/kmz/shape file needs to be emailed to development- dgm@moea.gov.bt		
3	Description of financial capability with evidences*	С	Bank deposits, machineries ownerships, assets, etc.		
4	A copy of Household Information (family tree) issued by MoHCA for an individual or proprietor of a licensed firm*	D	Mandatory for individuals and owners of business license. Registered company need not submit for their owners		
5	Written consent from the private landowners if the proposed area falls within private registered land	E	If private registered land falls within proposed mining or quarrying site, written consent is mandatory		
6	Exploration report (Mandatory for captive mines)	F	Copy of approved exploration report		



# **Annexure II - Guidelines for Pre-feasibility Study 2022**

Department of Geology and Mines Ministry of Economic Affairs

Comme Mart

## **1. OBJECTIVE**

Prefeasibility studies are intended to determine whether a mineral resource is likely to support a viable mining project. Pre-feasibility studies are more detailed than scoping studies and are the key intermediate step in the assessment of a mining project.

An applicant shall hire qualified professionals (at least a geologist and a mining engineer) to conduct the Pre-feasibility Study (PFS) of a proposed mining or quarrying site. The consulting geologist and a mining engineer shall carry out the verification of the applied mining or quarrying site to determine:

- the potential size, grade and extent of the deposit; and
- the possibility of carrying out the proposed mining or quarrying works with respect to the location, topographical conditions and behaviour of the deposit.

The consultants shall prepare the Pre-feasibility Study report and the applicant shall submit to the Department. The Department shall review the report along with other requirements of section 38 of Mines and Minerals Management Regulations 2022 for processing of the applications.

The Guideline shall serve as the guide to the consulting geologist and mining while verifying the site and writing the PFS report.

## 2. QUALIFICATION OF PROFESSIONALS

The qualified professionals shall have the following minimum qualification to conduct the PFS:

- Bachelor's Degree in Geology for geologist; and
- Bachelor of Engineering in Mining Engineering or Bachelor of Technology in Mining Engineering for mining engineer; or
- Diploma or certificate courses in relevant disciplines with at least five years of field experience conducting mineral deposit assessment or Final Mine Feasibility Studies.

## 3. CONDUCT OF THE SITE VERIFICATION AND REPORT WRITING

The consulting geologist and mining engineer shall collect and submit the Prefeasibility Study Report on the following:

## 3.1. Applicant details

• Name of the applicant; Valid postal address:

- Phone number and email address:
- Thram No.<sup>1</sup>:
- House No.<sup>2</sup>:
- Permanent address (Village/Gewog/Dzongkhag)<sup>3</sup>:

## 3.2. **Project location**

- Name of the area, nearest village, Gewog, Dungkhag and Dzongkhag;
- Location map with geographical coordinates;
- Describe the nearest highway and feeder/farm roads to the proposed site;
- Describe the current land use of the proposed site and surrounding area. Identify the land ownership by plotting the private registered land data of the locality; and
- The number of mines and quarries along with the applications under process within the radius of 5km along with a location map.

## **3.3.** Geology of the deposit

- Lithological description such as colour, texture, mineralogy, degree of weathering, mode of occurrence, contact and name of the target rock;
- Geological structures such as bedding, foliation, folds, faults, joints, unconformities with collection of structural data such as strike and dip of bedding or foliation, bedding thickness, foliation spacing, strike and dip of joint sets, spacing of joint sets, etc.;
- Possible reserve of the target rock type or mineral band and estimate volume of waste;
- Type of sampling carried out (representative chip/grab/systematic sample) with lab analytical results and its interpretation, where necessary Geological map prepared on an appropriate scale or google image indicating the target rock types or mineral bands, underlying and overlying rock types with sample locations;
- Statement on the general stability of the site, etc.

<sup>&</sup>lt;sup>1</sup> in case of an individual or proprietor of a licensed firm only

<sup>&</sup>lt;sup>2</sup> in case of an individual or proprietor of a licensed firm only

<sup>&</sup>lt;sup>3</sup> in case of an individual or proprietor of a licensed firm only

## **3.4.** Mineability parameters of the deposit site

- Landscape describing the topography with landforms and other features, gradient/slope angle and elevation including direction of terrain;
- Presence of water sources, type, their orientation and location with respect to the proposed site, its usage, drainage pattern, etc.; and
- Presence of part or whole of protected areas or Forest Management Unit or a Community Forest within the proposed area.

## 3.5. Area requirement and availability

The consulting geologist and mining engineer shall assess and include area requirement and availability for the following purposes:

- Mining area;
- Waste dump yard;
- Office space;
- Labour camps site;
- Stockyard;
- Beneficiation plants, etc.

#### 3.6. Access road

The report shall have a brief description on most feasible access road and the distance with an access road alignment map.

#### **3.7.** Social parameters

The report shall contain information on local community and their primary economic activities and livelihood. It shall also mention the number of households and land use type within 1 km radius from the periphery of the proposed site. It shall also contain information on any private and public infrastructures, cultural or heritage sites that are likely to be affected by the operation of mine or quarry.

## **3.8.** Conclusion and recommendation

The report shall include the conclusion and recommendation indicating feasibility of the proposed site for mining or quarrying.

## **3.9.** Appendices to the report

The report shall include the following maps as Appendices:

- Geological map prepared on an appropriate scale or google image showing the target rock types or mineral bands, underlying and overlying rock types, host rock of mineralization, and sample locations;
- Map showing the intended mining site boundary; and
- Map showing the access road alignment and all-important mining features such as working area, office space, labour camp, beneficiation plant, waste dump sites, workshop, magazine, etc.

## 4. **REPORT SUBMISSION**

The applicant shall submit two sets of Pre-feasibility Study report in colour to the Department until the introduction of the Mines Administration System. Once the system is launched, the report shall be submitted in soft copy online through the system.

In addition, soft copy maps (kmz/kml and shapefile) of the proposed site shall also be furnished to the Department via email (development-dgm@moea.gov.bt).



# Annexure III - Standards and Formats for Geological Deposit Assessment of Quarry

Department of Geology and Mines

Ministry of Economic Affairs

The mineral and rock resources form an important input for economic growth and the construction industry in the country. The quantity and quality of the construction material is critical to time, cost, suitability and sustainability of any infrastructural development. In exercise of the power conferred by Section 15 of the MMMA 1995, Mines and Minerals Management Regulations 2022 and in line with the Economic Development Policy 2016 and Mineral Development Policy 2017, the DGM is establishing standards for geological assessment of Quarry to guide and ensure standard approach for conducting such activities.

The standards shall provide the requirements and specifications to carry out detailed geological assessment of the quarry that can ascertain the reserve and grade of the deposit and facilitate decision making. The geological assessment report shall also facilitate preparation of a mine plan for extraction of the mineral/rock. Therefore, a well-planned and managed geological assessment of the mineral/rock deposit is imperative to determine the economic feasibility and profitability of the quarry.

#### 1. Standards of Geological Deposit Assessment

Detailed geological assessment involves the three-dimensional delineation of a known deposit. The size, shape, structure, grade, and other characteristics of the deposit will have to be established with high degree of accuracy. The reserve (Quantity) and grade (quality) of the mineral deposit shall be estimated using acceptable geological methods and extrapolation. The estimation of reserve and grade of the mineral deposit should be done in conjunction with interpretation of geological, chemical and geotechnical laboratory results.

The following requirements, specifications and standards of detailed geological assessment should be fulfilled for approval of the geological reports and maps by the DGM:

#### 1.1. Topographical Surveying

Topographical surveying forms a key part of geological assessment of mineral deposits for generating base information. The following standards shall be followed while conducting the topographical survey: topographical survey shall be carried out by a surveyor and survey engineer or qualified professional;

a. prior to undertaking the topographical survey, carry out proper desktop study with field reconnaissance of the proposed site to assess the topography for proper mobilization of resources;

- b. the topographical survey shall be carried out using appropriate technology and instruments to generate accurate base maps, geological maps and cross sections.
  Some of the available technologies or equipment are Total Station, UAV based LiDAR, photogrammetry, GNSS, RS techniques, etc;
- c. the topographical survey must be carried out on large scale considering nature and type of deposits;
- d. the contour interval must be consistent with the map scale or should be adequate enough to represent the topography;
- e. the topographical survey or any geospatial data must be carried out in DRUKREF 03/Bhutan National Grid CRS.
- f. in the process of map production and construction of cross sections, relevant software shall be used;
- g. the GIS layers should contain required attribute information;
- h. the final maps should contain, inset of location Map, title, scale bar, contour interval, field data collection period, name of surveyor, name of the reference coordinate system, orientation, legend, projected grid, etc.;
- i. the topographical map may feature areas beyond the mining demarcation boundary to facilitate interpretation of the geology and topography;
- j. base map/fundamental datasets may include but not limited to the following layers/features:
  - contour
  - drainage;
  - infrastructures; and
  - land use and land cover.
- k. the cross section should be oriented normal to the strike of the lithology and should represent all the lithological units. Where orientation deviates from normal to the strike, apparent dip amount must be used for sub-surface projection;
- 1. the number of cross sections should be representative of the scale of mapping, type and nature of deposits, and topography; and

m. the cross section should contain title, scale bar, orientation of the section line, legend and grid.

## 1.2. Geological Mapping

The following are the standards for geological mapping:

- a. geological mapping must be carried out by a geologist; and
- b. location of data must be collected using an instrument that has the capability to collect the locational data consistent with the accuracy level of the topographic base map and in the coordinates system consistent with base data.

## 1.3. Sampling

- a. The sampling must be carried out by a geologist or under the guidance of the geologist.
- b. Depending on the purpose and scope of work, an appropriate sampling method must be used. The recommended sampling method is grab sampling.
- c. The samples collected shall be used for the purpose of chemical or geotechnical analysis only.
- d. The sample collected shall meet the following requirements:
  - representative samples based on the scale of mapping free of weathering and contamination;
  - recorded with geo-coordinates;
  - packed properly with proper labelling;
  - in appropriate size weighing 1-2 kg for geochemical and geotechnical tests.

## 1.4. Pitting and Trenching

## 1.4.1. Pitting

Pitting, if required, shall be carried out under the guidance of a geologist. Limited number(s) of pits may be carried out. The number(s) and spacing may differ depending on the nature of mineral occurrence or deposit. Spacing may range from 5-50m;

- Excavating about 1mx1m or 1m radius pits using handheld tools only. The depth of the pits may vary depending on the extent of weathering and location of rock of interest;
- c. The pitting may be carried out in a systematic manner, preferably in a grid system, other materials excavated from the pit must be stacked properly for backfilling purposes.

## 1.4.2. Trenching

- a. Trenching, **if required**, must be carried out under the guidance of a geologist.
- b. Systematic trenching may be carried out by excavating appropriate dimensions.
- Limited number of trenches with appropriate dimensions may be carried out using handheld tools only. The number and spacing may differ depending on the nature of mineral occurrence or deposit. Spacing may range from 5-50m;
- d. The representative material recovered from each meter of trench must be stacked separately to collect samples for analysis to determine the variations across the mineralization. other materials excavated from the trench must be stacked properly for backfilling purposes.

#### 1.5. Geochemical and Geotechnical Analysis

Samples collected must be tested or analyzed in a certified laboratory.

#### 1.6 Reserve Estimation

- a. Reserve estimates must be at least in "Probable" Category;
- b. Reserve must be estimated using an appropriate method, which will depend on the type and nature of topography and deposits.

Any discrepancy(s) that may arise such as the reserve or grade shall be the sole responsibility of the promoter or the consultant.

## 2. Report Standards and Format

The geological assessment report of a mineral/rock is a scientific report and should be written by a geologist. The geological deposit assessment report must be submitted to DGM in the following standards or format:

• Font size 14-16 for headings, 12 or others.

- Font style must be "Times New Roman".
- Paper size must be A4 for text and appropriate size (not less than A3) for maps and cross sections.
- Softcopy (PDF) and one hard copy.
- Units used must be in SI unit system.
- All pictures and photographs must be in colour with proper annotations.
- Proper captions for tables, figures, annexures, appendices etc.
- All the maps, cross sections, annexure, and appendix and other supporting documents must be enclosed with reports in proper sequence and
- The survey or base data (in softcopy) to determine the consistency of the map and data.

## 2.1. Cover page

The cover page design shall include the title, submission date (d/m/y), representative photo, company or firm logo (if relevant), name and address of the promoter and name, sign and seal of the geologist.

#### 2.2. Abstract or Executive Summary

A brief description of background, purpose and objectives, study area, methodology, results, conclusion and recommendations.

#### 2.3. Table of Content

The table of content shall be provided with proper categorization of headings, page number and list of figures, tables, pictures, plates and annexures, etc.

#### 2.4. Introduction

Introduction part shall include:

- a. concise and appropriate background discussion on scope and limits of the work;
- b. clear aims, objectives or purpose of the study;
- c. detailed description on study area including locations, accessibility, topography, drainage, climate, flora and fauna; and
- d. outline any previous studies or works in the area by citing pertinent literature.

## 2.5. Regional Geological Setting

Brief description on regional geology using existing information.

## 2.6. Materials and Methods or Technique Applied

The report should succinctly describe what was done. It should include a description of the techniques used including scale of mapping, sampling methods, analytical techniques, surveying methods, data analysis, software used, etc.

## 2.7. Results and Discussion

This section should present the findings/results with respect to methods or techniques used. The findings should include but not limited to:

- discuss analytical results on geology, structures;
- laboratory analysis results;
- geological reserve estimation; and
- other graphical results or maps.

## 2.8. Conclusions and Recommendations

Include summarized key findings or results. Key findings and recommendations should be based on the evidence presented in the report and validated against the studies or methodology of similar kind.

## 2.9. References

- a. The purpose of the reference is to increase the credibility of the report and to help readers find the literature easily.
- b. List must be arranged in alphabetical order using the surname of the main author.
- c. In-text citations for all the references listed under this section must be provided in the report.

#### 2.10. Annexures

Annexures shall include but not limited to Maps, cross sections, models, samples logs and laboratory results.

## 2.11. Other Reporting Requirement

- a. DGM may request additional information on the received reports and the work accomplished.
- All the digital data of GIS (in shapefile) and images (in JPEG or TIFF, GeoTIFF or PNG) shall be submitted to the Geoscience and Mineral Division of DGM.
- c. The confidentiality of the reports and data submitted shall be maintained by DGM until an appropriate time for disclosure is determined.
- d. DGM or the Ministry may, without restrictions or conditions, make use (including publication) of reports or data for official use or that in the opinion of DGM is of public or national interest.