



S&T MARBLE AND MINING LTD. (STMM)

MINING PLAN

**MINE
LOCATION:
EPANKO
VILLAGE,
ULANGA
DISTRICT,
MAHENGE,
MOROGORO
REGION**

30 SEPTEMBER 2024

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I. EXECUTIVE SUMMARY

Purpose and objectives of the project

S&T Marble and Mining Limited (STMM), the company which owns the mine, is a business concern with its registered office in Pugu Street, Nyerere Road in Ilala Municipal Council, Dar Es Sallam, Tanzania with Postal Code 12101. The firm was incorporated in May 2015 under the Tanzania Companies Act 2002.

Project description

STMM's prime focus is on quarrying, processing and supply of high-quality marble. The firm puts an emphasis on the quality of its marble with the goal of creating a premium brand image for Tanzanian marble, both for the domestic as well as the international and regional African market.

STMM owns a Mining License (ML) whose site is located in Mahenge, near Epanko village in Ulanga District. This License confers on STMM the right to search, mine, dig, mill, process, transport, use and market the marble from this site.

In the regard, exploration and groundwork has been carried out in the region for development and operation of a quarry to mine Tanzanian marble.

The nature of the marble deposits is white with greyish veins with reasonable uniformity in the color.

Scale and scope

STMM operates a marble quarry next to Epanko village of Ulanga District, Mahenge in the Morogoro region of Tanzania. This is the site for Mining License 567 where the marble mine is located and this site covers an area of approx. 0.19 square kilometers.

The quarry site is located just north of Mahenge township, about 7.5 kms from the town center and in proximity to Msogezi. The mine is located within easy reach of Mahenge town for the purposes of necessities at the mining site. Further, the site is located south west of Dar Es Salaam and approximately 409 kms from the main business district of Tanzania.

Market potential

There is a demand for Tanzania marble in the international market as indicated by the price commanded by quality, unbroken/uncracked marble. The growing demand of marble as a premium offering in interiors and construction further highlights its scope as a mineral worth mining.

After the commercial operations at the site begin, STMM will implement a marketing plan for the marble processed at the quarry. As part of the

marketing plan for the marble from the Mahenge site, the product will be displayed in suitable exhibitions and samples of the marble shall be distributed to select potential customers in order to get their feedback and other inputs.

In terms of the potential key markets, India is a major export market. In the GCC region, Saudi Arabia shall be a major target as marble is used extensively in most of the hotels and mosques, especially for in and around the Mecca & Madina region.

Another potential market is China, the largest consumer of industrial minerals and construction materials globally.

Life of Mine (LOM) details

In accordance to the feasibility study conducted for the site; the project life, with its associated infrastructure, is expected to last for over 40 years.

Following the development and commercialisation of the marble resources in the area, STMM is confident that the mining venture has the potential to create business opportunities that will provide employment to local Tanzanians while generating revenue for the local government.

Cost estimations

The total cost for the development of the mine and obtaining the Mining License so far is approx. USD 3.5 million (this includes the cost of conversion of the Primary Mining License to a Mining License).

Equipment and infrastructure

At present the overburden at the site is in the process of being removed using wire saw machines. The next step after the cutting of the boulders and rocks which make up the overburden will be the preparation of benches which will be used to cut and store the blocks.

The current equipment and tools are maintained and kept in running order by the staff at the site. The details of equipment and tools used is provided below in 'the 'Equipment selection' section.

Quality control

A well-prepared Quality Control (QC) and Management Plan is one which encompasses the planning & implementing procedures to ensure the results are accurate & consistent standards, and meet the defined criteria for the marble quality.

The QC process at the site involves operational activities to verify the outcomes so that they meet the required quality standards, includes checks & inspections during the process to identify and correct errors and align with the established quality criteria.

Since the commercial production has not begun as yet, the formal QC plan for commercial production will be in place once operations are in place.

For now, the site operations include the following key aspects for ensuring quality control -

- I. The personnel at the site are trained on the equipment to be used and know the protocol to operate the tools and machinery at the site.
- II. The relevant workers, such as the wire saw operator, are aware of the specifications of the machinery and tools they use and know the safety measures to keep in mind when operating the tools.
- III. The tools and equipment at the site are kept in working condition and properly calibrated as required.
- IV. The samples are subject to a quality control check by the local staff.
- V. The handling and storage protocols are followed to prevent damage, loss and contamination.
- VI. Record keeping and documentation is followed by the accountant at the site office.
- VII. Reporting is carried out in a transparent and accurate manner, thereby ensuring a responsible and professional approach to the site operations.

Mine development

The process of acquiring the Mining License took almost 2 years including the requirement of approvals from various statutory bodies. Post this, STMM had commenced mine development activities in 2020.

The COVID pandemic impacted the development activities and the work has begun again last year.

These activities included clearing of the mine site and the surrounding area, repair and construction of the access roads, establishment of basic infrastructure facilities at the site, such as an office, drinking water facility etc. Along with these, the firm acquired equipment and machinery for quarry development and enhancement.

It may be noted that the overburden waste estimation will be done once we the license is transferred to the new entity.

Production rate and schedule plan

Once the Mining License is transferred to the new entity, International Marbel Tanzania (IMT), then the process to move to commercial production shall begin and the production of blocks at the site will ramp up. The expected monthly production rate once commercial production begins is about 250 blocks. This level of output is expected to take about 18 months (1.5 years) to reach. This timeframe will depend on internal and external factors and indicates the expected timeline as per the Mining Plan and mine development schedule.

Once this level of output is reached, the plan is to setup a processing facility in the region to process marble blocks. These blocks will be sold to the regional as well as the international market.

Mining License details

ML 567-2016 is situated at Epanko-Mahenge, Ulanga district, Morogoro, covers approximately 0.19 square kilometers.

Development of the mine

The mine is in development stage as mentioned above, so the current activities involve clearing the waste material, such as boulders which are fractured and/or fragmented. This process to clear and develop the area for future production is in progress.

Once the mining license is transferred and production commences as per the above-mentioned rate, STMM plans to construct and operate a marble processing facility in the vicinity of the quarry.

The team to operate this facility will consist of professionally qualified and experienced geologists and engineers looking after the mining process. This technical team will be supported by development activities run by marketing and finance professionals which will include Tanzanian professionals.

Safety measures in place

At present, the workers who are working on the quarry are provided personnel safety equipment/tools such as helmets, shoes, reflector jackets etc. Drinking water is readily provided during the working shift

and at the site office. Further, a rest room is available at the site for the workings.

The employees at the site are conversant with basic safety protocols and know where to go in case of a fire at the site. An Emergency Preparedness and Response Plan (EPRP) will be prepared specifically for the Mahenge site once commercial operations begin. This plan will be designed to ensure a safe environment for all employees, contractors, visitors and neighbours.

Reclamation and mine closure plan

Since the mine is in the development phase, there is no plan devised for reclamation of the land in the area or the closure of the site as yet. We assure that this aspect will be looked at the appropriate stage of the mine's lifespan.

II. INTRODUCTION

Location and accessibility

The quarry is just north of Mahenge Township, about 7.5 km away from the town. In Mahenge town, the quarry staff can access social services like medical facilities, banking, shopping and household requirements.

Mahenge town is located southwest of Dar es salaam and approximately 409 Km from the Main Business District of Tanzania.

Further, the mine site is easily accessible by road as it is close to the main road to Ifakara town.

The site can be accessed from Dar es Salaam either by road through Morogoro – Mikumi – Ifakara up to Mahenge or by Tazara railway to Ifakara and then by road to Mahenge. There is also a natural water stream near the site that flows throughout the year, which is a source of fresh water.

ML 567-2016 is located at Epanko village, Mahenge, Ulanga district in Morogoro region. It approximately covers an area of 0.19 sq. kilometers as defined by the following corner coordinates (Arc 1960) -

	Latitude	Longitude
1.	-08° 38' 06.90"	36° 42' 13.00"
2.	-08° 38' 17.00"	36° 42' 23.20"
3.	-08° 38' 24.80"	36° 42' 16.30"
4.	-08° 38' 12.20"	36° 42' 00.10"

Haulage

Currently, the excavator is used to haul the marble cut from the overburden. The wheel loader is used to move the rocks and marble to the storage area or the waste yard, as required.

The road used by the excavator is well maintained and in suitable condition for transporting the blocks.

Mineral tenure and surface rights

The Primary Mining License for the quarry was acquired in the year 2015 and the same has been converted to a Mining license in 2016.

The land use of quarry area was acquired by payment to the local villagers in line with the mining regulations. The ML 567 has a 10-year validity and is valid till 28 October 2026.

III. GEOLOGY AND RESOURCE

Regional And local geology

There are large rocks which contain marble in the mountains surrounding the mine. This is an indicator that there are significant marble deposits in the area. The area surrounding the quarry is hilly and there are natural reserves of marble as per the drilling report prepared for the area.

Local geology overview

Mahenge area forms part of the Paleoproterozoic Usagaran metamorphic belt, which contains greenschist, amphibolite, granulite and eclogite facies rocks. The Usagaran rocks of Mahenge are made up of a group of well foliated gneisses of pelitic origin and metamorphosed calcareous sediments with minor intrusion of basic and ultrabasic igneous rocks. Mahenge Precambrian rocks are separated from Karoo rocks by nearly N-S major fault to the East and South East of the project area. The Karoo consists of a series of alternations of ill-sorted arkosic sandstones, maroon shales, silts and conglomerates.

Drilling overview

A total of 240 meters were drilled in 6 vertical diamond drillholes in and around the quarry site with the goal of characterizing and estimating the

amount of minable/processable marble available. Single tube wireline drilling was undertaken for the purpose of this estimation.

Geological survey outline

A framework of Wireframes/solids were created for the various geological domains to be used in the geological survey of the site.

The 5 geological zones outlined for the survey are mentioned below –

- I. Clayey sand & marble
- II. Marble fragments
- III. Foliated marble
- IV. Nonfoliate marble
- V. Mica schist

The 3 Weathering Profiles modeled for the survey are given below –

- I.Oxide zone
- II.Transition zone
- III.Fresh zone

Resource model used in geology/drilling survey

The modeling of marble zones in the region was carried out in order to produce geological wireframes. This process involved incorporating drillhole locations, drillhole survey data and lithological information.

The estimation of the resources available in the project area was done after carrying out a data verification exercise from the 6 drilled holes where exploration database, down-hole survey and lithology were checked.

The 2 main types of marble found during the drilling process are as below –

I. **Light grey, medium to fine grained marble with very occasional graphite**

This marble type was found more in the topographical low ground in the area.

II. **White colored, resistive (relatively resistant to surface water) and fine-grained marble with medium graphite bands**

This type was more in the topographical high ground in the area.

Mineral resource/reserve estimates

The inferred marble resource estimate for the project area is indicated below based on the drilling report conducted for the area -

Global Resource	Commodity	Tonnes (metric) - approximate estimated value
Marble	Marble	742 million

It may be noted that out of this 742 mt of estimated mineral resource, the total minable marble resource comes to about 35 – 40% of this total estimate.

Geological interpretation

This marble at the site is viable as indicated by the petrography and geochemical analyses of the mine area.

Despite the marble in the area being slightly fractured in small parts/sections, the marble deposits here hold significant economic value as per the available geological and geotechnical data.

Rock Quality Designation (RQD) analysis is a method used in the mining industry to assess the quality and integrity of a mass of rock by calculating the percentage of intact drill core pieces longer than 10 cm recovered during a single core run.

The RQD analysis of the samples taken from the site suggests that the marble is intact, which is ideal for producing marble blocks for various commercial uses. Further, the physical quality of the marble meets current market standards.

Thus, it can be concluded that the marble mine in Mahenge is technically and economically viable as per geological findings from both the Drilling Report and field observations. The available geological and geotechnical data taken from the site also backs this claim.

IV. MINING

Mining design

The project area is part of the Mahenge marble region that forms a tight poly-phase sequence of marble around which mafic and felsic gneisses and graphitic schists makeup the Mahenge synform.

Field observations and drilling helped identify 2 types of joint sets in the region as mentioned below –

- I. Sub-vertical joints
- II. Sub-horizontal joints

These joints range from very narrow to very thick, whereas in some parts the sub-vertical joints are enlarged by percolating water from the surface which may create voids or cavities below.

Plan for quarry development

The overall plan is to develop the mine from the upper hill area where the overburden is prominent.

Here at the top of the hill in the site, there are large marble rocks with marble spread among them. With the help of a wire saw machine, the plan involves starting out with bigger rocks and then moving on to smaller and smaller blocks, preparing the area for development and access to the marble blocks.

Mining method

The broad process used in developing the mins is summarized below -

Initially, the excavator is used for cutting of the soil and waste blocks and shifting of the marble taken from the top of the hill as mentioned plan for quarry development. The cutting is carried out using a wire saw machines of 60 hp.

Once the inner rock face is exposed, drilling will be conducted to form a hole down to the core marble sheet.

Dimension of quarry (approximate) -

- I. Length - 60 meters
- II. Width - 50 meters
- III. Height - 80 meters

Dimension of blocks (approximate) -

- I. Length - 220cm -280 cm
- II. Width - 140 cm - 180 cm
- III. Height - 140 cm - 180 cm

To prepare the site for the production phase, the plan is to first remove the overburden present in such a way that the rocks present in the overburden can also be utilized. The soil, trees and bushes and extensively cracked marble rocks which are not fit for commercial use shall be separated and the rest will be set aside.

Weathering report

The drilling survey indicates that the region ranges from completely weathered rock to partially weathered rock.

Waste rock management

The waste material from the quarry is placed in a separate location at the side of the quarry. This separate area is where waste soil, cracked rocks and all types of unused stones are dumped away from the core mining area.

As the quarry is developed and production is ramped up, a path shall be prepared which can be used by a dumper. For this purpose, the dedicated ramp for a dumper vehicle shall be prepared, ensuring that it the path is wide enough and free of any stone capable of sliding.

Corporate Social Responsibilities (CSR) initiative

Background of local region

There are two recognized villages within a radius of around 3 kms from the mining site. The main livelihood of the people in and around the mining site include agriculture along with some cattle farming and charcoal making.

Small scale businesses are a key form of economic activity in the area. There are various small and medium businesses such as kiosks and shops situated along the main road and in the villages around the site. Most of these enterprises have been established during the commencement of mining and graphite exploration activities in the area. The local businesses focus on food items, soft drinks and alcohol.

STMM is a dutiful corporate citizen which aims to protect as well as improve the lives of workers and communities in the Mahenge region.

With this in mind, the company carries out operations while adhering to its ethical responsibilities as a corporate entity.

With this context, an outline of STMM's CSR related activities is mentioned below -

- STMM takes proper care to not harm the land at the site with its operations, thereby ensuring that the local environment is not degraded due to its mining activity.

- STMM provides access to drinking water via the borewell at the site to local villagers if required. This gesture can help in reducing illness for the locals since the availability of water is a challenge in the region.
- Since locals use marble chips from quarries in the region to sell in the local market, STMM plans to provide local villagers with the waste chips/stones from the operation. This will have a two-pronged impact as given below –
 - I. A source of livelihood for local villagers
 - II. Saves on disposal cost for STMM, thereby making the process more efficient.
- The scrap produced from the process of cutting the rocks and boulders can be given away to the villagers. This will be another source of support to the local villagers since many of them earn their livelihood from the sale of charcoal, which is produced by cutting the trees and burning the wood in the area. This approach also helps lower the burning of wood, which is a major cause of environmental pollution.

It is planned that once the mine is transferred to the new entity and commercial operations are in full swing, the firm will participate in the local charity activities and also provide greater support to the local community based on consultation with the local Government and village authorities.

V. DRAINAGE AND HYDROLOGY

Hydrological report

The site lies within the Epanko sub-catchment region, which is located in the southeast corner of the Rufiji River Basin. The hydrologic system in the project area comprises of tributaries which join the Luli River, which flows towards the Kilombero River to form the larger Rufiji River. This river flows into the Indian Ocean at Rufiji Delta opposite Mafia Island, about 500 km to the northeast.

The main tributaries and rivers/streams are relatively far from the quarry site.

It may be noted that land degradation is the principal source of water pollution in the area. Further, the graphite related mining activity in the region contributes to the degradation via a mixture of poor sanitation systems and inadequate land management.

Water quality

Water pollution is an issue in this part of the region. Poor farming systems and lack of supporting infrastructure are the primary causes of water pollution in this area. Given the nature of the Epanko sub-catchment area, local farmers are used to conducting agriculture on the sloping land. Most of the permanent farms are situated in steep areas of the valley. The valley is used to grow seasonal crops such as maize, beans and rice, some of which require a substantial amount of water.

Water balance

The critical limitation with respect to a hydrology related studies in this area is the fact that relevant data is not easily available. Hence, certain surveys/studies, such as Site Water Balance and Drought-Flood Analysis, have not been carried out for the site.

The Peak Flood is the Probable Maximum Flood (PMF) to be expected from the catchment following a rainfall of estimated intensity and duration for a selected return period taking into account the hydrological characteristics of the catchment. In the site region, the streams are not gauged to allow estimation of such floods for spillway purposes, hence the PMF estimate has not been calculated.

VI. MINERAL PROCESSING

Since the mine is still being developed, there is no processing facility at the mine and no crushing/grinding involved at this stage.

The storage of the blocks taken from clearing of the overburden of the mine are stored on site in a designated area, as described above.

VII. MINE INFRASTRUCTURE, EQUIPMENT AND POWER SUPPLY

Equipment selection

The site is currently in the development phase and hence the area is being readied for mining as explained above. Given below is a list of the machinery, equipment and tools used the site.

List of assets at the site –

- I. Excavator - 1 piece
- II. Wheel loader - 1 piece
- III. Wire Saw machine - 3 pieces
- IV. LD4 drilling machine - 2 pieces
- V. Hydro machine - 1 piece
- VI. Jack hammer - 1 piece
- VII. Wheel loader engine (spare) - 1 piece
- VIII. Generator (for providing power to the tools) - 1 piece
- IX. Compressor (for cooling the generator) - 1 piece
- X. Company vehicle - 1 piece

List of assets at the site office –

- I. Storage containers - 2 pieces
- II. Printer – 1 piece
- III. Table – 1 piece
- IV. Chair – 2 pieces
- V. Laptop computer – 1 piece
- VI. Room AC – 1 piece
- VII. LPV panel board - 1 piece

Technology

As the site is still in the development phase and commercial production is yet to start, the level of technology used at the site is suited to the current level of development. This is also indicated by the assets at the site, as described above in the 'Equipment selection' section.

Once the new firm, IMT Ltd., is established and the assets are transferred to this new firm, there will be upgradation of the technology in line with the growth in production output and capacity of the quarry.

Maintenance plans

At present, the equipment at the site is maintained and kept operable by the staff at the site. In case of any repair or issue, the same is carried out promptly as and when required by employing local service providers as per the nature of the maintenance or repair needed.

Power sources and supply

The site does not have an electricity line connection as yet due to its relatively remote location. For this reason, STMM makes use of a generator for powering the relevant tools for working on the blocks.

As and when the site is connected to the local power grid, the site will have regular power supply and the machinery and tools at the site can be upgraded and expanded as required.