GOVERNMENT OF MEGHALAYA
DIRECTORATE OF MINERAL RESOURCES
SHILLONG.

No.DMR/MM/81/2020/09 Dated Shillong, the 30.09.2020

To,

M/s Lafarge Umiam Mining Pvt. Ltd.,
3rd Floor, Goenka Towers,
Morello Compound, Keating Road,
Shillong, Meghalaya.

Sub: Approval of Mining Plan/Scheme of Mining in respect of Shale-Siltstone of M/s Lafarge Umiam Mining Pvt. Ltd over an area of 4.9 ha. at Shella, District-East Khasi Hills, Meghalaya submitted under Rule 19 (1) of Meghalaya Minor Mineral Concession Rules, 2016.

Sir,

In exercise of the power conferred under Rule 10 (a) & 19 (1) of Amended Meghalaya Minor Mineral Concession Rules, 2016 along with Govt. Notification No.MG.49/2011/Pt-I/58 dt. 01.03.2019 together with No.MG.29/2000/367 dt.18.08.2020, I hereby approve the above said Mining Plan/Scheme of Mining with following conditions.

(i) The Mining Plan is approved without prejudice to any other law applicable to the mine area from time to time made by the Central Government, State Government or any other authority and without prejudice to any order or direction from any court of competent jurisdiction.
(ii) The proposals shown on the plates and/or given in the document is based on the lease map/sketch submitted by the applicant/lease and is applicable from the date of approval.
(iii) It is clarified that the approval of Mining Plan does not in any way imply the approval of the State Government in terms of any other provision of the Meghalaya Minor Mineral Concession Rules, 2016 or Acts and Rules relating to Mines and Minerals framed by Central Government and any other laws including Forest and Labour Laws.
(iv) At any stage, if it is observed/found that the information furnished data incorporated in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.
(v) If this approval conflicts with any other law or court order/direction under any statute, it shall be revoked immediately.

Enclo: As above
3 (three copies of approved Mining Plan)

Yours faithfully,

(P.Ch.Marak)
Mining Engineer
Directorate of Mineral Resources
Meghalaya:::Shillong.

Memo. No.DMR/MM/81/2020/ Dated Shillong, the 2020

Copy to:

1. The Controller General, Indian Bureau of Mines, Govt. of India Ministry of Mines, Indira Bhavan, Civil Lines, Nagpur – 440 102 for information and necessary action.
2. The Director General of Mines Safety, Dhanbad, Jharkhand - 826016 for information and necessary action.
3. The Secretary to the Govt. of Meghalaya, Mining & Geology Department, Shillong for information and necessary action.
4. The Principal Chief Conservator of Forest, Meghalaya, Shillong for information and necessary action.
5. The Director of Mineral Resources for information.
6. The Commissioner of Labour, Meghalaya, Shillong for information and necessary action.
7. The Chairman, Meghalaya State Pollution Control Board, Lumpyngngad, Shillong for information and necessary action.
8. The Deputy Commissioner, East Khasi Hills District for information.
9. The RQP for information.

Mining Engineer
Directorate of Mineral Resources
Meghalaya:::Shillong.

CATEGORY B

SCHEME OF MINING

WITH

PROGRESSIVE MINE CLOSURE PLAN

FOR

SHELLA SHALE-SILTSTONE MINE

AT

SHELLA, DISTRICT- EAST KHASI HILLS, MEGHALAYA

OVER

AREA 4.90 HECTARES

FOR THE PERIOD- 2020-2021 TO 2024-2025

Prepared and submitted as per the Guide Lines of Indian Bureau of Mines, TMP Division, Ministry of Mines, Govt. Of India, vide their notification No.296/7/2000/MRC, dated 16 May 2011
And
Rule 10(a) and Rule 19 of Meghalaya Minor Mineral Concession Rules, 2016

LESSEE

M/S LAFARGE UMIAM MINING PVT LTD

3rd FLOOR, GOENKA TOWERS
MORELLO COMPOUND
KEATING ROAD, SHILLONG
MEGHALAYA

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

APPROVED

PREPARED BY

JAIPAL SINGH
RQP/AJM/378/2015/A
C-47, RAGHU MARG, HANUMAN NAGAR, JAIPUR, RAJASTHAN
jaipal1965@gmail.com
TELEPHONE: 91 9485112301, 91 8955956927

M/s Lafarge Umiam Mining Pvt. Ltd.

Hotel Polo Tower, Polo Ground,
Oakland Road, Shillong,
Meghalaya.

AUTHORIZATION LETTER
UNDERTAKING/CERTIFICATE FROM THE LESSEE

01. The Mining Scheme with PMCP in respect of Shella Shale-Siltstone Mine, over an area of 4.90 ha, at- Shella, District-East Khasi Hills, State- Meghalaya, under MMMCR 2016 has been prepared by RQP Shri Jaipal Singh (RQP/AJM/378/2015/A).

This Is to request the Department of Mining and Geology, Meghalaya, to make any further correspondence regarding any correction of the Mining Scheme with PMCP with the said recognized person at his address below:

Shri Jaipal Singh
RQP/AJM/378/2015/A
Qualified person as per rule 19(2) of MMMCR 2016
Validity upto 5.8.2025.
C-47, Raghu Marg,
Hanuman Nagar
P.O. Vaishali Nagar,
Jaipur, Pin 302021
e-mail: jaipal1965@gmail.com

I hereby undertake that all modification/ updating as made in the Mining Scheme with PMCP by the said recognized person be deemed to have been made with our knowledge and consent and shall be acceptable on us and binding in all respects.

02. It is certified that the CCOM Circular no 2/2010 will be implemented and complied with when an authorized agency is approved by the State Government.

03. It is certified that the progressive Mine Closure Plan of Shella Shale-Siltstone Mine of M/s Lafarge Umiam Mining Private Ltd over an area of 4.90 ha complies with all statuary rules, regulations, Orders made by Central or State Government, Statuary organization, Court etc which have been taken into consideration and wherever any specific permission is required the lessee will approach the concerned authorities.

The information furnished in the Progressive Mine Closure Plan is true and correct to the best of our kind knowledge and records.

04 "The provisions of Mines Act, Rules and Regulations made there under have been observed in the Mining Scheme with PMCP over an area of 4.90 ha at - Shella, District-East Khasi Hills, State- Meghalaya, belonging to Shale-Siltstone Mine and where specific permissions are required, the applicant will approach the DGMS. Further, standards prescribed by D.G.M.S. in respect of miner's health will be strictly implemented."

Place- Shillong
Date- January 27, 2020.

Authorized Signatory
M/s Lafarge Umiam Mining Pvt Ltd
(Lessee)

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

APPROVED

Jaipal Singh
RQP/AJM/378/2015/A
Qualified person as per rule 19(2) of MMMCR 2016
Validity up to 5.8.2025.
C-47, Raghu Marg, Hanuman Nagar
P.O. Vaishali Nagar, Jaipur, Pin 302021
e-mail: jaipal1965@gmail.com
mobile: 91 9485112301, 91 8955956927

CERTIFICATE

The provisions of MMMCR 2016 (Meghalaya Minor Mineral Concession Rules 2016) have been observed in the preparation of the Mining Scheme with PMCP for Shella Shale-Silstone Mine, over an area of 4.90 ha of M/s Lafarge Umiam Mining Pvt. Ltd. at-Shella, District-East Khasi Hills, State- Meghalaya, and whenever specific permission are required, the lessee will approach the concerned authorities of Government of Meghalaya.

The information furnished in the Mining Plan with PMCP is true and correct to the best of my knowledge.

JAIPAL SINGH
RQP/AJM/378/2015/A

Place- Shillong
Dated- January 25, 2020

Jaipal Singh
Qualified Person under rule 19(2)
Of MMMCR 2016
Valid up to August 5, 2025

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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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List of Annexures

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1	COPY OF THE APPROVAL LETTER OF MINING PLAN	1
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Directorate of Mineral Resources
Meghalaya, Shillong

List of Plates

Number	TITLE
1	LOCATION PLAN
2	KEY PLAN
3	ENVIRONMENT PLAN
4	SURFACE GEOLOGICAL PLAN & SECTIONS
5	COMPOSIT PLAN & YEARWISE SECTIONS
6	CONCEPTUAL PLAN
7	PROGRESSIVE MINE CLOSURE PLAN

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Directorate of Mineral Resources
Meghalaya, Shillong

1.0 GENERAL INTRODUCTION

Lessee:-

M/s Lafarge Umiam Mining Pvt. Ltd. a Pvt. Ltd. (the "Company"), is the Lessee of this mining lease for Shale-Siltstone, area 4.90 hectares and is involved in mining with this mining lease located at- Shella, East Khasi Hills District of Meghalaya State of India.

Lease details:-

Lessee	M/s Lafarge Umiam Mining Pvt. Ltd.
Mineral	Shale-Siltstone
Area of Lease	4.90 hectares
LOI issued	NO.MG.29/2000/237 Dated Shillong, 14th January, 2002
Mining Lease Grant Date	5th April 2002
Mining Lease Execution Date	30th August 2002
Mining Lease Expiry	30th August 2032 (Any action required on the validity of the lease period will be complied with as per the prevailing law of MMDR Act 1957)
Reason for submission of mining Scheme	This mining scheme is submitted in continuance of the previous approved scheme/plan.

For preparation of the Mining plan with PMCP the lessee approached the RQP and authorized the RQP for preparation of Mining plan with Progressive Mine Closure Plan.

The survey work was conducted in December 2019 and the plan with progressive mine closure plan has been prepared. This mining plan with Progressive Mine Closure Plan has been prepared as per the new guide lines provided by the approving authorities and circulars issued time to time.

Approach

From	To	Distance	Road
Mine Site	Mine turning point	0.3 km	Kacha Rasta
Mine Site	Mawsynram	50 kms	SH, NH
Mine site	Shillong	96 kms	SH, NH
Mine Site	Shillong Airport	116 kms	SH, NH
Mine Site	Guwahati Railway Station	200 kms	SH, NH
SH- State Highway, NH- National Highway			

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Directorate of Mineral Resources
Meghalaya, Shillong

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JAIPAL SINGH
RQP/AJM/378/2015/A

1.1 GENERAL

a) Name and address of lessee

M/s Lafarge Umiam Mining Private Ltd.
3rd Floor, Goenka Towers, Morello Compound
Keating Road, Shillong,
Meghalaya – 793001.
Phone: +91 364 2501115
Fax: +91 364 2501116.

(The address is effective from 01/03/2020)
(Intimation of address change submitted to DMR on 20/03/2020, enclosed)

b) Status of Lessee:

Lessee is a Private Limited Company.

c) Mineral which are included in prospecting license:

Not applicable.

d) Mineral which are included in the letter of Intent/ lease deed

Shale-Siltstone.

e) Mineral which lessee intends to mine

Shale-Siltstone.

f) Name of Recognized Person under MMMCR 2016 who prepared the mining plan/ scheme

Jaipal Singh
RQP/AJM/378/2015/A
C-47, Raghu Marg,
Hanuman Nagar
P.O. Vaishali Nagar,
Jaipur,
Pin 302021
Telephone: 91-9485112301
Registration Number (under rule 22B of MCR 1960)
RQP/AJM/378/2015/A
Date of Grant- 6.08.2015
Valid up to - 5.08.2025.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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2.0 LOCATION AND ACCESSIBILITY

a) Lease details

Name of the mine:
Shella Shale-Siltstone Mine
At- Shella,
District-East Khasi Hills.
State- Meghalaya.

b) Name of Lessee:

M/s Lafarge Umiam Mining Private Ltd.
3rd Floor, Goenka Towers, Morello Compound
Keating Road, Shillong,
Meghalaya – 793001.
Phone: +91 364 2501115
Fax: +91 364 2501116.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(The address is effective from 01/03/2020)
(Intimation of address change submitted to DMR on 20/03/2020, enclosed)

c) Details of lease area with location plan

- **Location plan is enclosed as Plate-1.**
- **Forest/ Non-Forest**

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  - The area has been determined as Forest on August 03, 2018.
  - Background
    The area under the mining lease is 4.90 hectares initially a non-forest, private land. However, in view of the judgment rendered by the Hon'ble Supreme Court in IA 1868 of 2007 in Writ Petition (c) No. 2002 of 1995 titled 'TN Godavarman Thirumulpad V.Union of India & Ors' where the Hon'ble Supreme Court was pleased to hold as under:
    'If the project proponent makes a claim regarding status of the land being non-forest and if there is any doubt the site shall be inspected by the State-Forest Department along with the Regional Office of MoEF to ascertain the status of forest, based on which the certificate in this regard be issued. In all such cases, it would be desirable for the representative of State Forest Department to assist the Expert Appraisal Committee.'
  - In the light of the aforementioned direction of the Hon'ble Supreme Court, a letters dated 20.10.2011 and 30.03.2017 were submitted by Lafarge Umiam Mining Private Limited to the Principal Chief Conservator of Forests, Meghalaya requesting him to determine as to whether the 4.9 hectares of land for shale/siltstone mining in East Khasi Hills District of Meghalaya is a forest land or not.

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RQP/AJM/378/2015/A

- By letter dated August 03, 2018 the Office of PCCF (T), Meghalaya communicated to M/s Lafarge Umiam Mining Private Limited that the area of 12.423 ha acquired by LUMPL for Shale mining is considered as forest land (Annexure 5). The Shale-Siltstone Mining Lease area of 4.90 ha falls within the 12.423 ha forest land.
- LUMPL is in the process of making an application to the State Government for seeking Forest Clearance.

d) Existence of public road/ railway line

From	To	Distance	Road
Mine Site	Mine turning point	0.3 Kms	Kacha Rasta
Mine Site	Mawsynram	50 kms	SH, NH
Mine site	Shillong	96 kms via Cherrapunjee	SH, NH
Mine Site	Shillong	110 kms via Mawsynram	SH, NH
Mine Site	Guwahati Railway Station	200 kms	SH, NH
SH- State Highway, NH- National Highway			

e) The Location Plan (not to scale) is enclosed (plate-1) showing the access routes with a Key plan (Plate-2).

f) Pillars of the lease area:

Pillar	Latitude	Longitude
S1	25°11'01.2253" N	91°37'51.6742" E
S2	25°10'57.9720" N	91°37'51.4662" E
S3	25°10'58.6791" N	91°37'34.0041" E
S4	25°11'01.9171" N	91°37'34.1591" E

DGPS map verified by DMR has been enclosed.

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Directorate of Mineral Resources
Meghalaya, Shillong

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RQP/AJM/378/2015/A

3.0 DETAILS OF APPROVED MINING PLAN/SCHEME OF MINING

3.1	**Date and reference of earlier approved mining plan/ scheme** Previous mining scheme/plan was approved by IBM vide Letter No. IBM/GHY/MEG/EKH/LST/MS-52, VOL-I issued on 14/10/2015.
3.2	**Details of last modification if any (for the previous approved period) of approved mining plan/ scheme indicating date of approval, reason for modification.** No modification carried out in the approved plan
3.3	**Give review of earlier approved proposals (if any) in respect of exploration, excavation and reclamation etc.** **Development:** 1,20,000 tones of production of Shale-Siltstone was proposed annually from 2015-16 to 2019-20. But no production carried out in the area as the Mining Lease is under temporary discountenance.
3.5	**Indicate and give details of any suspension / closure/ prohibitory order issued by any Government agency under any rule or court of law** 1. The Mining Lease is under temporary discountenance since March 21, 2009. A copy of the notice of Discontinuance submitted to IBM by the company has been enclosed. 2. By letter dated August 03, 2018 The Office of PCCF (T), Meghalaya communicated to M/s Lafarge Umiam Mining Private Limited that the Shale Mining area of 12.423 ha is considered as forest land (Annexure-5). 3. The Shale-Siltstone Mining Lease area of 4.90 ha falls within the 12.423 ha forest land. 4. The Company is in the process of making an application to the State Government for seeking Forest Clearance. 5. The Mining & Geology Department (Govt of Meghalaya) issued two letters (Annexure-6,7) on December 9, 2011; declaring the Mining Lease as lapsed and revived. Both the lapse and the revival were effective retrospectively from March 21, 2011.
3.6	**In case the MP/SOM submitted under rules 10 (a) or under rule 19 of MMMCR 2016 for approval of modification, specify reason and justification under these rules.** Not applicable.

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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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4.0 GEOLOGY AND RESERVES

The elevation range within the lease area is 150 mRL highest contour to 81mRL (lowest contour). It gives an escarpment feature also.
Drainage in the lease area is northerly to northeasterly. There is no water source or any stream within the lease area, except the streamlets formed in rainy season to drain rain water. General drainage outside the area is southerly. The area is hilly and stony. Area broken by nalahs in the five kilometers periphery is illustrated on plate-2.

a) Regional Geology

Regional Stratigraphic Succession
General Stratigraphic Sequence of the Formation of Meghalaya Plate

Geological Age	Group Name	Formation Name	Rock Type
Recent	Newer Alluvium	Unclassified	Sand, Silt and Clay
----------UNCONFIRMITY----------			
Pliestocene	Older Alluvium	Unclassified	Sand, Clay, Pebble, Gravel and boulder deposits
----------UNCONFIRMITY----------			
Mio- Pliocene	Dupitula Group	Unclassified	Mottled Clays, Feldspathic sandstone and conglomerate.
----------UNCONFIRMITY----------			
Oligo- Miocene	Garo Group	Chengopara Formation Baghmara Formation Simsang Formation	Sand, Siltstone, Clay, Mart Feldspathic Sandstone, Pebble, Conglomerate, Clay, Silty Clay. Shale, Sandstone, Mart
Eocene	Jaintia Group	Kopili Formation Shella Formation Langpar Formation	Siltstone-sandstone alternations, sand Alternation of sandstone- lime stone Calcareous Shale, Sandstone, Limestone
Upper Cretaceous	Khasi Group	Mahadek Formation Bottom Conglomerate	Arkose(glauconitic) Conglomerate, Arkose

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Directorate of Mineral Resources
Meghalaya, Shillong

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		Formation Jadukata Formation	Sandstone-Conglomerate altemation
----------UNCONFIRMITY----------			
Jurassic	Sylhet Trap	-	Basalt, alkali Basalt, Rhyolite acid tuff.
----------UNCONFIRMITY----------			
Pre- Cambrian	-	Intrusives (acid and basic) Shillong Group	Ponphyrithic and coarse granites, aplite, quartz vein,epidiorite, dolerite, basalt Quartzite, Phyllite, Conglomerate
----------UNCONFIRMITY----------			
Archaean	-	Gneissic Complex	Biotite- gneiss, Biotite- Hornblend gneiss, granitic gneiss, Migmatite, mica-schist, sillimanite- quartz schist, biotite-granulite-amphibolites, pynoxene-granulite etc.

b) Local Geology:

Succession of rocks in the lease area (Local Geology)

Geological Age	Group Name	Formation Name	Rock Type
Recent	Newer Alluvium	Unclassified	Sand, Silt and Clay
----------UNCONFIRMITY----------			
Upper Eocene to lower paleocene	Jaintia Group	Kopili Formation	Shale-Siltstone

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Directorate of Mineral Resources
Meghalaya, Shillong

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c) Detailed description of geology

- **Lithology:**
  The Shale-Siltstone exposed in the area in pit and continuing in sides and in depth. The scree/ talus, soil etc are observed in non-working area.

- **Structure**
  The Shale-Siltstone has strike almost east - west and dip seems 40° to 50° southerly.
  No fault, fold and geological disturbances are observed in the area.

- **Nature Of Mineralization**
  The Shale-Siltstone of this area belongs to Kopili Formation of Jaintia Group of Eocene age. Soil comes across in small patches.

- **Effect Of Weathering**
  The cracks and joints at surface are due to weathering effect.

- **Nature of Wall Rocks**
  No wall rock is exposed in the area.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

- **Geological Sections**
  The Geological sections are prepared at central of the lease across the strike.

- **Physical and Chemical Characteristics**
  Physically the Shale-Siltstone is of light reddish, brownish in colour. As the rock is hard and compact the bulk density is 2.15 tones per cu. meter of rock.

d) Name of Prospecting Agency

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It is an existing mining lease and pit is observed in the lease area made by excavation done in the past. Previously it was mapped by Geological Survey of India. Previously the area was prospected by bore holes by M/S GIEM (India) consortium Kolkata in 2000-2001, out of 21 bore holes, one bore hole of 50.25m depth was done. The prospecting estimated the total reserves in the area. Present mining lease is a part of this explored area covering 4.9 hectare.

e) Details of Prospecting / Exploration Already Carried Out:

The working pits are observed in the lease area as shown on surface Geological Plan. The Shale-Siltstone is observed in the area.

f) Surface Cum Surface Geological Plan is provided as Plate-4.

g) Surface Geological Plan is provided as Plate-4.

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RQP/AJM/378/2015/A

h) **Geological Sections are provided on Plate-4.**

i) **Future Program of Exploration:**
The prospecting is not required as maximum area will be excavated during the mining of next five years.

j) **Method of Estimation of Reserves:**

- Reserves and Resources as per recent survey in December, 2019
  The reserves are estimated by following formula:
- Volume of mineral =Area of section X Sectional influence length
- Mineral in tonnes = Volume of mineral × Recovery percentage x Bulk density 2.15 tonnes per cu. Metre).
- The reserves are computed for Measured and Indicated category of reserves.
- The sections are prepared at 100 meters interval across the strike.

- **Measured Mineral Resources:**
  The mineral is exposed up to depth in the pit. No production took place in the lease area during the period 2015-16 to 2019-20, thus the reserves are same as calculated in the previous approved mining plan.
  Details have been shown in plate-4.
  The area is prospected by bore holes on 100- 200 meters grids covering 1185.25 m of drilling. These bore holes justified the code E1, F1, and G1 axis i.e. 111 code.

- **Indicated Mineral Resources**
  The mineral is exposed in the area and in pit and is continuing in depth and in sides. Thus considering the continuity in depth the Indicated mineral resources are computed. The limit is shown on plate-4. The feasibility Study by opencast method, profitability and its utility and economics has proved for E1, F1 and G axis considering up to 90 m level of mineralization. The continuity of mineral for 6m more down depth has justified 332 code

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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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k) Reserve Calculations

Measured Mineral Resources (111+211)					
Section	Area of section (M^2)	Sectional Influence length (M)	Volume of Mineral (M^3)	Bulk Density	Mineral in tones
AA'	3015	100	301500	2.15	6,48,225
BB'	2970	100	297000	2.15	6,38,550
CC'	3010	100	301000	2.15	6,47,150
DD'	2830	100	283000	2.15	6,08,450
EE'	2960	90	266400	2.15	5,72,760
				Total	31,15,135

Indicated Mineral Resources (332)					
Section	Area of section (M^2)	Sectional Influence length (M)	Volume of Mineral (M^3)	Bulk Density	Mineral in tones
AA'	660	100	66,000	2.15	1,41,900
BB'	610	100	61,000	2.15	1,31,150
CC'	620	100	62,000	2.15	1,33,300
DD'	600	100	60,000	2.15	1,29,300
EE'	620	90	55,800	2.15	1,19,970
				Total	6,55,320
				Reserves in nearest tens	6,55,320

l) Mineral Reserves/ Resources: Shale-Siltstone

Quantity is in tones

A) Total Mineral Reserves	UNFC Code	Shale-Siltstone
Proved Mineral Reserves	111	9,20,425
Probable Mineral Reserves		
Total Mineable Reserves		9,20,425
B) Total Remaining Resources		
Feasibility Mineral Resources	*211*	21,94,710
Pre-feasible Mineral resources		
Indicated Mineral Resources	332	6,55,320
Inferred mineral resources		

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blocked in 7.5 meters lease barrier & UPL pit slope

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
RQP/AJM/378/2015/A

MINEABLE RESERVES AND ANTICIPATED LIFE OF THE MINE

- The mineable reserves of Shale-Siltstone is of the order of 9,20,425 tones
- The production in the period of this mining plan will be around 6,00,000 tones in 5 years.
- Balance reserves: 9,20,425 – 6,00,000 = 3,20,425 tones
- Production target is 1,20,000 tones/year.
- The balance reserves will sufficient for 3,20,425/1,20,000 = 2.67 years
- Thus, total life of the mine is 5+2.67= 7.67 or say 8 years.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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RQP/AJM/378/2015/A

5.0 MINING

a) Briefly describe the existing and proposed method for excavation:

Existing Mining:
It is an existing mining lease for Shale-Siltstone. The mine is not in operations since March 2009.

Proposed Mining:
The proposed mining will be by heavy earth moving machineries, i.e. by Hydraulic excavator, Loaders, Rock Breakers, Tippers, as Shale-Siltstone is weathered soft, therefore no blasting is proposed.

The opencast method of mining with mechanization is proposed to excavate the mineral. Bench height and width are proposed 6 meters each, considering mechanization.
Approach roads will be provided/maintained up to the faces from nearest tar road. The pneumatic or hydraulic breakers will be used for excavation of mineral if required.

The fencing around the pit/ excavation will be provided to check the inadvertent entry of human and livestock in the working zone.

The soil, if it comes across during mining in small layer or cavity will be scraped and stacked separately to be used for plantation during each monsoon.

Drinking water is being brought from nearby river and stored in water pitchers at site office and near the working sites for drinking purpose and in cement tanks near the site office for other purpose.
The following works are proposed:

1. The barbed wire fencing will be provided around the proposed and existing workings to check the inadvertent entry of human and livestock in mining zone.
2. The soil which may come across during mining in patches or in cavities will be scraper and stacked separately to be used for plantation ion monsoon.
3. Proper plantation will be done in the lease area and nearby the lease area in each monsoon and will be reported to the department with photographs.
4. Garland drains will be provided around the pit to check the entry of monsoon flowing water towards working pit.
5. Drinking water from nearby river will be brought and stored in water pitchers for drinking purpose and in cement tanks for other purpose
6. The workings will be done by maintaining the proper benches.
7. The site services, site office, water tanks, workshops, kitchen, bathrooms etc are located near lease area in lessee's land as shown onplate-3 Environment Plan.

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b) The Development year wise is proposed for first five years.

In the period of this mining plan the lessee will develop the following benches i.e. From Bench levels 95 mRL (lowest bench), 101 mRL, 107 mRL, 113 mRL, 119 mRL and 125 mRL (Topmost bench).

The approach roads up to faces will be provided time to time for movement of vehicles. The bench height and width are proposed 6 meters but the lessee may take permission from DGMS for bench height more than 6 meters.
The bench slope will be provided 85°. The loading will be from pits or from stocks.
The lessee will work as per proper benches and develop the benches as required but, in the manner, as proposed and as shown on plate-6. The length and width of workings are as per the situation at field.

Year	Bench level (mRL)	Total Tentative Excavation (Cu.m.)	Top Soil (Cu.m)	Ob/Sb/In (Cu.m.)	Mineral (M^3)
2020-21	95, 101	55814	300	Nil	55814
2021-22	95, 101,107	55814	205	Nil	55814
2022-23	95, 101, 107, 113, 119, 125	55814	55	Nil	55814
2023-24	95, 101, 107, 113, 119	55814	55	Nil	55814
2024-25	95, 101, 113	55814	55	Nil	55814

Year wise development				
Year	Tentative excavation in tones (ROM)	Soil in (Cu. m.)	Waste / OB/ SB/ IB (Tones)	Mineral (Tones)
2020-21	1,20,000	300	Nil	1,20,000
2021-22	1,20,000	205	Nil	1,20,000
2022-23	1,20,000	55	Nil	1,20,000
2023-24	1,20,000	55	Nil	1,20,000
2024-25	1,20,000	55	Nil	1,20,000
Total	6,00,000	670	Nil	6,00,000

c) Dump rehandling (for the purpose of recovery of mineral)

No waste dumps as no waste generation.

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d) Enclose development plans and sections

The development plan and sections are enclosed as composite plan and sections.

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e) Describe briefly giving salient features of the proposed method of workings indicating Category of Mine.

The mining activities during the period of the mining scheme will be done by the existing method of opencast mining by deploying excavators, transport by dumpers and maintaining of bench height and width 6 meters each. The salient features have been elaborated below:

- **Loading of Mineral and Material**
  Loading of mineral in dumpers is to be done by hydraulic loaders.

- **Transportation of Material**
  Shale-Siltstone from face to consumer's site will be transported in dumpers or other mode as convenient for the company as being used in the limestone mining nearby for the company.

- **Dewatering**
  The monsoon water will collect in the mine in deep cuttings. Deep cuttings whenever observed the monsoon water will collects in the same. The water will be dewatered through a sump made in the bottom of the mine to check the silt. From sump, the dewatering will be done in a surface tank and will be used for plantation. The garland drain will be provided around the pit to check the entry of monsoon water in the working pit

- **Beneficiation**
  No beneficiation will take place at site. The ROM mineral will be dispatched to the consumers

- **Extent of Mechanization**

Assumptions	
Production target of Shale-Siltstone per year	1,20,000 ROM
Number of working days per year	300 days
Average production of Shale-Siltstone per day	400 tones

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Excavator Requirement	
Output excavator per day (Only 1 shift) - 1.84 cum bucket capacity	1200-1300 tones
Total excavation	400 tones per day
Total Excavator required	400/1250 = 0.32 or 1 excavator

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Drill Machine Requirements- Nil, as no drilling and blasting recommended.
One water tank is proposed for supply of water at different places and for spraying water on approach/haul roads.
2 to 3 dumpers of 18.7 cu.m handles 400 MT of rocks per shift will be required considering distance upto the crusher. Thus, minimum 2 dumpers are proposed.

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The following machineries are proposed (as per MMMCR 2016):

Item	Quantity
Hydraulic excavator with rock breaker arrangement	One
Water tanker	One
Dumpers of 18.7 cu. m. capacity	Two
Other machineries	As needed

f) Conceptual Plan

- **Ultimate Extent & Size Of The Pit**
  The ultimate extent and size of the workings will be as follows:
  Dimensions of workings are given below

Dimension	Deposit
Length	470 meters maximum
Width	85 meters maximum
Depth	Up to 84* mRL, or 66** meters maximum

*As per Approved Mining Plan
**Highest contour is of 150 mRL and lowest is at 84 mRL i.e. 66 meters thickness

- **The Final Slope Angle Adopted**
  Considering the stability of rocks the final slope angle or says ultimate pit slope is proposed 45º from vertical. This slope angle will remain quite safe for these deposits.

- **Ultimate Capacity Of Dumps**
  The mineral is to be used as an additive in cement manufacturing and thus ROM mineral is to be dispatched to the plant. No waste generates at site. Small waste if generated will be used for construction and maintenance of approach/haul roads. No waste dump is proposed at site.

- **Stabilization Of Dumps**
  No waste will dump in the lease area.

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- **Ultimate Pit Limit**
  The section has been prepared and ultimate slope is drawn over the sections from end bottom point of possible reserves with ultimate slope (refer plate-4). The upper points of these slopes have been projected over the plan. By joining these points, the ultimate pit limit has been drawn, which is shown on Conceptual Plan.

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- **Reclamation**

  No reclamation is proposed during the period of this mining plan, as reserves will remain alive in the lease at the end of mining plan period. However, if reserve will be exhausted during the lease period, the exhausted benches will be reclaimed by mine rejects, spreading of topsoil and plantation will be done. It is also proposed to convert the pit into a water reservoir.

- **Land Use pattern**

All figures in hectares

S.No	Item	As on date	End of 5th year	End of lease
1	Area to be excavated	1.00	2.66	3.55
2	Storage of top soil	0.00	0.04	0.00
3	Overburden dump	0.00	0.00	0.00
4	Mineral/Sub-grade stack	0.00	0.00	0.00
5	Infrastructure	0.00	0.01	0.01
6	Roads	0.110	0.11	0.11
7	Green belt	0.22	0.44	0.60
8	Reclamation	0.00	0.0	*
9	Others	0.00	0.00	0.00
	Total Disturbed land	1.33	3.26	4.27

*

Reclamation	By Plantation in non-working area/green belt	0.60 ha
	By plantation on upper benches	1.05 ha
	By Water reservoir (Will be decided prior to Mine Closure)	2.50 ha
	Total Reclaimed area	4.15 ha

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6.0 MINE DRAINAGE

a) Minimum and Maximum depth of water table based on observations from nearby wells and water bodies:

In five hundred meters periphery:
General ground level near the lease area is 30 mRL towards SE side.
Minimum depth of water table is 49.21m and maximum depth is 50.83 m as per observation from Piezometer monitoring of ground water table at the eastern side of the lease area at transit house

b) Indicate minimum and maximum depth of workings

Minimum depth of workings- 95 mRL or 40 m
Maximum depth of workings- 84 mRL up to mineable reserves.

c) Quality and quantity of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged

There is a sufficient gap between proposed workings up to conceptual and level of ground water table, thus ground water will not be encountered in the workings at any stage. As the mining is of non-toxic mineral, therefore quality of water will not be affected, the draining/pumping of water if necessary will be done through siltation tank, from there it shall be used for plantation or spraying of approach/haul road.

d) Describe regional and local drainage pattern with annuli rain fall, catchment area, and likely quantity of rain water to flow through the lease area, arrangement to arresting the solid wash off etc.

Local drainage: Drainage in the lease area is northerly to northeasterly.
Regional drainage: General drainage outside the area is southerly. The area is hilly and stony. Area broken by nalahs in the five kilometers periphery is illustrated on plate-2.

Natural drainage: The monsoon water which directly precipitates over the workings will fill in the pit and rest water which precipitates outside the pit will flow down towards lower altitude side by the slope of the area into the siltation tank.

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The water accumulated in the pit will be dewatered by 10 HP diesel operated pumps which will be used for plantation and rest of it will be passed through the siltation tank to settle the silt. The desilted water will be discharged into nearby nalahs/streams. The rubble stone walls are constructed towards lower side of the dumps to check the wash off during monsoon.

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7.0 STACKING OF MINERL REJECTS/ SUB GRADE MATERIAL AND DISPOSAL OF WASTE

a) Indicate briefly the nature and quantity of top soil, overburden/waste and mineral rejects to be disposed off.

The soil may come across in small patches and in cavities on the proposed mining site and the soil which come across will be scraped and stacked separately in 0.01 ha area. The soil will be used for plantation in each monsoon. No mineral rejects come across during mining.
Waste generation is not anticipated thus, no measures for waste dump management have been recommended.

b) The proposed dumping ground within the lease area be proved for presence or absence of mineral and be outside the UPL unless simultaneous backfilling is proposed or purely temporary dumping for a short period is proposed in mineralized area with technical constraints and justification

The details are given in Conceptual Plan.

c) Attach a note indicating the manner of disposal of waste, configuration and sequence of year wise build up of dumps along with the proposals for protective measures

The waste dump is not proposed in this planning and as per previous approval no waste was proposed to generate in the area.

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8.0 USE OF MINERAL AND MINERAL REJECTS

a) Describe briefly the requirement of end use industry specially in terms of physical and chemical compositions;

The mined Shale-Siltstone will be transported by tippers to the Company's existing crushing unit in NW side. After crushing, it will be exported to the cement plant located at Chattak, Sunamganj District, Bangladesh, through a 17 km long elevated Long Belt Conveyor (LBC) 7 km of which lies in the territory of India and remaining in Bangladesh. Shale-Siltstone will be used as an additive in a suitable proportion to maintain LSF factor. These materials are mixed as 'Silica & Alumina corrective' to cement manufacture to give a desired Quality of cement.

b) Give brief requirement of intermediate industries involved in upgradation of mineral before end use.

No intermediate industry involved.

c) Give details requirement for other industries, captive consumption export associated industrial use

The mined Shale-Siltstone will be transported by tippers to the Company's existing crushing unit in NW side. After crushing, it will be sent to the cement plant located at Chattak, Sunamganj District, Bangladesh, through a 17 km long elevated Long Belt Conveyor (LBC) 7 km of which lies in the territory of India and remaining in Bangladesh.

d) Indicated precious physical and chemical specification stipulated by buyers

The Shale-Siltstone will be used in cement manufacturing as additive and the minerals will be dispatch to the crusher located outside the lease area. No specific requirement proposed by the end user.

e) Give details of processes adopted to upgrade the ROM to suit the user requirement

The lessee will dispatch the mineral in ROM form.

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9.0 PROCESSING OF ROM AND MINERAL REJECTS

No process takes place at mine site.
The ROM mineral is being dispatched to the consumers.

a) If processing/ beneficiation of the ROM or Mineral Rejects is planned to be conducted, briefly describe nature of processing/ beneficiation.

Not Applicable.

b) Give a material balance chart with a flow sheet or schematic diagram of the processing procedure indicating feed, product, recovery and its grade at each stage of processing

Not applicable.

c) Explain the disposal method for tailings or reject from the processing plant

Not applicable

d) Quantity and quality of tailing/ rejects proposed to be disposed

Not applicable.

e) Specify quantity and type of chemicals if any to be used in the processing plant

Not applicable

f) Specify quantity and type of chemicals to be stored

Not applicable

g) Indicate quantity (Cu. M per day) of water required for mining and processing and sources of supply of water, disposal of water and extent of recycling.

Around 2 Cu. M. water required for mining for drinking and other purpose.
Drinking water will be sourced from nearby tube well
Water for other purposes will be sourced from the siltation tank.

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10.0 OTHERS

a) Site services

The Shella Shale-Siltstone mine is nearby to the Nongtrai Limestone Mine. All the site services like Mine office, workshop, rest shelters, kitchen etc. will be available for use for this mine.

b) Employment Potential

Sl. No	Name of Post	Nos
1.	Mine Manager	1
2.	Mining Engineer	1
3.	Geologist	1
4.	Environment Officer	1
5.	Mine Forman/Mine Mate	2
6.	Mechanical Forman	1
7.	Electrician	1
8.	HVD & LVD, Operator & helpers including Office, Jeep, Medical aid van etc	5
9.	Manual Labour, helpers for Machines, Dumper, plantation, etc	10
	TOTAL	**23**

c) Personal Protective Equipment

1. Safety Helmet- Used for the safety of head
2. Safety Goggles- Used for the safety of Eyes from sun, welding and other flying rock particles
3. Dust Respirators: Used for dust free air at dusty areas in the mine
4. Ear Plugs: Used for protection of air from unwanted sound i.e. noise pollution
5. Safety Belts with Rope- For safety of body which may fall from high faces
6. Hand Gloves- For protection of hand during welding or other hot things/ articles
7. Safety Boots- For protection of foot from fall of Boulder Stone and for safety from injury

d) Other requisite requirements for laborers

1. WC (Latrines and Urinals) one for each and up to 50 laborers. Separate for Male and Females (Section 20 Mines Act, 33 of Mines Rules).
2. Rest Shelter for laborers for taking rest during off hours (Rule 62 of Mines Rules).
3. Water hut for storing of cold water for laborers (at least 2 liters for each labor for drinking purpose) (Section 19 Mines Act, 30 of Mines Rules).
4. First Aid Boxes in sufficient numbers (Section 21 of Mines Act).

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11.0 ENVIRONMENT ASSESSMENT AND ENVIRONMENT MANAGEMENT PLAN

a) Measure taken and to be taken for protection of environment in and around the lease area

- Existing

  The existing environment has been elaborated in the REIA enclosed.

- Proposed:

  The pit roads etc are observed in the lease area. No tree will destroy by proposed mining activities. For protection of environment and improving the aesthetic beauty of the area following measures will be provided:

  The mining will be systematic and scientific in supervision of technical staff.

  The stack will be at proper place as suggested and fully stabilized as proposed.

  The plantation between tar road and mine site and along the lease area will improve the environment.

  The land use by mining is as follows:

All figures in hectares

S.No.	Item	As on date	End of 5th year	End of lease
1	Area to be excavated	1.00	2.66	3.55
2	Storage of top soil	0.00	0.04	0.00
3	Overburden dump	0.00	0.00	0.00
4	Mineral/Sub-grade stack	0.00	0.00	0.00
5	Infrastructure	0.00	0.01	0.01
6	Roads	0.110	0.11	0.11
7	Green belt	0.22	0.44	0.60
8	Reclamation	0.00	0.0	0.0
9	Others	0.00	0.00	0.00
	Total Disturbed land	1.33	3.26	4.27

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- Flora and Fauna

  The Areca catechu, wild banana, Bambusa species, Duabanga nudiflora, Wallchia densiflora, litchi chinensis, Mangifera indica, Artocarpus integrifolia, Albezia procera, Toona species, Alstonia Scholaris, Tetrameles nudiflora, etc. are some of the common species. The study indicates the area does not have rare and endangered species. (Annexure)

  The fauna found as live stock and the rarely appearance of wild animals like Monkeys, Squirrels etc, which will not be affected by mining activities. The flora of the area will improve by proposed plantation.

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The barbed wire fencing will be provided around the excavation to check the inadvertent entry of human and live stock and fauna. In absence of wild fauna no adverse impact will encounter thus no measures are proposed.

- Climatic Conditions

Climate of the area is semi arid zone type. The average rain fall remains around 10000 mm per year to 12000 mm per year. The maximum, mean and lowest temperature remain around 34°C, 24°C and 4°C. Maximum precipitation takes place during month of July and August. The hottest months are May and June and coldest are of December and January.

- Public buildings, Places of Worship and Monuments

No such things are observed in and near the lease area thus no measures are proposed.
The roads, highway observed in 5 kilometres periphery of the applied lease area are illustrated on plate-2

- Human Settlements

No human settlement observed in the lease area. Nearest village is Shella. The main vocation of the habitants is agriculture. The habitants also have job at nearby mines and nearby towns.

b) Measure taken and to be taken for dumping overburden, stacking of top soil and utilization of top soil

The excavated minerals will be dispatch in ROM form. The whole excavated minerals will dispatch. No sorting takes place at site.

Waste dump and stabilization

No waste will generate at site.
Thus, no measures are proposed.

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Top soil

No separate soil is observed in the lease area.
The soil may come across in thin layer somewhere at surface.
It will be scraped and stacked separately to be used for plantation during the monsoon.
Thus, there will be no permanent stack of soil.

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c) Measures taken and to be taken for control of water, noise and air pollution

- **Water:**
  - The general ground level near the lease area (outside the lease area) is around 30 mRL. towards SE side.
    Minimum depth of water table is 49.21m and maximum depth is 50.83m as per observation from Piezometer monitoring of ground water table at the eastern side of the lease area at transit house.
    Proposed workings are far above to this level of ground water table, thus ground water table will not intersect in workings at any stage.

  - Dewatering:
    During monsoon the rain water of direct precipitation will collect in the working pits. The monsoon water of upper altitude side may also collect in the pit.
    A drain will be provided towards higher altitude side of the pit to divert the rain water away from the pit.
    The dewatering will be done through a sump made in the bottom of the pit and through a water tank/siltation tank at surface. Thus the silt will be checked and not allow to spread in the nearby area of lower altitude side and in agriculture lands.

  - The drinking water will be analyzed once in six months for quality. The source of drinking water is tube well, which are away from the area and thus do not get any adverse effect from mining.

- **Air**
  Present air is fresh and healthy as no mining activities are presently being done.
  The magnitude of air pollution in a mine varies with method of mining, type of mineral, level of mechanization and beneficiation of mineral. The gaseous pollution in the mine is due to emissions from diesel engines, transport vehicles. The dust pollution is due to movement of mine machineries etc, and vehicular movement. The dust once allowed to go into atmosphere cannot be controlled. Hence, it is necessary to suppress and minimize the dust at its generating point/source by water sprinkling etc and will be maintained as per guidelines of MSPCB.

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- **Measures proposed:**

Water pollution

1. Outmost precaution will be taken that workings should not intersect the water table.
2. In case of intersection with ground water table, the lessee will immediately inform to the concerned authorities.
3. Before monsoon arrival, all drains must be cleaned for proper flow of water.
4. Regular cleaning of sump and surface tank for proper dewatering.
5. Proper maintenance of dewatering pump.
6. The drinking water will be analyzed twice in one year for quality i.e. the source of drinking water will be tube well and hand pumps.

Dust pollution

1. Sharp drill bits are used and the drilling machine is kept leakage proof. Dust extractor will be provided in drill machine.
2. Controlled blasting is proposed only on hire requirement after taking permission from DGMS and other local authorities. Water Sprinklers provided over haul road to control the fly of dust.
3. All the haul roads will be kept wide, leveled and compact. Regular water Sprinklers should be done on road from site to tar road once or twice in a day especially during dry season to check the generation of dust during vehicular movement.
4. The green belt as shown on plate 6 in and near the lease area will minimize dispersion of dust in nearby area. The proposed plantation is illustrated on the plan.
5. The proposed plantation along both sides of haul road from tar road and between tar road and mine site will also check the spread of dust in nearby area.
6. Monitoring in six months is proposed for assessment of impact for generation of dust due to vehicular movement, drilling, blasting and loading etc. and measures should be adopted to minimize the gaseous pollution.

Gaseous Pollution

1. The emissions from diesel engines will be minimized by proper maintenance of all diesel operated mine machineries like diesel engines, D.G sets and transport vehicles.
2. The gaseous pollution due to blasting is for a short duration. The gases are diluted by wind in a short period in opencast mining.
3. All the machineries like compressor, trucks should be operated by trained operators.
4. Gaseous pollution from diesel engines is proposed to minimize by using good quality of silencers.
5. Monitoring in one year is proposed for assessment of impact due to vehicular movement and measures should be adopted to minimize the gaseous pollution.

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Noise Pollution

1. The adequate silencers will be provided in diesel operated mine Machineries and trucks and tractors
2. Compact and leveled haul road are proposed for smooth running of transport vehicles
3. The transport vehicles should be filled up to rated capacity of the vehicle to minimize the noise
4. The shrubs and bushes located in the area and proposed plantation will check the propagation of noise.
5. The bumps on haul/ approach roads are proposed to remove time to time. The voids on haul roads are proposed to fill by waste and leveled time to time.

- **Personal protective equipment:**
  The safety helmet, safety shoes, safety belts will be provided to the labourers. The ear plugs/muffs will be provided to the workers who will work near the noise creating machines.

d) Contribution Regarding the Social Development of the Nearby Residents

There is no impact of mining on local residents of the area as habitation is away from the applied lease area. The maximum persons will be employed from nearby villages. There is no source of employment in nearby area and thus the employment will develop by the proposed mining activity in nearby area. The applicant/lessee will help in maintenance of village kacha roads with request of local bodies. The lessee will provide maximum assistant to local body on their request. The lessee will develop the plantation along the roads. The lessee will contribute some funds from the income and the fund will be used only for the social development of the people in the field of Education and medical,

e) Details Of Health Checkup And Insurance Of All The Employed Persons (For Existing Lease)

Periodic health checkup will be provided as per rules. The labour insurance will be provided as per rules.

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12.0 PROGRESSIVE MINE CLOSURE PLAN UNDER RULE 19 (1) (g) OF MMMCR 2016.

12.1 Environment Base Line Information's:

The present degradation of land is as follows:

All figures in hectares

S.No	Item	As on date
1	Area to be excavated	1.00
2	Storage of top soil	0.00
3	Overburden dump	0.00
4	Mineral/Sub-grade stack	0.00
5	Infrastructure	0.00
6	Roads	0.110
7	Green belt	0.22
8	Reclamation	0.00
9	Others	0.00
	Total Disturbed land	1.33

a) Water Regime:

No water reservoir or perennial stream etc observed in the lease area. Umiam river is 480 meters SE of the Mining Lease.

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b) Quality of air:

The lease area is away from the habitation. Presently in absence of workings the air pollution is within limits.

c) Ambient Noise Level:

The noise level in the lease area is within the prescribed limit as there is no working in the lease area.

d) Flora and fauna:

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The Areca catechu, wild banana, Bambusa species, Duabanga nudiflora, Wallchia densiflora, litchi chinensis, Mangifera indica, Artocarpus integrifolia, Albezia procera, Toona species, Alstonia Scholaris, Tetrameles nudiflora, etc. are some of the common species. The study indicates the area does not have rare and endangered species. (Annexure)
The fauna found as livestock and the rarely appearance of wild animals like Monkeys, Squirrels etc, which will be not affected by mining activities.

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e) Climatic Conditions:

Climate of the area is semi arid zone type. The average rain fall remains around 10000mm per year to 12000mm per year. The maximum, mean and lowest temperature remain around 34°C, 14°C and 4°C. Maximum precipitation takes place during month of July and August. The hottest months are May and June and coldest are of December and January.

f) Human Settlement:

No human settlement observed in the lease area. Nearest village is Shella. The main vocation of the habitants is agriculture. The habitants also have job at nearby mines and nearby towns.

g) Public building, place of worship and monuments

No such things are observed in and around the lease area. The other things observed in five kilometers periphery is illustrated on plate-2

h) Indicate any sanctuary is located in the vicinity of leasehold

No sanctuary etc observed in the vicinity of the lease area.

12.2 Impact Assessment:

The land of the lease area will degrade by excavation and roads.

a) The infrastructure, roads, workings etc will be come across during the period of the mining plan. Thus, the fresh area will degrade by proposed workings.

The land use at the end of five years will be as follows:

All figures in hectares

S.No.	Item	As on date	End of 5th year
1	Area to be excavated	1.00	2.66
2	Storage of top soil	0.00	0.04
3	Overburden dump	0.00	0.00
4	Mineral/Sub-grade stack	0.00	0.00
5	Infrastructure	0.00	0.01
6	Roads	0.110	0.11
7	Green belt	0.22	0.44
8	Reclamation	0.00	0.0
9	Others	0.00	0.00
	Total Disturbed land	1.33	3.26

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JAIPAL SINGH
RQP/AJM/378/2015/A

b) Air Quality:

The quality of air is likely to be affected by transportation of mineral. The lessees will use rock breakers, pneumatic breakers if required for excavation of mineral.

Water spray is being used over the haul/ approach roads time to time and this practice is proposed to continue in future.

c) Water Quality:

The quality of water is affected by mining if ground water comes across in mining.

There is a high gap between the level of ground water and the depth of proposed deepest workings thus ground water will not intersect the workings at any stage.

If ground water is intersected during the course of workings, the lessee will get necessary permission.

d) Noise Level

Diesel operated machineries will create noise in the mining. The following measures are proposed:

High quality silencers will be provided to the diesel operated machineries uses for excavation and loading of mineral. and water pump etc. The approach roads will be provided smooth and wide.

e) Vibration level (due to Blasting)

Blasting is not required therefore no vibration will be experienced.

f) Water Regime:

No perennial water regime is observed in the lease area, however Umiam river is 480 meters SE of the Mining Lease. But no impact is anticipated.

g) Acid Mine Drainage

Not applicable in this mine.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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h) Surface subsidence

It is an opencast mining and no such subsidence will come across by mining.

i) Socio- Economic

The company is doing extensive work under CSR activities in the education and infrastructure development apart from the income generation programs. Nongtrai Limestone Mine is nearby Shella Shale-Siltstone mine, therefore the facilities will be common for both sites. In the health field the company provides a mobile clinic with a doctor, free medicine and free treatment etc. In the field of education the grant of scholarships, equipment in schools, contribution in teachers' salaries, building construction, play grounds etc. Awareness programs for environment etc. are being conducted by the company for the improvement of the socio-economic conditions of an area.

JAIPAL SINGH
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j) Historical Monuments etc

In absence of such monuments in and around the lease area no impact is anticipated.

12.3 PROGRESSIVE RECLAMATION PLAN

The mining is from top to bottom side. The reserves will not exhaust during the period of this mining plan; as reserves will remain alive in the lease at the end of mining plan period. However, if reserve will be exhausted during the lease period, the exhausted benches will be reclaimed by mine rejects, spreading of topsoil and plantation will be done. It is also proposed to convert the pit into a water reservoir.

a) MINED OUT LAND

All figures in hectares

S.No	Item	As on date	End of 5th year	End of lease
1	Degraded area	1.00	2,66	3.55
2	Storage of top soil	0.00	0.04	0.00
3	Overburden dump	0.00	0.00	0.00
4	Mineral/Sub-grade stack	0.00	0.00	0.00
5	Infrastructure	0.00	0.01	0.01
6	Roads	0.110	0.11	0.11
7	Green belt	0.22	0.44	0.60
8	Reclamation	0.00	0.0	0.0
9	Others	0.00	0.00	0.00
	Total Disturbed land	1.33	3.26	4.27

b) TOP SOIL MANAGEMENT

The soil come across during mining will be scraped and stacked separately in 0.01 ha area as shown on plate-5. The soil will be used for plantation in each monsoon.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

c) TAILING DAM MANAGEMENT

In absence of such tailing dams in the lease area and nearby no measures are called for.

d) ACID MINE DRAINAGE

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In absence of acid mine drainage, no management will be anticipated.

e) SURFACE SUBSIDENCE

The lease area will be worked by opencast method. Therefore, no surface subsidence will be encountered.

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The cost required for plantation (with watering, fencing and survival) and waste dump management etc is given below.

The retaining wall is proposed to be constructed during next five years. Pillaring as per the regulations is already in place. The fencing will be provided in non-fenced area. The cost is given below in table.

ITEM	DETAILS	AREA (HECT)	QUANTITY	EXPENDITURE	REMARKS
(A) RECLAMATION AND REHABILITATION OF MINES OUT LAND/AREA	(i) Backfilling	Nil	NA	NA	'Nil' & 'NA" because during the 5 years Plan period, the reserve remains alive.
	(ii)afforestation on backfilled area	Nil	NA	NA	
	(iii) Others (please Specify)eg. Afforestation on exhausted benches	Nil	NA	NA	
	(iv) Pisciculture	Nil	NA	NA	
	(v) converting into water reservoir	Nil	NA	NA	
	(vi)Picnic Spot	Nil	NA	NA	
(B) STABILIZATION & REHABILITATION OF DUMPS (Within Lease)	(i)Terracing	One	-	-	Part of dumping
	(ii) Construction of retaining wall at toe of dump	NA	NA	NA	No dump
	(iii)Construction of settling ponds (Garland drains etc)	Existing	Existing	NA	Periphery of Mine
	(iv)Afforestation on dumps	Nil	NA	NA	Continuous Dumping
(C) REHABILITATION OF BARREND AREA (Within Lease)	(i)Afforestation (Greenbelt building)	0.088 ha Per year	140 trees	42000/-	Along lease boundary and along road
	(ii)Others(Please Specify) Wire Fencing	20 metre Per year	20 running metre per year	10000/-	Around the excavation
(D) ENVIRONMENTAL MONITORING (Core Zone & Buffer Zone separately)	(i)Ambient air quality	Lease area	2 sample per year	6000/-	From lease area
	(ii)Water quality	well	2 sample per year	5000/-	From nearby well
	(iii) Noise Level Survey	Lease area	2 measurements per year	4000/-	Near working pits and hydraulic machineries
	Total	0.088 ha per year. Total 0.44 ha	700 trees; 100 meters wire fencing; 30 samples of air, water and noise (10 each)	67,000/- per year including all (Total for 5 years 335000/-)	

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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

JAIPAL SINGH
RQP/AJM/378/2015/4

f) DISASTER MANAGEMENT PLAN

No landslide and inundation like disaster were come across in this area and nearby the area in past. The workings are proposed from top to bottom by forming proper benches. The proposed workings will be by opencast mining method. Underground mining is not proposed. Face height will be maintained safe. No tailing dam is proposed. Thus high -risk accidents like land slide, subsidence, flood, inundation, fire, seismic activities etc. not come across. Small accidents like fire, explosion in explosives, accident and fall of face like disaster may come across. A firefighting station (sand filled buckets) is proposed at site in the supervision of mines manager and mate. After receiving the information, the officials will reach up the site and will remove men and machineries from the site. Magazine is proposed for storing the explosive and approved boxes are proposed for handling the explosive from magazine to site. Any person, who notices any explosion or accident, should immediately take steps to give warning by suitable mean and at the same time take necessary action for withdrawal of men from the site. He shall also inform the mines manager and other officials without any delay. The persons should be trained properly to handle the situation. Detailed warning system, implementation procedure, emergency control center, shall be maintained at the mine with names of trained persons. Proper arrangements should be made for treatment of injured persons. Firefighting arrangements should be provided at all the prone sites. All the safety equipment should be available at mine site. A vehicle should always remain at site. The lessee is capable to meet any type of risk. Fire tender is available at LUMPL site at a distance of 1.5 km. Dispensary is available at all prominent villages.

The responsible person is as follows:
M/s Lafarge Umiam Mining Private Ltd. (Lessee) and Manager of the mine

g) MINE CLOSURE:
CARE AND MAINTENANCE DURING TEMPORARY DISCONTINUENCE:

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

During any discontinuance, the mining workings will be in the watch of a watchman. Before re-opening the mine, maintenance will be provided to all the machineries deployed at mine. Before the laborers enter the mine, the workings are proposed to be inspected by manager for safety purpose as per Mines Act.

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h) Environmental safeguard:

Systematic workings are proposed keeping in view the conservation of mineral, protection of Environment and safety of human and machineries.

No natural water courses are observed in and near the lease area and no such thing will be obstructed by proposed mining activities. Although no separate soil observed at proposed mining site, however if any soil comes across in thin layer or in cavities, it will be scraped and temporarily stacked separately at proposed site. The soil will be used for plantation during each monsoon. The

JAIPAL SINGH
RQP/AJM/378/2015/A

waste generated during mining will be used in construction and maintenance of approach roads, construction of site services. The lessee will also sell the waste by permit from the concerning department. Rest of the waste will be dumped at proposed site as per the planning.

Regular water sprinkling will be provided over the approach road and all other dust creating points and places to minimize the dust during mining and other operations. Safe blasting as per Mines Act will be conducted by certified blaster by implementing all measures to arrest the fly rock and minimize the ground vibrations. The nearby structures should not be disturbed by blasting. Drilling will be either by wet process or by using dust extractors. In case of deep hole blasting the lessee will take permission from DGMS. For the safety of the laborers the personal protective devices will be provided and proper training will be provided for environment and safety. The height and width of the benches and face slope are proposed as per Metalliferous Mines Regulation 1961. Regular health checkups will be provided with periodically organized occupational health surveillance program for the workers. Insurance/Group insurance will be provided for all laborers as per rules. Vehicular emissions will be checked by adopting good quality of silencers and by maintaining wide and smooth roads. The noise level/pollution will be maintained within the permissible limit. Plantation as per approved planning will be provided in the lease area to increase the aesthetic environment of the lease area and nearby the lease area. The lessee will also follow the conditions imposed in the Environment Clearance for environment protection measures, CER, ESR, CSR etc.

I) FINANCIAL ASSURANCE

Financial assurance as security deposit of Rs 50,000/- (Rupees Fifty thousand only) for a Mining Lease of 4.9 ha area is to be provided to the concerned department as per Meghalaya Minor Mineral Concession Rules 2016.

Authorized Signatory
M/s Lafarge Umiam Mining Private Limited
(Lessee)

Jaipal Singh
RQP/AJM/ 378/2015/A
JAIPAL SINGH
RQP/AJM/378/2015/A

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

भारत सरकार
कोयला और खान मंत्रालय
खान विभाग
भारतीय खान ब्यूरो
खान नियंत्रण एवं खनिज संरक्षण प्रभाग
(मध्य अंचल)

GOVERNMENT OF INDIA
MINISTRY OF COAL & MINES
DEPARTMENT OF MINES
INDIAN BUREAU OF MINES
Mines Control & Conservation of Minerals Division (Central Zone)

सं./No. N-11013/1/MP/2002-CCOM

दिनांक/Dated, the 26/11/2002

To,

Shri S.G. Lyngdoh
Director,
M/s Lum Mawshun Minerals Pvt. Ltd.
Hotel Polo Tower, Oakland Road,
Shillong – 793 001.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Sub. : Approval of Mining Plan for grant of lease submitted under rule 22 of MCR, 1960 for Shellac Shale Siltstone area over an area of 4.9 Hectares situated in District East Khasi Hills, Meghalaya of M/s Lum Mawshun Minerals Pvt. Ltd.

APPROVED

Ref : 1) Your letter No. GM:190:02:Kb:90 dated 16.01.2002 addressed to Controller General.
2) This office letters of even no. dated 9.4.2002.
3. Your letter No. GM:190:02:Kb:BBM dated 03.06.2002 addressed to Controller of Mines I/C MCCM Division.
4. This office letter of even no. dated 02.08.2002.
5. Your letter No. GM:190:02:991 dated 23.08.2002 addressed to Deputy Controller of Mines, IBM, Kolkata.

Sir,

In exercise of the powers conferred by Clause (b) of Sub-Section (2) of Section 5 of Mines & Minerals (Development & Regulation) Act, 1957 read with Government of India Order No. S.O.445(E) dated 28.4.1987, I hereby **approve** the above said mining plan. This approval is subject to the following conditions :-

(i) This mining plan is approved without prejudice to any other laws applicable to the mine/area from time to time whether made by the Central Government, State Government or any other authority.

(ii) It is clarified that this approval of the mining plan does not in any way imply the approval of the Government in terms of any other

6 वी मंजिल, 'डी' ब्लॉक 6th Floor, 'D' Block
इंदिरा भवन, सिविल लाइन्स, नागपुर–440 001
Indira Bhavan, Civil Lines, NAGPUR-440 001
दूरभाष/Phone : 533603, फैक्स/Fax : (0712) 533603
e-mail : comer@ibmmah.nic.in
तार : माइनसबुरो/Gram : MINESBURO

provisions of the Mines and Minerals (Development & Regulation) Act, 1957 or the rules framed there under or any other laws.

(iii) It is further clarified that this approval of the mining plan is subject to the provision of Forest (Conservation) Act 1980, Forest Conservation Rule 1981 and other relevant statutes order and guidelines as may be applicable to the lease area from time to time.

(iv) The mining plan is approved without prejudice to any order or direction from the Court of competent jurisdiction.

(v) Your attention is invited to the Supreme Court interim order in W.P.(c) No.202 dated 12-12-96 for compliance. Approval of mining plan is therefore issued without prejudice to and is subject to the said directions of the Supreme Court.

(vi) The details of grant of the lease by the State Government whenever such an order is passed, may be intimated to the Regional Controller of Mines, Indian Bureau of Mines, Kolkata.

(vii) "Environment Management Plan" covering the data of quality of air, water, soil samples, noise levels, ground vibrations, meteorological data, plantation proposed to be done every year etc. shall be prepared through routine guidelines prescribed by the IBM and shall be submitted to this office for approval before execution of the mining lease and production of shales, siltstone.

(viii) The scientific investigations should be carried out for providing protective measures as management of hill slope alongside border road and a report thereof shall be submitted before the commencement of mining operations.

Yours faithfully,

Encl. : Two copies of approved mining plan

APPROVED

(C.P. Ambesh)
Controller of Mines

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

5/1

Registered AD/E-mail

Telephone : (033) 23673986
(033) 23673618
Fax : (033) 23673617
E-mail : : : ro.kolkata@ibm.gov.in

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES
OFFICE OF THE REGIONAL CONTROLLER OF MINES

No .IBM/GHY/MEG/EKH/LST/MS- 52, VOL-I

CP- 13, Sector V, Salt Lake City
Kolkata 700 091
Date: 14.10.2015

To,
Dr. Ashim Kumar Chattopadhyay, Nominated Owner
Nongtrai Limestone Mine
M/S Lafarge Umium Mining Pvt. Limited
Hotel Polo Towers, Polo Ground
Oakland Road, SHILLONG- 793001
MEGHALAYA– 793001

E-mail ID:achattopadhyay9@gmail.com,amit.dubey@lafarge.com

Sub : Approval of Scheme of Mining in respect of Shella Shale-Siltstone Mine of M/S LUMPL over an area of 4.90 ha. in village Shella, East Khasi Hills district of Meghalaya State, submitted under rule 12 of MCDR, 1988.

Ref: i) Your letter No. NLM/IBM/25/2015 dated 16/04/2015.
ii) This office letter of even no. dated 31/07/2015.
iii) Your letter No. NLM/IBM/88/2015 dated 28/08/2015.
iv) This office letter of even no. dated 24/09/2015.
v) Your letter No NLM/IBM/98/2015 dated 01/10/2015.
vi) This office letter of even no. dated 06/10/2015.
vii) Your letter No NLM/IBM/105/2015 dated 12/10/2015.

Sir,

In exercise of the power conferred by Sub-rule (4) of Rule-12 of Mineral Conservation & Development Rules, 1988, I hereby **approve** the Scheme of Mining including Progressive Mine Closure Plan of Shella Shale-Siltstone Mine of M/S Lafarge Umium Mining Pvt. Limited over an area of 4.90 ha. in village Shella, East Khasi Hills district of Meghalaya State, submitted under rule 12 of MCDR, 1988.This approval is subject to the following conditions:

(i) The Scheme of mining is approved without prejudice to any other law applicable to the mine area from time to time whether made by the Central Government, State Government or any other authority and without prejudice to any order or direction from any court of competent jurisdiction.

(ii) The proposals shown on the plates and/or given in the document is based on the lease map /sketch submitted by the applicant/ lessee and is applicable from the date of approval.

(iii) It is clarified that the approval of aforesaid Scheme of Mining does not in any way imply the approval of the Government in terms of any other provision of Mines & Minerals (Development & Regulation) Act, 1957, or the Mineral Concession Rules, 1960 and any other laws including Forest (Conservation) Act, 1980, Environment (Protection) Act, 1986 or the rules made there under, Mines Act, 1952 and Rule & Regulations made there under.

(iv) Indian Bureau of mines has not undertaken verification of the mining lease boundary on the ground and does not undertake any responsibility regarding correctness of the boundaries of the leasehold shown on the ground with reference to lease map & other plans furnished by the applicant / lessee.

Cont....2...

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(v) At any stage, if it is observed that the information furnished, data incorporated in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.

(vi) If this approval conflicts with any other law or court order / Direction under any statute, it shall be revoked immediately.

vii) The approval of Scheme of Mining is subject to the compliance of Ministry of Mines Notification published in The Gazette of India vide G.S.R. 710 (E) dated 8th October, 2014 regarding construction of boundary pillars and photographs (all pillars) of the same are to be sent by DVD to this office within three months from the date of approval failing which the approval of the document shall be deemed to have been withdrawn. No extension shall be granted.

(viii) Validity of this document shall expire on 31/03/2020.

(ix) Next Financial Assurance shall be due for submission on or before 31/03/2020.

Yours faithfully,

14/10/15

(A.B.PANIGRAHI)
Regional controller of Mines

Encl: One copy of approved Scheme of Mining.

Copy for kind information to:

1. The Director, Department of Mineral Resources, Govt. of Meghalaya, Risa Colony, Shillong –793 003, Meghalaya **along with one copy of approved Scheme Of Mining by REGISTERED PARCEL.**

2. Dr. Ashim Kumar Chattopadhyay, (RQP),M/S Lafarge Umium Mining Pvt Limited, Hotel Polo Towers, Polo Ground, Oakland Road, SHILLONG- 793001, **MEGHALAYA– 793001.**
E-mail ID:achattopadhyay9@gmail.com

(A.B.PANIGRAHI)
Regional controller of Mines

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Lafarge Umiam Mining Pvt. Ltd.

A Joint Venture of LAFARGE and M. CEMENTOS

NLM/IBM/2.1/48A/2009
May 02, 2009

MINE CODE: 77MEG04001

To,
The Controller General,
Indian Bureau of Mines, Indira Bhawan,
Civil lines, Nagpur. - 440001

Sub: Notice of temporary discontinuance of work in Mine under Rule 24(1) of MCDR 88

Dear Sir,

We, Lafarge Umiam Mining Pvt. Ltd. ("LUMPL"), are operating Shale and Siltsone Mine over an area of 4.9 hectares (Mine Code - 77MEG04001) at Shella after obtaining relevant mining concessions and permissions since 22/09/2005. Notice of opening of the said Shale and Siltstone mine in Form C as per Rule 22 of MCDR 1988 was sent to your office vide letter No. NLM/IBM/2.1/85/2005 dated 26/11/2005. Due to certain technical difficulties to work in rainy season and also due to the constrains in system of crushing and transportation and supply of same to the Lafarge Surma Cement Plant based at Chattak, Bangladesh, we have stopped complete mining operation from 21/03/2009 and planning to extend the closure till the complete end of monsoon season in the region. Once we will have the comfort to operate on technical ground, we will reopen the Mine with the prior notice.

In view of this, we are enclosing herewith the Notice of temporary discontinuance of work in Mine in Form D- 1 for our Shale and Siltstone Mine of M/s Lafarge Umiam Mining Pvt. Ltd. as required under the Rule 24 (1) of MCDR 1988

Please acknowledge the receipt for the above.

Thanking you,

Yours Sincerely

For Nongtrai Limestone Mine
M/S Lafarge Umiam Mining Pvt. Ltd.

(Sanjay Kumar)
Agent

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Copy:
1. The Controller of Mines, Central zone, Indian Bureau of Mines, Indira Bhawan, Civil lines, Nagpur.-440001.
2. The Deputy Controller of Mines & Officer-in- charge, Indian Bureau of Mines, CP-13, Sector V Salt Lake City, Kolkatta- 700 091
3. Assistant Controller of Mines and officer- in-charge, Indian Bureau of Mines, 1- A, K.C. Sen Road, Paltan Bazar, Guwahati.
4. The Under Secretary to the Government of Meghalaya, Mining and Geology Deptt. Under Secretary Building, Shillong- 793001
5. The Director of Mineral Resources, Government of Meghalaya, Risa Colony, Shillong- 793003

Head Office : Hotel Polo Tower, Polo Ground, Oakland Road, Shillong 793001, Meghalaya, India Tel: (+91) 3642-501 [illegible] Fax: (+91) 3642-50 [illegible]
Mines Office : Nongtrai-Shella, PO: Shella Bazar-793112, East Khasi Hills, Meghalaya, India Tel: (+91) 3651-[illegible]

GOVERNMENT OF MEGHALAYA

FORM D-1

NOTICE OF TEMPORARY DISCONTINUANCE OF MINE
(See rule 24)

MINE CODE – 77MEG04001

To

1. The Controller General, Indian Bureau of Mines, Indira Bhawan, Civil lines, Nagpur.-440001
2. The Controller of mines, Central zone, Indian Bureau of Mines, Indira Bhawan, Civil lines, Nagpur.-440001
3. The Deputy Controller of Mines & Officer-in- charge, Indian Bureau of Mines, 5th Floor, CP-13, Sector V Salt Lake City, Kolkatta- 700 091 .
4. Assistant Mining Geologist and officer- in-charge, Indian Bureau of Mines, 1-A, K.C. Sen. Road, Paltan Bazaar, Guwahati.
5. The Under Secretary to the Government of Meghalaya, Mining and Geology Deptt. Under Secretary Building, Shillong- 793001
6. The Director of Mineral Resources, Government of Meghalaya, Risa Colony, Shillong-793003

1	i) Name of the mineral worked	:	**Shale- Siltstone**
	ii) Name of other Mineral worked, if any	:	**Nil**
2	Name of the mine	:	**Shale-Siltstone Mine**
3	Name and address of the Lessee/**Owner**	:	**K Swaminathan** **Lafarge Umiam Mining Pvt. Ltd.** **Hotel Polo towers, Polo ground** **Oakland road** **Shillong 793001, Meghalaya**
4	Particulars of the Mining Lease (ML):		
	(i) Date of execution	:	**30th August 2002**
	(ii) Period	:	**30 Years (30th August 2002 to 29th August 2032)**
	(iii) Areas under Mining lease	:	4.9 hectares
5	Location of the mine:		
	(i) Village	:	**Shella**
	(ii) Taluka/Tahsil	:	**Sohra**
	(iii) District	:	**East Khasi Hills**
	(iv) State	:	**Meghalaya**
6	Name and address of Agent:		
	Name	:	**Sanjay Kumar**
	Designation	:	**Agent**
	Address:		**Shella Bazaar, Distt. East Khasi Hills, Meghalaya, 793112**

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

7 Name and address of Mining Engineer

Name	:	Amit Kumar Dubey
Designation	:	**Mining Engineer**
Address	:	**Shella Bazaar**, Distt. **East Khasi Hills, Meghalaya**

8 Date of temporary discontinuance: **21st March 2009**

9 Reason for temporary discontinuance:

1) Lack of Demand: **Not Applicable**
2) Non-Availability of Labor: **Not Applicable**
3) Rains: **Yes**
4) Transport Bottleneck: **Yes, due to technical difficulties during Monsoon**
5) Strike/lockout: **Not Applicable**
6) Operation becoming uneconomic: **Not Applicable**
7) Other Reason (Specify): **Not applicable**

10 Probable date of re-opening of the Mine

We can expect re opening by the end of September 2009.

Place: **Nongtral**
Date: **02.05.2009**

Signature:

Name in full Sanjay Kumar
Designation Agent

...ne Mine Ltd.
...iam Mining Pvt Ltd.
PO - Shella Bazaar, Distt. East Khasi Hills
Meghalaya, 793 112

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

प्रपत्र आई० आर०

Form I. R.

निगमन का प्रमाण पत्र

CERTIFICATE OF INCORPORATION

ता० _____ को० सं० _____

No. 13-05707 of 19 98-1999

मैं एतद्द्वारा प्रमाणित करता हूं कि आज _____

कम्पनी अधिनियम 1956 (1956 का 1.) के अधीन निगमित की गई है और कम्पनी परिसीमित है।

I hereby certify that LAFARGE UMIAM MINING PRIVATE LIMITED

is this day incorporated under the Companies Act, 1956 (No. 1 of 1956) and that the Company is limited.

मेरे हस्ताक्षर से आज ता० _____ को दिया गया

Given under my hand at SHILLONG this 22nd (Twentysecond day of MARCH One thousand nine hundred and NINETY-NINE

(S. R. KOM)

कम्पनियों का रजिस्ट्रार

Ragistrar of Companies

Assam, Meghalaya, Manipur, Tripura, Nagaland Arunachal Pradesh & Mizoram. Shillong

APPROVED

for Lafarge Umiam Mining (P) L

Authorised Signatory

Mining Engineer

Directorate of Mineral Resources

Meghalaya, Shillong

GOVERNMENT OF MEGHALAYA
DEPARTMENT OF FORESTS AND ENVIRONMENT
OFFICE OF THE PRINCIPAL CHIEF CONSERVATOR OF FORESTS (T): MEGHALAYA

No.MFG.16/18/PCCF (T)/Vol-II/ 6601 Dated Shillong, the 30th August, 2018.

To,

The Operations Director,
M/s Lafarge Umiam Mining Pvt. Ltd,
Hotel Polo Tower, Oakland, Shillong
East Khasi Hills District,
Meghalaya, Shillong-793001.

Sub: NOC for forest clearance for 13 ha of proposed shale mining at Mawiong, Shella of M/s Lafarge Umiam Mining Private Limited.

Sir,

With reference to the above, I am to inform you that vide your application dated 30.03.2017, the area of 12.423 ha for shale mining at Mawiong, Shella, is considered as forest land, as per record.

This is for favour of your information and necessary action.

Yours faithfully,

(P.S. NONGBRI, IFS)
Conservator of Forests (T),
Khasi & Jaintia Hills,
Meghalaya, Shillong.

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

MK/-

Sylvan House, Lower Lachumiere
Shillong 793001
Phone: 91 364 2220414
Fax: 91 364 2504068

GOVERNMENT OF MEGHALAYA
MINING AND GEOLOGY DEPARTMENT
***

NO.MG.29/2000/343 Dated Shillong, the 9th December, 2011.

From : Shri.C.K.Marak,
Under Secretary to the Govt. of Meghalaya,
Mining and Geology Department.

To : The Director of Mineral Resources,
Meghalaya, Shillong.

Sub : Mining Lease on Shale/Siltstone over an area of 4.90 hectares at Shella, East Khasi Hills District in respect of M/S Lafarge Umiam Mining Private Limited.

Ref : Letter No.DMR/MM/563/02/1435 dated 22.7.2011

Sir,

In pursuance of the powers conferred under Section 4 A (4) of the Mines and Minerals (Development & Regulation) Act, 1957 read with Rule 28 (1) of the Mineral Concession Rules, 1960, the State Government do hereby declare the Mining Lease on Shale/Siltstone over an area of 4.90 hectares at Shella, granted to M/S Lafarge Umiam Mining Private Limited as lapsed with effect from 21st March, 2011.

Yours faithfully,
Sd/-
(C.K.Marak)
Under Secretary to the Govt. of Meghalaya,
Mining and Geology Department

APPROVED

Memo No.MG.29/2000/343-A Dated Shillong,the 9th December, 2011.

Copy to :-

1. The Deputy Commissioner, East Khasi Hills District, Shillong for information.
2. M/S Lafarge Umiam Mining Private Limited, Hotel Polo Towers, Shillong for information.

By Order Etc.,

Under Secretary to the Govt. of Meghalaya,
Mining and Geology Department

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

GOVERNMENT OF MEGHALAYA
MINING AND GEOLOGY DEPARTMENT
***

NO.MG.29/2000/344 Dated Shillong, the 9th December, 2011.

From : Shri.C.K.Marak,
Under Secretary to the Govt. of Meghalaya,
Mining and Geology Department.

To : The Director of Mineral Resources,
Meghalaya, Shillong.

Sub : Mining Lease on Shale/Siltstone over an area of 4.90 hectares at Shella, East Khasi Hills District in respect of M/S LUMP Limited.

Ref : Letter No.DMR/MM/563/02/1435 dated 22.7.2011.

Sir,

With reference to the subject cited above, I am directed to convey the approval of the Government to the proposal for reviving the mining lease on Shale/Siltstone over an area of 4.90 hectares at Shella, East Khasi Hills District granted to M/S Lafarge Umiam Mining Private Limited with effect from the date of its lapse i.e. 21st March, 2011 for the remaining term of the lease in terms of second proviso to section 4 A (4) of the Mines and Minerals (Development & Regulation) Act, 1957 read with proviso to Rule 28 (4) of the Mineral Concession Rules, 1960.

Yours faithfully,

Sd/-

(C.K.Marak)
Under Secretary to the Govt. of Meghalaya,
Mining and Geology Department

Memo No.MG.29/2000/344-A Dated Shillong,the 9th December, 2011.

Copy to :-

1. The Deputy Commissioner, East Khasi Hills District, Shillong for information.
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By Order Etc.,

APPROVED

Under Secretary to the Govt. of Meghalaya,
Mining and Geology Department

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

O/C

Lafarge Umiam Mining Pvt. Ltd.

A company of LAFARGE and CEMENTOS MOLINS

NLM/IBM/14/2016

Dated: 12.01.2016

To,
The Regional Controller of Mines,
Indian Bureau of Mines
CP-13,Sector V, Salt Lake City
Kolkata: 700091

Sub: Construction of Boundary Pillars in respect of Shella Shale-Siltstone over an area of 4.90 Hect of M/s Lafarge Umiam Mining Pvt. ltd. in village Shella, district East Khasi Hills, state Meghalaya.

Reference: vide your letter no IBM/GHY/MEG/EKH/LST/MS-52, VOL-I dated 14.10.2015

Dear Sir,
With reference to the approved Scheme of Mining vide letter no IBM/GHY/MEG/EHK/LST/MS-52, VOL-I, dated 14th October 2015 as per condition (vii) regarding construction of boundary pillars, we are pleased to inform that we have completed the construction of boundary pillars at Shella Shale-Siltstone over an area of 4.90 Hect of M/s Lafarge Umiam Mining Pvt. Ltd in compliance to the condition and notification published in the Gazette of India vide G.S.R.710 (E) dated 8th Oct, 2014.

The Photograph of all the boundary pillars (32 nos.) is enclosed in DVD for your reference.

We hope that you will find the above in order

Thanking you,

Yours faithfully,
For Lafarge Umiam Mining Pvt. Ltd.

(Pramod Kumar Singh)
Mines Manager
Shella Shale-Siltstone Mine

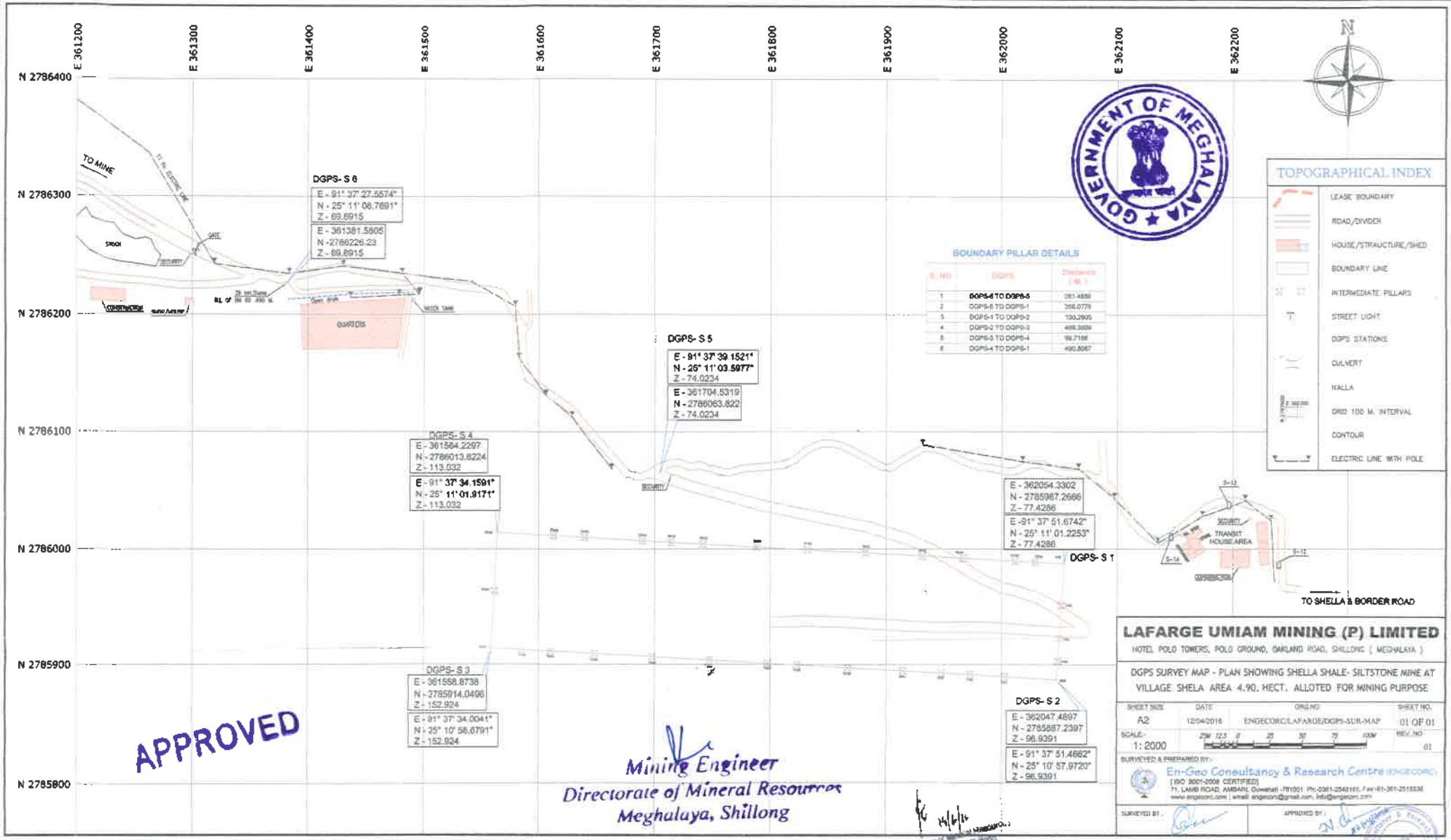
Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Encl.: As above.

APPROVED

CC to:

1. The Junior Mining Geologist & Office In-Charge, Indian Bureau of Mines, Guwahati.
2. The Director, Department of Mineral Resources, Govt. of Meghalaya, Shillong.


E 361200
E 361300
E 361400
E 361500
E 361600
E 361700
E 361800
E 361900
E 362000
E 362100
E 362200
N 2786400
N 2786300
N 2786200
N 2786100
N 2786000
N 2785900
N 2785800
N
TO MINE
SHED
GATE
SECURITY
QUARTERS
DGPS- S 6
E - 91° 37' 27.5574"
N - 25° 11' 06.7891"
Z - 69.6915
E - 361381.5805
N - 2786226.23
Z - 69.6915
DGPS- S 5
E - 91° 37' 39.1521"
N - 25° 11' 03.5977"
Z - 74.0234
E - 361704.5319
N - 2786063.822
Z - 74.0234
DGPS- S 4
E - 361564.2297
N - 2786013.8224
Z - 113.032
E - 91° 37' 34.1591"
N - 25° 11' 01.9171"
Z - 113.032
DGPS- S 3
E - 361558.8738
N - 2785914.0496
Z - 152.924
E - 91° 37' 34.0041"
N - 25° 10' 58.6791"
Z - 152.924
DGPS- S 2
E - 362047.4897
N - 2785887.2397
Z - 96.9391
E - 91° 37' 51.4662"
N - 25° 10' 57.9720"
Z - 96.9391
DGPS- S 1
E - 362054.3302
N - 2785987.2666
Z - 77.4266
E -91° 37' 51.6742"
N - 25° 11' 01.2253"
Z - 77.4266
TRANSIT HOUSE AREA
TO SHELLA & BORDER ROAD
BOUNDARY PILLAR DETAILS
S. NO. | DGPS | Distance (M.)
1 | DGPS-6 TO DGPS-5 | 281.4886
2 | DGPS-5 TO DGPS-1 | 356.0778
3 | DGPS-1 TO DGPS-2 | 100.2905
4 | DGPS-2 TO DGPS-3 | 489.3009
5 | DGPS-3 TO DGPS-4 | 99.7188
6 | DGPS-4 TO DGPS-1 | 490.8067
TOPOGRAPHICAL INDEX
LEASE BOUNDARY
ROAD/DIVIDER
HOUSE/STRAUCTURE/SHED
BOUNDARY LINE
INTERMEDIATE PILLARS
STREET LIGHT
DGPS STATIONS
CULVERT
NALLA
GRID 100 M. INTERVAL
CONTOUR
ELECTRIC LINE WITH POLE
GOVERNMENT OF MEGHALAYA
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Meghalaya, Shillong
LAFARGE UMIAM MINING (P) LIMITED
HOTEL POLO TOWERS, POLO GROUND, OAKLAND ROAD, SHILLONG (MEGHALAYA)
DGPS SURVEY MAP - PLAN SHOWING SHELLA SHALE- SILTSTONE MINE AT VILLAGE SHELA AREA 4.90. HECT. ALLOTED FOR MINING PURPOSE
SHEET SIZE A2
DATE 12/04/2016
DRG.NO ENGECORC/LAFARGE/DGPS-SUR-MAP
SHEET NO. 01 OF 01
SCALE:- 1: 2000
REV. NO 01
SURVEYED & PREPARED BY:-
En-Geo Consultancy & Research Centre (ENGECORC)
(ISO 9001-2008 CERTIFIED)
71, LAMB ROAD, AMBARI, Guwahati -781001 Ph:-0361-2540165, Fax-91-361-2515538
www.engecorc.com | email: engecorc@gmail.com, info@engecorc.com
SURVEYED BY :
APPROVED BY :

RAPID
ENVIRONMENT IMAPCT ASSESSMENT

OF

SHELLA SHALE - SILTSTONE MINE

TAH – PYRKAM, DISTRICT – EAST KHASI HILLS; MEGHALAYA
AREA – 4.90 Ha.

PROJECT PROPONENT
M/S LAFARGE UMIAUM MINING PVT. LTD
Hotel Polo Towers, Polo Ground
Oakland Road- SHILLONG, MEGHALAYA 793001

Prepared by
Anacon laboratory
NAGPUR

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

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1.0 BASELINE ENVIRONMENT

The baseline environment quality represents the background environmental scenario of various environmental components such as air, water, noise, land, and socio economic status of the study area.

1 MICRO METEOROLOGY OF THE STUDY AREA

Regional Meteorology

The climate of the study area is humid and sub tropical where seasons can be classified as summer (March - April), pre monsoon (May – mid June); peak monsoon (mid June - October); post monsoon (October – November) and winter (December - February). The annual rainfall from IMD Cherrapunjee is given in **Table 1.1.** To the north on higher elevations, the Cherrapunjee Mawsynram belt of Khasi Hills has the distinction of having the World's heaviest rainfall of 12000 mm per year.

TABLE 1.1

Cherrapunjee's Rainfall Data (in mm)

Particulars / Month	37 Yr Avg (1973-2009)	2007	2008	2009
January	14.9	0.0	47.9	0.0
February	71.1	131.4	54.0	100.4
March	320.1	21.6	570.3	85.8
April	830.0	800.3	509.3	636.2
May	1330.0	1081.3	400.7	1003.2
June	2475.4	2601.0	2092.6	1229.8
July	3167.5	4132.8	3615.8	2513.0
August	1831.1	973.6	2966.4	2424.6
September	1199.7	1958.0	789.3	641.1
October	531.2	728.4	368.3	360.6
November	65.9	218.4	0.0	5.2
December	22.8	0.0	0.0	0.0
Annual Total	**11859.7**	**12646.8**	**11414.6**	**9069.9**

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The climate is controlled by seasonal winds viz., south-west monsoon and the north-east winter winds. The atmosphere gradually warms up during March and April and the maximum temperature in summer reaches 35°C by mid April to mid May. The rainy season persists from May to October, although intermittent showers accompanied by storm are experienced in March and April. After November winter sets in and continues up to February. Occasional light rain and drizzles take place in winter and the temperature falls to a minimum of 8° - 10°C.

B Site Meteorology

An automatic weather monitoring station has been installed near to the Mine site to record micro meteorological data on Wind Speed (kmph), Wind Direction, Ambient Temperature (°C), Relative Humidity (%), and Rain fall (mm), Atmospheric pressure (mb) on hourly basis. Summary of the meteorological data is given in **Table 1.2.**

TABLE 1.2
SUMMARY OF THE METEOROLOGICAL DATA AT SITE

MONTH	TEMPERATURE (°C)		RELATIVE HUMIDITY (%)		ATMASPHERIC PRESSURE (mb)		RAINFALL mm
	Max	Min	Max	Min	DAY	Evening	Total
March, 2010	28.3	9.3	55	85	865.3	966.2	808
April, 2010	26.4	10.9	60	90	864.2	870.3	2734.5
May, 2010	25.6	14.1	60	85	860.8	869.2	1337.8

Percentage frequencies of wind in 16 directions have been computed from the recorded data of study period (Pre Monsoon' 10) covering March' 2010 to May' 2010. During the study period the wind roses were plotted at an interval for hourly **Fig - 1.1** represents the wind pattern of the study period. The predominant wind direction and wind speed observed at the project site during the study period were N and NNE for 34.2 %, and 14.9 % of the total time with calm 4.1%. The winds in other direction are NE (5.1 %), ENE (3.9%), E (7.3%), ESE (2.4%), SE (3.3%), SSE (2.8%), S (1.8%), SSW (1.8%), SW (2.2%), WSW (1.7%), W (1.3%), WNW (5.7%), NW (3.8%) and NNW (3.7 %).

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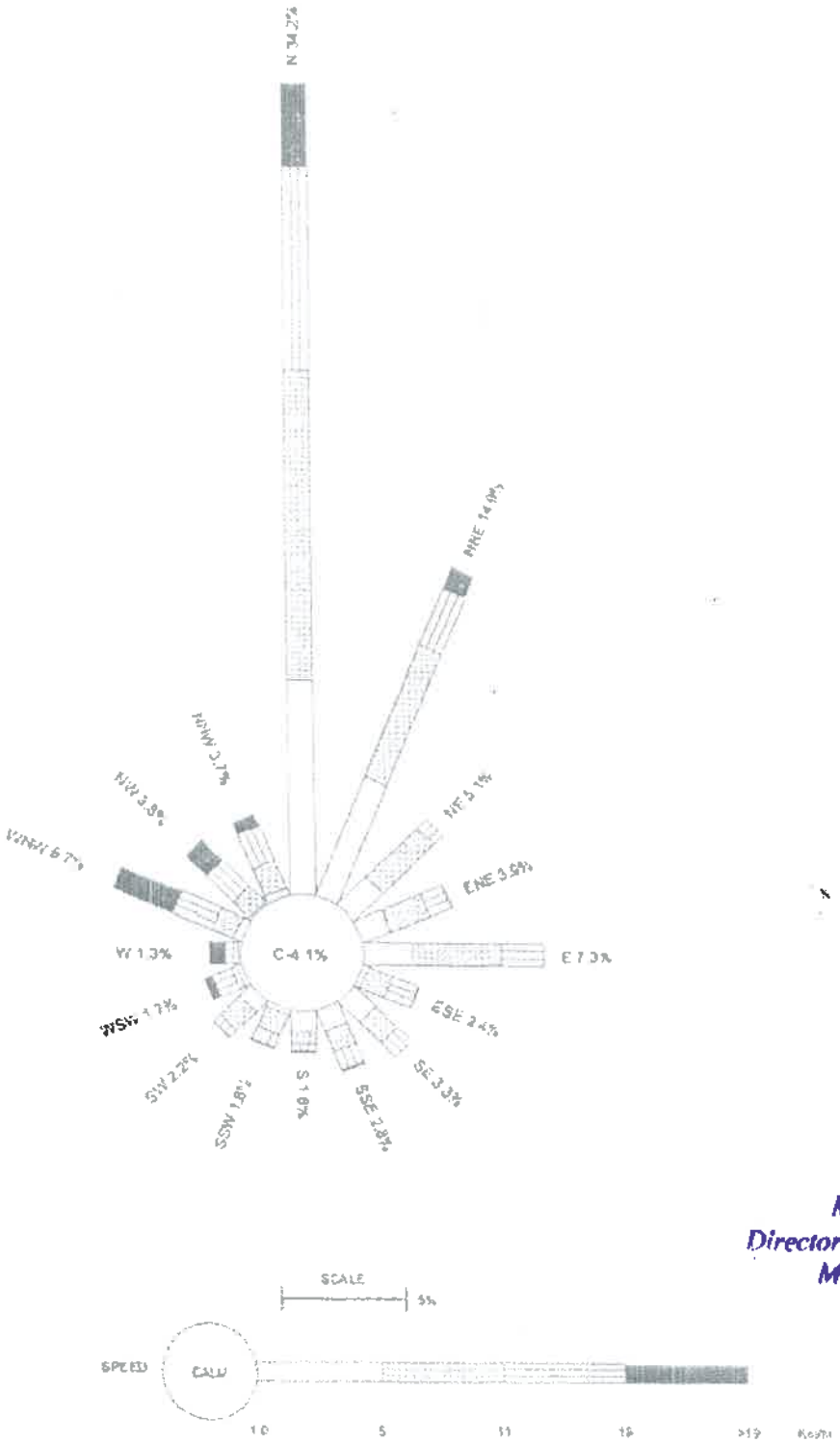

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Figure-1.1
Windrose – Site Specific (Summer Season)

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1.2 AMBIENT AIR QUALITY

In order to identify the background air quality data and also to represent the interference from various local activities, screening techniques have been used for identification of air quality stations in the study area.

The air pollution-monitoring network was designed to know the complex environmental scenario that exists as of now which would serve as baseline information prevailing in the area.

A Identification of Ambient air Quality Monitoring Stations:

Ambient air quality of the study area has been assessed through a network of 6 stations. These stations are designed keeping in view of the climatological conditions of the study region.

Fig – 1.2 shows the locations of the air quality stations in the study area. The following **Table – 1.3** gives the details of ambient air quality locations:

TABLE – 1.3
AMBIENT AIR QUALITY MONITORING STATIONS

S.No.	Station	Code	Distance From The Mine Site (Km)	Direction wrt Mine Site
1	Proposed Mine site	A-1	-	-
2	Shella Bazar	A-2	1.2	E
3	Phalangkaruh	A-3	1.3	SW
4	Pyrkan	A-4	0.8	E
5	Dishong	A-5	1.5	NW
6	Nongtrai	A-6	3.0	WNW

The above monitoring stations are located such that a representative background ambient air quality levels are obtained.

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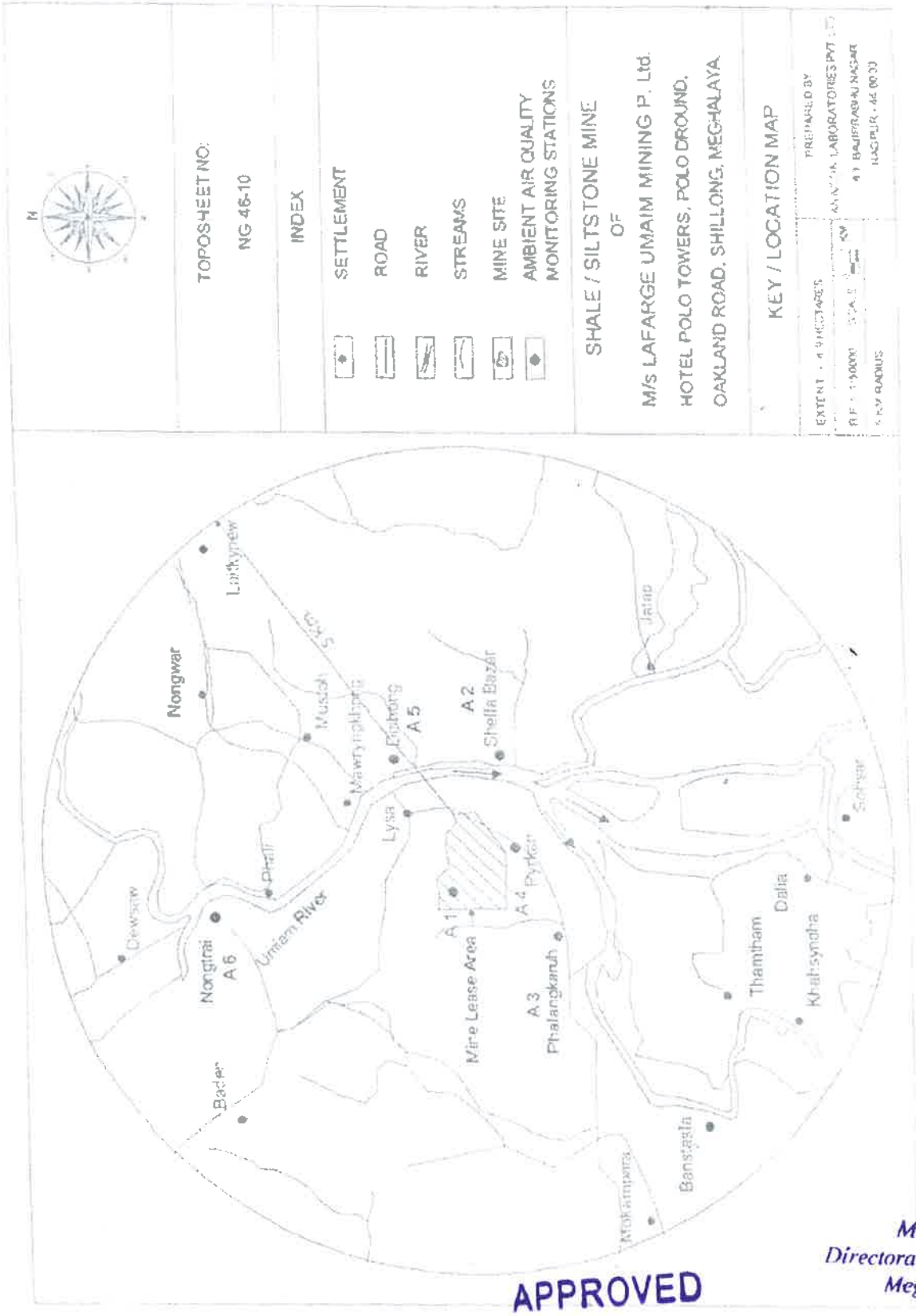

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FIG 1.2
AMBIENT AIR QUALITY SAMPLING LOCATIONS

ANALYSIS OF BASELINE CONCENTRATIONS

Observations of Primary Data

The minimum and maximum concentrations for PM_{10} was recorded as 15 µg/m³ and 43 µg/m³ respectively. The maximum concentration was recorded at Shella bazar the minimum concentration was recorded at Phalangkaruh and Nongtrai villages. The average concentrations were ranged between 25 to 34 µg/m³.

The minimum and maximum concentrations for $PM_{2.5}$ were recorded as 9 µg/m³ and 26 µg/m³ respectively. The maximum concentration was recorded at Shella bazar and the minimum concentration was recorded at Nongtrai. The average concentrations were ranged between 15 to 20 µg/m3.

The minimum and maximum SO_2 concentrations was recorded as 4.0 µg/m³ and 12 µg/m³ respectively. The average concentrations were ranged between 6 to 8 µg/m³.

The maximum concentration of 18 µg/m³ for NOx was recorded. The average concentrations were ranged in between 12 µg/m³ and 13 µg/m³.

CO levels were recorded < 100 µg/m³ within the study area.

The status of ambient air quality within the study area monitored for March 2010 to May 2010 is presented in **Table 1.4.**

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TABLE – 1.4
Summary of Ambient Air Quality (µg/m³)

Avg: 24 hrs.

Sr. No.	Location	PM_{10} (µg/m³)				$PM_{2.5}$ (µg/m³)			
		Min	Max	Avg	98th %le	Min	Max	Avg	98th %le
1.	Proposed Mine site	20	35	28	35	12	21	17	21
2.	Shella Bazar	25	43	34	43	15	26	20	26
3.	Phalangkaruh	15	32	26	32	9	19	15	19
4.	Pyrkan	20	36	27	36	12	22	17	22
5.	Dishong	18	37	27	37	11	22	16	22
6.	Nongtrai	15	34	25	34	9	20	15	20

TABLE-1.4 (CONT...)

Sr. No.	Location	SO_2 (µg/m³)				NOx (µg/m³)			
		Min	Max	Avg	98th %le	Min	Max	Avg	98th %le
1.	Proposed Mine site	4	12	8	12	9	18	13	18
2.	Shella Bazar	4	10	7	10	9	15	12	15
3.	Phalangkaruh	4	11	8	11	8	17	12	17
4.	Pyrkan	4	12	8	12	9	17	12	17
5.	Dishong	4	10	7	10	9	16	12	16
6.	Nongtrai	4	9	6	9	9	15	12	15

C DUST FALL DATA

Dust fall measurement of the study area has been assessed during Summer-2010 through a network of three stations. The locations of dust fall stations are given **Table – 1.5.** and results are shown in **Table – 1.6.**

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Directorate of Mineral Resources
Meghalaya, Shillong

Table – 1.5

Monitoring locations of Dust fall measurement

Station Code	Locations	Distance From The Mine Site (Km)	Direction vrt Mi .e Site
DFM-1.	Proposed mining lease area	---	---
DFM-2.	Shella Bazar	1.6	E
DFM-3.	Nongtrai	3.0	NW

The following table shows the summary of the dust fall monitored at various locations during the study period.

Table 1.6

Summary of Dust Fall

STATION CODE	LOCATION	DUST FALL T/Km²/month
DFM-1.	Proposed mining lease area	1.2
DFM-2.	Shella Bazar	0.9
DFM-3.	Nongtrai	0.5

1.3 NOISE ENVIRONMENT

The acoustical environment varies dynamically in magnitude and character through out most communities. The noise level variation can be temporal, spectral and spatial. The residential noise level is that level below which the ambient noise does not seem to dropdown during the given interval of time and is generally characterized by unidentified sources. Ambient noise level is characterized by significant variations above a base or a residential noise level. The maximum impact of noise is felt on urban areas, which is mostly due to the commercial activities and vehicular movement during peak hours of the day.

Measured noise level displayed as a function of time provides a useful scheme for describing the acoustical climate of a community. Noise levels recorded at each station with a time interval of about 30 minutes are computed for equivalent noise levels. Equivalent noise

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Directorate of Mineral Resources
Meghalaya, Shillong

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level is a single number descriptor for describing time varying noise levels. The equivalent noise level is defined as mathematically

$$10 \text{Log} 1/T \Sigma (10^{Ln/10})$$

where L = sound pressure level a function of time dB (A)
T = Time interval of observations

Noise levels during the night time generally drop, therefore to compute Equivalent noise levels for the night time, noise levels are increased by 10 dB (A) as the night time high noise levels are judged more annoying compared to the day time.

Noise levels at a particular station are represented as Day-Night equivalent (Ldn). Day-Night equivalent is the single number index designed to rate environmental noise on daily/24 hourly basis. Mathematically Ldn is given by

$$Ldn = 10 \log (1/24 (15 X 10^{(Ld/10)} + 9 X 10^{(Ln+10)/10)})$$

Where
Ld = A weighed equivalent for day time period (6 am to 10 pm)
Ln = A weighed equivalent for night time period (10 pm to 6 am)

NOISE LEVELS MONITORING

Noise levels in buffer zone were measured near residential areas and other settlements located within 10 km radius around the mine area. The noise recording stations at mine area and buffer zone are shown in **Fig- 1.3** and are given in the following **Table – 1.7** and results are shown **Table – 1.8**

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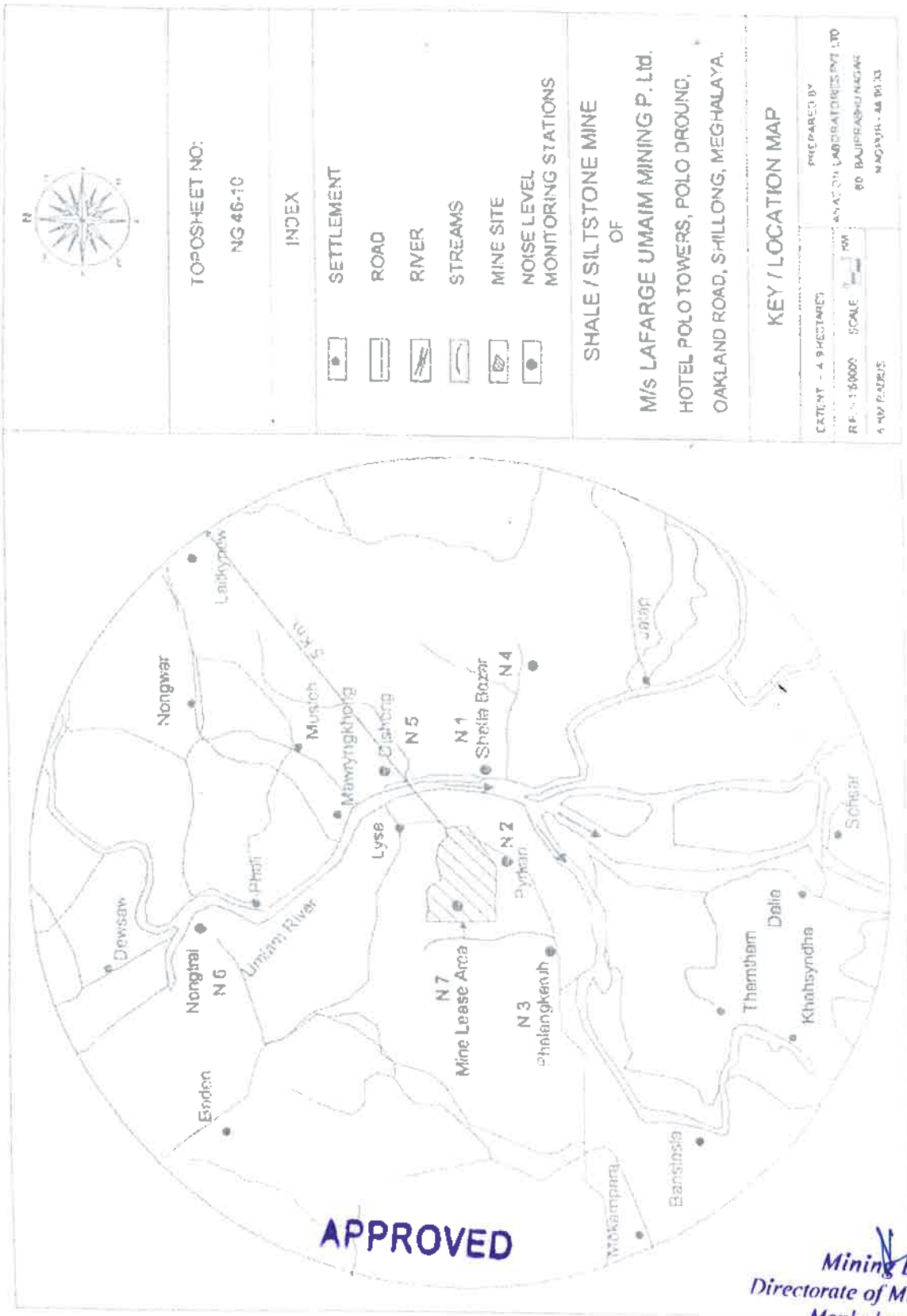

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FIG 1.3
NOISE MONITORING LOCATIONS

TABLE – 1.7
NOISE MONITORING STATIONS

Sl. No.	Station	Code	Distance From The Mine Site (Km)	Direction wrt Mine Site
1	Shella Bazar Market	N1	1.2	E
2	Pyrkan village	N2	0.7	SSE
3	Phalanghkaru Village	N3	1.3	SW
4	Shella Bazar PWD guest house	N4	2.7	ESE
5	Dishong Village	N5	1.5	NE
6	Nongtrai Village	N6	3.1	N
7	Mine Lease Area	N7	-	-

B AMBIENT NOISE LEVELS IN - WITHIN 10 KM RADIUS

The day equivalent noise levels were found to be relatively high due to local activities in the villages. Noise levels recorded in the nighttime were found to be less than 42.8 dB (A) in the surrounding villages.

Table 1.8
NOISE LEVELS IN THE STUDY AREA (10 KM RADIUS)

LOCATION	CODE	NOISE LEVEL DB (A)		
		Day Equivalent	Night Equivalent	Day-Night Equivalent
Shella Bazar Market	N1	60.5	42.8	58.9
Pyrekan village	N2	48.6	38.3	48.5
Phalanghkaru Village	N3	53.6	36.5	52.0
Shella Bazar PWD guest house	N4	49.3	39.0	49.2
Dishong Village	N5	48.2	34.6	47.2
Nongtrai Village	N6	55.4	41.6	54.3
Mine Lease Area	N7	52.5	39.2	51.5

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1.4 WATER ENVIRONMENT

Assessment of baseline data on Water environment includes

a) Identification of surface water sources
b) Identification of ground water sources
c) Collection of water samples
d) Analyzing water samples collected for physico-chemical and biological parameters

The principal Umiam River on the east of the deposit serves the drainage of the area. The Umiam River flows southwards and has a few tributaries like Phalangkaruh which are of very short length. The river Umiam originates from the Cherrapunjee plateau, skirts Shella Bazaar on the west and alter flowing further southwards over the plains of Bangladesh, finally flows into Surma river, a little to the west of Chhatak (Bangladesh). Upstream to the north of the deposit area, the Umiam River is marked by deep ravine resulting from heavy erosion by cascading waters during monsoon season.

The river Umiam is flowing at a distance of about 1.5 km on the Eastern side of the Mine site. The tributary, Phalangkaruh is flowing at a distance of about 1 km from the mine and joins Umiam River at Shella Bazar village. These rivers appear even during non-rainy season showing their link with some surface water drainage. Due to heavy rainfall, the area is prone to surface runoff and soil erosion that ultimately will lead to the river systems flowing along the gorges and the foothills.

Assessment of water quality in the study area includes the quality assessment of parameters as per the Indian standard IS 10500 (drinking water standard). The locations of water sampling stations are shown in **Fig-1.4** and **Table-1.9**

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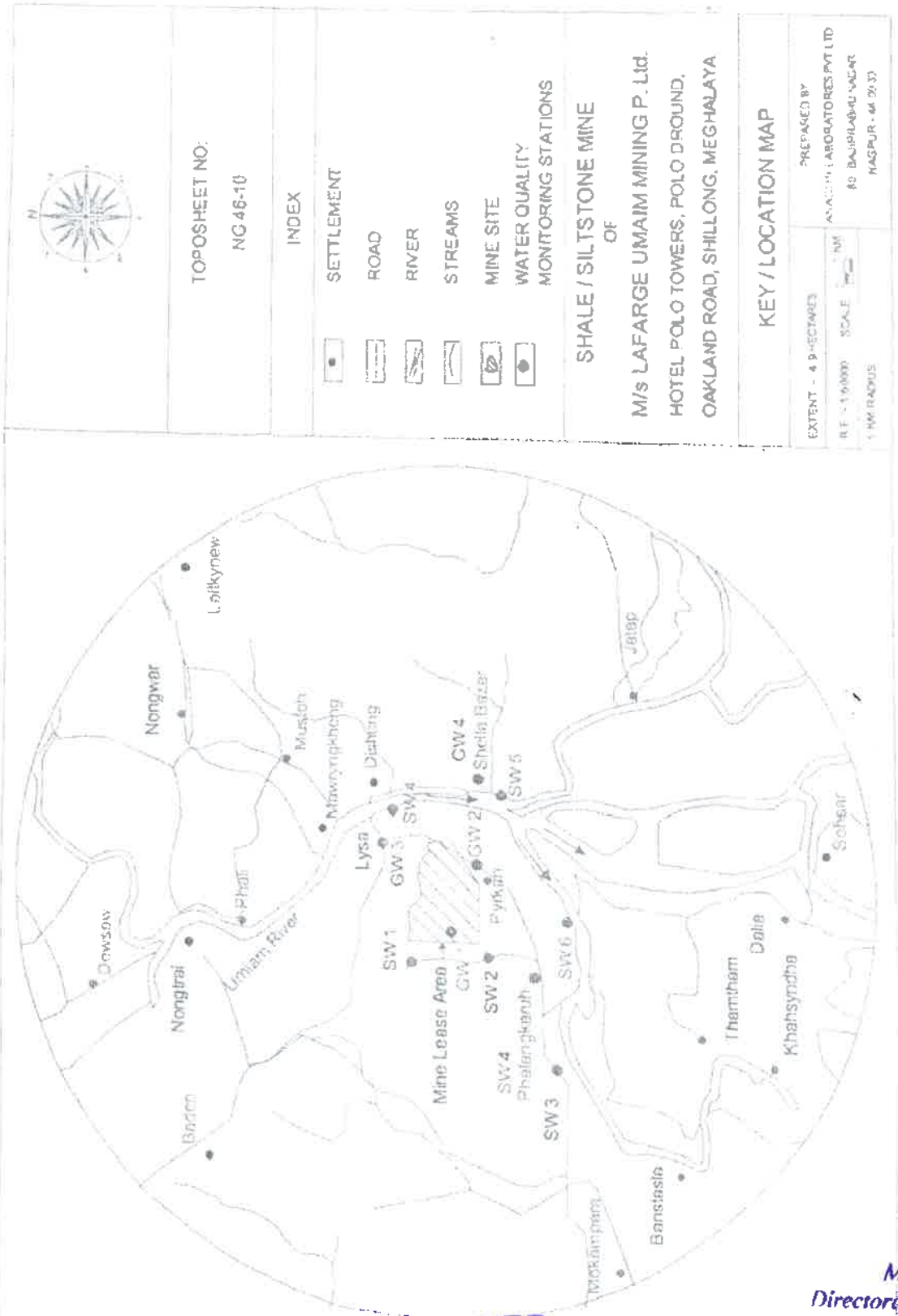
Meghalaya, Shillong



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Directorate of Mineral Resources
Meghalaya, Shillong

FIG 1.4
WATER SAMPLING LOCATIONS

TABLE – 1.9

WATER SAMPLING LOCATIONS

Location Code	Location	Direction	Distance (km)
		w.r.t. Project Site	
Surface Water			
SW1	Phalangkaruh River	NW	0.9
SW2	Phalangkaruh River (0.5 km D/S)	WSW	1.0
SW3	Phalangkaruh River (1.5 km D/S)	SW	2.4
SW4	Umiam River (1km U/S)	SSW	1.4
SW5	Umiam River (1 km D/S)	ESE	1.2
SW6	Umiam River (2 kmD/S)	S	1.4
Ground Water			
GW1	Mine Site Shale	Project Site	-
GW2	Pyrkan Village Hand pump	SE	0.6
GW3	Lysa Village Hand Pump	NE	0.9
GW4	Shella Bazar Village Handpump	ESE	1.2

The summary of water sample results are given in **Table 1.10** for surface water and **1.11** for Ground water samples.

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Directorate of Mineral Resources
Meghalaya, Shillong

Table 1.10

SURFACE WATER QUALITY

	Test Parameters	Measurement Unit	SW1	SW2	SW3	Limits As per IS:2296:1992
	pH Value	-	7.90 at 28°C	8.03 at 28°C	8.02 at 28°C	6.0 to 9.0
	Total Hardness as ($CaCO_3$)	mg / l	98.19	100.10	98.19	-
	Iron (as Fe)	mg / l	0.11	0.15	0.20	0.5
	Chlorides (as Cl)	mg / l	2.01	2.01	3.03	600
	Electrical Conductivity at 25°C	µs/cm	221	217	212	-
	Total Dissolved Solids (TDS)	mg / l	127.74	121.2	139.72	1500
	Calcium (as Ca)	mg / l	31.58	29.27	29.27	-
	Magnesium (as Mg)	mg / l	4.69	6.56	6.09	-
	Sulphate (as SO4)	mg / l	3.05	1.30	1.30	400
0	Nitrates (as NO3)	mg / l	< 2	< 2	< 2	50
1	Fluoride (as F)	mg / l	0.5	0.4	0.2	1.5
	Sodium (as Na)	mg / l	43.3	43.8	43.6	-
	Potassium (as K)	mg / l	1.30	1.16	1.16	-
14	Copper as(Cu)	mg / l	< 0.01	< 0.01	< 0.01	1.5
	Manganese as (Mn)	mg / l	< 0.05	< 0.05	< 0.05	-
	Cadmium as (Cd)	mg / l	< 0.01	< 0.01	< 0.01	0.01
17	Selenium as (Se)	mg / l	< 0.01	< 0.01	< 0.01	0.05
18	Arsenic as (As)	mg / l	< 0.001	< 0.001	< 0.001	0.2
	Mercury as (Hg)	mg / l	< 0.001	< 0.001	< 0.001	-
	Lead as (Pb)	mg / l	< 0.01	< 0.01	< 0.01	0.1
21	Zinc as (Zn)	mg / l	< 0.1	< 0.1	< 0.1	15
	Cyanide as (CN)	mg / l	< 0.01	< 0.01	< 0.01	0.05
	Boron as (B)	mg / l	< 0.01	< 0.01	< 0.01	-
	Chromium as (Cr +6)	mg / l	< 0.03	< 0.03	< 0.03	0.05
25	Barium as Ba	mg / l	< 0.01	< 0.01	< 0.01	-
	Phenolic Compounds	mg / l	< 0.001	< 0.001	< 0.001	0.005
	Anionic Detergents	mg / l	< 0.01	< 0.01	< 0.01	1
	BOD (at 270 C for 3 days)	mg / l	2.1	2.6	0.3	3
	COD	mg / l	11.76	13.5	4.7	-
30	Oil & Grease	mg / l	< 10	< 10	< 10	-
31	Dissolved Oxygen	mg / l	7.3	7.3	7.1	4
	HCO3	mg / l	94	92	94	-

Table 1.10 Cont...

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SURFACE WATER QUALITY

Sr. No	Test Parameters	Measurement Unit	SW4	SW5	SW6	Limits As per IS:2296:1992
1	pH Value	-	7.70 at 290C	7.70 at 290C	7.70 at 290C	6.0 to 9.0
2	Total Hardness as (CaCO3)	mg / l	40.22	40.43	40.59	-
3	Iron (as Fe)	mg / l	0.04	0.04	0.04	0.5
4	Chlorides (as Cl)	mg / l	3.03	3.03	3.03	600
5	Electrical Conductivity at 250C	µs/cm	99	101	104	-
6	Total Dissolved Solids (TDS)	mg / l	71.83	71.85	71.92	1500
7	Calcium (as Ca)	mg / l	14.5	14.63	14.78	-
8	Magnesium (as Mg)	mg / l	0.92	0.94	0.98	-
9	Sulphate (as SO4)	mg / l	< 1	< 1	< 1	400
10	Nitrates (as NO3)	mg / l	< 2	< 2	< 2	50
11	Fluoride (as F)	mg / l	0.2	0.2	0.2	1.5
12	Sodium (as Na)	mg / l	40.3	41.8	43.7	-
13	Potassium (as K)	mg / l	0.58	0.62	0.71	-
14	Copper as(Cu)	mg / l	< 0.01	< 0.01	< 0.01	1.5
15	Manganese as (Mn)	mg / l	< 0.05	< 0.05	< 0.05	-
16	Cadmium as (Cd)	mg / l	< 0.01	< 0.01	< 0.01	0.01
17	Selenium as (Se)	mg / l	< 0.01	< 0.01	< 0.01	0.05
18	Arsenic as (As)	mg / l	< 0.001	< 0.001	< 0.001	0.2
19	Mercury as (Hg)	mg / l	< 0.001	< 0.001	< 0.001	-
20	Lead as (Pb)	mg / l	< 0.01	< 0.01	< 0.01	0.1
21	Zinc as (Zn)	mg / l	< 0.1	< 0.1	< 0.1	15
22	Cyanide as (CN)	mg / l	< 0.01	< 0.01	< 0.01	0.05
23	Boron as (B)	mg / l	< 0.01	< 0.01	< 0.01	-
24	Chromium as (Cr +6)	mg / l	< 0.03	< 0.03	< 0.03	0.05
25	Barium as Ba	mg / l	< 0.01	< 0.01	< 0.01	-
26	Phenolic Compounds	mg / l	< 0.001	< 0.001	< 0.001	0.005
27	Anionic Detergents	mg / l	< 0.01	< 0.01	< 0.01	1
28	BOD (at 270 C for 3 days)	mg / l	0.9	0.9	0.9	3
29	COD	mg / l	5.4	5.4	5	-
30	Oil & Grease	mg / l	< 10	< 10	< 10	-
31	Dissolved Oxygen	mg / l	7.1	7.1	7.1	4
32	HCO3	mg / l	82	94	46	-

Table 1.11
GROUND WATER QUALITY

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Sr. No	Test Parameters	Unit	Concentration				Limits As per IS : 10500 : 1993
			GW1	GW2	GW3	GW4	
1	Turbidity NTU	NTU	18	0.1	0.1	0.1	5(10)
2	pH Value	-	7.67	7.55	7.66	7.60	6.5 to 8.5
3	Total Hardness as ($CaCO_3$)	mg / l	252.21	142.42	132.26	156.0	300(600)
4	Iron (as Fe)	mg / l	0.16	0.10	0.10	0.10	0.3(1.0)
5	Chlorides (as Cl)	mg / l	4.03	5.04	5.04	5.04	250(1000)
6	Electrical Conductivity at 25°C	µs/cm	559	413	407	427	-
7	Total Dissolved Solids (TDS)	mg / l	385.43	216.81	211.24	232.84	500(2000)
8	Calcium (as Ca)	mg / l	83.9	40.8	38.4	43.2	75(200)
9	Magnesium (as Mg)	mg / l	10.3	10.3	8.8	11.6	30(100)
10	Sulphate (as SO_4)	mg / l	37.01	< 1	< 1	< 1	200(400)
11	Nitrates (as NO_3)	mg / l	< 2	< 2	< 2	< 2	45(100)
12	Fluoride (as F)	mg / l	0.2	0.5	0.5	0.5	1.0(1.5)
13	Sodium (as Na)	mg / l	1.7	41.8	40.2	41.8	-
14	Potassium (as K)	mg / l	1.15	1.99	1.86	1.99	-
15	Copper (asCu)	mg / l	< 0.01	< 0.01	< 0.01	< 0.01	0.05(1.5)
16	Manganese (as Mn)	mg / l	< 0.05	< 0.05	< 0.05	< 0.05	0.1(0.3)
17	Cadmium (as Cd)	mg / l	< 0.01	< 0.01	< 0.01	< 0.01	0.01
18	Selenium (asSe)	mg / l	< 0.01	< 0.01	< 0.01	< 0.01	0.01
19	Arsenic (as As)	mg / l	< 0.001	< 0.001	< 0.001	< 0.001	0.05
20	Mercury (as Hg)	mg / l	< 0.001	< 0.001	< 0.001	< 0.001	0.001
21	Cyanide (as CN)	mg / l	< 0.01	< 0.01	< 0.01	< 0.01	0.05
22	Lead (as Pb)	mg / l	< 0.01	< 0.01	< 0.01	< 0.01	0.05
23	Zinc (as Zn)	mg / l	< 0.1	< 0.1	< 0.1	< 0.1	5(15)
24	Chromium (as Cr +6)	mg / l	< 0.03	< 0.03	< 0.03	< 0.03	0.05
25	Aluminum (as Al)	mg / l	0.01	< 0.01	< 0.01	< 0.01	0.03(0.2)
26	Boron (as B)	mg / l	0.06	< 0.01	< 0.01	< 0.01	1(5)
27	Phenolic Compounds	mg / l	< 0.001	< 0.001	< 0.001	< 0.001	0.001(0.002)
28	Anionic Detergents	mg / l	< 0.01	< 0.01	< 0.01	< 0.01	0.2(1.0)
29	Polyneuclear aromatic comp (as PAH)	ppb	< 0.01	< 0.01	< 0.01	< 0.01	-
30	HCO3	mg / l	164	140	132	146	-

Water samples collected within the study area showed compliance of all parameters with the drinking water standard of IS-2296 for surface water and IS-10500 for ground water.

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5 LAND ENVIRONMENT

1 PHYSIOGRAPHY OF THE AREA

The ML area is located of the southern edge of the Shillong Plateau, comprising the Khasi and Jaintia Hills. The following description relates to an area from approximately Shillong in the north to the floodplains of Surma River in the south.

- Bangladeshi Plains (with Surma River south of the mine area): A low lying alluvial plain, regularly flooded, braided and meandering rivers, levees, point bars, oxbow lakes, floodplains, back swamps, etc. Elevation lies between 5 and 50m amsl;

- Footslopes and alluvial fans: The transition from the plains to the hills and Shillong Plateau is characterised by a rapid rise in elevation and several alluvial fans. The alluvial fans are deposited in the plains by the larger rivers coming from the Plateau. The elevations range between approximately 50 and 150m amsl;

- Caenozoic sediments hills: Caenozoic sediments, ranging from sandstone to shale and limestone, cover the southern edge of the Shillong Plateau. These sediments have been uplifted to elevations between 150 and 1,800m amsl. The major uplift has been taken place along east-west trending faults, including the Dauki fault system, and monoclines. There are indications in the study area, that more than a single east-west trending fault is involved in the uplift;

- Shillong Plateau: Further north, a massive crystalline rock complex can be recognised in the satellite images. This basement area has formed a high plateau at a level of 1,800m amsl and above. The basement is folded in wide, open folds and dissected by numerous faults and fractures and joints. The drainage pattern of the larger rivers is clearly structural controlled; and

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- Incised Rivers: As separate unit, the deeply incised River valley can be distinguished. A number of north south running Rivers cut through the described topography and geomorphological units. A number of these rivers may represent an antecedent drainage pattern. However, some rivers or river branches show structural control. Structural control of the river courses is obvious in the basement area. Also in the Caenozoic sediments, structural features may have influenced the course of rivers. This is expressed in angular bends of the rivers or river branches.

- Waterfalls and rapids are present in the larger north to south running rivers. These may indicate lithological differences or structural features. The major river east of the mine area is Umiam River having its source near Shillong.

1.5.2 REGIONAL LANDSCAPE SETTING

The regional landscape surrounding has several distinct landscape types. These include rugged, vegetal cover on chain of hills, incised by numerous waterfronts and streams and channels. There are pockets of human settlements on foothills isolated in the vast landscape and distinct pattern of betel nuts plantations and orchards in the foothills and some fields under cultivation in the flood plains.

South of the site the Phalangkaruh river meanders to the plains of Bangladesh in the process creates distinctive flood plains. To the east is the up coming commercial township of Shella on the bank of river Umium, while the foothills are covered with dense growth of vegetation. To the North-West include the village of Nongtrai, and the betel nut plantation area of the village. Scattered in the western horizon are patches of bamboo growth mostly wild in the foothills. Other notable visual elements provide evidence of industrial activities. These includes make shift stacks of the lime kilns in the north and east of the site. The open cut limestone mining near Ishamati and Jatap are partially visible. Along the bank of river Umium quarried limestone are stockpiled in small heaps, waiting to be carried away to Bangladesh by boats.

1.5.3 GEOLOGICAL SETTING OF THE AREA

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To the north, the study area is bound by the Archaean Basement of the Shillong Plateau. South of the Basement area, a sequence of Mesozoic to Caenozoic sediments are found. At and around the mine area, the major formations area the Langpar Formation, Shella Formation and Kopili Formation. The first two of these formations comprise alternating series of sandstone and limestone. The Kopili Formations mainly consists of alterations of thin sandstone and shale with rare thin limestone bands.

The SPOT satellite images show an extensive limestone covered area at the mine site, which forms a west to east running band of limestone on both sides of Umiam River. This limestone belongs to the Shella Formation and comprises the Prang and Umlatdoh limestones. This band can be followed for several kilometres to the west and east of the mine site. The width of this band is a little over 1 kilometre near the mine site. To the south, this limestone is bound by the thinly bedded Kopili Formation. The dip and strike measurements reported and an angular unconformity between the shales and limestone encountered in inclined boreholes, suggest that the boundary between the Shella Formation and Kopili Formation at the mine site may be formed by a fault.

To the west, however, the Kopili Formation is overlying the Shella Formation conformably. Here, the change in dip of the rocks indicates a southerly dipping monocline without faulting. East of Umiam River, the Prang limestone signature can be followed for another few kilometres.

To the north of the mine area, a steep gradient is found. The terrain rises by several hundreds of metres. An alteration of limestone and sandstone bands is found on this escarpment. This higher part of the escarpment formed by the Langpar Formation. At the lower slopes of the escarpment, the Umlatdoh limestone is encountered in steep cliffs.

The Narpuh sandstone, separating the Umlatdoh and Prang limestones, is encountered north and east of the mine block. The lower part of the Narpuh sandstone appears to coincide partly with approximately west-north-west to east-south-east trending dark

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signature on the satellite images in the limestone area. To the west, the sandstone was not encountered in this zone. To North-west and north of the mine block, the sandstone is encountered, apparently dipping under the Prang limestone. To the east, along the Umian valley, as well as the Prang limestone Narpuh sandstone contact as the Narpuh sandstone – Umlatdoh limestone contact is encountered. The Prang – Narpuh contact is encountered at approximately 77m RL at latitude of the centre of the mine block and the sandstone is gently dipping (approximately 15°) to the south-west. It is therefore difficult to explain why no sandstone is encountered in the boreholes in the mine block itself, unless there is an offset through faulting.

.4 TECTONIC REGION/SEISMICITY

The Shillong Plateau and the Khasi and Jaintia Hills form a part of the basement unit of Meghalaya. This basement unit is located between the Himalayan Frontal Fault (HFF) to the north and the Dauki Fault to the south. The underthrusting of the Indian Plate under the Asian Plate has caused the uplift of this relatively rigid unit and its surroundings. Further to north, the Himalaya and to the east the Indo-Burman Ranges are exponents of this underthrusting and uplift and large scale folding.

The uplift of the area is still on going. This is expressed by a high seismicity of the area. Magnitude 8.5 and 8.7 earthquakes have been reported in the area in the past 110 years. With regular intervals, lesser quakes and tremors are reported for the Indian-Bangladeshi border regions. From 1973 to present, 1,283 earthquakes have been reported in the area bound by latitudes 20o and 30oN and longitudes 86o and 96oE. In the area between latitudes 24o and 26oN and longitudes 90o and 93oE and during the same period, 67 earthquakes have been occurred. Within a radius of 100km from the mine area, 32 earthquakes have been reported.

5.5 SINKHOLES IN THE STUDY AREA

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There are numerous sinkholes present in the area. Closed depressions of simple form are exceedingly common in karst. Many terms as

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sinkhole, swallow hole and swallet have been used for these loosely features. For more clarity, many have preferred the word Doline. Doline are generally circular or oval in plan, with a range of forms; dish and bowl shaped, conical and cylindrical. Various classifications have been proposed for the various types of Doline. One such classification distinguishes among : 1. Collapse Dolines; 2. Solution Dolines; 3. Subsidence Dolines; 4. Subjacent karst collapse Dolines; and 5. Alluvial stream sink Dolines.

The sinkholes encountered in the area fall in the categories of solution Dolines and collapse Dolines. Solution Dolines develop at solution favourable points, such as joint intersections. Solutes and some insoluble residues are removed down solutionwidened joints and bedding planes. Once enlarged, rock fragments and residues will slide and fall down in them. The Dolines of this type in the study area expose bedrock over all of the Doline's surface. These Dolines vary in size from a few metres to tens of metres in diameter. Their depth is generally less than 10m. However, the depth is difficult to establish as rockfall from the sides partly fills in most of the larger Dolines.

The collapse Dolines or collapse pits form a different category of sinkholes. The prime cause of this type of Doline can be the collapse of the roof of a cave formed by underground solution. To begin with, the collapse pit will be vertically walled and may be angular in plan through joint guidance. The depth-width ratio exceeds the maximum likely in solution Dolines of 1 to 3.5.

There are few possible causes for the development of a collapse pit:

- Various forces are acting on the rock, such as gravity, permanent tectonic stresses in the rock and hydrostatic load. Erosion causes decompression, which opens joints and permits rock fall on the surface and roof collapse underground;
- Drainage of previously water filled caves causes a sudden loss of roof and wall support and possible collapse; and
- Tremors, earthquakes and also rock blasting may trigger collapse.

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The largest sinkholes in the area are collapse pits. The obvious collapse pits are collapsed dome caves. The caves present in the area are dome caves as well. The Twin Sinkholes is a textbook example of a collapse pit. The highest point at the rim of the sinkholes lies at approximately 63m RL (by altimeter). The bottom of the sinkhole is at approximately 20m RL (by altimeter). The diameter is approximately 200m. The walls of the sinkhole are partly overhanging, still exhibiting the dome shape of the collapsed cave. At the floor of the sinkhole, a collapsed tunnel is present in the centre of the sinkhole.

A cave in the western edge of the sinkhole with an entrance at 39m RL leads to an intact dome cave at approximately 21m RL and below.

Some other large collapse pits have been identified northwest and west-northwest of the mine block. These structures are difficult to recognize due to their large shape and the fact that the collapsed roof and rock fall from the sides have partly filled in the collapse pit. A potential evolution of these structures that explains their present morphology has been described. These structures are only found in an east-west zone northwest of the mine block, just below the Nongtrai escarpment. These collapse pits clearly belong to a long passed tectonic phase with a subsequent relatively long period of tectonic rest.

Rejuvenation of the karst will occur as a result of a negative movement in the base level, for example by uplift of the area. Since there is always tendency for (underground) water to find lower routes through the karst rocks, uplift may result in a new (lower) level of caves. Subsequent erosinal denundation of the uplifted area may trigger the formation of collapse pits over the former caves at the higher level. The northern large collapse features are clearly related to such an old stage of uplift and erosion. The present caves occur all on almost perfect east-west line, indicating the present active stage of cave formation as a result of one of the younger uplift phases.

Geometry of sub-surface channels, cavities and sinkholes

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The only sinkhole in which water is encountered is the cave joining the Twin Sinkholes. Water is encountered at various places at low levels inside the cave. In all cases, the water level is 16m RL. The water level at the springs feeding Phalangkaruh southeast of the Twin Sinkholes is 8m RL.

The cave is partly filled with sand (quartz sand) and pebble (rounded shale fragments) dunes. These dunes have a height to 28m RL. Fresh plant remains on the top of the dunes indicate that during the rainy season the water overflows these dunes. The water level inside the cave may, therefore, rise by at least 12m during the rainy season.

The largest dome of the cave has a diameter of at least 100m and is approximately 20m high. Deeper inside the cave, there are deep and steep funnels and high and narrow triangular galleries to over 20m high. Stalactites and stalagmites are present, although the stalactites prevail. This indicates that the cave is probably regularly filled with flowing water. The stalactites are concentrates along larger joints in the cave ceilings. Water is dripping from the ceiling, even during the dry season. Therefore, shallow vadose water must still be present between the estimated ceiling level (approximately 50m RL) and the ground level (approximately 70m RL). The water percolates through joints and cracks to lower levels like the cave river.

This cave is filled with large, loose blocks fallen from the ceiling. Also, a large fallen stalactite is encountered, which is not yet covered by new calcite. This indicates a relatively recent event that has caused the fall. Probably, this could be related to the 1950 heavy earthquake.

Another cave is explored from the Border Road, just south of the mine block. The entrance is at 45m RL and the cave is explored to a depth of 38m RL. Some tens of metres from the entrance, a deep north-south running gully is encountered, which could not be further explored. Although no water is visible, it seems logical that this gully carries water during the rainy season and possibly also connects to the Phalangkaruh springs. The higher part of the cave exhibits as well stalactites as stalagmites, indicating that the higher part never gets filled with flowing water.

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A third cave visited is located east of the mine block. The entrance of this cave is located at 64m RL. Some tens of metres after the entrance, this cave bifurcate into a branch in downward direction and a higher located gallery. No evidence of flowing water is encountered, which was also not expected due to the high elevation. The cave contained impressive stalactite and stalagmite formations.

Only a short stretch, several hundreds of metres long, was investigated by geophysical means. This stretch ran along the Shella Nongtrai road from west of the Twin Sinkholes to a point just east of the sinkholes. The objective of these measurements was to test whether the technique applied (resistivity imaging) was feasible under the local circumstances and with the local equipment available. The results indicated a cavern in this stretch. The resistivity values indicate an air-filled cavern of at least 20m wide and more than 10m high between 15 and 30m below the road level, i.e. approximately 15 to 30m RL. As this level is well above the spring levels of Phalangkaruh springs, this cavity may be a part of the underground system connecting to the western spring.

1.5.6 Hydrology

The hydrology of the area has been studied in order to be able to assess the impact of the mining activities on the water quantity and water quality of the spring fed Phalangkaruh River. The techniques applied comprise the study of the hydrological patterns of the area by means of satellite imagery, the DEM and tracer tests to study the hydraulic connectivity of various waters encountered, the interpretation of flow and discharge measurements.

1.5.7 LAND USE PATTERN

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Landuse patterns reflect the topography, soil characteristics and proximity to the river, which dictates water availability for irrigation. In Meghalaya state, the land belongs to the people and not to the state. The Nongtrai Limestone Block is located on predominantly undulating to rolling country to the west of the Umium River, with a small portion of the eastern boundary extending into the flood plains.

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A large portion of the study area is covered with dense growth of vegetation, however, the site has not been considered or classified as reserved or protected forest land by the Department of Forest, Government of Meghalaya or Government of India. The surrounding land has some of the area as consecrated forests (Law Kyntang) set apart purposely for the religious performances of the village.

The core zone is practically devoid of any soil cover. This area is not arable and hence does not support agriculture. The land is mostly rocky and the rock is wholly limestone. The adjoining areas surrounding the core zone have almost similar structural features. Landuse pattern of the study area is given in **Table 1.12**:

Table 1.12
LANDUSE PATTERN OF THE STUDY AREA

SL. NO.	LANDUSE	AREA (SQ KM)	% AREA
1	Settlement	5.42	1.72
2	Agriculture	82.63	26.3
3	Grass /Shrubs	14.61	4.65
4	Dense Vegetation	188.33	59.95
5	Sandy River Bed	1.82	0.58
6	Limestone	21.35	6.80
	Total		**100**

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1.5.8 SOIL QUALITY

The entire plateau is devoid of soil while the slopes although have some soil cover but does not show prolific structures. High rainfall, hilly geography and nature of substrata are responsible for the loss of soil layer in the entire area. The soil at the mining site is found in gullies and crevices and cracks, which characterise the area. At places dense growth of grasses and shrubs, wild banana, and undergrowth have helped in retaining the soil whose thickness rarely exceeds 50 cm.

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Three soil types occur in the study area viz., in crevices, from hill slopes and from foot hills. As per their study, soil is characterised as sandy clay loam in texture in the cervices and sandy loam in the foothills. The soil reaction was near neutral to alkaline in all three

types with pH ranging from 6.67 - 7.10. The soil in cervices was reported rich in organic carbon, total nitrogen and available phosphorous.

Six soil samples were collected within 10 km radial distance of the study area and were analyzed to study the soil quality. **Fig – 1.5** and **Table – 1.13** shows the location of soil sampling stations. The Physico-chemical properties of soil are given in **Table 1.14.**

TABLE – 1.13
SOIL SAMPLING STATIONS

Station Code	Station	Distance From The Mine (Km)	Direction wrt Mine Site
S1	Nongtrai Village	3.1	NNW
S2	Proposed Mine Site Shale Mine	-	-
S3	Proposed Mine Lease Area Lime Stone	1.5	NW
S4	Palangkaruh Village	1.4	SW
S5	PyrkanVillage	0.7	SSE

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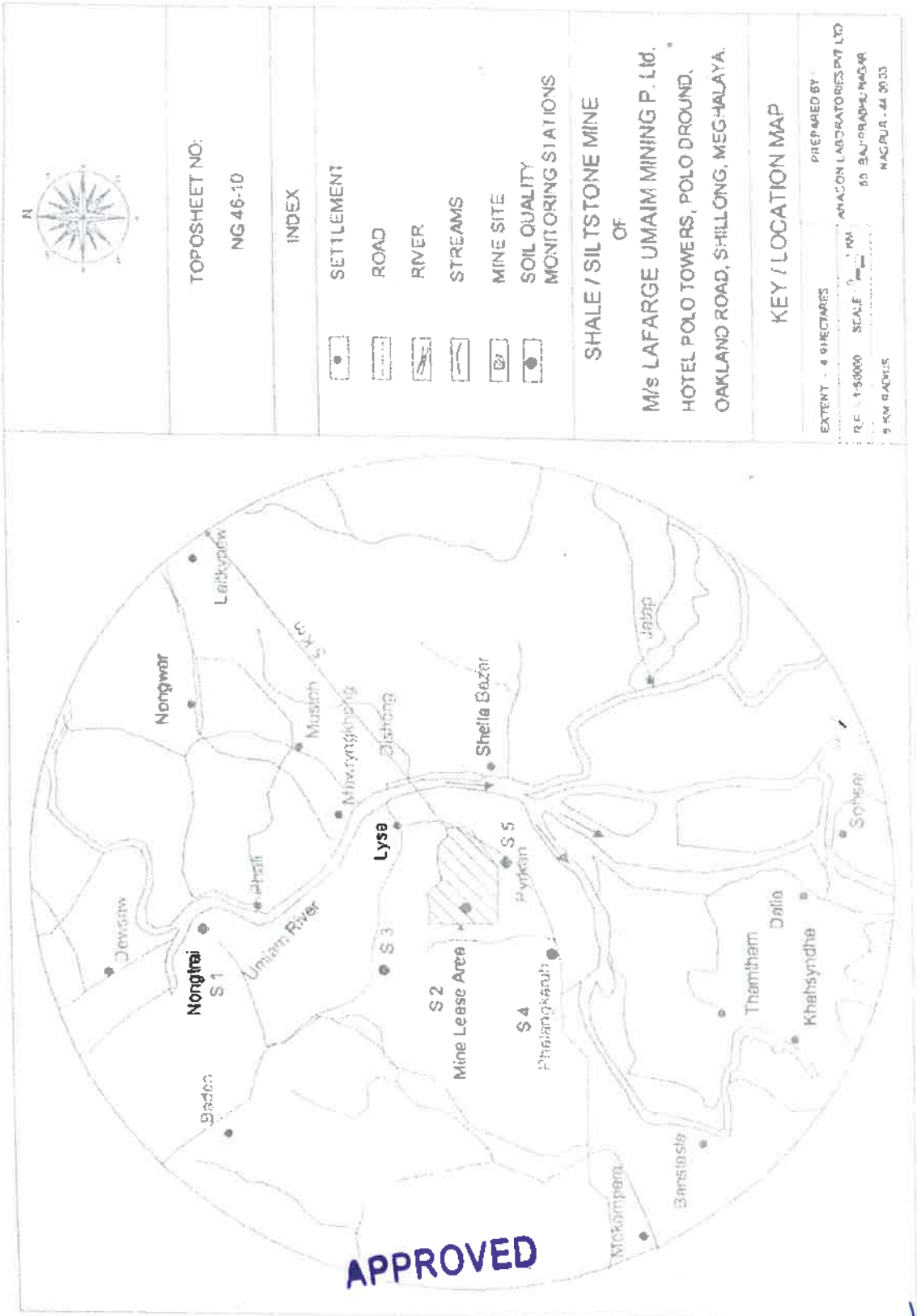

FIG 1.5
SOIL SAMPLING LOCATIONS

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Table 1.14
Physico - Chemical Properties of Soil

Sr. No	Parameters	Unit	Results				
			S1	S2	S3	S4	S5
1	pH	-	6.67	6.69	7.10	6.64	6.90
2	Electrical Conductivity at 25°C	µs/cm	67.2	196	138	92	175
3	Texture	-	Clayey	Silt Clay Loam	Sandy Clay	Sandy	Sandy
4	Sand	%	24.5	28.6	32.7	92.4	82.2
5	Silt	%	23.1	29.9	29.0	3.3	9.4
6	Clay	%	52.4	41.5	38.3	4.3	8.4
7	Bulk Density	g/cc	1.205	1.485	1.216	1.362	1.34
8	Available Calcium as Ca	mg/kg	9.6	28.8	38.4	24.0	38.4
9	Available Magnesium as Mg	mg/kg	11.69	29.22	17.53	14.61	23.38
10	Available Sodium as Na	mg/kg	99	61.0	81.5	82.75	80.25
11	Available Potassium as K	kg/ha	7.54	26.39	5.65	18.52	43.09
12	Available Phosphorous as P	kg/ha	52.0	48.64	62.06	78.84	129.16
13	Available Nitrogen as N	kg/ha	107.02	53.51	45.86	38.37	107.02
14	Organic Carbon	%	1.12	0.75	0.82	0.60	1.57
15	Water Soluble Sulphate as SO4	mg/kg	65.43	220.83	32.72	43.62	46.35
16	Sodium Absorption Ratio	-	30.37	11.32	15.41	18.85	14.43
17	Available Zinc	mg/kg	Nil	Nil	Nil	Nil	Nil

Soil quality in Study area –

- pH : 6.67 - 7.10.
- Organic Carbon : 0.60-1.57 %
- Soils in the area were found to be sandy to silty clay loam
- Calcium :
- Available Nitrogen: 38.37 – 107.02 kg/ha
- Available Phosphorous: 48.64 – 129.16 kg/ha
- Available Potassium: 5.65 – 43.09 kg/ha

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1.5.9 FERTILITY OF LAND

The flood plains are significantly rich soil due to alluvial deposit. However in the plateau and hill slopes the soil depth is very low and large tracts of land are uncultivable. In and around the limestone block the soil is alkaline and does not support any healthy plant growth.

The hill slopes are extensively used for plantation of betel nuts, which requires running water and very little soil depth for growth. Also to prevent land sliding and soil erosion the hill slopes, the bamboo vegetation and the plantation plays an important role. The growth of the bamboo does not allow washing away of the little top soil above the rock structures and in the fissures and gullies of the hill slopes. The flood plains and the valley soil are primarily sandy alluvial deposit where paddy is grown.

1.6 FLORA AND FAUNA

1.6.1 FORESTS

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The vegetation cover of North-East region, particularly Meghalaya region is rich and diverse. The forest of Meghalaya can be grouped under Tropical and Temperate forest on the basis of their climatic association and species composition. Further, Tropical forests are classified as "Tropical moist" and "Dry deciduous", "Tropical semi-evergreen", "Tropical evergreen" and Grassland" types.

Tropical moist and dry deciduous forest

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This type of forests occurs at the lower elevation of the hills in Meghalaya. The dominant upper canopy forming species are Tectona grandis, Terminaliamyriocarpa, Sterculia villosa, Lagerstroemia parviflora and Gmelina arborea both as natural and as plantation; while species like Schima wallichii, Salmaliamalabaricum, Albizia odontossima, Terminalia balerica and Amoora wallichi are found in natural forest. The second story is composed of small trees and shrubs. The dominant species are Careya arborea, Bridelia retusa, Grewia disperma,Holarrhena antidysenterica, Flemmingia

macrophylla, Zizyphous mauritianus, Eupatorium odoratum and Lantana camara. Climbers and lianas are also very abundant; they are represented by Combretum roxburghii, Holbolia latifolia,Ichinocarpus fruticens, Mikenea scandens and Derris elliptica. There are abundance of bamboo species, viz. Dendrocalamus hamiltonii, Bambusa tudla, Bambusa pallida and Arundinaria intermedia.

Tropical semi-evergreen forest

This type of forest is found at an elevation of 900-1200 m. The dominant species of the upper canopy are as follows: Elaeocarpus floribundus, Dillenia pentagyna,Dillenia indica, Symplocos racemosus, Garcinia indica and Careya arborea. The second story of small trees and shrubs layer is not very dense. It is composed of Ficus spp., Clerodendron infortunatum, Hypericum japonicum and Thysanolena maxima. Tropical evergreen forest These forests are found in upper hill zone with high rainfall. The upper canopy is composed of dominant species like Mesna ferra, Castanopsis indica, Terminalia belerica, laeocarpus floribundus, Pterospermum acerifolium and Lennaea coromandelia.

The second storied is composed of species like Grasinia indica, Ficus racemosa, Saraca indica, Sterculia villosa and Mangifera indica. The shrubs and small trees form the third storied. The dominant species are Ficus reticulata, Justicia gendarusa and Dracaena elliptica. Like semievergreen forest, this zone is also having wood climber viz. Thunbergia grandilfora and Combretum roxenburghii and the epiphytes like Hoya parasitica, species of Dendrobium and Pothos scandens are most frequent. The stream corridors have dominant trees like Duabanga grandiflora.

Grasslands

Grassland is found in hill slope after forest clearance by jhuming or in exposed river -beds. The dominant species are Saccharunm spontaneum, Chrysopogon aciculatum, Imperata cylindrica, Eriocaulon chinensis and Paspalum dilatatum.

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Temperate Forests

These forests are located in high mountain zone (>above 1000 m) outside the present study area. The dominant species are Quercus semiserrata, Alnus nepalensis, Castanopsis kuezii, Achima wallichi and Elaeocarpus acuminata. The shrub layer is represented by Mahonis pycnophylla, Daphne papyracea, Virubrum foetidum and Polygala arillata. This region is also rich in epiphytic flora and climbers. In some places, the temperate flora is dominated by Pine forest, which is mostly planted. A number of sacred groves are found in temperate zone. In a recent report, about 31 sacred grooves in east Khasi Hill district are recorded but almost all of them are located in upper hilly region outside the present study area.

Plantation and Orchards

In and around village settlements, there is frequent commercial plantation of Betelnut palm with Piper nigrum, pine apple, lemon grass, banana, turmeric and ginger and fruit trees like mango, guava, peach, pear and cherry. A few timber yielding species are also grown around the village orchards. Except road -side planting, plantation (in blocks) under social forestry schemes is not seen in the surveyed areas.

Riparian forest

The dominant species of riparian vegetation are Homonya riparia, saccharum spontaneum, Calotropis procera, Eupatorium odoratum, Holarrhena antidysenterica, Hyptis suaveolens, Zyziphus mauritianus and isolated trees like Alstonia scholaris, Duabauga gradiflora and Sizygium cumini.

In general much of the original forests of the East Khasi Hills area and of the state itself have declined in past years due to jhuming or shifting agriculture and fuelwood/ timber extraction. As most of the forest area is privately owned, there are few significant efforts for forest conservation or afforestation.

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Vegetation cover of Core Zone

The project site covers an area of about 100 hectares with uneven terrain. Trees such as Terminalia arjuna, Terminalia bellerica, Terminalia myriocarps, Alstonia scholaris, Ficus glomerata, Gmelina arborea, Bauhinia acuminata, Ailanthus grandis, Duabanga grandiflora and Sterculia villosa are very frequent this area. The dominant shrubs of this area are Eupatorium odonatum, Zizyphus muritinum and Clerodendron infortunatum, Saccharum spontaneum, Thysanolaena maxima are abundant in exposed places. There are quite a good number of herbs in comparatively exposed areas. The dominant forms are Sida cordifolia, Sida acuta, Urena lobata, Amaranthus viridis, Ageratum conyzoides and Bidens pillosa. Climbers are fairly abundant. The most predominant forms are Mikenia scandense and Combretum roxburghii. Wild Musa sapiantum occurs in the lower elevation. However no endemic or endangered plant species was found in the core zone area according to the primary survey and quadrants that were used for the same.

Vegetation cover of Buffer Zone

The study area extend from upper hills (>1000 m) to river bed and swampy paddy fields and is very diverse. There are a good number of village settlements with orchards and plantation areas. Thus the buffer zone shows different types of forests including tropical evergreen, tropical semievergreen, tropical moist and dry deciduous, grassland and plantations forest. The dominant species are as per described above.

Almost all households in the villages have homeland to grow crops like turmeric, ginger, banana, vegetables, betelnut or fruit trees. The canopy cover of the upper hill forests ranges between 20-30% while that of village orchards ranges from 10-15%. The ground cover in grassland is fairly dense. Timber and fuelwood extraction from the forest is a continued process. The grazing in forest area is fairly low except in the areas around the village settlement.

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The primary survey indicates that there are no endangered or endemic species in the buffer area, and that this is corroborated by a secondary data review.

1.6.2 FLORA

Meghalaya and East Khasi hills are floristically fairly rich areas. The study area (core and buffer zone) extends from near sea level elevation to an elevation of about 800 m. The buffer zone extends from hilly subtropical regions in the north and in the eastern part, to plains and swamp land in the south. As such it has floristic components have tropical, subtropical, riparian and grassland zones.

The floral checklist was prepared on the basis of intensive study and field observations in the project core area and also extensive study in the buffer zone.

A good number of species are commercially cultivated in orchards, a few of which have medicinal values. Though in Meghalaya there are a number of endemic plant species reported earlier, none of the species was observed in the study area.

The flora observed in the study area (Core zone & Buffer zone) is given in the **Table 1.15.**

Table 1.15.
FLORA IN THE STUDY AREA

SCIENTIFIC NAME	LOCAL/ COMMON NAME	SCIENTIFIC NAME	LOCAL/ COMMON NAME
Trees			
Aegle marmelos	Heikhagok	*Azadirachta indica*	Baigaina
Ailanthes grandis	Ganmathai	*Bambusa pallida*	Shken
Albizia lucida	Siris	*Bambusa tulda*	Shkong
Albizia odoratisima	Haya	*Bauhinia acuminata*	Chingthrou
Albizia procera	Dumkol	*Bauhinia purpurea*	Chingthao angnuba
Alstonea scholaris	Chaton	*Bixa orellana*	Annatto
Amoora walichi	Agachi, Akshi	*Bridelia retusa*	Geio
Areca catechu	Betelnut Palm	*Buddeja macrostachya*	Tipoka-moli
Artocarpus	Dewa-sali	*Careya arborea*	Gemble

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SCIENTIFIC NAME	LOCAL/ COMMON NAME	SCIENTIFIC NAME	LOCAL/ COMMON NAME
chaplasa			
rtocarpus integrifolia	Jackfruit	Caryota urens	Tamak
Arundinaria ntermedia	Perinypk	Cassia fistula	Haunaruaraung
Erythrina arborecens	Hieto	Castanopsis indica	Khashi badam
Ficus bengalensis	Bar	Chikrasia tabularis	-
Ficus glomerata	-	Cinnamomum bejolghota	Ashokhyphum
Ficus hispida	Takpiang	Cinnamomum tamala	Lapynriang
Ficus religiosa	Aliot	Cocos nucifera	Coconut
Ficus reticulata	Fig	Dalbergia sissoo	Sisoo
Garuga pinata	Bonkung-esing	Dendrocalamus giganteus	Wa
Glochidion lanceolarium	-	Dendrocalamus hamiltonii	Choya bans
Gmelia arborea	-	Dillenia indica	Heigri
Grevillea robusta	Kabulia	Dillenia pentagyna	Agachi, Akshi
Grewia sapida	Brbe	Duabanga grandiflora	Luaipap
Kydia calycina	Anisep	Elaeocarpus floribundus	Koying
Lagerstomea parviflora	Jarul	Lelnnea coromandelia	-
Tectona grandis	Teak	Lichi chinensis	Dieng-soh-manir
Terminalia arjuna	Arjuna	Macaranga peltata	-
Terminalia belerica	Bahera	Mangifera indica	Am, Chillujak
Toona ciliata	Poma	Mesua ferra	Karai
Trema orientalis	Pampak	Phoneix sylvestris	Datepalm
Trewia nudiflora	Wangbhop	Prunus persica	Chumberi
Zizyphus mauritiana	Soh-broi	Psidium guajava	Ambak
Spondias pinnata	Ambithong	Pterospermum acerifolium	-
Sterculia villosa	Chikaung-araung	Quercus semiserrata	Kara
Symplocos	Kharane	Salmalia	Semulu

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SCIENTIFIC NAME	LOCAL/ COMMON NAME	SCIENTIFIC NAME	LOCAL/ COMMON NAME
chaplasa			
Artocarpus integrifolia	Jackfruit	Caryota urens	Tamak
Arundinaria intermedia	Perinypk	Cassia fistula	Haunaruaraung
Erythrina arborecens	Hieto	Castanopsis indica	Khashi badam
Ficus bengalensis	Bar	Chikrasia tabularis	-
Ficus glomerata	-	Cinnamomum bejolghota	Ashokhyphum
Ficus hispida	Takpiang	Cinnamomum tamala	Lapynriang
Ficus religiosa	Aliot	Cocos nucifera	Coconut
Ficus reticulata	Fig	Dalbergia sissoo	Sisoo
Garuga pinata	Bonkung-esing	Dendrocalamus giganteus	Wa
Glochidion lanceolarium	-	Dendrocalamus hamiltonii	Choya bans
Gmelia arborea	-	Dillenia indica	Heigri
Grevillea robusta	Kabulia	Dillenia pentagyna	Agachi, Akshi
Grewia sapida	Brbe	Duabanga grandiflora	Luaipap
Kydia calycina	Anisep	Elaeocarpus floribundus	Koying
Lagerstomea parviflora	Jarul	Lelnnea coromandelia	-
Tectona grandis	Teak	Lichi chinensis	Dieng-soh-manir
Terminalia arjuna	Arjuna	Macaranga peltata	-
Terminalia belerica	Bahera	Mangifera indica	Am, Chillujak
Toona ciliata	Poma	Mesua ferra	Karai
Trema orientalis	Pampak	Phoneix sylvestris	Datepalm
Trewia nudiflora	Wangbhop	Prunus persica	Chumberi
Zizyphus mauritiana	Soh-broi	Psidium guajava	Ambak
Spondias pinnata	Ambithong	Pterospermum acerifolium	-
Sterculia villosa	Chikaung-araung	Quercus semiserrata	Kara
Symplocos	Kharane	Salmalia	Semulu

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Bauhinia vahlii	Bhorla	Ichnocarpus frutescens	Jorakuchare
Combretum roxburghii	Arkeng-rikang	Lablab purpureus	Tohi
Dendrobium dinsiflorum	Balgto	Mikenia scandanse	German-pula
Derris elliptica	Hiru rikang	Piper nigrum	Jaluk
Dioscorea alata	Eugin	Pothos scandens	-
Dioscorea belophylla	Ban-tarul	Smilax zeylanica	-
Tinospora cordifolia	Amaslota	Thunbergia gradiflora	Nungnung
Vanda teosellata	Akhasi-gos		
Herbs			
Achyranthes aspera	Minamkachi	Boerhavia repens	-
Ageratum conyzoidas	Imchenriza	Calamintha umbrosa	-
Alternanthera sessilis	-	Carex filicina	Dimba lapia
Amaranthus viridis	-	Centella asiatica	Atina
Ananus squamosus	Alipiong	Chenopodium ambrosoides	Chisik-bot
Andrographis paniculata	-	Curcuma zedoaria	Amada
Bidens pillosa	Bana	Cymbopogon nurdas	Citronella
Blumea lacera	Janya	Cynodon dactylon	Dubari
Eriocanton luzulaefolium	-	Cyperus griffithi	Bajran
Euphorbia lutra	-	Desmodium laxiflorum	Bhutu-ham
Fimbristylis falcata	Arza	Drymeria cordata	Achhamena
Hedychium aurantiacum	-	Echinochloa crus-	-
Imperata cylindrical	Altong	Eleusive indica	Bobosaben
Isachne albens	-	Eragrostis tenella	-
Mimosa pudica	-	Pouzozia hirta	Akhle
Ocimum basilium	-	Scoparia dulcis	Butburi
Oxalis corniculata	Chota tengeri	Sida acuta	Barphum
Paedaria foetida	Bhedailota	Sida cordifolia	Barial
Pennisetum americanum	Yangpah	Solanum nigrum	-
Polygonum molle	Borbung	Sonchus asper	Akatsu
Polygonum orientale	Agasom	Strobilanthus orientalis	Barcha
Themeda villosa	Kahinwon	Vinca rosea	-
Tridax procumbens	-	Xanthium strumarium	Agra

ENDANGERED PLANT SPECIES

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According to the report of Haridasan and Rao (1985) and Haridasn (1999), 89 plant species are recorded as "Endangered" from the entire state of Meghalaya; among the endangered species Nepenthes khasiana is most widely known but was never recorded in the study area. For in-situ conservation of endangered flora and fauna, natural habitats at Nokrek, Balphakhram and other protected areas (Wildlife Sanctuary, etc.) have already been established specially in Garo Hills.

However from the earlier field survey records and observations made during the present survey it appears that none of the endangered plant species exist in the study area.

MEDICINAL PLANTS

A total of 25 plants of known medicinal values have been recorded in the Buffer Zone of the study area. These have wide distribution in the state. Medicinal plants available in the study area are given in **Table 1.16.**

Table 1.16.
Medicinal Plants Observed In The Study Area

SPECIES	PARTS USEFUL FOR VARIOUS MEDICINAL PURPOSE
Abrus precatorius	*Whole plant*
Achyranthus aspera	*Root and stem*
Alstonea scholaris	*Bark*
Andrographis paniculata	*Whole plant*
Aristolochia cathertii	*Whole plant*
Boerhaavia repens	*Stem and leaf*
Calotropis gigantean	*Stem and root*
Cinnamomum tamala	*Leaf*
Curcuma longa	*Rhizome*
Eupatorium odoratum	*Leaf*
Holarrhena	*Bark*

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antidysenterica	
Justicia gendarussa	Stem and leaf
Nyctanthes arbortristis	Leaf
Ocimum basilicum	Stem and leaf
Paederia foetida	Stem and leaf
Piper longum	Fruit
Rauvolfia serpentina	Root
Saraca indica	Bark, leaf and flower
Sida acuta	Root, stem and leaf
Terminalia arjuna	Bark
Terminalia balerica	Bark and fruit
Terminalia chebula	Bark and fruit
Tinospora cordifolia	Whole plant
Vitis quadrangularis	Whole plant
Zinziber officinalis	Rhizome

Most of the medicinal plants listed above were not commercially cultivated. However very recently, the Silviculture division of Meghalaya Forest Department, took up initiative for cultivation and commercial utilisation of these plant species.

CRYPTOGAMIC FLORA

The study area specially Buffer zone show different species of ferns including tree fern, lihens and wood decaying fungi. The most common ferns belong to the gerera viz. *Diplazium, Pteris, Adiantum, Lygodium, Nephrolepis, Cyanthera,Argiopteris* and *Asplenium*. The dominant wood fungi are species of *Polyporus,Ganoderma, Lentinus* and *Schizophyllum*. The lichens are also fairly abundant in this area. The most common forms are Crantose and Foliose. In upper elevation of buffer zone, species of *Lycopodium* and *Selaginella* along with moss and liverwarts were observed particularly in moist places.

There are no endangered or rare species observed.

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1.6.3 FAUNA

Fauna observed in the study area during the study period is given in **Table 1.17.**

Table 1.17
FAUNA IN THE STUDY AREA

SCIENTIFIC NAME	COMMON NAME	LOCAL STATUS	IWPA
Mammalian Species			
Bandicota bengalensis	Indian Mole Rat	Common	V
Bandicota indica	Bandicoot Rat	Common	V
Cannomys badius	Bamboo Rat	Sporadic	V
Cynoptarus sphinx	Shortnosed Fruit Bat	Common	V
Dremomys lokriah	Himalayan Squirrels	Common	-
Lepus nigricollis	Indian Hare	Rare	-
Mus booduga	Indian Field Rat	Common	-
Scotophilus heathi	Common yellow Bat	Common	-
Vulpes bengalensis	Indian Fox	Sporadic	II
Bird Species			
Columba livia	Blue Rock Pigeon	Common	IV
Streptopelia chinensis	Spotted Dove	Common	IV
Psittacula krameri	Roseringed Parakeet	Sporadic	IV
Psittacula Alexandria	Indian Redbreasted Parakeet	Rare	IV
Loriculua verhalis	Lorikeet	Rare	IV
Cuculus canorus	Cuckoo	Sporadic	IV
Cuculus micropterus	Hawk Cuckoo	Sporadic	IV
Clamator coromandus	Redwinged Crested Cuckoo	Rare	IV
Eudynamys scolopacea	Koel	Common	-
Centropus sinensis	Koel	Sporadic	-
Strix leptogrammica	Brown Wood Owl	Rare	IV
Hemiprone longipennis	House Swift	Common	-
Cypsiurus parvus	Palm swift	Common	-
Caprimulgus asiaticua	Common Indian Nitghtar	Sporadic	IV
Merops leschenaultia	Chestnutheaded Bee-eater	Common	-
Merops orientalis	Small Green Bee-eater	Common	-
Coracias garrulous	Roller	Rare	IV

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SCIENTIFIC NAME	COMMON NAME	LOCAL STATUS	IWPA
Upupa epops	Hoopoe	Rare	IV
Megalaima haemacephala	Coppersmith	Common	IV
Megalaima rubricapilla	Crimsonthroated Barbet	Common	IV
Chyrysocolaptes festivus	Indian Goldenbacked Woodpecker	Sporadic	IV
Dinopium bengalensis	Lesser Goldenbacked Woodpeacker	Sporadic	IV
Megalaima asiatica	Blue throated Barbet	Common	IV
Pitta nipalensis	Bluenaped Pitta	Common	IV
Galerida cristata	Crested Lark	Rare	IV
Lanius cristatus	Brown Shrike	Common	-
Oriolus oriolus	Golden Oriole	Common	IV
Oriolus xanthornus	Lackheaded Oriole	Common	IV
Dicrurus adsimilis	Black Drongo	Sporadic	IV
Dicrurus aeneus	Brown Drongo	Rare	IV
Acridotheres tristis	Indian Myna	Sporadic	IV
Acridotheres ginginianus	Bank Myna	Sporadic	IV
Sturus contra	Pied Myna	Sporadic	IV
Dendrocitta vagabunda	Tree Pie	Rare	IV
Corvus splendens	House Crow	Rare	V
Corvus macrorhynchos	Jungle Crow	Sporadic	V
Hemipus picatus	Pied Flycatcher	Common	IV
Pericrocotus erythropygius	Whitebellied Minivet	Common	IV
Pericrocotus roseus	Rosy Minivet	Common	IV
Chloropsis cochinchinensis	Goldmantled Chloropsis	Common	IV
Pycnonotus atriceps	Blackheaded Bulbul	Common	IV
Pycnonotus cafer	Redvented Bulbul	Common	IV
Pellorneum ruficeps	Spotted Babbler	Sporadic	IV
Alsippe poioicephala	Quaker Babbler	Sporadic	IV
Gampsorhynchus rufulus	Whiteheaded Babbler	Sporadic	IV
Turdoides striatus	Jungle Babbler	Rare	IV
Garrulax maniligerus	Necklaced Laughing Thrus	Sporadic	IV

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SCIENTIFIC NAME	COMMON NAME	LOCAL STATUS	IWPA
Muscicapa muttui	Brown-breasted Flycatcher	Sporadic	IV
Orthotomus sutorius	Tailor Bird	Common	-
Copsychus saularis	Magpie Robin	Rare	-
Dicaeum erythrohynchos	Thickll's Flowerpecker	Common	IV
Dicaeum ignipeetus	Firebreasted Flowerpecker	Sporadic	IV
Acthopyga siparaja	Yellowbacked Sunbird	Common	IV
Nectarine asiatica	Purple Sunbird	Common	IV
Passer domesticua	House Sparrow	Common	-
Ploceus philippinus	Baya Weaver Bird	Rare	IV
Lanchura mallaca	Blackheaded Munia	Sporadic	IV
Milvus migrans	Pariah Kite	Common	IV
Reptiles			
Ahaectulla nasutus	Common Green Whip Snake	Common	-
Calotes jerdoni	Eastern Green Calotes	Rare	-
Calotes versicolor	Common garden Lizard	Common	-
Hemidactylus flaviviridis	House Gecko	Common	-
Mabuya carinata	Common Skink	Sporadic	-
Macropisthodon plumbicolor	Green Keelback	Common	-
Varanus bengalensis	Common Indian Monitor	Sporadic	II

Lepidoptera			
Scientific Name	**Common Name**	**Scientific Name**	**Common Name**
Argynnis hyperbius	Indian Fritillary	Eurema hecabe	Common Grass Yellow
Catopsilia Pomona	-	Eurema laeta laeta	Spotless Grass Yellow
Danaus chrysippus	Plain Tiger	Hypolimnas bolina	-
Danaus genutia	Common Tiger	Lamproptera eurius	-
Danaus Melissa	-	Pantoporia perius	Common Sergeant
Delius acalis	Red-Breasted jezebel	Papilio polytes	Common Mormon
Euploea mulciber	-	Precis almera	Peacock Pansy
Euploea mulciber	Striped Blue	Precis atlites	Grey Pansy

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20 Rs

TWENTY RUPEES

GOVERNMENT OF MEGHALAYA

Sub-Registrar

FORM K
Model Form of Mining Lease
(See rule 31)

THIS INDENTURE made this 30th (Thirtieth) day of August 2002 between the Governor of Meghalaya (hereinafter referred to as the "State Government" which expression shall where the context so admits be deemed to include the successors and assigns) of the one part and M/s LUM MAWSHUN MINERALS PRIVATE LIMITED (Name of Company) a company registered under The Companies Act 1956 (Act under which incorporated) and having its registered office at Hotel Polo Towers, Oakland Road, Shillong with contact address at Trusie), APHLC Road, Mawlai Nongkum, Shillong 793008 (Address) (hereinafter referred to as "the lessee" which expression shall where the context so admits be deemed to include its successors and permitted assigns), of the other part.

D.P. Wallang I.A.S.
Deputy Commissioner,
East Khasi Hills District
Shillong.

For Lum Mawshun Minerals (P) Ltd
B. O. Lyngdoh

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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

WHEREAS the lessee has applied to the State Government in accordance with the Mineral Concession Rules, 1960 (hereinafter referred to as the said Rules) for a mining lease for Shale/Siltstone in respect of the lands described in Part I of the Schedule hereunder written and has/have deposited with the State Government the sum of Rs. 10,000/- (Rupees ten thousand) only as security and the sum of Rs. 1,000/- (Rupees one thousand) only for meeting the preliminary expenses for a mining lease.

WITNESSETH that in consideration of the rents and royalties, covenants and agreements by and in these presents and the Schedule hereunder written reserved and contained and on the part of the lessee to be paid, observed and performed, the State Government hereby grants and demises unto the lessee.

All those mines beds/veins seams of Shale/Siltstone (here state the mineral or minerals) (hereinafter and in the Schedule referred to as the said minerals) situated lying and being in or under the lands which are referred to in Part I of the said Schedule, together with the liberties, powers and privileges to be exercised or enjoyed in connection herewith which are mentioned in Part II of the said Schedule subject to the restrictions and conditions as to the exercise and enjoyment of such liberties, powers and privileges which are mentioned in Part III of the said Schedule EXCEPT and reserving out of this demise unto the State Government the liberties, powers and privileges mentioned in Part IV of the said Schedule TO HOLD the premises hereby granted and demised unto the lessee from the 30th (Thirtieth) day of August 2002 for the term of 30 (thirty) years thence next ensuing YIELDING AND PAYING therefore unto the State Government the several rents and royalties mentioned in Part V of the said Schedule at the respective times therein specified subject to the provisions contained in Part VI of the said Schedule and the lessee hereby covenants/covenant with the State Government as in Part VII of the said Schedule is expressed and the State Government hereby covenants with the lessee as in Part VIII of the said Schedule as expressed AND it is hereby mutually agreed between the parties hereto as in Part IX of the said Schedule is expressed.

IN WITNESS WHEREOF these presents have been executed in manner hereunder appearing the day and year first above written.

The Schedule above referred to.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

D.P. WANDANG L.C.S.
Deputy Commissioner,
East Khasi Hills District
Shillong.

for Lum Nonshun Minerals (P) Ltd.

S. G. Lyngdoh
Director.

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PART – I

The Area of this Lease

Location and area of the lease:-

All that tract of lands situated at Sheila (Description of area or areas) village in (Pargana) in the Registration District of East Khasi Hills, Sub-District Shillong Sadar Sub-Division and Thana Mawsynram, Police Station bearing Cadestral survey Nos (Not available) containing an area of 4.9 hectares or thereabouts delineated on the plan hereto annexed and thereon coloured Green and bounded as follows:-

Northwest corner point is situated in the direction of 135 degrees and at a distance of 279 metres from the 39 km stone of the border road (Balat -- Sheila)

On the North by a distance of 490 metres
On the South by a distance of 490 metres
On the East by a distance of 100 metres
And On the West by a distance of 100 metres

hereinafter referred to as "the said lands" (Description of the boundaries and location map at Annexure – A).

PART – II

Liberties, powers and privileges to be exercised and enjoyed by the lessee subject to the restrictions and conditions in Part III.

To enter upon land and search for, win, work etc.:-

1. Liberty and power at all times during the term hereby demised to enter upon the said lands and to search for mine, bore, dig, drill for, win, work, dress, process, convert, carry away and dispose of the said mineral/minerals.

To sink, drive and make pits, shafts and inclines etc.: -

2. Liberty and power for or in connection with any of the purposes mentioned in this part to sink, drive, make, maintain and use in the said lands and pits shafts inclines, drifts, levels, waterways, airways and other works (and to use, maintain, deepen or extent any existing works of the like nature in the said lands).

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Shillong.

For East Mawshun Minerals (P) Ltd

S. G. Lyngdoh
Director.

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Meghalaya, Shillong

To bring and use machinery, equipment etc.:-

3. Liberty and power for or in connection with any of the purposes mentioned in this part to erect, construct, maintain and use on or under the said lands any engines, machinery, plant, dressing floors, furnaces, coke ovens, brick-kilns, workshops, store houses, bungalows, godowns, sheds and other buildings and other works and conveniences of the like nature on or under the said lands.

To make roads and ways etc. and use existing roads and ways:-

4. Liberty and power for or in connection with any of the purposes mentioned in this part to make any tramways, railways, roads, aircraft landing grounds and other ways in or over the said lands and to use maintain and go, and repass with or without horses, cattle, wagons, aircrafts, locomotives or other vehicles over the same (or any existing tramways roads and other ways in or over the said lands) on such conditions as may be agreed to.

To get building and road materials, etc:-

5. Liberty and power for or in connection with any of the purposes mentioned in this part to quarry and get stone gravel and other building and road materials and clay and to use and employ the same and to manufacture such clay into bricks or tiles and to use such bricks or tiles but to sell any such material bricks or tiles.

To use water from streams etc:-

6. Liberty and power for or in connection with any of the purpose mentioned in this part but subject to the right of any existing or future lessees and with the written permission of Deputy Commissioner/Collector to appropriate and use water from any streams water-courses, springs or other sources in or upon the said lands and to divert step up or dam any such stream or water course and collect or impound any such water and to make construct and maintain any watercourse culverts, drains or reservoirs but not so as to deprive any cultivated lands, villages, buildings or watering places for livestock of a reasonable supply of water as before accustomed nor in any way to foul or pollute any stream or springs. Provided that the lessee shall not interfere with the navigation in any navigable stream nor shall divert such stream without the previous written permission of the State Government.

To use land for stacking, heaping, depositing purposes:-

7. Liberty and power to enter upon and use a sufficient part of the surface of the said lands for the purpose of stacking, heaping, storing or depositing therein any produce of the mines or works carried on and any tools,

For Lion Diamond Minerals (P) Ltd.

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equipment, earth and materials and substances dug or raised under the liberties and powers mentioned in this part.

Beneficiation and conveying away of production:-

8. Liberty and power to enter upon and use a sufficient part of the said lands to beneficiate any ore produced from the said lands and to carry away such beneficiated ore.

To clear brushwood and to fell and utilise trees, etc.:-

9. Liberty and power for or in connection with any of the purposes mentioned in this part and subject to the existing rights of others and save as provided in clause 3 of Part III of this Schedule to clear undergrowth and brushwood and to fell and utilise any trees or timber standing or found on the said lands provided that the State Government may ask the lessee to pay for any trees or timber felled and utilised, by himothem at the rates specified by the Deputy Commissioner/Collector or the State Government.

PART - III

Restrictions and Conditions as to the exercise of the Liberties, Powers and Privileges in Part-II.

No building etc. upon certain places:-

1. No building or thing shall be erected, set up or placed and no surface operations shall be carried on in or upon any public pleasure ground, burning or burial ground or place, held sacred by any class of persons or any house or village site, public road or other place which the State Government may determine as public ground nor in such a manner as to injure or prejudicially effect any buildings, works, property or rights of other persons and no land shall be used for surface operations which is already occupied by persons other than the State Government for works or purposes not included in this lease. The lessee shall not also interfere with any right of way, well or tank.

Permission for surface operations in a land not already in use:-

2. Before using for surface operations any land which has not already been used for such operations, the lessee shall give to Deputy Commissioner/Collector of the District two calendar months previous notice in writing specifying the name or other description of the situation and the extent of the land proposed to be so used and the purpose for which the same is required and the said land shall not be so used if objection is

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For Lain Kanthan Minerals (P) Ltd.

Director.

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issued by the Deputy Commissioner/Collector within two months after the receipt by him of said notice issue. The objections so raised shall be referred to the State Government for consideration or waiver.

To cut trees in unreserved lands:-

3. The lessee shall not without the express sanction of the Deputy Commissioner/Collector cut down or injure any timber or trees on the said lands but may without such sanction clear away any brushwood or undergrowth which interferes with any operations authorised by these presents. The Deputy Commissioner/Collector or the State Government may require the lessee to pay for any trees or timber felled and utilised by him/them at the rates specified by the Deputy Commissioner/Collector of the District.

To enter upon reserved forests:-

4. Notwithstanding anything in this Schedule contained the lessee shall not enter upon any reserved forest included in the said lands without previous sanction in writing of the District forest Officer nor fell, cut and use any timber or trees without obtaining the sanction in writing of that Officer nor otherwise than in accordance with such conditions as the State Government may prescribe.

No mining operations within 50 metres of public works etc:-

5. The lessee shall not work or carry on or allow to be worked or carried on any mining operations at or to any point within a distance of 50 metres from any railway line except with the previous written permission of the Railway Administration concerned or under or beneath any ropeway or any ropeway trestle or station, except under and in accordance with the written permission of the authority owning the ropeway or from any reservoir, canal or other public works such as public roads and buildings or inhabited site except with the previous written permission of the Deputy Commissioner/Collector or any other officer authorised by the State Government in this behalf and otherwise than in accordance with such instructions, restrictions and conditions either general or special which may be attached to such permission. The said distance of 50 metres shall be measured in the case of railway, reservoir or canal horizontally from the outer toe of the bank or the outer edge of the cutting as the case may be and in case of a building horizontally from the plinth thereof. In the case of village roads no working shall be carried on within a distance of 10 metres of the outer edge of the cutting except with the previous permission of the Deputy Commissioner/Collector or any other officer duly authorised by the State Government in this behalf and otherwise than in accordance with such directions, restrictions and additions, either general or special, which may be attached to such permission.

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D.P. Pakkam
Deputy Commissioner
East Khasi Hills District
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For [illegible] Minerals (P) Ltd.

Director

GOVERNMENT OF MEGHALAYA

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Explanation:- For the purposes of the clause the expression "Railway Administration" shall have the same meaning as it is defined to have in the Indian Railways Act, 1890 by clause (*b*) of section 3 of that Act. "Public Road" shall mean a road which has been constructed by artificially surfaced as distinct from a track resulting from repeated use. Village road will include any track shown in the Revenue record as village road.

Facilities for adjoining Government licences and leases:-

6. The lessee shall allow existing and future holders of Government licences or leases over any land which is comprised in or adjoins or is reached by the land held by the lessee/lessees reasonable facilities of access thereto:

PROVIDED THAT no substantial hindrance or interference shall be caused by such holders of licences or leases to the operations of the lessee under these presents and fair compensation (as may be mutually agreed upon or in the event of disagreement as may be decided by the State Government) shall be made to the lessee for loss or damage sustained by the lessee by reason of the exercise of this liberty.

PART - IV

Liberties, Powers and Privileges reserved to the State Government

To work other minerals:-

1. Liberty and power for the State Government, or to any lessee or persons authorised by it in that behalf to enter into and upon the said lands and to search for, win, work, dig, get, raise, dress, process, convert and carry away minerals other than the said minerals and any other substances and for those purposes to sink, drive, make, erect, construct, maintain and use such pits, shafts, inclines, drifts, levels and other lines, waterways, airways, water courses, drains, reservoirs, engines, machinery, plant, buildings, canals, tramways, railways, roadways and other works and conveniences as may be deemed necessary or convenient.

To make railways and roads: -

2. Liberty and power for the State Government or any lessee or person authorised by it in that behalf to enter into and upon the said lands and to make upon, over or through the same any railways, tramways, roadways or pipelines for any purpose other than those mentioned in Part II of these presents and to get, from the said land, stones, gravel, earth and other materials for making maintaining and repairing such railways, tramways and roads or any existing railways and roads and to and repass at all times

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For Lyngdoh Minerals (P) Ltd.

S. G. Lyngdoh
Director.

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with or without horses, cattle or other animals, carts, wagons, carriages, locomotives or other vehicles over or along any such railways, tramways, road lines and other wages for all purposes and as occasion may require, provided that in the exercise of such liberty and power by such other lessee or person no substantial hindrance or interference shall be caused to or with the liberties, powers and privileges of the lessee under these presents and that fair compensation as may be mutually agreed upon or in the event of disagreement as may be decided by the State Government shall be made to the lessee/lessees for all loss or damage substantial hindrance or interference shall be caused to or with the exercise by such lessee or person of such liberty and power.

PART – V

Rents and royalties reserved by this lease

To pay dead rent or royalty whichever is higher:-

1. The lessee shall pay, for every year except the first year of the lease, dead rent as specified in clause 2 of this Part:

   Provided that, where the holder of such mining lease becomes liable under section 9 of the Act, to pay royalty for any mineral removed or consumed by him or by his agent, manager, employee, contractor or sub-lessee, from the leased area, he shall be liable to pay either such royalty or the dead rent in respect of that area, whichever is higher.

Rate and mode of payment of dead rent:-

2. Subject to the provisions of clause 1 of this Part, during the subsistence of the lease, the lessee shall pay to the State Government annual dead rent for the lands demised and described in Part I of this Schedule at the rate for the time being specified in the Third Schedule to the Act as revised from time to time, in such manner as may be specified in this behalf by the State Government vide memo *No. DMR/R/13/5093 – 103 dated 05.03.1975, placed at Annexure - B.*

Rate and mode of payment of royalty:-

3. Subject to the provision of clause 1 of this part, the lessee shall during the subsistence of this lease pay to the State Government royalty in respect of the quantity of Shale/Silstone removed by him/them from the leased area at the rate for the time being specified in the Second Schedule to the Mines and Minerals (Regulation and Development) Act, 1957 in such manner as specified in this behalf by the State Government vide *Office Memo No. DMR/R/13/5093-103 dated 05.03.75.*

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Deputy Commissioner
East Khasi Hills District
Shillong.

For Lota Mawhan Minerals (P) Ltd.

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Directorate of Mineral Resources
Meghalaya, Shillong

Payment of surface rent and water rate:-

2. The lessee shall pay rent and water rate to the State Government in respect of all parts of the surface of the said lands which shall from time to time be occupied or used by the lessee under the authority of these presents at the rate of Rs. 8.43 (Rupees eight and paise forty three) only and Rs. 3.43 (Rupees three and paise forty three) only respectively per annum per hectare of the area so occupied or used and so in proportion for any area less than a hectare during the period from the commencement of such occupation or used until the area shall cease to be so occupied or used and shall as far as possible restore the surface land so used to its original condition. Surface rent and water rate shall be paid as hereinbefore detailed in clause 2. PROVIDED THAT NO such rent/water rate shall be payable in respect of the occupation and use of the area comprised in any roads or ways to which the public have full right of access

PART - VI

Provisions relating to the rents and royalties

Rent and royalties to be free from deduction etc.:-

1. The rent, water rate and royalties mentioned in Part V of this Schedule shall be paid free from any deduction to the State Government at Shillong Treasury and such manner as the State Government may prescribe.

PROVIDED ALWAYS and it is hereby agreed that Rs 10,000/- (Rupees ten thousand) only the balance standing to the credit of the lessee on account of the security deposit made by him/them shall be retained and accepted by the State Government in satisfaction of the rents and royalties mentioned in Part V until they reach that amount.

Mode of computation of royalty:-

2. For the purposes of computing the said royalties the lessee shall keep a correct account of the quantity of Shale/Siltstone produced and despatched. The accounts as well as the weight of the Shale/Siltstone in stock or in the process of export may be checked by an officer authorised by the Central or State Government. Here specify the mode of arriving at sale price/prices at pits mouth of Shale/Siltstone.

Course of action if rents and royalties are not paid in time:-

3. Should any rent, royalty or other sums due to the State Government under the terms and conditions of these presents be not paid by the lessee within

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Deputy Commissioner,
East Khasi Hills District
Shillong.

For Lum Kirchiai Minerals (P) Ltd.

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Directorate of Mineral Resources
Meghalaya, Shillong

the prescribed time the same, together with simple interest thereon at the rate of twenty-four per cent per annum and as revised from time to time may be recovered on a certificate of such officer as may be specified by the State Government by general or special order, in the same manner as an arrear of land revenue.

PART - VII

The Covenants of the Lessee

Lessee to pay rents and royalties, taxes, etc:-

1. The lessee shall pay the rent, water rate and royalties reserved by this lease at such times and in the manner provided in PARTS V and VI of these presents and shall also pay and discharge all taxes, rates, assessments and impositions whatsoever being in the nature of public demands which shall from time to time be charged, assessed or imposed by the authority of the Central and State Governments upon or in respect of the premises and works of the lessee in common with other premises and works of a like nature except demands for land revenues.

To maintain and keep boundary marks in good order:-

2. The lessee shall at his/their own expenses erect and at all times maintain and keep in repair boundary marks and pillars according to the demarcation to be shown in the plan annexed to this lease. Such marks and pillars shall be sufficiently clear of the shrubs and other obstructions as to allow easy identification.

To commence operations within two years and work in a workman-like manner:-

3. The lessee shall commence operation within two years from the date of execution of the lease and shall thereafter at all times during the continuance of his lease search for, win, work and develop, the said minerals without voluntary intermission in a skilful and workman-like manner and as prescribed under clause 12 hereinafter without doing or permitting to be done any unnecessary or avoidable damage to the surface of the said lands or the crops, buildings, structures or other property thereon. For the purposes of this clause operations shall include the erection of machinery, laying of a tramway or construction of a road in connection with the mine.

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Shillong.

For [illegible] Associate (P) Ltd.

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To indemnify Government against all claims:-

4. The lessees shall make and pay such reasonable satisfaction and compensation as may be assessed by lawful authority in accordance with the law in force on the subject for all damage, injury or disturbance which may be done by him/them in exercise of the powers granted by this lease and shall indemnify and keep indemnified fully and completely the State Government against all claims which may be made by any person or persons in respect of any such damage, injury or disturbance and all costs and expenses in connection therewith.

To secure and keep in good condition pits, shafts, etc:-

5. The lessee shall during the subsistence of this lease well and sufficiently secure and keep open with timber or other durable means all pits, shafts and workings that may be made or used in the said lands and make and maintain sufficient fences to the satisfaction of the State Government round every such pit, shaft or working whether the same is abandoned or not and shall during the same period keep all workings in the said lands except such as may be abandoned accessible free from water and foul air as far as possible.

To strengthen and support the mine to necessary extent: -

6. The lessee shall strengthen and support to the satisfaction of the Railway Administration concerned or the State Government, as the case may be any part of the mine which in its opinion requires such strengthening or support for the safety of any railway, reservoir, canal, road and any other public works or structures.

To allow inspection of workings: -

7. The lessee shall allow any officer authorised by the Central Government or the State Government in that behalf to enter upon the premises including any building, excavation or land comprised in the lease for the purpose of inspecting, examining, surveying, prospecting and making plans thereof sampling and collecting any data and the lessee shall with proper person employed by the lessee and acquainted with the mines and work effectually assist such officer, agents, servants and workmen in conducting every such inspection and shall afford them all facilities, information connected with the working of the mines which they may reasonably require and also shall and will conform to and observe all orders and regulations which the Central and State Governments as the result of such inspection or otherwise may, from time to time, see fit to impose.

To report accident:-

8. The lessee shall without delay send to the Deputy Commissioner/Collector a report of any accident causing death or serious bodily injury or serious

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Deputy Commissioner
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Shillong.

For Lasi Kawishun Minerals (P) Ltd.

S. C. Lyngdoh
Director.

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

injury to property of adjoining owners or damaging the of property which may occur in the course of the operations under this lease.

To report discovery of other minerals:-

19. The lessee shall report to the State Government the discovery in the leased area of any mineral not specified in the lease within sixty days of such discovery along with full particulars of the nature and position of such find. If any mineral not specified in the lease is discovered in the leased area, the lessee shall not win and dispose of such mineral unless such mineral is included in the lease or a separate lease is obtained therefor.

To keep records and accounts regarding production and employees etc:-

20. The lessee shall at all time during the said term keep or cause to be kept at an office to be situated upon or near the said lands correct and intelligible books of accounts which shall contain accurate entries showing from time to time:

(1) Quantity and quality of the said mineral raised from the said lands.

(2) Quantity of the various qualities of ores beneficiated or converted (for a sample coal converted into coke).

(3) Quantities of the various qualities of the said mineral sold and exported separately.

(4) Quantities of the various qualities of the said mineral otherwise disposed of and the manner and purpose of such disposal.

(5) The prices and all other particulars of all sales of said mineral

(6) The number of persons employed in the mines or works or upon the said lands specifying nationality, qualifications and pays of the technical personnel.

(7) Such other facts, particulars and circumstances as the Central or the State Governments may from time to time require and shall also furnish free of charge to such officers and at such times as the Central and State Governments may appoint true and correct abstract of all or any such books of accounts and such information and returns to all or any of the matters aforesaid as the State Government may prescribe and shall at all reasonable times allow such officers as the Central Government or State Government shall in that behalf appoint to enter into and have free access to the said officers for the purpose of examining and inspecting the said books of accounts, plans and records and to make copies thereof and make extracts therefrom.

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For Lum Kawlipo Minerals (P) Ltd.
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Director.

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Mining Engineer
Directorate of Mineral Resources
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To maintain plans, etc :-

11 The lessee shall at all times during the said term maintain at the mine office correct intelligible up-to-date and complete plans and sections of the mines on the said lands. They shall show all the operations, and workings and all the trenches, pits and drillings made by him/them in the course of operations carried on by him/them under the seam faults and other disturbances encountered and geological data and all such plans and sections shall be amended and filled in by and from actual surveys to be made for that purpose at the end of twelve months of any period specified from time to time and the lessee shall furnish free of charge to the Central and State Governments true and correct copies of such plans and sections whenever required. Accurate records of all trenches, pits and drillings shall show:

(a) The subsoil and strata through which they pass.

(b) Any mineral encountered

(c) Any other matter of interest and all data required by the Central and State Governments, from time to time

The lessee shall allow any officer of the Central or the State Government, authorised in this behalf by the Central Government, to inspect the same at all reasonable times. He/they shall also supply when asked for by the State Government/the Coal Controller, the Director-General, Geological Survey of India, the Controller General, Indian Bureau of Mines, a composite plan of the area showing thickness, dip, inclination etc. of all the seams as also the quantity of reserves quality-wise.

11A. The lessee shall pay a wage, not less than the minimum wage prescribed by the Central or State Government from time to time.

11B The lessee shall comply with provisions of the Mines Act, 1952 and the rules made thereunder

11C. The lessee shall take measures for the protection of environment like planting of trees, reclamation of land, use of pollution control devices, and such other measures as may be prescribed by the Central or State Government, from time to time at his own expense.

11D. The lessee shall pay compensation to the occupier of the land on the date and in the manner laid down in these rules.

11E. The lessee shall, in the matter of employment, give preference to the local tribals, and to the persons who become displaced because of the taking up of mining operations.

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For Lum Kynjai Minerals (P) Ltd
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Meghalaya, Shillong

11F The lessee shall [illegible] work and economic welfare assistance programme as [illegible] under Para – 9.15 of the Environmental Impact Analysis Report of the mine

Act 67 of 1957:-

12 (1). The lessee shall be bound by such rules as may be issued from time to time by the Government of India under section 18 of the Mines and Minerals (Regulation & Development) Act, 1957(Act 67 of 1957) and shall not carry on mining or other operations under the said lease in any way other than as prescribed under these rules.

12 (2). Without prejudice to the above provisions the mining operations conducted by the lessee should be fully mechanized as per the approved Mining Plan

12 (3). The lessee shall installed a crushing and screening plant at the mining site to ensure that the Shale/Siltstone transported/exported to the Cement Factory at Bangladesh after it has undergo crushing and screening.

To provide Electronic Weighbridge:-

13. Unless specifically exempted by the State Government the lessee shall provide and at all times keep at or near the pit head or each of the pit heads at which the said mineral shall be brought to bank a properly constructed and efficient Electronic Weighbridge and shall weighed or cause to be weighed thereon all the said mineral from time to time, brought to bank, sold, exported and converted and also the converted products and shall at the close of each day cause the total weights, ascertained by such means of the said mineral, ores products raised, sold, exported and converted during the previous twenty-four hours to be entered in the aforesaid books of accounts. The lessee shall permit the State Government at all times during the said term to employ any persons to be present at the weighing of the said mineral as aforesaid and to keep accounts thereof and to check the accounts kept by the lessee.

To allow test of Electronic Weighbridge:-

14. The lessee/lessees shall allow any person or persons appointed in that behalf by the State Government at any time or times during the said term to examine and test every electronic weighbridge to be provided and kept as aforesaid and the weights used therewith in order to ascertain whether the same respectively are correct and in good repair and order and if upon any such examination or testing any such electronic weighbridge or weights shall be found incorrect or out of repair or order the State Government may require that the same be adjusted, repaired and put in order by and at the expense of the lessee and if such requisition be not complied with within fourteen days after the same shall have been made, the State Government may cause electronic weighbridge or weights to be adjusted, repaired, and

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for Lum Mawsiang Minerals (P) Ltd
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out in order and the expense of so doing shall be paid by the lessee to the State Government on demand and if upon any such examination or testing as aforesaid any error shall be discovered in any electronic weighbridge or weights to the prejudice of the State Government such error shall be regarded as having existed for three calendar months previous to the discovery thereof or from the last occasion of so examining and testing the same electronic weighbridge and weights in case such occasion be within such period of three months and the said rent and royalty shall be paid and accounted for accordingly.

To pay compensation for injury of third parties:-

15. The lessee shall make and pay reasonable satisfaction and compensation for all damage, injury or disturbance of person or property which may be done by or on the part of lessee in exercise of the liberties and power granted by these presents and shall at all times save harmless and keep indemnified the State Government from and against all suits, claims and demands which may be brought or made by any person or persons in respect of any such damage, injury or disturbance.

Not to obstruct working of other minerals:-

16. The lessee will exercise the liberties and powers hereby granted in such a manner as to offer no unnecessary or reasonably avoidable obstruction or interruption to the development and working within the said lands of any minerals not included in this lease and shall at all times afford to the Central and State Government and to the holders of prospecting licences or mining leases in respect of any such minerals or any minerals within any land adjacent to the said lands as the case may be reasonable means of access and safe and convenient passage upon and across the said lands to such minerals for the purpose of getting working, developing and carrying away the same provided that the lessee shall receive reasonable compensation for any damage or injury which he/they may sustain by reason or in consequence of the use of such passage by such lessees or holders of prospecting licences.

Transfer of lease:-

17 (1) The lessee shall not, without the previous consent in writing of the State Government:-

(a) assign, sublet, mortgage, or in any other manner, transfer the mining lease, or any right, title or interest therein, or

(b) enter into or make any arrangement, contract or understanding whereby the lessee will or may be directly or indirectly financed to a substantial extent by, or under which the lessee's operations or undertakings will or may be substantially controlled by, any person or body of persons other than the lessee;

J.P. WAHLANG
Deputy Commissioner
East Khasi Hills District
Shillong

For Lum Kynshan Minerals (P) Ltd.

S. G. Lyngdoh
Director.

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Provided that the State Government may grant its written consent only :-

(a) the lessee has furnished an affidavit along with his application for transfer of the mining lease, stating therein the amount that he has already taken or proposes to take as consideration from the transferee;

(b) the transfer of the mining lease is to be made to a person or body directly undertaking mining operations.

(2) Without prejudice to the above provisions the lessee may transfer this lease or any right, title or interest therein to a person who has filed an affidavit stating that he has filed up-to-date income tax returns, paid income tax assessed on him and paid the income tax on the basis of self-assessment as provided in the Income-Tax Act, 1961 (43 of 1961), on payment of five hundred rupees to the State Government:

Provided that the lessee shall make available to the transferee the original or certified copies of all plans of abandoned workings in the area and in a belt 65 metres wide surrounding it.

Provided further that where the mortgagee is an Institution or a Bank or a Corporation specified in Schedule V, it shall not be necessary for any such Institution or Bank or Corporation to meet with the requirement relating to income tax and the said valid clearance certificate.

(3) The State Government, may by order in writing, determine the lease at any time if the lessee has/have in the opinion of the State Government committed a breach of any of the above provisions or has/have transferred the lease or any right, title or interest therein otherwise than in accordance with clause (2):

Provided that no such order shall be made without giving the lessee a reasonable opportunity of stating his/their case.

Not to be financed or controlled by a Trust, Corporation, Firm or person:-

18. The lessee shall not be controlled and the lessee shall not allow themselves to be controlled by any Trust, Syndicate, Corporation, Firm or person except with the written consent of the Central Government. The lessee shall not enter into or make any arrangement compact or understanding whereby the lessee will or may be directly or indirectly financed by or under which the lessee's/lessees' operations or undertakings will or may be carried on directly or indirectly by or for the benefit of or subject to the control of any Trust, Syndicate, Corporation, Firm or person unless with the written sanction given prior to such arrangement compact or understanding being entered into or made of the Central Government and any or every such arrangement compact or understanding as aforesaid (entered into or made with such sanction as aforesaid) shall only be entered into or made and shall

Deputy Commissioner
East Khasi Hills District
Shillong.

For Lum Sohing Minerals (P) Ltd.

Director

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

(b) Should the right of pre-emption conferred by the present provisions be exercised and a lease or license for carry the minerals or products thereof purchased on behalf of the State Government or the Central Government be delayed for whatever reason or for any other reason the lessee shall pay the amount due for such delay according to the terms of the charter party of such vessel unless the State Government shall be satisfied that the delay is due to causes beyond the control of the lessee.

(c) The price to be paid for all minerals or products of minerals taken to pre-emption by the State Government in exercise of the right hereby conferred shall be the fair market price prevailing at the time of pre-emption PROVIDED THAT in order to assist in arriving at the said fair market price the lessee shall be required furnish to the State Government for the confidential information of the Government particulars of the quantities description and prices of the said minerals or products thereof sold to other customers and of charters entered into for freight for carriage of the same and shall produce to such officer or officers as may be directed by the State Government original or authenticated copies of contracts and charter parties entered into for the sale or freighting of such minerals or products.

(d) In the event of the existence of a state of war or emergency (of which existence and President of India shall be the sole judge and a notification to this effect in the Gazette of India shall be conclusive proof), the State Government with the consent of the Central Government shall from time to time and all times during the said term have the right (to be exercised by a notice in writing to the lessee) forthwith take possession and control of the works, plant, machinery and premises of the lessee on or in connection with the said lands or operations under this lease and during such possession or control the lessee shall conform to and obey all directions given by or on behalf of the Central Government or State Government regarding the use or employment of such works, plants, premises and minerals PROVIDED THAT fair compensation which shall be determined in default of agreement by the State Government shall be paid to the lessee for all loss or damage sustained by him/them by reason or in consequence of the exercise of the powers conferred by this clause and PROVIDED ALSO that the exercise of such powers shall not determine the said term hereby granted or affect the terms and provisions of these presents further than may be necessary to give effect to the provisions of this clause.

Please to be true copy

Employment of foreign national:-

22. The lessee shall not employ, in connection with the mining operations any person who is not an Indian national except with the previous approval of the Central Government.

D.P. WAHLANG, I.A.S.
Deputy Commissioner,
East Khasi Hills District
Shillong.

For Lum Mawshuo Minerals (P) Ltd.

S. G. Lyngdoh
Director.

APPROVED.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Recovery of expenses incurred by the State Government:-

23. If any of the works or matters which in accordance with the covenants in that behalf hereinbefore contained are to be carried or performed by the lessee be not so carried out or performed within the time specified in that behalf the State Government may cause the same to be carried out or performed and the lessee shall pay to State Government on demand all expenses which shall be incurred in carrying out or performance of the same and the decision of the State Government as to such expenses shall be final.

Furnishing of geophysical data:-

24. The lessee shall furnish:

(a) all geophysical data relating to mining fields or engineering and ground water surveys, such as anomaly maps, sections, plans, structures, contour maps, logging, collected by him during the course of mining operations to the Director-General, Geological Survey of India, Calcutta.

(b) all information pertaining to investigations of radioactive minerals collected by him during course of mining operations to the Secretary, Department of Atomic Energy, New Delhi.

Data or information referred to above shall be furnished every year reckoned from the date of commencement of the period of the mining lease.

PART – VIII

The Covenants of the State Government

Lessee/lessees may hold and enjoy rights quietly:-

1. The lessee paying the rents, water rate and royalties hereby reserved and observing and performing all the covenants and agreements herein contained and on the part of the lessee to be observed and performed shall and may quietly hold and enjoy the rights and premises hereby demised for and during the term hereby granted without any unlawful interruption from or by the State Government, or any person rightfully claiming under it.

Acquisition of land of third parties and compensation thereof:-

2. If in accordance with the provision of clause 4 of Part VII of this Schedule the lessee/lessees shall offer to pay to an occupier of the surface of any part

D.P. Bizzang Lyngdoh
Deputy Commissioner,
East Khasi Hills District
Shillong.

For Lum [illegible] Minerals (P) Ltd

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

of the said lands compensation for any damage or injury which may arise from the proposed entry on the lessee and the said occupier shall refuse his consent to the exercise of the rights and powers reserved to the State Government and demised to the lessee by these presents and the lessee/lessees shall report the matter to the State Government and shall deposit with it the amount offered as compensation and if the Central/State Government is satisfied that the amount of compensation offered is fair and reasonable or if it is not so satisfied and the lessee shall have deposited with it such further amount as the State and Central Government shall consider fair and reasonable the State Government shall order the occupier to allow the lessee to enter the land and to carry out such operations as may be necessary for the purpose of this lease. In assessing the amount of such compensation the State Government shall be guided by the principles of the Land Acquisition Act.

To renew:-

3 The mining lease is renewable in terms of the provisions of the Act and the rules made thereunder.

Provided that the State Government may for reasons to be recorded in writing reduce the area applied for.

If the lease is in respect of minerals specified in the First Schedule to the Act, renewal will be subject to the prior approval of the Central Government.

If the lessee be desirous of taking a renewed lease of the premises hereby demised or of any parts of them for a further term from the expiration of the term hereby granted and is otherwise eligible, he/they shall prior to expiration of the last mentioned term give to the State Government twelve calendar months previous notice in writing and shall pay the rent, rates and royalties hereby reserved and shall observe and perform the several covenants and agreements herein contained and on the part of the lessee to be observed and performed up to the expiration of the term hereby granted. The State Government on receipt of application for renewal, shall consider it in accordance with the provisions of the Act and the rules made thereunder and shall pass orders as it deems fit. If renewal is granted, the State Government will at the expense of the lessee and upon his executing and delivering to the State Government if required a counterpart thereof execute and deliver to the lessee a renewed lease of the said premises or part thereof for the further term of 30 (twenty) years at such rents, rates and royalties and on such terms and subject to such rents, rates and royalties and on such terms and subject to such covenants and agreements, including this present covenant to renew as shall be in accordance with the Mineral Concession Rules, 1960, applicable to Shale/Siltstone (name of minerals) on the day next following the expiration of the term hereby granted.

Certified to be true copy

Deputy Commissioner

D.P. WAHLANG I.A.S.
Deputy Commissioner,
East Khasi Hills District
Shillong.

For Lum Kawshua Minerals (P) Ltd.

S.G. Lyngdoh
Director.

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Liberty to determine the lease:-

4. The lessee may at any time determine this lease by giving not less than 12 calendar months notice in writing to the State Government or to such officer or authority as the State Government may specify in this behalf and upon the determination of such notice provided that the lessee shall upon such determination [illegible] and pay to the State Government compensation for damages or other money which may then be due and payable under these presents to the lessor or any other person or persons and shall deliver these presents to the State Government then this lease and the said term and the liberties powers and not lease hereby granted shall absolutely cease and determine but without prejudice to any right or remedy of the lessor in respect of any breach of any of the covenants or agreements contained in these presents.

4A. The State Government may on an application made by the lessee permit him to surrender one or more minerals from his lease which is for a group of minerals on the ground that deposits of that mineral have since exhausted or depleted to such an extent that it is no longer possible to work the mineral economically subject to the condition that the lessee

(a) Makes an application for such surrender of mineral at least six months before the intended date of surrender; and

(b) Gives an undertaking that he will not cause any hindrance in the working of the mineral so surrendered by any other person who is subsequently granted a mining lease for the mineral.

Refund of security deposits:-

5. On such date as the State Government may elect within 12 calendar months after the determination of this lease or of any renewal thereof, the amount of the security deposit paid in respect of this lease and then remaining to deposit with the State Government and not required to be applied to any of the purposes mentioned in this lease shall be refunded to the lessee. No interest shall run on the security deposit.

Certified to be true copy:-

PART – IX

General Provisions

Obstructions to inspections:-

1. In case the lessee or his/their transferee/assignee does/do not allow entry or inspection by the officers authorised by the Central or State Government

Deputy Commissioner,
East Khasi Hills District
Shillong.

For Lum Mawshun Minerals (P) Ltd.

Director.

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

under clauses (1) or (2) of rule 27 of said Rules, the State Government shall provide notice in writing to the lessee requiring him to show cause within such time as may be specified in the notice why the lease should not be determined and his security deposit forfeited; and if the lessee fails to show cause within the aforesaid time to the satisfaction of the State Government the State Government may determine the lease and forfeit the whole or part of the security deposit.

Penalty in case of default in payment of royalty and breach of covenants:-

2. If the lessee or his/their transferee or assignee makes make any default in payment of rent or water rate or royalty as required by section 9 of the Act or commits a breach of any of the conditions and covenants other than those referred to in covenant 1 above, the State Government shall give notice to the lessee requiring him/them to pay the rent, water rate, royalty or remedy the breach, as the case may be, within sixty days from the date of receipt of the notice and if the rent, water rate and royalty are not paid or the breach is not remedied within such period, the State Government without prejudice to any proceedings that may be taken against him/them, determine the lease and forfeit the whole or part of the security deposit.

Penalty for repeated breaches of covenants:-

3. In case of repeated breaches of covenants and agreements by the lessee for which notice has been given by the State Government in accordance with clauses (1) and (2) aforementioned on earlier occasion, the State Government without giving any further notice, may impose such penalty not exceeding twice the amount of annual dead rent specified in clause 2 Part V.

Failure to fulfil the terms of leases due to "Force Majeure":-

4. Failure on the part of the lessee to fulfill any of the terms and conditions of this lease shall not give the Central or State Government any claim against the lessee or be deemed a breach of this lease, in so far as such failure is considered by the said Government to arise from force majeure, and if through force majeure the fulfillment by the lessee of any of the terms and conditions of this lease be delayed, the period of such delay shall be added to the period fixed by this lease. In this clause the expression "Force Majeure" means act of God, war, insurrection, riot, civil commotion, strike earth quake, tide, storm, tidal wave, flood, lightning, explosion, fire earthquake and any other happening which the lessee could not reasonably prevent or control.

Lessee to remove his/their properties on the expiry of lease:-

5. The lessee having first paid discharged rents, rates and royalties payable by virtue of these presents may at the expiration or sooner determination of the

B.P. WAHLANG I.A.S.
Deputy Commissioner
East Khasi Hills District
Shillong.

for Lion Mining Minerals (I) Ltd.

Director

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

[illegible] clause [illegible] of this Schedule [illegible] and in the case of any [illegible] months or more but less than six calendar months after such notice shall have been given to him then [illegible] at any time within the currency of lease [illegible] machinery, plant, buildings, structures, tramways, railway and other works, erections and conveniences which may have been erected and set up or placed by the lessee upon the said land and which the lessee is not bound to deliver to the State Government under clause 20 of Part VII of this Schedule and which the State Government shall not desire to purchase.

Forfeiture of property left more than six months after determination of lease:-

6 If at the end of six calendar months after the expiration or sooner determination of the said term under the provision contained in clause [illegible] of Part VIII of this Schedule become effective, there shall remain in or upon the said land any tore or winning, engines, machinery, plant, buildings, structures, tramways, railways and other work, erections and conveniences or other property which are not required by the lessee in connection with operations in any other lands held by him/them under prospecting licence or mining lease the same shall if not removed by the lessee within one calendar month after notice in writing requiring their removal has been given to lessee by the State Government be deemed to become the property of the State Government and may be sold or disposed of in such manner as the State Government shall deem fit without liability to pay any compensation or to account to the lessee in respect thereof.

Notices:-

7 Every notice by these presents required to be given to the lessee shall be given in writing to such person resident on the said lands as the lessee may appoint for the purpose of receiving such notices and if there shall have been no such appointment then every such notice shall be sent to the lessee by registered post addressed to the lessee/lessees at the address recorded in this lease or at such other address in India as the lessee/lessees may from time to time in writing to the State Government designate for the receipt of notices and every such service shall be deemed to be proper and valid service upon the lessee/lessees and shall not be questioned or challenged by him/them.

Entry of finished products:-

8 The lessee or its transferee shall ensure that in no way the finished products processed outside the State out of the Shale/Siltstone removed by him from the said land, is exported to the State of Meghalaya or for that matter into any other States of the North East.

D.P. WALLANG I.A.S.
Deputy Commissioner
East Khasi Hills District
Shillong.

For Lessee

APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

579

10 RS.

GOVERNMENT OF MEGHALAYA

TEN RUPEES

10 RS

508 = 62101.00 = ...

...act Act ... is compulsorily stamped exempted from stamp duty under the Assam state act adopted by Meghalaya.

...

FORM - 'O'

MODEL FORM FOR TRANSFER OF MINING LEASE
(See rule 37 A)

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

The indenture made this 15th (Fifteenth) day of January, 2003 between M/s LUM MAWSHUN MINERALS PRIVATE LIMITED (name of Company) a company registered under the Companies Act, 1956 (Act under which incorporated) and having its registered office at Hotel Polo Towers, Oakland Road, Shillong with contact address at Traisier, APHLC Road, Mawlai Nongkum, Shillong - 8 (hereinafter referred to as the "Transferor" which expression shall where the context so admits be deemed to include its successors and permitted assigns) of the first part.

And

APPROVED

M/s LAFARGE UMIAM MINING PRIVATE LIMITED (name of the Company) a company registered under the Companies Act, 1956 (Act under which incorporated) and having its registered office at Hotel Polo Towers, Oakland Road, Shillong (hereinafter referred to as the "Transferee" which expression shall where the context so admits be deemed to include its successors and permitted assigns) of the second part.

2

For Lum Mawshun Minerals (P) Ltd
S. G. Lyngdoh
Director

For Lafarge Umiam Mining (P) Ltd
N. A. Rahim
Director

Certified to be true copy

Notary Registered
East Khasi Hills District
Shillong

And

The Governor of Meghalaya (hereinafter referred to as the "State Government" which expression shall where the context so admits be deemed to include the successors and assigns) of the third part.

Whereas by virtue of an indenture of lease dated the 30th (thirtieth) day of August 2002 and registered as No. 520 on the 13th September 2002 (date) in the office of the Sub-registrar of Sohra Sub Division (place) (hereinafter referred to as lease) the original whereof is annexed hereto and marked 'A' entered into between the State Government (therein called the lessor) and the transferor (therein called the lessee), the transferor is entitled to search for, win and work mines and minerals in respect of Shale and Limestone (name of minerals) in the land described in Schedule thereto and also in Schedule annexed hereto for the term and subject to the payment of the rents and royalties and observance and performance of the lessee's covenant and conditions in the said deed of lease reserved and contained including a covenant not to assign the lease or any interest thereunder without the previous sanction of the State Government.

And whereas the transferor is now desirous of transferring and assigning the lease to the transferee and the State Government has, at the request of the transferor, granted permission to the transferor vide order No. MG.29/2000/227 dated 13th January 2003 to such a transfer and assignment of the lease upon the condition of the transferee entering into an agreement is and contained the terms and conditions hereinafter setforth.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Now this Deed Witnesseth as follows:-

1. The transferee hereby covenants with the State Government that from and after the transfer and assignment of the lease the transferee shall be bound by, and be liable to perform, observe and conform and be subject to all the provisions of all the covenants, stipulations and conditions contained in the said hereinbefore recited lease in the same manner in all respects as if the lease had been granted to the transferee as the lessee thereunder and he had originally executed it as such.

APPROVED

2. It is further hereby agreed and declared by the transferor of the one part and the transferee of the other part that

   (i) The transferor and the transferee declare that they have ensured that the mineral rights over the area for which the mining lease is being transferred vest in the State Government.

.....3

Deputy Commissioner
East Khasi Hills District
Shillong

Certified to be true copy

For Lum Sawkhar Minerals

S. G. Lyngdoh
Director

For Lafarge Umiam Minerals (P) Ltd

M. A. Rahim
Director

(ii) The transferor hereby declares that he has not assigned subject, mortgaged or in any other manner transferred the mining lease now being transferred and that no other person or persons has any right, title or interest where under in the present mining lease being transferred.

(iii) The transferor further declares that he has not entered into or made any agreements, contract or understanding whereby he had been or is being directly or indirectly financed to a substantial extent by or under which the transferor's operation or understandings were or are being substantially controlled by any person or body of persons other than the transferor.

(iv) The transferee hereby declares that he/she has accepted all the conditions and liabilities which the transferor was having in respect of such mining lease.

(v) The transferee further declares that he is financially capable of and will directly undertake mining operations.

(vi) The transferee further declares that he has filed an affidavit stating that he has filed up-to-date income tax returns, paid the income tax assessed on him and paid the income tax on the basis of self-assessment as provided in the Income Tax Act, 1961, (43 of 1961).

(vii) The transferor has supplied to the transferee the original certified copies of all plans of abandoned workings in the area and in a belt 65 metres wide surrounding it.

(viii) The transferee hereby further declares that as a consequence of this transfer, the total area while held by him under mineral concession are not in contravention of Section 6 of the Mines and Minerals (Regulation & Development) Act, 1957 or rule 35 of the Mineral Concession Rules, 1960.

(ix) The transferor has paid all the rent, royalties and other dues towards Government till the date in respect of this lease.

In witness whereof the parties hereto have signed on the date and year first above written.

.....4

Deputy Commissioner
East Khasi Hills District,
Shillong.

APPROVED

For Lum Moyshun Minerals (P) Ltd

S. G. Lyngdoh
Director.

For Lafarge Umiam Mining (P) Ltd

M. A. Rahim
Director

Certified to be true copy

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Deputy Commissioner
East Khasi Hills District
Shillong

Signed by:

For and on behalf of the State Government in the presence of

1. H. M. LIANG, MCS
Additional Deputy Commissioner

2. Head Assistant,
Office of the Deputy Commissioner
East Khasi Hills District
Shillong

For Lucy Mawsiun Minerals Pvt. Ltd

S. G. Lyngdoh

Signature of Transferor in the presence of Witnesses

1. (O. BASAIAWMOIT)

2.

For Lafarge Umiam Mining (P) Ltd

M. A. Rahim

Signature of Transferee in the presence of

1. (Narayan Sharma)
Mining Development Manager
Lafarge Umiam Mining

2. (Manjaree Rai)
Company Secretary
Lafarge Umiam Mining Ltd

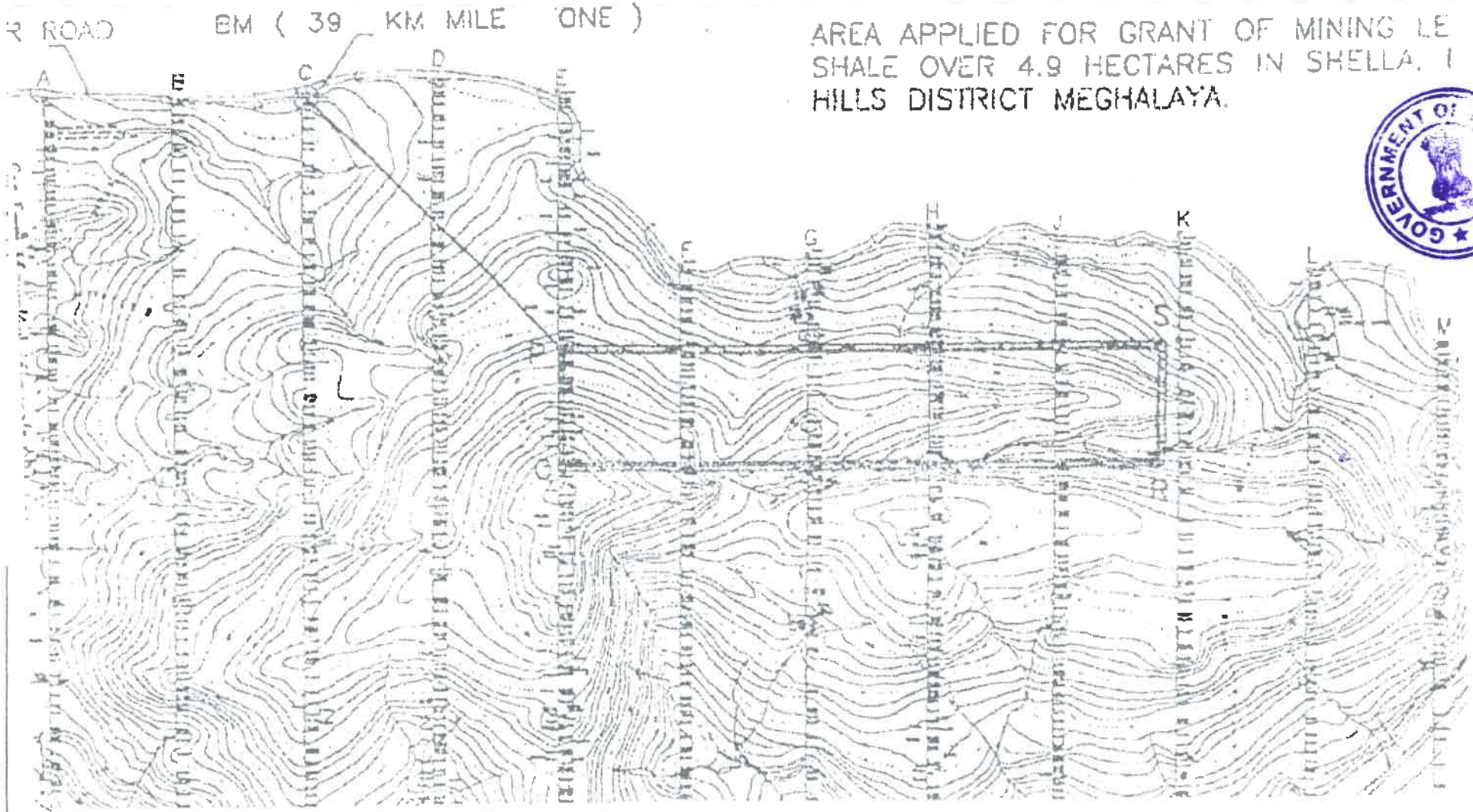
APPROVED

Certified to be true copy

Sub-Registrar
Shillong

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

AREA APPLIED FOR GRANT OF MINING LE
SHALE OVER 4.9 HECTARES IN SHELLA, I
HILLS DISTRICT MEGHALAYA.



APPROVED

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

SCALE
0 100 200

OF THE BOUNDARY POINTS OF THE APPLIED AREA

FROM	TO	BEARING	DISTANCE (METRES)
39 KM STONE	P	135°	279
P	Q	180°	100
Q	R	90°	490
R	S	360°	100
S	P	270°	490

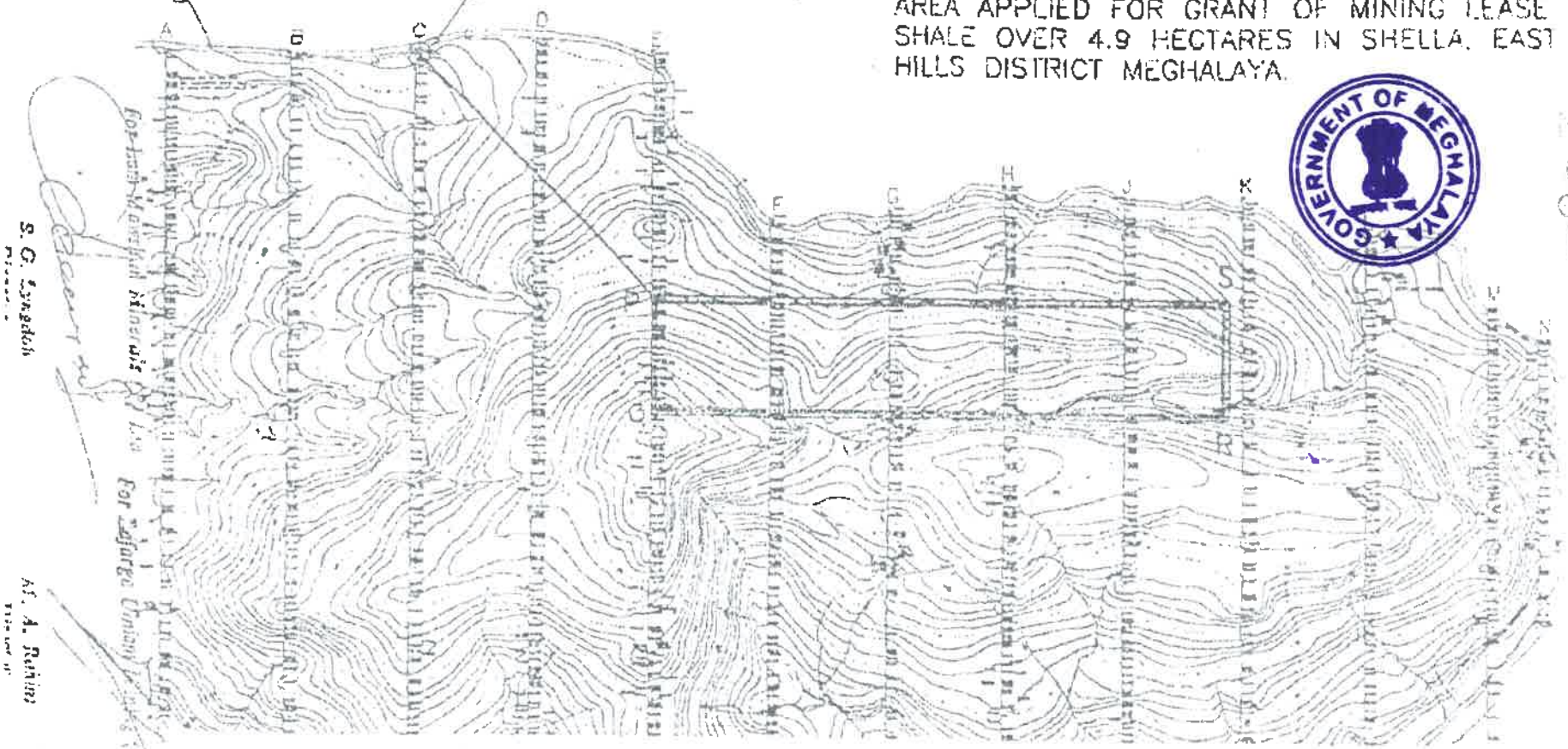
APPLICANT

LUM MAWSHUN MINERALS PV
HOTEL POLO TOWERS, POLO
OAKLANDS ROAD, SHILLONG

BORDER ROAD

BM (39 KM MILE STONE)

AREA APPLIED FOR GRANT OF MINING LEASE OF SHALE OVER 4.9 HECTARES IN SHELLA, EAST KHASI HILLS DISTRICT MEGHALAYA.



GOVERNMENT OF MEGHALAYA

S. G. Lyngdoh

A. A. Rahim

APPROVED

SCALE

0 100 200 METRES

LOCATION OF THE BOUNDARY POINTS OF THE APPLIED AREA.

FROM	TO	BEARING	DISTANCE (METRES)
39 KM STONE	P	135°	279
P	Q	180°	100
Q	R	90°	490
R	S	360°	100
S	P	270°	490

Deputy Commissioner
East Khasi Hills District
Shillong

APPLICANT

CUM MAWSHUN MINERALS PVT. LTD
HOTEL POLO TOWERS, POLO GROUNDS
OAKLANDS ROAD, SHILLONG - 793 001
MEGHALAYA

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

ANNEX. IV

MEGHALAYA STATE POLLUTION CONTROL BOARD
'ARDEN' LUMPYNGNGAD, SHILLONG
Phone (Off.): 0364-227017, 227064 Telex: 0364

NO.MPCB/TB-755/2001-2002/5 Dt. Shillong, the 12th March, 2002.

CONSENT TO ESTABLISH

CONSENT TO ESTABLISH under Section 25/26 of the Water(Prevention and Control of Pollution)Act,1974 as amended and Section 21 of the Air(Prevention and Control of Pollution)Act, 1981 as amended is hereby granted to M/S. Lum Mawshun Minerals (P) Ltd. (SHALE DIVISION) for setting up a Shale & Silt Stone Mining Project in an area measuring 4.90 hectares at Shelle village under Shella Confederacy, East Khasi Hills District, Meghalaya having an installed production capacity of 1200 TONNES/DAYS (One thousand two hundred) M.T. per day of SHALE with reference to their application No.NIL Dated 29-01-2002 and subsequent correspondences under the following terms and conditions :-

I. GENERAL :

1) Proper planning should be made in such a way that the natural vegetation which are beyond the excavated area are not disturbed. Provision of green belt in the vacant lands all around the mine should invariably by made, so as to maintain the environment and ecology of the area, by planting selected spices of trees at a spacing of 1 meter and the height of which should grow to not less than 5 meters when matured.

2) It shall be the prime responsibility of the firm to ensure that the nearby habitat, population, crops, orchards etc will not be affected due to emission/effluent to be emanated out of the mine.

3) As per the provisions of Water(Prevention and Control of Pollution)Act, 1981 as amended, any Officer empowered by the Board on its behalf shall have without any interruption, the right at any time to enter the mine for inspection, collection of samples for analysis and may call for any information etc. Denial of this right shall cause withdrawal of this consent.

4) Compensatory afforestation should be done as mentioned in the EMP and EIA Report.

5) A seperate environmental cell should be set up alongwith a well equiped laboratory for monitoring the necessary environment parameters.

II. FOR PREVENTION & CONTROL OF WATER POLLUTION :

APPROVED

The following measures should be taken up by the industry for prevention and control of water pollution.

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

भारत सरकार /GOVERNMENT OF INDIA
खान मंत्रालय/MINISTRY OF MINES
भारतीय खान ब्यूरो /INDIAN BUREAU OF M

अर्हताप्राप्त व्यक्ति के रूप में मान्यता प्रमाण पत्र

(खनिज रियायत नियमावली, 1960 के नियम 22सी के तहत)

CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON

(Under Rule 22C of Mineral Concession Rules, 1960)

श्री जयपाल सिंह पुत्र स्व. श्री गोरूराम निवासी सी–47, रघु मार्ग, हनुमान नगर, पोस्ट– वैशाली नगर, जयपुर – 302021 (राजस्थान), जिनका फोटो और हस्ताक्षर ऊपर दिया हुआ है, तथा जिन्होंने अपनी अर्हता और अनुभव का संतोषजनक साक्ष्य दिया है, को खनन योजना तैयार करने हेतु खनिज रियायत नियमावली 1960 के नियम 22सी के तहत अर्हताप्राप्त व्यक्ति के रूप में मान्यता प्रदान की जाती है।

Shri Jaipal Singh S/o Late Shri Goru Ram R/o C-47, Raghu Marg, Hanuman Nagar, P.O- Vaishali Nagar jaipur-302 021 (Rajasthan), **whose Photograph and signature is affixed herein above, having given satisfactory evidence of his qualifications & experience is hereby *RECOGNISED* under Rule 22C of the Mineral Concession Rules, 1960 as a Qualified Person to prepare Mining Plans.**

उनकी पंजीयन संख्या है

His registration number is **RQP/AJM/378/2015/A**

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यह मान्यता दस वर्षों की अवधि के लिए मान्य है जो दिनांक 05.08.2025 को समाप्त होगी ।

This recognition is valid for a period of ten years ending on .

उनके द्वारा प्रस्तुत खनन योजना में गलत जानकारी/दस्तावेज पाए जाने की स्थिती में यह प्रमाण पत्र वापस लिया जाएगा/निरस्त किया जाएगा ।

This certificate will liable to be withdrawn/cancelled in the event of furnishing the wrong information/documents in the Mining Plan submitted by him.

स्थान /Place : Ajmer
दिनांक /Date : 6.8.2015

क्षेत्रीय खान नियंत्रक / Regional Controller of Mines
भारतीय खान ब्यूरो /Indian Bureau of Mines
अजमेर क्षेत्र /Ajmer Region

क्षेत्रीय खान नियन्त्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines
अजमेर AJMER

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

LafargeHolcim

March 20, 2020

To,
The Director of Mineral Resources
Government of Meghalaya
Shillong- 793014

Subject: Change of Registered Office.

Dear Sir/Madam,

Kindly treat this letter as intimation regarding change of Registered Office of Lafarge Umiam Mining Private Limited from Hotel Polo Towers, Polo Ground, Oakland Road, East Khasi Hills, Meghalaya, Shillong - 793001 to 3rd Floor, Goenka Towers, Morello Compound, Keating Road, Shillong – 793001, Meghalaya, India with effect from March 1, 2020.

You are kindly requested to update your records and address all future communication/ correspondences to our new Registered Office.

Yours sincerely
For, Lafarge Umiam Mining Private Limited

Manjuree Rai
Company Secretary

Office of the Director of Mineral Resources, Meghalaya, Shillong

18/3/2020

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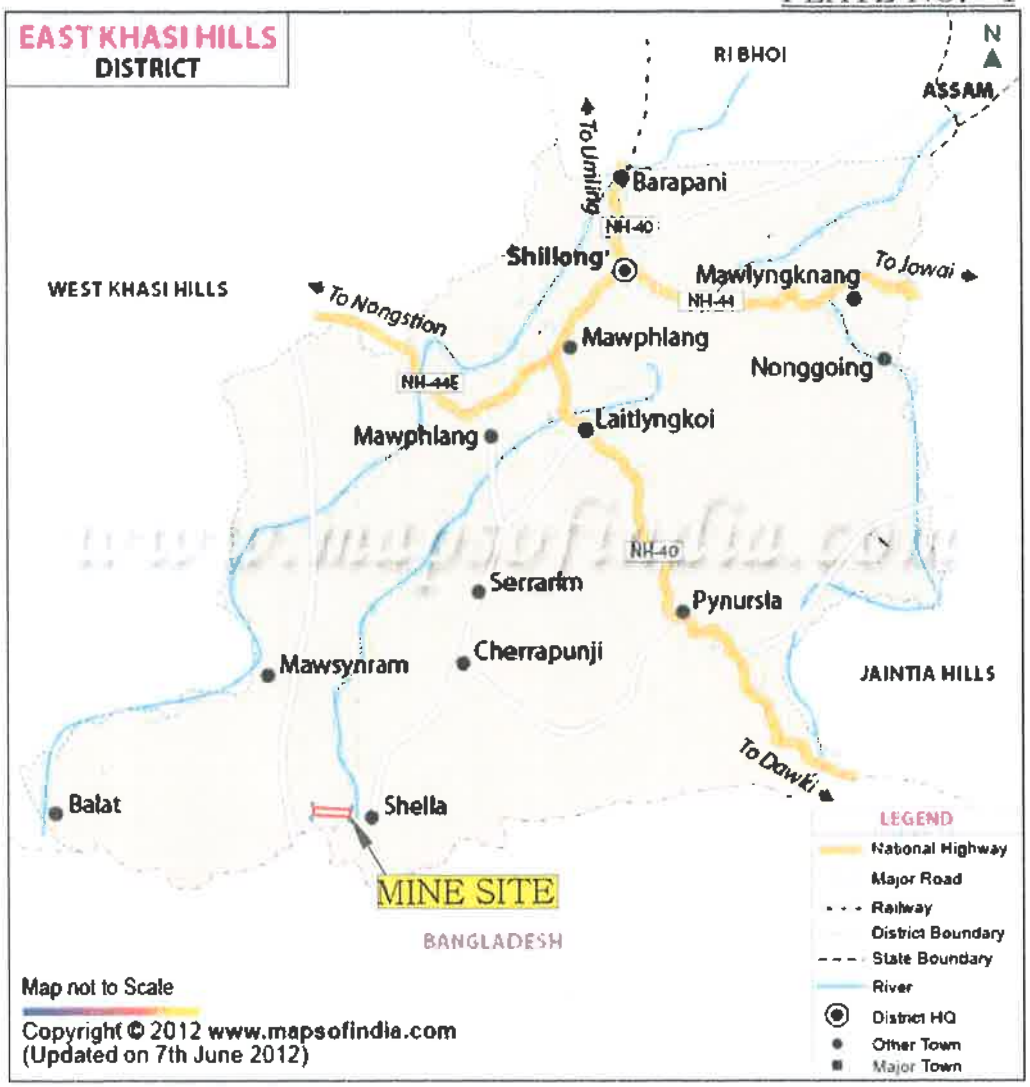
Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

Lafarge Umiam Mining Private Limited
A company of LafargeHolcim and Holcim
CIN No U14107ML 1999PTC005707
Regd Office 3rd Floor, Goenka Towers, Morello Compound, Keating Road, Shillong -793001, Meghalaya India
Mines Office: Nongtrai – Shella, PO Shella Bazar – 793112, East Khasi Hills, Meghalaya, India
Tel (+91 364) 2501115, Fax Tel (+91 364) 2505519

LOCATION MAP

PLATE NO.- 1



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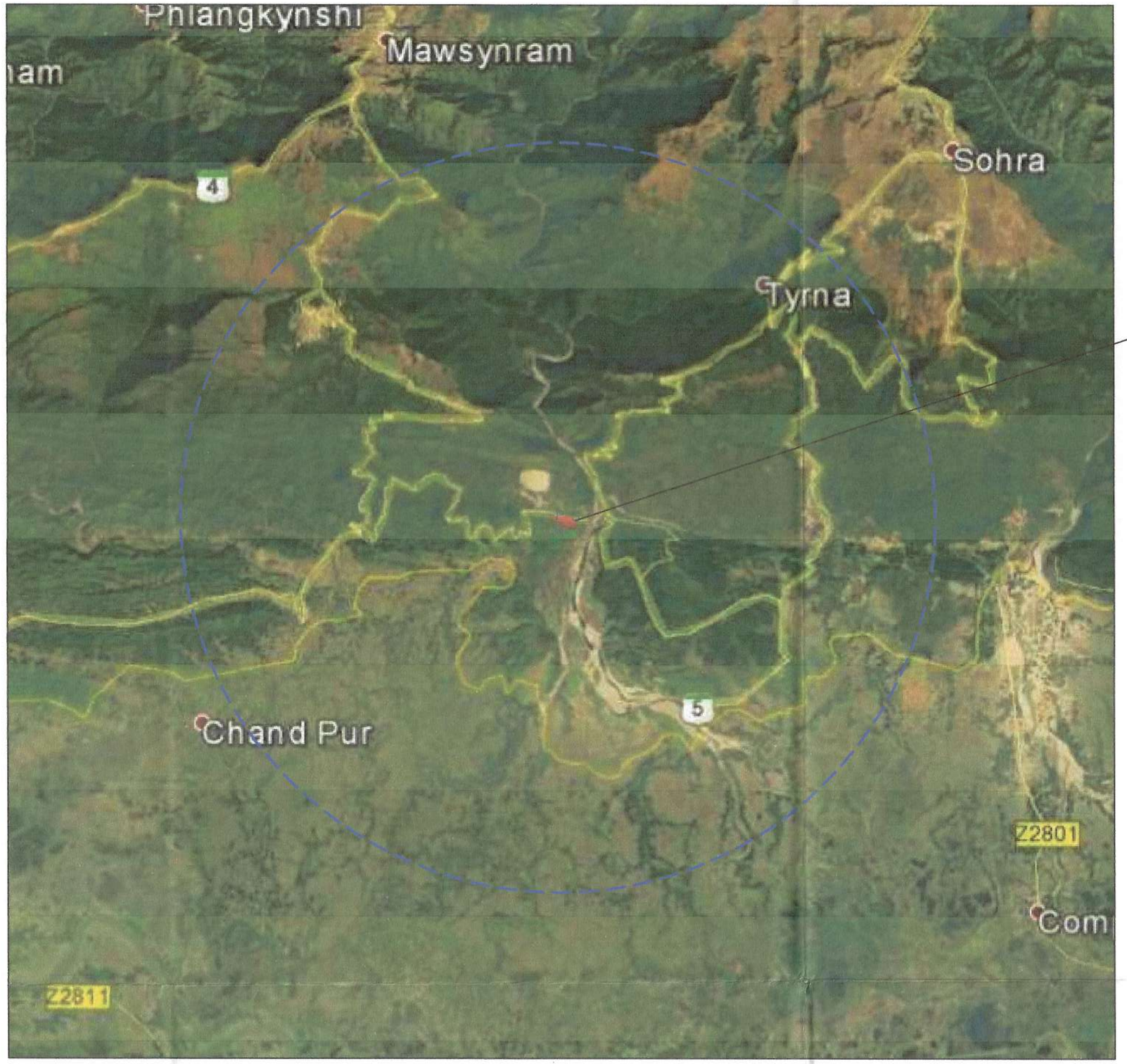
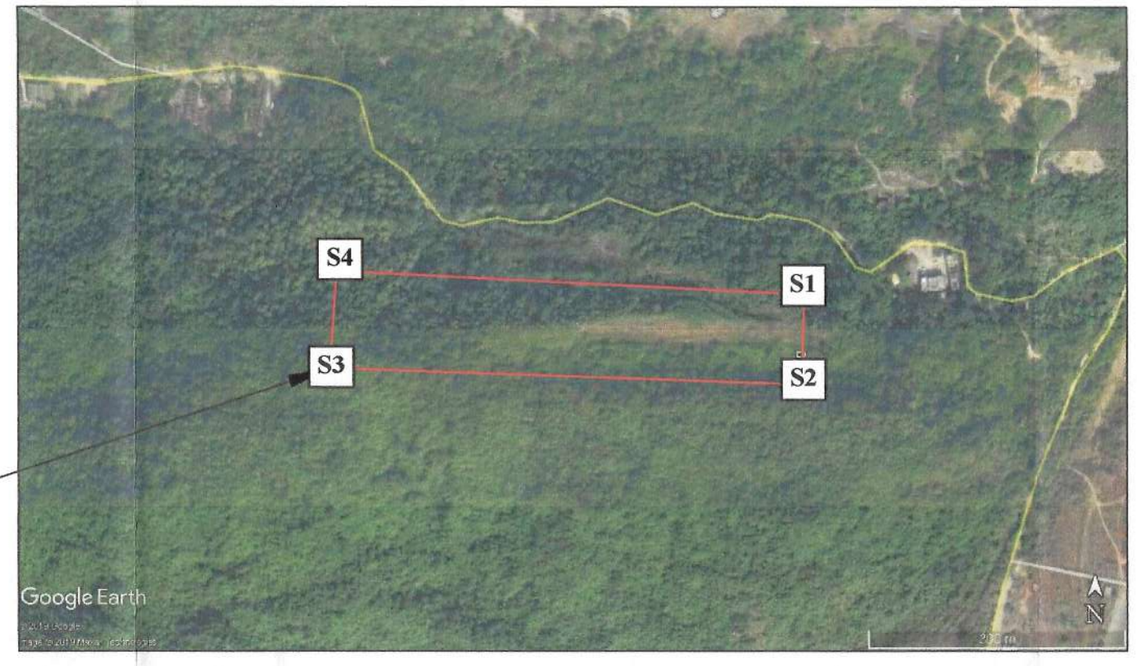
Directorate of Mineral Resources
Meghalaya, Shillong





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Pillar	Latitude	Longitude
S1	25°11'01.2253" N	91°37'51.6742" E
S2	25°10'57.9720" N	91°37'51.4662" E
S3	25°10'58.6791" N	91°37'34.0041" E
S4	25°11'01.9171" N	91°37'34.1591" E

Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

S.NO.	PARTICULARS	REFER
1.	LEASE AREA	S4 S1 S3 S2
2.	NALAH	
3.	VILLAGE	
4.	ROAD, KACHA ROAD	
5.	TEMPLE CHATRI	

1000 500 0 1 2 3 4 5 6 7 8 9 10 KMS.
1 2 4 6 8 10 12 14 16 18 20 CMS.

Scale- 1cm = 500m(R.F. 1:50,000)
2cms =1 km

KEY PLAN
Of Shella Shale–Siltstone Mine
At- Shella,
District- East Khasi Hills (Meghalaya)

PLATE No 2

MINERAL : Shale–Siltstone

LESSEE : **M/s Lafarge Umiam Mining Pvt. Ltd.**

AREA : 4.9 Hect.

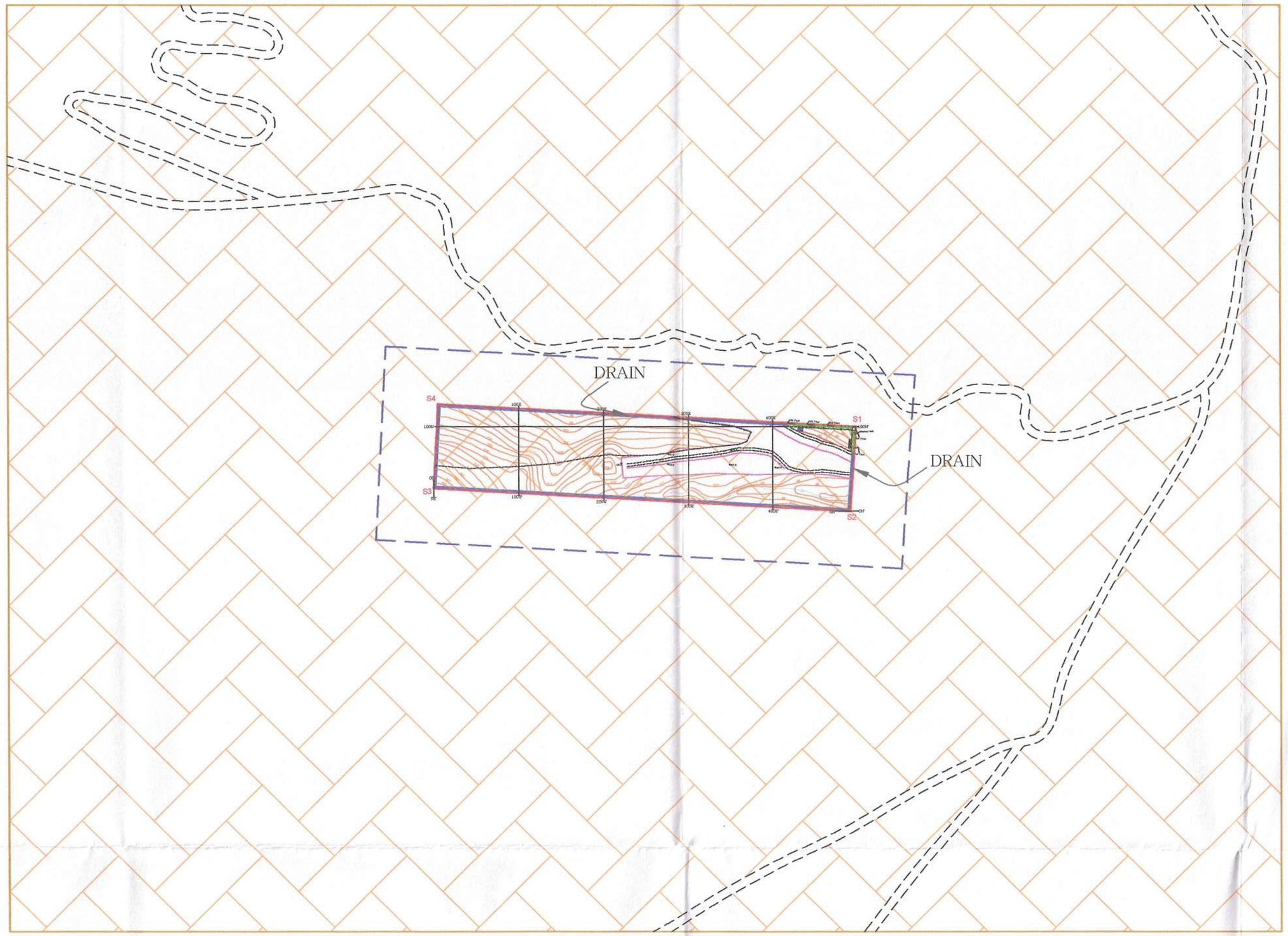
LOCATION

At : Shella
District : East Khasi Hills
State : Meghalaya

PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

LESSEE



S.NO	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	PIT	
3.	SPOT LEVEL	•125.0
4.	CONTOUR	144
5.	ROAD	
6.	NALAH	
7.	SOIL STACK	
8.	PROPOSED PLANTATION	
9.	PRIVATE LAND	
10.	60 M. BARRIER LINE	
11.	500 M. BARRIER LINE	

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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

1 0 1 2 3 4 5 10 15 20 25
50 0 50 100 150 200 250 500 750 1000 1250

Scale- 1cm = 50m(1:5000)

ENVIRONMENT PLAN
Of Shella Shale–Siltstone Mine
At– Shella,
District– East Khasi Hills (Meghalaya)

PLATE No 3

MINERAL : Shale–Siltstone

LESSEE : **M/s Lafarge Umiam Mining Pvt. Ltd.**

AREA : 4.9 Hect.

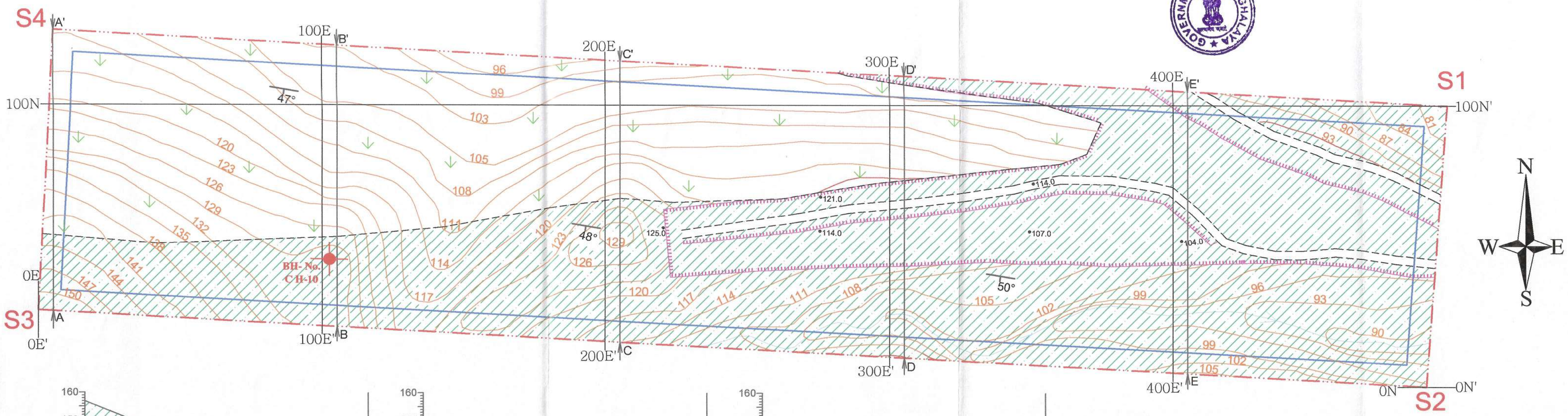
LOCATION

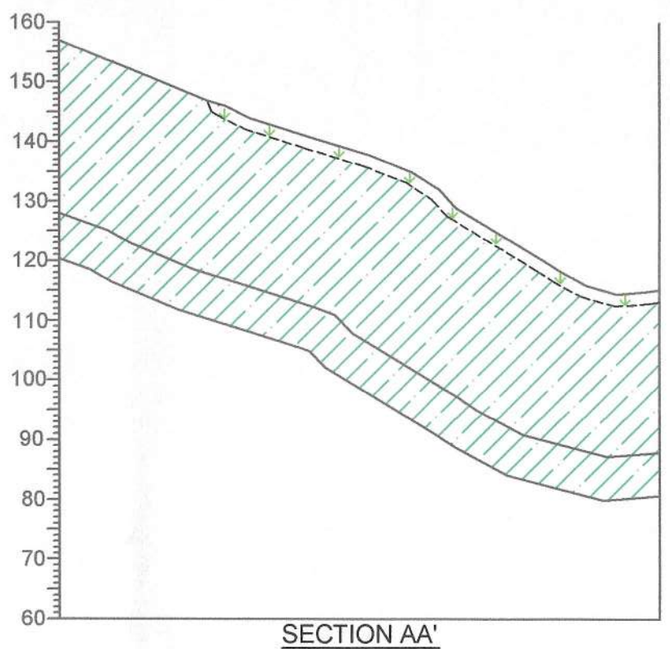
At : Shella
District : East Khasi Hills
State : Meghalaya

PREPARED BY :

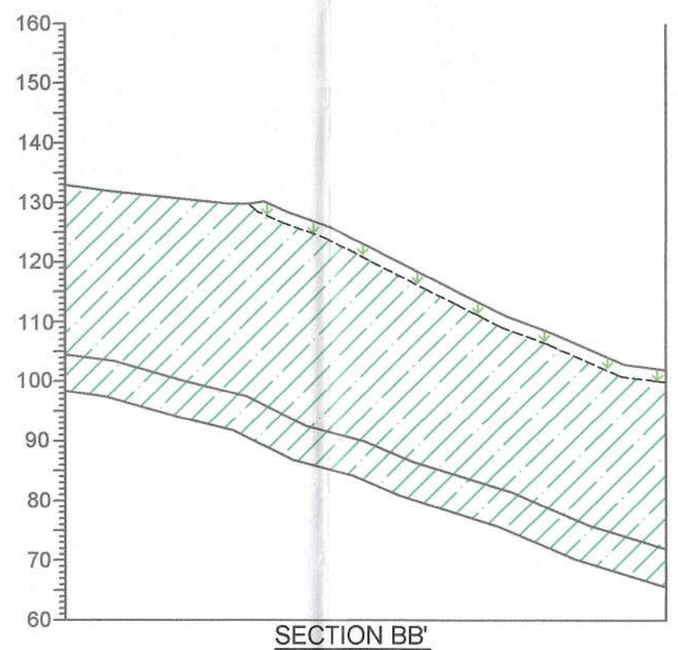
JAIPAL SINGH
RQP/AJM/378/2015/A

LESSEE





SECTION AA'



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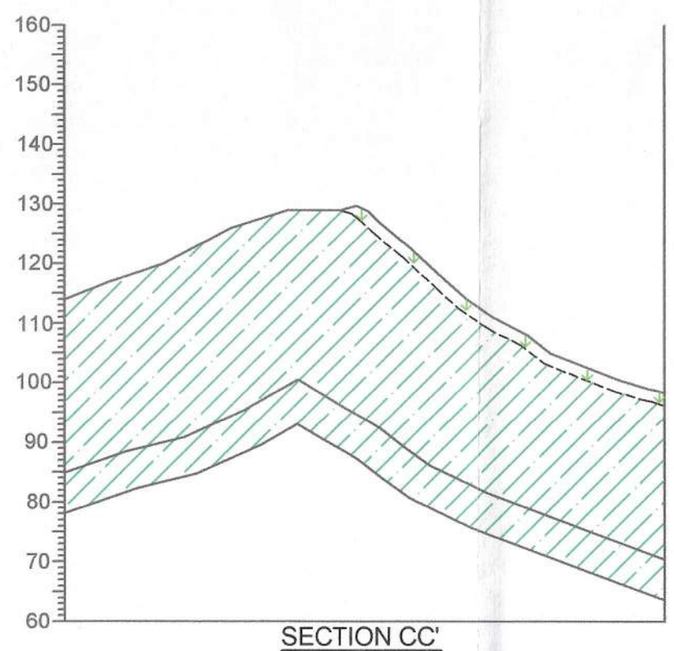

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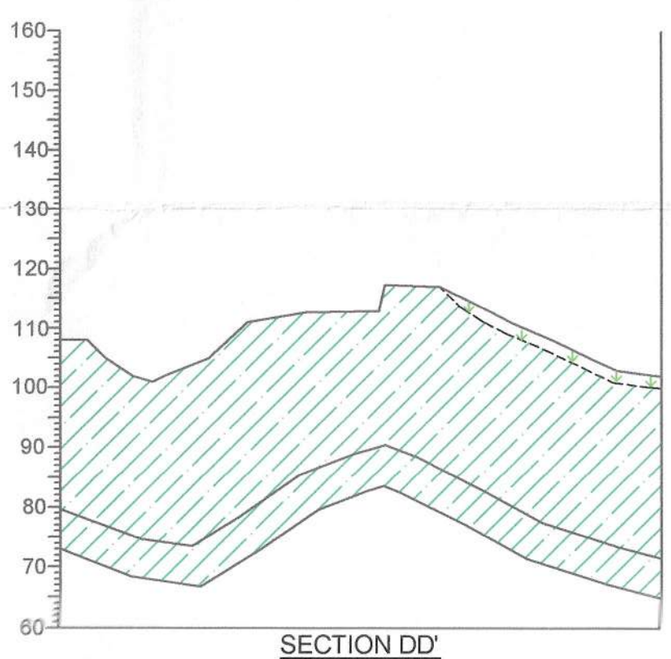

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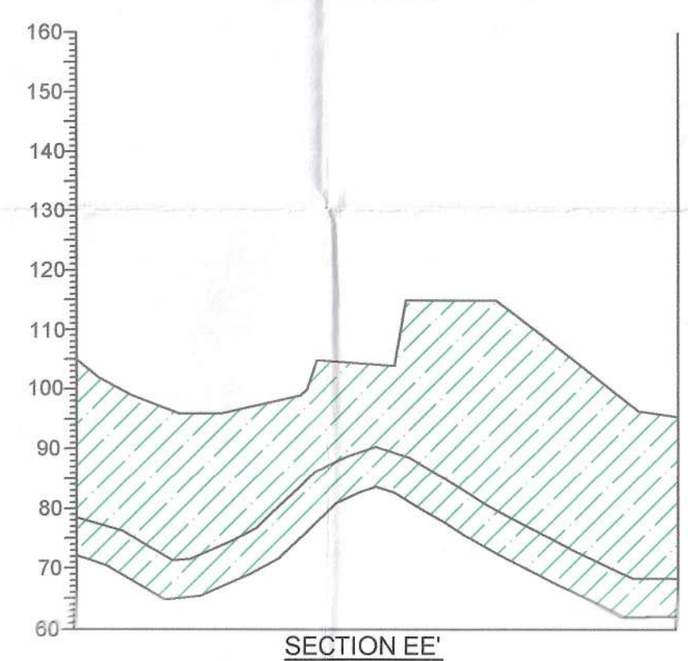

SECTION EE'

S.NO	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	PIT	
3.	SPOT LEVEL	125.0
4.	CONTOUR	144
5.	ROAD	
6.	DIP & STRIKE	50°
7.	ULTIMATE PIT LIMIT	
8.	NALAH	
9.	SOIL	
10.	SHALE-SILTSTONE	
11.	BOREHOLE	

Scale- 1cm = 10m(1:1000)

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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

SURFACE GEOLOGICAL PLAN & SECTIONS
Of Shella Shale-Siltstone Mine
At- Shella,
District- East Khasi Hills (Meghalaya)

PLATE No 4

MINERAL : Shale-Siltstone

LESSEE : **M/s Lafarge Umiam Mining Pvt. Ltd.**

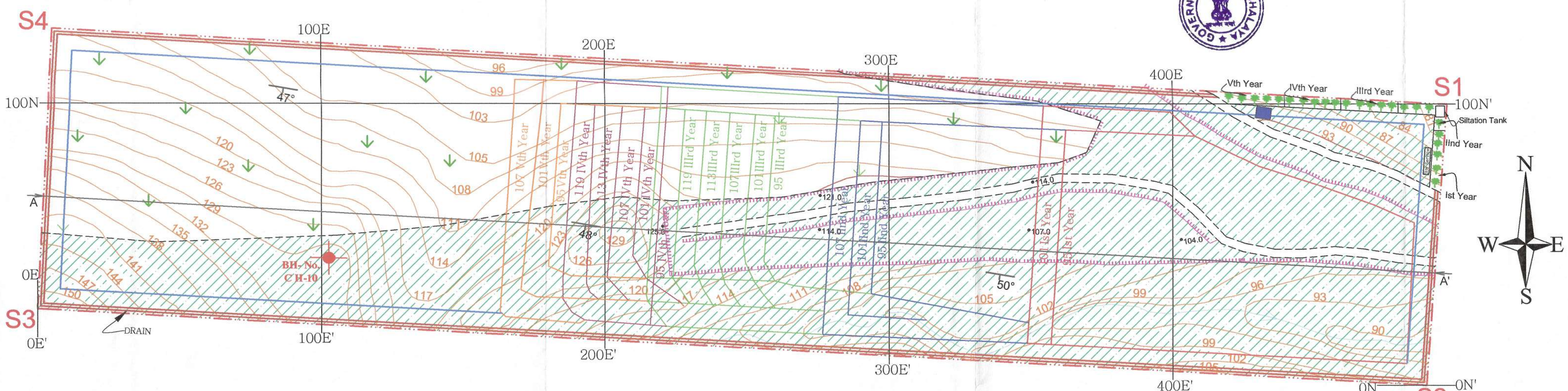
AREA : 4.9 Hect.

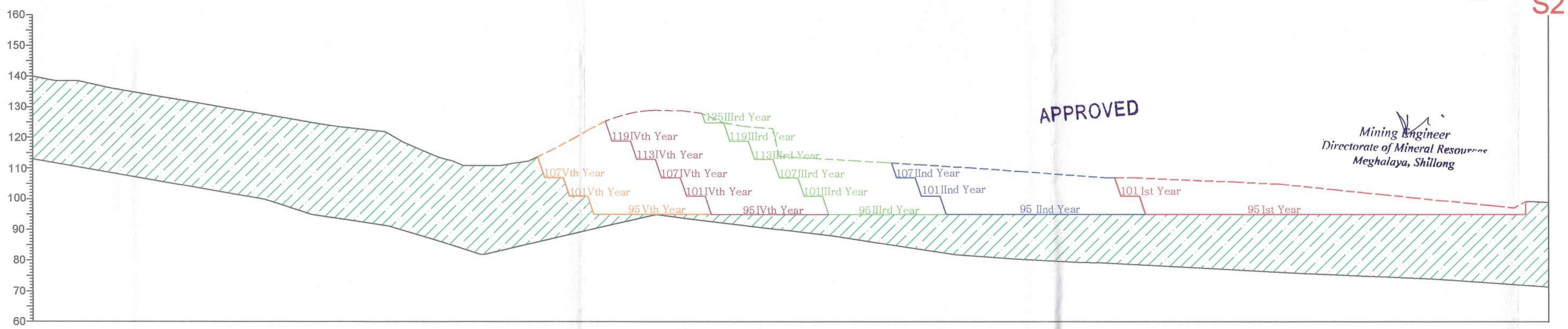
LOCATION
At : Shella
District : East Khasi Hills
State : Meghalaya

PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

LESSEE





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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

SECTION AA'

S.NO	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	PIT	
3.	SPOT LEVEL	•125.0
4.	CONTOUR	144
5.	ROAD	
6.	DIP & STRIKE	50°
7.	ULTIMATE PIT LIMIT	
8.	NALAH	
9.	SOIL	
10.	SOIL STACK	
11.	SHALE & SILT STONE	
12.	PROPOSED PLANTATION	
13.	SILTATION TANK	
14.	DRAIN	
15.	BOREHOLE	

Scale- 1cm = 10m(1:1000)

COMPOSIT PLAN & YEARWISE SECTIONS
Of Shella Shale–Siltstone Mine
At– Shella,
District– East Khasi Hills (Meghalaya)

PLATE No 5

MINERAL : Shale–Siltstone

LESSEE : **M/s Lafarge Umiam Mining Pvt. Ltd.**

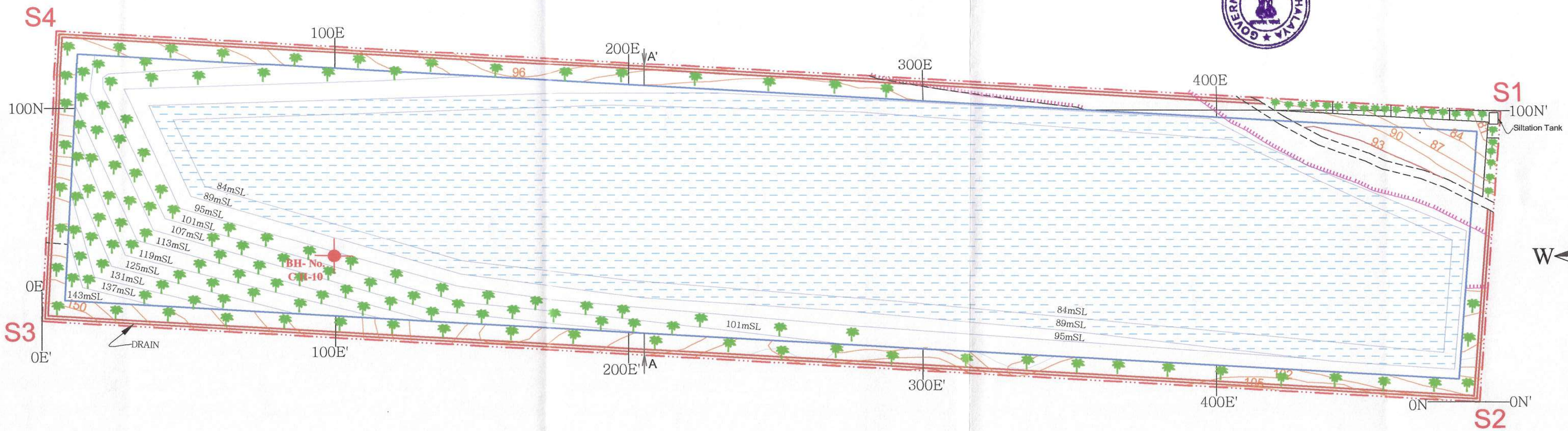
AREA : 4.9 Hect.

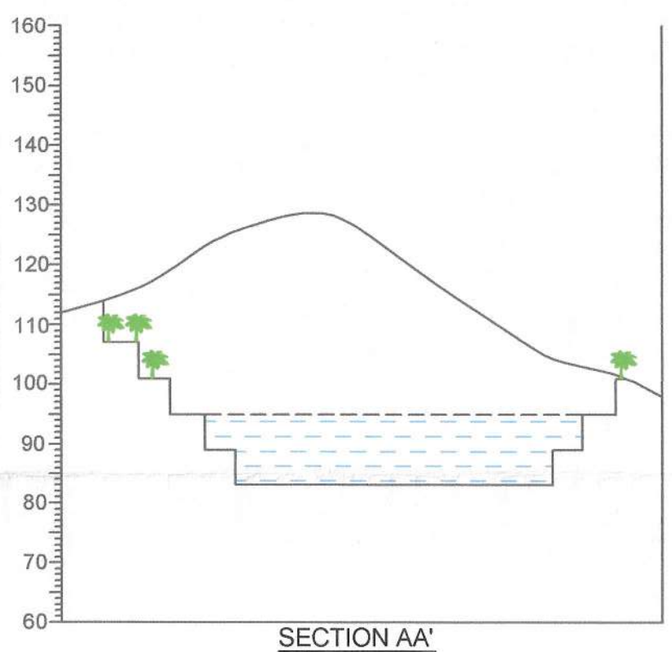
LOCATION
At : Shella
District : East Khasi Hills
State : Meghalaya

PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

LESSEE





SECTION AA'

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Meghalaya, Shillong

S.NO	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	PIT	
3.	SPOT LEVEL	86.0mSL
4.	CONTOUR	144
5.	ROAD	
6.	ULTIMATE PIT LIMIT	
7.	NALAH	
8.	WATER RESERVOIR	
9.	PROPOSED PLANTATION	
10.	SILTATION TANK	
11.	DRAIN	
12.	BOREHOLE	

1 0 1 2 3 4 5 10 15 20 25
10 0 10 20 30 40 50 100 150 200 250

Scale- 1cm = 10m(1:1000)

CONCEPTUAL PLAN
Of Shella Shale–Siltstone Mine
At– Shella,
District– East Khasi Hills (Meghalaya)

PLATE No 6

MINERAL : Shale–Siltstone

LESSEE : **M/s Lafarge Umiam Mining Pvt. Ltd.**

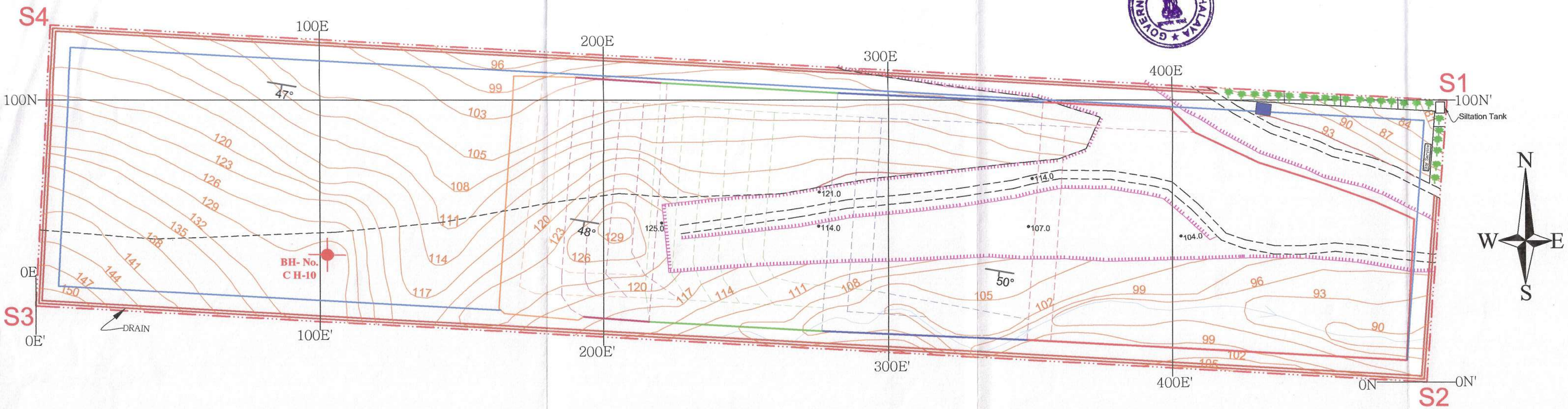
AREA : 4.9 Hect.

LOCATION
At : Shella
District : East Khasi Hills
State : Meghalaya

PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

LESSEE



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Mining Engineer
Directorate of Mineral Resources
Meghalaya, Shillong

S.NO	PARTICULARS	SYMBOL
1.	LEASE BOUNDARY	
2.	PIT	
3.	SPOT LEVEL	125.0
4.	CONTOUR	144
5.	ROAD	
6.	DIP & STRIKE	50°
7.	ULTIMATE PIT LIMIT	
8.	NALAH	
9.	SOIL STACK	
10.	PROPOSED PLANTATION	
11.	SILTATION TANK	
12.	DRAIN	
13.	WORKING LIMIT OF Vth YEAR	
14.	BOREHOLE	

1 0 1 2 3 4 5 10 15 20 25
10 0 10 20 30 40 50 100 150 200 250

Scale- 1cm = 10m(1:1000)

PROGRESSIVE MINE CLOSURE PLAN
Of Shella Shale–Siltstone Mine
At– Shella,
District– East Khasi Hills (Meghalaya)

PLATE No 7

MINERAL : Shale–Siltstone

LESSEE : **M/s Lafarge Umiam Mining Pvt. Ltd.**

AREA : 4.9 Hect.

LOCATION
At : Shella
District : East Khasi Hills
State : Meghalaya

PREPARED BY :

JAIPAL SINGH
RQP/AJM/378/2015/A

LESSEE