

EXECUTIVE SUMMARY

FOR OBTAINING

**Environmental Clearance under EIA Notification – 2006
Schedule Sl. No. 1 (a): VIOLATION Category ‘A’**

EXTENT = 268.80.0 ha

Total production (ROM) proposed (2024-29) -856101 Tons

Life of the mine 22 years, Lease valid upto 2048.

(As per MMDR Amendment Act 2015, the validity of lease period shall be deemed to have been extended upto 31.03.2030 years)

ALANGULAM LIMESTONE MINES

at

Alangulam, Lakshmipuram, Pernaickenpatti, Duraisampuram Village, Edirkottai & Narnapuram Villages, Sivakasi Taluk, Virudhunagar District, Tamil Nadu.

G.O No & Date	Village and Taluk	Total Extent (Ha)	MoEFCC ToR obtained
G.O.No 427, 19.03. 1980	Alangulam, Lakshmipuram, Pernaickenpatti, Duraisampuram Village, Edirkottai & Narnapuram Sivakasi Taluk	268.80.0 Ha	F.No.23-21/2019-1A.III (V) dated 28 th June 2021

APPLICANT



M/S TAMIL NADU CEMENTS CORPORATION LTD.

(A GOVERNMENT OF TAMIL NADU UNDERTAKING)

5th Floor, Aavin Illam, No.3A, Pasumpon Muthuramalingam Salai, Nandanam, Chennai – 600 035

Environmental Consultant

GEO EXPLORATION AND MINING SOLUTIONS



Old No. 260-B, New No. 17,
Advaitha Ashram Road, Alagapuram,
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Accredited for sector 1 Category ‘A’ & 31,38 Category ‘B’
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Baseline survey: March 2023 to May 2023 (Summer)

AUGUST- 2023

1. INTRODUCTION –

M/s **Tamil Nadu Cements Corporation Limited (TANCEM)** was operating a limestone Mine at **Villages-** Alangulam, Lakshmipuram, Pernaickenpatti, Duraisampuram Village, Edirkottai & Narnapuram Tehsil-Sivakasi, District Virudhunagar State-Tamil Nadu with a production capacity of 856101 Tons.

The ministry has examined the proposal in accordance with the EIA notification,2006 and further amendments thereto, and after accepting the recommendation of EAC in its 44th meeting held during 18th -19th February 2021, after detailed presentation by the PP, EAC observed that PP has gone to enhanced production beyond 1993-94 base year production level without taking prior EC hence violated the provision of the EIA notification under E (P) Act. EAC further noted PP has submitted the letter dated 12.07.2018 of Department of mines and geology wherein it was informed that lease for extension till 31.03.2030 is under consideration under MMDR Act 2015, and corrigendum minutes of EAC in its 45th meeting held during 8th -9th March, 2021 grant the ToR for M/s. Tamil Nadu Cements Corporation Limited.

TANCEM applied for Terms of Reference (ToR) to MoEF&CC on 19.06.2017 under A category for Existing G.O. No. 215 & 427, Alangulam, Lakshmipuram, Pernaickenpatti, Duraisampuram Village, Edirkottai & Narnapuram limestone mining lease over cluster extent of 449.63.0ha. wherein the committee deferred the proposal and essential detail sought the information PP submitted the information. accordingly, the proposal was considered in the EAC in its 45th meeting held during 8th - 9th March, 2021 wherein the committee recommended the proposal for grant of TOR vide for preparation of EIA report along with assessment of ecological damage, remediation plan and natural and community resource augmentation plan. As per amendment of MMDR 2015 the lease applied for renewal or extended up to a period ending 31st March 2030

The proponent for their Alangulam Limestone Mines-I had submitted the Environmental Clearance Applications for ToR to MoEF & CC vide online proposal No.

G.O No & Date	Village and Taluk	Total Extent (Ha)	Online proposal No.	MoEFCC ToR obtained
G.O.No 427, 19.03. 1980	Alangulam, Lakshmipuram, Pernaickenpatti, Duraisampuram Village, Edirkottai & Narnapuram Sivakasi Taluk	268.80.0 Ha	IA/TN/MIN/66122/2017 Dated: 12.07.2017	F.No.23-21/2019-1A.III (V) dated 28 th June 2021

The above proposal seeking ToR was placed in the EAC observed that PP has gone to enhanced production beyond 1993-94 base year production level without taking prior EC hence violated the provision of the EIA notification under E (P) Act. grant the ToR for M/s. Tamil Nadu Cements Corporation Limited. observed that the project falls under the Category “A” and Schedule 1(a) of the

EIA Notification, 2006. The committee recommended the Terms of Reference for the project for assessment of Ecological Damage, remediation plan and natural & Community resource augmentation plan to be prepared an independent chapter in the Environment Impact Assessment report by Accredited consultant.

Public hearing is mandatory as per the Hon'ble high court of Madras order dated 13.10.2017 in W.P.No 1189 of 2017.

In order to abide the above said Gazette Notification, the proponent applied for grant of Environmental Clearance and carried out Environmental Impact assessment study for summer season (March-May) 2023.

2. IDENTIFICATION OF PROJECT & PROJECT PROPONENT

Identification of Project

The Proposal of G.O. no. 427, Alangulam Limestone Mines of M/s Tamil Nadu Cements Corporation Ltd. is for expansion in production capacity **836101Tons** from Mine lease area of **268.80 Ha** out of which in Alangulam village 108.69.0Ha is a Patta Land and 004.81.0ha is a Govt. Poramboke land respectively. Perinaickenpatti Village 044.28.5 Ha is a Patta Land, 0.13.34.0 Ha in Government land respectively. Duraisampuram Village in 003.11.5Ha in Patta Land and 000.69.0Ha in Government Land respectively. Edirkottai village in 066.92.5ha is a patta land and 009.27.5Ha in Government Land respectively. Narnapuram village in 011.02.0Ha is a Patta land and 000.49.0 is a Government Land respectively. Lakshampuram Village in 000.5.20.5Ha in Patta land and 000.95.5Ha in Government Land respectively. The mine is situated at Villages- Alangulam, Lakshampuram, Pernaickenpatti, Narnapuram, Edirkottai & Duraisampuram Villages of Sivakasi Taluk, Virudhunagar District. Mine lease area falls in the survey of India Toposheet no 58 G/11 & G/15 and lies between East longitude 77° 46'44.00" E to 77° 47'16.00" E" and North latitude, 09° 23'56.00" N to 09° 24'16.00" N. The method of mining is Open cast mechanized. Mining lease area is about 103m above mean sea level and forms a sloping ground towards East exists within the lease.

3. PROJECT PROPONENT

M/s Tamil Nadu Cement Corporation Limited (TANCEM) is a state-government undertaking of Government of Tamil Nadu located in the Indian state of Tamil Nadu. It manufactures cement and stone wire pipes. It was incorporated on April 1, 1976 to take over and operate the existing cement plant in Alangulam, Virudhunagar with an authorized share capital of Rs. 16.13 Crores for P1 and 23.31 Crores for P2.

4. BRIEF DESCRIPTION OF THE PROJECT

TABLE 1.2: BRIEF DESCRIPTION OF THE PROJECT

S. No.	Particulars	Details
A	Nature and Size of the Project	Production capacity 836101Tons , of Alangulam Limestone Mines-1 (G.O. No. 427) by Tamil Nadu Cement Corporation Limited.

B. Location			
Name of Unit		Survey No	Area of Blocks in Ha
Alangulam Limestone Mines		126,132,133/1,133/2,134,135, etc.,	268.80.0 Ha
IBM registration No		IBM/7446/2011	
Mine Code		38TMN19001	
Total			268.80.0
	Village	Alangulam, Lakshmipuram, Pernaickenpatti, Duraisamipuram, Edirkottai and Narnapuram village	
	Taluk	Sivakasi	
	District	Virudhunagar	
	State	Tamil Nadu	
	Geographical Coordinates	North latitude, 09° 23'56.00" N to 09° 24'16.00" N. East Longitude 77° 46'44.00" E to 77° 47'16.00" E"	
	Toposheet No	58 G/11 & G15	
C Lease area details			
	Lease Area	268.80.0	
	Type of Land	Government and Patta Land	
	Depth of mining	55m (1.5m Topsoil +53.5m Limestone)	
D Machinery Details			
S.No	Name of the machine	Nos.	Capacity
1	Excavator L&T Komatsu	1	Bucket capacity 1.20m ³
2	Mechanical	1	Atlas Copco 1.81 (t)
3	Excavator	3	Tata Hitachi 1.20m ³
4	Dozer BD	1	D10 Dozer BEML 3.60hp
E Cost details			
	Cost of the project	Approx. Rs. 23.31Crores	
	Cost for EMP	Rs. 1.165 Crores/Yr	
	Cost for CER	Rs. 1.165 Crores	
F Environmental Settings of the area			
a)	Ecological Sensitive Areas (National Park, Wild Life Sanctuary, Biosphere Reserve, Reserve/ Protected Forest etc.) within 10 Km radius	No such area is located within 10km radius of the mine lease area.	
b)	Inter-state boundary within 5 Km radius	No such area is located within 10km radius of the mine lease area.	
c)	Nearest Town/ Major City	Vembakottai-7km SE	
d)	Nearest Railway Station	Rajapalayam -15km-NW	
e)	Nearest State Highway/ National Highway	SH-186 Rajapalayam Vembakottai 50m-South SH-183 Sivakasi-Alangulam Vembakottai west side NH-44 Virudhunagar-Tirunelveli-14km-East	
f)	Nearest Airport	Madurai airport - 65km-SE	
g)	Sea Port	Sea Port Tuticorin-82km-SE	

h)	Medical Facilities	Dr. Anantharaj Hospital-Alangulam-W
i)	Education Facilities	ERRSM Government Higher secondary school-Alangulam-E
j)	Seismic Zone	Zone III
k)	Water body	Vaippar River-S Vembakottai reservoir-SE

2. PROJECT DESCRIPTION –

- The Mine Lease area over an extent of Cluster 449.63.0Ha is located in S.F.Nos. 28,29,30/2,31,32/1,32/3, etc., for P1 and S.F No 126,132,133/1,133/2,134,135, etc.,for P2 (Partially patta and Government poramboke land), villages Alangulam, Lakshmipuram, Pernaickenpatti, Duraisamipuram, Edirkottai and Narnapuram village of Sivakasi Taluk, Virudhunagar District, Tamil Nadu.
- The Topography of the area is almost undulating terrain. The Mine is located in various survey numbers in Alangulam, Lakshmipuram, Pernaickenpatti, Duraisamipuram, Edirkottai and Narnapuram villages, Taluk Sivakasi & District- Virudhunagar, State-Tamil Nadu. Mine falls in the survey of India Toposheet no. 58 G/11 & G15 and lies **Coordinates** North latitude, 09^o 23'56.00" N to 09^o 24'16.00" N. East Longitude 77^o 46'44.00" E to 77^o 47'16.00" E"
- The Review of Mining Plan (2023-24to 2027-28) was prepared and submitted for a cumulatively quantity of 1,539,512Ts ROM, Top soil 4560Tons the same was approved by Indian Bureau of Mines vide Letter No. TN/VRD/LST/ROMP-1643MDS dated 05.03.2021-P1, TN/VRD/LST/ROMP-1660MDS dated 2.08.2021-P2
- Anticipated Quantity of Limestone with 70% recovery is about 1,077,659Tons and anticipated waste is cumulatively about 1,382,206Ts (30% of Mineral rejects and side burden) for the present plan period.
- The mineral rejects and side burden is proposed to be dump on the South Eastern side of the lease area; the waste will be utilized for the backfilling in the mined-out pit.
- The mined-out quantity of limestone will be transported to needy cement and lime-based industries.
- Opencast, category "A" other than fully Mechanized Mining is proposed

∞ Existing Dump dimension

Band	Pit No.	Length	Width	Depth	Area In Ha.
1	K1 Band-A	440	69	7	3.04
2	K1 Band-B	265	125	15	3.31
3	HSL-N	162	130	10	2.11
4	HSL-S-Pit-1	265	120	46	3.18
5	ALS Mines	460	90	30	4.14
6	ALQ Mines	235	235	35	5

- Present proposed depth is 55m (1.5m Topsoil +53.5m Limestone)
- Proposed Bench Height, 9m Height, 6m Width with 60^o Slope

- Short-hole drilling of 32-35 mm diameter by jackhammer drills with Air Compressor.
- Project has provided direct employment opportunities to 80 peoples and indirect employment opportunities within the surrounding region for about 200peoples in the field of Mineral transport, service sector, garages, shops/canteen, etc.,

Green Belt Development

- Existing greenbelt area is 10.48.0 Hectares; Greenbelt area at the end of life of mine is 22.48.0 Hectares. It is proposed to plant predominant local species like Pungum, casuarian and other regional trees.

The Project Site Connectivity:

Nearest Roadway	SH-186 Rajapalayam Vembakottai 50m-South SH-183 Sivakasi-Alangulam Vembakottai west side NH-44 Virudhunagar-Tirunelveli-14km-East
Nearest Village	Alangulam- 80m-SW
Nearest Town	Vembakottai-7km SE
Nearest Railway	Rajapalayam –15km-NW
Nearest Airport	Madurai airport - 65km-NE
Seaport	Thoothukudi-82km – SE
Interstate Boundary	Tamilnadu-Kerala -33km-W

- There is No Protected Areas Notified under The Wild Life (Protection) Act, 1972, Critically Polluted Areas as notified by the Central Pollution Control Board constituted, Notified Eco-Sensitive Areas, Interstate boundaries and International Boundaries, besides there are No National Parks, Reserve Forest, Biosphere Reserves, Elephant Corridors, Mangrove Forest, Archeological Monuments, Heritage Site etc. within 10 Km Radius from Project Site.
- The Nearest water bodies are Vaippar River is about 5.8Km on the South side and Vembakottai Reservoir 4.5km-SE
- The proponent has been carrying out CSR Activities in various fields for social welfare around the project site and will continue to do. The proponent has spent an amount of Rs 10 Lakhs till date.
- The Seismic Sensitivity of the project area is categorized as Zone III, Moderate Risk Zone as per BMTPC, Vulnerability Atlas of Seismic Zone of India IS: 1893 – 2002.

Table 2.2 LAND USE PATTERN OF THE PROPOSED PROJECT

Sno	Type of land use (in ha)	Present area (Ha)	Additional area to be required at this Scheme period (Ha)	Area at the end of life of mine (Ha)
1	Area under Mining	14.80.0	0.38.0	25.90.0
2	Dumps	15.01.0	NIL	15.01.0
3	Roads	2.17.0	NIL	3.00.0
4	Infrastructures	1.88.0	NIL	1.88.0
5	Green belt	10.48.0	12.00.0	22.48.0
6	Unutilized Area	224.46.0	212.08.0	200.53.0
Total		268.80.0	224.46.0	268.80.0

Table 2.3 OPERATIONAL DETAILS FOR PROPOSED PROJECT

Year	ROM (Ts)	Limestone @70%(Ts)	Mineral Rejects @ 30%(Ts)	Over burden & side burden(Ts)
2024-25	171282	119897.40	51384.60	59785.00
2025-26	171004	119703.50	51301.50	46207.50
2026-27	171435	120004.50	51430.50	0
2027-28	150750	105525.00	45225.00	138600.00
2028-29	171630	120141.00	51489.00	439695.00
Total	836101	585271.40	250830.60	684287.5

Table 2.4 Water Requirement

*Purpose	Fresh water	Waste water	Disposal
Dust Suppression	3.0 KLD	1.6	Rainwater accumulated in Mine Pit
Green Belt development	15.0 KLD	0	Rainwater accumulated in Mine Pit
Domestic purpose	5.0 KLD	0	Rainwater accumulated in Mine Pit
Total	23.0 KLD	1.6 KLD	

Source: Prefeasibility Report.

Table 2.5 PROPOSED MACHINERY DEPLOYMENT

S.No	Name of the machine	Nos.	Capacity
1	Wagon drill (Ingersoll Rand)	1	110mm dia
2	Compressor	1	460cfm,150psi
3	Hydraulic excavator	1	2.1m ³ & 0.9 m ³
4	Tarus Tippers	8	30 tons
5	Explosive van	1	7.5 tons
6	Water Bouser	1	4000 lts
7	Pumps	2	50 hp/ 25 hp

Table. 2.6 PROPOSED MANPOWER DEPLOYMENT

G.O 427		
Sno	Employment	No. of persons
1	Mines Engineer	1
2	Geologist	1
3	1 st class Manager	1
4	2 nd class Manager	1
5	Foreman	5
6	Mine mate	1
7	Blaster	1
Skilled worker operators		
8	Other	5
9	Operator	4
10	Drill operator	2
11	Other	1
12	Semi skilled workers	4
13	Unskilled workers	5
	Total	32

FIGURE.1 DIGITIZED LOCATION MAP ON THE GEO REFERENCED TOPOSHEET (10Km RADIUS)

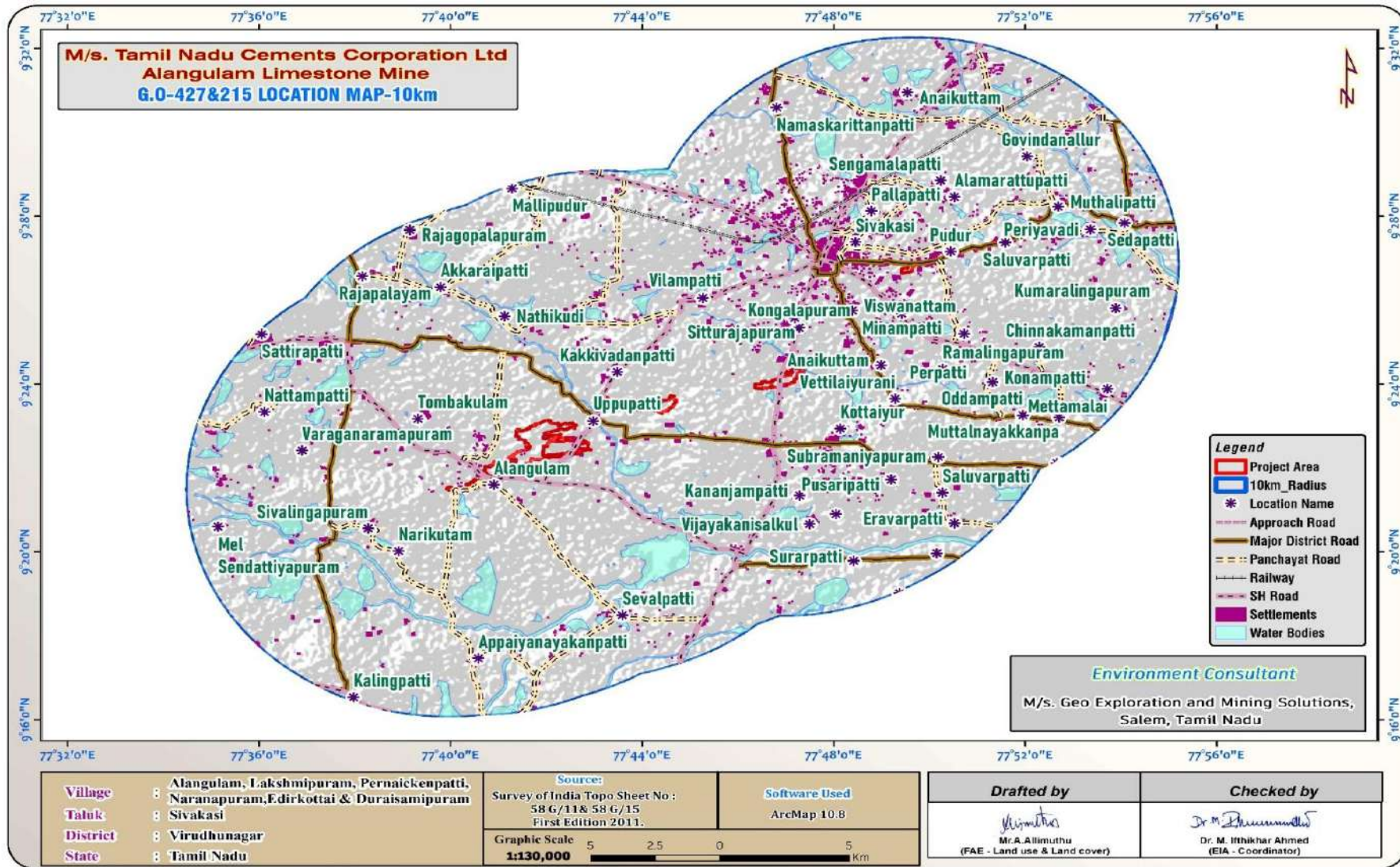


FIGURE.2 LOCATION MAP COVERING 1KM RADIUS

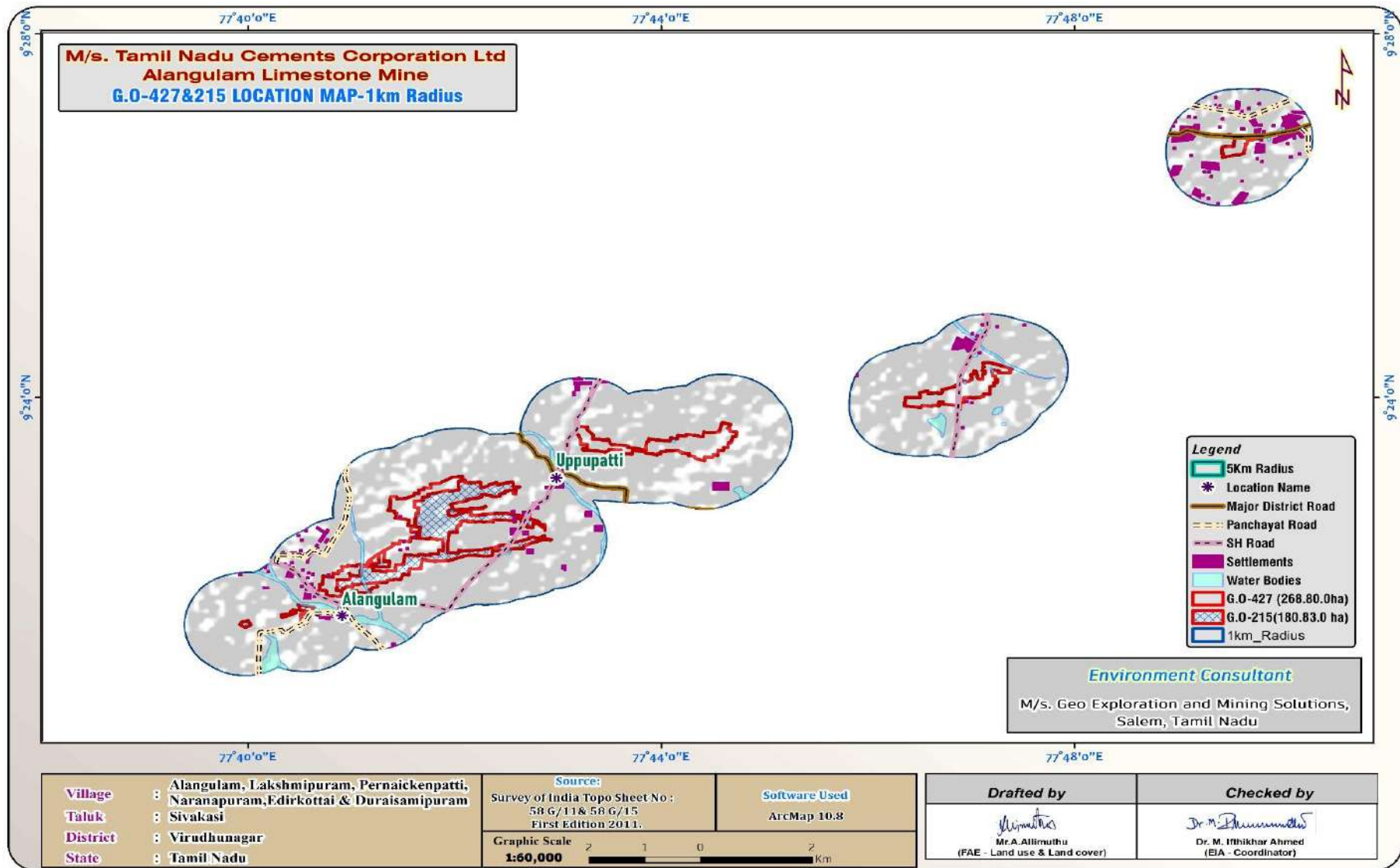


FIGURE 3: GOOGLE EARTH IMAGE SHOWING AROUND 500M RADIUS BLOCK-1

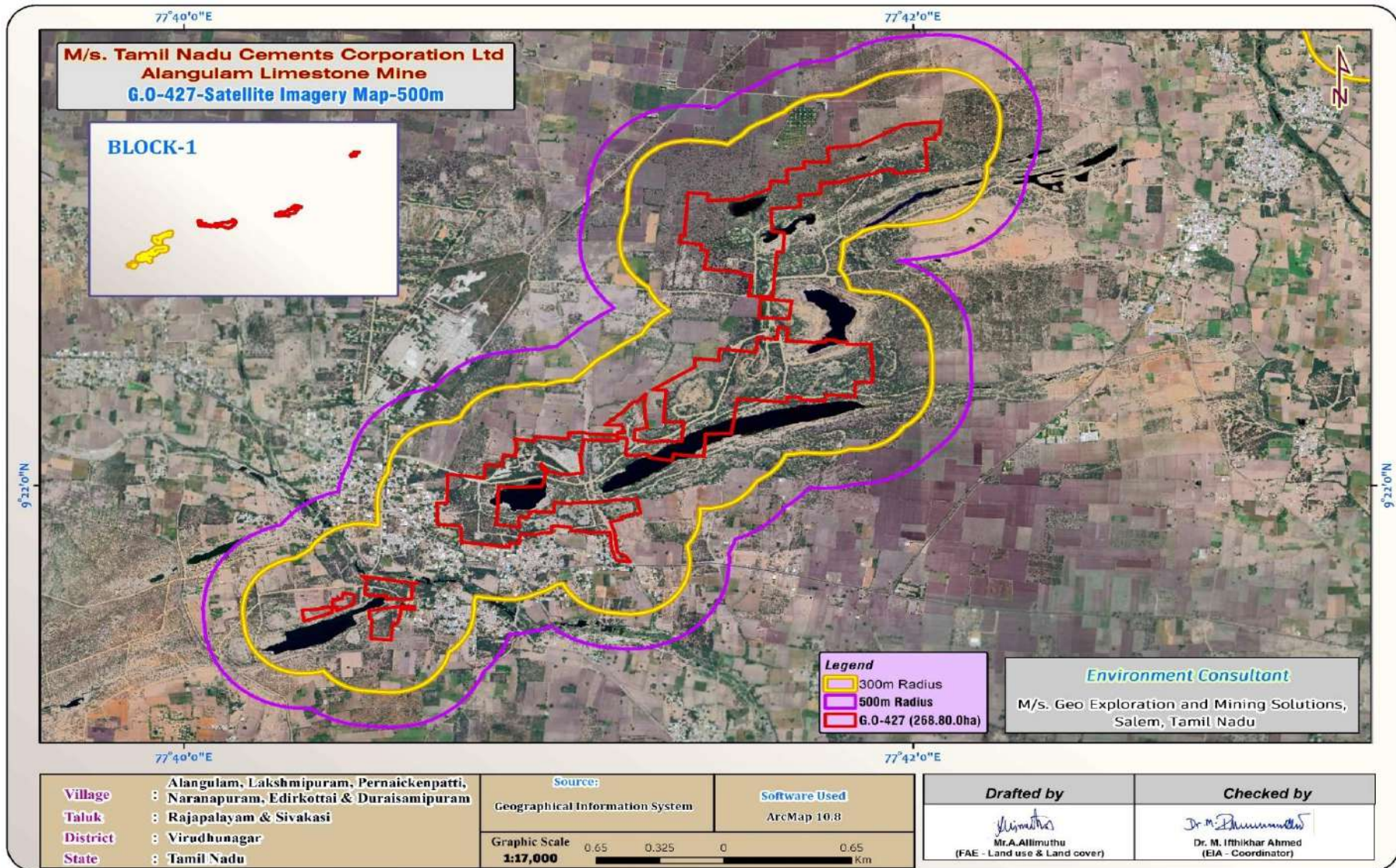


FIGURE.4: GOOGLE EARTH IMAGE SHOWING AROUND 500M RADIUS BLOCK-II

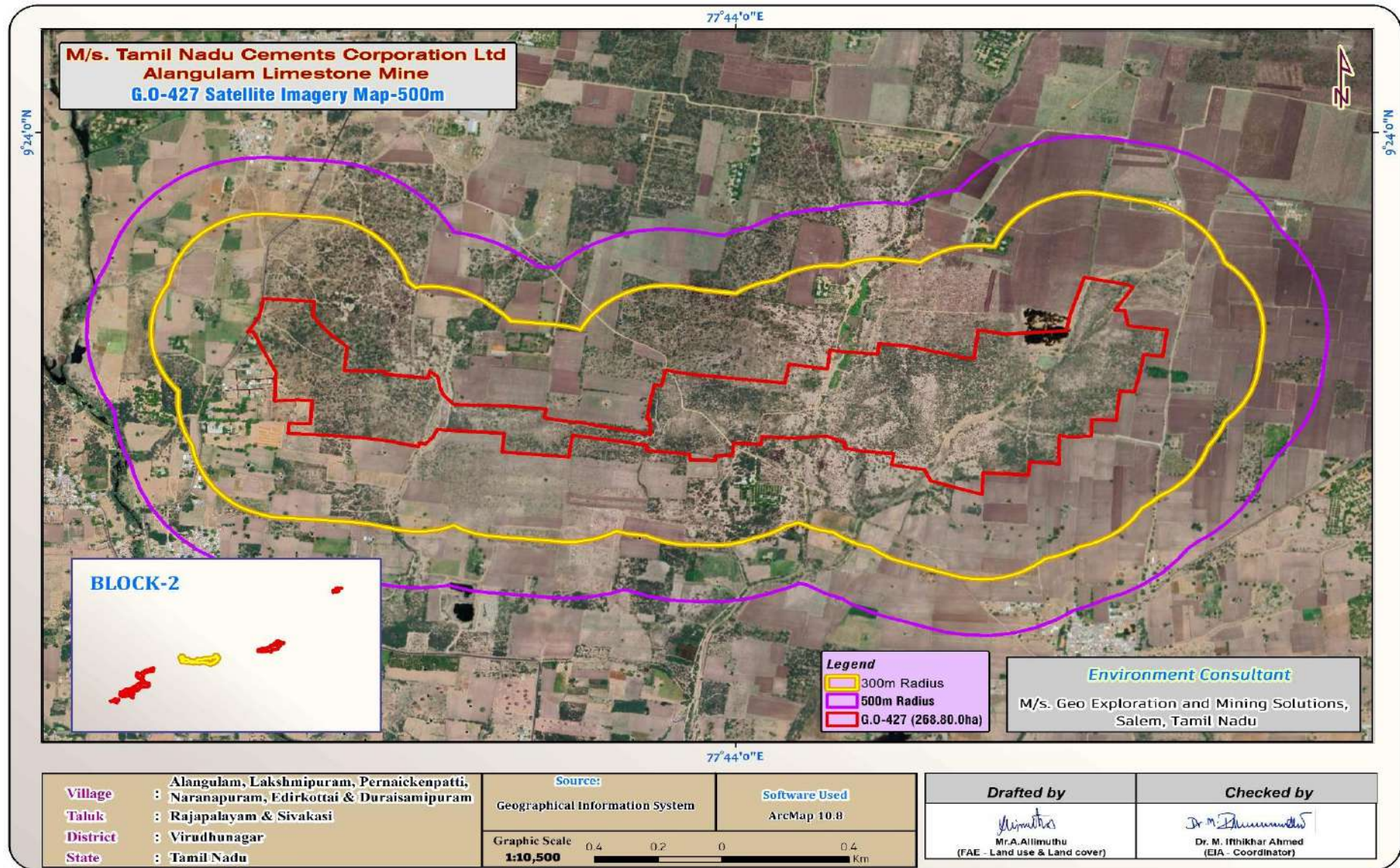


FIGURE.5 GOOGLE EARTH IMAGE SHOWING AROUND 500M RADIUS BLOCK-III

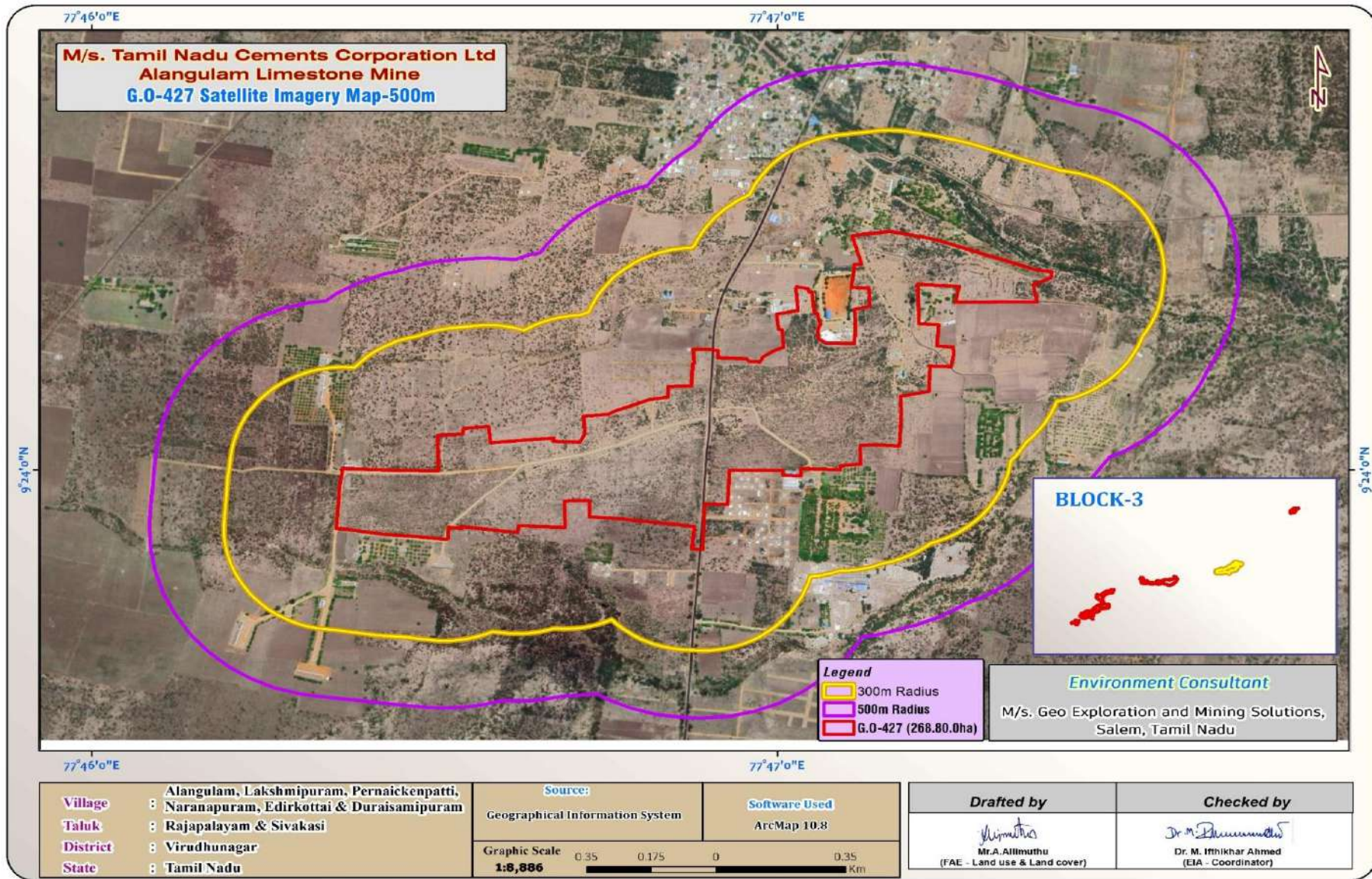


FIGURE .6: GOOGLE EARTH IMAGE SHOWING AROUND 500M RADIUS BLOCK-IV

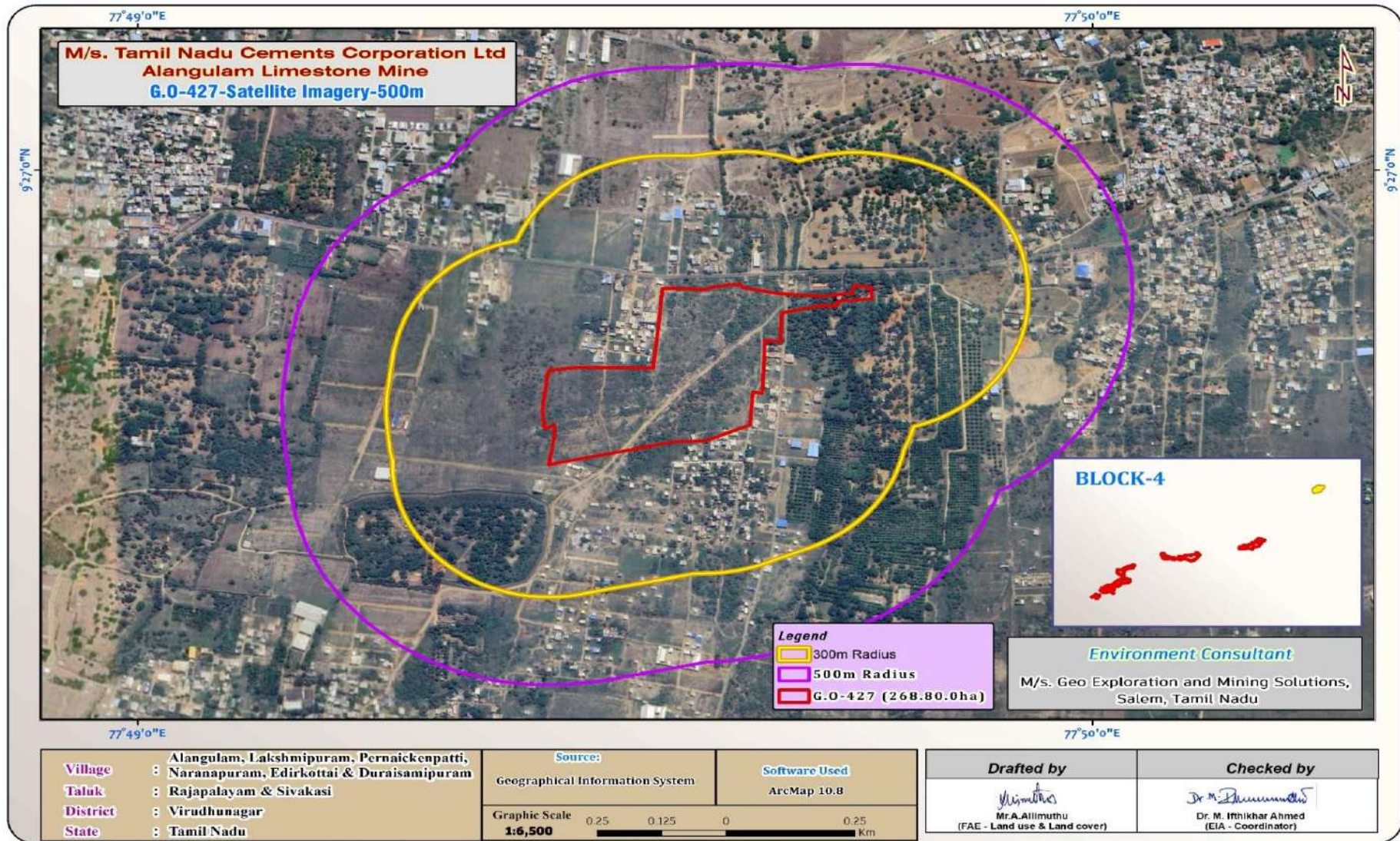


FIGURE.7 : YEAR-WISE DEVELOPMENT PRODUCTION PLAN AND SECTIONS BLOCK1 (2024-2025)

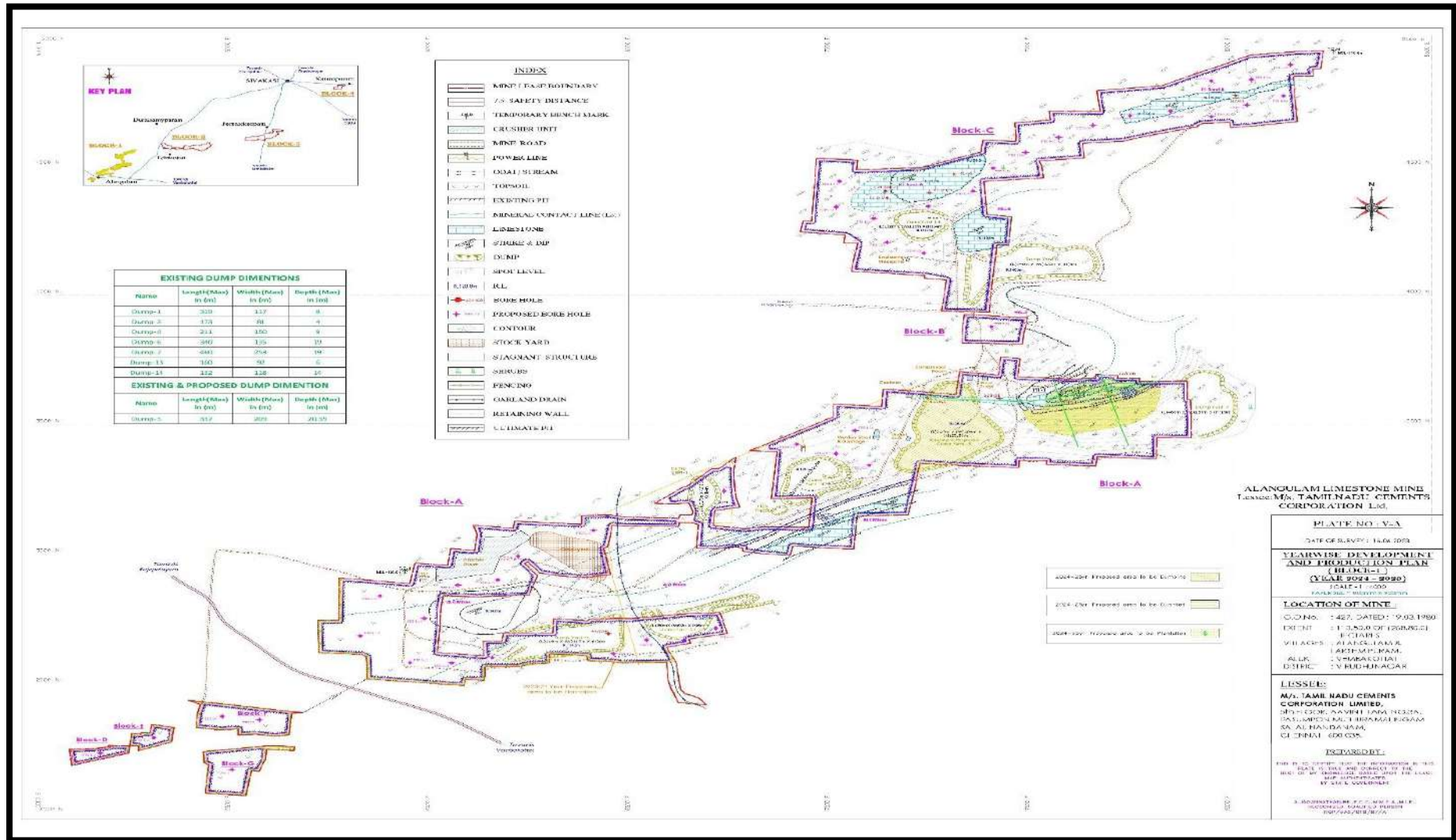


FIGURE.8 YEAR-WISE DEVELOPMENT PRODUCTION PLAN AND SECTIONS (2025-2026)

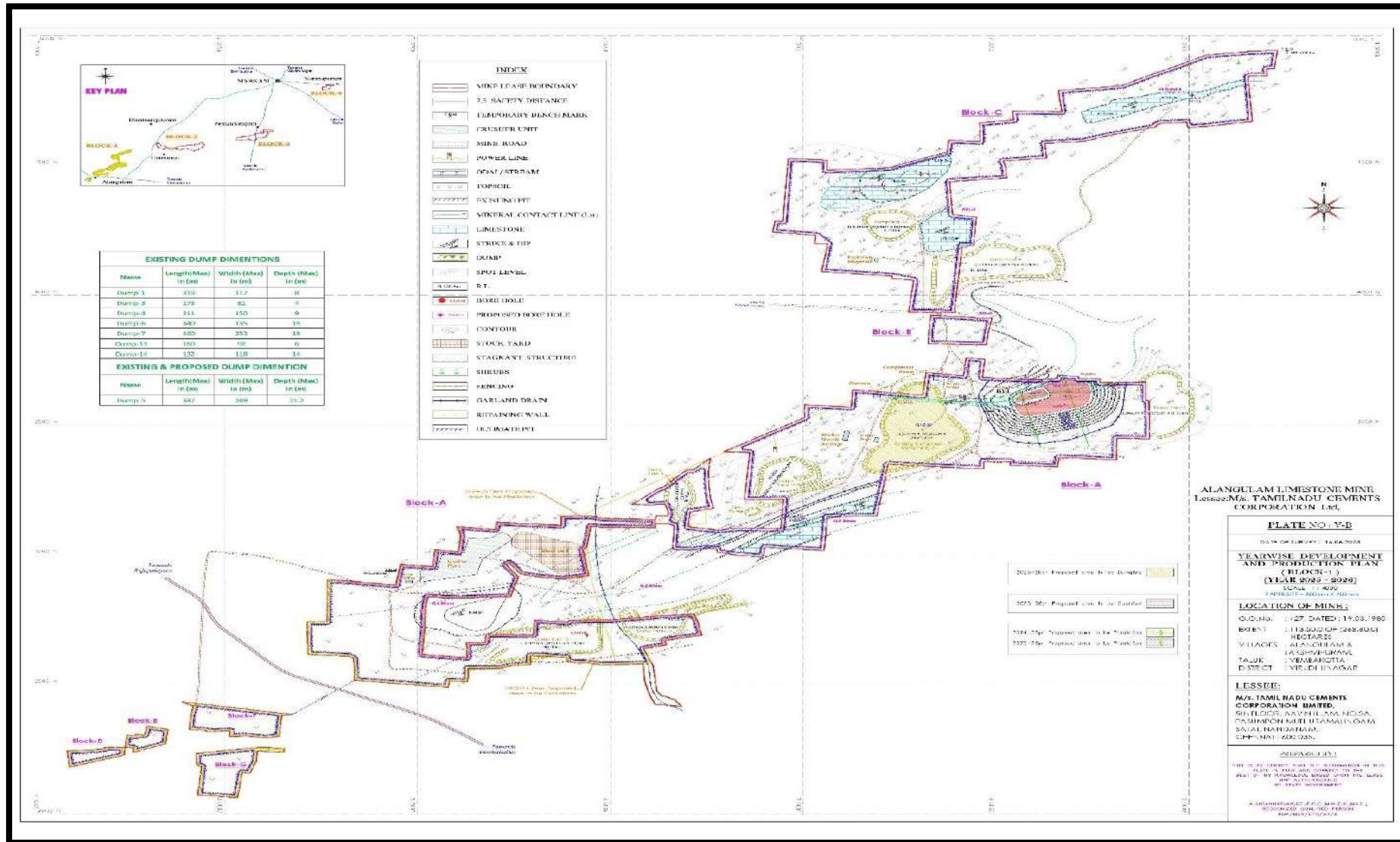


FIGURE.9. YEAR-WISE DEVELOPMENT PRODUCTION PLAN AND SECTIONS (2026-2027)

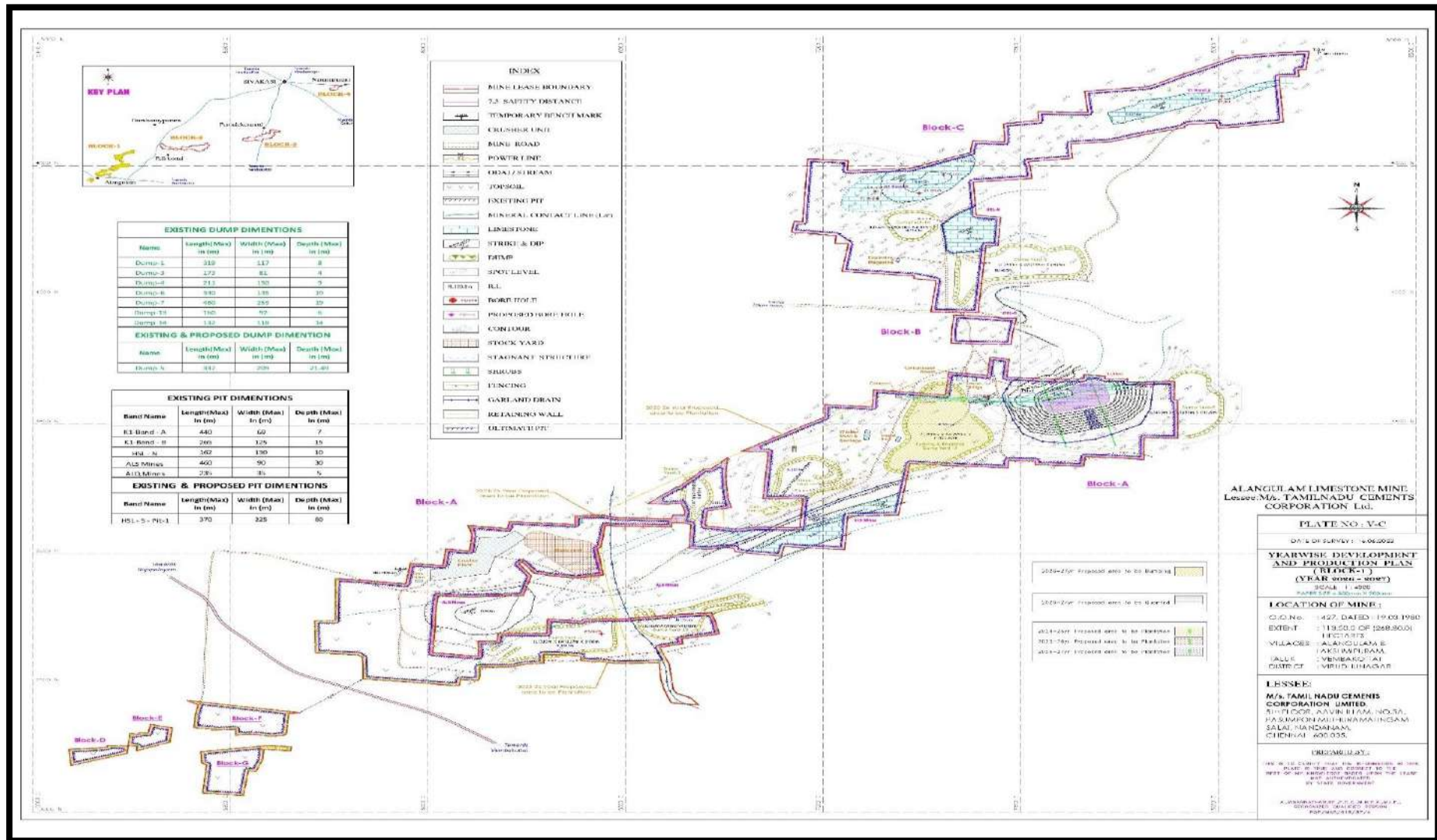


FIGURE.10. YEAR-WISE DEVELOPMENT PRODUCTION PLAN AND SECTIONS-BLOCK-1 (2027-2028)

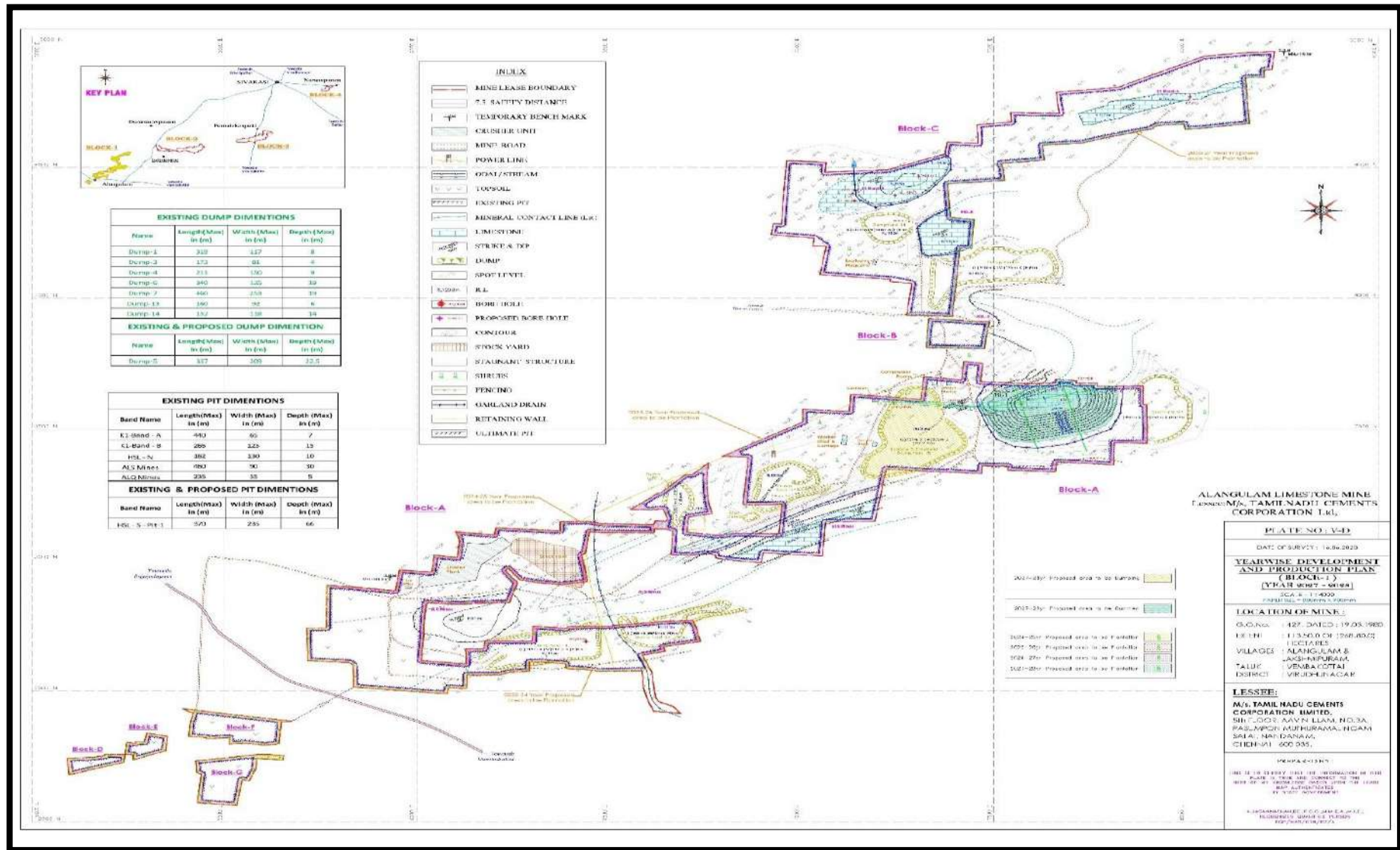


FIGURE.11 YEAR-WISE DEVELOPMENT PRODUCTION PLAN AND SECTIONS-BLOCK-1 (2028-2029)

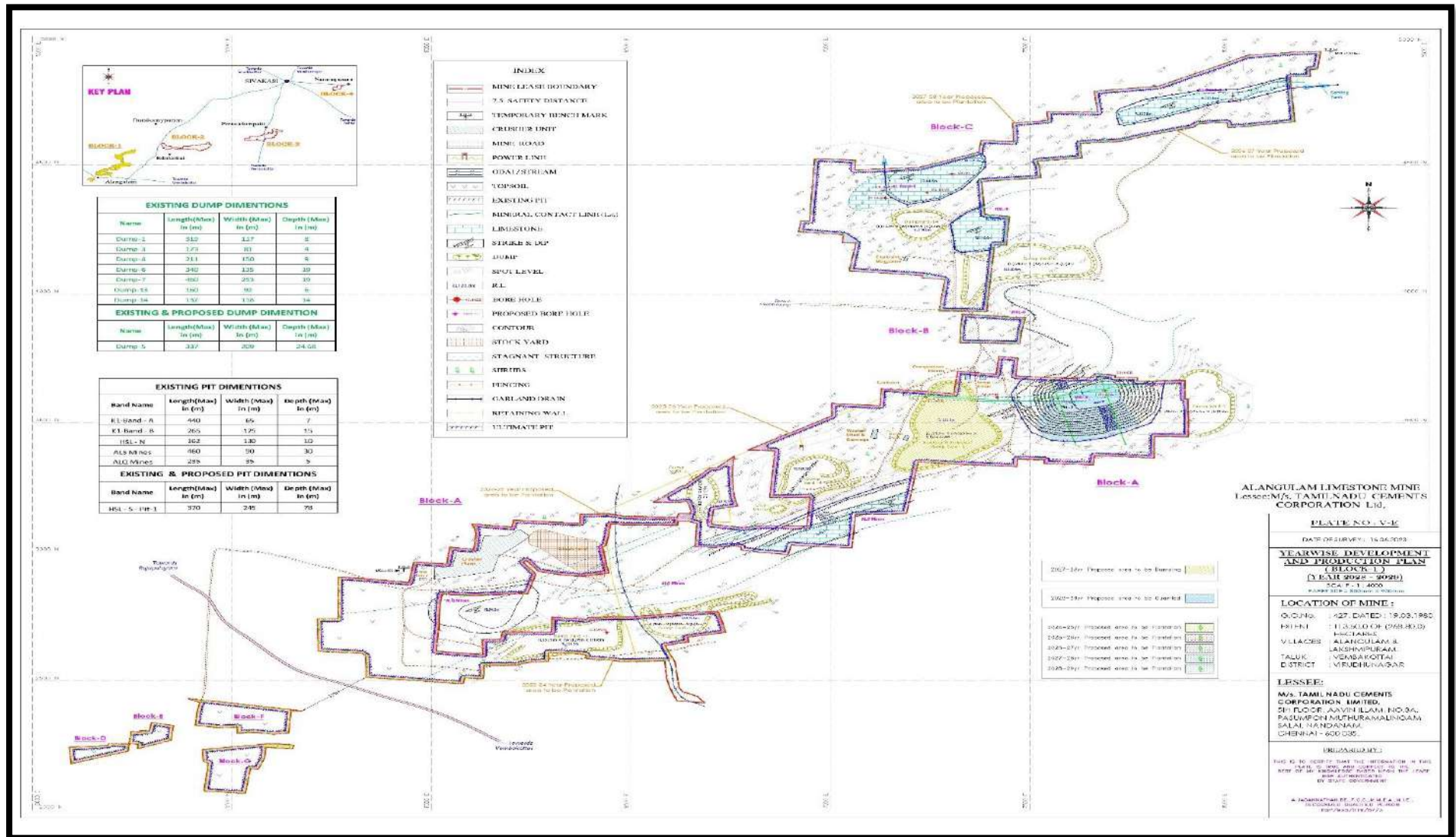


FIGURE.12: YEARWISE DEVELOPMENT PRODUCTION SECTIONS -BLOCK-1

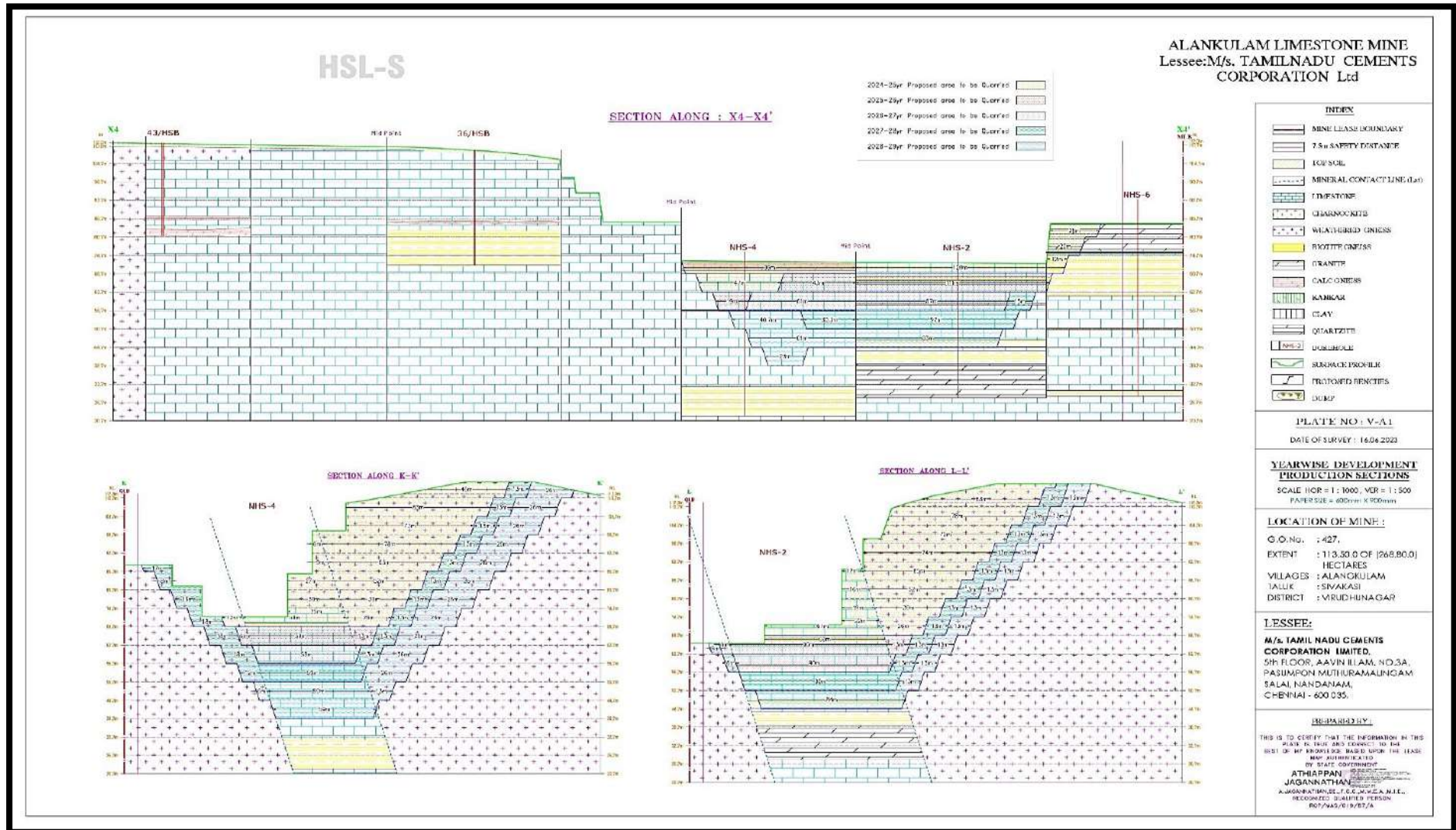


FIGURE.13: PROGRESSIVE MINE CLOSURE PLAN AND SECTIONS (BLOCK-1) (2024-2025)

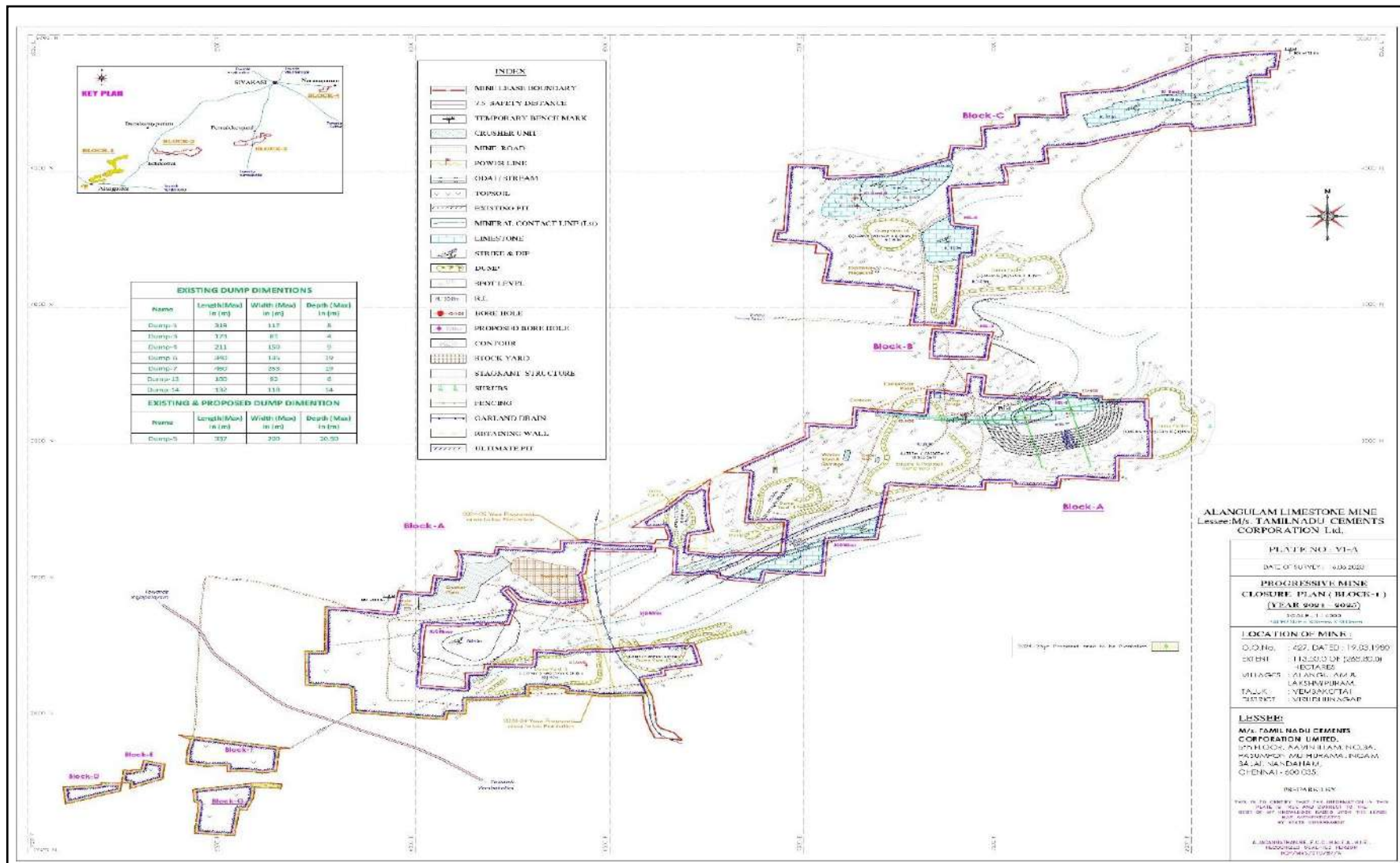


FIGURE.14: PROGRESSIVE MINE CLOSURE PLAN AND SECTIONS (BLOCK1) (2025-2026)

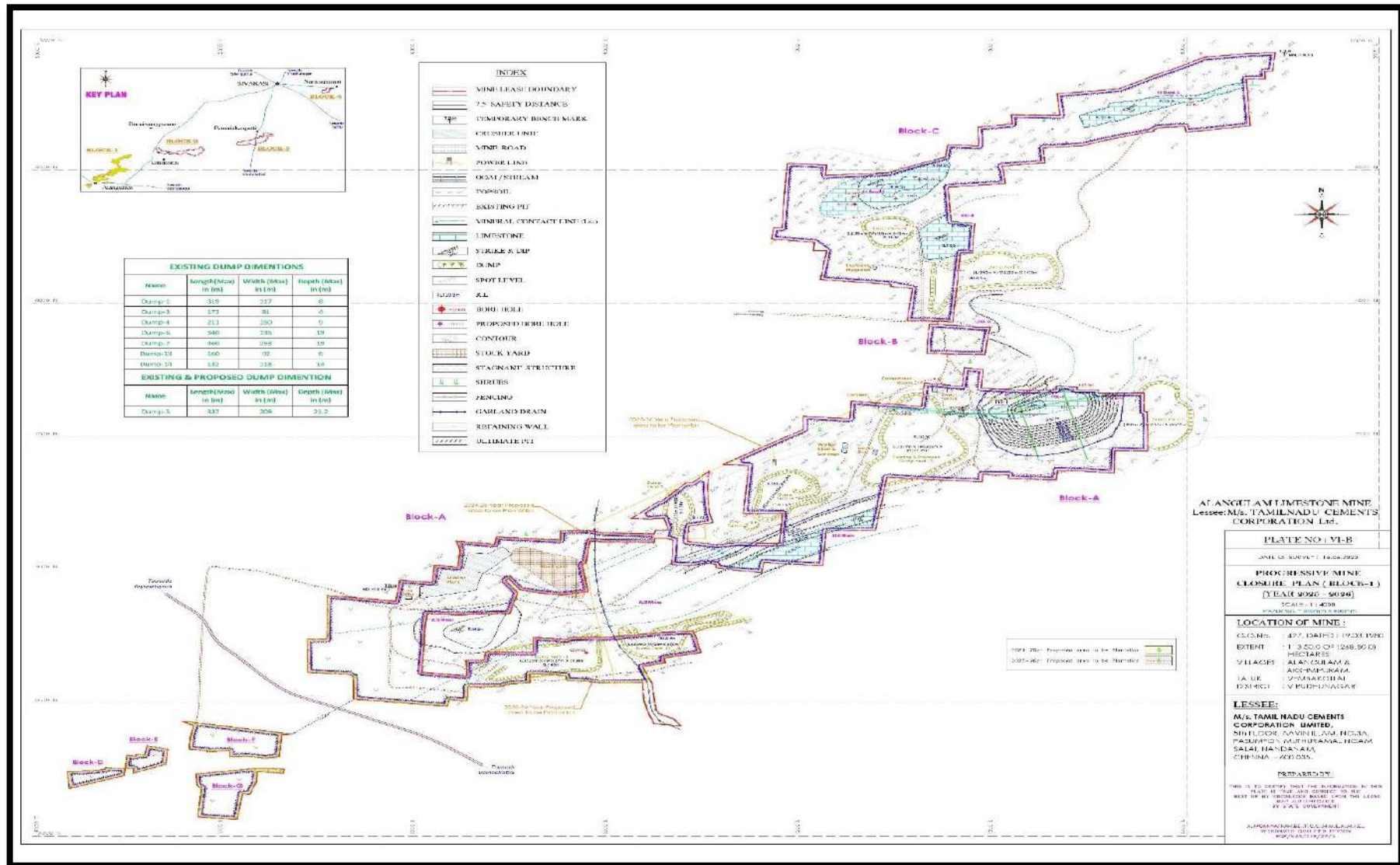


FIGURE.15: PROGRESSIVE MINE CLOSURE PLAN AND SECTIONS (BLOCK-1) (2026-2027)

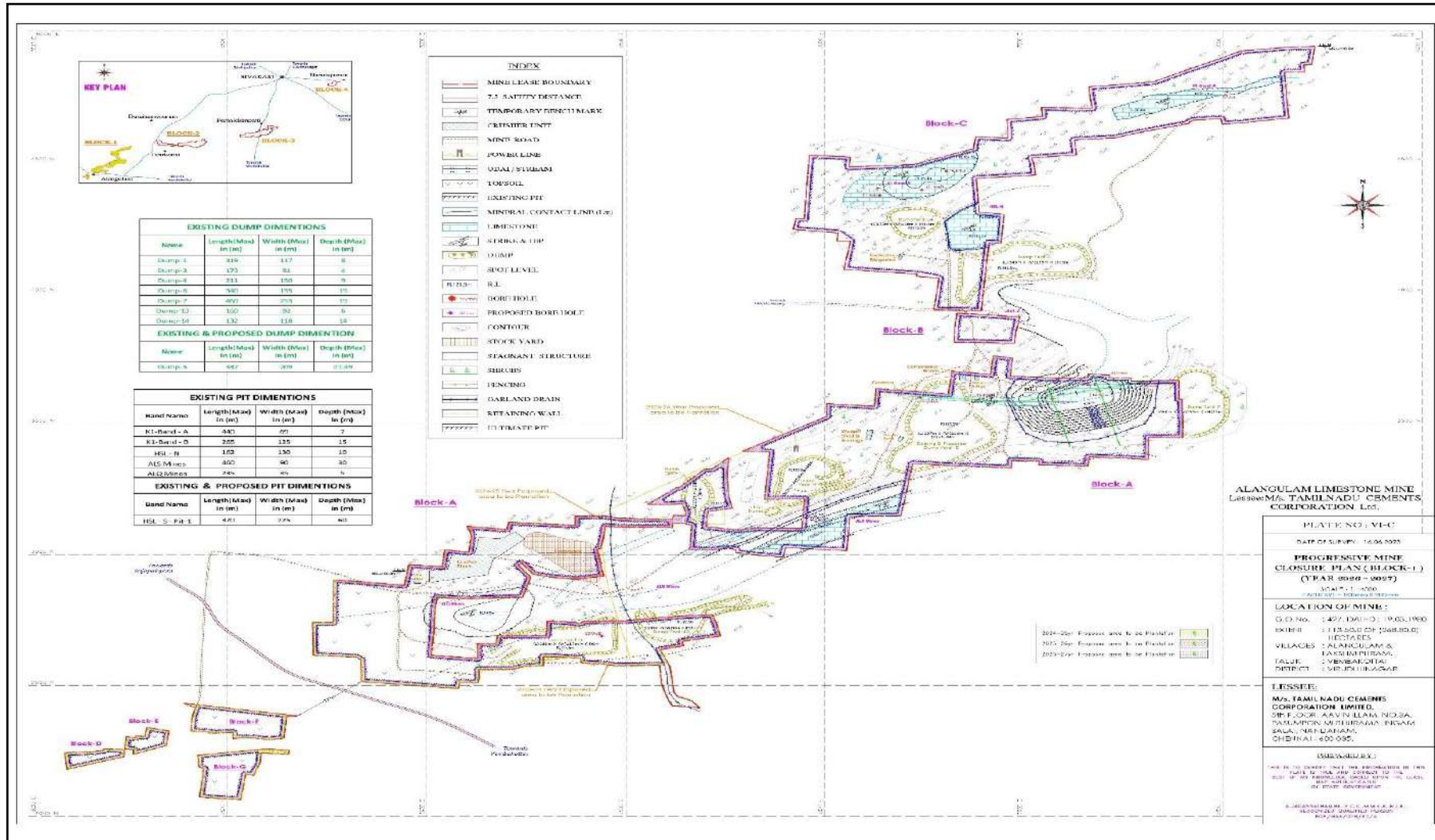


FIGURE.16: PROGRESSIVE MINE CLOSURE PLAN AND SECTIONS (BLOCK-1) (2027-2028)

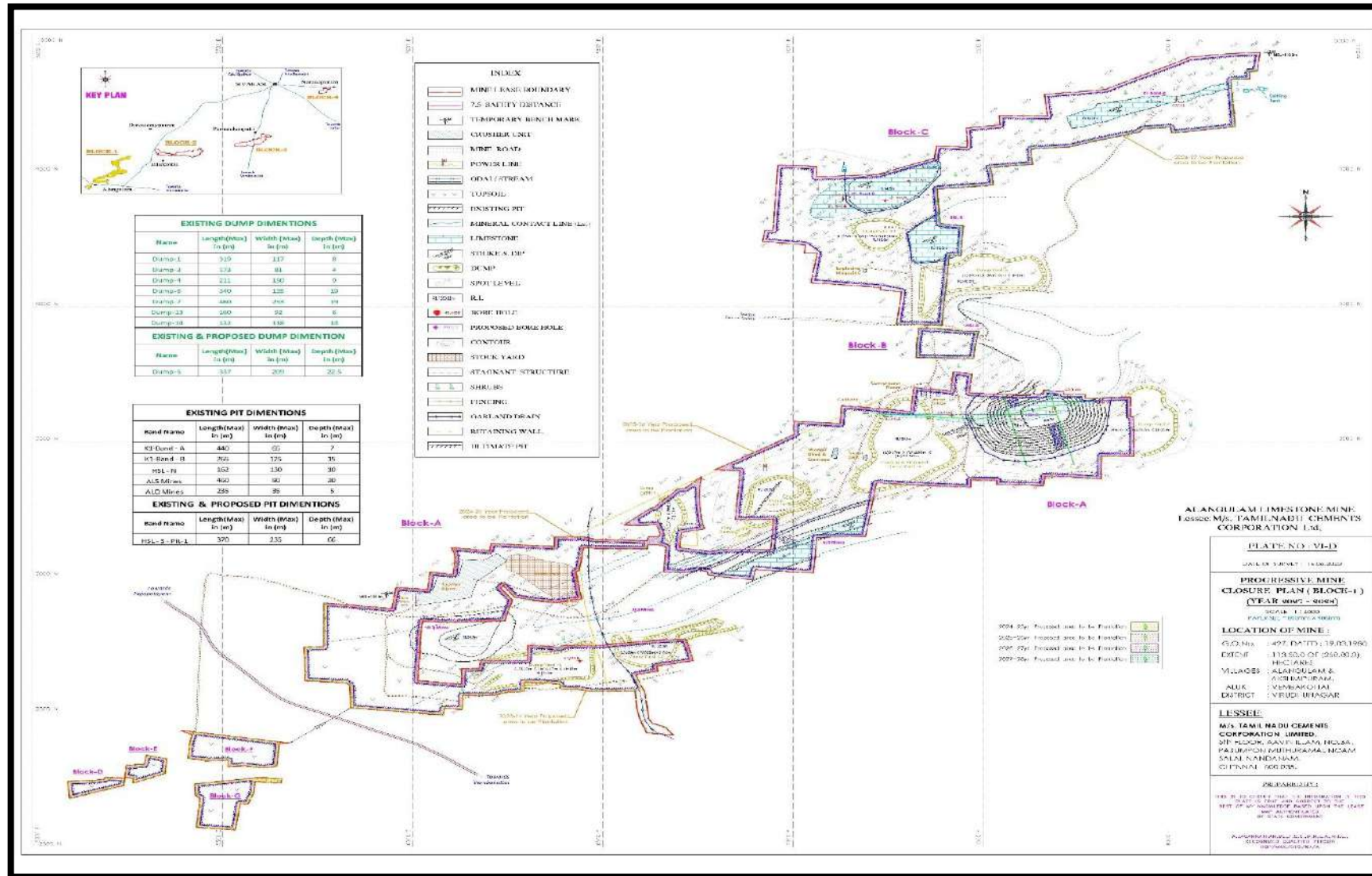


FIGURE.17: PROGRESSIVE MINE CLOSURE PLAN AND SECTIONS (BLOCK-1) (2028-2029)

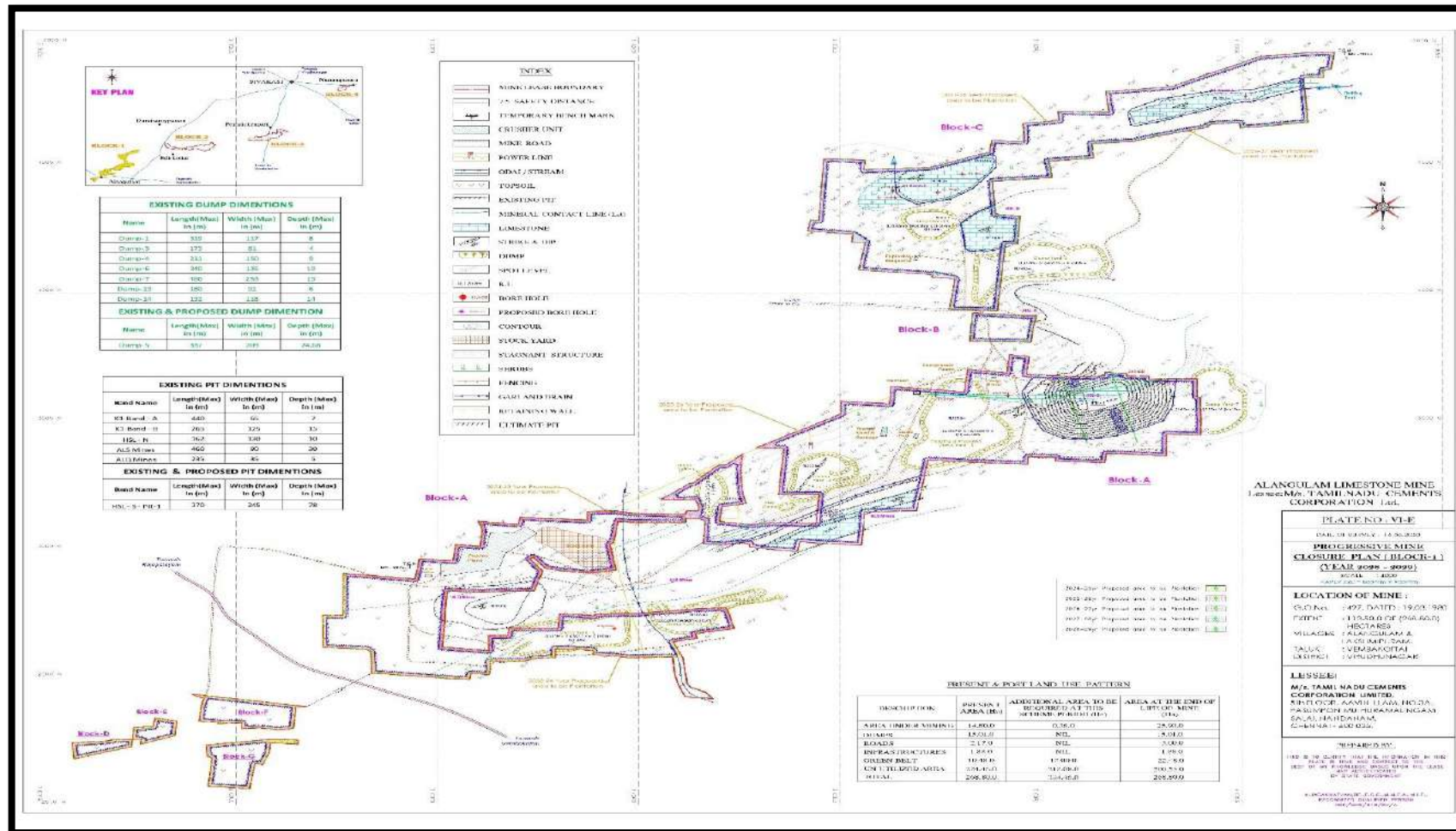
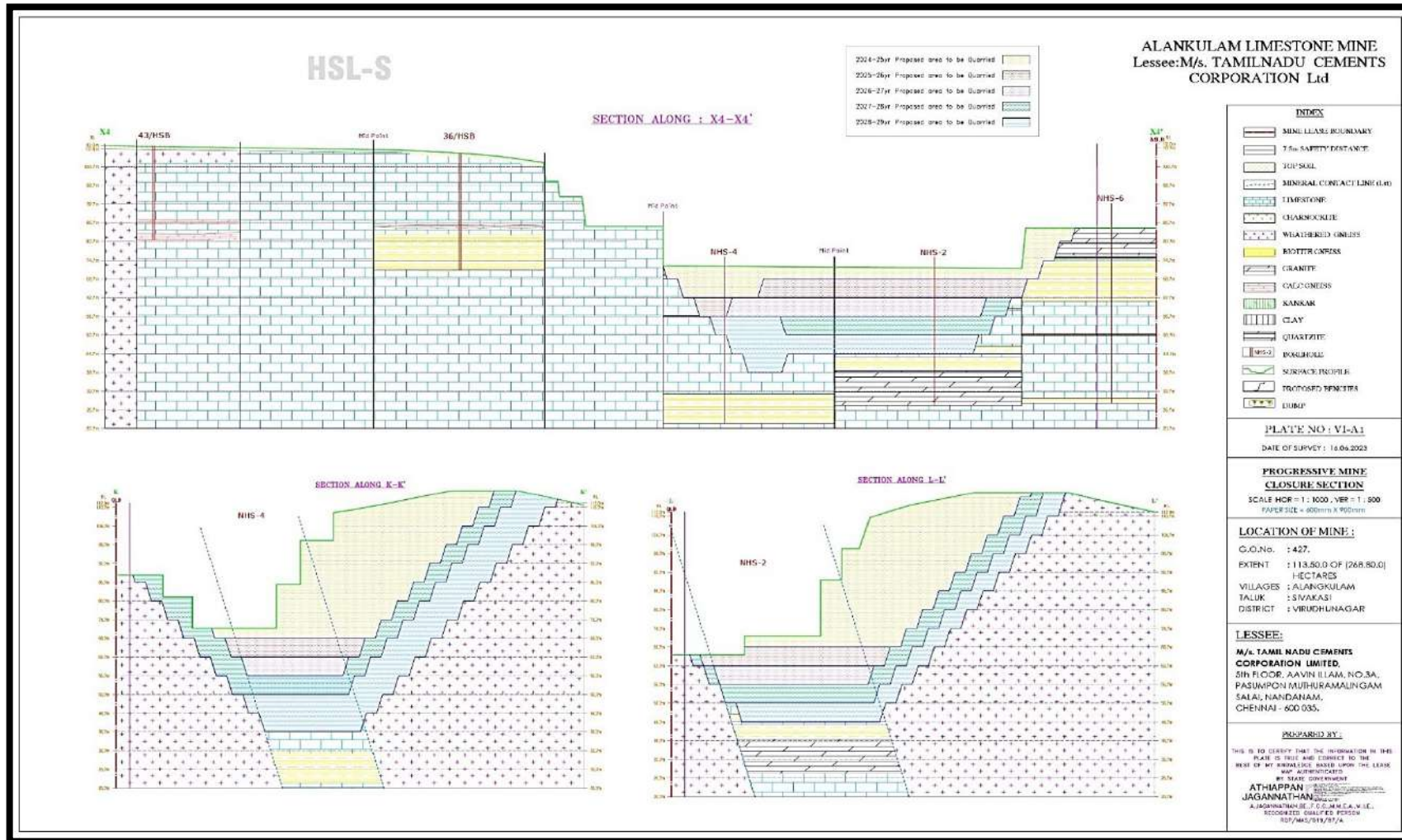


FIGURE.18: PROGRESSIVE MINE CLOSURE SECTIONS



3. DESCRIPTION OF THE ENVIRONMENT –

Baseline data generation forms a part of the Environment Impact Assessment Study, which helps to evaluate the predicted impacts on the various environmental attributes and helps in preparing an Environmental Management Plan (EMP) outlining the measures for improving the environmental quality and scope of future expansions for environmentally sustainable development.

Baseline data was generated for various environmental parameters including air, water (surface and ground water), land and soil, ecology and socio-economic status to determine quality of the prevailing environmental settings. The Base Line Study was conducted during Summer season (March-May 2023).

3.1 Land Environment

- ∞ The 10 km radius study area mainly comprises of crop land & Plantation land accounting of 58.64% & 0.84 % of the total study area. The study area also consists of fallow land of 26.95%.
- ∞ Water Bodies such as ponds/ lakes comprises of 5.69% of the core and buffer area.
- ∞ The Scrub land accounts of 2.22%. As per the primary survey, it was observed the scrub land is mainly occupied by the grass with stony waste and left-over domestic waste generated by the nearby areas.
- ∞ 0.82% of the total study area is occupied by the mine industries of captive mines. The area occupied by Mainly Limestone mine of the total buffer area. As also observed within the primary survey, the 10 km buffer area.
- ∞ The 10 km study area mostly covers of crop land 58.64%. As per current study 2.22% of the area is occupied by scrub land.
- ∞ 3.74% of the area is covered under the human Settlement in rural and urban. The nearest village within the 3km radius from the project site boundary is observed to be villages like Alangulam (TP), Kallamanaickenpatti, Lakshmipuram, Duraisamipuram, Edirkottai, Kundairuppu etc,

TABLE: 3.3 LAND USE / LAND COVER DETAILS OF STUDY AREA

S.No	CLASSIFICATION	AREA_HA	AREA_%
BUILTUP			
1	URBAN	1518.51	2.00
2	RURAL	1320.95	1.74
3	MINING	624.12	0.82
AGRICULTURAL LAND			
4	CROP LAND	44497.51	58.64
5	PLANTATION	633.97	0.84
6	FALLOW LAND	20452.18	26.95
BARREN/WASTE LANDS			
7	SALT AFFECTED LAND	832.28	1.10
8	SCRUB LAND	1687.47	2.22
WETLANDS/ WATER BODIES			
9	WATER BODIES	4319.01	5.69
TOTAL		75886.00	100.00

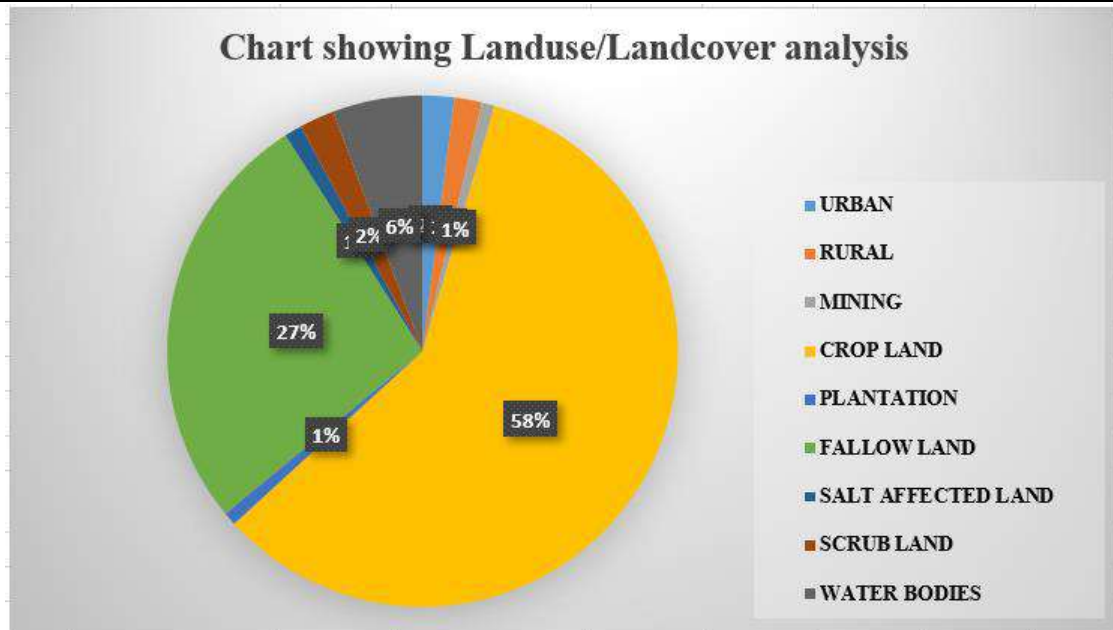


FIGURE.19 LAND USE LAND COVER MAP OF THE STUDY AREA (10KM RADIUS)

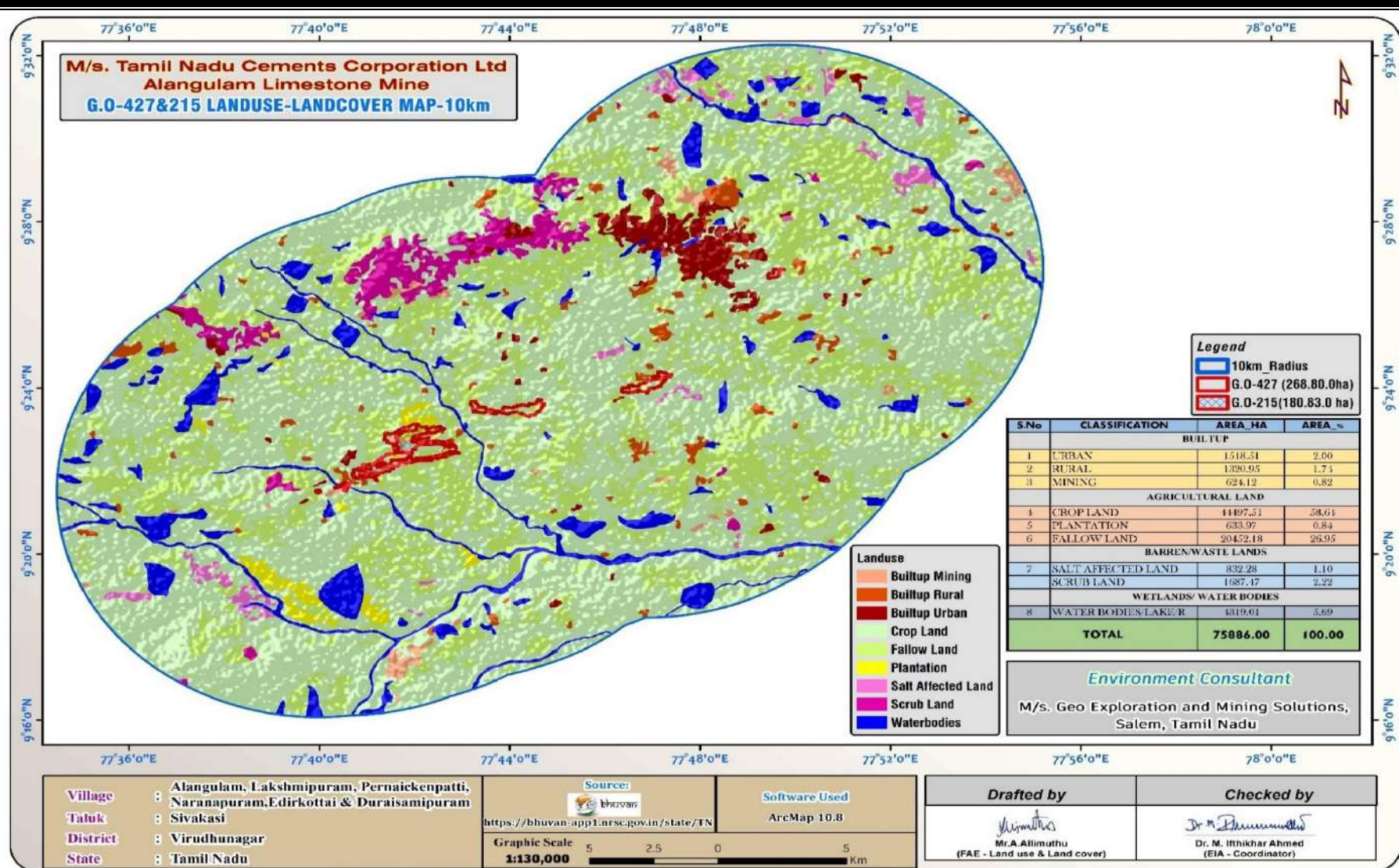


FIGURE.20: LAND USE LAND COVER MAP 10KM RADIUS

Soil Environment

For studying soil quality, sampling locations were selected to assess the existing soil conditions in and around the project site representing various land use conditions. The samples were collected by auger boring into the soil up to 90-cm depth. Ten (10) locations were selected for soil sampling on the basis of soil types, vegetative cover, industrial & residential activities including infrastructure facilities, which would accord an overall idea of the soil characteristics.

Physical Characteristics –

The physical properties of the soil samples were examined for texture, bulk density, porosity and water holding capacity. The soil texture found in the study area is Clay Loam Soil and Bulk Density of Soils in the study area varied between 1.01– 1.20g/cm³. The Water Holding Capacity 36.6-42.6% and Porosity of the soil samples is found to be medium i.e. ranging from 31.8– 35.4%.

Chemical Characteristics –

- The nature of soil is slightly alkaline to strongly alkaline with pH range 7.96 to 8.72
 - The available Nitrogen content range between 243 to 321kg/ha
 - The available Phosphorus content range between 0.71 to 1.34 kg/ha
 - The available Potassium range between 28.6 to 36.4 mg/kg
-

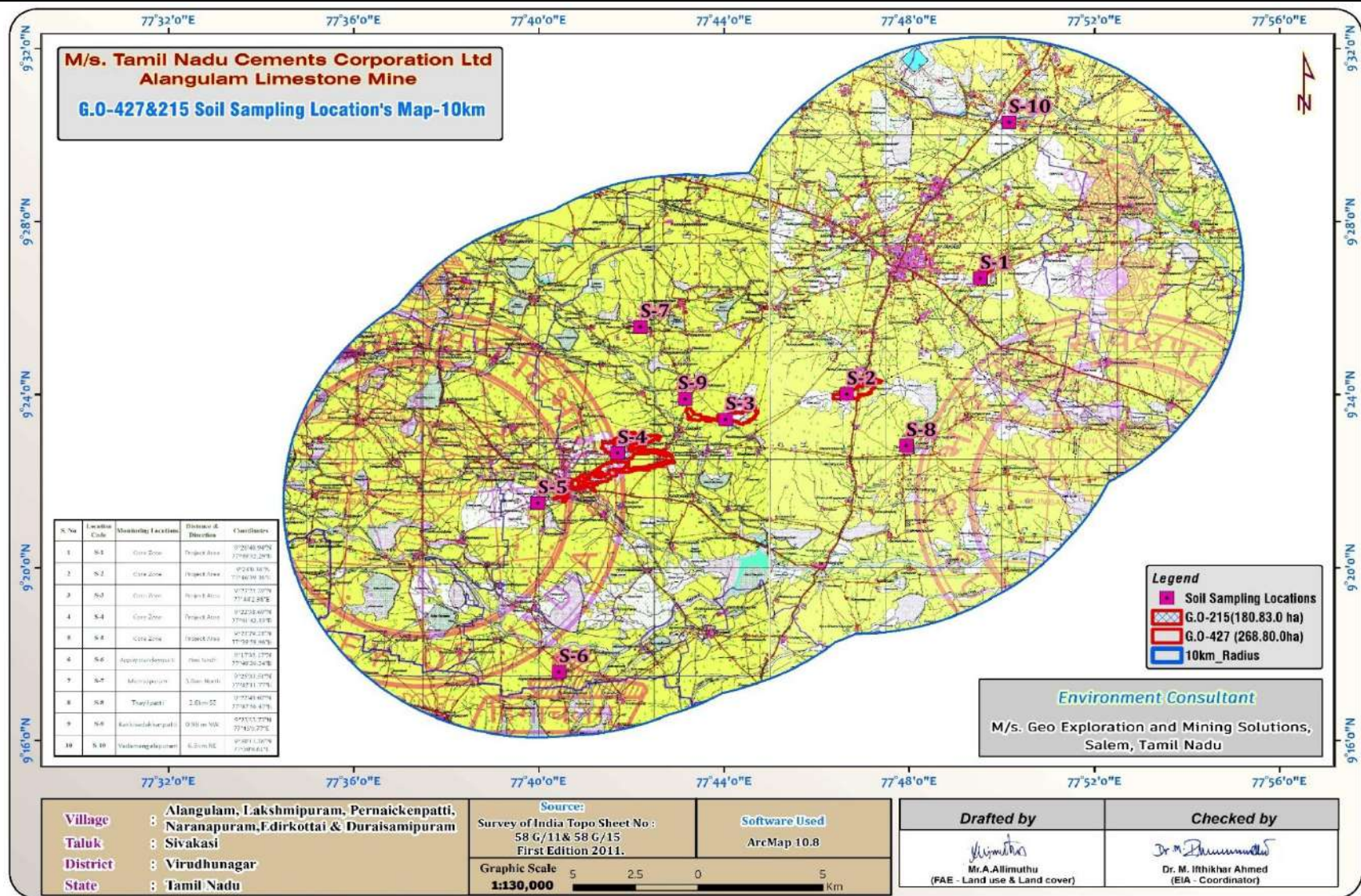


FIGURE.21 SOIL SAMPLES COLLECTION LOCATION MAP

3.2 Water Environment –

Three (3) surface water and Seven (7) ground water samples were collected from the study area and were analysed for physio-chemical, heavy metals and bacteriological parameters in order to assess the effect of mining and other activities on surface and ground water.

Surface Water

Ph:

The pH 7.72 to 7.91 while turbidity found within the standards (Optimal pH range for sustainable aquatic life is 6.5 to 8.5 pH).

Total Dissolved Solids:

Total Dissolved Solid 426-504 mg/l, the TDS mainly composed of carbonates, bicarbonates, Chlorides, phosphates and nitrates of calcium, magnesium, sodium and other organic matter.

Other parameters:

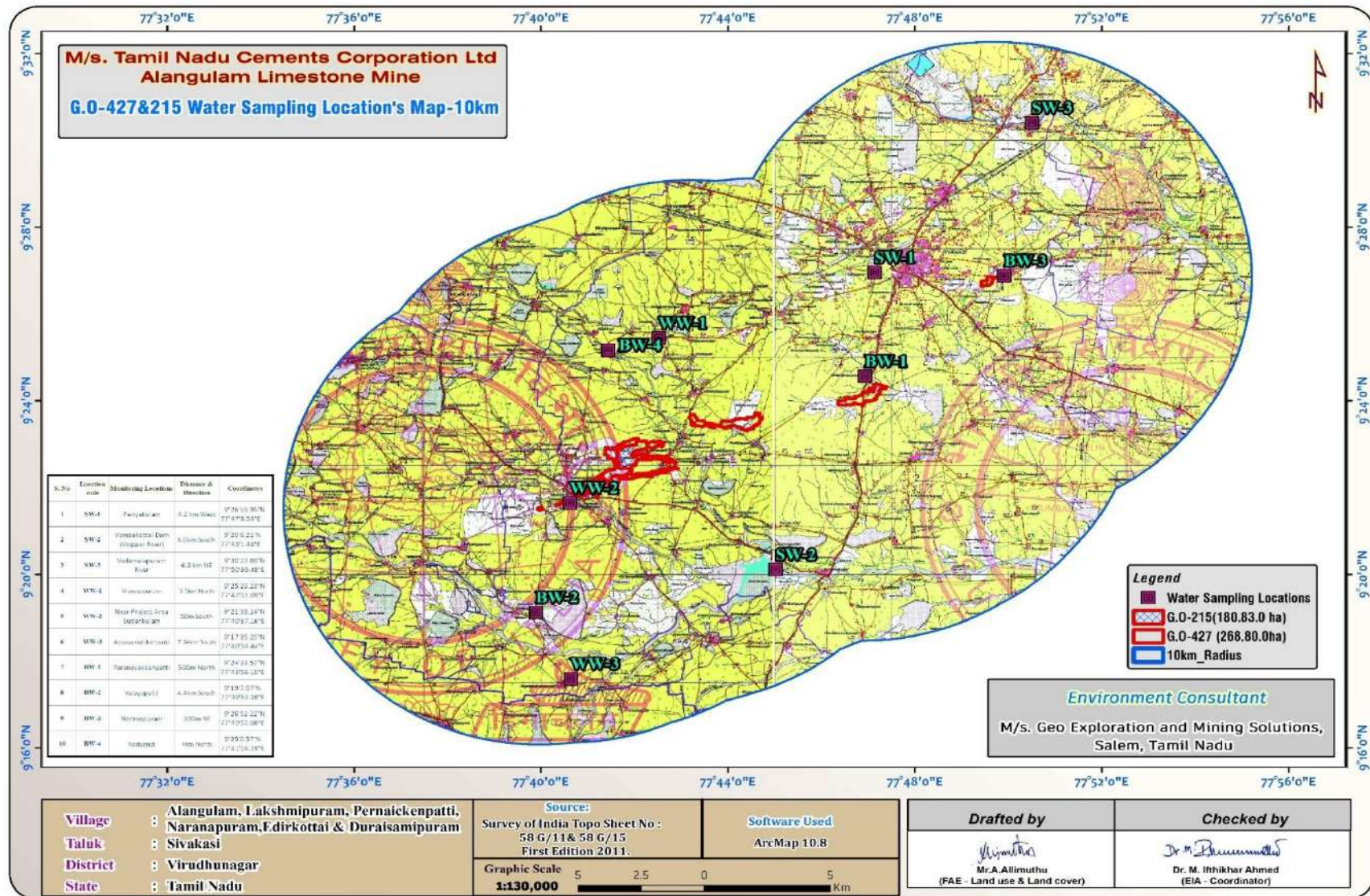
Chloride content is 72.5-93.4mg/l. Nitrates 5.8 – 7.1 mg/l, while sulphate 32.1 – 56.5 mg/l.

Ground Water

The pH of the water samples collected ranged from 6.98– 7.56 and within the acceptable limit of 6.5 to 8.5. PH, Sulphates and Chlorides of water samples from all the sources are within the limits as per the Standard. On Turbidity, the water samples meet the requirement. The Total Dissolved Solids were found in the range of 366-464 mg/l in all samples. The Total hardness varied between 124-192 -mg/l for all samples.

On Microbiological parameters, the water samples from all the locations meet the requirement. The parameters thus analysed were compared with IS 10500:2012 and are well within the prescribed limits.

FIGURE.22 WATER QUALITY MONITORING LOCATIONS



3.3 Air Environment – Meteorology (Climate) –

A temporary meteorological station was installed at project site by covering cluster quarries. The station was installed at a height of 3 m above the ground level in such a way that there are no obstructions facilitating flow of wind, wind speed, wind direction, humidity and temperature are recorded on hourly basis.

Climate

- The Virudhunagar lies on 102m above sea level the climate here is considered to be a local steppe climate. The average annual temperature is 28.6 °C | 83.4 °F.
- The precipitation here is around 829 mm |32.6 inch per year. The driest month is May, with 9 mm |0.4inch. The greatest amount of precipitation occurs in October, with an average of 144 mm | 5.6 inch.
- The warmest month of the year is October, with an average temperature of 32.2°C | 89.9 °F.
- The lowest average temperatures in the year occur in December, when it is around 22°C | 71.6°F.
- The difference in precipitation between the driest month and the wettest month is 107mm | 7inch. The variation in temperatures throughout the year is 3.4°C | 38.1 °F.

Source: <https://en.climate-data.org/asia/india/tamil-nadu/virudhunagar>

Air quality Monitoring -

Ambient air quality monitoring has been carried out with a frequency of two samples per week at eighteen (18) locations, adopting a continuous 24 hourly (3 shift of 8-hour) schedule for the period March to May, 2023. The baseline data of ambient air has been generated for PM10, PM2.5, Sulphur Dioxide (SO₂) & Nitrogen Dioxide (NO₂) Monitoring has been carried out as per the CPCB, MoEF guidelines and notifications.

- The 98th Percentile Value of PM₁₀ varies between 39.0 µg/m³ at Jaminepatti Village to 48.6 µg/m³ at Core zone.
 - The 98th Percentile Value of PM_{2.5} varies between 19.3 µg/m³ at Sundankulam Village to 26.8 µg/m³ at Core zone.
 - The average concentration of SO₂ between 5.0 µg/m³ core zone and 8.8 µg/m³ at Near project area , Appayanaickenpatti, Sivalingapuram respectively.
 - The average concentration of NO_x between 20.0 µg/m³ core zone and 27.9µg/ Vadamalapuram Village
 - The concentrations of PM₁₀, PM_{2.5}, SO₂ and NO_x are observed to be well within the NAAQ standards prescribed by Central Pollution Control Board (CPCB) for industrial and rural/residential zone.
 - All the values are found to be well within the prescribed standard as per CPCB norms.
-

FIGURE.23 WIND ROSE MAP

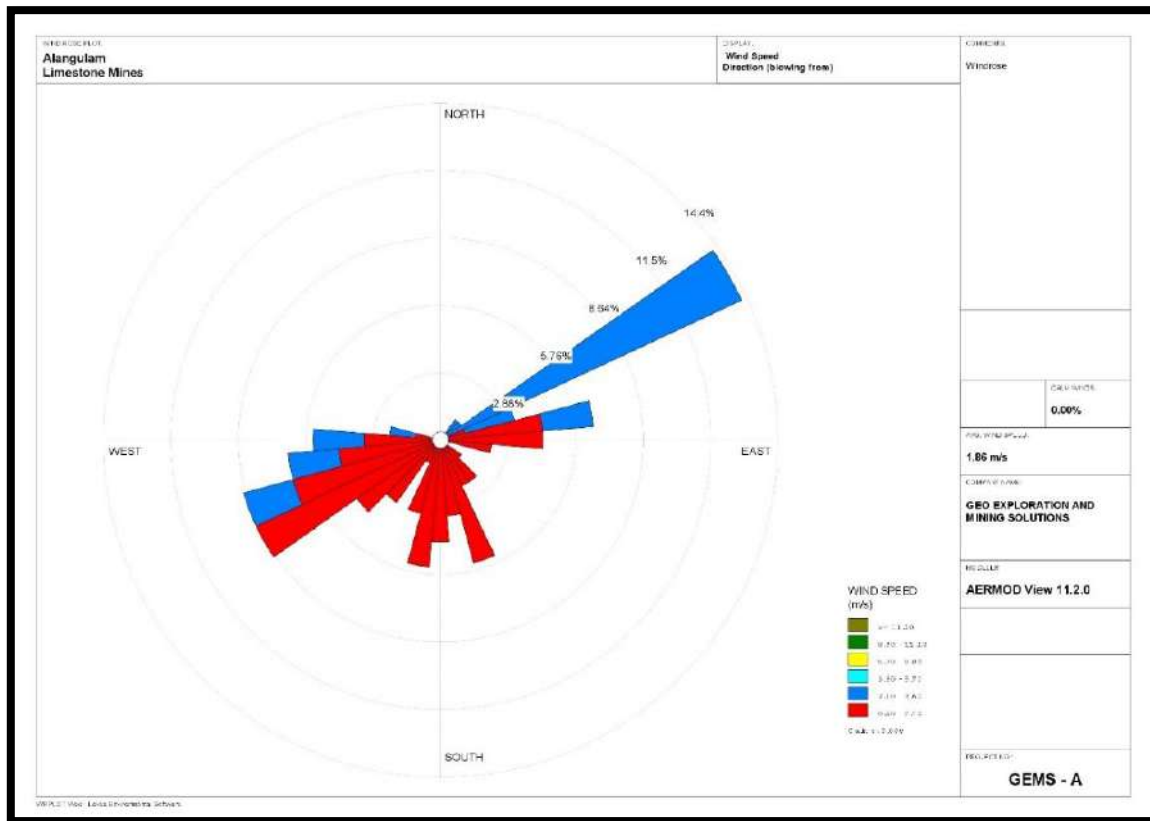
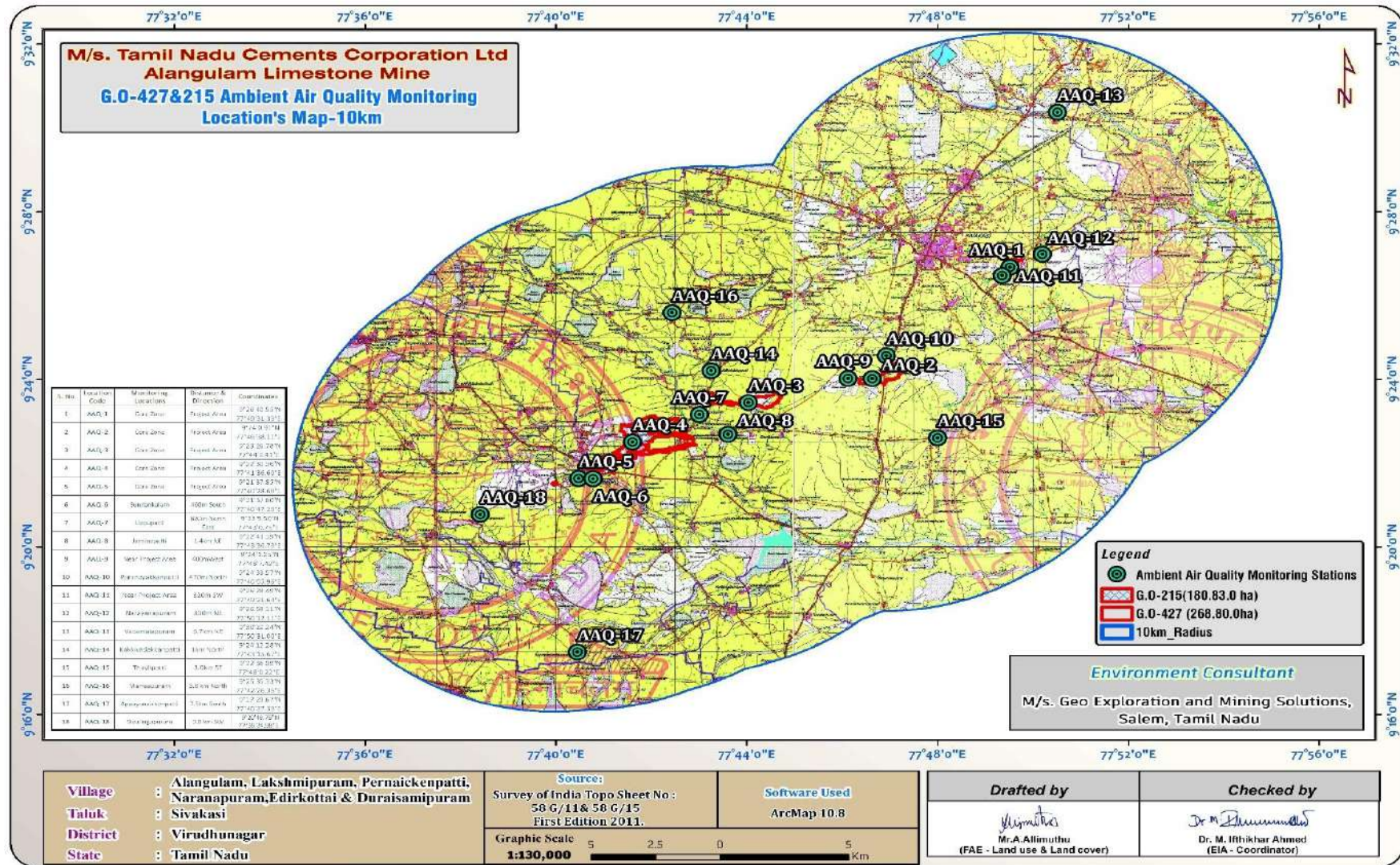


FIGURE.24 AIR QUALITY MONITORING LOCATION MAP



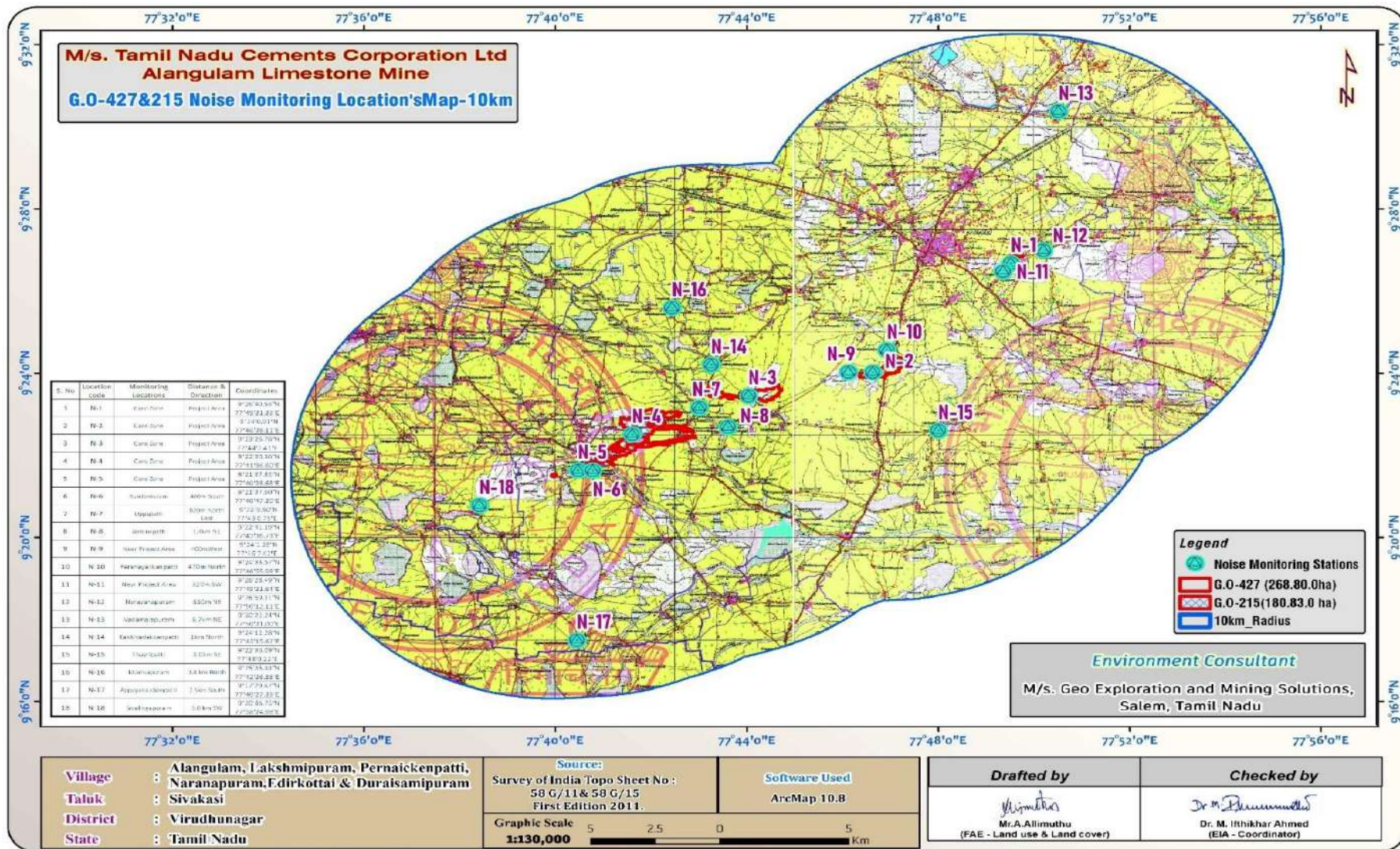
3.4 Noise Environment –

In order to assess the ambient noise levels within the study area, noise monitoring was carried out at Eighteen (18) locations. The noise level monitoring locations were carried out by covering commercial, residential, rural areas within the radius of 10km. A noise monitoring methodology was chosen such that it best suited the purpose and objectives of the study.

Ambient noise levels were measured at 18 (Eighteen) locations around the proposed project area. Noise levels recorded in core zone during day time were from 40.4 – 41.6 dB (A) Leq and during night time were is 35.1-36.8dB (A) Leq. Noise levels recorded in buffer zone during day time were from 37.1 – 40.0 dB (A) Leq and during night time were from 34.6 – 37.9 dB (A) Leq.

Thus, the noise level for Industrial and Residential area meets the requirements of CPCB.

FIGURE.25 NOISE MONITORING LOCATION MAP



3.5 Biological Environment –

Ecological survey has been carried out to understand baseline ecological status, important floristic elements and fauna structure.

There are No Schedule – I Species listed as per The Indian Wildlife (Protection) Act, 1972 or Threatened Species as per IUCN Red List noticed within the Study Area.

3.6 Socio Economics

Sample survey was carried out to collect qualitative information about the socio- economic environment of the area. The Study area has all basic amenities such as roads, drinking water facilities, township, education institution, temples, medical facilities and electricity facilities and was evident during the site visit. Thus, the study of socioeconomic component incorporating various facets related to prevailing social and cultural conditions and economic status of limestone mine region is an important part of EIA study. The study of these parameters helps in identification, prediction and evaluation of the likely impacts on the socio economics and parameters of human interest due to the project.

The primary data collection includes the collection of data through a structured interview schedule by direct observation method. The questionnaire survey includes both open and closed methods. The sample size is limited respondents, who were selected on the basis of simple random sampling from sampling from Alangulam & Lakshmpuram villages, Sivakasi Taluk, Virudhunagar District, Tamil Nadu State. in the field survey has been divided into three major segments namely Primary Zone (0 - 3 km), Secondary Zone (3 - 7 km) and tertiary Zone (7 - 10 km).

4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Land Environment:

In the Opencast method the major impact is Land Environment, the existing land use pattern of the area is dry barren land, no forest land is involved in this project. Total extent of Land area is 75886 ha about 624.12 ha area is proposed for Mining activity which will have the impact during the mining. After end of the life of mine the mined-out pits will be partially backfilled and partially allowed to store the rain water which act as a temporary reservoir. Total area of 10000 sqm is proposed for green belt development.

There is no vegetation found in the project area at present, after the completion of the mining operation the rate of the green belt development will be increased.

4.2 Water Environment

Water table in the area is 70m in summer and 75m in rainy season. The proposed depth for the mining operation is well above the water table and there is no intersection of surface water (streams, Canal, Odai etc..) within the study area.

Mitigation Measures –

- Construction of garland drains to divert surface run – off in to the mining area
-

-
- Construction of retaining with weep holes around the Mineral reject dumps to prevent the siltation to the nearby lands.

4.3 Air Environment–

The air borne particulate matter generated by mining operations and transportation is the main air pollutant. The emissions of Sulphur Dioxide (SO₂), Nitrogen Oxides (NO_x) contributed by vehicles plying on haul roads will be marginal.

The Predicted maximum Ground level concentration of 24-Hour average of particulate matter concentration is superimposed on the maximum baseline concentration obtained during the study period to estimate the post project scenario, which would prevail at the post operational phase.

The maximum incremental ground level concentration of PM₁₀ is 47.6 µg/m³ at Core Zone to 21.73 µg/m³ at Project Area (Non-Operational). This shows that the adverse impact of mining outside the ML area is marginal and has no adverse effect on health of human and animals and also on the flora of the area.

Mitigation Measures –

- Water spraying on working face to control dust emission due to loading & handling operations
- Water sprinklers along the mine haulage roads to reduce dust generation during plying of HEMM
- Controlled blasting techniques will be implemented
- Periodic water sprinkling on waste dumps and haul roads to minimize dust emissions.
- Practicing wet drilling procedures & Dust mask provision to workers
- Avoiding of overloading of tippers and covering of loaded tippers with tarpaulins during mineral transportation
- Green belt development will be carried out to arrest the dust particles
- Periodical monitoring of air quality to take steps to control the pollutants

4.4 Noise Environment

Noise pollution is mainly due to the blasting, Operation of machineries and Occasional plying of tippers in the mines and during transportation of mineral to needy customers.

Mitigation Measures –

- Controlled blasting techniques will be implemented, thus Noise due to the blasting from the mine site not going to be significant it will be up to a few seconds in the whole day.
 - In the high noise intensity working areas, earmuffs or earplugs or any other suitable personal protective equipment will be provided to the workers.
 - Regular noise level monitoring shall be done periodically for taking corrective action.
 - Green belt development around the mine sites, office buildings and all along the internal road will be practiced as to create a barrier between the source and the receiver so that the noise is absorbed and the exposure level is minimized.
-

4.5 Biological Environment

The impact on biodiversity is minimal as there is no forest, wild life sanctuaries, and Eco sensitive zone within the radius of 10 Km.

The impact would be due to dust generated from drilling and blasting activities and emission of gaseous pollutant from HEMM and mineral transportation. Adequate dust control measures will be taken to control dust emission. Thick Greenbelt development will be carried out in the mine area and haul roads to control the dust emission. Besides the air quality standards for PM₁₀, PM_{2.5}, SO₂ and NO_x and all other values are well within the AAQ standards.

4.6 Socio Economic Environment.

Due to the mining activities in the Limestone mines about 32 numbers of skilled and unskilled workers are benefitted through direct employment. About 100 numbers of peoples will be benefitted indirectly. Additional facilities such as medical, educational and infrastructural development will also take place under CSR/CER activities.

Considering the socio – economic and sociological impact it has been noticed that the economic level and living standard of the people will generally increase.

Construction Phase

Anticipated Impacts:

- ♣ No. of people will get employment during the construction stage resulting in the ancillary development and growth. Nearby Local people will be given preference for employment on the basis of their skill and experience.
- ♣ Further due to proposed project, influx of working community will also generate an indirect employment through development of nearby market/ shops, trade centers, activities, transportation etc.
- ♣ Population influx during the construction phase can introduce various water and vector borne diseases which can lead to various unhygienic health problems in the area by disturbing the existing sanitation infrastructure.
- ♣ Rapid diverse population influx at the project site can create unusual behavioral activity such as worker-community conflicts, increase violence such as theft/stabbing and increased consumption of drugs/alcohol within the area.
- ♣ Impacts on the health of nearby villagers can be envisaged due to the transportation activities leading to short term exposure of fugitive dust, resulting in various acute diseases such as increased eye irritation, nausea, headache etc.

Mitigation measures:

- ♣ Deploying of mobile toilets or the construction of temporary toilets will be done near to the construction site with the adequate water supply.
 - ♣ Awareness programme will be conducted before the monsoon season regarding the spread of water borne/ vector diseases.
-

♣ Mosquito repellents will be provided in the nearby villages and at construction site to avoid the spread of diseases.

♣ To overcome behavioral impact, proper site in charge with timely supervision will be done. In advance, facilities with equipped medical and safety services will be provided to take a control over the incident/violence if any caused.

♣ To overcome behavioral impact, supervision will be done by site in charge. In advance, emergency cell will be formed with fully equipped communication system, medical and safety services to take control over the incident/violence caused.

Operation Phase:

Anticipated Impacts:

♣ Long term exposure to the pollutants such as PM, SO₂ and NO_x Cement dust have a potential to create health impacts such as risk of cardiovascular and respiratory disease, eye irritation, bronchitis, lung damage, increased heart ailments, etc.

♣ Other impacts, associated with the applied for Limestone mine Project will create a positive impact as it will result in the overall development of the area in respect to the infrastructure development, educational growth, health facilities etc., as a part of the CSR activity.

Mitigation Measures:

♣ In order to mitigate the long-term health impacts, efficient Air Pollution Control Equipment (APCE) like Bag House / Bag Filter / ESP will be installed at all major stacks to keep the emissions within the permissible limits. To reduce the gaseous emission, Pyro-process itself acts as a long SO₂ scrubber and De - NO_x system will be installed for fuel burning along with calciner for low NO_x formation. To reduce fugitive emission from vehicles and machineries will be regularly monitored and maintained.

♣ For emergency, proposed to develop an occupational health centre for its employees and nearby villagers.

4.6.3 Impact Evaluation:

Table 4.9 Socio economics Impact Evaluation

Impact Evaluation Element	Impact on socio economics due to the applied for Alangulam Limestone mines over an extent of 268.80.0ha of both Government poramboke and Patta land.		
Potential Effect/ Concern	Proposed project will provide direct & indirect employment opportunities to the local residents, which will help to increase their earning and better living standard as well as further upliftment of socio-economic status of the area.		
Characteristics of Impacts			
Nature	Positive		Negative
	✓		
Type	Direct	Indirect	Cumulative
			✓

Extent	Project area	Local	Zonal	Regional
		✓		
Duration	Short time		Long term	
			✓	
Intensity	Low		Medium	High
			✓	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	Continuous (C)
			✓	
Significance of Impact				
Significance	Insignificant	Minor	Moderate	Major
			✓	

IMPACT ON HUMAN SETTLEMENT

There is no human settlement in or adjacent to the cluster area of Limestone mine. Nearest human settlement from cluster area as Alangulam village – above 0.5km – W, there will not be any impact on the human settlement in the area. The operation of the Limestone mine and associated activities will improve the economic development, civic amenities, and educational facilities in the project vicinity. Overall, due to employment generation and economic progress, there will be positive changes in the socio-economic condition of the people residing in the vicinity of the project site.

EMPLOYMENT

This is Limestone projects. The projects will provide total manpower cumulatively for 80nos of persons for mine management and another for activities such as excavation, transportation etc. Mostly local persons will be employed in the mine. Additional manpower requirement in the mine will be employed from the nearby villages. Thus, there will not be any population growth in the area due to the Limestone projects.

IMPACT ON CIVIC AMENITIES

The existing infrastructure facilities are sufficient to provide the needs of the Limestone projects. However, the quarry management will take efforts as a part of CER for improvement in civic amenities like sanitation, drinking water facilities, transport road, etc. in the nearby villages.

IMPACT ON HEALTH CARE FACILITIES

There are primary health care facilities in the nearby villages and hospital is available in Rajapalayam town. Mine management will also conduct periodic medical camps in the nearby villages as a part of CER.

IMPACT ON ECONOMIC ASPECTS

The quarry will have fulltime (80 nos.) for mine management such as excavation, transportation etc. Mostly local persons will be employed in the mine. The local population will be given preference in employment. The employment potential will improve economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service-oriented activities. This will, in-turn improve the quality of life in the region.

5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)**Site Alternatives –**

No alternative site has been proposed as Limestone occurrence is site specific in nature and the location of the proposed project is restricted to the geology and mineral deposition of the area.

Mining Technology alternatives –

Opencast, category “A” opencast Mechanized method and the excavator will be deployed for the formation of benches and loading. Excavator attached with rock breaker will be deployed for breaking and fragmentation to avoid blasting as the strata is medium hard in nature.

The project will follow opencast mining method because of surface mineral deposits and to ensure higher mineral conservation. The mining by opencast method will be highly productive & economical as compared to underground method.

6 ENVIRONMENT MONITORING PROGRAM

Usually, an impact assessment study is carried over short period of time and the data cannot bring out all variations induced by natural or human activities. Hence regular monitoring program of Environmental parameters is essential to take into account the changes in the Environment. The Objective of Monitoring -

- To check or assess the efficiency of the controlling measures;
- To establish a data base for future impact assessment studies.

7 ADDITIONAL STUDIES - RISK ASSESSMENT & HAZARD –

The components associated with risk and hazard in these mines include jackhammer drilling & blasting, waste dump and explosive storage. Measures to reduce and avoid any incidents occurring from the above-mentioned components shall be planned and implemented as soon as the mine starts commissioning; this includes measures to avoid the above discussed risk factors. Proper risk management plan will be proposed to avoid any kind of accident/ disaster.

8 PROJECT BENEFITS –

- Improvement in physical infrastructure
- Improvement in Social Infrastructure
- Employment Potential
- Proponents will carry out CSR activities like community awareness program, health camps, Medical aid, family welfare camps etc.,
- A massive plantation will be done in the mine area to mitigate the ill-effects of mining and to improve the vicinity and environment of mine and its surrounding area.

9 ENVIRONMENTAL COST BENEFIT ANALYSIS.

Environmental cost benefit analysis is not recommended.

10 ENVIRONMENT MANAGEMENT PLAN

The Environmental Management Plan (EMP) is a site-specific plan developed based on the base line environmental status, mining methodology and environmental impact assessment. In each of the areas of impact, measures have to be taken to reduce potentially significant adverse impacts and where these are beneficial in nature, such impacts are to be enhanced/ augmented so that the overall adverse impacts are reduced to as low level as possible.

The proponent shall organize an Environment Monitoring Cell in common which is responsible for the management and implementation of the environmental control measures. Basically, this department shall supervise the monitoring of environmental pollution levels like ambient air quality, water quality, soil quality and noise level by appointing approved external agencies.

The working conditions in the mines are governed by the enactments of the Director General of Mines Safety (DGMS). The proponent shall take all necessary precautions regarding health and safety of workers as per the guidelines of the Mines Act, sanitary facilities shall be provided within the lease area; carry out periodic health check-up of workers.

The proponent will carry out CSR activities for overall development of the people in the area. The activities shall include medical camps, water supply, improvement of school infrastructure, etc. The proponents have been carrying out CSR Activities in various fields for social welfare around the project site and spent an amount of Cumulatively about Rs. 78 Lakhs.

11. CONCLUSION

It can be concluded from overall assessment of the impacts, in terms of positive and negative effects on various environmental components, that the mining activities will not have any adverse effect on the surrounding environment.

To mitigate any impacts due to the mining activities, a well-planned EMP and a detailed post project monitoring system is provided for continuous monitoring and immediate rectification at site. Due to the mining activities, socio economic conditions in and around the project site will be improved substantially. Hence, the Environmental Clearance shall be granted at the earliest based on the merits of the project.

- Since the mining operation have been stopped for last years which has caused unemployment and affected the livelihood of the workers who were employed and a major loss to the infrastructure and machinery deployed.
- The livelihood of the proponent is very much dependent upon this mining operation which had been working from several years hence the Environmental Clearance shall be granted at the earliest.
