

## ENVIRONMENT MANAGEMENT PLAN

### Executive Summary

The applicant, THE EXECUTIVE ENGINEER, Public Works Department, Water Resources Department, Mining and Monitoring Division, Trichy District has applied for sand Quarrying in Vellaru River at over an extent of 4.90.0 Hectares in S.F. No. 158/1 (P), in Silippanur Village, Sendurai Taluk, Ariyalur District, Tamil Nadu.

The District Collector, Ariyalur has directed the applicant vide his precise area communication letter Roc.No.315/2018/Mines dated 27.02.2020 to get approved Mining plan and Environmental Clearance from the state Environmental Impact Assessment Authority (SEIAA) for grant of Sand Quarry in S.F. No. 158/1(P), Silippanur Village, Sendurai Taluk, Ariyalur District, Tamil Nadu for a period of One year.

The mining plan is prepared as per the District Collector's proceedings letter. No. Roc.No.315/2018/Mines dated 27.02.2018 under Rule 41& 42 of Tamil Nadu Minor Minerals Concession Rules, 1959 for quarrying Sand with due consideration of environmental parameters so as to obtain Environmental clearance (EC) from EIA Authority (SEIAA/DEIAA), as per the EIA Notification, 2006 and EM- Sand Mining Guidelines, 2020. The project cost is about Rs 3.55 lakhs and EMP cost is Rs 2.5 lakhs.

Open cast manual mining will be adopted to extract Sands of required size from the area for which lease applied for. Before opening a mine, several aspects should be considered like construction of semi-permanent structures, planning for the development / production works, formation of faces, lying of approach for movement of Tippers, recruitment of man power, deployment of machinery, etc.

Geological reserves are estimated at **169,500 m<sup>3</sup>** depths of 3m (1.48 +3m) including shoal portion and recoverable reserve is estimated as 73,500 m<sup>3</sup> of Shoal (0.531) and 48,000m<sup>3</sup> for 1m below theoretical bed level and the average production is about 284m<sup>3</sup> or 451 loads/per day @ 0.71m<sup>3</sup>/load for 150 days per annum.

**Table No: 1.1. Salient features of the proposed project**

FEATURE	DETAILS
<b>Project and Proponent details</b>	
Name of the Proponent and address	<b>THE EXECUTIVE ENGINEER,</b> Public Works Department, Water Resources Organization, Mining and Monitoring Division, Tiruchirappalli.
Existing/New Quarry	New

  
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Classification of the area (Ryotwari/Poramboke/Others)	The proposed site is located in River basin of a Poramboke land.
Ownership /occupancy of the Applied area (Surface Rights )	<b>THE EXECUTIVE ENGINEER</b>
Category	B <sub>2</sub>
Type of Project	Sand Quarry
Site Location	Silippanur Village of Sendurai Taluk, Ariyalur district Tamil Nadu.
Period of Lease	One year
<b>Mining Details</b>	
Method of Mining	Open cast semi mechanized,
Mining lease area	4.80.0 Ha
Geological Resources	<b>169,500 m<sup>3</sup></b>
Mineable Reserves	48,000 m <sup>3</sup>
Production	320m <sup>3</sup> or 451 loads/per day @ 0.71m <sup>3</sup> for 150days per annum.
Depth of Mining	1m below the theoretical bed level
Water Table	Water table in this area is 5-6m in the boreholes.
Existing Pit Dimension	Nil
Proposed bench height & Width	Nil
<b>Machineries</b>	
Types of Machineries used in the quarry	It is open cast manual mining method, Bullock carts of 0.71m <sup>3</sup> Capacity.
<b>Blasting Pattern and Explosive</b>	
Blasting Pattern	No blasting is proposed
Types of Explosive	
Measures proposed to minimize ground vibration due to blasting	
Storage of explosive	
<b>Approvals</b>	
Mining plan approval	Deputy Director, Geology and Mining, Ariyalur vide Roc. No: 315/G&M/2017 dated 02.06.2020
AD Letter for 500m radius cluster certificate.	AD Letter for 500m radius cluster letter Enclosed.
Precise area Communication Letter	Roc.no. 315/Mines/2018 dated 27.02.2020
<b>General conditions</b>	
Does it attract any general conditions specified in the EIA notification, 2006?	<b>1. Forest (Conservation) Act 1980:</b> Vangaram R.F found about 8.2Km on SW direction. The area does not attract the Forest

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	(Conservation) Act 1980 <b>2. Wild Life (Protection) Act, 1972:</b> There is no wild animal sanctuary within 10 km radius from the project site under the Wildlife (Protection) Act, 1972. <b>3. Coastal Zone:</b> The proposed quarry is located 62.Kms away from sea coast on towards eastern side. Hence, the project doesn't attract the C.R.Z. Notification, 2011.
Defence installations	Nil within 10 km
Archaeological features	Nil within 10 km
Ecological sensitive zones	Nil within 10 km
Interstate Boundary	Interstate boundary is located at 160kms from site to Tamil Nadu – Andhra Pradesh border line on the North directions
Nearest streams/ rivers/ water bodies	The project site located at Vellaru river.
Seismic zone	Zone-II, Low damage risk zone as per BMTPC, Vulnerability atlas Seismic zone of India IS: 1893-2002.
<b>Requirement (Water and Man power)</b>	
Man Power	36 Persons
Water requirement	Total water requirement – 4 KLD Drinking and Utilities 2 KLD, Dust suppression 1 KLD Green Belt 1 KLD. Source: Mineral water supply and water tank
EMP Cost	Rs2.5 Lakhs
Project Cost	Rs.3.55 Lakhs
<b>Infrastructure facilities</b>	
Nearest habitation	gooddalur – 8.20m - North
PMHC	Pennadam – 2.5km - Northeast
Nearest Town	Pennadam – 2.5km- Northeast
Nearest Railway station	Pennadam Railway Station – 1.4km- Northeast
Nearest Airport	Thiruchirappalli Airport- 88km-Southwest
<b>Climatic Conditions</b>	
Climatic condition	1. Generally tropical climatic condition. 2. This district receives rain both in south west and north east monsoon. 3. The average rainfall is about 843.5 to 1123.3 mm. 4. Temperature

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	Max: 40.0°C Mini: 22.0°C			
<b>Survey details</b>				
Survey number	158/1(P)			
Geographical features	The area applied for mining lease is a River Bed, with elevation vary from 41.5m (Minimum) to 46.50 m (Maximum) above MSL. It is represented in the Geological Survey of India 58 M/3. The applied Lease area lies between Latitude of 11°23'07.23"N to 11°23'17.08"N and Longitude of 79°12'51.15"E to 79°13'06.69"E.			
Land use pattern	<b>S.No</b>	<b>Description</b>	<b>Present area (Ha)</b>	<b>Proposed land use (Ha)</b>
	1	Area under mining	0.00.0	4.80.00
	2	Roads	0.00.0	0.00.0
	3	Green belt & Dump	0.00.0	0.00.0
	4	Infrastructure	0.00.0	0.00.0
	5	Unutilized Area	4.80.0	0.00.0
	<b>Total</b>		<b>4.80.0</b>	<b>4.80.0</b>

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## ENVIRONMENT MANAGEMENT PLAN

There would not be any adverse impact in the existing environment arising from this mining activity. To protect the environment, the proponent would do adequate afforestation program and spend CER @ 2% of the project cost and CSR at a rate of 2.5% of the profit through local Panchayat for the welfare of Silippanur Village.

**TABLE NO: 2: ENVIRONMENT MANAGEMENT PLAN**

S.No	Parameters	Mitigation Measures
1	Water Environment	<ul style="list-style-type: none"><li>▪ Mining activity will be above the ground water level and hence ground water table will not be affected.</li><li>▪ Drinking water utilized from Mineral water industries</li><li>▪ Total Water requirement will be 4.0 KLD</li></ul>
2	Air Environment	<ul style="list-style-type: none"><li>▪ Water sprinklers along the sides of haul road shall be fixed to control fly of dust while transporting minerals and waste</li><li>▪ Avenue trees along roads around ML boundary shall be planted as per the norms of MoEF&amp;CC to control fly of dust, noise etc.</li><li>▪ Labours engaged in such dust prone areas should be provided with safety devices like ear muff, mask, goggles as per the MMR, 1961 amendments and circulars of DGMS.</li></ul>
3	Noise Environment	<ul style="list-style-type: none"><li>▪ This eco-friendly quarrying operation does not involves any blasting and drilling methods. Hydraulic excavator is less than 80db.</li><li>▪ Hence noise will be minimal and this is only due to the movement of Excavator and trucks.</li><li>▪ Plantation will help in arresting noise at source</li><li>▪ Periodical monitoring of noise and vibration to ensure safety environment for workers.</li></ul>
4	Soil Environment	<ul style="list-style-type: none"><li>▪ Humus top soil shall be preserved for reuse in afforestation and agriculture.</li></ul>
5	Land Environment	<ul style="list-style-type: none"><li>▪ By permitting quarrying of sand from this silted bed can be deepened and it will enable to increase the water holding capacity of the</li></ul>

  
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		<p>tank.</p> <ul style="list-style-type: none"><li>▪ Greenbelt will be developed around the mine lease boundary</li></ul>
6	Ecology and Biodiversity	<ul style="list-style-type: none"><li>▪ No rare species of flora and fauna identified except regional common species.</li></ul>
7	Waste Management	<ul style="list-style-type: none"><li>▪ There is no wastage is encountered during the quarrying operation the entire quarry is utilized.</li></ul>
8	Occupational Health and Safety	<ul style="list-style-type: none"><li>▪ Workers involved in quarrying work shall be provided protective equipments such as Thick Gloves, Goggles, ear plugs, safety boot wears, etc...</li><li>▪ First Aid station as per provision under Rule (44) – schedule III of the Mines Rules 1955 to be provided.</li><li>▪ Qualified First Aid personnel should be appointed /nominated to attend emergency first aid treatment.</li><li>▪ Periodic medical examination has to be made for occupational health once in six months in addition to attending medical treatment of occupational injuries under Rule 45 (A).</li></ul>
9	CSR Activities	<ul style="list-style-type: none"><li>▪ The proponent is proposed to spend CSR @ 2.5% of profit as per the Companies Act, 2013 and CSR Rules, 2014 through local Panchayat for maintenance of road, street light, school sanitation etc., The CER will be @ 2% of the project cost.</li></ul>

  
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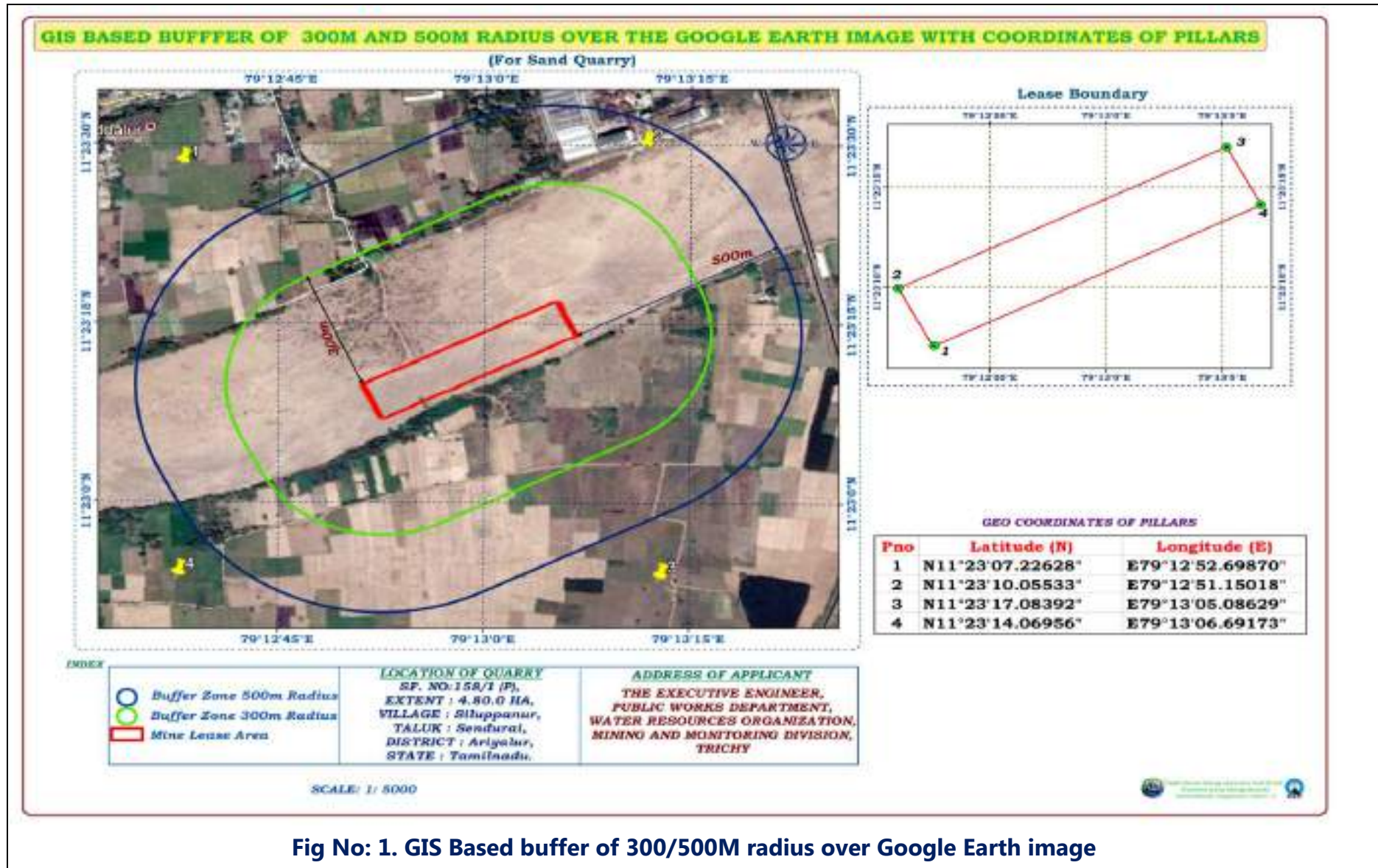


Fig No: 1. GIS Based buffer of 300/500M radius over Google Earth image

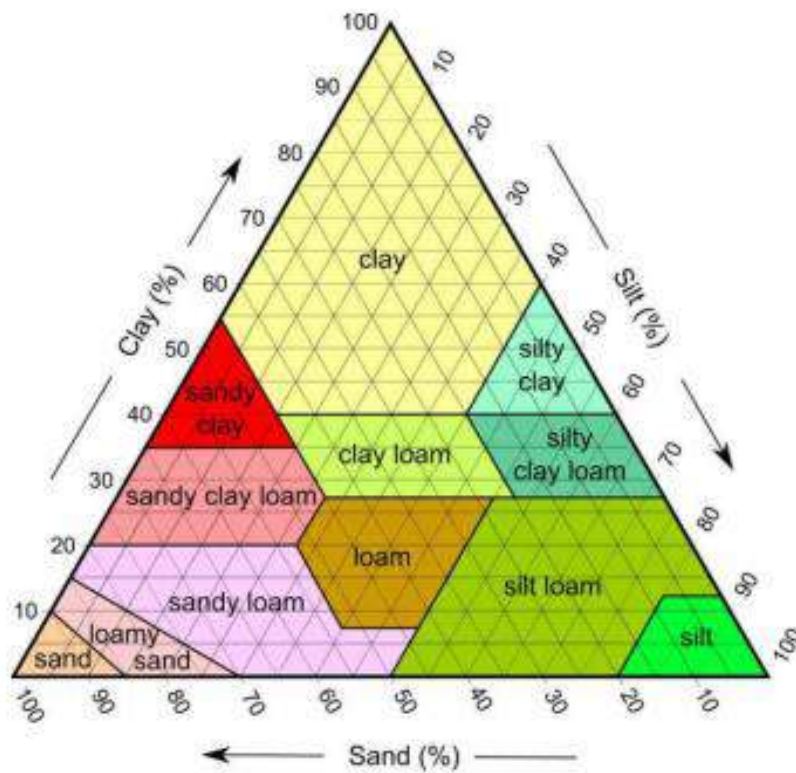
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**Fig No: 1. GIS Based buffer of 300/500M radius over Google Earth image**

**SOIL CLASSIFICATION**

Land of Limestone Ferruginous red loam occurs in Ariyalur district. The texture is usually loamy, the colour varying from red at the surface to yellow at the lower horizon. The soils are of medium depth with good drainage, free from accumulation of salt and calcium carbonate, pH ranging from 6.5 to 8.0 and contain low amounts of organic matter, nitrogen and phosphorus but with generally adequate amounts of potash and lime.

Red loam soil is found to be prevalent in Sendurai, T.Palur, Andimadam, Jeyankondam blocks of Ariyalur District. Block soil is found in Thirumanur and Ariyalur blocks of the district.



**Textural triangle of Soil**

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**Fig No: 2.Collection soil Sample**

**TABLE NO: 3: SOIL TEXTURE ANALYSIS**

<b>PARAMETERS</b>	<b>RESULTS</b>
pH value (10% solution )	8.21
EC@ 25°C (Micromhos/cm) (10% solution)	123
moisture	0.098 %
Bulk density	1.55 g/cc
texture	Sand = 91.66% : Silt = 8.33%:

**CHEMICAL PARAMETERS**

<b>PARAMETERS</b>	<b>RESULTS</b>
Alkalinity	0.009%
Calcium	0.1223%
Magnesium	0.086%
Sodium	0.0018%
Potassium	0.0014%
Iron	1.22%
Copper	0.0013%
Chlorides	0.2935%
Organic Matter	13.54%
Water Holding Capacity	40%

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### WATER QUALITY

Quarrying does not have any significant impact on the water quality, as the neither quarrying nor intercept with the ground water level neither there is any surface water body near the site.



**Fig: No: 4: Collection of Water sample**

**TABLE: NO: 4 WATER QUALITY ANALYSIS- SAMPLE -1  
 Physical and Chemical Properties**

S.No	PARAMETERS	UNIT	RESULT	As Per Is 10500:2012		PROTOCOL: APH A 23 <sup>rd</sup> Edition 2017
				Requirement (Acceptable limit)	Permissible limit in the absence of alternate source	
1	pH value at 25°C	-	<b>8.13</b>	6.5-8.5	6.5-8.5	IS:3025 (PART-11)-1983
2	Turbidity	NTU	-	1	5	IS:3025 (PART-10)-1984
3	Electrical conductivity at 25°C	Micromhos/cm	<b>473</b>	-	-	IS: 3025 (PART-14) -1984
4	Total Suspended Solids	mg/l	<b>0.024</b>	-	-	IS:3025 (PART-17)-1984

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5	Total Dissolved Solids	mg/l	<b>410</b>	500	2000	IS:3025 (PART-16)-1984
6	Total Hardness as CaCO <sub>3</sub>	mg/l	<b>76.03</b>	200	600	IS:3025 (PART-21)-2009
7	Chlorides as Cl	mg/l	<b>71.44</b>	<b>250</b>	<b>1000</b>	<b>IS: 3025 (PART-32)-1988</b>
8	Sulfates as SO <sub>4</sub>	mg/l	-	200	400	IS 3025 (Part 24)
9	Total Iron as Fe	mg/l	-	0.3	0.3	IS:3025 (PART-53)-2003
10	Silica (Reactive) as SiO <sub>2</sub>	mg/l	-	-	-	IS:3025 (PART-35)-1988
<b>BDL-Below Detectable Limit; DL-Detection Limit.</b>						

SI. No	PARAMETERS	UNITS	SAMPLE 1 (SURFACE WATER) RESULT	SAMPLE 2 (GROUND WATER) RESULT	Requirement as per IS 10500: 2012 Second revision (Acceptable LiMit)
1	Total Coliforms	MPN / 100ml	Absent	Absent	Shall not be detectable in any 100 ml
2	E.coli	MPN / 100ml	Absent	Absent	Shall not be detectable in any 100 ml

**i. Mitigation Measures**

- The quality of ground water is fairly good. There is no liquid waste discharge from quarrying activity, which is likely to pollute water.
- People already consuming this water for drinking purposes and no health implications reported.
- Total water requirement will be 4.0 KLD

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**• NOISE AND VIBRATION**

Major noise generating sources may be considered as excavation, drilling blasting, loading and vehicle movement during transportation of minerals. With the starting of quarrying operations, it is imperative that noise levels shall increase. In order to assess the impact baseline ambient noise level, noise monitoring has been carried out at different points using Sound level meter



**Fig.5: Image showing Noise level study along the lease boundary**

**• Fig: No: 4: Measuring Noise Level**

**TABLE: NO: 5 AMBIENT NOISE LEVELS**

S. No	Location	Noise levels dB (A)	Limits as per TNPCB dB(A)
			(Day Time: 6:00 AM – 10:00PM)
1	Core zone	35.7	Day Time Industrial – 75 dB (A) Residential – 55 dB (A)
2	At Pillars lease boundary	40.4	
		37.0	
		38.5	
		39.0	

• The noise level found to be within the limits as per TNPCB Standards.

**i. Mitigation Measures**

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- Greenbelt will be developed around the mine lease as well as safety zones which will help in arresting noise at source
- Safety devices provided to workers, where noise is more than 80dB (A)
- Limiting time exposure of workers to excessive noise
- Proper and regular maintenance of vehicles, machinery and other equipments
- Periodic inspection of all equipments and risk prone areas
- Regular lubrication & replacement of worn out parts etc...

### Air Quality

Drilling and blasting operations are source of fugitive dust emission but its effect is more or less localized. Ambient Air monitoring has been carried out in the core zone.



**Fig: No: 6: Ambient Air Monitoring**

The major part of the dust generated during such operations usually gets settle down and thus the effect of such operation will be localized phenomenon.

**TABLE: NO: 6 AMBIENT AIR QUALITY MONITORING**

S. No	Parameters ( $\mu\text{g}/\text{M}^3$ )	Measured Value	NAAQS
1	Particulate Matter ( $\text{PM}_{2.5}$ )	28	60
2	Respirable Particulate Matter ( $\text{PM}_{10}$ )	45	100
3	Sulphur Dioxide ( $\text{SO}_2$ )	9	80
4	Nitrogen Dioxide ( $\text{NO}_2$ )	13	80
5	Ozone ( $\text{O}_3$ )	20	180
6	Lead (Pb)	BDL (DL=0.1)	1
7	Carbon Monoxide (CO) 1 hour	BDL (DL=1.17)	4

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8	Ammonia (NH <sub>3</sub> )	21	400
9	Arsenic (As)	BDL (DL=1.0)	6
10	Nickel (Ni)	BDL (DL=0.1)	20
11	Benzene (C <sub>6</sub> H <sub>6</sub> )	BDL (DL=0.1)	5
12	Benzo (a) Pyrene	BDL (DL=0.1)	1
BDL = Below Detectable Limit, DL = Detection Limit NAAQS = National Ambient Air Quality Standards			

The above results comply with NAAQS. The generation of dust is controlled and suppressed at source by sprinkling of water on haul roads, loading points at regular intervals as shown below.

**i) Mitigation Measures**

- Dust extractor or wet drilling to be followed to control dust at source of emission
- Water sprinklers along the sides of haul road shall be fixed to control fly of dust while transporting minerals and waste
- Avenue trees along roads around ML boundary shall be planted as per the norms of MoEF&CC to control fly of dust, noise etc...
- Labours engaged in such dust prone areas should be provided with safety devices like ear muff, mask, and goggles as per the MMR, 1961 amendments and circulars of DGMS.



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## EIA General Conditions

**Table No: 7: General conditions**

Interstate Boundary	ii) Interstate boundary is located at 160kms from site to Tamil Nadu – Andhra pradesh border line on the North directions
Coastal Zone	iv)The proposed quarry is located 62Kms away from Bay of Bengal on towards eastern side
Reserve Forest	Vangaram R.F found about 8.2Km on SW direction.
Park	No within 10km radius

### **1. Power Lines (HT / LT)**

There is no HT or LT lines are found in 50m radius.

### **2. Water bodies**

The groundwater table is reported as 6m depth in nearby bore wells on this area. The desilting of the tank will facilitate rain water harvesting and recharging of the water table in the surrounding area. For quarry operation water is not required.

### **3. Archaeological / historical Monuments**

There is no Archeological /Historical Monuments within a radius of 500 km.

### **4. Road (NH, SH others).**

The area is accessible from Ariyalur to reach Sendurai by 20Km via Ariyalur-Sendurai Road then 20Km to reach Silippanur village. Further 1Km to reach the site. An approach road is available nearby the site.

### **5. Places of worship (Temple, Church, Mosque etc.,)**

No infrastructures like residential building, places of special interest like temples, Sanctuaries etc., are found in the radius of 300m.

No quarry is found around 500m radius. The quarry lease area does not attract the general conditions as per EIA Notification, 2006. The project cost is about Rs. 3.55Lakhs and EMP cost is Rs. 2.5 Lakhs.

  
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