

# **EXECUTIVE SUMMARY**

**For**  
**VAGAIKULAM ROUGH STONE AND GRAVEL QUARRY**

**Extent -1.83.50 Ha of Patta land**  
**At**

**S.F. No.: 492/2**  
**Vagaikulam Village**  
**Manur Taluk,**  
**Tirunelveli District,**  
**Tamilnadu State.**

**Applicant**  
**Thiru. A.Densingh Babu,**  
**S/o. Shri.Arulraj,**  
**No. 276 – Main Road,**  
**Kanarpatti Village,**  
**Manur Taluk,**  
**Tirunelveli District.**

**(Project termed under Schedule of 1(a) Mining of Minor Minerals ‘B2’ category as per EIA Notification 2006 and its Amendments thereafter and As per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster the project is termed under Schedule 1(a) Mining of Minor Minerals ‘B1’ Category)**

## **EIA Consultant**

**HUBERT ENVIRO CARE SYSTEMS (P) LTD, CHENNAI**

**January 2022**

## EXECUTIVE SUMMARY

### 1. Project Description

Thiru. A. Densing Babu has initiated action towards obtaining Environmental Clearance for its Rough stone, Jelly and Gravel Quarry over an extent of 1.83.50 Hec in the survey Nos of 492/2, Vagaikulam Village, Manur Taluk, Tirunelveli District, Tamilnadu for the production of Rough Stone 138580 cu.m and Gravel 75330 cum upto a depth of 25 M below Ground Level for the period of Five Years.

Precise area communication letter for this lease was obtained from the Assistant Director, Geology and Mining Department, Tirunelveli vide letter No. **Rc. No.M3/36244/2019 dated 21.09.2020.** mining plan for the subject area and the same was approved by Assistant director of Geology and mining, Tirunelveli vide **RC No.M3/36244/2019 dated 05.10.2020.**

Projects termed under Schedule of 1(a) Mining of Minor Minerals 'B2' category as per EIA Notification 2006 and its amendments thereafter and as per the O.M issued vide F.No. L-11011/175/2018-IA-II (M), dated: 12.12.2018 considering the cluster the project is termed under Schedule 1(a) Mining of Minor Minerals 'B1' Category, **TN SEIAA vide File No. 8493/2021.**

The proposal was appraised during 215<sup>th</sup> SEAC meeting held on 29.06.2021 and 448<sup>th</sup> SEIAA meeting held on 23.07.2021 and ToR was issued vide **Letter No. SEIAA-TN/F.No.8493/SEAC/ToR-990/2021, dated: 28.07.2021.**

Although the individual lease area of this project is less than 5 Ha, the other quarries within the 500 M radius along with this subject project works out to **5.90.5 Ha** and as such this proposal is consider under Category-B1.

The details of other quarries in 500 M radius is provided below.

Sl.No	Name of the Lessee	Survey Nos and Village	Extent in Hects	Lease status
<b>I. Abandoned Quarries</b>				
1.	Thiru. A. Arulraj	97/1, 97/2 & 97/3, Kanarpatti Village, Manur Taluk, Tirunelveli District.	2.68.0	Closed.

<b>II. Existing Quarries</b>				
2.	Thiru. A. Kanagaraj	66/3, 67/1, Kanarpatti Village, Manur Taluk, Tirunelveli District.	1.42.0	Closed.
3.	Thiru. M. Marithurai	62 & 63, Kanarpatti Village, Manur Taluk, Tirunelveli District.	2.65.0	Closed.
<b>III. Proposed Quarries</b>				
1.	Thiru. A. Densing Babu	492/2, Vagaikulam Village, Manur Taluk, Tirunelveli District.	1.83.5	Terms of reference obtained and awaited for environmental clearance after conducting of public hearing
	Total Extent of Above quarries		5.90.5	

### **STATUTORY APPROVALS**

1.	Precise Area Communication Letter	The Assistant Director, Geology and Mining Department, Tirunelveli vide letter No. <b>Rc. No.M3/36244/2019 dated 21.09.2020</b>
2.	Mining plan Approval	The Assistant director of Geology and mining, Tirunelveli vide <b>RC No.M3/36244/2019 dated 05.10.2020.</b>
3.	Terms of Reference	<b>Letter No. SEIAA-TN/F.No.8493/SEAC/ToR-990/2021, dated: 28.07.2021.</b>

The draft EIA/EMP report will be submitted for Public Hearing (PH). After completion of Public Hearing, the minutes issued will be incorporated in the EIA report along with action plan by the proponent. Final EIA will be submitted to TNSEAC for further appraisal of the project for obtaining Environment Clearance.

## 2. Management Commitment

Project Proponent will firmly address all the EC conditions and its requirements once obtained from SEIAA, TN and will execute the Environmental Management Plan.

## 3. Environmental Sensitive Areas

As seen in **Table-I** below, there are no environmental sensitive areas within 15km radius. Thus, the project does not attract the special conditions and general conditions as per EIA Notification.

**Table-1 Environmental Sensitive areas within 15km of the project**

S. No.	Areas	Distance & Direction from project boundary																																																																																											
1	List of Monuments, Heritages & Memorials	<b>Monuments: Nil</b> <b>Heritages &amp; Memorials: Nil</b>																																																																																											
2	list of water bodies and Reserve Forests	<b>Water Bodies:</b> <table border="1"> <thead> <tr> <th>S.No</th> <th>Name</th> <th>Distance (~km)</th> <th>Direction</th> </tr> </thead> <tbody> <tr><td>1.</td><td>Pallikkottai Channel</td><td>0.16</td><td>SSW</td></tr> <tr><td>2.</td><td>Pillaiyarkulam Canal</td><td>1.15</td><td>NNE</td></tr> <tr><td>3.</td><td>Chittar R</td><td>1.24</td><td>NNE</td></tr> <tr><td>4.</td><td>Vagaikkulam Canal</td><td>1.87</td><td>N</td></tr> <tr><td>5.</td><td>ManurKulam</td><td>3.3</td><td>SSW</td></tr> <tr><td>6.</td><td>Odai near Chettikurichi</td><td>3.66</td><td>N</td></tr> <tr><td>7.</td><td>Manur Channel</td><td>4.13</td><td>SW</td></tr> <tr><td>8.</td><td>Seliyanallur Canal</td><td>4.2</td><td>ENE</td></tr> <tr><td>9.</td><td>Ukkirankottai Canal</td><td>4.38</td><td>WNW</td></tr> <tr><td>10.</td><td>Palamadai Kulam</td><td>4.81</td><td>SE</td></tr> <tr><td>11.</td><td>Pirancheri Canal</td><td>7.66</td><td>E</td></tr> <tr><td>12.</td><td>Odai near Arunachalapuram</td><td>9.67</td><td>WNW</td></tr> <tr><td>13.</td><td>Marandai Channel</td><td>9.82</td><td>WSW</td></tr> <tr><td>14.</td><td>Nettur Channel</td><td>12.0</td><td>W</td></tr> <tr><td>15.</td><td>Uppodai R</td><td>14.5</td><td>ENE</td></tr> </tbody> </table> <b>Reserve Forest:</b> <table border="1"> <thead> <tr> <th>S. No</th> <th>Name</th> <th>Distance (~km)</th> <th>Direction</th> </tr> </thead> <tbody> <tr><td>1.</td><td>Kavalkutti Parambu PF</td><td>7.0</td><td>WSW</td></tr> <tr><td>2.</td><td>Kottaimalai PF</td><td>8.29</td><td>W</td></tr> <tr><td>3.</td><td>Uttumalai RF</td><td>9.41</td><td>NNW</td></tr> <tr><td>4.</td><td>Talaiyuttu Malai RF</td><td>10.05</td><td>ESE</td></tr> <tr><td>5.</td><td>Gangaikondan PF</td><td>13.05</td><td>ESE</td></tr> </tbody> </table>				S.No	Name	Distance (~km)	Direction	1.	Pallikkottai Channel	0.16	SSW	2.	Pillaiyarkulam Canal	1.15	NNE	3.	Chittar R	1.24	NNE	4.	Vagaikkulam Canal	1.87	N	5.	ManurKulam	3.3	SSW	6.	Odai near Chettikurichi	3.66	N	7.	Manur Channel	4.13	SW	8.	Seliyanallur Canal	4.2	ENE	9.	Ukkirankottai Canal	4.38	WNW	10.	Palamadai Kulam	4.81	SE	11.	Pirancheri Canal	7.66	E	12.	Odai near Arunachalapuram	9.67	WNW	13.	Marandai Channel	9.82	WSW	14.	Nettur Channel	12.0	W	15.	Uppodai R	14.5	ENE	S. No	Name	Distance (~km)	Direction	1.	Kavalkutti Parambu PF	7.0	WSW	2.	Kottaimalai PF	8.29	W	3.	Uttumalai RF	9.41	NNW	4.	Talaiyuttu Malai RF	10.05	ESE	5.	Gangaikondan PF	13.05	ESE
S.No	Name	Distance (~km)	Direction																																																																																										
1.	Pallikkottai Channel	0.16	SSW																																																																																										
2.	Pillaiyarkulam Canal	1.15	NNE																																																																																										
3.	Chittar R	1.24	NNE																																																																																										
4.	Vagaikkulam Canal	1.87	N																																																																																										
5.	ManurKulam	3.3	SSW																																																																																										
6.	Odai near Chettikurichi	3.66	N																																																																																										
7.	Manur Channel	4.13	SW																																																																																										
8.	Seliyanallur Canal	4.2	ENE																																																																																										
9.	Ukkirankottai Canal	4.38	WNW																																																																																										
10.	Palamadai Kulam	4.81	SE																																																																																										
11.	Pirancheri Canal	7.66	E																																																																																										
12.	Odai near Arunachalapuram	9.67	WNW																																																																																										
13.	Marandai Channel	9.82	WSW																																																																																										
14.	Nettur Channel	12.0	W																																																																																										
15.	Uppodai R	14.5	ENE																																																																																										
S. No	Name	Distance (~km)	Direction																																																																																										
1.	Kavalkutti Parambu PF	7.0	WSW																																																																																										
2.	Kottaimalai PF	8.29	W																																																																																										
3.	Uttumalai RF	9.41	NNW																																																																																										
4.	Talaiyuttu Malai RF	10.05	ESE																																																																																										
5.	Gangaikondan PF	13.05	ESE																																																																																										

		6.	Gangikondan Spotted Deer Sanctuary ESZ	14.71	ESE	
		7.	Gangikondan Spotted Deer Sanctuary Core/Gangikondan PF	14.72	ESE	
3	State, National boundaries	Nil				
4	Highways	<ul style="list-style-type: none"> <li>NH-44 Srinagar – Tirunelveli - Kanniyakumari) (Old NH-7) <math>\approx</math> 13.89 Km (E)</li> <li>(SH-41 Rajapalayam – Sankarankoil - Tirunelveli) is about <math>\approx</math>1.50Km (ENE)</li> </ul>				
5	Defence installations	None within 15km radial distance from the site boundary.				
6	list of habitations	<b>S. No</b>	<b>Name of the villages</b>	<b>Distance (~km)</b>	<b>Direction</b>	<b>Approximate population as per the census 2011</b>
		1.	Terku Vagaikkulam	1.26	NNW	4,489
		2.	Alagiyapandiyapuram	1.98	NNE	4,946
		3.	Vadaku Vagaikkulam	2.04	N	-
		4.	Kallampuli	2.62	ESE	1,982
		5.	Pillaiarkulam	3.19	E	4,107
7	Seismicity	The area under study falls in Zone-II				

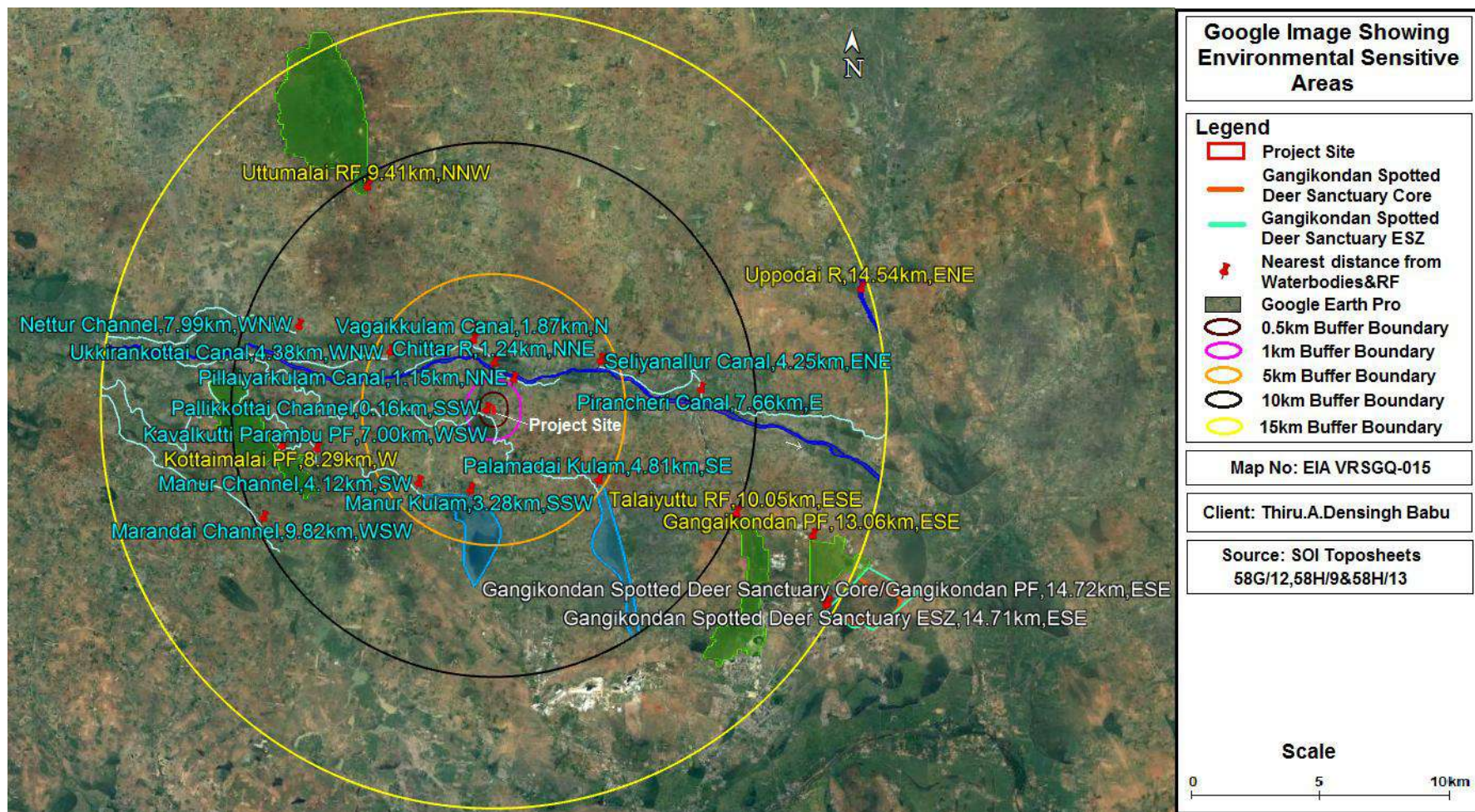


Figure-1 Google image for Environmental Sensitive areas demarcated within 15km radius of the project site

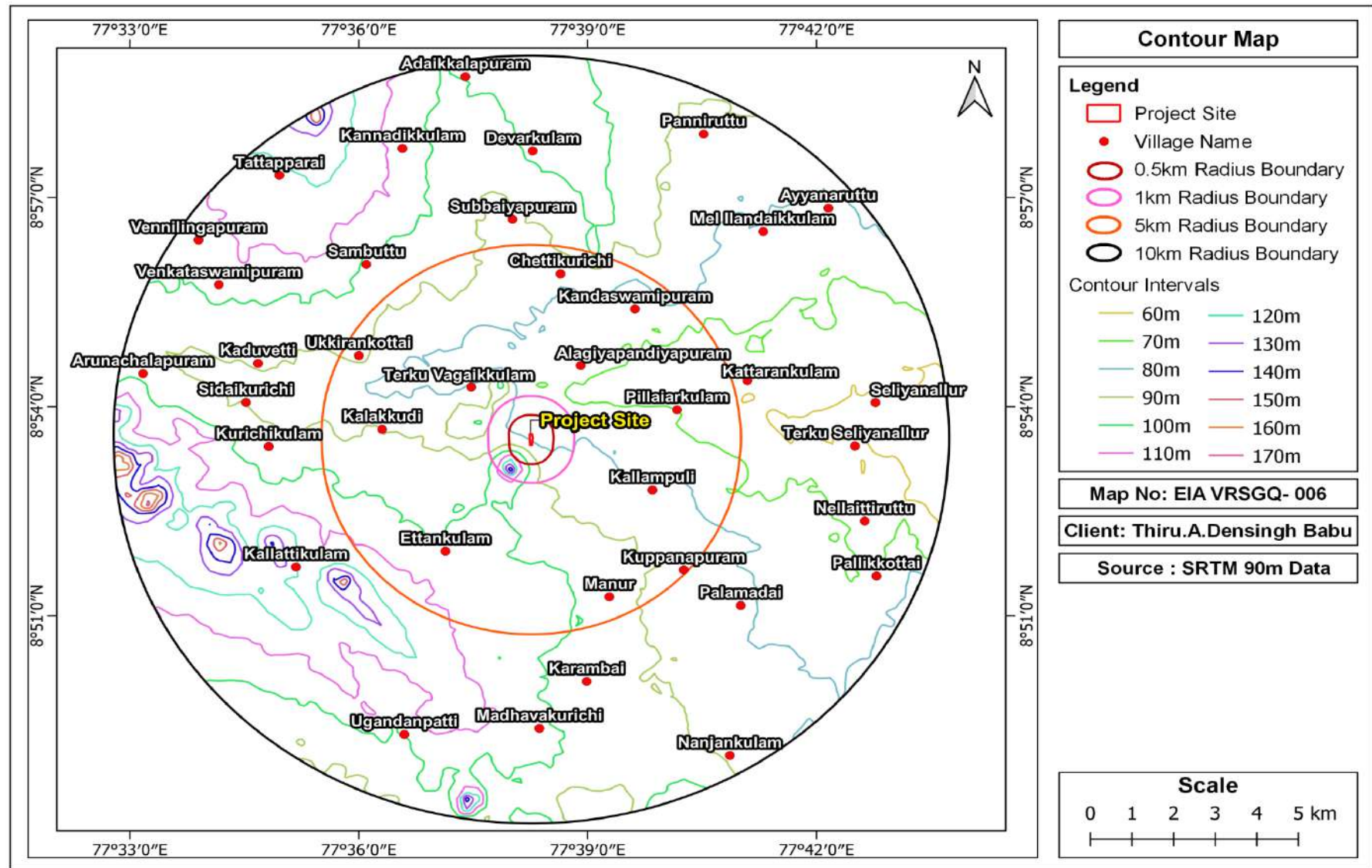


Figure 2 Contour Map of the Project Site

#### **4. Rough Stone & Gravel Quarry Reserves**

- The estimated Geological Reserves of Rough Stone estimated based on the Geological cross sections was 4,20,320 m<sup>3</sup> of Rough stone, and 1,05,080m<sup>3</sup> of Gravel.
- The Mineable Reserves have been arrived as 1,38,580 m<sup>3</sup> of Rough Stone and 75,330m<sup>3</sup> of Gravel.
- The Proposed production capacity is restricted to 1,38,580 m<sup>3</sup> of Rough Stone and 75,330m<sup>3</sup> of Gravel for five years.

#### **5. Summary of the Magnitude of Operation**

- The Rough Stone quarrying operation is proposed to be carried out by opencast semi mechanized method by formation of benches. Benches are proposed with a height of 5m & 5m width. Major machineries are Compressor, Jack hammer, and excavator is used in proposed quarry. Tippers and dumpers will be used for transportation.
- The Proposed production capacity is restricted to 1,38,580 m<sup>3</sup> of Rough Stone and 75,330m<sup>3</sup> of Gravel for five years.
- The Mineable Reserves have been arrived as 1,38,580 m<sup>3</sup> of Rough Stone and 75,330m<sup>3</sup> of Gravel for five years.
- The estimated Geological Reserves of Rough Stone estimated based on the Geological cross sections was 4,20,320 m<sup>3</sup> of Rough stone, and 1,05,080m<sup>3</sup> of Gravel.
- The depth of the mine will be 25m BGL.

#### **6. Project Requirements**

##### **I. Land requirement:**

- The Vagaikulam Rough Stone and Gravel Quarry is over an extent of 1.83.50. Ha.
- Lease area located at S. F. No.492/2, Vagaikulam Village, Manur Taluk, Tirunelveli District, Tamil Nadu State, lies in the latitude of 08°53'27.06"N to 08°53'36.72"N and longitude of 77°38'16.08"E to 77°38'18.60"E.
- The lease area topography is plain terrain; site elevation is ~105m (max) MSL. The area is marked in the survey of India Topo sheet No. 58H/09. The lithology of the mining lease will be submitted on final EIA report. Land use Patterns is given in **Table-2.**



**Table-2 Quarry Lease area breakup**

S. No	Description	Area to be required at present Mining Plan Period (Ha.)
1.	Quarrying pit	1.32.0
2.	Infrastructure	0.01.0
3.	Roads	0.02.0
4.	Green Belt	0.48.5
5.	Unutilized	0.00.0
<b>Total</b>		<b>1.83.5</b>

**II. Quarry Reserves**

**Table-3 Rough stone & Gravel Quarry Reserves**

S. No	Description	Rough Stone (m <sup>3</sup> )	Gravel (m <sup>3</sup> )
1.	Geological Resource	4,20,320	1,05,080
2.	Mineable Reserves	1,38,580	75,330
3.	Production capacity	1,38,580	75,330

**III. Water Requirement**

- The total water requirement is 2.3 KLD (Drinking & Domestic purpose-0.3KLD, Dust suppression – 1.5 KLD & for Greenbelt- 0.5KLD). The total water requirement will be met from Private tankers.
- The Rough Stone and Gravel quarry will not produce any toxic effluent in the form of solid, liquid or gas.
- No wastewater will be discharged by quarry operation. Domestic wastewater will be disposed to Septic Tank followed by soak pit.

**Table-4 Water requirement breakup**

S. No	Description	Water Requirement (KLD)
1.	Drinking & Domestic purpose	0.30
2.	Dust suppression	1.5
3.	Green Belt	0.5
<b>Total</b>		<b>2.3</b>

**IV. Power & Fuel Requirement**

- No power is required during mining operations. Working is restricted in day time only between 9AM to 6PM.
- 1,23,414 liters of HSD for the entire project life will be brought from nearby diesel pumps.

**Table-5 Power & Fuel Requirement**

S. No	Details	Gravel (Liters)	Rough stone (Liters)	Source
1	Diesel Requirements approx. (Litres of HSD for 5 years)	12,550	1,10,864	HP/BPCL/IOCL/Reliance

**V. Manpower**

Manpower requirement for the proposed project will be 10 Nos.

**Table -6 Manpower requirement of the Project**

S. No	Description	No of persons (Direct)
<b>Skilled</b>		
1	Operator	2
2	Mechanic	1
3	Mines manager/Mate	1
<b>Semi – skilled</b>		
1	Driver	2
<b>Unskilled</b>		
1	Musdoor/Labours	4
<b>Total</b>		<b>10</b>

**VI. Solid Waste Generation & Management**

❖ **Municipal Solid Waste Management**

**Table -7 Municipal Solid Waste generation & Management**

S. No	Type	Quantity Kg/day	Disposal method
1	Organic	2.7	Municipal bin including food waste
2	Inorganic	1.8	TNPCB authorized recyclers
<b>Total</b>		<b>4.5</b>	

As per CPHEEO guidelines: MSW per capita/day =0.45

❖ **Hazardous Waste Management**

**Table -8 Hazardous Waste Generation and Management**

Waste Category No	Description	Quantity (L/Year)	Mode of Disposal
5.1	Waste Oil	3.0	Will be Collected in leak proof containers and disposed to TNPCB Authorized Agencies for Reprocessing/Recycling

## VII. Nearest Human Settlement

The details of nearest human settlement from the project site is provided in **Table-9**.

**Table-9 Nearest Human Settlement**

S. No	Name of the Village	Approximate distance & Direction from lease applied area	Approximate population as per the census 2011
1.	TerkuVagaikkulam	1.26km NNW	4,489
2.	VadakuVagaikkulam	2.04km N	-
3.	Alagiyapandiyapuram	1.98km NNE	4,946
4.	Pillaiarkulam	3.19km E	4,107
5.	Kallampuli	2.62km ESE	1,982

## 7. Industries

The details of Industries within 15km radius from the project site are given in **Table -10**.

**Table -10 Industries within 15km radius from the project site**

S. No	Places	Distance (≈km)	Direction
1.	WWIL OMS Manur	2.35	SSE
2.	Solar Power Plant near Nadplyrpuram	4.08	E
3.	NLC India Ltd Solar Plant	4.85	SW
4.	Solar Power Plant Marainthi	6.02	SW
5.	NLC Solar Power Plant Marainthi	6.8	SW
6.	Solar Power Plant near Seliyanallur	6.99	ENE
7.	Solar Power Plant Therkupatti	7.11	W
8.	Solar Power Plant near Kalisapudur	7.92	ENE
9.	Solar Power Plant Subbaihapuram	8.26	W
10.	Solar Power Plant near Kalisapudur	8.81	ENE
11.	Solar Power Plant Nettur	9.47	W
12.	Dakshin Pipes- Pvc Pipe Manufacturers	9.87	S

## 8. Project Cost

The total capital investment on the project is Rs. **78,63,240/-** including EMP cost is 3,30,000/-  
The Capital investment of the Project is given in **Table-11**.

**Table-11 Capital Investment of the Project**

S. No	Description of the Cost	Amount in Rs.
<b>➤ Fixed Cost</b>		
1	Land Cost	NIL/-
2	First aid room and accessories	10,000/-
3	Labourers shed	30,000/-
4	Sanitary facilities	20,000/-
<b>Total</b>		<b>60,000/-</b>
<b>➤ Operational</b>		
1	Mining cost	58,76,125/-
2	Top soil with gravel	15,97,080/-
<b>Total</b>		<b>74,73,240 /-</b>
<b>➤ EMP Cost</b>		
1	Air Quality Sampling	40,000/-
2	Water Quality Sampling	40,000/-
3	Noise Monitoring	20,000/-
4	Ground Vibration	20,000/-
<b>Expenditure</b>		
1	Drinking water facility	40,000/-
2	Sanitary Arrangements	40,000/-
3	Safety Kits	20,000/-
4	Water Sprinkling	80,000/-
5	Afforestation	30,000/-
<b>Total EMP Cost</b>		<b>3,30,000/-</b>
<b>Total Cost of the Project (A+B+C)</b>		<b>78,63,240/-</b>

## 9. Mine Closure Plan:

- There is no proposal for back filling reclamation and rehabilitation. The Quarried pits after the end of the life of lease will be fenced using Barbed wire fencing to prevent inherent entry of public and cattle.
- Measures will be taken as per the Acts and Rules.
- Drilling will be carried out by wet drilling mode to control the dust propagation into the air.
- Blasting will be carried out on limited scale. Mist water spraying on haul road is proposed to prevent the dust propagation into the air.

## 10. Description of Environment

### Project Influence Area (PIA)/Study Area:

An area covering 10 km radius from Vagaikulam Rough Stone and Gravel quarry boundary has been earmarked as study area for baseline studies.

### Study Period:

The baseline environmental surveys were carried out during (July 2021- September 2021) within the study area.

### Summary of Baseline Studies:

- Site has a Plain terrain with level ~105m MSL.
- The project site falls under Zone- III (Low Risk Zone) as per IS 1893 (Part- I).
- The predominant wind direction is West during study period.
- Max Temperature: 40°C , Min Temperature: 24°C & Avg Temperature: 30.53°C
- Max Relative Humidity:100 %, Min Relative Humidity:31.34 %, & Avg Relative Humidity:64.25 %
- Average Wind Speed :2.70 m/s

**Table-12 Total maximum GLCs from emissions**

Pollutant	Max. Base Line Conc. ( $\mu\text{g}/\text{m}^3$ )	Estimated Incremental Conc ( $\mu\text{g}/\text{m}^3$ )	Total Conc. ( $\mu\text{g}/\text{m}^3$ )	NAAQ standard	% contribution of concentration above Base line
PM <sub>10</sub>	60	33	93	100	55.00
PM <sub>2.5</sub>	34	20	54	60	58.82
SO <sub>2</sub>	14	2	16	80	14.29
NO <sub>x</sub>	27	29	56	80	107.41

### Ambient Air Quality Monitoring

The ambient air quality has been monitored at 8 locations for 12 parameters as per NAAQS, 2009 within the study area. Maximum concentrations of all the parameters are well within the National Ambient Air Quality Standards (CPCB, NAAQS, 2009):

- PM<sub>10</sub> ranged between 43.72 $\mu\text{g}/\text{m}^3$ –71.04 $\mu\text{g}/\text{m}^3$  (NAAQ standard 100  $\mu\text{g}/\text{m}^3$ ).
- PM<sub>2.5</sub> values varied from 24.54 $\mu\text{g}/\text{m}^3$  –40.25 $\mu\text{g}/\text{m}^3$  (NAAQ standard 60  $\mu\text{g}/\text{m}^3$ ).
- SO<sub>2</sub> levels varied from 9.08 $\mu\text{g}/\text{m}^3$ – 16.47 $\mu\text{g}/\text{m}^3$  (NAAQ standard is 80  $\mu\text{g}/\text{m}^3$ ).
- NO<sub>x</sub> ranged between 19.40 $\mu\text{g}/\text{m}^3$  –31.94 $\mu\text{g}/\text{m}^3$  (NAAQ standard is 80  $\mu\text{g}/\text{m}^3$ ).

### **Noise Environment**

- In Industrial areas day time noise levels was about 72.3 dB(A) and 64.5 dB(A) during night time, which is within prescribed limit by CPCB (75 dB(A) Day time & 70 dB(A) Night time).
- In residential areas day time noise levels varied from 49.2 dB(A) to 53.4 dB(A) and night time noise levels varied from 40.2 dB(A) to 43.1 dB(A) across the sampling stations. The field observations during the study period indicate that the ambient noise levels is within the prescribed limit by CPCB (55 dB(A) Day time & 45 dB(A) Night time).

### **Ground Water Quality**

- The prevailing status of water quality at 8 locations for ground water has been assessed during the study period. Groundwater samples are within the permissible limits specified for drinking water quality standards as per IS: 10500 (2012).
- The average pH ranges from 7.28 to 8.24.
- TDS value varied from varied from 476 mg/l – 691 mg/l.
- The chloride concentration ranged from 104.5mg/l – 178.5 mg/l
- Sodium range from 47.3 mg/l to 85.6 mg/l
- Potassium concentration range from 4.8 to 7.3 mg/l.
- Magnesium ranges from 21.8 to 38.7 mg/l within the permissible limit of the IS 10500: 2012.

### **Surface Water Quality**

- Surface water sample are within the limits as per ISI-IS2296-1982 Class C (Drinking water source with conventional treatment followed by disinfection).
- pH ranges from 7.42 – 8.34
- Total Dissolved Solids range from 591mg/l to 854mg/l.
- Chloride ranges from 137.2 mg/l to 208.6mg/l.
- The sulphate content in the surface water of the study area varies between 49.6mg/l – 92.6mg/l.
- Total hardness ranges between 241mg/l –357mg/l.
- The BOD value ranges from 3.3 mg/l to 7.3 mg/l
- COD value 18.4 to 43.2 mg/l.
- The concentration of heavy metals like As, Cd, Cr, Pb, Mn, Hg, Ni and Se at all locations are within the limits of IS 2296:1992(Class-C: Drinking water with conventional treatment followed by disinfection)

### **Soil Quality**

- Soil sampling was carried out at eight (08) locations in the study area. It is observed that, Soil types are Sandy Clay Loam, Loam, Loam sand, and clay and the soil samples are slightly alkaline in nature.
- The pH of the soil samples ranged from 7.34 to 8.32.
- Conductivity of the soil samples ranged from 235µmhos/cm to 463µmhos/cm.
- Nitrogen content in the collected soil samples ranged from 152.6 mg/kg to 273.6 mg/kg.
- Phosphorous content ranged from 56.3 mg/kg to 107.5 mg/kg.
- Potassium content ranges from 293.4 mg/kg to 452.7 mg/kg.

### **Biological Environment**

- The Rough Stone and Gravel quarry is located at Vagaikulam village. The proposed project will not have any impact of terrestrial ecology of the area. Quarry area will be developed with greenbelt by planting native species to maintain the good environment.
- There is no extinct flora and fauna species found in the study area. Observed species comes under least concern as per IUCN status
- There is no National Park, Wildlife Sanctuary, Biosphere Reserve, Wildlife corridors and Tiger/Elephant Reserve found within 10 km radius of the project site.
- There is one Reserve Forest which is located at a distance of 7.00km from the project site.
- Therefore, no management plan is required.

### **Socio-economic Conditions:**

Tirunelveli district was ranked 8<sup>th</sup> in terms of the highest population in Tamil Nadu State. The Total population of the district is 3,077,233 which comprise of 1,520,912 male and 1,556,321 female populations. The population density of the district was 460 persons/sq km. The district had urban population of 49.4% to the total population. The district sex ratio was 1023, higher than the State sex ratio of 996. The district has recorded the highest Scheduled Caste sex ratio of 1038 among the districts in the State. The district literacy was 82.5%, higher than the State literacy of 80.1%. The decadal population growth during 2001- 2011 in the district was 13.8%; the rural decadal variation was 11.6% and urban was 16.2%. Sankarankoil taluk has the highest number of inhabited villages with 83 while Shenkottai taluk has the lowest number with 9 such villages. Chockampatti village in Tenkasi taluk had the highest

population of 18220 and Courtallam Slopes Reserve Forest village in Tenkasi taluk had the lowest population of 4 persons. Papanasam Reserve Forest village in Ambasamudram taluk is the largest village with an area of 35,692.44 hectares and Muthur Reddiarpatti village in Palayamkottai taluk is the smallest village with an area of 9.61 hectares.

## **11. Anticipated Environmental Impacts with Mitigation Measures**

Anticipated impacts on the environmental and social attributes, which are likely to arise due to quarry operations have been identified, predicted and evaluated.

- Vagaikulam Rough Stone & Gravel Quarry is a Patta land, over an extent of 1.83.5.Ha, at Vagaikulam Village, Manur Taluk, Tirunelveli District, Tamil Nadu State. There are no R&R issues as it is a patta land.
- The lease area topography is Plain terrain with site elevation is ~105m MSL. Vagaikulam Rough Stone & Gravel quarry will be provided with self-sufficient infrastructure like office, Toilets, to minimize impact/strain on the existing infrastructure.
- All the necessary Air pollution control measures will be adopted to control the fugitive emissions, particulates, SO<sub>2</sub> and NO<sub>x</sub>.
- The impact on air environment was studied through air quality modeling studies. The 1<sup>st</sup> highest 24hour average concentrations of NO<sub>x</sub>, PM<sub>10</sub>, PM<sub>2.5</sub> and SO<sub>2</sub> at all receptor locations are found to be well within the National Ambient Air Quality Standards (NAAQS), 2009. The maximum concentration observed due to proposed mining for PM<sub>10</sub> is 60µg/m<sup>3</sup>, PM<sub>2.5</sub> is 34µg/m<sup>3</sup>, SO<sub>2</sub> is 14µg/m<sup>3</sup> and NO<sub>x</sub> is 27µg/m<sup>3</sup>, respectively. So, it can be concluded that even after operation of quarry the impact envisaged is moderate.
- Baseline study showed that the noise levels in both Industrial area and in Residential area are observed that the day equivalent and night equivalent noise levels at all locations are within the prescribed CPCB standards. The designed equipment with noise levels not exceeding beyond the requirements of Occupational Health and Safety Administration Standard will be employed.
- The water demand for the project will be met from private tankers. Proper garlands will be provided around the quarry. Domestic sewage will be disposed to septic tank followed by soak pit. Septic Tank will be cleaned periodically. There is no effluent generation due to mining activities.
- The solid waste generated may impact soil quality, water quality and public health if not regulated properly. Municipal Solid Wastes including food waste are disposed to municipal bin. Waste Diesel oil will be properly disposed through authorized recyclers



per the Hazardous and Other wastes (Management and Transboundary Movement) Rules 1989 and subsequent amendment in 2016. Top soil will be stored and used for afforestation within lease area.

- To reduce the adverse effects on flora/fauna status that are found in project area due to deposition of dust generating from mining operations, water sprinkling and water spraying systems will be ensured in all dust prone areas to arrest dust generation.

## 12. Risk Identification & Management

### ❖ Identification of Hazards in Open Cast Mining

There are various factors, which can cause disaster in the mines. These hazards are as follows:

- Drilling
- Blasting
- Overburden handling
- Heavy Machinery

## 13. Safety Measures at the quarry

- Adequate care has been taken in deciding the size of the bench for the working pit.
- The benches are properly sloped at an angle of 60 degree to avoid any spillage of benches.
- Adequate drainage system at the top of the pit and also on the benches shall be made to prevent erosion of the benches.
- The quarries will be protected by garland drains around the periphery for storm water drainage.

## 14. Post Project Environmental Monitoring

**Table -13 Post Project Environmental Monitoring Program**

S. No	Area of Monitoring	Number of Sampling Stations	Frequency of Sampling	Parameters to be Analysed
1.	Meteorology	One	Hourly and Daily basis.	Wind speed and direction, Temperature, Relative Humidity, Atmospheric pressure, Rainfall.
2.	Ambient Air Quality	2 Stations (In downwind)	Twice a week:24 hourly period	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , and NO <sub>2</sub>
3.	Noise	2 (two within site premises and two outside site premises)	Once every season	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
4	Exhaust from DG set	Stack of DG set	Quarterly	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> & CO

5	Vehicular Emissions	Parking area	Periodic monitoring of vehicles	Air emission and noise, PCU
6	Soil	Two Locations within the Project Site	Yearly Once	Physico chemical properties, Nutrients, Heavy metals
7	Terrestrial Ecology	Within 10km, around the project	Once in three years	Symptoms of injuries on plants
8	Surface/ Ground water quality	Two Locations Within Project Site	Yearly Once	As per ISO 10500 Standard parameters

### **15. Disposal of Waste:**

The overburden in the form of topsoil and weathered rock, after the excavation weathered rock mass will be preserved all along the boundary barrier. The excavated topsoil and weathered rock will be directly loaded into tipper to the needy buyers for road project and construction works for filling and leveling of low lying areas

### **16. Occupational Health Measures**

- Adoption of dust suppression measures like spraying water, use of drill with dust collection system or wet drills etc.
- Plantation.
- Avoid blasting during unfavorable wind & atmospheric conditions.
- Use of personal protective equipment. Compliance with DGMS circulars.
- Emergency response plan that includes installation of emergency response equipment to combat events such as fire.
- All personnel required to handle hazardous materials will be provided with personal protective equipment suitable for the hazardous material being handled.
- On-site first aid facilities will be provided and employees will be extended to the local community in emergencies.

### **17. Greenbelt Development**

An area of 0.48.5 Ha hectare land was allotted for greenbelt development during 5 years of mining plan. Mr. A. Densingh Babu has proposed to plant 75 No's of trees per year and Rs. 30,000/- will be spent for proposed greenbelt development and maintenance.

### **18. Analysis of Alternatives**

The mineral deposits are site specific in nature; hence question of seeking alternate site does not arise. No R&R, no Sensitive area etc., making the site suitable for the mining

of rough stone & gravel. The site meets the requirement of all critical factors that are important for success of mining in the state and could be a pre-eminent location.

### **19. Environment Monitoring Programme**

Environmental monitoring programme has been formulated for the environmental attributes (Air, Water, Noise, and Soil) and the same will be implemented as per CPCB guidelines. The effective implementation and close supervision of the environmental management to mitigate the environmental impacts due to mining activities.

### **20. Emergency Management Plan**

The salient features of Disaster Management Plan include

- Emergency shutdown procedure
- Fire protection system
- Emergency safety equipment & Reporting and response to emergency
- Emergency Help from nearby industries and tie up with nearby industries

### **21. Corporate Environmental Responsibility**

- The site has no Relocation and Rehabilitation.
- Most villages have benefitted mutually at Vagaikulam where the mining industry has provided indirect jobs for labor and villages provide accommodation for the labor and staff.
- Supportive industries like food supply and essential shops promote economic growth in the villages.
- 2 % (Rs. 1,57,265/-) on total cost will be allocated for CER activities as per MoEF&CC Office memorandum dated 1<sup>st</sup>May, 2018.

### **22. Benefits of the Proposed Project**

- The quarrying activities in this belt will benefit to the local people 10 Nos.
- Improvement in Per Capita Income can be expected.
- The socio - Economic conditions of the village and distance will enhance due to the project, hence the project should be allowed after considering all the parameters.
- It can thus be concluded that the project is environmentally compatible, financially viable and would be in the interest of construction industry thereby indirectly benefiting the masses.

\*\*\*