



Ref: LQ: GO: 21/ 176  
26<sup>th</sup> Nov 2018

Lanjiberna Limestone & Dolomite Mines  
At/PO = Lanjiberna-770023  
Dist.Sundargarh (ODISHA)

The Director  
Ministry of Environment, Forest & Climate Change  
Paryavaran Bhawan  
CGO Complex, Lodhi Road  
**NEW DELHI-110 003**

Dear Sir,

Sub: Submission of Six Monthly Environmental Monitoring Report of Lanjiberna Limestone & Dolomite Mines of M/s OCL India Limited for the period April-2018 to September-2018.

Ref:- Environmental clearance letter ref. no. J-11015/372/2007-IA.II (M) dated 28<sup>th</sup> April-2010.

Dear Sir,

With reference to above subject matter and referred letter, we are submitting herewith the Six Monthly Environmental Monitoring report as per condition laid down in the above Environmental clearance for the period April-2018 to September-2018 pertaining to Lanjiberna Limestone & Dolomite Mines for your kind perusal and record.

Hope, you will be find the same in order.

Thanking you,

Yours faithfully,  
for OCL INDIA LIMITED

(Lokesh Shrivalli)  
Dy. General Manager (Mines)

Encl. as above

- Cc to The Regional Director  
Ministry of Environment, Forest & Climate Change  
Eastern Regional Office, A/3, Chandrasekharapur  
BHUBANESWAR-751 023
- Cc to The Chairman,  
Central Pollution Control Board, Parivesh Bhawan,  
CBD-Cum-Office Complex, East Arjun Nagar,  
DELHI- 110 032
- Cc to The Member Secretary  
State Pollution Control Board, Odisha  
Paribesh Bhawan, A/118, Nilakanthanagar, Unit-VIII  
BHUBANESWAR-751 012

# ENVIRONMENTAL MONITORING REPORT

BASED ON DATA GENERATED

FROM

**APRIL 2018 – SEPTEMBER 2018**

FOR

**OCL INDIA LIMITED**

At/Po: RAJGANGPUR, District: SUNDARGARH, ODISHA



AT

**LANJIBERNA LIMESTONE & DOLOMITE MINES PROJECT**

Prepared By:

**Cleenviron Private Limited**

D-124, KOELNAGAR, ROURKELA, ODISHA

Tele fax: 0661 – 2475746

Email: [cleenviron@gmail.com](mailto:cleenviron@gmail.com)

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## 1. INTRODUCTION

Lanjiberna Lime stone & Dolomite Mines of M/s OCL India Ltd. is a captive mine for its Cement manufacturing works situated at Rajgangpur in the district of Sundargarh of Odisha State. The mining lease covering an area of 873.057 ha is located near the village Lanjiberna (**Figure No: 1.1**), under Sundargarh Sadar sub-division of Sundargarh district approximately 18 kms from the Cement Works by road and the aerial distance will be around 12 kms. A vicinity map up to 10 kms radius from the center of the lease is given in **Figure No: 1.2**. Presently the mine is producing 4.20 million tones of Lime Stone per annum and 80, 000 TPA of Dolomite as per Environmental Clearance from Ministry of Environment and Forest, Govt. India vide letter no: J-11015/372/2007-IA.II(M) dated: 28<sup>th</sup> April 2010. Consent to operate from State Pollution Control Board, Odisha is also valid up to 31<sup>st</sup> March 2019 vide Order No 162, vide letter No 4449/IND-I-CON-258, Dt 22.03.2017 for the production of 4.20 million tones of Limestone and 80, 000 TPA of Dolomite.

## 2. PRESENT STATUS OF THE PROJECT

At present from April 2018 to September 2018 the mine has produced Limestone of 20, 12, 307.770 MT and production of Dolomite was nil during the period mentioned, apart from this 19, 23, 771.80 MT of sized Limestone has been dispatched to the cement plant. Total plantation done is 3, 26, 734 saplings covering an area of 102.39 ha and the survival rate is 67.3%.

## 3. ASPECTS CONSIDERED FOR ENVIRONMENTAL MONITORING

This report is based on the monitoring results generated from April 2018 to September 2018 covering summer and monsoon seasons of the year. Micro-meteorological monitoring was carried out on continuous basis and Ambient Air monitoring was carried out on twice weekly basis at each location and Stack Emission from Limestone Crusher Plant was carried out on monthly once basis. However other aspects like, Water quality, Fugitive Dust Emission monitoring and Noise level studies are carried out on quarterly basis, i.e. during May and August months of the year. Environmental Monitoring data were generated at Lanjiberna Limestone & Dolomite Mines and its buffer zone covering the following aspects in detail.

- i. Micro-meteorological Study
- ii. Ambient Air Quality Study
- iii. Fugitive Dust Emission Study
- iv. Stack Emission Monitoring from Crusher Plant
- v. Quarry Discharge Water Quality Study
- vi. Ground Water Level Study
- vii. Noise Level Study
- viii. Effluent Water Quality Study
- ix. Soil Quality Study

Monitoring of environmental parameters for collection of data involves field work, which is described below:

### 3.1 Micro-meteorological Study

For collection of micro-meteorological data like Temperature, Relative Humidity, Wind Speed, Wind Direction, & Rainfall, a weather monitoring station is fixed on the Magazine Hill Top of Lanjiberna Limestone and Dolomite Mines of M/s OCL India Ltd. Hourly data is being recorded continuously by putting up windows compatible data logging facility instrument, Make: Virtual Electronics Company, Roorkee.





### **3.2 Ambient Air Monitoring**

To assess ambient air quality, total 6 (six) monitoring stations are fixed including 4 (four) in the Core zone and 2(two) in the buffer zone. The monitoring locations are fixed according to the micro-meteorological data and in consultation with State Pollution Control Board. The monitoring was carried out for parameters like PM2.5, PM10, SO<sub>2</sub>, NO<sub>x</sub> & CO and monitoring was carried out on twice weekly from each location. For collection of samples Respirable Dust sampler with PM2.5 attachment was placed at each location, sampling and analytical techniques are followed as per the standard method of ambient air sampling and analysis. The other parameters like NH<sub>3</sub>, O<sub>3</sub>, As, Ni, Pb, Benzene & Benzo(a)pyrene are monitored once in six months from all the six AAQ monitoring stations.

### **3.3 Fugitive Dust Emission Monitoring**

To find out the quantity of fugitive dust emission from the mining operation, two main dust generating locations are identified and those are within the quarry during operation of Excavators and Drill machines. The second location was set up on the haulage road of the mines leading to Crusher Plant. For collection of samples two high volume samplers are used and 8 hourly samples are collected for Particulate Matter only. Fugitive monitoring was carried out on quarterly basis, during month of May for summer and August for monsoon season.

### **3.4 Stack Emission Monitoring from Crusher Plant**

The crusher plant of Lanjiberna Limestone and Dolomite mines is equipped with a Dust Extraction and Bag House Filter system to control the emission of dust particles during crushing operation of Limestone lumps in to required size. To assess the emission level of Particulate Matter from the stack of bag filter system, monitoring of Stack emission levels was scheduled on monthly once basis. Particulate Matter emission was monitored following the BIS methods for Stack monitoring.

### **3.5 Quarry Discharge Water Quality Study**

Total three locations were fixed for sampling of the quarry discharge water from three different quarries operating. The sampling and analysis of quarry discharge water were carried out on monthly basis. The parameters analyzed are as per the Schedule – IV of EPA, G.S.R.422(E), 1993. Few parameters like pH, Temperature and DO are recorded at the site. For other parameters the samples were fixed and preserved as per the standard methods of sampling by APHA 22<sup>nd</sup> Edition.

### **3.6 Ground Water Quality Study**

To find out the ground water quality of the area, a net work of 5(five) existing dug wells are fixed and the sampling was carried out only during the month of May as per the environmental clearance conditions of MoEF. The parameters analyzed were as per the drinking water standards of IS10500. Few parameters like pH and Temperature are recorded at the site. For other parameters the samples were fixed and preserved as per the standard methods of sampling by APHA 22<sup>nd</sup> Edition.

### **3.7 Ground Water Level Study**

To assess the ground water availability and fluctuation, a net work of 5(Five) existing dug wells are fixed, from where the ground water quality study were carried out during the month of May and one extra location was considered in the village Katang for ground water level measurement. To measure the ground water level variation, water level is being studied on quarterly basis during the months of May for summer season and August for monsoon season manually.

### **3.8 Noise Level Study**

Noise monitoring were carried out at 4(four) different locations within the Core zone once in three months period during May and August months. The measurements were collected by Sound Level Meter, make: Envirotech Instruments Pvt. Ltd., New Delhi, in dB(A) at a height of 1.5 meter, above ground level and away from the sound reflecting sources like walls and buildings etc.

### **3.9 Soil Quality Study**

Soil samples were collected from three different sites, where the three quarry discharge water is discharged on to the land. The Soil samples are collected and analysed once in a year and in the month of May during summer season for 16 parameters.

### **3.10 Effluent Water Quality**

The waste water from Workshop/Garage of the Lanjiberna Limestone & Dolomite mines is directed to an Oil Separation Tank and after removal of Oil & TSS it is reused in HEMM washing. The outlet water from the Oil & Grease Separation tank was sampled and analysed for 5 (Five) parameters on quarterly basis during the months of May and August.

## **4. SAMPLING LOCATIONS**

### **4.1 Micro-Meteorological Study**

One meteorological station was set up on the Magazine Hill Top of the Lanjiberna Limestone & Dolomite Mines to monitor wind speed, wind direction, temperature, relative humidity and rainfall on hourly basis by data logging technique.

### **4.2 Ambient Air Quality Monitoring**

Four ambient air quality monitoring stations are fixed within the core zone and two stations are fixed in the buffer zone. General precautions were taken to position the Respirable Dust Samplers at all the locations. The descriptions of the Ambient Air Monitoring Stations are as follows:

#### **A-1 Near Quarry No – 2 Site Office:**

The sampling station is located within the core zone and the station was selected to assess the present level of pollution due to excavation, drilling works being carried out in the quarry no 2&6 and also the movement of crushed limestone from the crusher plant to the Cement Works at Rajgangpur, by belt conveyors systems.

#### **A-2 Limestone Crusher Plant Area:**

This location is around the Crusher plant area of the Mines within the core zone. This was selected to assess the air quality in and around the crusher plant and the level of pollution due to crushing, screening and transfer of Limestone to conveyor belts.

#### **A-3 Stone Crusher Plant**

The location was selected within the core zone and to assess the pollution load generated from the mini crusher plants situated near the northern boundary of the lease and near Quarry no 4&5.

#### **A-4 Magazine Hill Top**

The location was selected within the core zone and to assess the effect of mining as well as crushing operations of the mine on the background air quality and sensitive receptors on the hill top which is at a higher elevation from the ground.

#### **A-5 Village Katang**

This location is situated in the buffer zone of the mine and selection of this location was done as to assess the effect of the mining operation on the local receptors, as this village is falling in the predominant wind direction towards south-west of the lease area.

#### **A-6 Village Bihabandh**

This location is situated in the buffer zone of the mine and selection of this location was done as to assess the effect of the mining operation on the local receptors, as this village is falling in the predominant wind direction towards north-east of the lease area.

The distances and directions of the Ambient Air Quality monitoring locations are summarized in **Table No 4.1**

**Table No 4.1: Ambient Air Quality Monitoring Stations**

<b>SI No</b>	<b>Name of Location</b>	<b>Zone</b>	<b>Distance</b>	<b>Direction</b>
1	Quarry No-2 Site Office	Core	-	-
2	Crusher Plant Area	Core	-	-
3	Mini Crusher Plant	Core	-	-
4	Magazine Hill Top	Core	-	-
5	Village Katang	Buffer	1 km from ML Area	SW
6	Village Bihabandh	Buffer	2 km from ML Area	NE

#### **4.3 Fugitive Dust Emission Study Locations:**

Two fugitive dust emission monitoring locations are established inside the core zone, to find out the amount of dust being generated from the source during the excavation, drilling & hauling of Limestone to crusher plant. The descriptions of fugitive emission monitoring locations are as follows:

##### **F-1 Downwind of Excavator/ Drill Machine within the Quarry**

This location was fixed within an operating quarry and while operation of mining equipments are on. Towards the down wind direction of any excavator or drill machine within a distance of 500 m, one high volume sampler was set for 8 hour operation and the parameter monitored is SPM general precautions are obeyed while collection of samples.

##### **F-2 Haulage Road Leading to Crusher Plant**

This location was fixed to evaluate the amount of pollution load on the ambient air due to moving of heavy earth moving equipments like 35T & 50T Dumpers on the haulage road which leads to the Limestone Crusher Plant. The samplers are being operated for continuous of 8 hours by the side of the haulage road and parameter like SPM was measured.

#### **4.4 Stack Emission Monitoring:**

The stack of the bag filter unit installed at the limestone crusher plant was monitored for Particulate Matter emission from the same during the crushing of Limestone lumps in to different sizes. There is a platform made at a height around 25m from the ground at the stack and sample has been collected on monthly basis to evaluate the performance of the bag filters and emission level from the stack.

#### **4.5 Quarry Discharge Water:**

In order to assess the present quality of water, which is being discharged on to the land after pumping out from the quarry. Three sampling locations were set at the discharge points of the pumped out water. The samples were being collected from each discharge point every month. The descriptions of the locations are given below:

##### **SW-1 Quarry 2&6 Discharge Water**

The water collected inside the quarry no-2&6 is pumped out continuously and is stored in a RCC tank before allowing it to flow out of the ML area by a guided channel towards the northern side of the lease and the water is used by the nearby villagers for irrigation purpose. The sample were collected from the out let

of the RCC tank and analyzed for 27 parameters as per the Schedule – VI of EPA, G.S.R.422(E) 1993 for any contaminants in it.

#### **SW-2 Quarry 1&3 Discharge Water**

The water collected inside the quarry no-1&3 is pumped out continuously and is stored in a RCC tank before allowing it to flow out of the ML area by a guided channel towards the southern side of the lease and the water is used by the nearby villagers for irrigation purpose. The sample were collected from the out let of the RCC tank and analyzed for 27 parameters as per the Schedule – VI of EPA, G.S.R.422(E) 1993 for any contaminants in it.

#### **SW-3 Quarry 4&5 Discharge Water**

The water collected inside the quarry no-4&5 is pumped out continuously and is stored in a RCC tank before allowing it to flow out of the ML area by a guided channel towards the north-eastern side of the lease and the water is used by the nearby villagers for irrigation purpose. The sample were collected from the out let of the RCC tank and analyzed for 27 parameters as per the Schedule – VI of EPA, G.S.R.422(E) 1993 for any contaminants in it.

#### **4.6 Ground Water Quality and Level:**

Ground Water quality were monitored by fixing a network of existing dug wells of 5(five) numbers and Water level was monitored by fixing a net work of 6(six) existing dug wells in the nearby villages as well as in the core zone. Samples were collected during the month of May only for evaluating the quality of the water and analyzed as per IS 10500. Ground water levels were measured during month of May and August to know the amount of seasonal fluctuation and availability of ground water during pre-monsoon and monsoon seasons of the area. The details of the water level measurement locations are described below:

#### **GW-1 Village Kheramuta Dug Well**

The water sample was collected from the dug well of Kheramuta village and was tested for drinking water quality as the villagers are using the dug well water for their drinking purpose.

#### **GW-2 Lanjiberna Colony Dug Well**

The water sample was collected from the dug well of Lanjiberna colony of M/s OCL India Ltd. and was tested for drinking water quality as the workers are using the dug well water for their drinking domestic purpose.

#### **GW-3 Village Dhauradah Dug Well**

The water sample was collected from the dug well of Dhauradah village and was tested for drinking water quality as the villagers are using the dug well water for their drinking purpose.

#### **GW-4 Lanjiberna Mines Workshop Dug Well**

The water sample was collected from the dug well of the HEMM workshop/garage of the Lanjiberna Mines and was tested for drinking water quality as the workers are using the dug well water for their drinking purpose.

#### **GW-5 Village Lanjiberna Dug Well**

The water sample was collected from the dug well of Lanjiberna village and was tested for drinking water quality as the villagers are using the dug well water for their drinking purpose.

#### **GW-6 Village Katang Dug Well**

The water level was measured from the dug well of Katang village for water availability as the villagers are using the dug well water for their domestic purpose.

#### **4.7 Noise Level Monitoring**

Noise levels were measured at 4(four) different locations within the core zone only to assess the impact of the mining operation on the ambient noise level. A brief description of the monitoring location is given below:

##### **N-1 Quarry Area during Operation of HEMM**

This station was selected to assess the ambient noise level due to the operation of HEMM within the quarry area during ongoing mining works. The monitoring was carried out inside the quarry and at distance of 100 m from the operating machines.

##### **N-2 Limestone Crusher Plant area**

This station was selected to assess the ambient noise level due to the operation of Crusher Plant and crushing and screening operation of Limestone lumps. The monitoring was carried out at a distance of 100m from the Crusher building.

##### **N-3 Lanjiberna Colony Area**

This station was selected to assess the ambient noise level due to the mining activities and transportation of limestone to the Cement Plant by Railway wagons. The monitoring was carried out near the Lanjiberna Colony.

##### **N-4 Magazine Hill Top**

This station was selected to assess the ambient noise level due to the mining activities and crushing of limestone and its impact on the background and sensitive receptors. The monitoring was carried out on the Magazine Hill top near the security search light post.

#### **4.8 Soil Sampling Stations**

Soil samples were collected from three different locations in the buffer zone to assess the quality of soil and its fertility. The soil samples are collected from the agriculture land of some nearby villagers, who used to irrigate their cultivated land by Lanjiberna mines quarry discharge water. The descriptions of sampling sites are given below:

##### **SS-1 Village Bihabandh Agriculture Land**

Soil sample was collected from the agriculture land of village Bihabandh, where the pumped out water of quarry 2&6 is discharged.

##### **SS-2 Village Lanjiberna Agriculture Land**

Soil sample was collected from the agriculture land of village Lanjiberna, where the pumped out water of quarry 1&3 is discharged.

##### **SS-3 Village Dhauradah Agriculture land**

Soil sample was collected from the agriculture land of village Dhaurada, where the pumped out water of quarry 4&5 is discharged.

#### **4.9 Effluent Water Quality Sampling Station**

The wash water of HEMM in workshop is directed to an Oil & Grease separation tank inside the garage premises and the treated water is reused in the washing process. The sample from the outlet of the Tank is collected on quarterly basis for analysis of 5 parameters and to find out the efficiency of the Oil & Grease separation process.

## **5. METHODOLOGY OF SAMPLING & ANALYTICAL PROCEDURES**

### **5.1 Meteorological Study**

For recording various meteorological parameters like, Temperature, RH, Wind Speed, Wind Direction & Rainfall, a weather monitoring station, Make: Virtual Electronics Company, Roorkee was installed at the site. The instrument is equipped with windows based data logging software to store each data on hourly basis, which can be further down loaded to a PC and data can be interpreted as per the requirement of the report.

### **5.2 Ambient Air Monitoring**

Air quality samples were monitored for all parameters as per NAAQS. For sampling and analysis, methods prescribed by CPCB were followed and Respirable Dust Samplers (RDS) APM 460BL – 411TE, Make: Envirotech Instruments Pvt. Ltd. were used and for PM2.5 sampling AAS 190 attachment for fine particulate sampling along with RDS was used where ever necessary at the site.

### **5.3 Fugitive Dust Emission Monitoring**

Fugitive dust samples were monitored for parameter like, SPM only. For sampling and analysis ambient air monitoring methods prescribed by CPCB were followed and High Volume Samplers (HVS) APM 415, Make: Envirotech Instruments Pvt. Ltd. were used at the site. 8 hours continuous samplings were carried out once in three months at each location.

### **5.4 Stack Monitoring**

Stack monitoring were carried out once in every month from the bag filter outlet stack of the Limestone Crusher plant and the CPCB standard for monitoring of Stack emission was followed for collecting the sample and the concentration of Particulate Matter were calculated by following the standard methods of CPCB. For collection of sample Ecotech Instruments make Stack sampler, Model: ESS 100 was used at the site.

### **5.5 Water Quality Sampling**

As per the standard practice, one sample from each station was collected once, during the month of August and November. Grab water samples were collected in plastic container by standard sampling technique. Necessary precautions were taken for sample preservation. The parameters like pH, Temp., Conductivity and DO were measured at the site by using portable water analysis kit from WTW, Germany. All other parameters were analysed as per the standard methods for Water and Waste Water analysis by APHA.

### **5.6 Noise Level Monitoring**

Ambient Noise level monitoring was carried out with an integrating Sound Level Meter, Model: SLM 100, Make: Envirotech Instruments Pvt. Ltd. in dB(A). The measurements were collected at a height of 1.5m from the ground level and away from any sound reflecting sources like walls and buildings etc.

The Ambient Noise monitoring was carried out on continuous basis by the data logging system of the instrument and data are logged on at every minute for 24 hours. The Sound Pressure Level were measured and Lmin, Lmax & Leq Day Time and Leq Night Time were calculated and interpreted for data analysis.

## 6. DATA ANALYSIS

### 6.1 Micro-meteorological Study:

#### 6.1.1 Wind Speed & Wind Direction

During the entire period from 1<sup>st</sup> April to 30<sup>th</sup> September all total 4387 no. of data are recorded by the instrument and after interpretation of the collected data it was found that Calm condition prevailed over 31.39%, while considering the 24 hourly data. 18.28% calm condition prevailed from morning 6 hrs to 14hrs for the entire study period, 28.97% calm condition prevailed from 14hrs to 22hrs and 44.68% calm condition prevailed from 22hrs to 06hrs. The predominant wind directions were from North & NE with average wind speed 2.11 m/sec. The wind rose diagram for the entire study period are depicted on the **Figure No: 6.1, 6.2, 6.3 & 6.4.**

#### 6.1.2 Temperature

The maximum & minimum temperature during the entire study period were divided in to two parts as the study period was covering summer as well as monsoon seasons. The Minimum temperature during the summer season was found to be 19.4°C and the Maximum temperature was found to be 43.2°C up to the end of 30<sup>th</sup> June.

The minimum and maximum temperature during the monsoon season i.e. from July to September was found to be 20.8°C and 35.7°C. **Table No 6.1** shows a summary of micro-meteorological data collected for the entire period.

#### 6.1.3 Rainfall

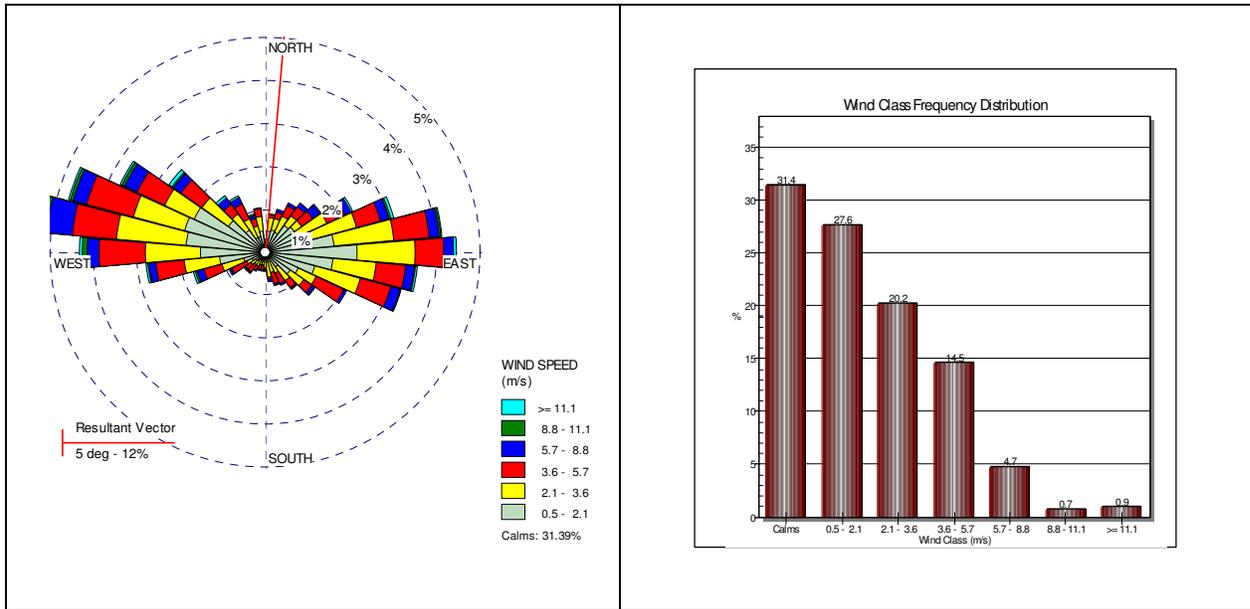
The total rain fall from 1<sup>st</sup> April to 30<sup>th</sup> September was observed to be 1336.4 mm. during the study period. A month wise rainfall data recorded at the site is depicted in **Table No 6.1.**

**Table No: 6.1**  
**A Summary of the Micro-meteorological Data**

**Project Site** : Lanjiberna Limestone & Dolomite Mines  
**Location** : Magazine Hill Top

SI No	Parameters	From April – September 2018
1	Predominant Wind Direction	From North & NE
2	Calm Condition %	31.39
3	Average Wind Speed m/sec	2.11
4	Temperature °C	
	<b>Summer Season</b>	
	Minimum	19.42
	Maximum	43.17
	<b>Monsoon Season</b>	
	Minimum	20.80
	Maximum	35.68
5	<b>Rain Fall in mm</b>	
	April	13.8
	May	28.8
	June	161.2
	July	243.0
	August	715.0
	September	174.6
	<b>Total</b>	<b>1336.4</b>

**Figure No: 6.1** Wind Rose Diagram for 24 Hours



**Figure No: 6.2** Wind Rose Diagram from 06 – 14 Hours

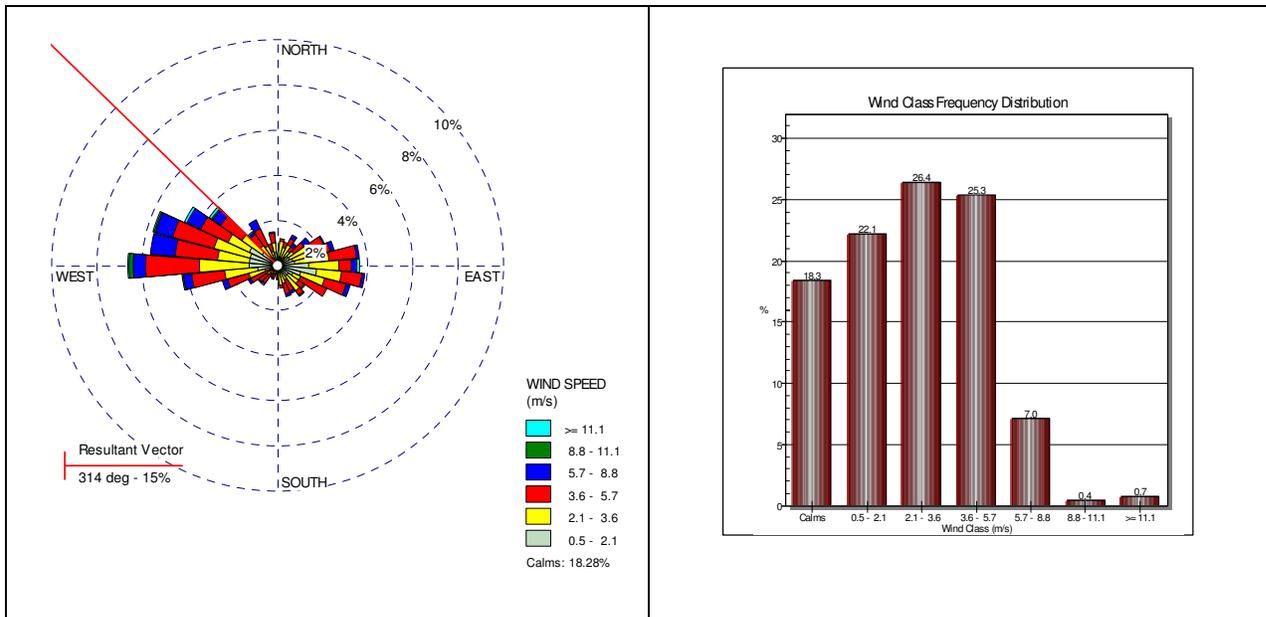


Figure No: 6.3 Wind Rose Diagram from 14 – 22 Hours

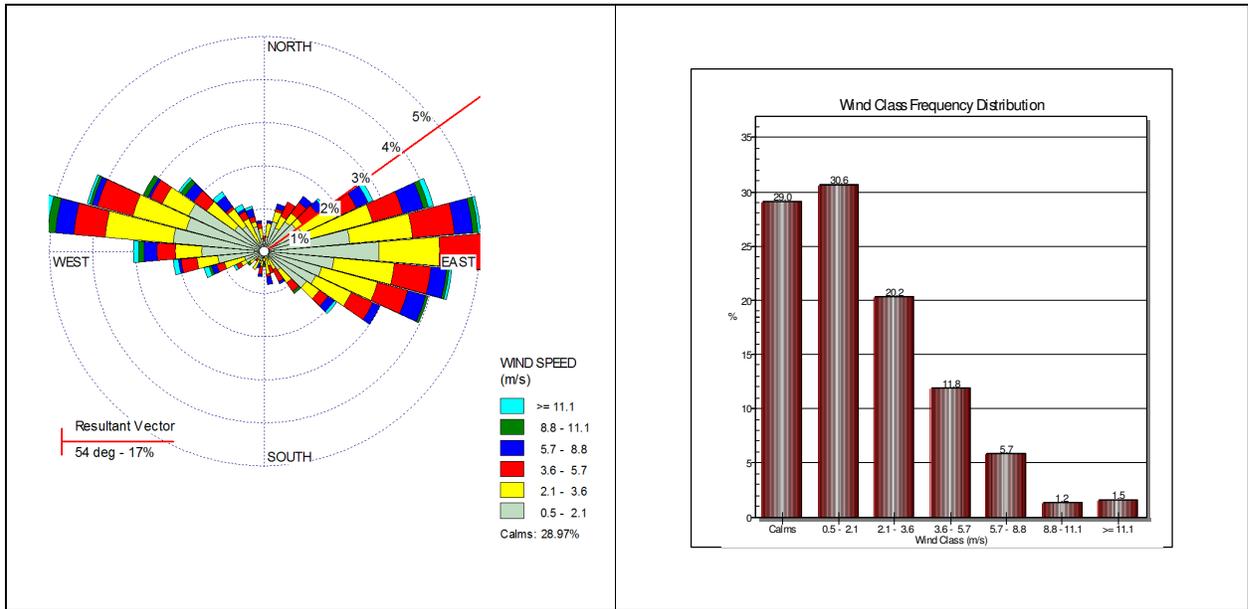
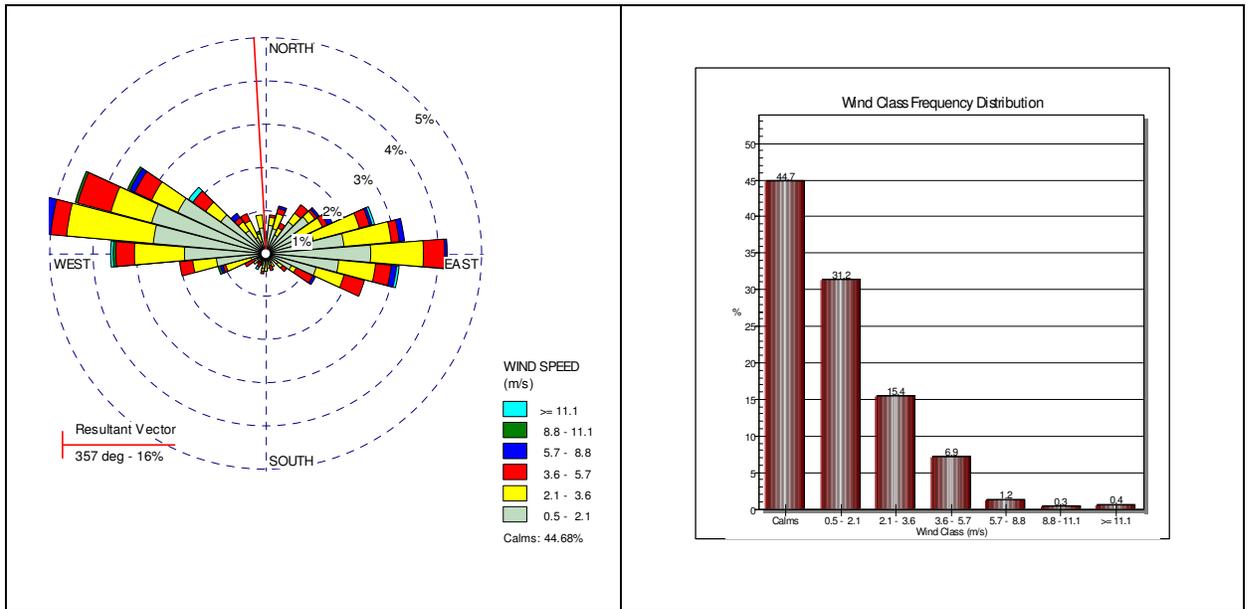


Figure No: 6.4 Wind Rose Diagram from 22 – 06 Hours



## 6.2 Ambient Air Quality Data

### 6.2.1 Quarry 2 Site Office (A-1)

#### PM2.5

Data as given in the **Table No: 6.2** shows that the maximum value was  $37\mu\text{g}/\text{m}^3$ , 98 percentile values were  $7.06\mu\text{g}/\text{m}^3$ , the lowest value was  $7\mu\text{g}/\text{m}^3$  and the average value was  $21.91\mu\text{g}/\text{m}^3$ .

#### PM10

Data as given in the **Table No: 6.2** shows that the maximum value was  $98\mu\text{g}/\text{m}^3$ , 98 percentile values were  $33.06\mu\text{g}/\text{m}^3$ , the lowest value was  $29\mu\text{g}/\text{m}^3$  and the average value was  $62.07\mu\text{g}/\text{m}^3$ .

All the readings are below the permissible limit of 60 &  $100\mu\text{g}/\text{m}^3$  as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

#### SO<sub>2</sub>

The data given in the **Table No: 6.2** shows the maximum value was  $06\mu\text{g}/\text{m}^3$ , 98 percentile values were  $3.0\mu\text{g}/\text{m}^3$ , the lowest value was  $3.0\mu\text{g}/\text{m}^3$  and the average value was  $3.63\mu\text{g}/\text{m}^3$ .

#### NO<sub>2</sub>

The data given in the **Table No: 6.2** shows the maximum value was  $31\mu\text{g}/\text{m}^3$ , 98 percentile values were  $6.0\mu\text{g}/\text{m}^3$ , the lowest value was  $6.0\mu\text{g}/\text{m}^3$  and the average value was  $14.41\mu\text{g}/\text{m}^3$ .

All the readings are below the permissible limit of  $80\mu\text{g}/\text{m}^3$  as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

**Table No: 6.2**

**AMBIENT AIR QUALITY DATA**  
From 01.04.2018 to 30.09.2018  
Station: A-1 (Quarry 2 Site Office)

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
02.04.2018	17	47	< 3	22
05.04.2018	29	78	< 3	11
09.04.2018	33	75	3	14
12.04.2018	33	77	6	20
16.04.2018	26	88	4	13
19.04.2018	33	92	3	15
23.04.2018	8	29	< 3	9
26.04.2018	23	68	4	18
30.04.2018	26	72	4	15
02.05.2018	28	78	< 3	21
05.05.2018	32	97	< 3	6
09.05.2018	34	82	< 3	20
12.05.2018	37	98	< 3	15
16.05.2018	31	83	3	13

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
19.05.2018	32	85	3	29
23.05.2018	18	50	3	22
26.05.2018	23	67	4	19
30.05.2018	26	73	3	23
01.06.2018	21	41	< 3	13
05.06.2018	30	60	< 3	6
08.06.2018	18	51	< 3	26
12.06.2018	30	95	3	16
15.06.2018	16	53	< 3	9
19.06.2018	30	94	4	17
22.06.2018	35	77	3	14
26.06.2018	32	73	4	16
29.06.2018	28	70	5	18
02.07.2018	27	71	3	11
05.07.2018	18	33	3	13
09.07.2018	25	73	3	11
12.07.2018	19	59	5	18
16.07.2018	26	55	4	15
19.07.2018	21	48	< 3	< 6
23.07.2018	23	56	3	12
26.07.2018	20	52	4	10
30.07.2018	22	55	4	12
01.08.2018	11	62	< 3	8
04.08.2018	11	39	3	11
08.08.2018	19	55	< 3	< 6
11.08.2018	22	59	< 3	< 6
16.08.2018	20	67	< 3	12
20.08.2018	7	40	< 3	14
23.08.2018	19	43	4	31
27.08.2018	10	34	3	12
30.08.2018	12	42	< 3	10
01.09.2018	7	47	< 3	10
05.09.2018	10	41	3	9
08.09.2018	15	49	< 3	6
12.09.2018	12	44	4	11
15.09.2018	11	54	4	13
19.09.2018	15	41	< 3	13
22.09.2018	15	60	< 3	7
26.09.2018	17	58	4	12
29.09.2018	20	62	3	14

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
Minimum	7	29	3	6
Maximum	37	98	6	31
Average	21.91	62.07	3.63	14.41
98%tile Value	7.06	33.06	3.00	6.00

The other parameters monitored during the month of May is described below in the **Table No: 6.2A**

**Table No: 6.2A**

SI No	Date of Sampling	Sample ID	Parameters					
			PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	NH <sub>3</sub>	O <sub>3</sub>
<b>Units</b> →			µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
<b>Method of Analysis</b> →			CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	EN 12341, 1998 Low Volume Sampler	IS:5182 (Part – 2) 2001, RA 2017	IS: 5182 (Part – 6) 2006, RA 2017	CPL/SOP/01/NH <sub>3</sub> , Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/O <sub>3</sub> , Issue No: 02, dtd: 23.10.2017
1.	12.05.2018	CPL/AAQ/MAY-18/19	37	98	< 3	15	46	28
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			60 (24 Hours Average)	100 (24 Hours Average)	80 (24 Hours Average)	80 (24 Hours Average)	400 (24 Hours Average)	180 (1 Hour Average)
SI No	Date of Sampling	Sample ID	Parameters					
			Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzene (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase only
<b>Units</b> →			µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
<b>Method of Analysis</b> →			IS 5182 (Part – 22)	CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/PM 2.5, Issue No: 02, dtd: 23.10.2017	IS 5182 (Part – 11)	Electro-chemical Sensor	IS 5182 (Part – 12)
1.	12.05.2018	CPL/AAQ/MAY-18/19	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			1.0 (24 Hours Average)	06 (Annual Average)	20 (Annual Average)	05 (Annual Average)	4 (1 Hour Average)	01 (Annual Average)

## 6.2.2 Limestone Crusher Plant (A-2)

### PM<sub>2.5</sub>

Data as given in the **Table No: 6.3** shows that the maximum value was 41µg/m<sup>3</sup>, 98 percentile values were 7µg/m<sup>3</sup>, the lowest value was 6.0µg/m<sup>3</sup> and the average value was 21.28µg/m<sup>3</sup>.

### PM<sub>10</sub>

Data as given in the **Table No: 6.3** shows that the maximum value was 97µg/m<sup>3</sup>, 98 percentile values were 26.12µg/m<sup>3</sup>, the lowest value was 26.0µg/m<sup>3</sup> and the average value was 64.41µg/m<sup>3</sup>.

All the readings are below the permissible limit of 60 & 100µg/m<sup>3</sup> as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

### SO<sub>2</sub>

The data given in the **Table No: 6.3** shows the maximum value was 09µg/m<sup>3</sup>, 98 percentile values were 3.0µg/m<sup>3</sup>, the lowest value was 3.0µg/m<sup>3</sup> and the average value was 4.28µg/m<sup>3</sup>.

**NO<sub>2</sub>**

The data given in the **Table No: 6.3** shows the maximum value was 29µg/m<sup>3</sup>, 98 percentile values were 6.0µg/m<sup>3</sup>, the lowest value was 6.0µg/m<sup>3</sup> and the average value was 14.93µg/m<sup>3</sup>.

All the readings are below the permissible limit of 80µg/m<sup>3</sup> as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

**Table No: 6.3**

**AMBIENT AIR QUALITY DATA**  
From 01.04.2018 to 30.09.2018  
Station: A-2 (Limestone Crusher Plant)

<b>Date</b>	<b>PM2.5</b>	<b>PM10</b>	<b>SO<sub>2</sub></b>	<b>NO<sub>2</sub></b>
02.04.2018	18	46	9	29
05.04.2018	35	77	< 3	10
09.04.2018	26	76	< 3	11
12.04.2018	31	88	3	13
16.04.2018	21	82	6	19
19.04.2018	41	97	4	13
23.04.2018	12	31	< 3	12
26.04.2018	30	86	3	14
30.04.2018	28	77	4	16
02.05.2018	37	92	< 3	25
05.05.2018	26	88	< 3	6
09.05.2018	22	57	< 3	17
12.05.2018	26	79	< 3	14
16.05.2018	34	92	< 3	12
19.05.2018	28	89	7	22
23.05.2018	26	83	5	17
26.05.2018	28	86	4	22
30.05.2018	32	88	8	24
01.06.2018	28	86	< 3	17
05.06.2018	10	46	< 3	6
08.06.2018	17	75	3	13
12.06.2018	19	76	< 3	13
15.06.2018	29	87	< 3	6
19.06.2018	22	69	4	11
22.06.2018	16	37	< 3	15
26.06.2018	27	69	4	12
29.06.2018	30	74	3	16
02.07.2018	39	95	6	19
05.07.2018	9	35	4	15
09.07.2018	15	48	4	12

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
12.07.2018	27	68	3	15
16.07.2018	31	78	< 3	9
19.07.2018	16	65	8	24
23.07.2018	23	69	3	16
26.07.2018	24	72	4	18
30.07.2018	22	61	5	20
01.08.2018	10	48	4	24
04.08.2018	11	53	4	11
08.08.2018	20	56	3	11
11.08.2018	21	55	3	12
16.08.2018	17	65	< 3	16
20.08.2018	7	31	3	13
23.08.2018	15	49	4	25
27.08.2018	18	54	4	19
30.08.2018	20	58	3	16
01.09.2018	7	26	4	15
05.09.2018	6	26	5	16
08.09.2018	23	68	< 3	7
12.09.2018	7	28	< 3	7
15.09.2018	11	51	< 3	10
19.09.2018	14	55	3	10
22.09.2018	7	31	3	13
26.09.2018	12	44	4	12
29.09.2018	18	56	3	16
<b>Minimum</b>	<b>6</b>	<b>26</b>	<b>3</b>	<b>6</b>
<b>Maximum</b>	<b>41</b>	<b>97</b>	<b>9</b>	<b>29</b>
<b>Average</b>	<b>21.28</b>	<b>64.41</b>	<b>4.28</b>	<b>14.93</b>
<b>98%tile Value</b>	<b>7</b>	<b>26.12</b>	<b>3.00</b>	<b>6.00</b>

The other parameters monitored during the month of May is described below in the **Table No: 6.3A**

**Table No: 6.3A**

Sl No	Date of Sampling	Sample ID	Parameters					
			PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	NH <sub>3</sub>	O <sub>3</sub>
<b>Units</b> →			µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
<b>Method of Analysis</b> →			CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	EN 12341, 1998 Low Volume Sampler	IS:5182 (Part – 2) 2001, RA 2017	IS: 5182 (Part – 6) 2006, RA 2017	CPL/SOP/01/NH <sub>3</sub> , Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/O <sub>3</sub> , Issue No: 02, dtd: 23.10.2017
1.	16.05.2018	CPL/AAQ/MAY-18/26	34	92	< 3	12	52	38
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			60 (24 Hours Average)	100 (24 Hours Average)	80 (24 Hours Average)	80 (24 Hours Average)	400 (24 Hours Average)	180 (1 Hour Average)

SI No	Date of Sampling	Sample ID	Parameters					
			Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzene (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase only
Units			µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
Method of Analysis			IS 5182 (Part – 22)	CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/PM 2.5, Issue No: 02, dtd: 23.10.2017	IS 5182 (Part – 11)	Electro-chemical Sensor	IS 5182 (Part – 12)
1.	16.05.2018	CPL/AAQ/MAY-18/26	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			1.0 (24 Hours Average)	06 (Annual Average)	20 (Annual Average)	05 (Annual Average)	4 (1 Hour Average)	01 (Annual Average)

### 6.2.3 Stone Crusher Plant (A-3)

#### PM2.5

Data as given in the **Table No: 6.4** shows that the maximum value was 36µg/m<sup>3</sup>, 98 percentile values were 8.0µg/m<sup>3</sup>, the lowest value was 6.0µg/m<sup>3</sup> and the average value was 22.00µg/m<sup>3</sup>.

#### PM10

Data as given in the **Table No: 6.4** shows that the maximum value was 98µg/m<sup>3</sup>, 98 percentile values were 27.24µg/m<sup>3</sup>, the lowest value was 23.0µg/m<sup>3</sup> and the average value was 61.64µg/m<sup>3</sup>.

All the readings are below the permissible limit of 60 & 100µg/m<sup>3</sup> as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

#### SO<sub>2</sub>

The data given in the **Table No: 6.4** shows the maximum value was 13µg/m<sup>3</sup>, 98 percentile values were 3.0µg/m<sup>3</sup>, the lowest value was 3.0µg/m<sup>3</sup> and the average value was 4.42µg/m<sup>3</sup>.

#### NO<sub>2</sub>

The data given in the **Table No: 6.4** shows the maximum value was 34µg/m<sup>3</sup>, 98 percentile values were 7.04µg/m<sup>3</sup>, the lowest value was 7.0µg/m<sup>3</sup> and the average value was 16.34µg/m<sup>3</sup>.

All the readings are below the permissible limit of 80µg/m<sup>3</sup> as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

**Table No: 6.4**

**AMBIENT AIR QUALITY DATA**  
From 01.04.2018 to 30.09.2018  
Station: A-3 (Stone Crusher Plant Area)

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
03.04.2018	19	53	4	12
06.04.2018	23	62	< 3	10
10.04.2018	30	69	3	19
13.04.2018	34	84	< 3	11
17.04.2018	30	90	< 3	23
20.04.2018	25	57	< 3	13

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
24.04.2018	26	98	3	7
27.04.2018	27	78	3	9
30.04.2018	29	84	3	12
03.05.2018	30	79	< 3	20
07.05.2018	24	75	< 3	16
10.05.2018	26	65	3	15
14.05.2018	32	91	7	28
17.05.2018	31	61	4	16
21.05.2018	29	72	13	34
24.05.2018	24	50	5	25
28.05.2018	26	76	4	28
31.05.2018	28	79	6	33
02.06.2018	25	72	4	18
06.06.2018	29	73	3	24
09.06.2018	36	92	4	14
13.06.2018	17	52	< 3	14
16.06.2018	15	47	< 3	9
20.06.2018	24	66	5	15
23.06.2018	20	56	6	19
27.06.2018	22	54	4	17
30.06.2018	26	67	5	15
03.07.2018	22	61	< 3	21
06.07.2018	20	58	4	13
10.07.2018	16	50	< 3	16
13.07.2018	20	43	< 3	16
17.07.2018	28	77	< 3	< 6
20.07.2018	8	27	5	9
24.07.2018	6	50	< 3	9
27.07.2018	18	54	< 3	23
31.07.2018	12	44	3	18
02.08.2018	28	69	4	19
06.08.2018	14	54	< 3	7
09.08.2018	9	33	< 3	15
13.08.2018	10	48	3	10
17.08.2018	11	35	< 3	19
21.08.2018	19	47	< 3	10
24.08.2018	8	23	< 3	11
28.08.2018	16	49	4	16
31.08.2018	18	50	3	11
03.09.2018	10	45	< 3	12

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
06.09.2018	18	44	< 3	18
10.09.2018	9	48	< 3	10
13.09.2018	10	54	< 3	9
17.09.2018	14	41	4	33
20.09.2018	22	88	< 3	12
24.09.2018	22	68	< 3	15
27.09.2018	23	66	4	16
29.09.2018	24	69	3	12
<b>Minimum</b>	<b>6</b>	<b>23</b>	<b>3</b>	<b>7</b>
<b>Maximum</b>	<b>36</b>	<b>98</b>	<b>13</b>	<b>34</b>
<b>Average</b>	<b>22.00</b>	<b>61.64</b>	<b>4.42</b>	<b>16.34</b>
<b>98%tile Value</b>	<b>8</b>	<b>27.24</b>	<b>3.00</b>	<b>7.04</b>

The other parameters monitored during the month of May is described below in the **Table No: 6.4A**

**Table No: 6.4A**

SI No	Date of Sampling	Sample ID	Parameters					
			PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	NH <sub>3</sub>	O <sub>3</sub>
<b>Units</b>			µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
<b>Method of Analysis</b>			CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	EN 12341, 1998 Low Volume Sampler	IS-5182 (Part - 2) 2001, RA 2017	IS: 5182 (Part - 6) 2006, RA 2017	CPL/SOP/01/NH <sub>3</sub> , Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/O <sub>3</sub> , Issue No: 02, dtd: 23.10.2017
1.	03.05.2018	CPL/AAQ/MAY-18/3	30	79	< 3	20	39	26
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			60 (24 Hours Average)	100 (24 Hours Average)	80 (24 Hours Average)	80 (24 Hours Average)	400 (24 Hours Average)	180 (1 Hour Average)
SI No	Date of Sampling	Sample ID	Parameters					
			Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzene (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase only
<b>Units</b>			µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
<b>Method of Analysis</b>			IS 5182 (Part - 22)	CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	03.05.2018	CPL/AAQ/MAY-18/3	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			1.0 (24 Hours Average)	06 (Annual Average)	20 (Annual Average)	05 (Annual Average)	4 (1 Hour Average)	01 (Annual Average)

## 6.2.4 Magazine Hill Top (A-4)

### PM<sub>2.5</sub>

Data as given in the **Table No: 6.5** shows that the maximum value was 28µg/m<sup>3</sup>, 98 percentile values were 6.0µg/m<sup>3</sup>, the lowest value was 4.0µg/m<sup>3</sup> and the average value was 15.56µg/m<sup>3</sup>.

### PM<sub>10</sub>

Data as given in the **Table No: 6.5** shows that the maximum value was 68µg/m<sup>3</sup>, 98 percentile values were 22.3µg/m<sup>3</sup>, the lowest value was 10.0µg/m<sup>3</sup> and the average value was 46.33µg/m<sup>3</sup>.

All the readings are below the permissible limit of 60 & 100 $\mu\text{g}/\text{m}^3$  as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

### SO<sub>2</sub>

The data given in the **Table No: 6.5** shows the maximum value was 9 $\mu\text{g}/\text{m}^3$ , 98 percentile values were 3.0 $\mu\text{g}/\text{m}^3$ , the lowest value was 3.0 $\mu\text{g}/\text{m}^3$  and the average value was 4.47 $\mu\text{g}/\text{m}^3$ .

### NO<sub>2</sub>

The data given in the **Table No: 6.5** shows the maximum value was 34 $\mu\text{g}/\text{m}^3$ , 98 percentile values were 7.00 $\mu\text{g}/\text{m}^3$ , the lowest value was 6.0 $\mu\text{g}/\text{m}^3$  and the average value was 15.96 $\mu\text{g}/\text{m}^3$ .

All the readings are below the permissible limit of 80 $\mu\text{g}/\text{m}^3$  as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

**Table No: 6.5**

#### AMBIENT AIR QUALITY DATA

From 01.04.2018 to 30.09.2018

Station: A-4 (Magazine Hill Top)

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
03.04.2018	19	50	< 3	11
06.04.2018	12	47	6	13
10.04.2018	11	52	4	23
13.04.2018	20	42	3	19
17.04.2018	18	52	6	11
20.04.2018	15	43	3	9
24.04.2018	7	49	< 3	12
27.04.2018	16	50	4	12
30.04.2018	18	53	6	18
03.05.2018	19	47	3	24
07.05.2018	24	60	6	20
10.05.2018	21	55	< 3	15
14.05.2018	22	58	3	16
17.05.2018	18	53	6	20
21.05.2018	18	51	6	20
24.05.2018	24	61	3	34
28.05.2018	20	57	4	22
31.05.2018	22	59	6	28
02.06.2018	17	51	3	10
06.06.2018	4	27	< 3	7
09.06.2018	28	68	7	20
13.06.2018	19	43	9	31
16.06.2018	21	56	< 3	6

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
20.06.2018	23	52	< 3	7
23.06.2018	19	54	6	18
27.06.2018	22	55	4	19
30.06.2018	20	51	5	16
03.07.2018	19	55	3	12
06.07.2018	6	10	5	14
10.07.2018	7	48	4	22
13.07.2018	14	55	< 3	9
17.07.2018	14	33	< 3	< 6
20.07.2018	13	36	6	16
24.07.2018	20	37	< 3	12
27.07.2018	20	32	3	16
31.07.2018	18	33	4	12
02.08.2018	13	48	5	20
06.08.2018	10	42	< 3	7
09.08.2018	15	45	< 3	16
13.08.2018	6	33	3	21
17.08.2018	9	30	< 3	< 6
21.08.2018	7	36	5	21
24.08.2018	7	22	< 3	7
28.08.2018	10	40	4	20
31.08.2018	12	44	5	22
03.09.2018	18	44	< 3	12
06.09.2018	13	52	4	21
10.09.2018	13	53	< 3	7
13.09.2018	12	45	< 3	15
17.09.2018	18	53	3	25
20.09.2018	10	42	3	9
24.09.2018	13	46	3	14
27.09.2018	12	44	3	10
29.09.2018	14	48	4	9
<b>Minimum</b>	<b>4</b>	<b>10</b>	<b>3</b>	<b>6</b>
<b>Maximum</b>	<b>28</b>	<b>68</b>	<b>9</b>	<b>34</b>
<b>Average</b>	<b>15.56</b>	<b>46.33</b>	<b>4.47</b>	<b>15.96</b>
<b>98%tile</b>	<b>6</b>	<b>22.3</b>	<b>3.00</b>	<b>7.00</b>

The other parameters monitored during the month of May is described below in the **Table No: 6.5A**

Table No: 6.5A

Sl No	Date of Sampling	Sample ID	Parameters					
			PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	NH <sub>3</sub>	O <sub>3</sub>
<b>Units</b>			µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
<b>Method of Analysis</b>			CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	EN 12341, 1998 Low Volume Sampler	IS:5182 (Part - 2) 2001, RA 2017	IS: 5182 (Part - 6) 2006, RA 2017	CPL/SOP/01/NH <sub>3</sub> , Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/O <sub>3</sub> , Issue No: 02, dtd: 23.10.2017
1.	07.05.2018	CPL/AAQ/MAY-18/10	24	60	06	20	< 20	< 19.6
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			60 (24 Hours Average)	100 (24 Hours Average)	80 (24 Hours Average)	80 (24 Hours Average)	400 (24 Hours Average)	180 (1 Hour Average)
Sl No	Date of Sampling	Sample ID	Parameters					
			Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzene (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase only
<b>Units</b>			µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
<b>Method of Analysis</b>			IS 5182 (Part - 22)	CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/PM 2.5, Issue No: 02, dtd: 23.10.2017	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	07.05.2018	CPL/AAQ/MAY-18/10	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			1.0 (24 Hours Average)	06 (Annual Average)	20 (Annual Average)	05 (Annual Average)	4 (1 Hour Average)	01 (Annual Average)

Figure No: 6.5 Graphical Representations of PM2.5 Values in Core Zone

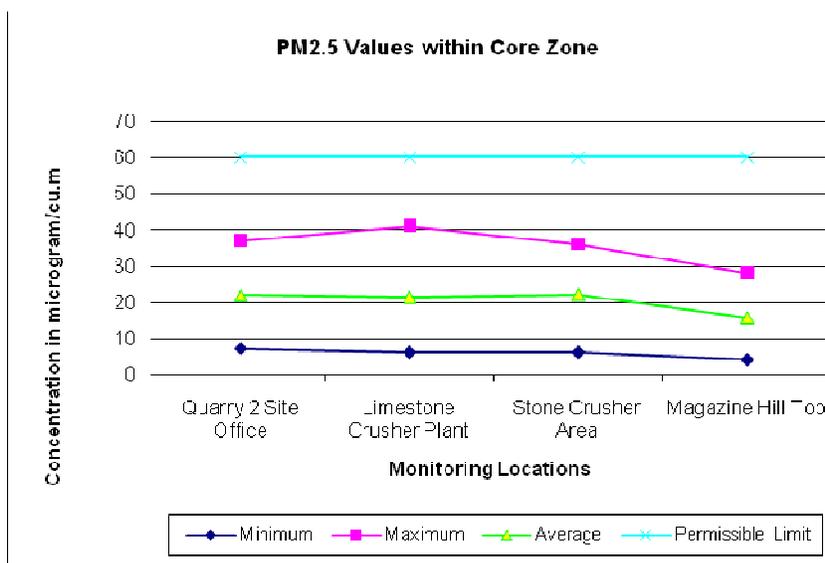


Figure No: 6.6 Graphical Representations of PM10 Values in Core Zone

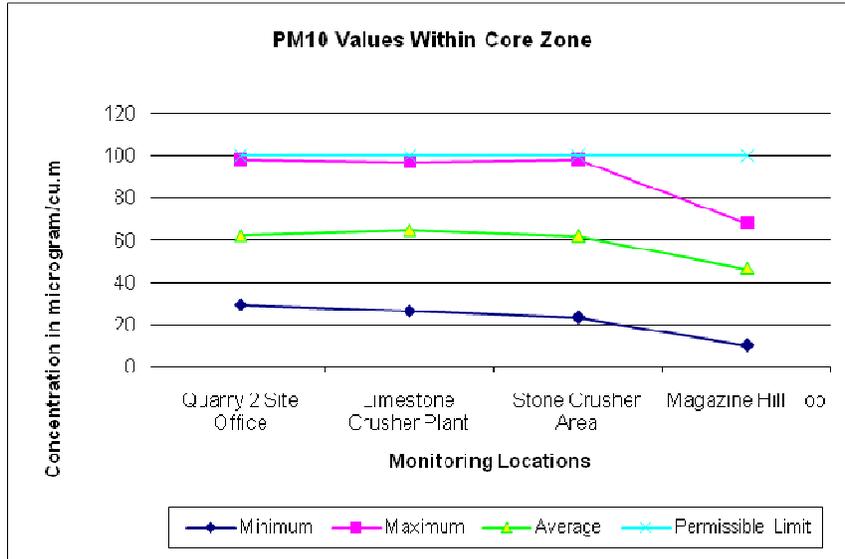
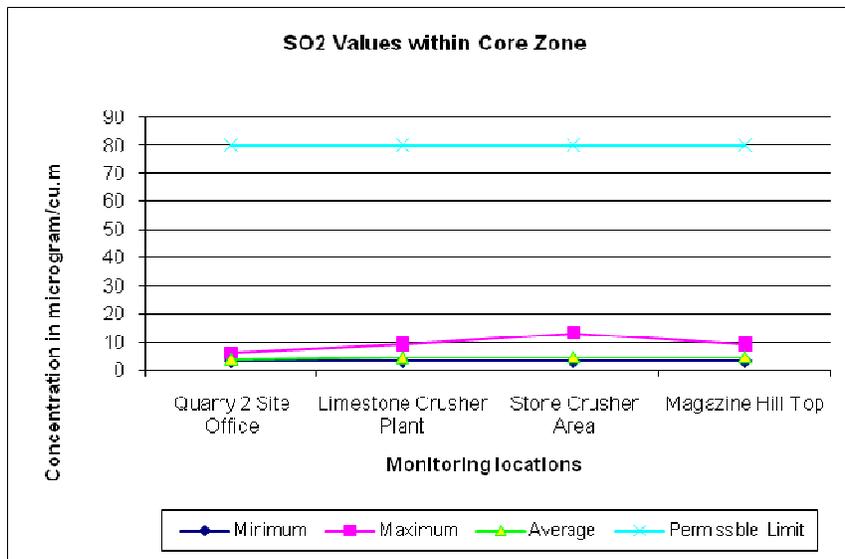
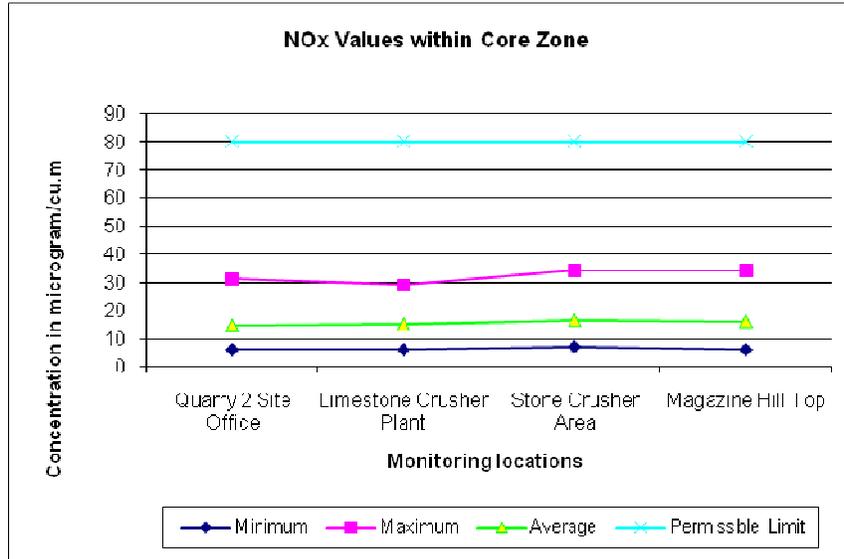


Figure No: 6.7 Graphical Representations of SO<sub>2</sub> Values in Core Zone



**Figure No: 6.8 Graphical Representations of NOx Values in Core Zone**



### 6.2.5 Village Katang (A-5)

#### PM2.5

Data as given in the **Table No: 6.6** shows that the maximum value was  $30\mu\text{g}/\text{m}^3$ , 98 percentile values were  $6.94\mu\text{g}/\text{m}^3$ , the lowest value was  $6.0\mu\text{g}/\text{m}^3$  and the average value was  $17.10\mu\text{g}/\text{m}^3$ .

#### PM10

Data as given in the **Table No: 6.6** shows that the maximum value was  $75\mu\text{g}/\text{m}^3$ , 98 percentile values were  $23.82\mu\text{g}/\text{m}^3$ , the lowest value was  $21.0\mu\text{g}/\text{m}^3$  and the average value was  $48.21\mu\text{g}/\text{m}^3$ .

All the readings are below the permissible limit of  $60$  &  $100\mu\text{g}/\text{m}^3$  as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

#### SO<sub>2</sub>

The data given in the **Table No: 6.6** shows the maximum value was  $8\mu\text{g}/\text{m}^3$ , 98 percentile values were  $3.0\mu\text{g}/\text{m}^3$ , the lowest value was  $3.0\mu\text{g}/\text{m}^3$  and the average value was  $4.17\mu\text{g}/\text{m}^3$ .

#### NO<sub>2</sub>

The data given in the **Table No: 6.6** shows the maximum value was  $24\mu\text{g}/\text{m}^3$ , 98 percentile values were  $7.92\mu\text{g}/\text{m}^3$ , the lowest value was  $7.0\mu\text{g}/\text{m}^3$  and the average value was  $14.83\mu\text{g}/\text{m}^3$ .

All the readings are below the permissible limit of  $80\mu\text{g}/\text{m}^3$  as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

**Table No: 6.6****AMBIENT AIR QUALITY DATA**

From 01.04.2018 to 30.09.2018

Station: A-5 (Village Katang)

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
04.04.2018	18	42	< 3	15
07.04.2018	20	54	< 3	8
11.04.2018	18	52	5	14
14.04.2018	27	62	3	8
18.04.2018	30	75	8	24
21.04.2018	22	45	3	18
25.04.2018	23	52	4	18
28.04.2018	24	55	5	22
04.05.2018	14	33	4	17
08.05.2018	24	68	< 3	16
11.05.2018	20	41	< 3	13
15.05.2018	22	54	6	16
18.05.2018	21	57	< 3	16
22.05.2018	17	55	3	17
25.05.2018	19	57	4	19
29.05.2018	20	61	5	22
04.06.2018	18	44	6	19
07.06.2018	15	48	< 3	11
11.06.2018	12	54	3	15
14.06.2018	22	59	3	13
18.06.2018	22	57	4	24
21.06.2018	11	21	6	19
25.06.2018	18	54	4	18
28.06.2018	20	57	5	17
04.07.2018	14	33	< 3	18
07.07.2018	15	52	< 3	8
11.07.2018	15	55	< 3	8
14.07.2018	28	64	< 3	16
18.07.2018	18	48	6	19
21.07.2018	19	34	5	8
25.07.2018	16	40	3	12
28.07.2018	15	42	4	16
03.08.2018	12	49	< 3	14
07.08.2018	7	24	3	11
10.08.2018	6	31	< 3	11

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
14.08.2018	20	57	3	19
18.08.2018	11	26	< 3	18
22.08.2018	8	39	3	9
25.08.2018	16	52	3	12
29.08.2018	18	55	4	16
04.09.2018	10	29	< 3	15
07.09.2018	9	49	< 3	18
11.09.2018	9	44	< 3	11
14.09.2018	13	45	4	11
18.09.2018	17	48	< 3	7
21.09.2018	21	57	< 3	< 6
25.09.2018	12	36	3	9
28.09.2018	15	48	3	12
<b>Minimum</b>	<b>6</b>	<b>21</b>	<b>3</b>	<b>7</b>
<b>Maximum</b>	<b>30</b>	<b>75</b>	<b>8</b>	<b>24</b>
<b>Average</b>	<b>17.10</b>	<b>48.21</b>	<b>4.17</b>	<b>14.83</b>
<b>98%tile</b>	<b>6.94</b>	<b>23.82</b>	<b>3.00</b>	<b>7.92</b>

The other parameters monitored during the month of May is described below in the **Table No: 6.6A**

**Table No: 6.6A**

SI No	Date of Sampling	Sample ID	Parameters					
			PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	NH <sub>3</sub>	O <sub>3</sub>
<b>Units</b> →			µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
<b>Method of Analysis</b> →			CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	EN 12341, 1998 Low Volume Sampler	IS:5182 (Part - 2) 2001, RA 2017	IS: 5182 (Part - 6) 2006, RA 2017	CPL/SOP/01/NH <sub>3</sub> , Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/O <sub>3</sub> , Issue No: 02, dtd: 23.10.2017
1.	08.05.2018	CPL/AAQ/MAY-18/11	24	68	< 3	16	27	22
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			60 (24 Hours Average)	100 (24 Hours Average)	80 (24 Hours Average)	80 (24 Hours Average)	400 (24 Hours Average)	180 (1 Hour Average)
SI No	Date of Sampling	Sample ID	Parameters					
			Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzene (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase only
<b>Units</b> →			µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
<b>Method of Analysis</b> →			IS 5182 (Part - 22)	CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/PM 2.5, Issue No: 02, dtd: 23.10.2017	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	08.05.2018	CPL/AAQ/MAY-18/11	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			1.0 (24 Hours Average)	06 (Annual Average)	20 (Annual Average)	05 (Annual Average)	4 (1 Hour Average)	01 (Annual Average)

## 6.2.6 Village Bihabandh (A-6)

### PM2.5

Data as given in the **Table No: 6.7** shows that the maximum value was  $26\mu\text{g}/\text{m}^3$ , 98 percentile values were  $5.0\mu\text{g}/\text{m}^3$ , the lowest value was  $5.0\mu\text{g}/\text{m}^3$  and the average value was  $18.13\mu\text{g}/\text{m}^3$ .

### PM10

Data as given in the **Table No: 6.7** shows that the maximum value was  $75\mu\text{g}/\text{m}^3$ , 98 percentile values were  $21.76\mu\text{g}/\text{m}^3$ , the lowest value was  $18.0\mu\text{g}/\text{m}^3$  and the average value was  $50.35\mu\text{g}/\text{m}^3$ .

All the readings are below the permissible limit of  $60$  &  $100\mu\text{g}/\text{m}^3$  as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

### SO<sub>2</sub>

The data given in the **Table No: 6.7** shows the maximum value was  $05\mu\text{g}/\text{m}^3$ , 98 percentile values were  $3.0\mu\text{g}/\text{m}^3$ , the lowest value was  $3.0\mu\text{g}/\text{m}^3$  and the average value was  $3.62\mu\text{g}/\text{m}^3$ .

### NO<sub>2</sub>

The data given in the **Table No: 6.7** shows the maximum value was  $27\mu\text{g}/\text{m}^3$ , 98 percentile values were  $6.0\mu\text{g}/\text{m}^3$ , the lowest value was  $6.0\mu\text{g}/\text{m}^3$  and the average value was  $13.00\mu\text{g}/\text{m}^3$ .

All the readings are below the permissible limit of  $80\mu\text{g}/\text{m}^3$  as specified in the National Ambient Air Quality Standards, CPCB Notification 18<sup>th</sup> November 2009.

**Table No: 6.7**

### AMBIENT AIR QUALITY DATA

From 01.04.2018 to 30.09.2018

Station: A-6 (Village Bihabandh)

Date	PM2.5	PM10	SO <sub>2</sub>	NO <sub>2</sub>
04.04.2018	25	53	< 3	7
07.04.2018	19	50	< 3	9
11.04.2018	22	57	4	11
14.04.2018	24	58	4	12
18.04.2018	11	43	< 3	14
21.04.2018	21	60	< 3	7
25.04.2018	24	56	3	12
28.04.2018	26	58	4	16
04.05.2018	25	58	< 3	8
08.05.2018	26	62	< 3	6
11.05.2018	19	45	< 3	17
15.05.2018	22	46	< 3	17
18.05.2018	22	60	4	27
22.05.2018	18	57	4	11
25.05.2018	23	56	4	16
29.05.2018	20	52	5	19

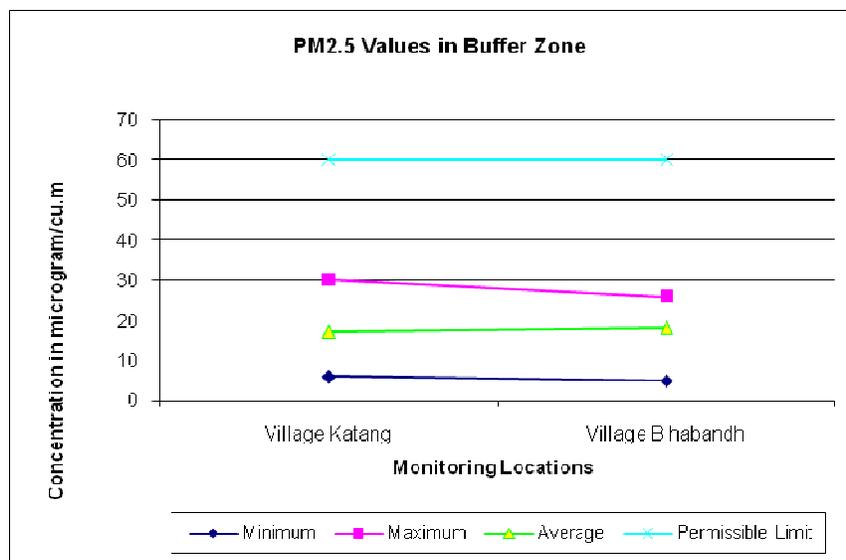
<b>Date</b>	<b>PM2.5</b>	<b>PM10</b>	<b>SO<sub>2</sub></b>	<b>NO<sub>2</sub></b>
04.06.2018	25	58	3	10
07.06.2018	17	54	3	16
11.06.2018	25	75	< 3	22
14.06.2018	25	62	< 3	12
18.06.2018	20	51	< 3	17
21.06.2018	14	43	3	14
25.06.2018	19	52	4	16
28.06.2018	22	56	5	14
04.07.2018	13	42	3	16
07.07.2018	14	43	3	16
11.07.2018	19	56	< 3	21
14.07.2018	21	55	< 3	21
18.07.2018	5	29	< 3	7
21.07.2018	20	50	3	9
25.07.2018	16	46	3	10
28.07.2018	18	50	4	14
03.08.2018	17	46	3	18
07.08.2018	18	49	< 3	7
10.08.2018	10	46	< 3	7
14.08.2018	15	57	3	17
18.08.2018	11	22	< 3	8
22.08.2018	10	50	< 3	6
25.08.2018	9	38	3	9
29.08.2018	12	40	3	10
04.09.2018	5	18	< 3	< 6
07.09.2018	7	40	< 3	9
11.09.2018	19	50	< 3	15
14.09.2018	18	53	4	7
18.09.2018	19	58	4	18
21.09.2018	22	54	< 3	10
25.09.2018	18	50	4	12
28.09.2018	20	53	4	14
<b>Minimum</b>	<b>5</b>	<b>18</b>	<b>3</b>	<b>6</b>
<b>Maximum</b>	<b>26</b>	<b>75</b>	<b>5</b>	<b>27</b>
<b>Average</b>	<b>18.13</b>	<b>50.35</b>	<b>3.62</b>	<b>13.00</b>
<b>98%tile</b>	<b>5</b>	<b>21.76</b>	<b>3.00</b>	<b>6.00</b>

The other parameters monitored during the month of May is described below in the **Table No: 6.7A**

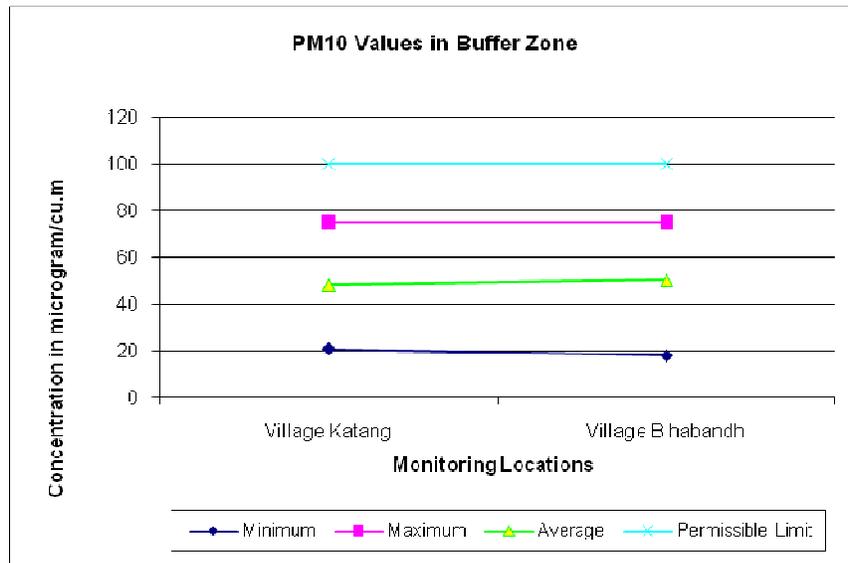
Table No: 6.7A

Sl No	Date of Sampling	Sample ID	Parameters					
			PM <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	NH <sub>3</sub>	O <sub>3</sub>
<b>Units</b>			µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>	µg/m <sup>3</sup>
<b>Method of Analysis</b>			CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	EN 12341, 1998 Low Volume Sampler	IS:5182 (Part - 2) 2001, RA 2017	IS: 5182 (Part - 6) 2006, RA 2017	CPL/SOP/01/NH <sub>3</sub> , Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/O <sub>3</sub> , Issue No: 02, dtd: 23.10.2017
1.	18.05.2018	CPL/AAQ/MAY-18/30	22	60	04	27	33	28
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			60 (24 Hours Average)	100 (24 Hours Average)	80 (24 Hours Average)	80 (24 Hours Average)	400 (24 Hours Average)	180 (1 Hour Average)
Sl No	Date of Sampling	Sample ID	Parameters					
			Lead (Pb)	Arsenic (As)	Nickel (Ni)	Benzene (C <sub>6</sub> H <sub>6</sub> )	Carbon Monoxide (CO)	Benzo(a)pyrene (BaP) – Particulate Phase only
<b>Units</b>			µg/m <sup>3</sup>	ng/m <sup>3</sup>	ng/m <sup>3</sup>	µg/m <sup>3</sup>	mg/m <sup>3</sup>	ng/m <sup>3</sup>
<b>Method of Analysis</b>			IS 5182 (Part - 22)	CPL/SOP/01/PM2.5, Issue No: 02, dtd: 23.10.2017	CPL/SOP/01/PM 2.5, Issue No: 02, dtd: 23.10.2017	IS 5182 (Part - 11)	Electro-chemical Sensor	IS 5182 (Part - 12)
1.	18.05.2018	CPL/AAQ/MAY-18/30	< 0.4	< 1.0	< 5.0	< 0.1	< 0.1	< 0.1
National Ambient Air Quality Standards, CPCB Notification New Delhi, 18 <sup>th</sup> November, 2009 for Industrial, Residential, Rural & Other Area			1.0 (24 Hours Average)	06 (Annual Average)	20 (Annual Average)	05 (Annual Average)	4 (1 Hour Average)	01 (Annual Average)

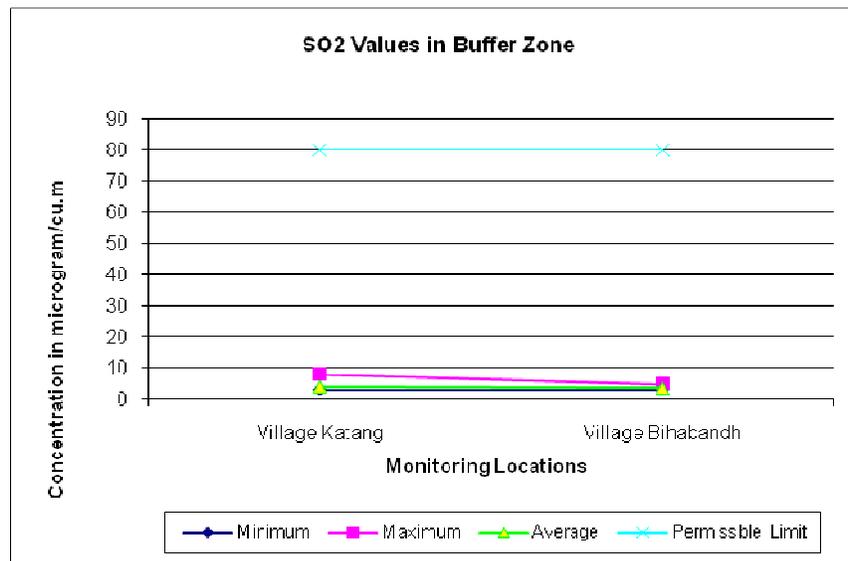
Figure No: 6.9 Graphical Representations of PM2.5 Values in Buffer Zone



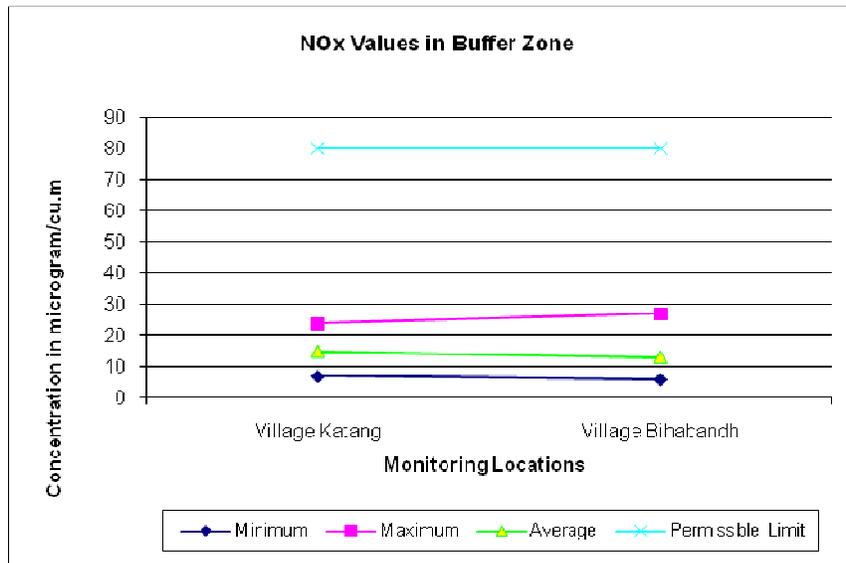
**Figure No: 6.10 Graphical Representations of PM10 Values in Buffer Zone**



**Figure No: 6.11 Graphical Representations of SO<sub>2</sub> Values in Buffer Zone**



**Figure No: 6.12 Graphical Representations of NOx Values in Buffer Zone**



### 6.3 Fugitive Dust Emission

The fugitive dust samples collected from two locations during May and August is detailed below.

**Table No 6.8: Fugitive Dust Emission Results**

Month	Haulage Road from Quarry to Crusher Plant	Downwind of Drill Machine within the Quarry
	Particulate Matter	Particulate Matter
May	659 µg/m <sup>3</sup>	1231 µg/m <sup>3</sup>
August	81 µg/m <sup>3</sup>	910 µg/m <sup>3</sup>

In the month of May the results are slightly higher from the August month's results due to ongoing dry summer months.

### 6.4 Stack Emission Monitoring

The monthly monitoring results of stack emission from the Limestone Crusher Plant Bag filter outlet given below shows that all the results from April to September are within the prescribed limits (150mg/ Nm<sup>3</sup>) of State Pollution Control Board. The detail results are as follows:

**Table No 6.9: Stack Emission Monitoring Results**

SI No	Month	Particulate Matter Concentration in mg/Nm <sup>3</sup>
1	April	44
2	May	104
3	June	41
4	July	25
5	August	98
6	September	47

## 6.5 Water Quality

### SW-1 Quarry 2&6 Discharge Water:

The sample after analysis and in comparison with the Standards prescribed in the Schedule – VI of the EPA, G.S.R. 422(E), 1993 for discharge of water on land for irrigation is found to be well within the prescribed limits in both the seasons monitored. The results are detailed in **Table No. 6.10**.

### SW-2 Quarry 1&3 Discharge Water

The sample after analysis and in comparison with the Standards prescribed in the Schedule – VI of the EPA, G.S.R. 422(E), 1993 for discharge of water on land for irrigation is found to be well within the prescribed limits in both the seasons monitored. The results are detailed in **Table No. 6.11**.

### SW-3 Quarry 4&5 Discharge Water

The sample after analysis and in comparison with the Standards prescribed in the Schedule – VI of the EPA, G.S.R. 422(E), 1993 for discharge of water on land for irrigation is found to be well within the prescribed limits in both the seasons monitored. The results are detailed in **Table No. 6.12**.

**Table No: 6.10**  
**Discharge Water Quality from Quarry No 2&6**

Sl No	Parameters	April	July	General Standards As per Schedule - VI of EPA, G.S.R.422(E), 1993
1.	Colour in hazen unit	< 5	< 5	-
2.	Odour	Odourless	Odourless	-
3.	Total Suspended Solids mg/l	< 2.5	2.6	200
4.	pH Value	8.18	7.96	5.5 – 9.0
5.	Temperature °C	27.4	29.2	-
6.	Oil & Grease mg/l	0.10	< 0.10	10
7.	Total Residual Chlorine mg/l	0.13	0.21	-
8.	Ammoniacal Nitrogen (as N) mg/l	< 0.01	< 0.01	-
9.	Total Kjeldahl Nitrogen (as NH <sub>3</sub> ) mg/l	< 0.01	< 0.01	-
10.	Free Ammonia (as NH <sub>3</sub> ) mg/l	< 0.012	< 0.012	-
11.	BOD (3 days at 27°C) mg/l	01	01	100
12.	COD mg/l	< 04	< 04	-
13.	Lead (as Pb) mg/l	< 0.10	< 0.10	-
14.	Cadmium (as Cd) mg/l	< 0.05	< 0.05	-
15.	Hex. Chromium (as Cr <sup>+6</sup> ) mg/l	< 0.01	0.02	-
16.	Total Chromium (as Cr) mg/l	< 0.10	< 0.10	-
17.	Copper (as Cu) mg/l	< 0.10	< 0.10	-
18.	Zinc (as Zn) mg/l	< 0.02	< 0.02	-
19.	Nickel (as Ni) mg/l	< 0.25	< 0.25	-
20.	Cyanide (as CN) mg/l	< 0.002	0.002	0.2
21.	Fluoride (as F) mg/l	1.0004	0.5368	-
22.	Dissolved Phosphate (as P) mg/l	< 0.10	< 0.10	-
23.	Sulphide (as S) mg/l	< 0.02	< 0.02	-
24.	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH) mg/l	< 0.10	< 0.10	-
25.	Manganese (as Mn) mg/l	< 0.05	< 0.05	-
26.	Iron (as Fe) mg/l	0.04	0.3065	-
27.	Nitrate Nitrogen mg/l	0.5231	< 0.50	-

**Table No: 6.11**  
**Discharge Water Quality from Quarry No 1&3**

SI No	Parameters	May	August	General Standards As per Schedule - VI of EPA, G.S.R.422(E), 1993
1.	Colour in hazen unit	< 5	< 5	-
2.	Odour	Odourless	Odourless	-
3.	Total Suspended Solids mg/l	< 2.5	3.62	200
4.	pH Value	8.13	8.11	5.5 – 9.0
5.	Temperature ° C	28.6	28.3	-
6.	Oil & Grease mg/l	< 0.10	< 0.10	10
7.	Total Residual Chlorine mg/l	0.11	0.1534	-
8.	Ammoniacal Nitrogen (as N) mg/l	< 0.01	< 0.01	-
9.	Total Kjeldahl Nitrogen (as NH <sub>3</sub> ) mg/l	< 0.01	< 0.01	-
10.	Free Ammonia (as NH <sub>3</sub> ) mg/l	< 0.012	< 0.012	-
11.	BOD (3 days at 27°C) mg/l	01	01	100
12.	COD mg/l	< 04	< 04	-
13.	Lead (as Pb) mg/l	< 0.10	< 0.10	-
14.	Cadmium (as Cd) mg/l	< 0.05	< 0.05	-
15.	Hex. Chromium (as Cr <sup>+6</sup> ) mg/l	< 0.01	< 0.01	-
16.	Total Chromium (as Cr) mg/l	< 0.10	< 0.10	-
17.	Copper (as Cu) mg/l	< 0.10	< 0.10	-
18.	Zinc (as Zn) mg/l	< 0.02	< 0.02	-
19.	Nickel (as Ni) mg/l	< 0.25	< 0.25	-
20.	Cyanide (as CN) mg/l	< 0.002	< 0.002	0.2
21.	Fluoride (as F) mg/l	0.6824	0.0786	-
22.	Dissolved Phosphate (as P) mg/l	< 0.10	< 0.10	-
23.	Sulphide (as S) mg/l	< 0.02	< 0.02	-
24.	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.05	0.3730	-
25.	Manganese (as Mn) mg/l	< 0.05	< 0.05	-
26.	Iron (as Fe) mg/l	0.02	0.23	-
27.	Nitrate Nitrogen mg/l	1.67	3.26	-

**Table No: 6.12**  
**Discharge Water Quality from Quarry No 4&5**

SI No	Parameters	June	September	General Standards As per Schedule - VI of EPA, G.S.R.422(E), 1993
1.	Colour in hazen unit	< 5	< 5	-
2.	Odour	Odourless	Odourless	-
3.	Total Suspended Solids mg/l	< 2.5	< 2.5	200
4.	pH Value	7.94	8.09	5.5 – 9.0
5.	Temperature ° C	30.8	23.8	-
6.	Oil & Grease mg/l	0.2	< 0.10	10
7.	Total Residual Chlorine mg/l	0.1244	0.38	-
8.	Ammoniacal Nitrogen (as N) mg/l	< 0.01	< 0.01	-
9.	Total Kjeldahl Nitrogen (as NH <sub>3</sub> ) mg/l	< 0.01	< 0.01	-
10.	Free Ammonia (as NH <sub>3</sub> ) mg/l	< 0.012	< 0.012	-
11.	BOD (3 days at 27°C) mg/l	01	01	100
12.	COD mg/l	< 04	< 04	-
13.	Lead (as Pb) mg/l	< 0.10	< 0.10	-
14.	Cadmium (as Cd) mg/l	< 0.05	< 0.05	-
15.	Hex. Chromium (as Cr <sup>+6</sup> ) mg/l	0.09	< 0.01	-
16.	Total Chromium (as Cr) mg/l	< 0.10	< 0.10	-
17.	Copper (as Cu) mg/l	< 0.10	< 0.10	-
18.	Zinc (as Zn) mg/l	< 0.02	< 0.02	-

Sl No	Parameters	June	September	General Standards As per Schedule - VI of EPA, G.S.R.422(E), 1993
19.	Nickel (as Ni) mg/l	< 0.25	< 0.25	-
20.	Cyanide (as CN) mg/l	< 0.002	< 0.002	0.2
21.	Fluoride (as F) mg/l	0.0842	0.4925	-
22.	Dissolved Phosphate (as P) mg/l	< 0.10	< 0.10	-
23.	Sulphide (as S) mg/l	< 0.02	< 0.02	-
24.	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.03	< 0.10	-
25.	Manganese (as Mn) mg/l	< 0.05	< 0.05	-
26.	Iron (as Fe) mg/l	0.29	0.0961	-
27.	Nitrate Nitrogen mg/l	< 0.50	1.09	-

#### GW-1 Village Kheramuta Dug Well

In comparison of the parameters with the prescribed limits of IS 10500:2012, it was found that the water quality is good and all parameters are found to be within the prescribed limits. All the Heavy metals are found to be below the detection limits. The detail results are given in the **Table No 6.13**.

#### GW-2 Lanjiberna Colony Dug Well

In comparison of the parameters with the prescribed limits of IS 10500:2012, it was found that the water quality is good and all parameters are found to lie within the prescribed limit. All the Heavy metals are found to be below the detection limits. The detail results are given in the **Table No 6.13**.

#### GW-3 Village Dhauradah Dug Well

In comparison of the parameters with the prescribed limits of IS 10500:2012, it was found that the water quality is good and all parameters within the prescribed limits. All the Heavy metals are found to be below the detection limits. The detail results are given in the **Table No 6.13**.

#### GW-4 Lanjiberna Mines Workshop Dug Well

In comparison of the parameters with the prescribed limits of IS 10500:2012, it was found that the water quality is good and parameters are found to lie within the prescribed limits. All the Heavy metals are found to be below the detection limits. The detail results are given in the **Table No 6.13**.

#### GW-5 Village Lanjiberna Dug Well

In comparison of the parameters with the prescribed limits of IS 10500:2012, it was found that the water quality is good and all parameters lie within the prescribed limits. All the Heavy metals are found to be below the detection limits. The detail results are given in the **Table No 6.13**.

#### GW-6 Village Katang Dug Well

In comparison of the parameters with the prescribed limits of IS 10500:2012, it was found that the water quality is good and all parameters lie within the prescribed limits. All the Heavy metals are found to be below the detection limits. The detail results are given in the **Table No 6.13**.

**Table No: 6.13**  
**Ground Water Quality in the month of May**

Sl No	Parameters	Data Recorded from current Analysis						Max. Desirable Limit As per IS 10500:2012
		GW1	GW2	GW3	GW4	GW5	GW6	
1.	Colour in hazen unit	< 5	< 5	< 5	< 5	< 5	< 5	15
2.	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4.	Turbidity NTU	0.8	0.2	< 0.10	0.2	0.1	0.4	5.0

SI No	Parameters	Data Recorded from current Analysis						Max. Desirable
5.	pH Value	7.37	7.13	6.75	7.77	6.79	6.82	6.5 – 8.5
6.	Temperature °C	29.4	29.0	28.7	29.0	29.0	29.2	-
7.	Total Hardness (as CaCO <sub>3</sub> ) mg/l	304.8	268.22	369.82	373.88	365.76	341.38	600
8.	Iron (as Fe) mg/l	0.1823	0.1197	0.0336	0.1628	0.1238	0.1932	0.3
9.	Chlorides (as Cl) mg/l	103.71	31.31	49.89	21.53	46.96	48.92	1000
10.	Residual Free Chlorine mg/l	0.30	0.19	0.14	0.20	0.13	0.18	1.0 (min)
11.	Total Dissolved Solids mg/l	530	345	454	447	463	461	2000
12.	Electrical Conductivity, µS/cm	813	530	697	688	712	708	-
13.	Calcium (as Ca) mg/l	71.67	52.12	79.81	76.55	81.44	81.44	200
14.	Magnesium (as Mg) mg/l	30.61	33.57	41.48	44.44	39.50	33.57	100
15.	Copper (as Cu) mg/l	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.5
16.	Manganese (as Mn) mg/l	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.3
17.	Sulfate (as SO <sub>4</sub> ) mg/l	17.64	36.07	30.91	56.22	31.47	30.96	400
18.	Nitrate (as NO <sub>3</sub> ) mg/l	< 2.20	< 2.20	37.44	2.797	36.48	36.32	45
19.	Fluoride (as F) mg/l	0.1531	< 0.05	0.8741	< 0.05	0.7689	1.0393	1.5
20.	Cadmium (as Cd) mg/l	ND	ND	ND	ND	ND	ND	0.003
21.	Cyanide (as CN) mg/l	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0.05
22.	Lead (as Pb) mg/l	ND	ND	ND	ND	ND	ND	0.01
23.	Zinc (as Zn) mg/l	ND	ND	ND	ND	ND	ND	15.0
24.	Total Chromium (as Cr) mg/l	ND	ND	ND	ND	ND	ND	0.05
25.	Alkalinity mg/l	280	264	264	336	272	264	600
26.	Acidity mg/l	16	22	32	10	32	26	-
27.	Sodium (as Na) mg/l	60.82	17.37	23.49	14.01	24.57	22.84	-
28.	Potassium (as K) mg/l	2.77	0.93	2.18	2.78	2.14	2.23	-
29.	Total Bacterial Count, Number/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent
30.	E coli, Number/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent

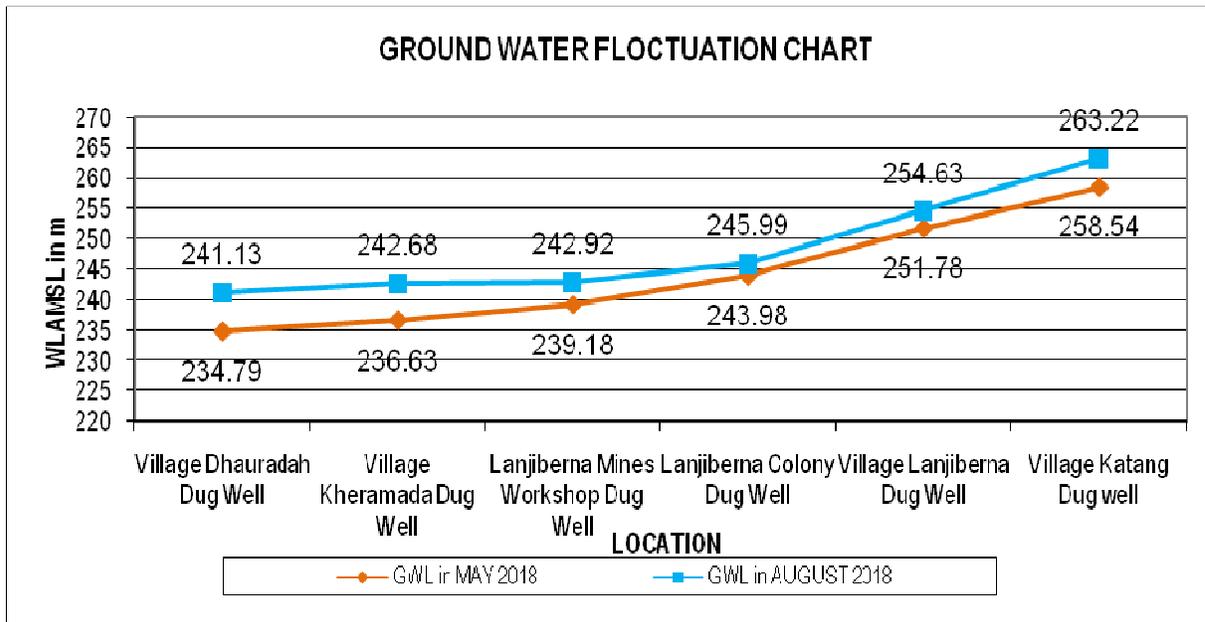
## 6.6 Ground Water Level Data

The ground water level measured from the existing dug wells mentioned above are found to be varying significantly at all the locations, during the month of May the water level was found to be very low, which has increased significantly during monsoon season. The detail data is given below in the **Table No 6.14**, with a graphical representation of the fluctuation in **Figure No: 6.13**.

**Table No 6.14: Ground Water Level Data**

SI No	Location	Ground Level in m AMSL	Ground Water Level in m AMSL		Height of Water Column in m	
			May	August	May	August
1	Village Kheramada Dug Well	243.23	236.63	242.68	1.41	7.46
2	Lanjiberna Colony Dug Well	247.83	243.98	245.99	7.55	9.56
3	Village Dhauradah Dug Well	242.34	234.79	241.13	0.94	7.28
4	Lanjiberna Mines Workshop Dug Well	245.03	239.18	242.92	0.29	4.03
5	Village Lanjiberna Dug Well	255.14	251.78	254.63	1.64	4.49
6	Village Katang Dug well	264.89	258.54	263.22	1.60	6.28

Figure No 6.13: Seasonal Fluctuation of Ground Water Level



## 6.7 Noise Level Monitoring Data

Noise monitoring was carried out at four different locations of the mine during month of May and August for summer and monsoon seasons respectively. The Sound Pressure Level recorded was calculated for Lmin, Lmax, Leq Day Time & Leq Night Time. All the data are given in detail in the **Table No 6.15 & 6.16**.

### N-1 Quarry Area during Operation of HEMM

The noise level range between 65.8 and 34.3 dB(A) and the Leq values for Day time was 57.9 dB(A) and Leq values for Night time was 38.5 dB(A) during the month of May.

The noise level range between 67.1 and 37.6 dB(A) and the Leq values for Day time was 61.0 dB(A) and Leq values for Night time was 47.2 dB(A) during the month of August.

On comparison of the results with ambient air quality standards in respect of noise by CPCB, it was found that the ambient noise levels from this location was well within the standards for Industrial area for both day and night time.

### N-2 Limestone Crusher Plant Area

The noise level range between 75.9 and 39.6 dB(A) and the Leq values for Day time was 68.5 dB(A) and Leq values for Night time was 51.7 dB(A) during the month of May.

The noise level range between 80.6 and 39.8 dB(A) and the Leq values for Day time was 72.5 dB(A) and Leq values for Night time was 53.6 dB(A) during the month of August.

On comparison of the results with ambient air quality standards in respect of noise by CPCB, it was found that the ambient noise levels from this location was well within the standards for both day and night time.

### N-3 Lanjiberna Colony area

The noise level range between 64.3 and 35.2 dB(A) and the Leq values for Day time was 56.1 dB(A) and Leq values for Night time was 40.0 dB(A) during the month of May.

The noise level range between 60.3 and 36.9 dB(A) and the Leq values for Day time was 53.0 dB(A) and Leq values for Night time was 46.8 dB(A) during the month of August.

On comparison of the results with ambient air quality standards in respect of noise by CPCB, it was found that the ambient noise levels from this location was well within the standards for Residential area for both day and night time.

### N-4 Magazine Hill Top

The noise level range between 45.6 and 33.8 dB(A) and the Leq values for Day time was 42.2 dB(A) and Leq values for Night time was 35.9 dB(A) during the month of May.

The noise level range between 55.9 and 36.4 dB(A) and the Leq values for Day time was 49.1 dB(A) and Leq values for Night time was 39.5 dB(A) during the month of August.

On comparison of the results with ambient air quality standards in respect of noise by CPCB, it was found that the ambient noise levels from this location was well within the standards for Silence Zone for both day and night time.

**Table No: 6.15**  
**Noise Level Data in Month of May**

SL NO	STATION NO	Leq dB(A) Day Time (600 Hrs – 2200 Hrs)	Leq dB(A) Night Time (2200 Hrs – 600 Hrs)	L <sub>max</sub> dB(A)	L <sub>min</sub> dB(A)
1.	N1	57.9	38.5	65.8	34.3
2.	N2	68.5	51.7	75.9	39.6
3.	N3	56.1	40.0	64.3	35.2
4.	N4	42.2	35.9	45.6	33.8

**Table No: 6.16**  
**Noise Level Data in Month of August**

SL NO	STATION NO	Leq dB(A) Day Time (600 Hrs – 2200 Hrs)	Leq dB(A) Night Time (2200 Hrs – 600 Hrs)	L <sub>max</sub> dB(A)	L <sub>min</sub> dB(A)
1.	N1	61.0	47.2	67.1	37.6
2.	N2	72.5	53.6	80.6	39.8
3.	N3	53.0	46.8	60.3	36.9
4.	N4	49.1	39.5	55.9	36.4

## 6.8 Soil Quality Data

Soil samples collected from the three different locations during the month of May was analyzed and found to be good enough for agriculture purpose. The **Table No 6.17** shows the detail data of all the three locations.

### SS-1 Village Bihabandh Agriculture land

The soil sample from the Bihabandh agriculture land is of good quality and is suitable for agriculture purpose. The pH was found to be slightly alkaline in nature (8.01). Available Nitrogen in the soil was 213.25 kg/ha, Available Phosphorous was very less, i.e. < 5 kg/ha and Available Potassium was 331.2 kg/ha. Organic Carbon Content was found to be 0.84%. All parameters are suitable for agriculture except Phosphorus was very less.

### SS-2 Village Lanjiberna Agriculture land

The soil sample from the Lanjiberna agriculture land is of good quality and is suitable for agriculture purpose. The pH was found to be neutral in nature (8.09). Available Nitrogen in the soil was 200.7 kg/ha, Available Phosphorous was < 5 kg/ha and Available Potassium was 333.12 kg/ha. Organic Carbon Content was found to be 0.86%. All parameters are suitable for agriculture except Phosphorus, which is very less and can be upgraded by adding fertilizer.

### SS-3 Village Dhauradah Agriculture land

The soil sample from the Dhauradah agriculture land is of good quality and is suitable for agriculture purpose. The pH was found to be neutral in nature (8.28). Available Nitrogen in the soil was 213.25 kg/ha, Available Phosphorous was < 5 kg/ha and Available Potassium was 351.0 kg/ha. Organic Carbon Content was found to be 0.46%. All parameters are suitable for agriculture except Phosphorus, which is very less and can be upgraded by adding fertilizer.

**Table No: 6.17**  
**Soil Quality Data in the Month of May**

Sl. No.	Parameter	Method of Analysis	Unit	SS1	SS3	SS2
1	pH (1:2 Suspension)	IS:2720 (Part 26) – 1987, RA 2011	-	8.01	8.28	8.09
2	Electrical Conductivity	IS 14767 – 2000, RA 2016	µS/cm	613	461	960
3	Available Nitrogen (as N)	CPL/SOP/03/N, Issue No: 03, Dtd.: 23.10.2107	Kg/ha	213.25	213.25	200.7
4	Available Phosphorous (as P <sub>2</sub> O <sub>5</sub> )	CPL/SOP/03/P, Issue No: 03, Dtd.: 23.10.2107	Kg/ha	< 5.0	< 5.0	< 5.0
5	Available Potassium (as K <sub>2</sub> O)	CPL/SOP/03/K, Issue No: 03, Dtd.: 23.10.2107	Kg/ha	331.2	351.0	333.12
6	Organic Carbon	IS 2720 (Part 22) – 1972, RA 2015	%	0.84	0.46	0.86
7	Organic Matter	IS 2720 (Part 22) – 1972, RA 2015	%	1.45	0.79	1.48

### 6.9 Effluent Water Quality Data

The water quality from the outlet of Oil & Grease Separation tank was monitored during month of May and August for five parameters. pH was in the range of 8.01 to 7.80 which is slightly alkaline, TSS was 40.2 & 20.08 mg/l in May & August months, Oil & Grease content was 1.2 and 2.7 mg/l, Iron was < 0.01 mg/l in both the months and Nickel was < 0.25 mg/l in both the months. All the results are found to be well within the prescribed standards of State Pollution Control Board.

## **7. CONCLUSION**

### **7.1 Ambient Air Quality**

It is concluded from the above study that the overall ambient air quality of the Lanjiberna Limestone & Dolomite mines of OCL India Ltd. is good and the action taken by the mines authority were quite satisfactory.

### **7.2 Fugitive Dust Emission**

The results of fugitive dust emission monitoring shows that the mining authority has taken up highly effective sprinkling systems inside the mines to control the emission of dust from the drilling, excavation and hauling operations.

### **7.3 Stack Emission Monitoring**

The stack emission monitoring results of all the six months shows that the bag filter installed in the limestone crusher plant is very much effective and results are all within the prescribed standards by the State Pollution Control Board, Odisha.

### **7.4 Water Quality**

The discharge water quality of all the quarries are found to be well within the prescribed standards as per EPA, G.S.R.422(E), 1993 and the ground water quality of the entire area was also good.

### **7.5 Ground Water Level**

There is no problem in the availability of ground water in the area and all the locations have adequate water. The ground water level is found to be low in the month of May due to ongoing dry summer months but is found to be rising sufficiently during the monsoon season as found in the month of August.

### **7.6 Noise level**

Noise monitoring results show that noise levels are well within the limits at all the stations, and there is no problem in the area due noise from the mining activity.

### **7.7 Soil Quality**

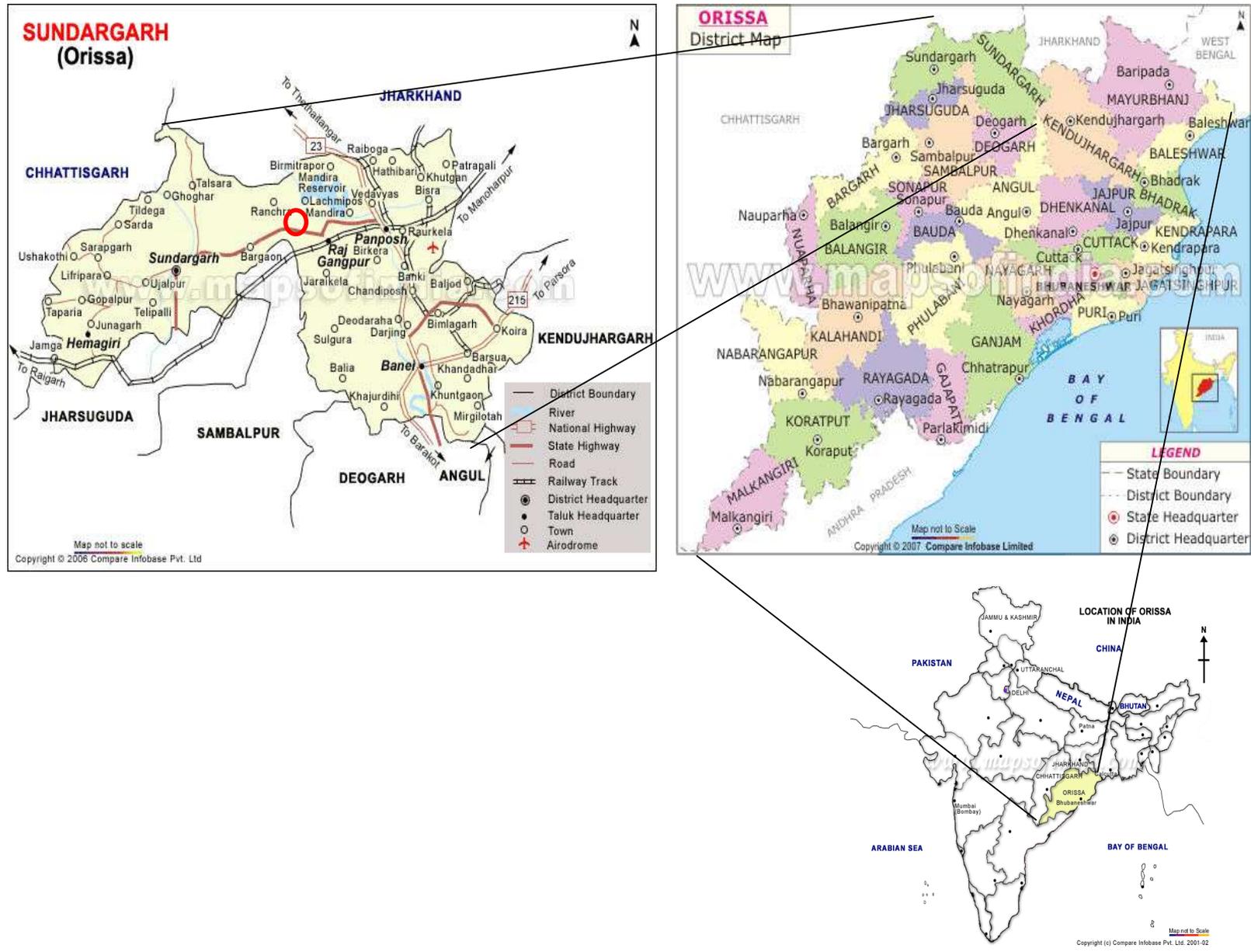
Soil of the area is found to be of slightly alkaline nature due to large deposit of limestone in the area. The N & K available in the soil is also quite good and the soil is suitable for agriculture. As available Phosphorus in the soil is very low, phosphorus based fertilizer can be added for agriculture purpose.

### **7.8 Effluent Water Quality**

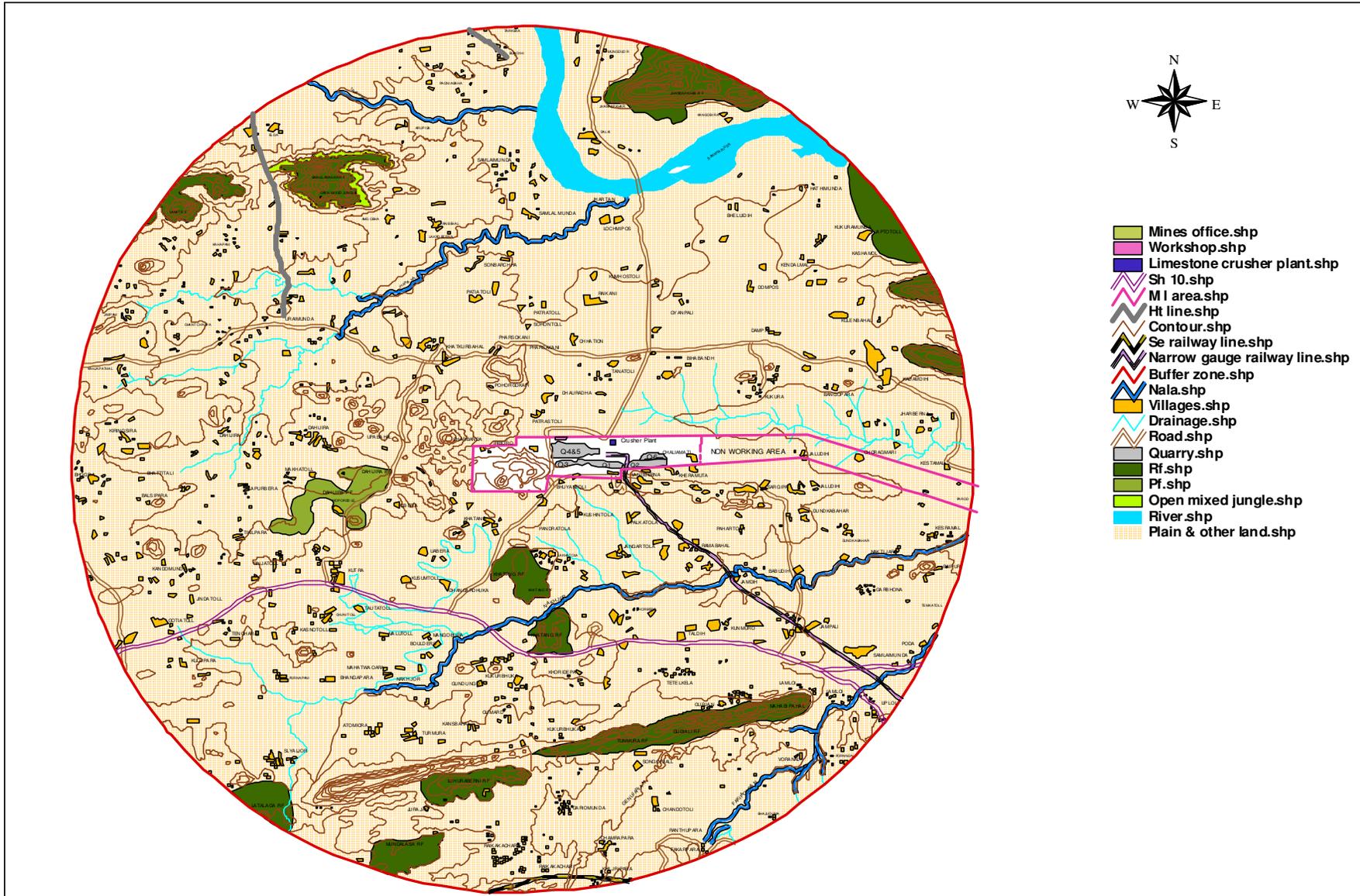
The treatment facility available for Oil & Grease separation in the workshop waste water of the mines is found to be good and the system is operating quite well.

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Figure No: 1.1 Location Map of the Project



# Figure No:1.2 Vicinity Map of Lanjiberna Limestone & Dolomite Mines



Prepared by: Cleenviron Pvt. Ltd.