

# Gujarat Industries Power Company Limited



At. : Nani Naroli, Ta: Mangrol  
Dist.: Surat -394112

**Six Monthly Report of Vastan Lignite Mine**

## ENVIRONMENTAL MONITORING & ANALYSIS REPORT

For the period of July 2021 to December -2021

Prepared By

**ECOSYSTEM RESOURCE MANAGEMENT PVT. LTD.**



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## PREFACE

Consciousness at national level in the industrial sector is increasing day by day with the focus on environment and sustainable development. A good environment management policy requires a constant effort to analyses and monitors various operations and processes, to generate and transmit this information to the inspecting authority.

As per the Air & Water Consent Orders issued by **Gujarat Pollution Control Board** (GPCB) Gandhinagar & also as per the Environment Clearance certificate issued by Ministry of Environment, Forest and Climate Change (MoEF & CC), Govt. of India, New Delhi, it is mandatory to collect the samples of Air/Gaseous emissions and effluent, to analyses the samples from a recognized laboratory and submit the analysis reports to GPCB & MoEF.

**Gujarat Industries Power Company Limited** (GIPCL) - Surat Lignite Power Plant is situated at Village – Nani Naroli, Tal. Mangrol, Dist. Surat. This company engaged in the generation of Electricity. The Industry has awarded the contract for bimonthly monitoring and analysis to M/s. Ecosystem Resource Management Pvt. Ltd. Surat.

**Ecosystem Resource Management Pvt. Ltd.** is one of the leading companies in the field of Environmental Consultancy Service Providers in India. ERM has a well-equipped and developed **NABL Accredited and MoEF & CC** recognized laboratory to carry out the analysis in air, stack emission, fugitive emission, water & waste water, noise, soil, and solid waste etc.

## Scope of work for Vastan Lignite Mine

### I. Ambient Air Monitoring

Sr. No.	No. of stations & Location	Duration	Frequency	Parameters	Method of Analysis
1.	8 Nos. within the Core & Buffer Zone.	24 hours	Bi-Monthly	PM <sub>10</sub>	IS 5182 Part 23 2006/Reaffirmed 2017
				PM <sub>2.5</sub>	SOP No.WI/5.4/02-B/03,Issue No.1Date:01/01/2010
				SO <sub>2</sub>	IS 5182 Part II 2001/Reaffirmed 2017
				NO <sub>x</sub>	IS 5182(Part VI):2006/Reaffirmed 2017
				CO	IS 5182(Part 10):1999/Reaffirmed 2014

### II. Dust Fall Measurement

Sr. No.	No. of station and locations	Duration	Frequency	Parameters	Method of analysis
1.	9 Nos. within the Core & Buffer Zone.	One Month	Bi-Monthly	Dust fall	As per IS-5182

### III. Noise Monitoring:

Sr. No.	Noise of stations and locations	Duration	Frequency	Parameters	Method of analysis
1.	10 Nos. at various location within the plant premises	24 hours	Bi-Monthly	Day & night Noise level	As per IS 9989 using the Noise level meter.

## Weather Monitoring Data

Sr. No.	No. of stations and locations	Duration	Frequency	Parameters	Method of analysis
1.	1 No. at Site.	24 hours	Bi-Monthly	Dry Bulb & Wet Bulb Temp., Atmospheric Pressure, Relative Humidity, Wind Speed, Wind Direction, Rain Fall and its Min. Max. & Avg. Value	As per IS 8829 on hourly basis for 24 hrs by using mechanical Instrument.

## Water Quality Monitoring

Sr. No.	No. of stations and locations	Duration	Frequency	Parameters	Method of analysis
1.	7 Nos. of Bore well & 2 No. of Surface Water sample located both in Core & Buffer Zone	1	Bi-Monthly	Physical parameters, Chemical Parameters, Heavy metals	As per the standard methods for the examination of water and waste water APHA 23 <sup>rd</sup> Edition 2017 and various Indian standards IS 3025.

**Comparative Ambient Air  
Monitoring Report &  
Graphical Presentation**

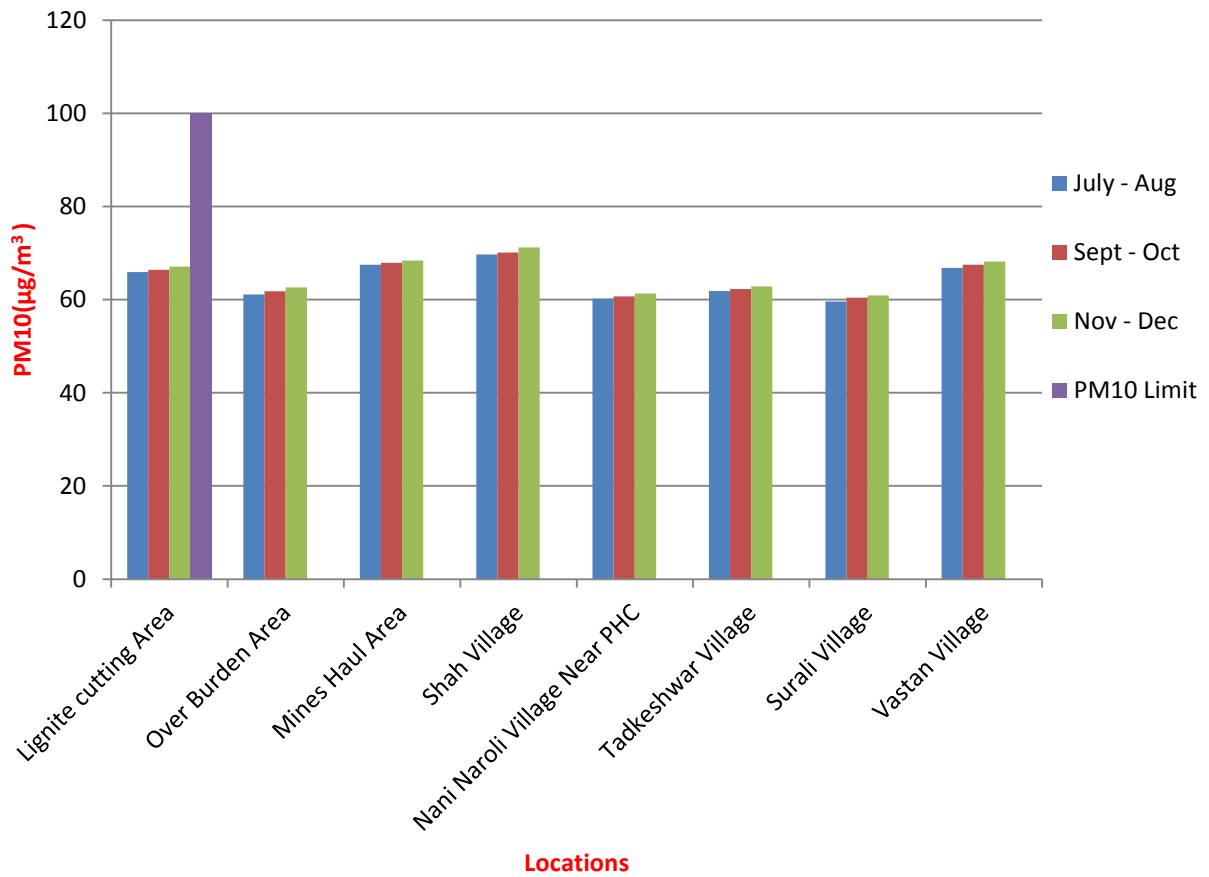
## Six Monthly Variations in Ambient Air Quality

Parameter: PM<sub>10</sub> (Respirable Particulate Matter)

Period: July – 2021 to December – 2021

Sr. No.	Location	Results ( $\mu\text{g}/\text{m}^3$ )		
		Bi-Monthly July to Aug - 2021	Bi-Monthly Sept to Oct - 2021	Bi-Monthly Nov- Dec 2021
1	Lignite cutting Area	65.9	66.4	67.1
2	Over Burden Area	61.1	61.8	62.6
3	Mines Haul Area	67.5	67.9	68.4
4	Shah Village	69.7	70.1	71.2
5	Nani Naroli Village Near PHC	60.2	60.7	61.3
6	Tadkeshwar Village	61.9	62.3	62.8
7	Surali Village	59.6	60.4	60.9
8	Vastan Village	66.8	67.5	68.2
	Limit	100( $\mu\text{g}/\text{m}^3$ )		

## Graphical Presentation for the PM10 Parameter at Various Locations



## Six Monthly Variations in Ambient Air Quality

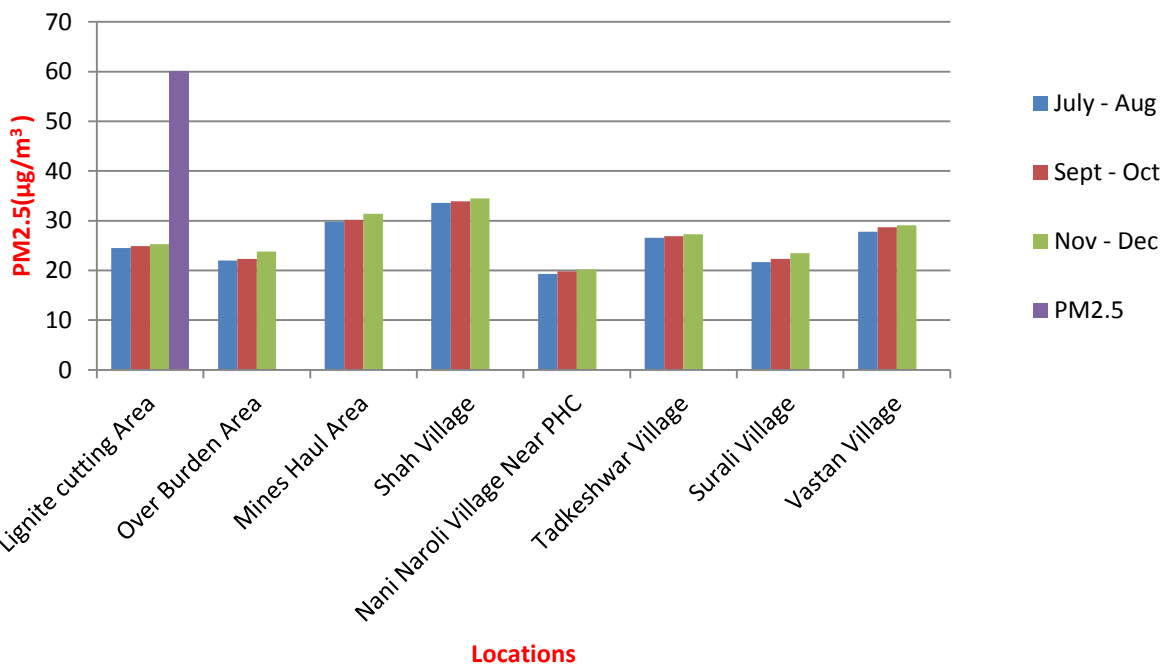
Parameter: PM<sub>2.5</sub> (Respirable Particulate Matter)

Period: July – 2021 to December – 2021

Sr. No.	Location	Results ( $\mu\text{g}/\text{m}^3$ )		
		Bi-Monthly July to Aug - 2021	Bi-Monthly Sept to Oct - 2021	Bi-Monthly Nov- Dec 2021
1	Lignite cutting Area	24.5	24.9	25.3
2	Over Burden Area	22.0	22.3	23.8
3	Mines Haul Area	29.8	30.2	31.4
4	Shah Village	33.6	33.9	34.5
5	Nani Naroli Village Near PHC	19.3	19.8	20.2
6	Tadkeshwar Village	26.6	26.9	27.3
7	Surali Village	21.7	22.3	23.5
8	Vastan Village	27.8	28.7	29.1
	Limit	60( $\mu\text{g}/\text{m}^3$ )		



## Graphical Presentation for the PM2.5 Parameter at Various Locations



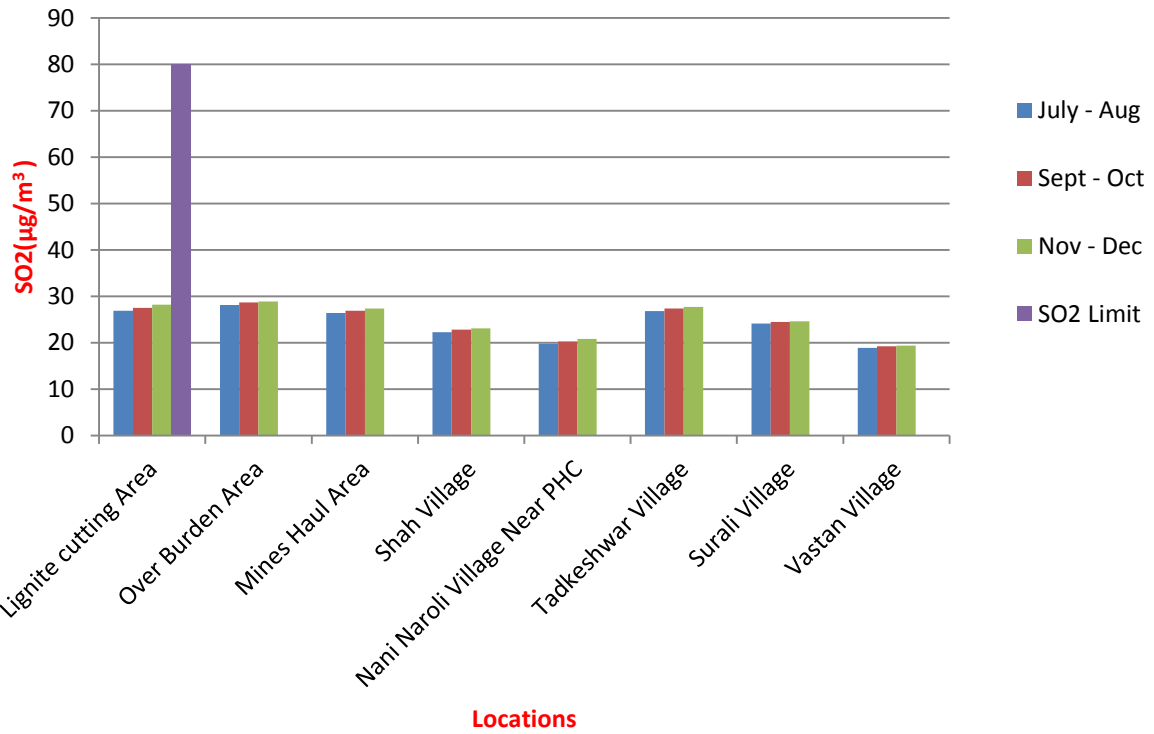
## Six Monthly Variations in Ambient Air Quality

Parameter: SO<sub>2</sub> (Sulphur Dioxide)

Period: July – 2021 to December – 2021

Sr. No.	Location	Reults ( $\mu\text{g}/\text{m}^3$ )		
		Bi-Monthly July to Aug - 2021	Bi-Monthly Sept to Oct - 2021	Bi-Monthly Nov- Dec 2021
1	Lignite cutting Area	26.9	27.5	28.2
2	Over Burden Area	28.1	28.7	28.9
3	Mines Haul Area	26.4	26.9	27.4
4	Shah Village	22.3	22.8	23.1
5	Nani Naroli Village Near PHC	19.8	20.3	20.8
6	Tadkeshwar Village	26.8	27.4	27.7
7	Surali Village	24.1	24.5	24.6
8	Vastan Village	18.9	19.2	19.4
	Limit	<b>80(<math>\mu\text{g}/\text{m}^3</math>)</b>		

## Graphical Presentation for the SO<sub>2</sub> Parameter at Various Locations



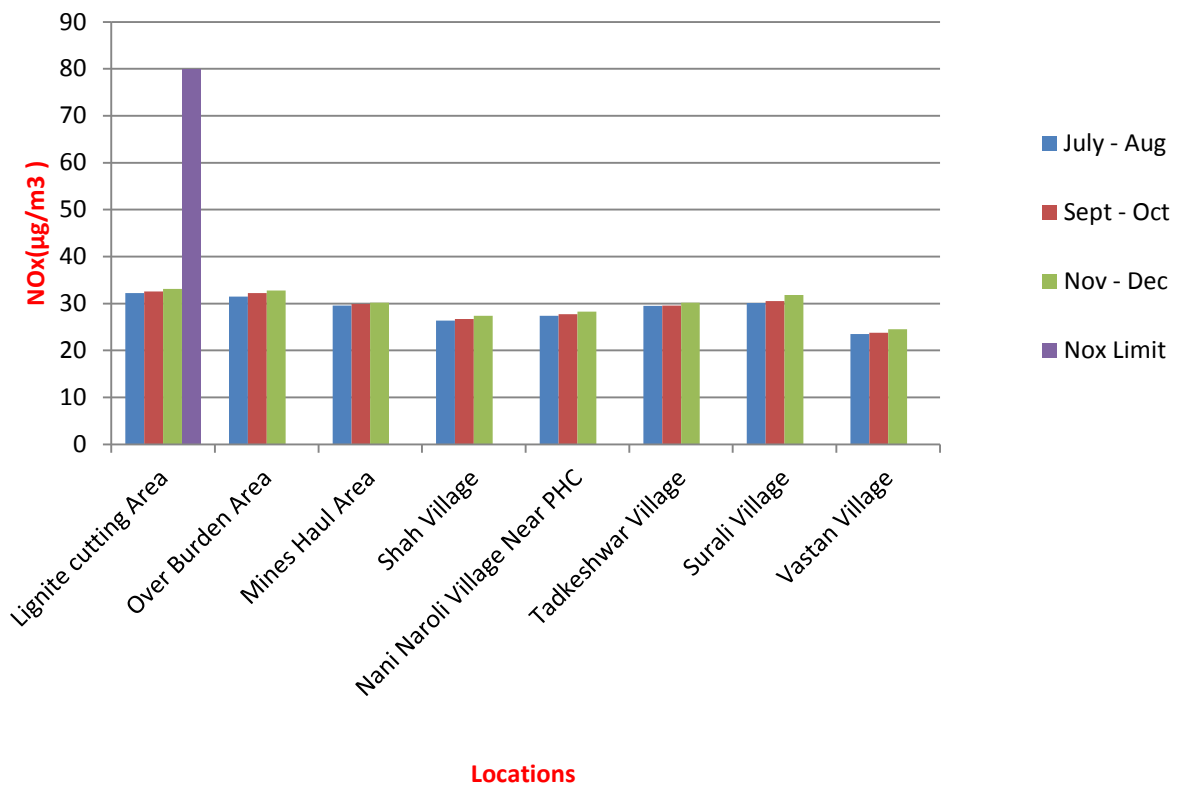
## Six Monthly Variations in Ambient Air Quality

Parameter: NO<sub>x</sub> ( Nitrogen dioxide)

Period: July – 2021 to December – 2021

Sr. No.	Location	Results ( $\mu\text{g}/\text{m}^3$ )		
		Bi-Monthly July to Aug - 2021	Bi-Monthly Sept to Oct - 2021	Bi-Monthly Nov- Dec 2021
1	Lignite cutting Area	32.2	32.6	33.1
2	Over Burden Area	31.5	32.2	32.8
3	Mines Haul Area	29.6	29.9	30.2
4	Shah Village	26.4	26.7	27.4
5	Nani Naroli Village Near PHC	27.4	27.7	28.3
6	Tadkeshwar Village	29.5	29.6	30.2
7	Surali Village	30.1	30.5	31.8
8	Vastan Village	23.5	23.8	24.5
	Limit	80( $\mu\text{g}/\text{m}^3$ )		

## Graphical Presentation for the NOx Parameter at Various Locations



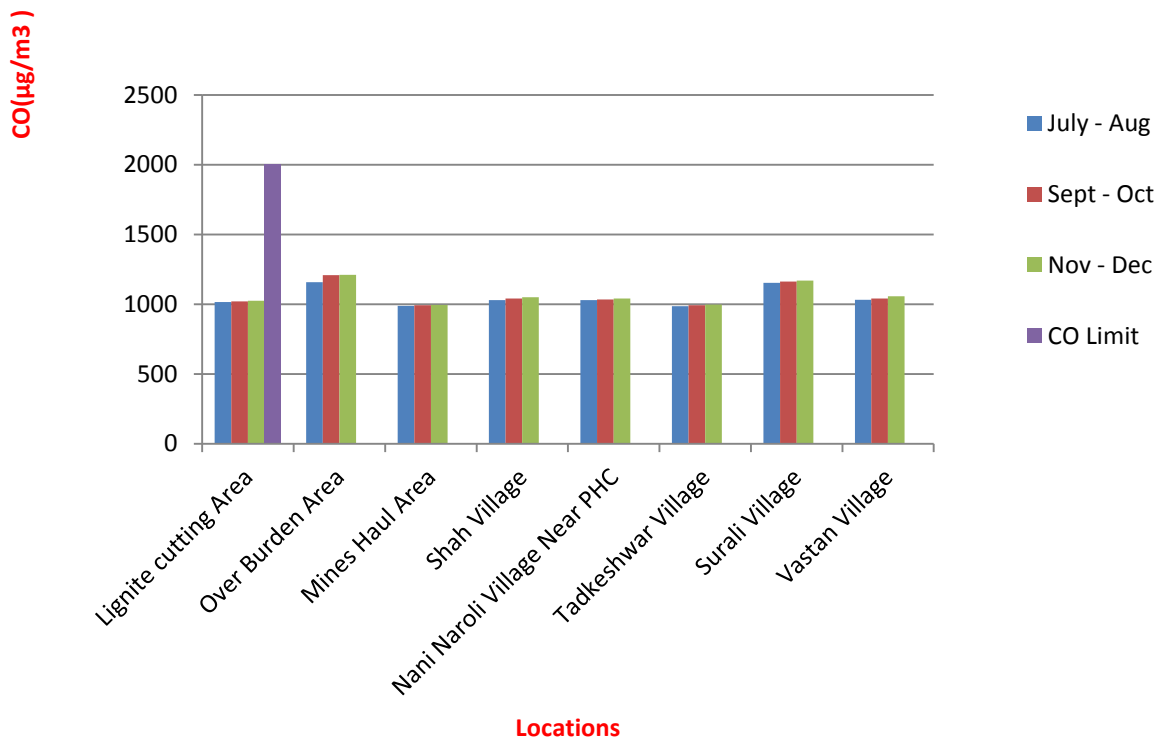
## Six Monthly Variations in Ambient Air Quality

Parameter: CO (Carbon Monoxide)

Period: July – 2021 to December – 2021

Sr. No.	Location	Results ( $\mu\text{g}/\text{m}^3$ )		
		Bi-Monthly July to Aug - 2021	Bi-Monthly Sept to Oct - 2021	Bi-Monthly Nov- Dec 2021
1	Lignite cutting Area	1015	1021	1026
2	Over Burden Area	1159	1208	1212
3	Mines Haul Area	989	992	996
4	Shah Village	1030	1042	1051
5	Nani Naroli Village Near PHC	1029	1035	1041
6	Tadkeshwar Village	987	992	998
7	Surali Village	1153	1162	1169
8	Vastan Village	1032	1042	1056
	Limit	2000( $\mu\text{g}/\text{m}^3$ )		

## Graphical Presentation for the CO Parameter at Various Locations



## Six Monthly Variations in Ambient Air Quality

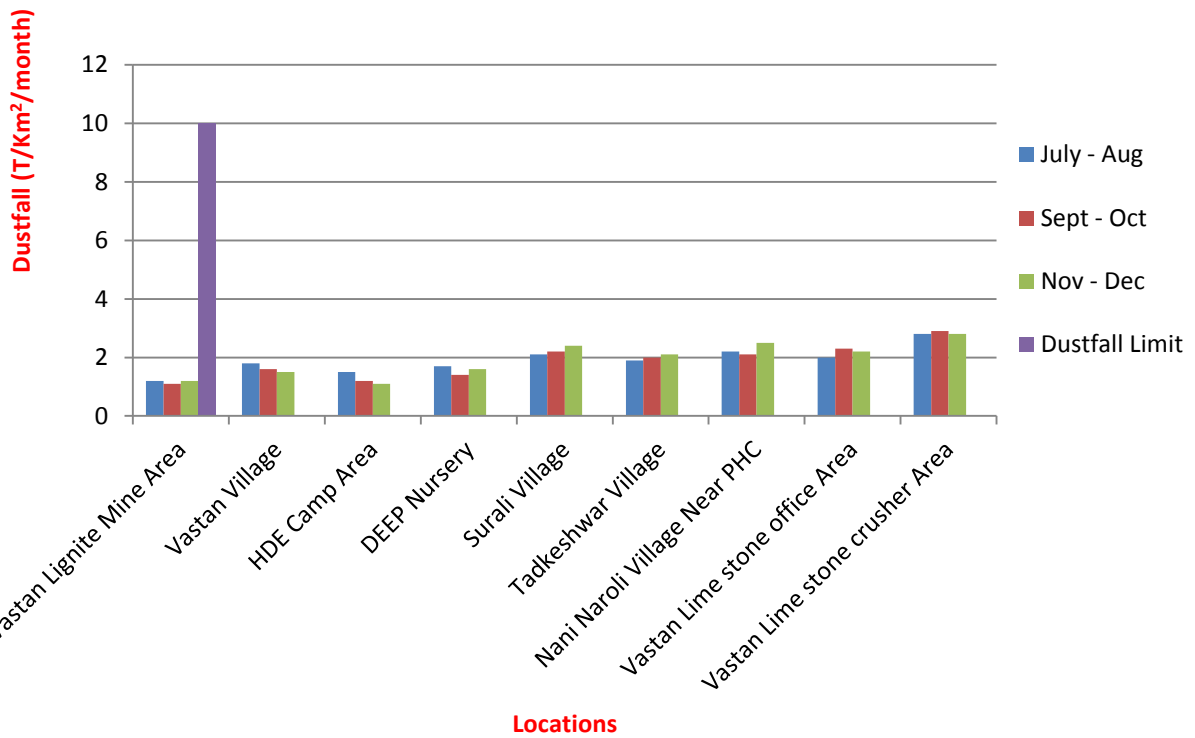
Parameter: Dust Fall

Period: July – 2021 to December – 2021

Sr. No.	Location	Results (T/Km <sup>2</sup> /month)		
		Bi-Monthly July to Aug - 2021	Bi-Monthly Sept to Oct - 2021	Bi-Monthly Nov- Dec 2021
1	Vastan Lignite Mine Area	1.2	1.1	1.2
2	Vastan Village	1.8	1.6	1.5
3	HDE Camp Area	1.5	1.2	1.1
4	DEEP Nursery	1.7	1.4	1.6
5	Surali Village	2.1	2.2	2.4
6	Tadkeshwar Village	1.9	2.0	2.1
7	Nani Naroli Village Near PHC	2.2	2.1	2.5
8	Vastan Lime stone office Area	2.0	2.3	2.2
9	Vastan Lime stone crusher Area	2.8	2.9	2.8
	<b>Limit</b>	<b>10</b>		



## Graphical Presentation for the Dustfall Parameter at Various Locations



**Comparative Water Analysis  
Test Report & Graphical  
Presentation**

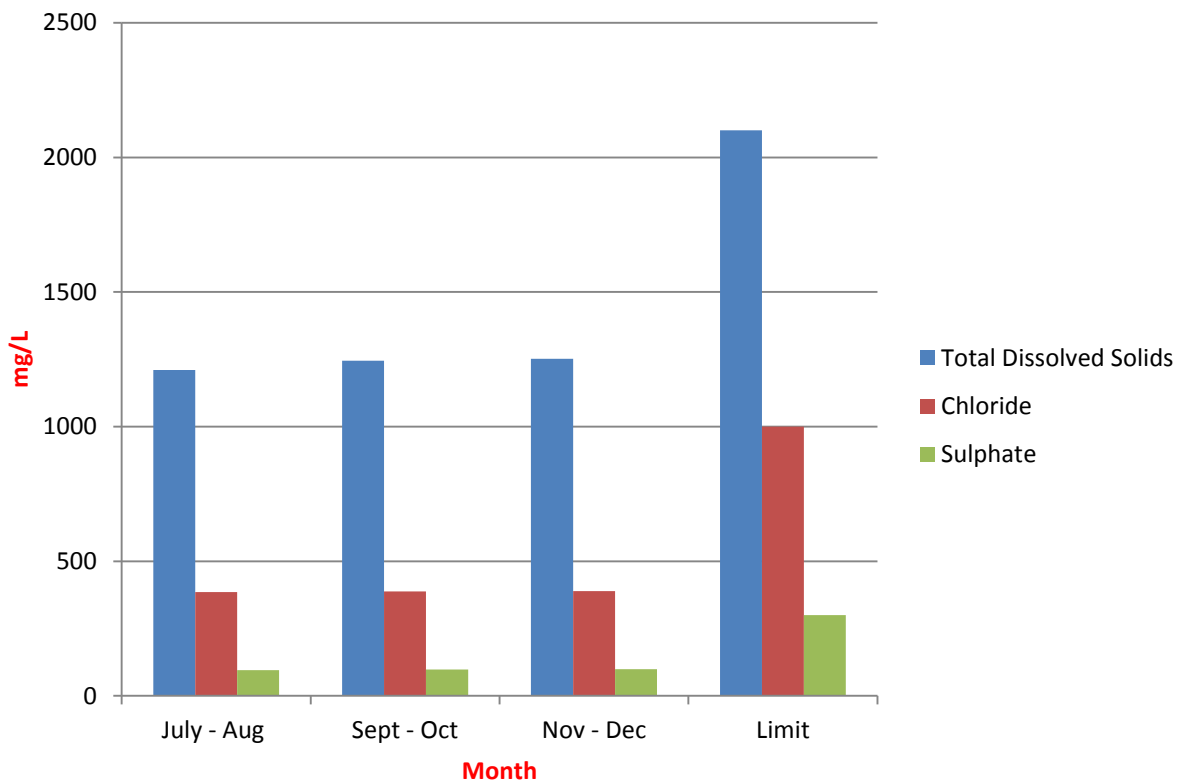
## Six Monthly Variations in Bore water

**Sampling point: Bore well (Hand Pump in Surali Village)**

**Period: July – 2021 to December – 2021**

Sr. No.	Parameter	Unit	Bi-Monthly July-Aug 2021	Bi-Monthly Sept - Oct 2021	Bi-Monthly Nov - Dec 2021	MoEF Limit
1	Temperature	°C	28.5	28.1	27.8	Shall not exceed 5°c above the receiving water temp.
2	pH@ 25°C	pH unit	7.50	7.62	7.81	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	2.0	2.2	2.0	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1210	1245	1252	2100
6	Total volatile Solids	mg/L	1.1	1.2	1.1	--
7	COD	mg/L	< 4	< 4	< 4	250
8	BOD (5 days at 20° C)	mg/L	< 2	< 2	< 2	30
9	Oil & Grease	mg/L	< 0.1	< 0.1	< 0.1	10
10	Chloride	mg/L	385	388	389	1000
11	Sulphate	mg/L	95	98	99	300
12	Fluoride	mg/L	0.7	0.8	0.7	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	1.2	1.3	1.2	--
14	Total Residual Chlorine	mg/L	< 0.10	< 0.10	< 0.10	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.05	< 0.05	< 0.05	0.1
18	Copper	mg/L	< 0.05	< 0.05	< 0.05	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.1	< 0.1	< 0.1	5.0
22	Iron	mg/L	0.6	0.8	0.9	3.0
23	Calcium	mg/L	118	120	122	--
24	Magnesium	mg/L	69	72	73	--
25	Percentage Sodium	%	30.5	30.8	31.3	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	100	90%Survival of fish after 96 Hours in 100% of effluent

## Graphical Presentation for the variation of TDS, Chloride, Sulphate in Bore well (Hand Pump in Surali Village)



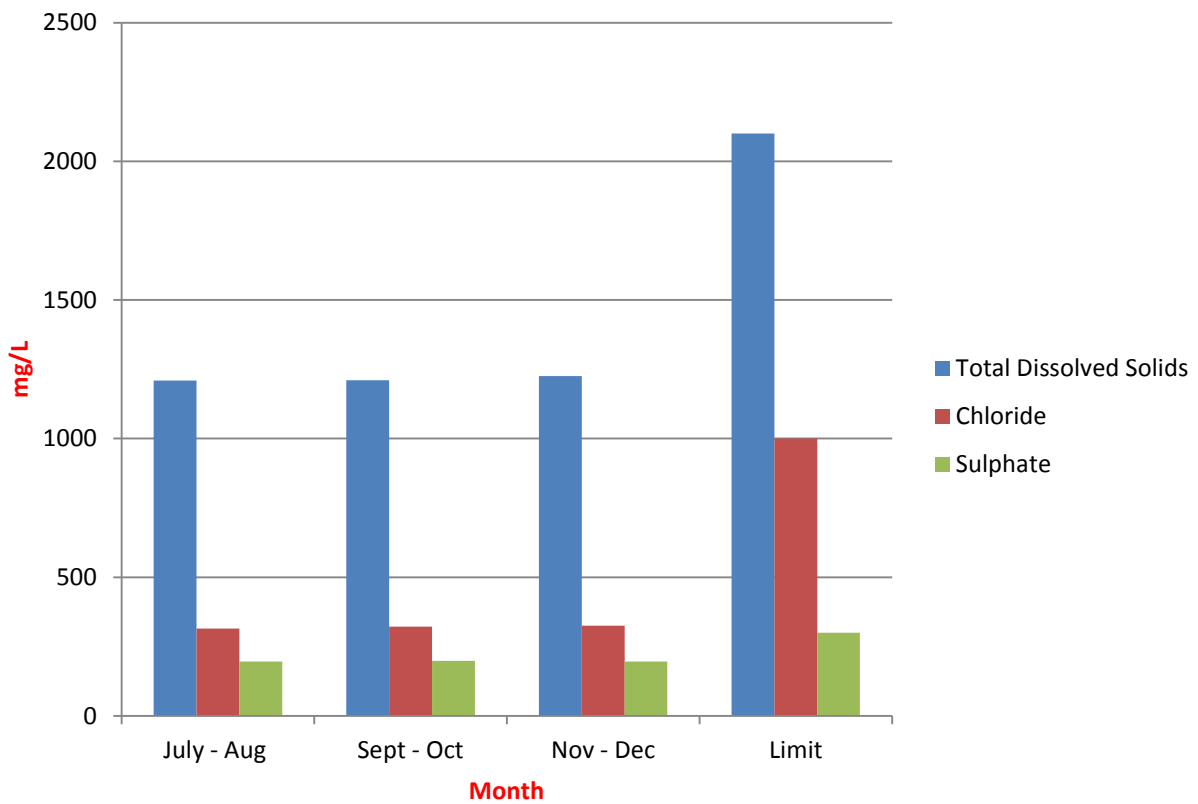
## Six Monthly Variations in Bore water Data

**Sampling point: Bore well (Mosali Char Rasta)**

**Period: July – 2021 to December – 2021**

Sr. No.	Parameter	Unit	Bi-Monthly July-Aug 2021	Bi-Monthly Sept - Oct 2021	Bi-Monthly Nov - Dec 2021	MoEF Limit
1	Temperature	°C	29.3	29.1	28.5	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 °C	pH unit	7.55	7.68	7.84	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	1.6	1.4	1.3	100
5	Total Dissolved Solids (TDS) @180 °C	mg/L	1210	1210	1226	2100
6	Total volatile Solids	mg/L	1.3	1.3	1.2	--
7	COD	mg/L	< 4	< 4	< 4	250
8	BOD (5 days at 20° C)	mg/L	< 2	< 2	< 2	30
9	Oil & Grease	mg/L	< 0.1	< 0.1	< 0.1	10
10	Chloride	mg/L	315	322	325	1000
11	Sulphate	mg/L	196	198	196	300
12	Fluoride	mg/L	0.1	0.3	0.5	2.0
13	Phosphate as PO <sub>4</sub> <sup>-</sup>	mg/L	1.3	1.1	1.2	--
14	Total Residual Chlorine	mg/L	< 0.10	< 0.10	< 0.10	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.05	< 0.05	< 0.05	0.1
18	Copper	mg/L	< 0.05	< 0.05	< 0.05	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.1	< 0.1	< 0.1	5.0
22	Iron	mg/L	0.8	0.8	0.9	3.0
23	Calcium	mg/L	109	115	117	--
24	Magnesium	mg/L	71	79	80	--
25	Percentage Sodium	%	29.8	29.6	30.2	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	100	90%Survival of fish after 96 Hours in 100% of effluent

## Graphical Presentation for the variation of TDS, Chloride, Sulphate in Bore well (Mosali Char Rasta)



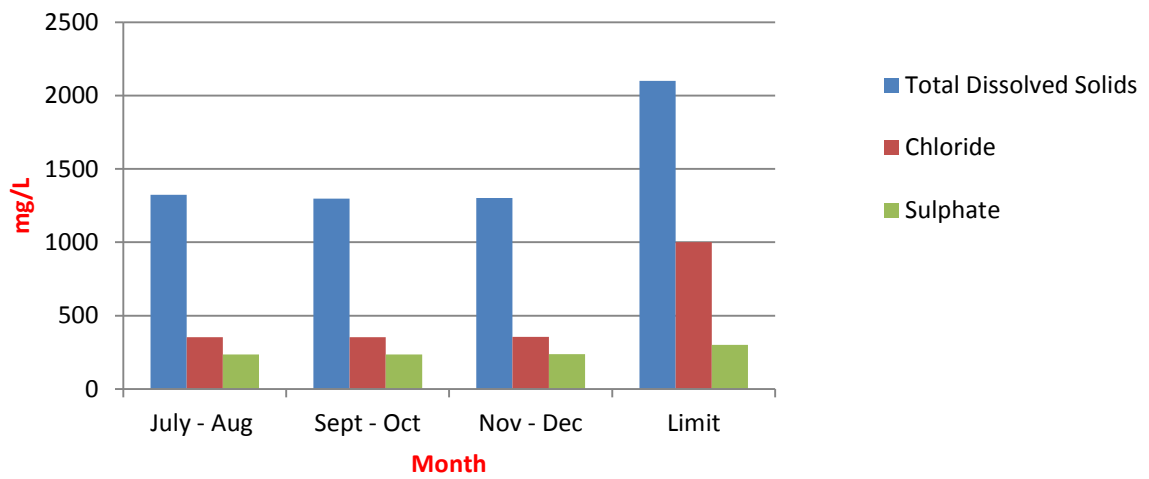
## Six Monthly Variations in Bore water

**Sampling point: Bore well (Vastan Village)**

**Period: July – 2021 to December – 2021**

Sr. No.	Parameter	Unit	Bi-Monthly July-Aug 2021	Bi-Monthly Sept - Oct 2021	Bi-Monthly Nov - Dec 2021	MoEF Limit
1	Temperature	°C	28.6	28.9	29.2	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.50	7.50	7.59	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	2.0	2.1	2.2	100
5	Total Dissolved Solids (TDS) @180 °C	mg/L	1325	1298	1302	2100
6	Total volatile Solids	mg/L	1.0	1.3	1.2	--
7	COD	mg/L	< 4	< 4	< 4	250
8	BOD (5 days at 20 °C )	mg/L	< 2	< 2	< 2	30
9	Oil & Grease	mg/L	< 0.1	< 0.1	< 0.1	10
10	Chloride	mg/L	352	352	355	1000
11	Sulphate	mg/L	235	235	237	300
12	Fluoride	mg/L	0.9	0.9	0.8	2.0
13	Phosphate as PO <sub>4</sub> <sup>3-</sup>	mg/L	1.1	1.1	1.2	--
14	Total Residual Chlorine	mg/L	< 0.10	< 0.10	< 0.10	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.05	< 0.05	< 0.05	0.1
18	Copper	mg/L	< 0.05	< 0.05	< 0.05	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.1	< 0.1	< 0.1	5.0
22	Iron	mg/L	0.8	0.8	0.9	3.0
23	Calcium	mg/L	108	95	96	--
24	Magnesium	mg/L	38	32	34	--
25	Percentage Sodium	%	28 .6	28 .6	29 .2	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	100	90%Survival of fish after 96 Hours in 100% of effluent

## Graphical Presentation for the variation of TDS, Chloride, Sulphate in Bore well (Vastan Village)





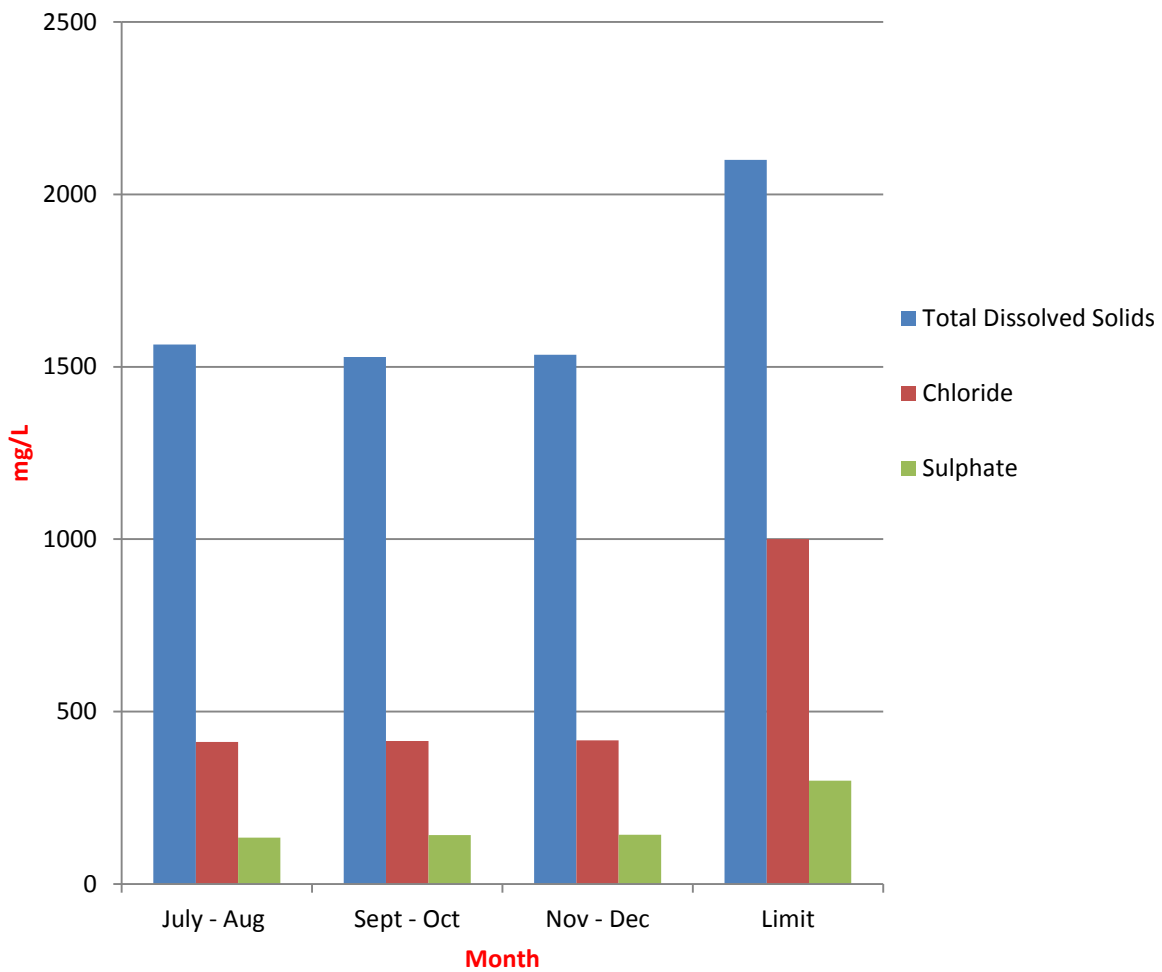
## Six Monthly Variations in Bore water

**Sampling point: Bore well (Hand Pump in Dungri Village)**

**Period: July – 2021 to December – 2021**

Sr. No.	Parameter	Unit	Bi-Monthly July-Aug 2021	Bi-Monthly Sept - Oct 2021	Bi-Monthly Nov - Dec 2021	MoEF Limit
1	Temperature	°C	26	26.3	27.2	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.55	7.62	7.68	5.5-9.0
3	Colour	pt. Co. Scale	<5	<5	<5	--
4	Total Suspended Solids (TSS) @105°C	mg/L	1.9	1.7	1.6	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1565	1528	1535	2100
6	Total volatile Solids	mg/L	0.9	0.9	1.0	--
7	COD	mg/L	< 4	< 4	< 4	250
8	BOD (5 days at 20° C)	mg/L	< 2	< 2	< 2	30
9	Oil & Grease	mg/L	<0.1	<0.1	<0.1	10
10	Chloride	mg/L	412	415	417	1000
11	Sulphate	mg/L	135	142	143	300
12	Fluoride	mg/L	0.9	0.9	0.8	2.0
13	Phosphate as PO <sub>4</sub> <sup>3-</sup>	mg/L	1.3	1.3	1.2	--
14	Total Residual Chlorine	mg/L	<0.1	<0.1	<0.1	1.0
15	Free Available Chlorine	mg/L	< 0.1	< 0.1	< 0.1	--
16	Phenolic Compound	mg/L	< 0.1	< 0.1	< 0.1	1.0
17	Lead	mg/L	< 0.05	< 0.05	< 0.05	0.1
18	Copper	mg/L	< 0.05	< 0.05	< 0.05	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.1	< 0.1	< 0.1	5.0
22	Iron	mg/L	0.9	0.9	0.8	3.0
23	Calcium	mg/L	122	122	123	--
24	Magnesium	mg/L	56	56	57	--
25	Percentage Sodium	%	30.1	30.1	30.2	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	100	90%Survival of fish after 96 Hours in 100% of effluent

## Graphical Presentation for the variation of TDS, Chloride, Sulphate in Bore well (Hand Pump in Dungri Village)



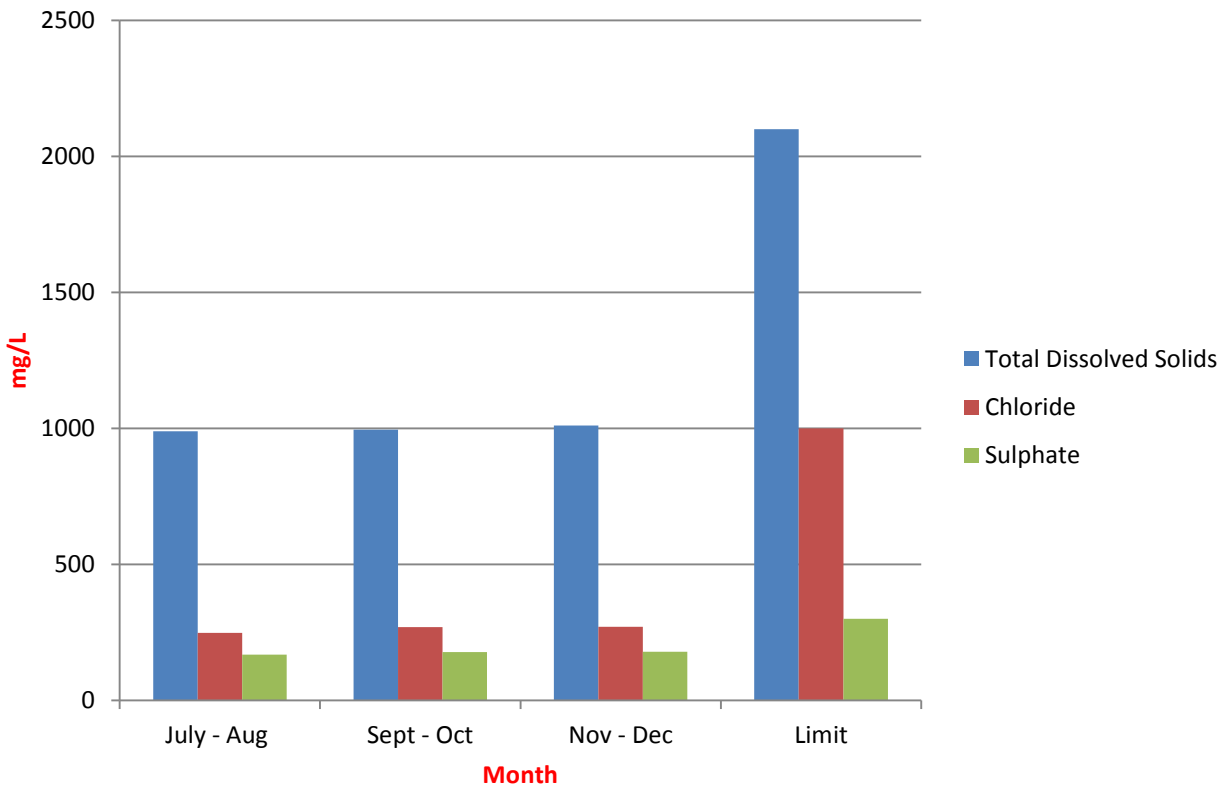
## Six Monthly Variations in water

**Sampling point: (Natural pond in Vastan village)**

**Period: July – 2021 to December – 2021**

Sr. No.	Parameter	Unit	Bi-Monthly July-Aug 2021	Bi-Monthly Sept - Oct 2021	Bi-Monthly Nov - Dec 2021	MoEF Limit
1	Temperature	°C	28.2	28.8	27.4	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.35	7.49	7.62	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	7.9	6.5	6.1	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	989	995	1010	2100
6	Total volatile Solids	mg/L	<1	<1	<1	--
7	COD	mg/L	<4	<4	<4	250
8	BOD (5 days at 20° C)	mg/L	<2	<2	<2	30
9	Oil & Grease	mg/L	< 0.1	< 0.1	< 0.1	10
10	Chloride	mg/L	248	269	271	1000
11	Sulphate	mg/L	168	178	179	300
12	Fluoride	mg/L	0.7	0.7	0.8	2.0
13	Phosphate as PO <sub>4</sub> <sup>3-</sup>	mg/L	1.1	1.2	1.1	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.05	< 0.05	< 0.05	0.1
18	Copper	mg/L	< 0.05	< 0.05	< 0.05	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.1	< 0.1	< 0.1	5.0
22	Iron	mg/L	<0.1	<0.1	<0.1	3.0
23	Calcium	mg/L	88	91	93	--
24	Magnesium	mg/L	32	43	44	--
25	Percentage Sodium	%	23.6	23.8	23.8	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	100	90%Survival of fish after 96 Hours in 100% of effluent

## Graphical Presentation for the variation of TDS, Chloride, Sulphate Natural pond in Vastan village



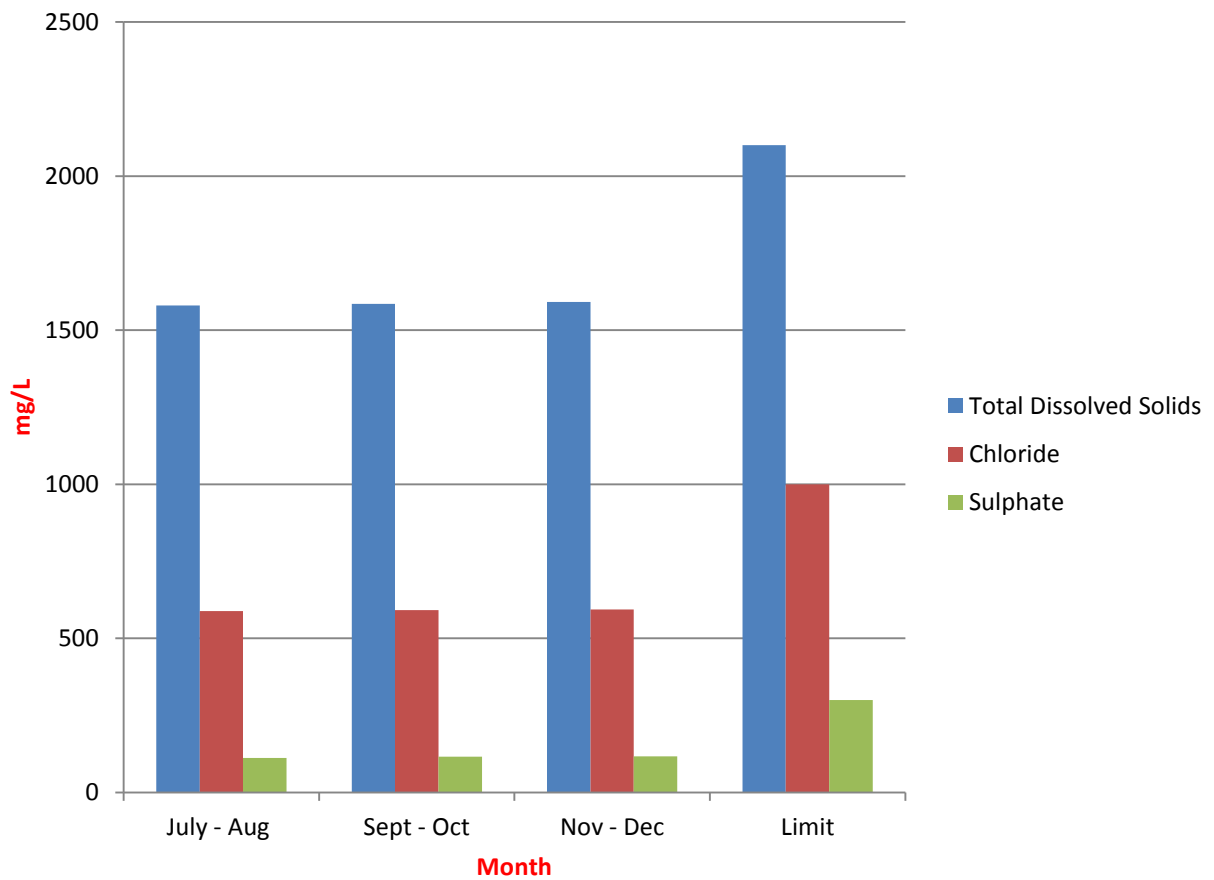
## Six Monthly Variations in Bore water

**Sampling point: Bore well (Ansodla Village)**

**Period: July – 2021 to December – 2021**

Sr. No.	Parameter	Unit	Bi-Monthly July-Aug 2021	Bi-Monthly Sept - Oct 2021	Bi-Monthly Nov - Dec 2021	MoEF Limit
1	Temperature	°C	26	26.3	26.8	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.7	7.4	7.51	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	1.4	1.2	1.1	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1580	1585	1591	2100
6	Total volatile Solids	mg/L	1.2	1.0	1.1	--
7	COD	mg/L	< 4	< 4	< 4	250
8	BOD (5 days at 20° C)	mg/L	< 2	< 2	< 2	30
9	Oil & Grease	mg/L	< 0.1	< 0.1	< 0.1	10
10	Chloride	mg/L	589	592	594	1000
11	Sulphate	mg/L	112	116	117	300
12	Fluoride	mg/L	0.8	0.9	1.0	2.0
13	Phosphate as PO <sub>4</sub> <sup>3-</sup>	mg/L	1.0	1.1	1.2	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	< 0.10	1.0
17	Lead	mg/L	< 0.05	< 0.05	< 0.05	0.1
18	Copper	mg/L	< 0.05	< 0.05	< 0.05	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.10	< 0.10	< 0.10	5.0
22	Iron	mg/L	0.8	0.9	1.0	3.0
23	Calcium	mg/L	168	169	171	--
24	Magnesium	mg/L	74	75	76	--
25	Percentage Sodium	%	33.8	33.8	34.3	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	100	90%Survival of fish after 96 Hours in 100% of effluent

## Graphical Presentation for the variation of TDS, Chloride, Sulphate Bore well (Ansodla Village)



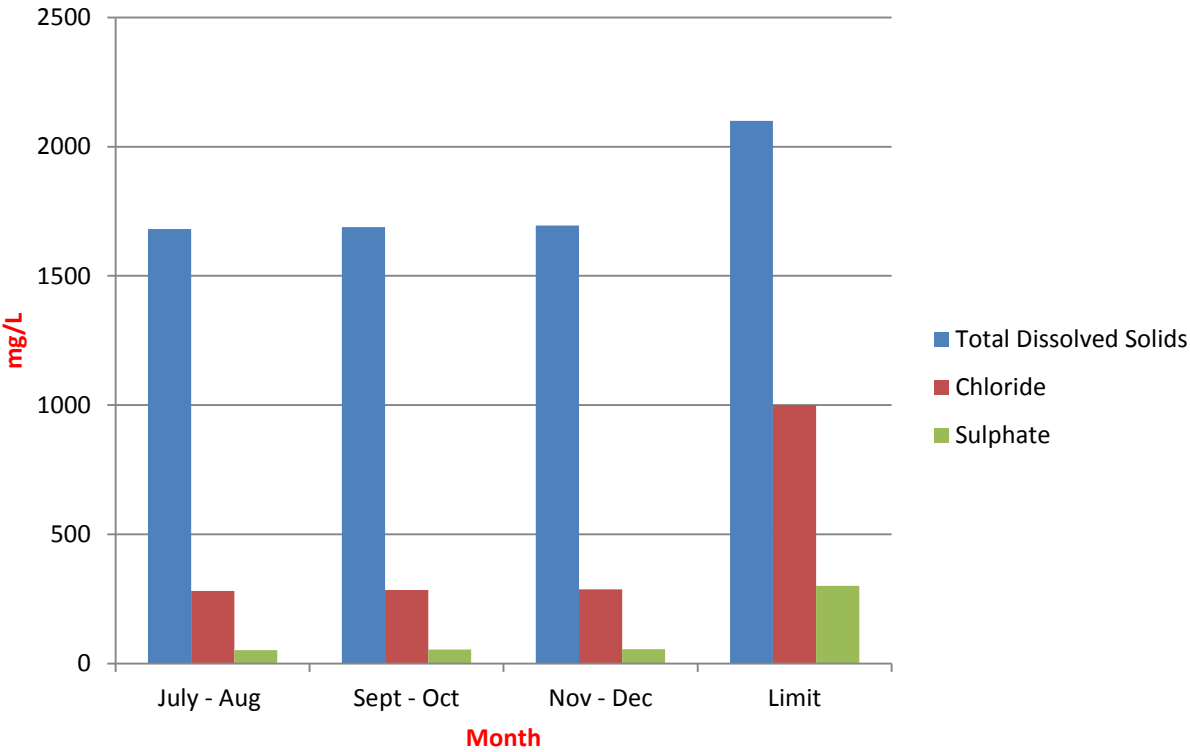
## Six Monthly Variations in surface water

**Sampling point: Surface water (Nani naroli village)**

**Period: July – 2021 to December – 2021**

Sr. No.	Parameter	Unit	Bi-Monthly July-Aug 2021	Bi-Monthly Sept - Oct 2021	Bi-Monthly Nov - Dec 2021	MoEF Limit
1	Temperature	°C	29	29.2	28.7	Shall not exceed 5°c above the receiving water temp <b>5.5-9.0</b>
2	pH@ 25°C	pH unit	7.6	7.10	7.36	
3	Colour	pt. Co. Scale	<5	<5	<5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	1.4	1.6	1.4	<b>100</b>
5	Total Dissolved Solids (TDS) @180° C	mg/L	1682	1689	1695	<b>2100</b>
6	Total volatile Solids	mg/L	1.3	1.1	1.1	--
7	COD	mg/L	<4	<4	<4	<b>250</b>
8	BOD (5 days at 20° C)	mg/L	<2	<2	<2	<b>30</b>
9	Oil & Grease	mg/L	<0.1	<0.1	<0.1	<b>10</b>
10	Chloride	mg/L	281	285	287	<b>1000</b>
11	Sulphate	mg/L	52	54	55	<b>300</b>
12	Fluoride	mg/L	0.7	0.6	0.7	<b>2.0</b>
13	Phosphate as PO <sub>4</sub> <sup>-</sup>	mg/L	1.1	1.0	1.1	--
14	Total Residual Chlorine	mg/L	<0.1	<0.1	<0.1	<b>1.0</b>
15	Free Available Chlorine	mg/L	<0.1	<0.1	<0.1	--
16	Phenolic Compound	mg/L	<0.1	<0.1	<0.1	<b>1.0</b>
17	Lead	mg/L	<0.05	<0.05	<0.05	<b>0.1</b>
18	Copper	mg/L	<0.05	<0.05	<0.05	<b>3.0</b>
19	Hexavalent Chromium	mg/L	<0.03	<0.03	<0.03	<b>0.1</b>
20	Total Chromium	mg/L	<0.03	<0.03	<0.03	<b>2.0</b>
21	Zinc	mg/L	<0.1	<0.1	<0.1	<b>5.0</b>
22	Iron	mg/L	0.9	0.9	0.8	<b>3.0</b>
23	Calcium	mg/L	87	88	89	--
24	Magnesium	mg/L	36	38	39	--
25	Percentage Sodium	%	27.8	27.4	28.5	--
26	Total Coliform(MPN)	Present / Absent	Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	100	<b>90%Survival of fish after 96 Hours in 100% of effluent</b>

# Graphical Presentation for the variation of TDS, Chloride, Sulphate Surface water (Nani naroli village)





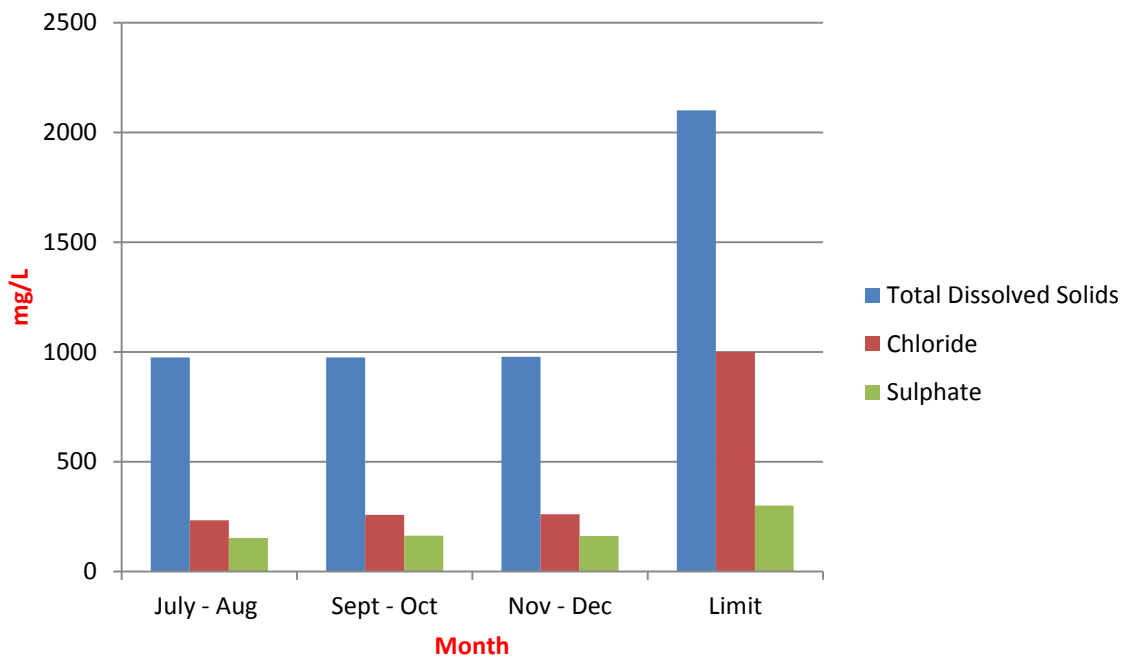
## Six Monthly Variations in surface water

**Sampling point: (Vastan Lignite Mine Accumulated Rain Water)**

**Period: July – 2021 to December – 2021**

Sr. No.	Parameter	Unit	Bi-Monthly July - Aug 2021	Bi-Monthly Sept - Oct 2021	Bi-Monthly Nov - Dec 2021	MoEF Limit
1	Temperature	°C	27.2	27.8	27.3	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.50	7.58	7.60	<b>5.5-9.0</b>
3	Colour	pt. Co. Scale	< 5	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	8.2	7.9	7.5	<b>100</b>
5	Total Dissolved Solids (TDS) @180° C	mg/L	975	975	978	<b>2100</b>
6	Total volatile Solids	mg/L	<1	<1	<1	--
7	COD	mg/L	<4	<4	<4	<b>250</b>
8	BOD (5 days at 20° C)	mg/L	<2	<2	<2	<b>30</b>
9	Oil & Grease	mg/L	< 1	< 1	< 1	<b>10</b>
10	Chloride	mg/L	232	258	260	<b>1000</b>
11	Sulphate	mg/L	152	162	161	<b>300</b>
12	Fluoride	mg/L	0.6	0.8	0.9	<b>2.0</b>
13	Phosphate as PO <sub>4</sub> <sup>3-</sup>	mg/L	0.7	0.6	0.7	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	< 0.1	<b>1.0</b>
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	< 0.10	<b>1.0</b>
17	Lead	mg/L	<0.02	<0.02	<0.02	<b>0.1</b>
18	Copper	mg/L	<0.50	<0.50	<0.50	<b>3.0</b>
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	< 0.03	<b>0.1</b>
20	Total Chromium	mg/L	< 0.03	< 0.03	< 0.03	<b>2.0</b>
21	Zinc	mg/L	<0.10	<0.10	<0.10	<b>5.0</b>
22	Iron	mg/L	<0.05	<0.05	<0.05	<b>3.0</b>
23	Calcium	mg/L	74	77	79	--
24	Magnesium	mg/L	31	35	36	--
25	Percentage Sodium	%	22.9	23.7	24.3	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	100	<b>90%Survival of fish after 96 Hours in 100% of effluent</b>

## Graphical Presentation for the variation of TDS, Chloride, Sulphate (Lignite Mine Discharge)



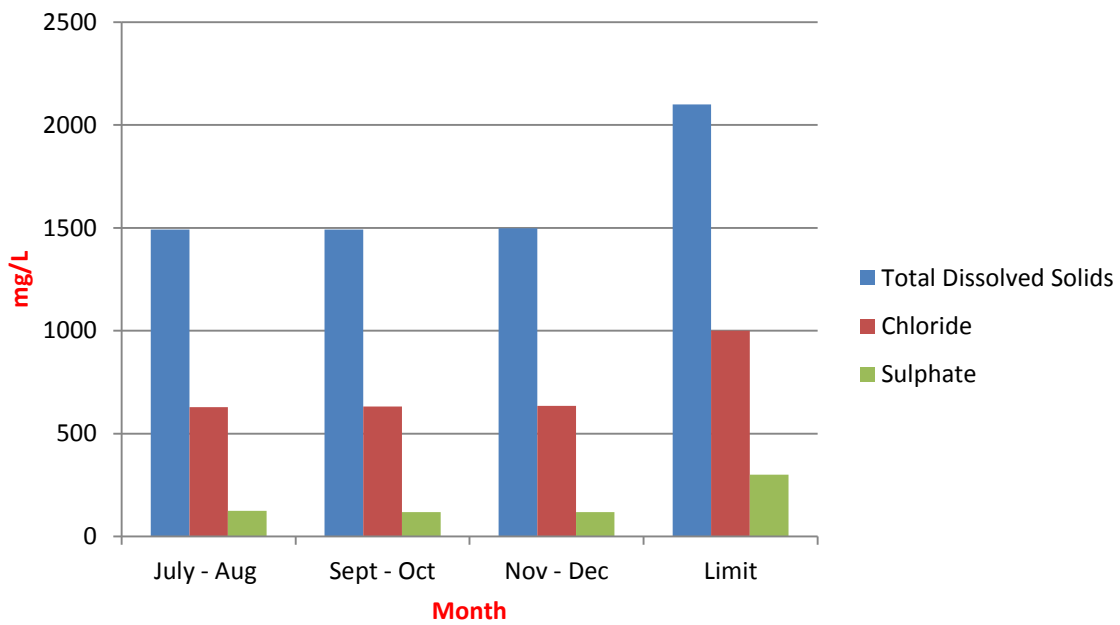
## Six Monthly Variations in surface water

**Sampling point: (Limestone Accumulated Rain Water)**

**Period: July – 2021 to December – 2021**

Sr. No.	Parameter	Unit	Bi-Monthly July -Aug 2021	Bi-Monthly Sept - Oct 2021	Bi-Monthly Nov - Dec 2021	MoEF Limit
1	Temperature	°C	26..9	27.2	27.8	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.48	7.56	7.64	5.5-9.0
3	Colour	pt. Co. Scale	< 5	< 5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	10	10	09	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1492	1492	1498	2100
6	Total volatile Solids	mg/L	3.1	3.1	2.9	--
7	COD	mg/L	31	31	30	250
8	BOD (5 days at 20° C)	mg/L	8	8	9	30
9	Oil & Grease	mg/L	< 1	< 1	< 1	10
10	Chloride	mg/L	629	632	635	1000
11	Sulphate	mg/L	125	118	119	300
12	Fluoride	mg/L	1.1	1.1	1.0	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	0.8	0.8	0.8	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.10	< 0.10	< 0.10	--
16	Phenolic Compound	mg/L	< 0.10	< 0.10	< 0.10	1.0
17	Lead	mg/L	<0.1	<0.1	<0.1	0.1
18	Copper	mg/L	0.6	0.6	0.6	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	< 0.03	2.0
21	Zinc	mg/L	0.15	0.15	0.15	5.0
22	Iron	mg/L	0.8	0.8	0.9	3.0
23	Calcium	mg/L	124	126	127	--
24	Magnesium	mg/L	45	36	37	--
25	Percentage Sodium	%	32.6	32.2	32.8	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	90	90	90	90%Survival of fish after 96 Hours in 100% of effluent

## Graphical Presentation for the variation of TDS, Chloride, Sulphate (Limestone Pit Discharge)



**Comparative Noise  
Monitoring Report &  
Graphical Presentation**

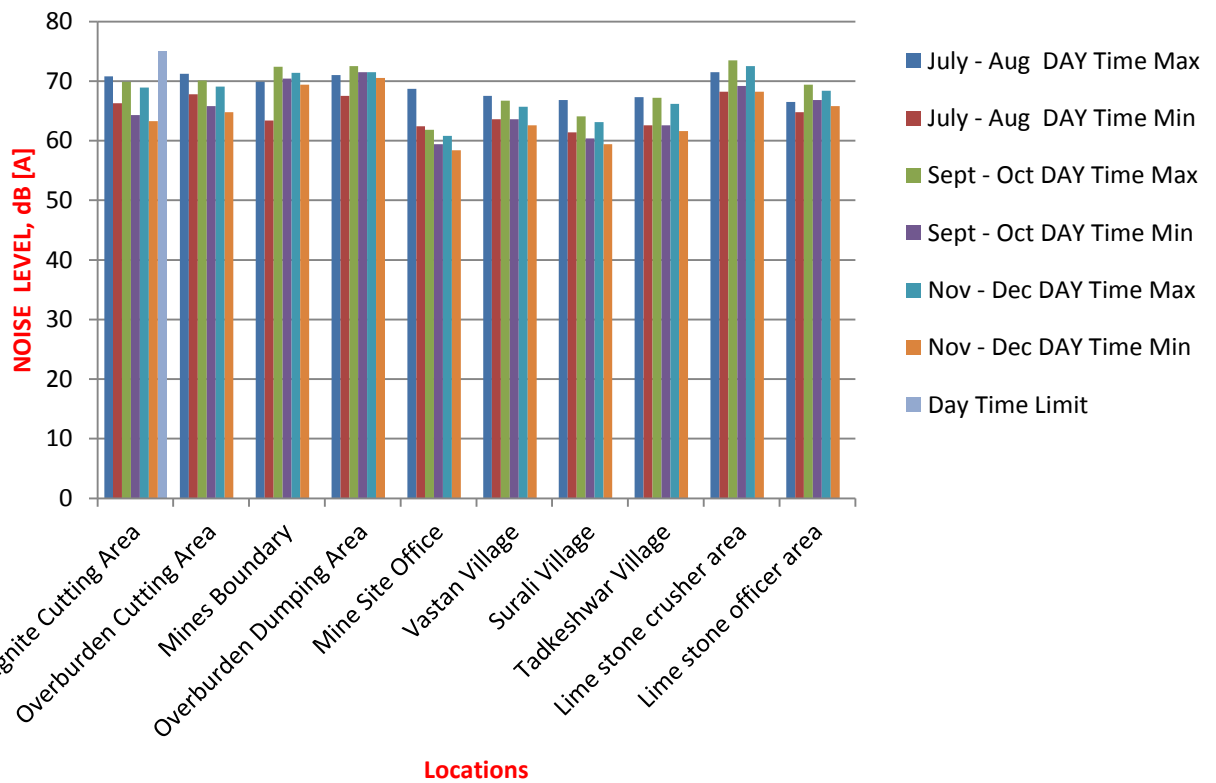
## Six Monthly Variations in Noise Level

**Parameter: Noise**

**Period: July – 2021 to December – 2021**

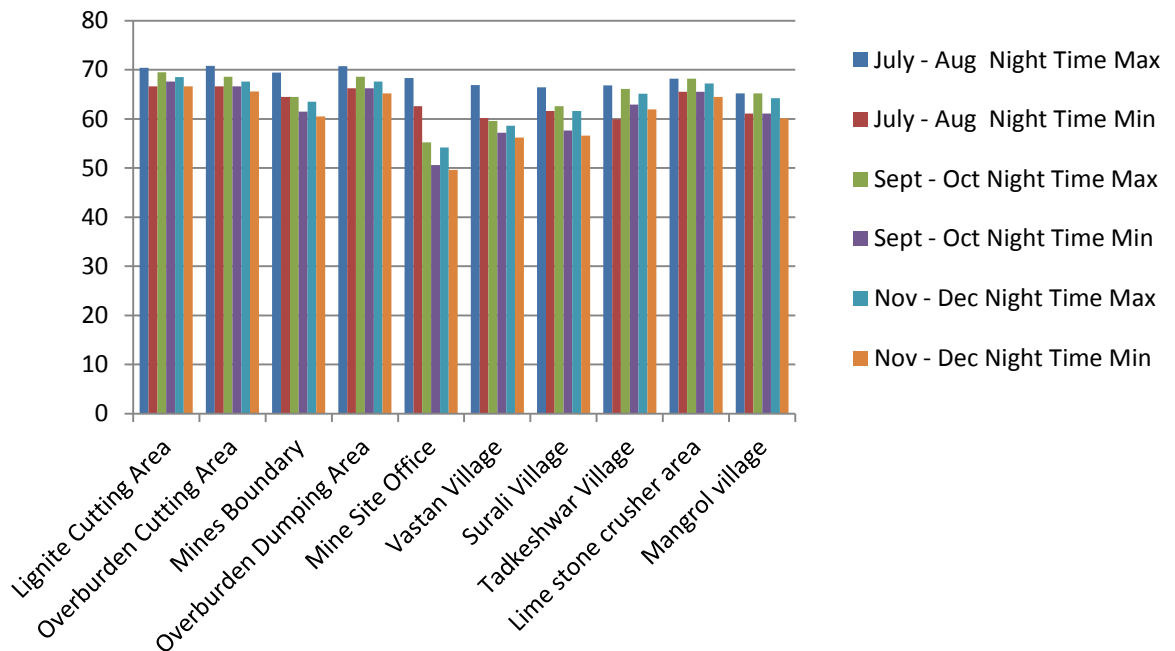
SR · N O.	LOCATION	NOISE LEVEL, dB [A]											
		Bi-Monthly July. to Aug - 2021				Bi-Monthly Sept to Oct - 2021				Bi-Monthly Nov to Dec - 2021			
		DAY Time		Night Time		DAY Time		Night Time		DAY Time		Night Time	
		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	Lignite Cutting Area	70.8	66.3	70.4	66.6	69.9	64.3	69.5	67.6	68.9	63.3	68.5	66.6
2	Overburden Cutting Area	71.2	67.8	70.8	66.6	70.1	65.8	68.6	66.6	69.1	64.8	67.6	65.6
3	Mines Boundary	69.9	63.4	69.4	64.5	72.4	70.4	64.5	61.5	71.4	69.4	63.5	60.5
4	Overburden Dumping Area	71.0	67.5	70.7	66.2	72.5	71.5	68.6	66.2	71.5	70.5	67.6	65.2
5	Mine Site Office	68.7	62.4	68.3	62.6	61.8	59.4	55.2	50.6	60.8	58.4	54.2	49.6
6	Vastan Village	67.5	63.6	66.9	60.2	66.7	63.6	59.6	57.2	65.7	62.6	58.6	56.2
7	Surali Village	66.8	61.4	66.4	61.6	64.1	60.4	62.6	57.6	63.1	59.4	61.6	56.6
8	Tadkeshwar Village	67.3	62.6	66.8	59.9	67.2	62.6	66.1	62.9	66.2	61.6	65.1	61.9
9	Lime stone crusher area	71.5	68.2	68.2	65.5	73.5	69.2	68.2	65.5	72.5	68.2	67.2	64.5
10	Lime stone officer area	66.5	64.8	65.2	61.1	69.4	66.8	65.2	61.1	68.4	65.8	64.2	60.1
	<b>GPCB limit</b>	<b>75 (dB)</b>		<b>70(dB)</b>		<b>75 (dB)</b>		<b>70(dB)</b>		<b>75 (dB)</b>		<b>70(dB)</b>	

## Graphical Presentation for the Parameter Noise Level at Various Locations During Day Time



## Graphical Presentation for the Parameter Noise Level at Various Locations During Night Time

NOISE LEVEL, dB [A]



Locations



**Comparative Micro  
Meteorological Data and  
Wind rose & Wind  
Frequency Distribution**

## Six Monthly Variations in Micrometeorological data

Period: July – 2021 to December – 2021

Dry Bulb Temperature (°C)			
Time in Hrs.	Bi-Monthly July. to Aug- 2021	Bi-Monthly Sept to Oct - 2021	Bi-Monthly Nov to Dec - 2021
10.00	34.2	29.9	25.5
11.00	35.3	35.5	30.2
12.00	36.8	38.4	31.4
13.00	36.4	38.0	31.5
14.00	36.1	37.5	31.4
15.00	36.0	37.1	31.5
16.00	35.8	36.4	31.1
17.00	35.2	32.1	29.7
18.00	35.0	30.2	27.6
19.00	34.9	28.4	26.4
20.00	34.3	27.5	24.3
21.00	34.0	27.1	22.6
22.00	33.9	26.8	22.3
23.00	33.2	26.7	21.9
00.00	33.8	26.6	21.3
01.00	33.5	26.5	20.7
02.00	33.1	26.3	20.2
03.00	33.9	26.1	19.8
04.00	33.6	25.6	19.7
05.00	33.4	25.1	19.4
06.00	33.2	25.0	19.3
07.00	33.8	25.8	19.9
08.00	33.9	27.6	20.3
09.00	34.0	29.0	21.6
<b>Maximum</b>	<b>36.8</b>	<b>38.4</b>	<b>31.5</b>
<b>Minimum</b>	<b>33.1</b>	<b>25.0</b>	<b>19.3</b>
<b>Average</b>	<b>35.0</b>	<b>31.7</b>	<b>25.4</b>

## Six Monthly Variations in Micrometeorological data

**Period: July – 2021 to December – 2021**

<b>Wet Bulb Temperature (°C)</b>			
<b>Time in Hrs.</b>	<b>Bi-Monthly July. to Aug- 2021</b>	<b>Bi-Monthly Sept to Oct - 2021</b>	<b>Bi-Monthly Nov to Dec - 2021</b>
10.00	29.8	27.2	23.1
11.00	29.2	31.8	27.6
12.00	29.0	33.0	30.3
13.00	29.5	32.5	30.5
14.00	29.9	32.1	30.7
15.00	30.0	32.0	30.8
16.00	29.8	31.5	29.4
17.00	29.3	29.4	27.6
18.00	29.0	28.0	26.4
19.00	28.6	27.5	26.1
20.00	28.1	26.2	23.5
21.00	28.5	26.0	21.1
22.00	28.3	25.5	20.9
23.00	28.1	25.1	20.2
00.00	28.6	25.0	20.1
01.00	28.4	24.9	19.6
02.00	28.2	24.3	19.3
03.00	28.7	24.1	19.1
04.00	28.6	23.8	18.8
05.00	28.4	23.4	18.7
06.00	28.0	23.1	18.6
07.00	28.5	25.7	18.9
08.00	28.9	26.9	20.3
09.00	29.0	27.0	20.7
<b>Maximum</b>	<b>30.0</b>	<b>33.0</b>	<b>30.8</b>
<b>Minimum</b>	<b>28.0</b>	<b>23.1</b>	<b>18.6</b>
<b>Average</b>	<b>29.0</b>	<b>28.1</b>	<b>24.7</b>

## Six Monthly Variations in Micrometeorological data

Period: July – 2021 to December – 2021

Relative Humidity %			
Time in Hrs.	Bi-Monthly July. to Aug- 2021	Bi-Monthly Sept to Oct - 2021	Bi-Monthly Nov to Dec - 2021
10.00	79.0	68.1	96.0
11.00	73.0	62.5	92.3
12.00	63.0	53.6	89.0
13.00	64.0	54.2	89.9
14.00	65.0	54.9	90.8
15.00	68.0	55.0	91.7
16.00	67.0	58.7	92.2
17.00	66.0	61.2	92.8
18.00	65.0	62.5	93.0
19.00	68.0	62.9	93.8
20.00	70.0	63.5	94.2
21.00	72.0	64.0	94.9
22.00	74.0	64.8	95.5
23.00	78.0	68.7	95.9
00.00	79.0	69.0	96.0
01.00	80.0	70.5	95.5
02.00	81.0	72.6	94.6
03.00	85.0	73.0	94.1
04.00	84.0	74.4	93.7
05.00	83.0	74.9	93.1
06.00	82.0	75.0	92.0
07.00	79.0	72.3	89.3
08.00	73.0	68.4	89.9
09.00	71.0	66.0	89.1
<b>Maximum</b>	<b>85.0</b>	<b>75.0</b>	<b>96.0</b>
<b>Minimum</b>	<b>63.0</b>	<b>53.6</b>	<b>89.0</b>
<b>Average</b>	<b>74.0</b>	<b>64.3</b>	<b>92.5</b>

## Six Monthly Variations in Micrometeorological data

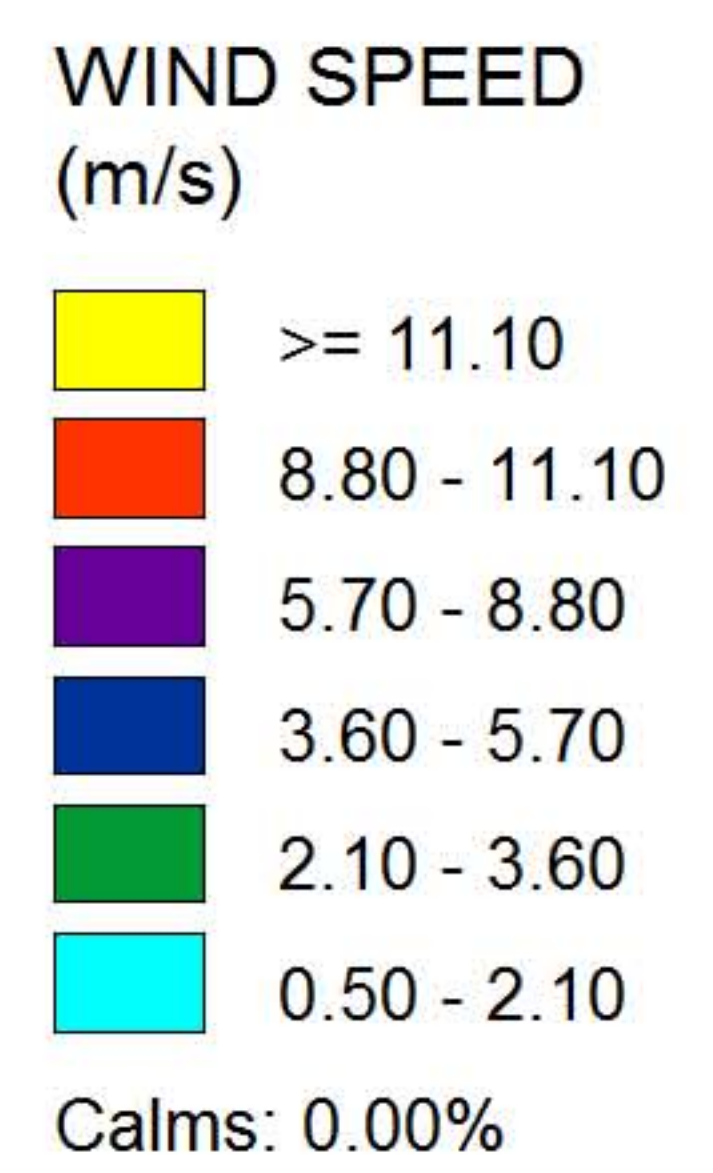
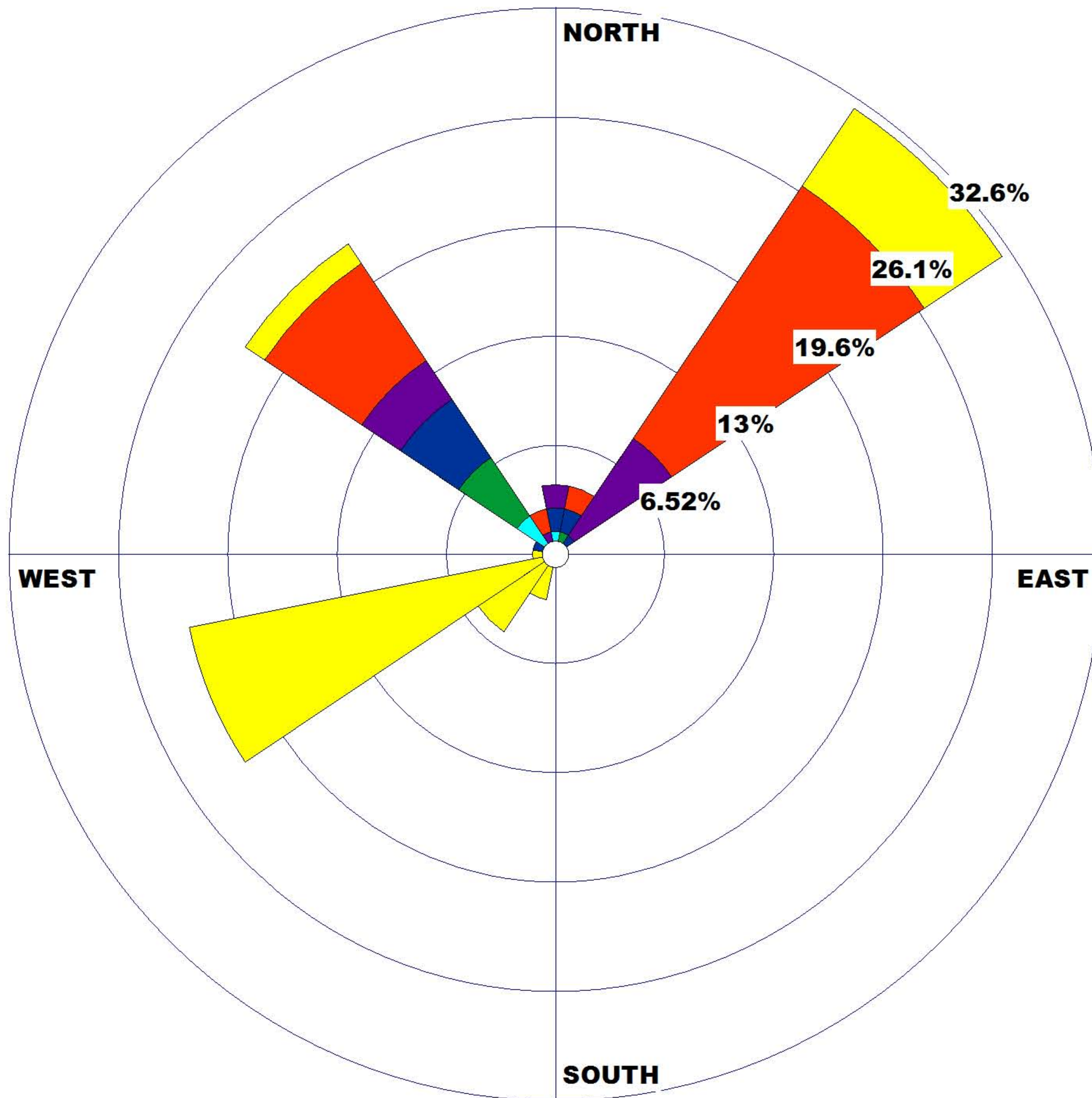
**Period: July – 2021 to December – 2021**

<b>Wind Speed (km/hour)</b>			
<b>Time in Hrs.</b>	<b>Bi-Monthly July. to Aug- 2021</b>	<b>Bi-Monthly Sept to Oct - 2021</b>	<b>Bi-Monthly Nov to Dec - 2021</b>
10.00	30	3.0	7.0
11.00	32	5.0	9.0
12.00	31	9.0	10.0
13.00	34	10.0	9.8
14.00	33	11.0	9.6
15.00	32	12.0	7.5
16.00	30	11.0	7.4
17.00	31	10.0	7.3
18.00	32	9.0	8.0
19.00	34	8.0	8.5
20.00	33	6.0	8.9
21.00	31	7.0	9.2
22.00	33	5.0	9.6
23.00	32	4.0	9.9
00.00	30	3.0	10.0
01.00	31	5.0	10.2
02.00	29	4.0	10.4
03.00	28	3.0	10.9
04.00	29	1.0	11.6
05.00	28	2.0	11.9
06.00	27	3.0	13.0
07.00	24	2.0	10.2
08.00	25	4.0	10.9
09.00	26	5.0	11.3
<b>Maximum</b>	<b>34</b>	<b>12.0</b>	<b>13.0</b>
<b>Minimum</b>	<b>24</b>	<b>1.0</b>	<b>7.0</b>
<b>Average</b>	<b>29</b>	<b>6.5</b>	<b>10.0</b>



**WIND ROSE PLOT:**  
**M/s. Gujarat Industries Power Company Limited**  
**Vastan Lignite Mine**

**DISPLAY:**  
 Wind Speed  
 Direction (blowing from)



**COMMENTS:**

**DATA PERIOD:**

Start Date: 22-07-2021 - 00:00  
 End Date: 29-12-2021 - 10:00

**COMPANY NAME:**

M/s. Gujarat Industries Power Company Limited

**MODELER:**

M/s. Ecosystem Resource Management Pvt. Ltd.

**CALM WINDS:**

0.00%

**TOTAL COUNT:**

71 hrs.

**AVG. WIND SPEED:**

15.06 m/s

**DATE:**

07-01-2022

**PROJECT NO.:**



### Wind Class Frequency Distribution

