

# Gujarat Industries Power Company Limited

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

**Six Monthly Report of Valia and Mangrol Lignite Mines**

## **ENVIRONMENTAL MONITORING & ANALYSIS REPORT**

For the period of July to December -2020

**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 Valia & Mangrol lignite Mine

### I. Ambient Air Monitoring

Sr. No.	No. of stations & Location	Duration	Frequency	Parameters	Method of Analysis
1.	8 Nos within the radius of 10 km from the Core Zone and 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>2</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.	8 Nos within the radius of 10 km from the Core Zone and 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.	8 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 office of the Mine	24 hours	Bi-Monthly	Dry & Wet Bulb Temp. Relative Humidity wind speed & direction max & min. Temperature	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.	10 Nos. of Bore well & 2 No. of Sump Water sample 2 No. of Pond water	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.

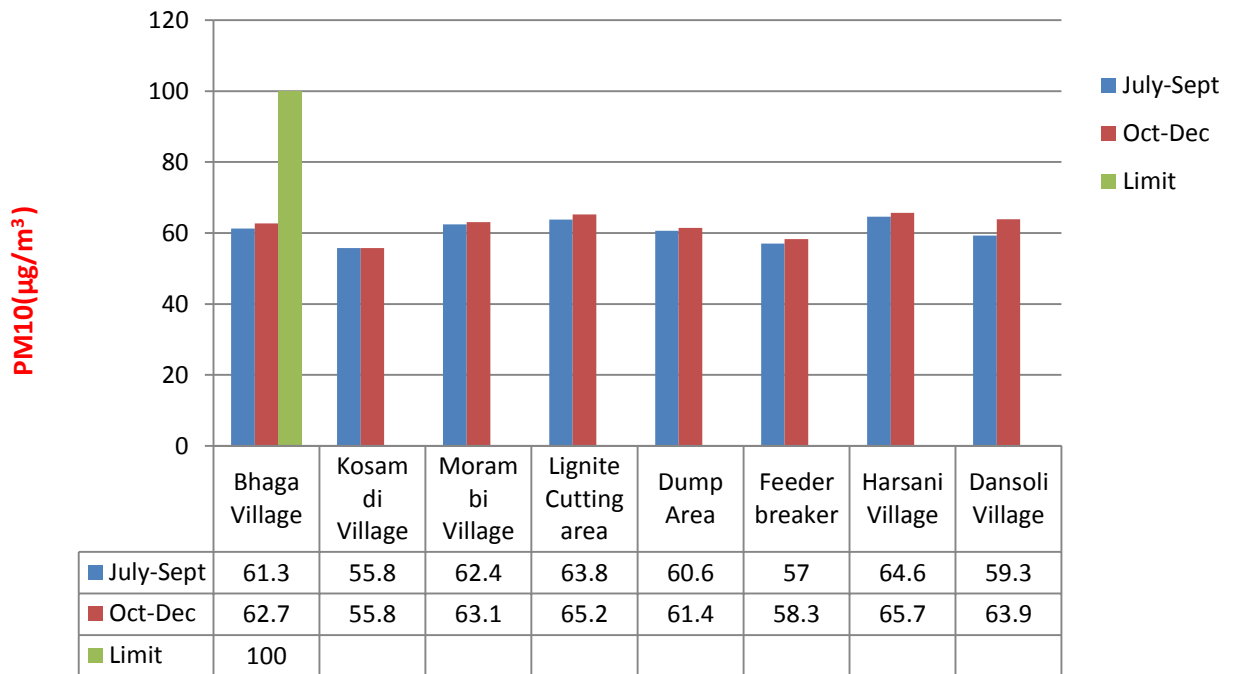
## Six Monthly Variation in Ambient Air Quality Data

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

**Period: July – 2020 to December – 2020**

<b>Sr. No.</b>	<b>Location</b>	<b>Results (µg/m<sup>3</sup>)</b>	
		<b>Quarterly July to Sept -2020</b>	<b>Quarterly Oct to Dec - 2020</b>
<b>1</b>	<b>Bhaga Village</b>	61.3	62.7
<b>2</b>	<b>Kosamdi Village</b>	55.8	55.8
<b>3</b>	<b>Morambi Village</b>	62.4	63.1
<b>4</b>	<b>Lignite Cutting area</b>	63.8	65.2
<b>5</b>	<b>Dump Area</b>	60.6	61.4
<b>6</b>	<b>Feeder breaker</b>	57.0	58.3
<b>7</b>	<b>Harsani Village</b>	64.6	65.7
<b>8</b>	<b>Dansoli Village</b>	59.3	63.9
	<b>Limit</b>	<b>100(µg/m<sup>3</sup>)</b>	

## Graphical Presentation for the Parameter PM<sub>10</sub> for July to Dec



**Location**

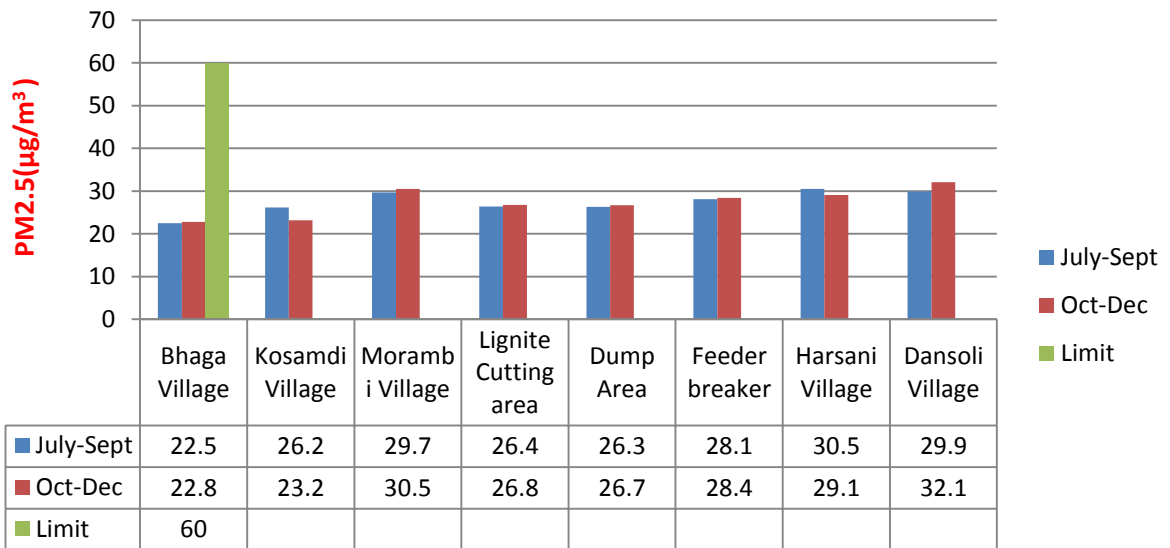
## Six Monthly Variation in Ambient Air Quality Data

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

**Period: July – 2020 to December – 2020**

Sr. No.	Location	Results ( $\mu\text{g}/\text{m}^3$ )	
		Quarterly July to Sept -2020	Quarterly Oct to Dec - 2020
1	Bhaga Village	22.5	22.8
2	Kosamdi Village	26.2	23.2
3	Morambi Village	29.7	30.5
4	Lignite Cutting area	26.4	26.8
5	Dump Area	26.3	26.7
6	Feeder breaker	28.1	28.4
7	Harsani Village	30.5	29.1
8	Dansoli Village	29.9	32.1
	Limit	60( $\mu\text{g}/\text{m}^3$ )	

## Graphical Presentation for the Parameter PM2.5 for July-Dec



**Location**



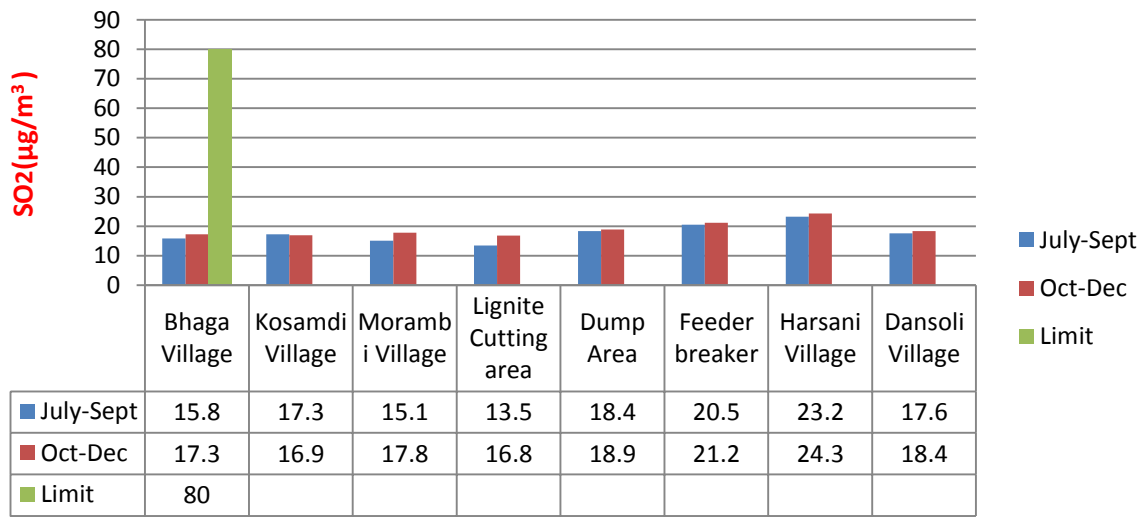
## Six Monthly Variation in Ambient Air Quality Data

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

Period: July – 2020 to Dec – 2020

Sr. No.	Location	Results (µg/m <sup>3</sup> )	
		Quarterly July to Sept -2020	Quarterly Oct to Dec - 2020
1	Bhaga Village	15.8	17.3
2	Kosamdi Village	17.3	16.9
3	Morambi Village	15.1	17.8
4	Lignite Cutting area	13.5	16.8
5	Dump Area	18.4	18.9
6	Feeder breaker	20.5	21.2
7	Harsani Village	23.2	24.3
8	Dansoli Village	17.6	18.4
	Limit	80(µg/m <sup>3</sup> )	

## Graphical Presentation for the Parameter SO<sub>2</sub> for July-Dec



**Location**

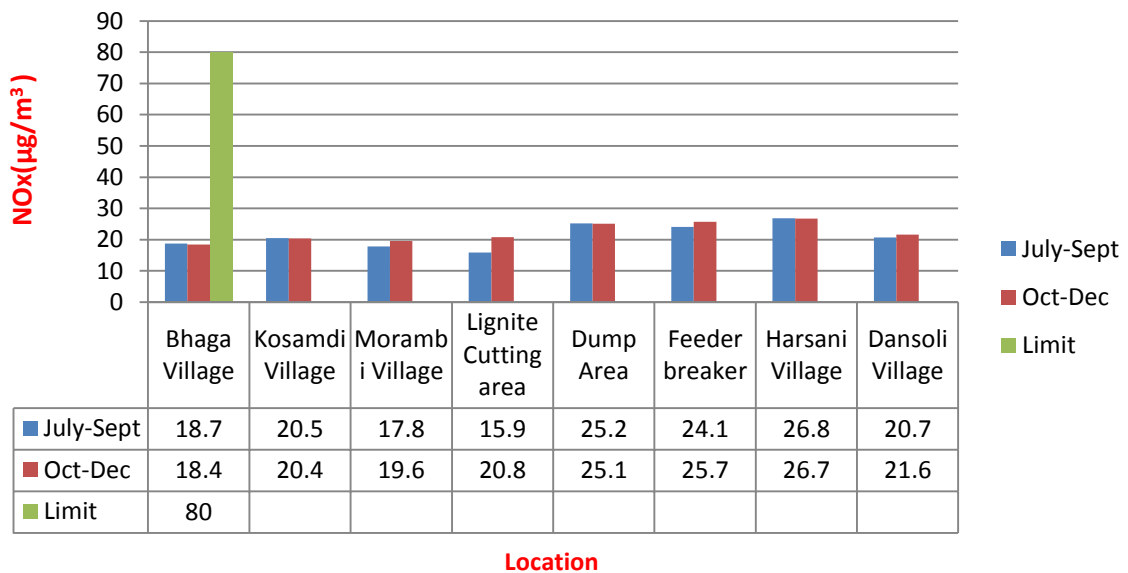
## Six Monthly Variation in Ambient Air Quality Data

Parameter: NO<sub>x</sub> (Oxides of Nitrogen)

Period: July – 2020 to December – 2020

Sr. No.	Location	Results (µg/m <sup>3</sup> )	
		Quarterly July to Sept -2020	Quarterly Oct to Dec - 2020
1	Bhaga Village	18.7	18.4
2	Kosamdi Village	20.5	20.4
3	Morambi Village	17.8	19.6
4	Lignite Cutting area	15.9	20.8
5	Dump Area	25.2	25.1
6	Feeder breaker	24.1	25.7
7	Harsani Village	26.8	26.7
8	Dansoli Village	20.7	21.6
	Limit	80(µg/m <sup>3</sup> )	

## Graphical Presentation for the Parameter NOx for July-Dec



**Location**

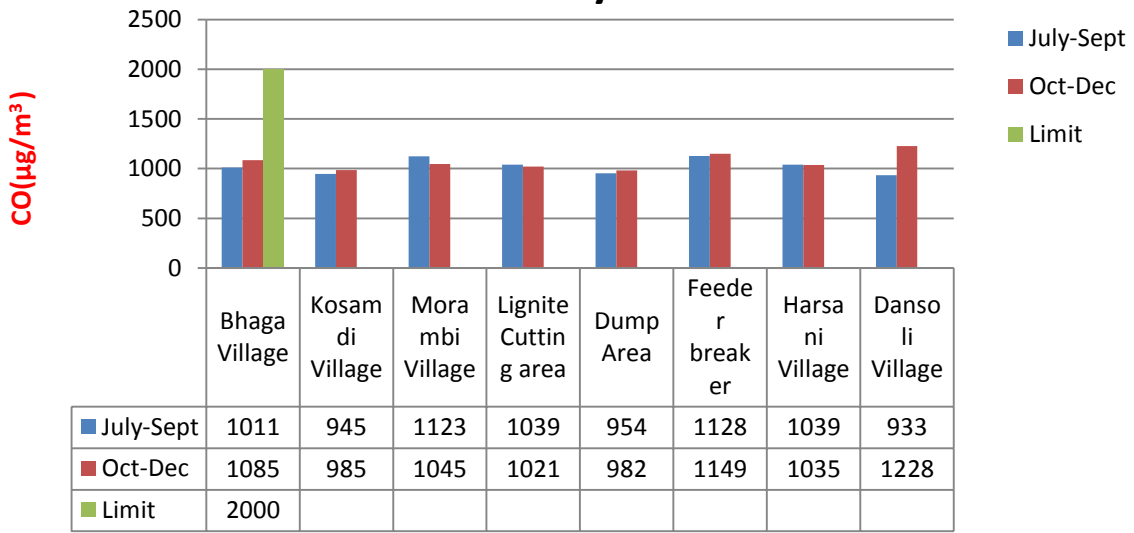
## Six Monthly Variation in Ambient Air Quality Data

Parameter: CO (Carbon Monoxide)

Period: July – 2020 to December – 2020

Sr. No.	Location	Results ( $\mu\text{g}/\text{m}^3$ )	
		Quarterly July to Sept -2020	Quarterly Oct to Dec - 2020
1	Bhaga Village	1011	1085
2	Kosamdi Village	945	985
3	Morambi Village	1123	1045
4	Lignite Cutting area	1039	1021
5	Dump Area	954	982
6	Feeder breaker	1128	1149
7	Harsani Village	1039	1035
8	Dansoli Village	933	1228
	Limit	2000( $\mu\text{g}/\text{m}^3$ )	

## Graphical Presentation for the Parameter CO for July-Dec



**Location**

## Six Monthly Variation in Ambient Air Quality Data

Parameter: Dust Fall

Period: July – 2020 to December – 2020

Sr. No.	Location	Results (T/Km <sup>2</sup> /month)	
		Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020
1	Bhaga Village	2.3	1.6
2	Kosamdi Village	1.8	2.2
3	Morambi Village	1.3	1.4
4	Lignite Cutting area	1.7	1.0
5	Dump Area	2.3	2.0
6	Feeder breaker	1.4	2.4
7	Harsani Village	2.0	2.9
8	Dansoli Village	1.1	1.7
	Limit	10(T/Km <sup>2</sup> /month)	

## Graphical Presentation for Dustcollection July-Dec





## Six Monthly Variation in bore water Data

**Location: Shah Nallah village (Pond water)**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	26	29	Shall not exceed 5°c above the receiving water temp.
2	pH@ 25°C	pH unit	7.23	7.43	5.5-9.0
3	Color	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4	4.4	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1122	1231	2100
6	Total volatile Solids	mg/L	2.4	3.3	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20° C)	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	290	297	1000
11	Sulphate	mg/L	110	116	300
12	Fluoride	mg/L	0.6	0.7	2.0
13	Phosphate as PO <sub>4</sub> <sup>3-</sup>	mg/L	1.0	1.1	--
14	Total Residual Chlorine	mg/L	<0.10	< 0.10	1.0
15	Free Available Chlorine	mg/L	<0.10	< 0.10	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	<0.10	3.0
23	Calcium	mg/L	133	141	--
24	Magnesium	mg/L	55	61	--
25	Percentage Sodium	%	41.3	44.3	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Bhaga Village (Valia Block)**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	27	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 °C	pH unit	7.22	7.33	5.5-9.0
3	Color	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	1.5	2.0	100
5	Total Dissolved Solids (TDS) @180 °C	mg/L	1134	1253	2100
6	Total volatile Solids	mg/L	1.0	1.3	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20° C)	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	413	478	1000
11	Sulphate	mg/L	157	164	300
12	Fluoride	mg/L	0.8	0.7	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	0.9	1.0	--
14	Total Residual Chlorine	mg/L	<0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<0.1	< 0.1	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	< 0.10	3.0
23	Calcium	mg/L	98	106	--
24	Magnesium	mg/L	71	79	--
25	Percentage Sodium	%	37.6	41.4	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Shah Nallah village (Bore water)**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	27	28	Shall not exceed 5°c above the receiving water temp.
2	pH@ 25°C	pH unit	7.32	7.45	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	3.0	3.6	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	802	853	2100
6	Total volatile Solids	mg/L	3.0	3.3	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20° C)	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	127	135	1000
11	Sulphate	mg/L	58	61	300
12	Fluoride	mg/L	0.9	0.9	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	1.0	1.0	--
14	Total Residual Chlorine	mg/L	<0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<0.10	< 0.10	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.50	< 0.50	3.0
23	Calcium	mg/L	198	104	--
24	Magnesium	mg/L	40	45	--
25	Percentage Sodium	%	33.2	35.6	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Bore Well (Charetha Village)**

**Period: July – 2020 to Dec – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	26	28	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.36	7.41	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4.0	4.6	100
5	Total Dissolved Solids (TDS) @180 °C	mg/L	785	905	2100
6	Total volatile Solids	mg/L	2.0	2.3	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20 °C )	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	97	111	1000
11	Sulphate	mg/L	67	71	300
12	Fluoride	mg/L	0.7	0.8	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	0.8	0.9	--
14	Total Residual Chlorine	mg/L	<0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<0.1	< 0.1	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	<0.10	3.0
23	Calcium	mg/L	90	95	--
24	Magnesium	mg/L	57	61	--
25	Percentage Sodium	%	27.3	28.4	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Charetha Village (Down Stream)**

**Period: July – 2020 to Dec – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	27	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.31	7.42	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	2.6	4.1	100
5	Total Dissolved Solids (TDS) @180 °C	mg/L	768	894	2100
6	Total volatile Solids	mg/L	1.0	1.0	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20 °C )	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	132	144	1000
11	Sulphate	mg/L	44	53	300
12	Fluoride	mg/L	0.3	0.4	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	0.8	1.0	--
14	Total Residual Chlorine	mg/L	<0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<0.1	< 0.1	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.1	< 0.1	5.0
22	Iron	mg/L	<0.10	< 0.10	3.0
23	Calcium	mg/L	90	95	--
24	Magnesium	mg/L	44	50	--
25	Percentage Sodium	%	33.2	36.5	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Bore Well (Dansoli Village)**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	26	28	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.25	7.3	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	3.2	5.0	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1345	1532	2100
6	Total volatile Solids	mg/L	2.0	3.1	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20° C)	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	578	624	1000
11	Sulphate	mg/L	157	165	300
12	Fluoride	mg/L	0.7	1.0	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	0.6	0.8	--
14	Total Residual Chlorine	mg/L	<1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<1	< 0.1	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	< 0.10	3.0
23	Calcium	mg/L	80	85	--
24	Magnesium	mg/L	48	53	--
25	Percentage Sodium	%	47.8	52.1	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Harsani Village**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	26	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.2	7.32	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4.1	5.3	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1213	1325	2100
6	Total volatile Solids	mg/L	1.7	2.0	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20° C)	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	244	251	1000
11	Sulphate	mg/L	48	53	300
12	Fluoride	mg/L	0.8	1.0	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	0.7	1.1	--
14	Total Residual Chlorine	mg/L	<0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<0.10	< 0.10	--
16	Phenolic Compound	mg/L	<0.10	<0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.1	< 0.1	5.0
22	Iron	mg/L	<0.10	<0.10	3.0
23	Calcium	mg/L	156	160	--
24	Magnesium	mg/L	80	89	--
25	Percentage Sodium	%	38.6	42.3	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Bore Well (Kosambdi Village)**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	26	28	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.21	7.33	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	1.6	2.1	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1323	1549	2100
6	Total volatile Solids	mg/L	0.8	1.0	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20° C)	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	802	854	1000
11	Sulphate	mg/L	144	151	300
12	Fluoride	mg/L	0.6	0.8	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	1.2	1.5	--
14	Total Residual Chlorine	mg/L	<0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<0.10	< 0.10	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	< 0.10	3.0
23	Calcium	mg/L	137	145	--
24	Magnesium	mg/L	80	84	--
25	Percentage Sodium	%	27.2	30.4	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent



## Six Monthly Variation in bore water Data

**Location: Bore Water (Anoi Village)**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	26	28	Shall not exceed 5°c above the receiving water temp
2	pH@ 25°C	pH unit	7.34	7.43	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	1.0	1.3	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1231	1425	2100
6	Total volatile Solids	mg/L	1.0	1.5	--
7	COD	mg/L	< 10	< 10	250
8	BOD (5 days at 20° C)	mg/L	< 4	< 4	30
9	Oil & Grease	mg/L	< 1	< 1	10
10	Chloride	mg/L	511	572	1000
11	Sulphate	mg/L	97	120	300
12	Fluoride	mg/L	0.5	0.3	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	1.0	0.8	--
14	Total Residual Chlorine	mg/L	< 0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	< 0.1	< 0.1	--
16	Phenolic Compound	mg/L	< 0.01	< 0.01	1.0
17	Lead	mg/L	< 0.02	< 0.02	0.1
18	Copper	mg/L	< 0.5	< 0.5	3.0
19	Hexavalent Chromium	mg/L	< 0.03	< 0.03	0.1
20	Total Chromium	mg/L	< 0.03	< 0.03	2.0
21	Zinc	mg/L	< 0.1	< 0.1	5.0
22	Iron	mg/L	< 0.1	< 0.1	3.0
23	Calcium	mg/L	87	98	--
24	Magnesium	mg/L	32	36	--
25	Percentage Sodium	%	21.4	23.1	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Mine Water Sump – 1 (Vastan Village)**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	27	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 °C	pH unit	7.32	7.41	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	4.2	5.0	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1021	1231	2100
6	Total volatile Solids	mg/L	3.2	4.0	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20° C)	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	326	335	1000
11	Sulphate	mg/L	77	84	300
12	Fluoride	mg/L	0.8	0.7	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	0.7	1.0	--
14	Total Residual Chlorine	mg/L	<0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<0.1	< 0.1	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.50	< 0.50	3.0
23	Calcium	mg/L	97	103	--
24	Magnesium	mg/L	38	42	--
25	Percentage Sodium	%	37.7	40.3	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Mine Water Sump – 2**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	27	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 °C	pH unit	7.35	7.43	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	1.8	2.2	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	879	945	2100
6	Total volatile Solids	mg/L	2.7	3.0	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20 °C )	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	157	161	1000
11	Sulphate	mg/L	87	91	300
12	Fluoride	mg/L	0.8	1.0	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	1.2	1.4	--
14	Total Residual Chlorine	mg/L	<0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<0.1	< 0.1	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	< 0.10	3.0
23	Calcium	mg/L	102	112	--
24	Magnesium	mg/L	57	61	--
25	Percentage Sodium	%	40.3	46.1	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

## Six Monthly Variation in bore water Data

**Location: Bore water (Mangrol Village)**

**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	26	28	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 °C	pH unit	7.34	7.54	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	3.6	4.7	100
5	Total Dissolved Solids (TDS) @180° C	mg/L	1021	1145	2100
6	Total volatile Solids	mg/L	1.7	2.1	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20 °C)	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	167	208	1000
11	Sulphate	mg/L	98	112	300
12	Fluoride	mg/L	0.6	0.8	2.0
13	Phosphate as PO <sub>4</sub> <sup>---</sup>	mg/L	0.8	1.0	--
14	Total Residual Chlorine	mg/L	<0.1	< 0.1	1.0
15	Free Available Chlorine	mg/L	<0.10	< 0.10	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	< 0.10	3.0
23	Calcium	mg/L	98	111	--
24	Magnesium	mg/L	48	51	--
25	Percentage Sodium	%	40.2	45.7	--
26	Total Coliform(MPN)	Present/ Absent	Absent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

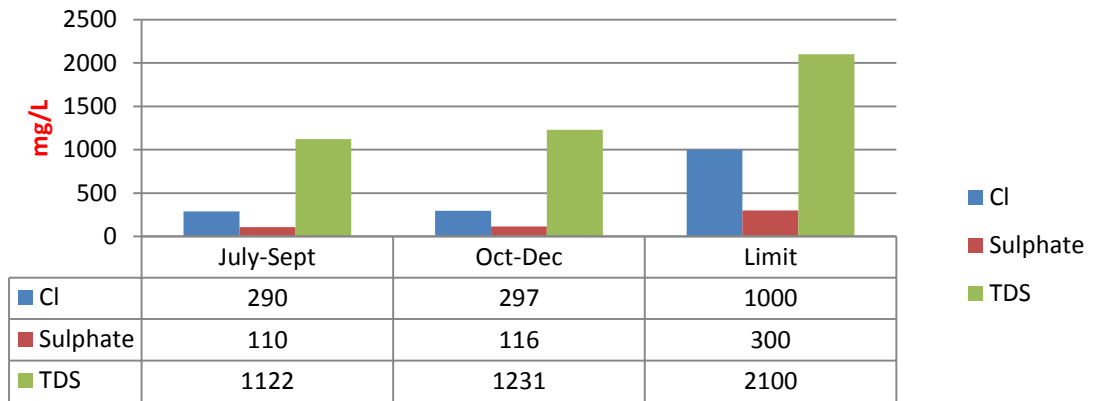
## Six Monthly Variation in bore water Data

**Location: Bore Well (Mosali Village)**

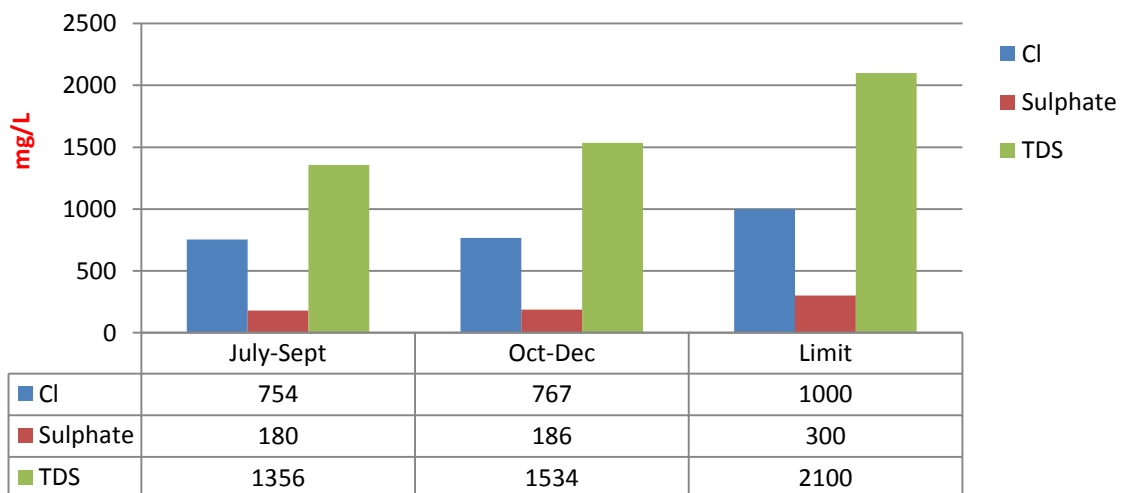
**Period: July – 2020 to December – 2020**

Sr. No.	Parameter	Unit	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020	MoEF Limit
1	Temperature	°C	26	29	Shall not exceed 5°c above the receiving water temp
2	pH@ 25 °C	pH unit	7.36	7.56	5.5-9.0
3	Colour	pt. Co. Scale	<5	< 5	--
4	Total Suspended Solids (TSS) @105 °C	mg/L	1.7	2.0	100
5	Total Dissolved Solids (TDS) @180 °C	mg/L	1356	1534	2100
6	Total volatile Solids	mg/L	2.0	2.3	--
7	COD	mg/L	<10	< 10	250
8	BOD (5 days at 20 °C)	mg/L	<4	< 4	30
9	Oil & Grease	mg/L	<1	< 1	10
10	Chloride	mg/L	754	767	1000
11	Sulphate	mg/L	180	186	300
12	Fluoride	mg/L	0.7	0.8	2.0
13	Phosphate as PO <sub>4</sub> <sup>3-</sup>	mg/L	1.0	1.2	--
14	Total Residual Chlorine	mg/L	<0.10	< 0.10	1.0
15	Free Available Chlorine	mg/L	<0.10	< 0.10	--
16	Phenolic Compound	mg/L	<0.10	< 0.10	1.0
17	Lead	mg/L	<0.02	< 0.02	0.1
18	Copper	mg/L	<0.50	< 0.50	3.0
19	Hexavalent Chromium	mg/L	<0.03	< 0.03	0.1
20	Total Chromium	mg/L	<0.03	< 0.03	2.0
21	Zinc	mg/L	<0.10	< 0.10	5.0
22	Iron	mg/L	<0.10	< 0.10	3.0
23	Calcium	mg/L	131	137	--
24	Magnesium	mg/L	52	57	--
25	Percentage Sodium	%	37.8	41.5	--
26	Total Coliform(MPN)	Present/ Absent	ASbsent	Absent	--
27	Bioassay Test	% Survival of fish after 96 hrs in 100% effluent	100	100	90%Survival of fish in 96 Hours in 100% of effluent

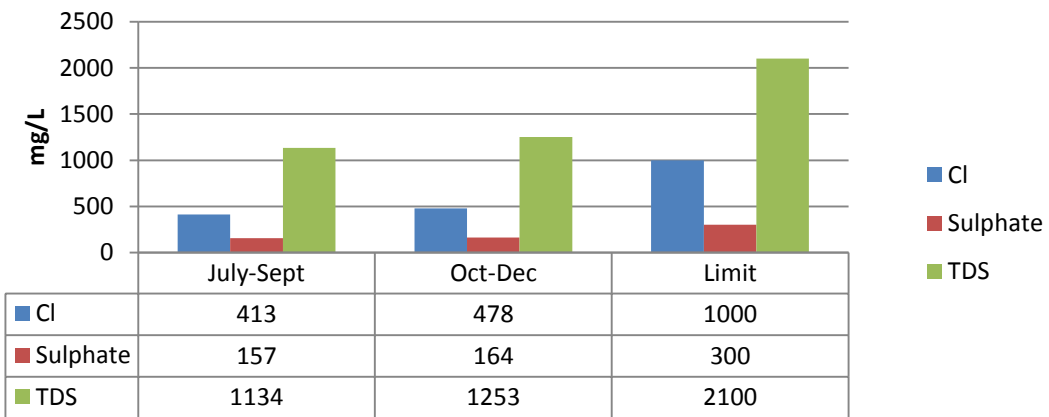
### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Shah Nallah village (Pond water)



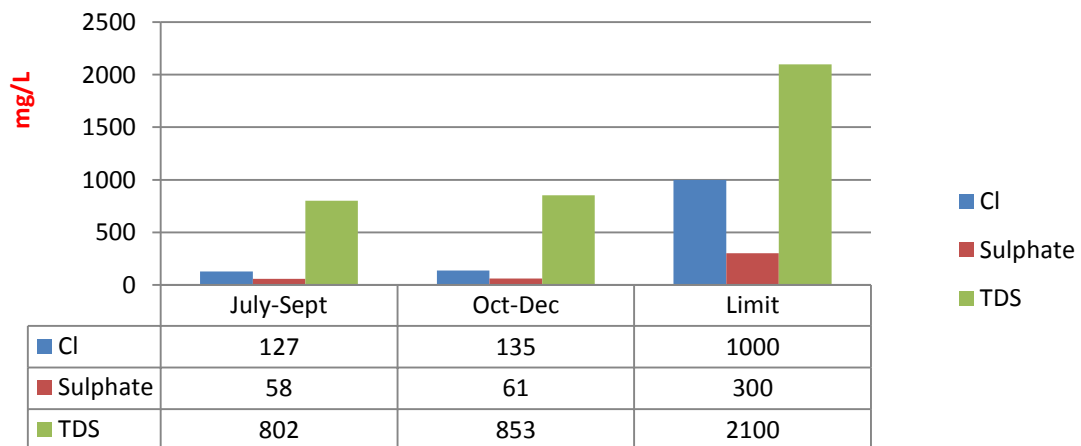
### Graphical Presentation for the parameters Chloride, Sulphate, TDS for : Bore Well (Mosali Village)



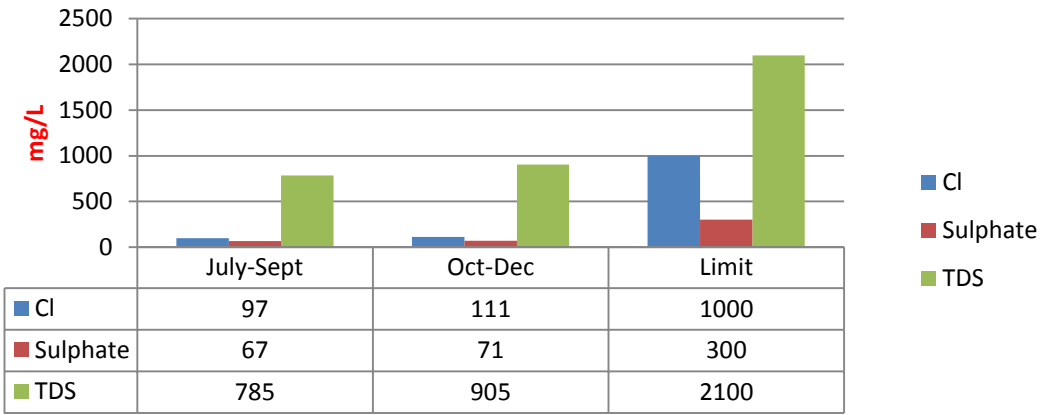
### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Bhaga Village (Valia Block)



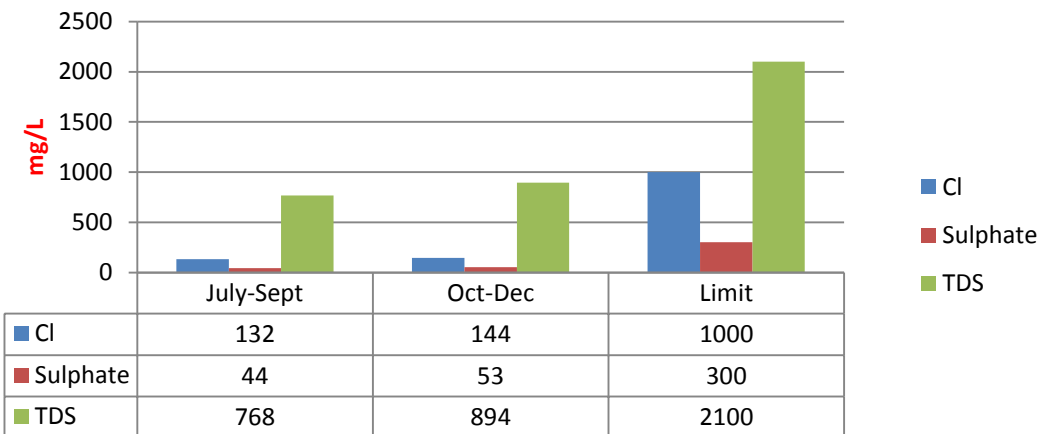
### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Shah Nallah village (Bore water)



### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Bore Well (Charetha Village)

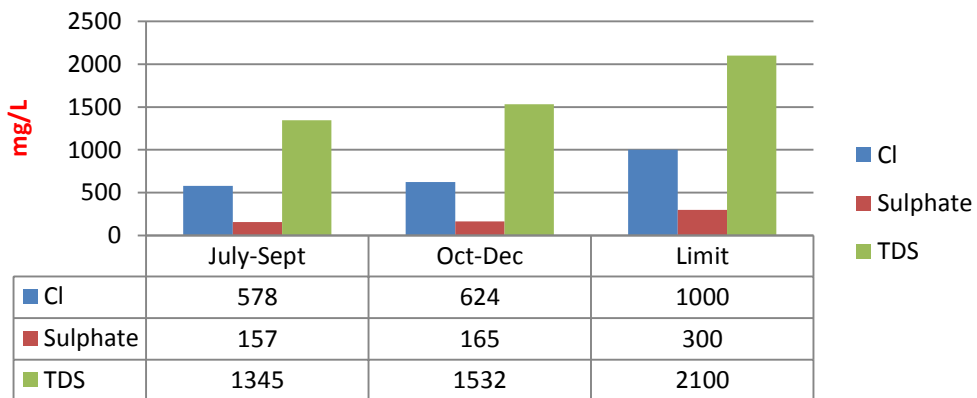


### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Charetha Village Down Stream

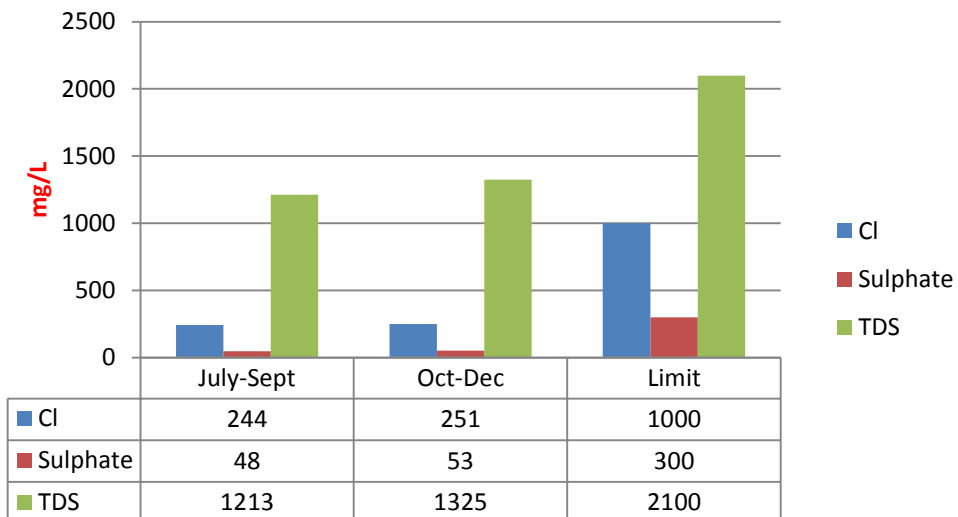




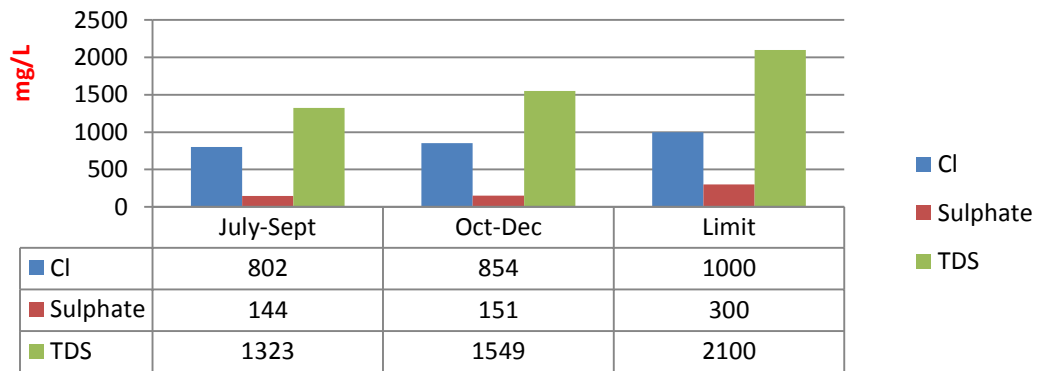
### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Bore Well (Dansoli Village)



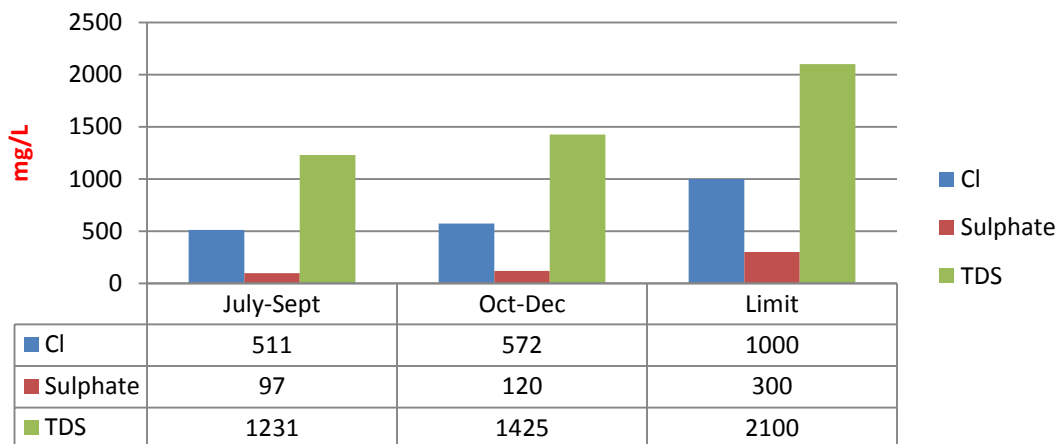
### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Harsani Village



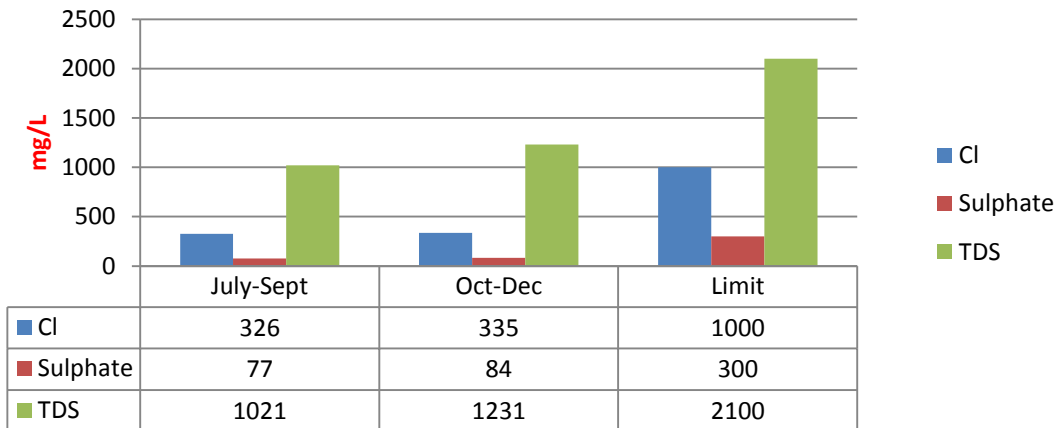
### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Bore Well (Kosambdi Village)



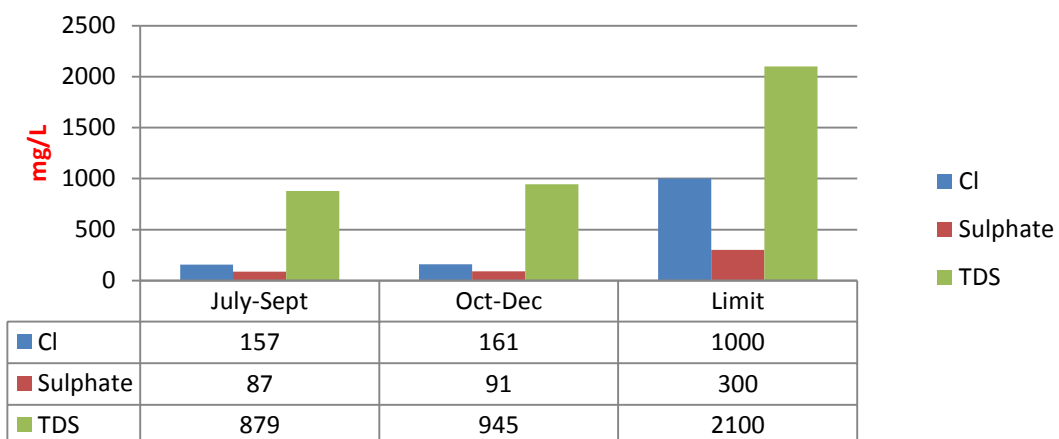
### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Bore Water (Anoi Village)



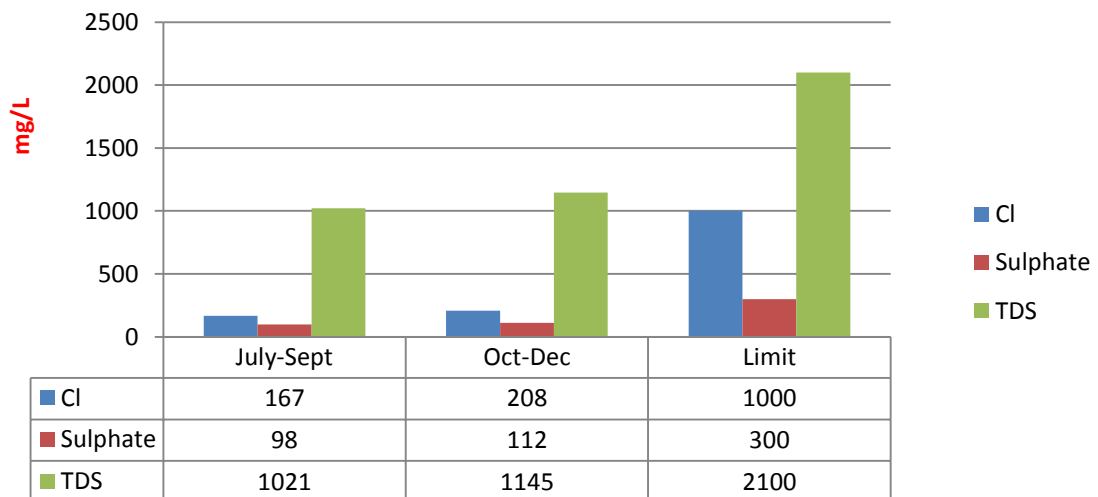
## Graphical Presentation for the parameters Chloride, Sulphate, TDS for Mine Water Sump – 1 (Vastan Village)



## Graphical Presentation for the parameters Chloride, Sulphate, TDS for Mine Water Sump – 2 (Vastan Village)



### Graphical Presentation for the parameters Chloride, Sulphate, TDS for Bore water (Mangrol Village)



## Six Monthly Variations in Noise Level Data

**Parameter: Noise**

**Period: July – 2020 to December – 2020**

SR. NO.	LOCATION	NOISE LEVEL, dB [A]							
		Quarterly July to Sept - 2020				Quarterly Oct to Dec - 2020			
		DAY Time		Night Time		DAY Time		Night Time	
		Max	Min	Max	Min	Max	Min	Max	Min
1	Bhaga Village	60.4	56.3	59.7	54.1	55.0	48.5	53.9	53.0
2	Kosamadi Village	55.3	51.8	56.3	51.2	51.3	46.8	50.1	46.8
3	Morambi Village	52.1	48.3	50.7	45.9	57.3	55.1	55.7	51.4
4	Lignite Cutting Area	55.3	50.6	54.3	50.2	60.2	56.2	58.7	55.9
5	Dump Area	61.7	56.3	60.3	56.7	66.3	61.9	63.4	58.3
6	Feeder Breaker	65.6	61.7	64.1	60.3	68.4	67.3	66.1	62.0
7	Harsani Village	56.3	51.3	55.3	51.7	55.3	50.1	53.2	50.3
8	Dansoli Village	54.8	50.8	53.1	49.3	58.6	53.7	57.7	56.5
	<b>GPCB limit</b>	<b>75 (dB)</b>		<b>70(dB)</b>		<b>75 (dB)</b>		<b>70(dB)</b>	



## Six Monthly Variations in Micro-meteorological data

Period: July – 2020 to December – 2020

Dry Bulb Temperature (°C)		
Time in Hrs.	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020
10.00	27.4	28.4
11.00	28.0	29.0
12.00	28.6	29.0
13.00	28.5	30.1
14.00	28.3	28.9
15.00	28.1	31.4
16.00	28.7	30.0
17.00	28.6	31.3
18.00	28.6	27.5
19.00	27	28.5
20.00	27.6	29.1
21.00	27.7	29.6
22.00	28.0	27.8
23.00	28.5	26.1
00.00	28.6	26.6
01.00	28.5	27.0
02.00	28.0	27.4
03.00	28.2	27.1
04.00	27.2	27.9
05.00	27.6	28.0
06.00	27.4	28.9
07.00	27.8	27.0
08.00	27.6	28.5
09.00	27.8	29.4
<b>Maximum</b>	<b>28.7</b>	<b>30.0</b>
<b>Minimum</b>	<b>27.0</b>	<b>24.0</b>
<b>Average</b>	<b>28.0</b>	<b>26.8</b>

## Six Monthly Variations in Micrometeorological data

Period : July – 2020 to December – 2020

<b>Wet Bulb Temperature (°C)</b>		
<b>Time in Hrs.</b>	<b>Quarterly July to Sept - 2020</b>	<b>Quarterly Oct to Dec - 2020</b>
10.00	24.2	27.5
11.00	25.7	27.0
12.00	26.8	28.0
13.00	25.2	29.1
14.00	26.4	26.4
15.00	26.0	29.0
16.00	26.3	28.5
17.00	25.8	30.0
18.00	26.1	27.0
19.00	24.8	28.0
20.00	25.4	27.9
21.00	25.2	27.0
22.00	26.0	25.0
23.00	25.7	24.1
00.00	25.8	24.0
01.00	26.2	25.4
02.00	25.7	25.0
03.00	26.3	25.2
04.00	24.8	25.8
05.00	24.1	25.9
06.00	24.5	25.0
07.00	24.8	26.8
08.00	24.1	27.9
09.00	24.0	28.1
<b>Maximum</b>	<b>26.8</b>	<b>30.0</b>
<b>Minimum</b>	<b>24.0</b>	<b>24.0</b>
<b>Average</b>	<b>24.0</b>	<b>26.8</b>



## Six Monthly Variations in Micrometeorological data

Period : July – 2020 to December – 2020

Relative Humidity %		
Time in Hrs.	Quarterly July to Sep - 2020	Quarterly Oct to Dec - 2020
10.00	89.3	78.4
11.00	88.1	77.8
12.00	87.4	70.8
13.00	86.7	72.4
14.00	85.2	75.4
15.00	85.1	74.8
16.00	84.0	75.1
17.00	84.3	77.6
18.00	84.2	72.0
19.00	85.7	72.6
20.00	86.0	75.8
21.00	86.9	78.4
22.00	87.2	82.7
23.00	87.0	84.2
00.00	87.1	86.7
01.00	87.4	84.1
02.00	87.0	83.9
03.00	87.6	83.1
04.00	86.8	80.9
05.00	86.9	78.4
06.00	86.3	77.8
07.00	85.4	70.8
08.00	85.1	68.4
09.00	85.4	64.5
<b>Maximum</b>	<b>89.3</b>	<b>86.7</b>
<b>Minimum</b>	<b>84.0</b>	<b>64.5</b>
<b>Average</b>	<b>86.4</b>	<b>76.8</b>

## Six Monthly Variations in Micrometeorological data

Period : July – 2020 to December – 2020

Wind Speed (km/hour)		
Time in Hrs.	Quarterly July to Sept - 2020	Quarterly Oct to Dec - 2020
10.00	32	14
11.00	25	12
12.00	22	10
13.00	21	11
14.00	27	9
15.00	26	8
16.00	27	8
17.00	28	18
18.00	30	14
19.00	31	12
20.00	32	10
21.00	33	11
22.00	30	16
23.00	29	18
00.00	28	14
01.00	25	12
02.00	22	10
03.00	27	11
04.00	28	9
05.00	29	8
06.00	30	8
07.00	27	9
08.00	28	11
09.00	26	11
<b>Maximum</b>	<b>33.0</b>	<b>18</b>
<b>Minimum</b>	<b>21.0</b>	<b>8.0</b>
<b>Average</b>	<b>27.6</b>	<b>11.5</b>