To,

The Member Secretary
Expert Appraisal Committee (Industry- II)
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhawan, Jor Bagh Road,
Ali Ganj, New Delhi - 110 003

Sub: Submission of Additional Document asked.

Dear Sir,
Our application for obtaining Environmental Clearance of our new Distillery unit was considered by the Hon'ble Committee in their 17th meeting held on 27th December, 2016 wherein some observations were made. Accordingly we are submitting herewith the reply as under:-

S. No.	**OBSERVATIONS**	**COMPLIANCE**
1	One month baseline data additionally for January 2017.	Enclosed as Document-I
2	Submit Final EIA and EMP report.	Enclosed herewith
3	Permission from CGWA to be submitted.	Enclosed as Document-II
4	Environmental Sensitivity of 10 km radius to be submitted.	No environmentally sensitive area is there around 10 km radius.

In view of the above compliance we are submitting the documents for consideration & issuing Environment Clearance of the project for expansion.

Thanking you.

Yours faithfully,
For Rock and Storm Distilleries (P) Limited,

(Authorized Signatory)

Document-I

CHANDIGARH POLLUTION TESTING LABORATORY
(Environmental Monitoring, EIA, NOC, ETP, STP)
Website : www.cptl.co.in
H.O. : #372, Sec. 15-A, Chandigarh-160 015 ☎ : 0172-4669295
Lab : E-126, Phase-VII, Indl. Area, Mohali - 160055 ☎ : 0172-5090312; e-mail : sital_cptlmohali@yahoo.co.in, cptle126@gmail.com, lab@cptl.co.in

ISO 14001:2004 EQUALITAS REGISTERED JAS-ANZ M4410210II
NABET accredited EIA consultant, MoEF & CC & PPCB recognized, ISO 9001 : 2008, ISO 14001:2004 and OHSAS 18001:2007 certified laboratory

TEST CERTIFICATE

NAME OF INDUSTRY: **M/s. ROCK & STROM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL- HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Type of Sample:	Ambient Air
Time period for sampling	1440 Minutes
Monitoring Period	02.01.2017-26.01.2017
Date of Reporting	31.01.2017
Sample Identification no.	CPTL/EC/2017/01(A)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and As per Requirements.
Sample Location	Project Site
Sample Collected By	R.K. Mukherjee & team

RESULTS

S. No.	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
1.	02.01.2017	68.8	29.8	12.5	5.3	0.52
2.	05.01.2017	59.1	25.4	13.4	5.5	0.50
3.	09.01.2017	64.2	30.4	13.8	6.1	0.50
4.	12.01.2017	62.8	28.6	14.4	5.4	0.51
5.	16.01.2017	63.5	31.4	15.1	6.5	0.53
6.	19.01.2017	61.9	30.1	15.3	6.8	0.53
7.	23.01.2017	59.7	29.8	12.8	6.1	0.52
8.	26.01.2017	62.6	26.4	14.8	5.8	0.51

(Chemist In-Charge)
Date: 31/01/2017

(Authorized Sign.)
Date: 31/01/2017

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TEST CERTIFICATE

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SAMPLE PARTICULARS

Type of Sample:	Ambient Air
Time period for sampling	1440 Minutes
Monitoring Period	02.01.2017-26.01.2017
Date of Reporting	31.01.2017
Sample Identification no.	CPTL/EC/2017/02(A)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and As per Requirements.
Sample Location	Jongpur
Sample Collected By	R.K. Mukherjee & team

RESULTS

S. No.	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
1.	02.01.2017	58.9	29.5	11.8	5.1	0.51
2.	05.01.2017	59.7	28.4	12.2	4.9	0.53
3.	09.01.2017	58.4	29.2	13.6	5.5	0.52
4.	12.01.2017	61.5	29.5	11.6	5.8	0.49
5.	16.01.2017	62.3	27.4	14.2	6.1	0.52
6.	19.01.2017	61.4	26.5	15.2	6.4	0.51
7.	23.01.2017	59.6	29.8	13.6	5.8	0.50
8.	26.01.2017	58.6	28.7	14.4	6.2	0.53

(Chemist In-Charge)
Date: 31/01/2017

(Authorized Sign.)
Date: 31/1/17

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TEST CERTIFICATE

NAME OF INDUSTRY: **M/s. ROCK & STROM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL- HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Type of Sample:	Ambient Air
Time period for sampling	1440 Minutes
Monitoring Period	02.01.2017-26.01.2017
Date of Reporting	31.01.2017
Sample Identification no.	CPTL/EC/2017/03(A)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and as per requirements.
Sample Location	Hiran
Sample Collected By	R.K. Mukherjee & team

RESULTS

S. No.	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
1.	02.01.2017	57.7	28.5	12.2	4.4	0.46
2.	05.01.2017	59.1	27.8	10.9	4.5	0.50
3.	09.01.2017	61.2	30.5	10.5	4.4	0.34
4.	12.01.2017	63.4	32.7	11.2	4.6	0.37
5.	16.01.2017	66.8	33.7	12.3	4.7	0.35
6.	19.01.2017	62.1	31.2	11.0	4.8	0.45
7.	23.01.2017	60.1	29.8	10.6	4.5	0.43
8.	26.01.2017	59.4	29.7	10.9	5.0	0.50

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TEST CERTIFICATE

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SAMPLE PARTICULARS

Type of Sample:	Ambient Air
Time period for sampling	1440 Minutes
Monitoring Period	03.01.2017-27.01.2017
Date of Reporting	31.01.2017
Sample Identification no.	CPTL/EC/2017/04(A)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and As per Requirements.
Sample Location	Makargarh
Sample Collected By	R.K. Mukherjee & team

RESULTS

S. No.	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
1.	03.01.2017	52.4	24.4	14.2	6.3	0.50
2.	06.01.2017	61.8	31.5	14.6	6.4	0.35
3.	10.01.2017	55.8	26.2	12.4	6.7	0.39
4.	13.01.2017	58.9	27.6	11.6	6.9	0.45
5.	17.01.2017	60.7	28.2	10.8	6.2	0.45
6.	20.01.2017	64.2	30.2	12.4	5.6	0.47
7.	24.01.2017	58.4	32.7	13.2	6.8	0.48
8.	27.01.2017	56.7	30.4	14.1	5.8	0.50

(Chemist In-Charge)
Date: 31/01/2017

(Authorized Sign.)
Date: 31/01/17

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TEST CERTIFICATE

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SAMPLE PARTICULARS

Type of Sample:	Ambient Air
Time period for sampling	1440 Minutes
Monitoring Period	03.01.2017-27.01.2017
Date of Reporting	31.01.2017
Sample Identification no.	CPTL/EC/2017/05(A)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and As per Requirements.
Sample Location	Bitan
Sample Collected By	R.K. Mukherjee & team

RESULTS

S. No.	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
1.	03.01.2017	65.7	27.4	14.2	4.5	0.45
2.	06.01.2017	67.4	29.1	15.4	4.6	0.48
3.	10.01.2017	69.4	30.6	13.6	4.5	0.45
4.	13.01.2017	66.9	29.7	14.2	5.1	0.55
5.	17.01.2017	64.8	28.5	16.4	5.3	0.52
6.	20.01.2017	62.2	30.1	13.8	5.4	0.54
7.	24.01.2017	58.3	28.9	14.1	5.5	0.45
8.	27.01.2017	65.6	24.2	15.2	5.6	0.50

(Chemist In-Charge)
Date: 31/01/2017

(Authorized Sign.)
Date: 31/1/17

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TEST CERTIFICATE

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SAMPLE PARTICULARS

Type of Sample:	Ambient Air
Time period for sampling	1440 Minutes
Monitoring Period	03.01.2017-27.01.2017
Date of Reporting	31.01.2017
Sample Identification no.	CPTL/EC/2017/06(A)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and As per Requirements.
Sample Location	Bathu
Sample Collected By	R.K. Mukherjee & team

RESULTS

S. No.	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
1.	03.01.2017	59.8	27.7	12.1	5.9	0.50
2.	06.01.2017	61.3	29.8	12.3	6.1	0.43
3.	10.01.2017	62.7	30.4	13.2	6.2	0.46
4.	13.01.2017	66.4	24.4	12.3	6.0	0.39
5.	17.01.2017	61.6	28.5	13.6	5.9	0.55
6.	20.01.2017	59.7	27.4	12.6	6.1	0.48
7.	24.01.2017	57.1	25.8	12.9	6.2	0.45
8.	27.01.2017	54.6	28.2	13.0	6.3	0.40

(Chemist In-Charge)
Date: 31/01/2017

(Authorized Sign.)
Date: 31/1/17

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SAMPLE PARTICULARS

Type of Sample:	Ambient Air
Time period for sampling	1440 Minutes
Monitoring Period	04.01.2017-28.01.2017
Date of Reporting	31.01.2017
Sample Identification no.	CPTL/EC/2017/07(A)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and As per Requirements.
Sample Location	Binewal
Sample Collected By	R.K. Mukherjee & team

RESULTS

S. No.	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
1.	04.01.2017	65.2	24.8	14.9	6.1	0.45
2.	07.01.2017	62.4	26.4	14.2	6.4	0.35
3.	11.01.2017	63.8	28.2	15.1	7.2	0.54
4.	14.01.2017	64.9	29.6	13.4	5.9	0.46
5.	18.01.2017	62.7	28.4	14.4	6.8	0.42
6.	21.01.2017	60.6	27.8	14.6	7.1	0.50
7.	25.01.2017	58.5	25.4	15.0	7.3	0.45
8.	28.01.2017	67.4	25.4	13.8	6.9	0.50

(Chemist In-Charge)
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SAMPLE PARTICULARS

Type of Sample:	Ambient Air
Time period for sampling	1440 Minutes
Monitoring Period	04.01.2017-28.01.2017
Date of Reporting	31.01.2017
Sample Identification no.	CPTL/EC/2017/08(A)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and As per Requirements
Sample Location	Mahindwani
Sample Collected By	R.K. Mukherjee & team

RESULTS

S. No.	Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
1.	04.01.2017	63.4	28.9	11.6	6.5	0.50
2.	07.01.2017	65.7	27.4	12.4	5.9	0.45
3.	11.01.2017	68.4	28.8	13.2	6.6	0.35
4.	14.01.2017	64.6	32.6	12.8	6.2	0.50
5.	18.01.2017	61.1	31.3	13.1	6.8	0.45
6.	21.01.2017	58.7	29.3	12.7	7.0	0.52
7.	25.01.2017	65.4	28.7	11.8	6.9	0.54
8.	28.01.2017	62.6	24.6	12.4	7.1	0.45

(Chemist In-Charge)
Date: 31/01/2017

(Authorized Sign.)
Date: 31/1/17

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TEST CERTIFICATE

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SAMPLE PARTICULARS

Type of Sample:	Noise Level Monitoring
Monitoring Period	23.01.2017 to 24.01.2017
Date of Reporting	25.01.2017
Sample Identification no.	CPTL/EC/2017/01(N)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and as per requirements.
Sample Collected By	R.K. Mukherjee & team

RESULTS

S. No.	Station	Noise Levels in dB (A)	
		Day Time (Hourly)	Night time (Hourly)
1.	Project Site	50.2	42.2
2.	Jongpur	48.4	41.6
3.	Hiran	50.8	38.4
4.	Makargarh	52.6	36.2

(Chemist In-Charge)
Date: 25/01/2017

(Authorized Sign.)
Date: 25/01/17

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TEST CERTIFICATE

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SAMPLE PARTICULARS

Type of Sample:	Noise Level Monitoring
Monitoring Period	27.01.2017 to 28.01.2017
Date of Reporting	29.01.2017
Sample Identification no.	CPTL/EC/2017/02(N)
Sampling Protocol:	IS: 5182 (P-14) 2000, CPCB Guidelines and as per requirements
Sample Collected By	R.K. Mukherjee and team

RESULTS

S. No.	Station	Noise Levels in dB (A)	
		Day Time (Hourly)	Night time (Hourly)
5.	Bitan	50.6	41.2
6.	Bathu	48.4	38.5
7.	Binewal	52.1	36.4
8.	Mahindwani	51.8	38.2

(Chemist In-Charge)
Date: 29/01/2017

(Authorized Sign.)
Date: 29/01/2017

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TEST CERTIFICATE

NAME OF INDUSTRY: **M/s. ROCK & STORM DISTILLERIES PVT.LTD, VILL.-GOANDPUR JAICHAND, NICHLA & SINGA TEH.-HAROLI, DISTT. - UNA (H.P).**

SAMPLE PARTICULARS

Date of Sample Collection	11.01.2017
Sample Received in Lab	12.01.2017
Type of Sample	Surface water (Grab)
Point of Sample Collection	Swan river
Environmental Conditions	Normal
Quantity & Packaging	2.0 liters in plastic bottle, 300ml in BOD bottle & 250ml in sterilized glass bottle
Sample Identification No.	$CPTL_{(EC)}$/2017/01/07 (W)
Analysis Duration	12.01.2017 to 16.01.2017
Date of Reporting	17.01.2017
Sample Collected By	R.K. Mukherjee
Visual Observation	Clear and colorless

TEST RESULTS

S. No.	Parameters	Results	Test Method
1.	pH	7.08	APHA-4500-H^+ B, 22nd Edition- 2012.
2.	Color, HU	<5	APHA-2120 B, 22nd Edition-2012.
3.	Odour	Agreeable	APHA-2150 B, 22nd Edition-2012.
4.	Turbidity, NTU	<1	APHA-2130 B, 22nd Edition -2012.
5.	Total Dissolved Solids, mg/l	301.0	APHA-2540 C ,22nd Edition -2012.
6.	Dissolved Oxygen, mg/l	6.9	APHA-4500-O B, 22nd Edition-2012
7.	Chemical Oxygen Demand, mg/l	27.4	APHA -5220 B, 22nd Edition-2012
8.	BOD (at 27° C) for 3 days, mg/l	5.6	IS:3025 (Part -44) 1993
9.	Total Hardness (as $CaCO_3$), mg/l	202.9	APHA-2340 C, 22nd Edition-2012.
10.	Calcium (as Ca^{++}), mg/l	55.4	APHA-3500 Ca B,22nd Edition -2012.
11.	Magnesium (as Mg^{++}), mg/l	15.4	APHA-2340 B, 22nd Edition -2012.
12.	Total Alkalinity (as $CaCO_3$), mg/l	232.8	APHA-2320 B, 22nd Edition-2012.
13.	Chloride (as Cl), mg/l	21.3	APHA-4500 Cl'B, 22nd Edition -2012.
14.	Sulphate (as SO_4), mg/l	32.4	APHA-4500 E, 22nd Edition-2012.
15.	Iron (as Fe), mg/l	0.21	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.

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Sample Received in Lab	12.01.2017
Type of Sample	Surface water (Grab)
Sample Identification No.	$CPTL_{(EC)}$/2017/01/07 (W)

S. No.	Parameters	Results	Test Method
16.	Zinc (as Zn), mg/l	ND	APHA-3030 D, 22nd Edition -2012.
17.	Nitrate (as NO_3), mg/l	0.42	IS: 3025(Part-34), 1988, RA 2003.
18.	Total Chromium (as Cr), mg/l	ND	APHA-3111 B, 22nd Edition. -2012.
19.	Manganese (as Mn), mg/l	ND	APHA-3030D & 3111B, 22nd Edition -2012.
20.	Lead (as Pb), mg/l	ND	APHA-3030D & 3111B, 22nd Edition-2012.
21.	Copper (as Cu), mg/l	ND	APHA-3111B, 22nd Edition -2012.
22.	Mercury (as Hg), mg/l	ND	APHA-3500 Hg-B, 22nd Edition-2012.
23.	Boron (as B), mg/l	ND	APHA-4500B C, 22nd Edition-2012.
24.	Cadmium (as Cd), mg/l	ND	APHA-3030D & 3111B, 22nd Edition -2012.
25.	Fluoride (as F), mg/l	0.51	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
26.	E.coli, MPN/100ml	Present	IS : 1622-1981 ,MPN Method.
27.	Total Coliform, MPN/100ml	864	IS : 1622-1981 ,MPN Method.

(Chemist In-Charge)
Date: 17/1/17

(Authorized Sign)
Date: 17/01/17

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TEST CERTIFICATE

NAME OF INDUSTRY:	**M/S ROCK & STORM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL-HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Date of Sample Collection	09.01.2017
Type of Sample	Drinking water (Grab)
Point of Sample Collection	From Borewell – Project Site
Environmental Conditions	Normal
Quantity & Packaging	2.0 liters in plastic bottle & 250ml in sterilized glass bottle
Analysis Duration	10.01.2017 to 16.01.2017
Date of Reporting	16.01.2017
Sample Collected By	R.K. Mukherjee & team
Sampling Protocol	IS: 3025 (P-1) 1987 R1998 Amdt-1
Visual Observation	Clear and Colorless

TEST RESULTS

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
1.	pH	7.72	6.5-8.5	No relaxation	APHA-4500-H^+ B, 22nd Edition-2012.
2.	Color, HU, Hazen	<5	5	15	APHA-2120 B, 22nd Edition-2012.
3.	Turbidity	<1	1 Max.	5	APHA-2130 B, 22nd Edition -2012.
4.	Odour	Agreeable	Agreeable	Agreeable	APHA-2150 B, 22nd Edition-2012.
5.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 part 7 and 8
6.	Total Hardness as $CaCO_3$, mg/l	387	200 Max.	600	APHA-2340 C, 22nd Edition-2012.
7.	Calcium as Ca, mg/l	85.6	75 Max.	200	APHA-3500 Ca B,22nd Edition -2012.
8.	Alkalinity as $CaCO_3$, mg/l	369	200 Max.	600	APHA-2320 B, 22nd Edition-2012.
9.	Chloride as Cl, mg/l	68.8	250 Max.	1000	APHA-4500 Cl' B, 22nd Edition -2012.
10.	Magnesium as Mg, mg/l	41.2	30 Max.	100	APHA-2340 B, 22nd Edition -2012.
11.	Total Dissolved Solids, mg/l	537	500 Max.	2000	APHA-2540 C ,22nd Edition -2012.
12.	Sulphate as SO_4, mg/l	54.3	200 Max.	400	APHA-4500 E ,22nd Edition-2012.
13.	Fluoride as F, mg/l	0.43	1.0 Max.	1.5	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
14.	Nitrate as NO_3, mg/l	ND	45 Max	No relaxation	IS: 3025 (Part-34), 1988, RA 2003.
15.	Iron as Fe, mg/l	0.19	0.3 Max.	No relaxation	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.

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Sample Received in Lab	10.01.2017
Type of Sample	Drinking water (Grab)

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
16.	Aluminimum as Al, mg/l	BDL	0.03 Max.	0.2	APHA-3500 Al-B, 22nd Edition-2012.
17.	Boron as B, mg/l	ND	0.5 Max.	1.0	APHA-4500B C, 22nd Edition-2012.
18.	Phenolic Compounds, mg/l	BDL	0.001 Max.	0.002	APHA-5530 C, 22nd Edition-2012
19.	Mineral oil, mg/l	BDL	0.5	No relaxation	IS- 3025 (Part-39)
20.	Anionic Detergents as MBAS, mg/l	BDL	0.2	1.0	IS: 13428
21.	Zinc as Zn, mg/l	0.19	5 Max.	15	APHA-3030 D, 22nd Edition -2012.
22.	Copper as Cu, mg/l	0.02	0.05 Max.	1.5	APHA-3111B, 22nd Edition -2012.
23.	Manganese as Mn, mg/l	BDL	0.1 Max.	0.3	APHA-3030D & 3111B, 22nd Edition -2012.
24.	Cadmium as Cd, mg/l	BDL	0.003 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition -2012.
25.	Lead as Pb, mg/l	BDL	0.01 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition-2012.
26.	Selenium as Se, mg/l	BDL	0.01 Max.	No relaxation	APHA-3500 Se-A, 22nd Edition-2012.
27.	Arsenic as As, mg/l	BDL	0.01 Max.	0.05	APHA-3500 B, 22nd Edition-2012.
28.	Mercury as Hg, mg/l	BDL	0.001 Max.	No relaxation	APHA-3500 Hg-B, 22nd Edition-2012.
29.	E.coli, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS: 1622-1981, MPN Method.
30.	Total Coliform, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS: 1622-1981, MPN Method.

(Chemist In-Charge)
Date: 16/1/17

(Authorized Sign)
Date: 16/01/2017

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TEST CERTIFICATE

NAME OF INDUSTRY:	**M/S ROCK & STORM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL-HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Date of Sample Collection	09.01.2017
Type of Sample	Drinking water (Grab)
Point of Sample Collection	From Borewell – Jongpur
Environmental Conditions	Normal
Quantity & Packaging	2.0 liters in plastic bottle & 250ml in sterilized glass bottle
Analysis Duration	10.01.2017 to 16.01.2017
Date of Reporting	16.01.2017
Sample Collected By	R.K. Mukherjee & team
Sampling Protocol	IS: 3025 (P-1) 1987 R1998 Amdt-1
Visual Observation	Clear and Colorless

TEST RESULTS

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
1.	pH	7.51	6.5-8.5	No relaxation	APHA-4500-H^+ B, 22nd Edition-2012.
2.	Color, HU, Hazen	<5	5	15	APHA-2120 B, 22nd Edition-2012.
3.	Turbidity	<1	1 Max.	5	APHA-2130 B, 22nd Edition -2012.
4.	Odour	Agreeable	Agreeable	Agreeable	APHA-2150 B, 22nd Edition-2012.
5.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 part 7 and 8
6.	Total Hardness as $CaCO_3$, mg/l	415	200 Max.	600	APHA-2340 C, 22nd Edition-2012.
7.	Calcium as Ca, mg/l	105.6	75 Max.	200	APHA-3500 Ca B,22nd Edition -2012.
8.	Alkalinity as $CaCO_3$, mg/l	392	200 Max.	600	APHA-2320 B, 22nd Edition-2012.
9.	Chloride as Cl, mg/l	72.5	250 Max.	1000	APHA-4500 Cl' B, 22nd Edition -2012.
10.	Magnesium as Mg, mg/l	36.0	30 Max.	100	APHA-2340 B, 22nd Edition -2012.
11.	Total Dissolved Solids, mg/l	598	500 Max.	2000	APHA-2540 C ,22nd Edition -2012.
12.	Sulphate as SO_4, mg/l	83.9	200 Max.	400	APHA-4500 E ,22nd Edition-2012.
13.	Fluoride as F, mg/l	0.60	1.0 Max.	1.5	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
14.	Nitrate as NO_3, mg/l	ND	45 Max	No relaxation	IS: 3025 (Part-34), 1988, RA 2003.
15.	Iron as Fe, mg/l	0.24	0.3 Max.	No relaxation	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.

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Sample Received in Lab	10.01.2017
Type of Sample	Drinking water (Grab)

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
16.	Aluminimum as Al, mg/l	BDL	0.03 Max.	0.2	APHA-3500 Al-B, 22nd Edition-2012.
17.	Boron, mg/l	ND	0.5 Max.	1.0	APHA-4500B C, 22nd Edition-2012.
18.	Phenolic Compounds, mg/l	BDL	0.001 Max.	0.002	APHA-5530 C, 22nd Edition-2012
19.	Mineral oil, mg/l	BDL	0.5	No relaxation	IS- 3025 (Part-39)
20.	Anionic Detergents as MBAS, mg/l	BDL	0.2	1.0	IS: 13428
21.	Zinc as Zn, mg/l	0.25	5 Max.	15	APHA-3030 D, 22nd Edition -2012.
22.	Copper as Cu, mg/l	ND	0.05 Max.	1.5	APHA-3111B, 22nd Edition -2012.
23.	Manganese as Mn, mg/l	BDL	0.1 Max.	0.3	APHA-3030D & 3111B, 22nd Edition -2012.
24.	Cadmium as Cd, mg/l	BDL	0.003 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition -2012.
25.	Lead as Pb, mg/l	BDL	0.01 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition-2012.
26.	Selenium as Se, mg/l	BDL	0.01 Max.	No relaxation	APHA-3500 Se-A, 22nd Edition-2012.
27.	Arsenic as As, mg/l	BDL	0.01 Max.	0.05	APHA-3500 B, 22nd Edition-2012.
28.	Mercury as Hg, mg/l	BDL	0.001 Max.	No relaxation	APHA-3500 Hg-B, 22nd Edition-2012.
29.	E.coli, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.
30.	Total Coliform, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.

(Chemist-In-Charge)
Date: 16/1/17

(Authorized Sign)
Date: 16/01/2017

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TEST CERTIFICATE

NAME OF INDUSTRY:	**M/S ROCK & STORM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL-HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Date of Sample Collection	09.01.2017
Type of Sample	Drinking water (Grab)
Point of Sample Collection	From Borewell – Hiran Village
Environmental Conditions	Normal
Quantity & Packaging	2.0 liters in plastic bottle & 250ml in sterilized glass bottle
Analysis Duration	10.01.2017 to 16.01.2017
Date of Reporting	16.01.2017
Sample Collected By	R.K. Mukherjee & team
Sampling Protocol	IS: 3025 (P-1) 1987 R1998 Amdt-1
Visual Observation	Clear and Colorless

TEST RESULTS

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
1.	pH	7.51	6.5-8.5	No relaxation	APHA-4500-H^+ B, 22nd Edition-2012.
2.	Color, HU, Hazen	<5	5	15	APHA-2120 B, 22nd Edition-2012.
3.	Turbidity	<1	1 Max.	5	APHA-2130 B, 22nd Edition -2012.
4.	Odour	Agreeable	Agreeable	Agreeable	APHA-2150 B, 22nd Edition-2012.
5.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 part 7 and 8
6.	Total Hardness as $CaCO_3$, mg/l	470	200 Max.	600	APHA-2340 C, 22nd Edition-2012.
7.	Calcium as Ca, mg/l	127.2	75 Max.	200	APHA-3500 Ca B,22nd Edition -2012.
8.	Alkalinity as $CaCO_3$, mg/l	371	200 Max.	600	APHA-2320 B, 22nd Edition-2012.
9.	Chloride as Cl, mg/l	89.7	250 Max.	1000	APHA-4500 Cl'B, 22nd Edition -2012.
10.	Magnesium as Mg, mg/l	36.4	30 Max.	100	APHA-2340 B, 22nd Edition -2012.
11.	Total Dissolved Solids, mg/l	632	500 Max.	2000	APHA-2540 C ,22nd Edition -2012.
12.	Sulphate as SO_4, mg/l	42.6	200 Max.	400	APHA-4500 E ,22nd Edition-2012.
13.	Fluoride as F, mg/l	0.51	1.0 Max.	1.5	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
14.	Nitrate as NO_3, mg/l	ND	45 Max	No relaxation	IS: 3025 (Part-34), 1988, RA 2003.
15.	Iron as Fe, mg/l	0.18	0.3 Max.	No relaxation	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.

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Sample Received in Lab	10.01.2017
Type of Sample	Drinking water (Grab)

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
16.	Aluminimum as Al, mg/l	BDL	0.03 Max.	0.2	APHA-3500 Al-B, 22nd Edition-2012.
17.	Boron as B, mg/l	ND	0.5 Max.	1.0	APHA-4500B C, 22nd Edition-2012.
18.	Phenolic Compounds, mg/l	BDL	0.001 Max.	0.002	APHA-5530 C, 22nd Edition-2012
19.	Mineral oil, mg/l	BDL	0.5	No relaxation	IS- 3025 (Part-39)
20.	Anionic Detergents as MBAS, mg/l	BDL	0.2	1.0	IS: 13428
21.	Zinc as Zn, mg/l	0.41	5 Max.	15	APHA-3030 D, 22nd Edition -2012.
22.	Copper as Cu, mg/l	0.03	0.05 Max.	1.5	APHA-3111B, 22nd Edition -2012.
23.	Manganese as Mn, mg/l	BDL	0.1 Max.	0.3	APHA-3030D & 3111B, 22nd Edition -2012.
24.	Cadmium as Cd, mg/l	BDL	0.003 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition -2012.
25.	Lead as Pb, mg/l	BDL	0.01 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition-2012.
26.	Selenium as Se, mg/l	BDL	0.01 Max.	No relaxation	APHA-3500 Se-A, 22nd Edition-2012.
27.	Arsenic as As, mg/l	BDL	0.01 Max.	0.05	APHA-3500 B, 22nd Edition-2012.
28.	Mercury as Hg, mg/l	BDL	0.001 Max.	No relaxation	APHA-3500 Hg-B, 22nd Edition-2012.
29.	E.coli, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.
30.	Total Coliform, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.

(Chemist In-Charge)
Date: 16/1/17

(Authorized Sign)
Date: 16/01/17

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TEST CERTIFICATE

NAME OF INDUSTRY:	**M/S ROCK & STORM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL-HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Date of Sample Collection	09.01.2017
Type of Sample	Drinking water (Grab)
Point of Sample Collection	From Borewell – Makargarh Village
Environmental Conditions	Normal
Quantity & Packaging	2.0 liters in plastic bottle & 250ml in sterilized glass bottle
Analysis Duration	10.01.2017 to 16.01.2017
Date of Reporting	16.01.2017
Sample Collected By	R.K. Mukherjee & team
Sampling Protocol	IS: 3025 (P-1) 1987 R1998 Amdt-1
Visual Observation	Clear and Colorless

TEST RESULTS

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
1.	pH	7.58	6.5-8.5	No relaxation	APHA-4500-H^+ B, 22nd Edition-2012.
2.	Color, HU, Hazen	<5	5	15	APHA-2120 B, 22nd Edition-2012.
3.	Turbidity	<1	1 Max.	5	APHA-2130 B, 22nd Edition -2012.
4.	Odour	Agreeable	Agreeable	Agreeable	APHA-2150 B, 22nd Edition-2012.
5.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 part 7 and 8
6.	Total Hardness as $CaCO_3$, mg/l	242.5	200 Max.	600	APHA-2340 C, 22nd Edition-2012.
7.	Calcium as Ca, mg/l	66.4	75 Max.	200	APHA-3500 Ca B,22nd Edition -2012.
8.	Alkalinity as $CaCO_3$, mg/l	305.5	200 Max.	600	APHA-2320 B, 22nd Edition-2012.
9.	Chloride as Cl, mg/l	85.6	250 Max.	1000	APHA-4500 Cl'B, 22nd Edition -2012.
10.	Magnesium as Mg, mg/l	29.7	30 Max.	100	APHA-2340 B, 22nd Edition -2012.
11.	Total Dissolved Solids, mg/l	478	500 Max.	2000	APHA-2540 C ,22nd Edition -2012.
12.	Sulphate as SO_4, mg/l	62.7	200 Max.	400	APHA-4500 E ,22nd Edition-2012.
13.	Fluoride as F, mg/l	0.60	1.0 Max.	1.5	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
14.	Nitrate as NO_3, mg/l	ND	45 Max	No relaxation	IS: 3025 (Part-34), 1988, RA 2003.
15.	Iron as Fe, mg/l	0.19	0.3 Max.	No relaxation	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.

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ISO 14001:2004 EQUALITAS REGISTERED JAS-ANZ M4410210II
NABET accredited EIA consultant, MoEF & CC & PPCB recognized, ISO 9001 : 2008, ISO 14001:2004 and OHSAS 18001:2007 certified laboratory

Sample Received in Lab	10.01.2017
Type of Sample	Drinking water (Grab)

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
16.	Aluminimum as Al, mg/l	BDL	0.03 Max.	0.2	APHA-3500 Al-B, 22nd Edition-2012.
17.	Boron as B, mg/l	ND	0.5 Max.	1.0	APHA-4500B C, 22nd Edition-2012.
18.	Phenolic Compounds, mg/l	BDL	0.001 Max.	0.002	APHA-5530 C, 22nd Edition-2012
19.	Mineral oil, mg/l	BDL	0.5	No relaxation	IS- 3025 (Part-39)
20.	Anionic Detergents as MBAS, mg/l	BDL	0.2	1.0	IS: 13428
21.	Zinc as Zn, mg/l	0.22	5 Max.	15	APHA-3030 D, 22nd Edition -2012.
22.	Copper as Cu, mg/l	ND	0.05 Max.	1.5	APHA-3111B, 22nd Edition -2012.
23.	Manganese as Mn, mg/l	BDL	0.1 Max.	0.3	APHA-3030D & 3111B, 22nd Edition -2012.
24.	Cadmium as Cd, mg/l	BDL	0.003 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition -2012.
25.	Lead as Pb, mg/l	BDL	0.01 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition-2012.
26.	Selenium as Se, mg/l	BDL	0.01 Max.	No relaxation	APHA-3500 Se-A, 22nd Edition-2012.
27.	Arsenic as As, mg/l	BDL	0.01 Max.	0.05	APHA-3500 B, 22nd Edition-2012.
28.	Mercury as Hg, mg/l	BDL	0.001 Max.	No relaxation	APHA-3500 Hg-B, 22nd Edition-2012.
29.	E.coli, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.
30.	Total Coliform, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.

(Chemist In-Charge)
Date: 16/1/17

(Authorized Sign)
Date: 16/01/17

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NABET accredited EIA consultant, MoEF & CC & PPCB recognized, ISO 9001 : 2008, ISO 14001:2004 and OHSAS 18001:2007 certified laboratory

TEST CERTIFICATE

NAME OF INDUSTRY:	**M/S ROCK & STORM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL-HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Date of Sample Collection	13.01.2017
Type of Sample	Drinking water (Grab)
Point of Sample Collection	From Borewell – Bitan Village
Environmental Conditions	Normal
Quantity & Packaging	2.0 liters in plastic bottle & 250ml in sterilized glass bottle
Analysis Duration	14.01.2017 to 19.01.2017
Date of Reporting	19.01.2017
Sample Collected By	R.K. Mukherjee & team
Sampling Protocol	IS: 3025 (P-1) 1987 R1998 Amdt-1
Visual Observation	Clear and Colorless

TEST RESULTS

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
1.	pH	7.58	6.5-8.5	No relaxation	APHA-4500-H^+ B, 22nd Edition-2012.
2.	Color, HU, Hazen	<5	5	15	APHA-2120 B, 22nd Edition-2012.
3.	Turbidity	<1	1 Max.	5	APHA-2130 B, 22nd Edition -2012.
4.	Odour	Agreeable	Agreeable	Agreeable	APHA-2150 B, 22nd Edition-2012.
5.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 part 7 and 8
6.	Total Hardness as $CaCO_3$, mg/l	218	200 Max.	600	APHA-2340 C, 22nd Edition-2012.
7.	Calcium as Ca, mg/l	48.8	75 Max.	200	APHA-3500 Ca B,22nd Edition -2012.
8.	Alkalinity as $CaCO_3$, mg/l	255	200 Max.	600	APHA-2320 B, 22nd Edition-2012.
9.	Chloride as Cl, mg/l	69.2	250 Max.	1000	APHA-4500 Cl'B, 22nd Edition -2012.
10.	Magnesium as Mg, mg/l	23.0	30 Max.	100	APHA-2340 B, 22nd Edition -2012.
11.	Total Dissolved Solids, mg/l	330.0	500 Max.	2000	APHA-2540 C ,22nd Edition -2012.
12.	Sulphate as SO_4, mg/l	39.8	200 Max.	400	APHA-4500 E ,22nd Edition-2012.
13.	Fluoride as F, mg/l	0.62	1.0 Max.	1.5	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
14.	Nitrate as NO_3, mg/l	ND	45 Max	No relaxation	IS: 3025 (Part-34), 1988, RA 2003.
15.	Iron as Fe, mg/l	0.13	0.3 Max.	No relaxation	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.

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NABET accredited EIA consultant, MoEF & CC & PPCB recognized, ISO 9001 : 2008, ISO 14001:2004 and OHSAS 18001:2007 certified laboratory

Sample Received in Lab	14.01.2017
Type of Sample	Drinking water (Grab)

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
16.	Aluminimum as Al, mg/l	BDL	0.03 Max.	0.2	APHA-3500 Al-B, 22nd Edition-2012.
17.	Boron as B, mg/l	ND	0.5 Max.	1.0	APHA-4500B C, 22nd Edition-2012.
18.	Phenolic Compounds, mg/l	BDL	0.001 Max.	0.002	APHA-5530 C, 22nd Edition-2012
19.	Mineral oil, mg/l	BDL	0.5	No relaxation	IS- 3025 (Part-39)
20.	Anionic Detergents as MBAS, mg/l	BDL	0.2	1.0	IS: 13428
21.	Zinc as Zn, mg/l	0.22	5 Max.	15	APHA-3030 D, 22nd Edition -2012.
22.	Copper as Cu, mg/l	ND	0.05 Max.	1.5	APHA-3111B, 22nd Edition -2012.
23.	Manganese as Mn, mg/l	BDL	0.1 Max.	0.3	APHA-3030D & 3111B, 22nd Edition -2012.
24.	Cadmium as Cd, mg/l	BDL	0.003 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition -2012.
25.	Lead as Pb, mg/l	BDL	0.01 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition-2012.
26.	Selenium as Se, mg/l	BDL	0.01 Max.	No relaxation	APHA-3500 Se-A, 22nd Edition-2012.
27.	Arsenic as As, mg/l	BDL	0.01 Max.	0.05	APHA-3500 B, 22nd Edition-2012.
28.	Mercury as Hg, mg/l	BDL	0.001 Max.	No relaxation	APHA-3500 Hg-B, 22nd Edition-2012.
29.	E.coli, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.
30.	Total Coliform, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.

(Chemist In-Charge)
Date: 19/1/17

(Authorized Sign)
Date: 19/01/2017

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NABET accredited EIA consultant, MoEF & CC & PPCB recognized, ISO 9001 : 2008, ISO 14001:2004 and OHSAS 18001:2007 certified laboratory

TEST CERTIFICATE

NAME OF INDUSTRY:	**M/S ROCK & STORM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL-HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Date of Sample Collection	13.01.2017
Type of Sample	Drinking water (Grab)
Point of Sample Collection	From Borewell – Bathu Village
Environmental Conditions	Normal
Quantity & Packaging	2.0 liters in plastic bottle & 250ml in sterilized glass bottle
Analysis Duration	14.01.2017 to 19.01.2017
Date of Reporting	19.01.2017
Sample Collected By	R.K. Mukherjee & team
Sampling Protocol	IS: 3025 (P-1) 1987 R1998 Amdt-1
Visual Observation	Clear and Colorless

TEST RESULTS

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
1.	pH	7.56	6.5-8.5	No relaxation	APHA-4500-H^+ B, 22nd Edition-2012.
2.	Color, HU, Hazen	<5	5	15	APHA-2120 B, 22nd Edition-2012.
3.	Turbidity	<1	1 Max.	5	APHA-2130 B, 22nd Edition -2012.
4.	Odour	Agreeable	Agreeable	Agreeable	APHA-2150 B, 22nd Edition-2012.
5.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 part 7 and 8
6.	Total Hardness as $CaCO_3$, mg/l	435	200 Max.	600	APHA-2340 C, 22nd Edition-2012.
7.	Calcium as Ca, mg/l	112.8	75 Max.	200	APHA-3500 Ca B,22nd Edition -2012.
8.	Alkalinity as $CaCO_3$, mg/l	426.8	200 Max.	600	APHA-2320 B, 22nd Edition-2012.
9.	Chloride as Cl, mg/l	92.8	250 Max.	1000	APHA-4500 Cl'B, 22nd Edition -2012.
10.	Magnesium as Mg, mg/l	36.4	30 Max.	100	APHA-2340 B, 22nd Edition -2012.
11.	Total Dissolved Solids, mg/l	618	500 Max.	2000	APHA-2540 C ,22nd Edition -2012.
12.	Sulphate as SO_4, mg/l	62.8	200 Max.	400	APHA-4500 E ,22nd Edition-2012.
13.	Fluoride as F, mg/l	0.58	1.0 Max.	1.5	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
14.	Nitrate as NO_3, mg/l	ND	45 Max	No relaxation	IS: 3025 (Part-34), 1988, RA 2003.
15.	Iron as Fe, mg/l	0.28	0.3 Max.	No relaxation	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.

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Sample Received in Lab	14.01.2017
Type of Sample	Drinking water (Grab)

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
16.	Aluminimum as Al, mg/l	BDL	0.03 Max.	0.2	APHA-3500 Al-B, 22nd Edition-2012.
17.	Boron as B, mg/l	ND	0.5 Max.	1.0	APHA-4500B C, 22nd Edition-2012.
18.	Phenolic Compounds, mg/l	BDL	0.001 Max.	0.002	APHA-5530 C, 22nd Edition-2012
19.	Mineral oil, mg/l	BDL	0.5	No relaxation	IS- 3025 (Part-39)
20.	Anionic Detergents as MBAS, mg/l	BDL	0.2	1.0	IS: 13428
21.	Zinc as Zn, mg/l	0.28	5 Max.	15	APHA-3030 D, 22nd Edition -2012.
22.	Copper as Cu, mg/l	ND	0.05 Max.	1.5	APHA-3111B, 22nd Edition -2012.
23.	Manganese as Mn, mg/l	BDL	0.1 Max.	0.3	APHA-3030D & 3111B, 22nd Edition -2012.
24.	Cadmium as Cd, mg/l	BDL	0.003 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition -2012.
25.	Lead as Pb, mg/l	BDL	0.01 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition-2012.
26.	Selenium as Se, mg/l	BDL	0.01 Max.	No relaxation	APHA-3500 Se-A, 22nd Edition-2012.
27.	Arsenic as As, mg/l	BDL	0.01 Max.	0.05	APHA-3500 B, 22nd Edition-2012.
28.	Mercury as Hg, mg/l	BDL	0.001 Max.	No relaxation	APHA-3500 Hg-B, 22nd Edition-2012.
29.	E.coli, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.
30.	Total Coliform, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.

(Chemist-In-Charge)
Date: 19/1/17

(Authorized Sign)
Date: 19/01/17

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TEST CERTIFICATE

NAME OF INDUSTRY:	**M/S ROCK & STORM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL-HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Date of Sample Collection	13.01.2017
Type of Sample	Drinking water (Grab)
Point of Sample Collection	From Borewell – Binewal Village
Environmental Conditions	Normal
Quantity & Packaging	2.0 liters in plastic bottle & 250ml in sterilized glass bottle
Analysis Duration	14.01.2017 to 19.01.2017
Date of Reporting	19.01.2017
Sample Collected By	R.K. Mukherjee & team
Sampling Protocol	IS: 3025 (P-1) 1987 R1998 Amdt-1
Visual Observation	Clear and Colorless

TEST RESULTS

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
1.	pH	7.49	6.5-8.5	No relaxation	APHA-4500-H^+ B, 22nd Edition-2012.
2.	Color, HU, Hazen	<5	5	15	APHA-2120 B, 22nd Edition-2012.
3.	Turbidity	<1	1 Max.	5	APHA-2130 B, 22nd Edition -2012.
4.	Odour	Agreeable	Agreeable	Agreeable	APHA-2150 B, 22nd Edition-2012.
5.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 part 7 and 8
6.	Total Hardness as $CaCO_3$, mg/l	362	200 Max.	600	APHA-2340 C, 22nd Edition-2012.
7.	Calcium as Ca, mg/l	88.8	75 Max.	200	APHA-3500 Ca B,22nd Edition -2012.
8.	Alkalinity as $CaCO_3$, mg/l	327	200 Max.	600	APHA-2320 B, 22nd Edition-2012.
9.	Chloride as Cl, mg/l	56.8	250 Max.	1000	APHA-4500 Cl'B, 22nd Edition -2012.
10.	Magnesium as Mg, mg/l	59.7	30 Max.	100	APHA-2340 B, 22nd Edition -2012.
11.	Total Dissolved Solids, mg/l	492	500 Max.	2000	APHA-2540 C ,22nd Edition -2012.
12.	Sulphate as SO_4, mg/l	45.9	200 Max.	400	APHA-4500 E ,22nd Edition-2012.
13.	Fluoride as F, mg/l	0.84	1.0 Max.	1.5	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
14.	Nitrate as NO_3, mg/l	ND	45 Max	No relaxation	IS: 3025 (Part-34), 1988, RA 2003.
15.	Iron as Fe, mg/l	0.19	0.3 Max.	No relaxation	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.

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NABET accredited EIA consultant, MoEF & CC & PPCB recognized, ISO 9001 : 2008, ISO 14001:2004 and OHSAS 18001:2007 certified laboratory

Sample Received in Lab	14.01.2017
Type of Sample	Drinking water (Grab)

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
16.	Aluminimum as Al, mg/l	BDL	0.03 Max.	0.2	APHA-3500 Al-B, 22nd Edition-2012.
17.	Boron as B, mg/l	ND	0.5 Max.	1.0	APHA-4500B C, 22nd Edition-2012.
18.	Phenolic Compounds, mg/l	BDL	0.001 Max.	0.002	APHA-5530 C, 22nd Edition-2012
19.	Mineral oil, mg/l	BDL	0.5	No relaxation	IS- 3025 (Part-39)
20.	Anionic Detergents as MBAS, mg/l	BDL	0.2	1.0	IS: 13428
21.	Zinc as Zn, mg/l	0.29	5 Max.	15	APHA-3030 D, 22nd Edition -2012.
22.	Copper as Cu, mg/l	0.03	0.05 Max.	1.5	APHA-3111B, 22nd Edition -2012.
23.	Manganese as Mn, mg/l	BDL	0.1 Max.	0.3	APHA-3030D & 3111B, 22nd Edition -2012.
24.	Cadmium as Cd, mg/l	BDL	0.003 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition -2012.
25.	Lead as Pb, mg/l	BDL	0.01 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition-2012.
26.	Selenium as Se, mg/l	BDL	0.01 Max.	No relaxation	APHA-3500 Se-A, 22nd Edition-2012.
27.	Arsenic as As, mg/l	BDL	0.01 Max.	0.05	APHA-3500 B, 22nd Edition-2012.
28.	Mercury as Hg, mg/l	BDL	0.001 Max.	No relaxation	APHA-3500 Hg-B, 22nd Edition-2012.
29.	E.coli, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.
30.	Total Coliform, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS : 1622-1981 ,MPN Method.

(Chemist In Charge)
Date: 19/1/17

(Authorized Sign)
Date: 19/01/2017

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TEST CERTIFICATE

NAME OF INDUSTRY:	**M/S ROCK & STORM DISTILLERIES (P) LIMITED, VILLAGE- GOANDPUR JAICHAND, NICHLA & SINGA, TEHSIL-HAROLI, DISTRICT-UNA (H.P.)**

SAMPLE PARTICULARS

Date of Sample Collection	13.01.2017
Type of Sample	Drinking water (Grab)
Point of Sample Collection	From Borewell – Mahindwani Village
Environmental Conditions	Normal
Quantity & Packaging	2.0 liters in plastic bottle & 250ml in sterilized glass bottle
Analysis Duration	14.01.2017 to 19.01.2017
Date of Reporting	19.01.2017
Sample Collected By	R.K. Mukherjee & team
Sampling Protocol	IS: 3025 (P-1) 1987 R1998 Amdt-1
Visual Observation	Clear and Colorless

TEST RESULTS

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
1.	pH	7.75	6.5-8.5	No relaxation	APHA-4500-H^+ B, 22nd Edition-2012.
2.	Color, HU, Hazen	<5	5	15	APHA-2120 B, 22nd Edition-2012.
3.	Turbidity	<1	1 Max.	5	APHA-2130 B, 22nd Edition -2012.
4.	Odour	Agreeable	Agreeable	Agreeable	APHA-2150 B, 22nd Edition-2012.
5.	Taste	Agreeable	Agreeable	Agreeable	IS 3025 part 7 and 8
6.	Total Hardness as $CaCO_3$, mg/l	193.0	200 Max.	600	APHA-2340 C, 22nd Edition-2012.
7.	Calcium as Ca, mg/l	46.4	75 Max.	200	APHA-3500 Ca B,22nd Edition -2012.
8.	Alkalinity as $CaCO_3$, mg/l	208	200 Max.	600	APHA-2320 B, 22nd Edition-2012.
9.	Chloride as Cl, mg/l	57.5	250 Max.	1000	APHA-4500 Cl' B, 22nd Edition -2012.
10.	Magnesium as Mg, mg/l	18.2	30 Max.	100	APHA-2340 B, 22nd Edition -2012.
11.	Total Dissolved Solids, mg/l	325	500 Max.	2000	APHA-2540 C ,22nd Edition -2012.
12.	Sulphate as SO_4, mg/l	32.9	200 Max.	400	APHA-4500 E ,22nd Edition-2012.
13.	Fluoride as F, mg/l	0.32	1.0 Max.	1.5	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
14.	Nitrate as NO_3, mg/l	ND	45 Max	No relaxation	IS: 3025 (Part-34), 1988, RA 2003.
15.	Iron as Fe, mg/l	0.25	0.3 Max.	No relaxation	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.

Page 1of 2

CHANDIGARH POLLUTION TESTING LABORATORY
(Environmental Monitoring, EIA, NOC, ETP, STP)
Website : www.cptl.co.in
H.O. : #372, Sec. 15-A, Chandigarh-160 015 ☎ : 0172-4669295
Lab : E-126, Phase-VII, Indl. Area, Mohali - 160055 ☎ : 0172-5090312; e-mail : sital_cptlmohali@yahoo.co.in, cptle126@gmail.com, lab@cptl.co.in

ISO 14001:2004 EQUALITAS REGISTERED JAS-ANZ M4410210II
NABET accredited EIA consultant, MoEF & CC & PPCB recognized, ISO 9001 : 2008, ISO 14001:2004 and OHSAS 18001:2007 certified laboratory

Sample Received in Lab	14.01.2017
Type of Sample	Drinking water (Grab)

S. No.	Parameters	Results	Acceptable Limit	Permissible Limit	Test Method
16.	Aluminimum as Al, mg/l	BDL	0.03 Max.	0.2	APHA-3500 Al-B, 22nd Edition-2012.
17.	Boron as B, mg/l	ND	0.5 Max.	1.0	APHA-4500B C, 22nd Edition-2012.
18.	Phenolic Compounds, mg/l	BDL	0.001 Max.	0.002	APHA-5530 C, 22nd Edition-2012
19.	Mineral oil, mg/l	BDL	0.5	No relaxation	IS- 3025 (Part-39)
20.	Anionic Detergents as MBAS, mg/l	BDL	0.2	1.0	IS: 13428
21.	Zinc as Zn, mg/l	0.30	5 Max.	15	APHA-3030 D, 22nd Edition -2012.
22.	Copper as Cu, mg/l	ND	0.05 Max.	1.5	APHA-3111B, 22nd Edition -2012.
23.	Manganese as Mn, mg/l	BDL	0.1 Max.	0.3	APHA-3030D & 3111B, 22nd Edition -2012.
24.	Cadmium as Cd, mg/l	BDL	0.003 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition -2012.
25.	Lead as Pb, mg/l	BDL	0.01 Max.	No relaxation	APHA-3030D & 3111B, 22nd Edition-2012.
26.	Selenium as Se, mg/l	BDL	0.01 Max.	No relaxation	APHA-3500 Se-A, 22nd Edition-2012.
27.	Arsenic as As, mg/l	BDL	0.01 Max.	0.05	APHA-3500 B, 22nd Edition-2012.
28.	Mercury as Hg, mg/l	BDL	0.001 Max.	No relaxation	APHA-3500 Hg-B, 22nd Edition-2012.
29.	E.coli, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS: 1622-1981, MPN Method.
30.	Total Coliform, MPN/100ml	Absent	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample	IS: 1622-1981, MPN Method.

(Chemist In-Charge)
Date: 19/1/17

(Authorized Sign)
Date: 19/01/2017

- The results are related to test items only.
- This certificate is not to be reproduced wholly or in part and cannot be used as evidence in the court of law.
- Sample will be destroyed after retention time unless otherwise specified.

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ISO 14001:2004 EQUALITAS REGISTERED JAS-ANZ M4410210II
NABET accredited EIA consultant, MoEF & CC & PPCB recognized, ISO 9001 : 2008, ISO 14001:2004 and OHSAS 18001:2007 certified laboratory

TEST CERTIFICATE

NAME OF INDUSTRY:	**M/s. ROCK & STORM DISTILLERIES PVT.LTD, VILL.-GOANDPUR JAICHAND, NICHLA & SINGA TEH.-HAROLI, DISTT. - UNA (H.P).**

SAMPLE PARTICULARS

Date of Sample Collection:	11-01-2017
Type of Sample:	Soil
Quantity & Packaging:	600 gm in plastic bag
Point of Sample Collection:	Project Site
Sample Identification No.:	**CPTL/2017/01/01(S)**
Analysis Duration:	12-01-2017 to 16-01-2017
Date of Reporting:	17-01-2017
Sample Collected By:	R.K Mukherjee
Visual Observation:	Brown lumps.

TEST RESULTS

S. No.	Test Parameters	Unit	Results	Test method
1.	pH **(1: 2.5)**	---	6.87	IS:2720 (P-26)1987, Reff 2007 CPTL/SP-46
2.	Electrical Conductivity **(1:2)**	µmhos/cm	0.628	IS : 14767:2000 conductivity meter CPTL/SP-47
3.	Soil Texture	---	Sandy loam	IS : 2720 (Part-4)1985
4.	Bulk Density	gm/cc	1.64	IS : 2720 (Part-8)- 1983 CPTL/SP-48
5.	Soil Moisture Content	%	35.9	USEPA Method
6.	Organic Matter	%	0.55	IS : 2720 (Part-22) 2001 CPTL/SP-56
7.	Calcium (as Ca)	mg/Kg	68.0	CPTL/SP-50, Issue Date-04-08-12
8.	Magnesium (as Mg)	mg/Kg	36.0	CPTL/SP-50, Issue Date-04-08-12
9.	Sodium (as Na)	mg/Kg	21.2	CPTL/SP-52, Issue Date-04-08-12
10.	Potassium (as K)	mg/Kg	8.2	CPTL/SP-52, Issue Date-04-08-12
11.	Available Phosphorous	Kg/hac	6.8	CPTL/SP-54, Issue Date-04-08-12

(Chemist In-Charge)
Date: 17/1/17

(Authorized Sign.)
Date: 17/01/2017

- The results are related to test items only.
- This certificate is not to be reproduced wholly or in part and cannot be used as evidence in the court of law.
- Sample will be destroyed after retention time unless otherwise specified.

Document-II

FORM-3
(See Rule 19 (3)
PERMIT FOR EXTRACTION AND AUGMENTATION OF THE GROUND WATER SOURCE
THE HIMACHAL PRADESH GROUND WATER AUTHORITY SHIMLA

Permit No. HPGWA-NU/388. **Dated:- 25.05.2016.**

The Himachal Pradesh Ground Water Authority Shimla exercising the powers vested in it under Sub-section (3) of Section 7 of the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Act, 2005 (Act No 31 of 2005) hereby grant a permit to **M/S Rock and Storm Distrilleries Pvt. Ltd., (Tube well No-I), Vill. Dullher, Tehsil Haroli, Distt. Una (H.P.)** to drill **one tube well** located at Latitude N 31°18'52.5" and Longitud E 76°13'55.6" in the area **Khata No. Khatauni No. Khasra No. 486 to 494, 881 to 883, 918 to 923, 926, 928, 1438 & 1439** of **Vill. Dullher, Tehsil Haroli, Distt. Una (H.P.)** for the use of ground water for **Industrial purpose** as you have fulfilled the requirement for issuance of permit subject to terms and conditions given hereunder:

(a) The applicant shall be allowed to extract maximum 10,00,000 Liter/day of ground water from above mentioned well.
(b) The applicant shall construct a rainwater harvesting structure for conservation and re-charge of ground water in his premises as per section-15 of the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Act, 2005 within six months and shall intimate Executive Engineer, IPH Division, No-I Una on its completion.
(c) The applicant shall have to pay royalty through Executive Engineer, IPH Division, No-I Una for the use of ground water to the Member Secretary, Himachal Pradesh Ground Water Authority as per the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Rules 2007 as per the log book of tube well.
(d) The applicant shall install **a water meter** on the ground water extraction pipe so as to check the water drawl at any time and will maintain its log book.
(e) The drilling of the tube well/bore well/shallow well shall be got done from a drilling firm duly registered with the Himachal Pradesh Ground water Authority and shall intimate the Executive Engineer, IPH Division, No-I Una before the start of drilling. The drilling work shall be completed within three months from the date of issuance of permit.
(f) The firm shall construct piezometer and equipped with DWLR of latest version within six months at the site which may be got selected from the Sr. Hydrogeologist, GWO, IPH Deptt. Una .
(g) The firm shall not use waste water of the Industry for recharging of Ground Water.
(h) The firm will run only one tube well at a time.

The permit holder is bound to develop and maintain the aforementioned source in an efficient, coordinated and economical manner and to use the water for the purpose for which permit has been given as well as all other provisions contained in the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Act- 2005 (Act No. 31 of 2005) and the rules framed there under; and the conditions of the permit issued or specified by this Authority.

Failing which the Authority shall have the full powers to withdraw the permit and forfeit the amount deposited as permit fee and royalty.

Given under the seal of Himachal Pradesh Ground Water Authority.

Place : Shimla
Dated : 25.05.2016.

Himachal Pradesh SEAL Ground Water Authority

Member Secretary
Member Secretary
H.P. Ground Water Authority Shimla

FORM-3
(See Rule 19 (3))
PERMIT FOR EXTRACTION AND AUGMENTATION OF THE GROUND WATER SOURCE
THE HIMACHAL PRADESH GROUND WATER AUTHORITY SHIMLA

Permit No. HPGWA-NU/389. **Dated:- 25.05.2016.**

The Himachal Pradesh Ground Water Authority Shimla exercising the powers vested in it under Sub-section (3) of Section 7 of the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Act, 2005 (Act No 31 of 2005) hereby grant a permit to **M/S Rock and Storm Distrilleries Pvt. Ltd., (Tube well No-2), Vill. Dullher, Tehsil Haroli, Distt. Una (H.P.)** to drill **one tube well** located at Latitude N 31°18'46.3" and Longitud E 76°13'58.2" in the area **Khata No. Khatauni No. Khasra No. 486 to 494, 881 to 883, 918 to 923, 926, 928, 1438 & 1439** of **Vill. Dullher, Tehsil Haroli, Distt. Una (H.P.)** for the use of ground water for **Industrial purpose** as you have fulfilled the requirement for issuance of permit subject to terms and conditions given hereunder:

(a) The applicant shall be allowed to extract maximum 10,00,000/day of ground water from above mentioned well.
(b) The applicant shall construct a rainwater harvesting structure for conservation and re-charge of ground water in his premises as per section-15 of the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Act, 2005 within six months and shall intimate Executive Engineer, IPH Division, No-I Una on its completion.
(c) The applicant shall have to pay royalty through Executive Engineer, IPH Division, No-I Una for the use of ground water to the Member Secretary, Himachal Pradesh Ground Water Authority as per the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Rules 2007 as per the log book of tube well.
(d) The applicant shall install **a water meter** on the ground water extraction pipe so as to check the water drawl at any time and will maintain its log book.
(e) The drilling of the tube well/bore well/shallow well shall be got done from a drilling firm duly registered with the Himachal Pradesh Ground water Authority and shall intimate the Executive Engineer, IPH Division, No-I Una before the start of drilling. The drilling work shall be completed within three months from the date of issuance of permit.
(f) The firm shall not use waste water of the Industry for recharging of Ground Water.
(g) The firm will run only one tube well at a time.

The permit holder is bound to develop and maintain the aforementioned source in an efficient, coordinated and economical manner and to use the water for the purpose for which permit has been given as well as all other provisions contained in the Himachal Pradesh Ground Water (Regulation and Control of Development and Management) Act- 2005 (Act No. 31 of 2005) and the rules framed there under; and the conditions of the permit issued or specified by this Authority.

Failing which the Authority shall have the full powers to withdraw the permit and forfeit the amount deposited as permit fee and royalty.

Given under the seal of Himachal Pradesh Ground Water Authority.

Place : Shimla
Dated : 25.05.2016.

Himachal Pradesh SEAL Ground Water Authority

Member Secretary
H.P. Ground Water Authority Shimla-9

ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PLAN

Proposed 100 KLD (Grain Based) Distillery At Village –Goandpur Jaichand, Nichla & Singa, Tehsil: Haroli, Distt. Una, Himachal Pradesh.

Study Period: Post Monsoon (1st Oct 2015 to 31st December 2015) and January, 2017

Applicant

M/s. Rock & Storm Distilleries (P) Limited
Village- Goandpur Jaichand, Nichla & Singa, Tehsil- Haroli and District- Una, Himachal Pradesh

Consultant

Mantras Green Resources Ltd.
(NABET/QCI Accredited Consultant)
Address: Hall No. 1, 1st Floor, NICE Sankul,
Plot No. A -9, Opp. Nashik Merchant Co- op Bank Ltd.,
ITI Signal, MIDC Satpur, Nasik-422007
E-mail: info@mantrasresources.com,
Tel.: 0253 2355665 / 2355086

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ABBREVIATIONS	
AAQM	Ambient Air Quality Monitoring
APCD	Air Pollution Control Devices
cm	Centimeter
CPCB	Central Pollution Control Board
dB	Decibel
DG	Diesel Generator
E	East
ECC	Emergency Control Centre
EIA	Environmental Impact Assessment
EMC	Environmental Management Cell
EMP	Environmental Management Plan
ENE	East Of North- East
EPA	Environmental Protection Agencies
ESE	East Of South East
ETP	Effluent treatment plant
FCC	False Colour Composite
GC	Gas Chromatography
GIS	Geological Information System
GLC	Ground level concentration
GPS	Global Positioning System
HPLC	High pressure Liquid Chromatography
IPA	Iso propyl alcohol
IMD	Indian Meteorological Department
IRS	Indian Remote Sensing Satellite
ISCST	Industrial Source Complex, Short Terms
ISO	International Organization Of Standardization
ISS	Indian Standard Specification
KLD	Kilo Litre Per Day
Km	Kilometer
KVA	Kilo Volt Ampere
KW	Kilo Watt
LISS	Linear Imaging Self Scanning Sensor
M	Meter
M bgl	Meter Below Ground Level
mg	Milligram
MoEF & CC	Ministry of Environment , Forest & Climate Change

mRL	Mean Reference Level
MSMEs	Micro, Small and Medium Enterprises
MT	Metric Tonne
MTPA	Million Tonns Per Annum
N	North
NE	North-East
NH	National Highway
NNE	North Of North-East
NNW	North Of North-West
NO_2	Nitrogen Dioxides
NTU	Naphelo Turbidity Unit
NW	North-West
OHSAS	Occupational Health & Safety Assessment
PPCB	Punjab Pollution Control Board
PPE	Personal Protective Equipment
PPM	Part Per Million
Pvt.	Private
R&R	Rehabilitation & Resettlement
RDS	Respirable Dust Sampler
RPM	Respirable Particulate Matter
RSPM	Respirable Suspended Particulate Matter
SE	South- East
SEIAA	State Level Environmental Assessment Authority
SO_2	Sulphur-di-Oxide
SOI	Survey Of India
SOPs	Standard Operating Procedures
SPCB	State Pollution Control Board
SPM	Suspended Particulate Matter
SSE	South Of South-East
SSW	South Of South-West
STP	Sewage Treatment plant
TAC	Traffic Advisory Committee
TPA	Tone Per Hour
TDS	Total Dissolve Solid
TOR	Terms Of Reference
TPH	Tones Per Hour

TS	Total Solid
US EPA	United State Environmental Protection Agencies
$\mu g/m^3$	Micro gram per meter cube
VOC	Volatile organic matter
w.e.f.	With Effective From
w.r.t.	With Reference To
W/W	Weight By Weight
WNW	West Of North-West
WSW	West Of South-West

J-11011/234/2015-IA II (I)
Government of India
Ministry of Environment, Forest and Climate Change
(I.A. Division)

Indira Paryavaran Bhawan
Aliganj, Jorbagh Road
New Delhi – 110 003

E-mail: lk.bokolia@nic.in
Telefax: 011-24695313
Dated: 17th May, 2016

To,

Shri Ashu Rattan Khare
Director
M/s Rock and Storm Distilleries Pvt. Ltd.
Office no. 11, Ground Floor,
Central Mall, Industrial Area, Phase-I,
Chandigarh- 160002

Email.: ashukhare@rockandstorm.com ; Fax.: 0172-4013640

Subject: Setting up of grain based Distillery (100 KLPD) at Village Goandpur Jai Chand, Tehsil Haroli, District Una, Himachal Pradesh by M/s Rock and Storm Distilleries Pvt. Ltd.- reg. TOR

Ref. No.: Your Proposal no. IA/HP/IND2/31171/2015; dated 21st September, 2015

Sir,

Kindly refer your proposal no. IA/HP/IND2/31171/2015 dated 21st September, 2015 along with project documents including Form-I, Pre-feasibility Report and draft 'Terms of Reference' as per the EIA Notification, 2006. It is noted that the proposal is for setting up of grain based Distillery (100 KLPD) at Village Goandpur Jai Chand, Tehsil Haroli, District Una, Himachal Pradesh by M/s Rock and Storm Distilleries Pvt. Ltd.

2.0 Draft Terms of Reference (TOR) have been discussed and finalized during 6th Expert Appraisal Committee (Industry-2) meeting held during 30th March- 2nd April, 2016 for preparation of EIA/EMP report. The Committee prescribed the following Specific and Additional TOR in addition to Generic TOR provided at Annexure-I (refer to Ministry's website) for preparation of EIA-EMP report:

A. Specific TOR

1. List of existing distillery units in the study area along with their capacity and sourcing of raw material.
2. Number of working days of the distillery unit.
3. Details of raw materials such as molasses/grains, their source with availability.
4. Details of the use of steam from the boiler.
5. Surface and Ground water quality around proposed spent wash storage lagoon, and compost yard.
6. Plan to reduce spent wash generation within 6-8 KL/KL of alcohol produced.
7. Proposed effluent treatment system for molasses/grain based distillery (spent wash, spent lees, condensate and utilities) as well as domestic sewage and scheme for achieving zero effluent discharge (ZLD).
8. Proposed action to restrict fresh water consumption within 10 KL/KL of alcohol production.
9. Details about capacity of spent wash holding tank, material used, design consideration. No. of peizometers to be proposed around spent wash holding tank.

10. Action plan to control ground water pollution.
11. Details of solid waste management including management of boiler ash, yeast, etc. Details of incinerated spent wash ash generation and its disposal.
12. Details of bio-composting yard (if applicable).
13. Action plan to control odour pollution.
14. Arrangements for installation of continuous online monitoring system (24x7 monitoring device)

B. Additional TOR

i. Public hearing to be conducted and issues raised and commitments made by the project proponent on the same should be included in EIA/EMP Report in the form of tabular chart with financial budget for complying with the commitments made.

ii. Permission from groundwater board to be obtained.

3.0 These 'TORs' should be considered for the preparation of EIA/EMP for setting up of grain based Distillery (100 KLPD) at Village Goandpur Jai Chand, Tehsil Haroli, District Una, Himachal Pradesh by M/s Rock and Storm Distilleries Pvt. Ltd. in addition to all the relevant information as per the 'General Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006. The EIA/EMP as per TORs should be submitted to the Chairman, Himachal Pradesh Pollution Control Board, for public consultation. The SPCB shall conduct the public hearing/public consultation as per the provisions of EIA notification, 2006.

4.0 You are requested to kindly submit the final EIA/EMP prepared as per TORs and incorporating all the issues raised during Public Hearing / Public Consultation to the Ministry for considering the proposal for environmental clearance ***within 3 years as per the MoEF O.M. No. J-11013/41/2006-IA.II (I) dated 8th October, 2014***. The TOR issued electronically on 27.01.2016 stands cancelled.

5.0 The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India/ National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s)/Laboratories including their status of approvals etc.

(Lalit Bokolia)
Additional Director

Copy to:

1 The Chairman, H. P. State Environment Protection & Pollution Control Board, Paryavaran Bhavan, Phase-III, New Shimla - 171 009, H.P.
2 Additional Principal Chief Conservator of Forests (C), Ministry of Environment, Forest and Climate Change, Regional Office (NCZ), Pearson Road, P.O. New Forest, Forest Research Institute (FRI) campus, Dehradun - 248006.

(Lalit Bokolia)
Additional Director

COMPLIANCE OF TOR

Point wise compliance of TOR points issued by Ministry of Environment, Forest and Climate Change, Impact Assessment Division, Government of India, New Delhi for proposed 100 KLPD grain based distillery (Rectified Sprit/ENA/Anhydrous Alcohol) at Village Goandpur Jaichand, & Singa, Tehsil Haroli and District Una, Himachal Pradesh by M/s. Rock & Storm Distilleries (P) Limited:

Compliance of TORs

S. No.	Item Description	Remarks/ Compliance
1.	**Executive Summary**	
2.	**Introduction**	
i.	Details of the EIA Consultant including NABET accreditation	M/s Mantras Green Resources Limited (MGRL), details provided on page no. 123.
ii.	Information about the project proponent	Provided on page no. 2.
iii.	Importance and benefits of the project	Provided on page no. 11.
3.	**Project Description**	
i.	Cost of project and time of completion.	Rs. 101.0 Crores; two year after EC.
ii.	Products with capacities for the proposed project.	Provided on page no. 20.
iii.	If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.	Not Applicable. It is a new Project.
iv.	List of raw materials required and their source along with mode of transportation.	Grains and Rice Husk is available from local market. Mode of transport would be road.
v.	Other chemicals and materials required with quantities and storage capacities.	Provided on page no. 15. Storage details are given in layout plan.
vi.	Details of Emission, effluents, hazardous waste generation and their management.	Provided on page no. 22.
vii.	Requirement of water, power with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)	Provided on page no. 20-21.
viii.	Process description along with major equipments and machineries, process flow sheet (quantitative) from raw material to	Provided on page no. 15-19.

	products to be provided.	
ix.	Hazard identification and details of proposed safety systems.	As this project is a proposed project. Hence, no risk at site. The future project risk assessment has been done and given in Chapter 7.
x.	**Expansion/ modernization proposals**	
a.	Copy of all the Environmental Clearance (s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing/ existing operation of the project from SPCB shall be attached with the EIA-EMP report.	Not Applicable
b.	In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/ or EIA Notification 2006 shall be provided. Copies of Consent to Establish/ No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of F.Y. 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.	It is a new Project.
4.	**Site Details**	
i.	Location of the project site covering village, Taluka/ Tehsil, District and State, Justification for selecting the site, whether other sites were considered.	Provided on page no. 2-3, 8.
ii.	A TopoSheet of the study area of radius of 10 km. and site location on 1:50,000/ 1: 25,000 scale on an A3/A2 sheet (including all eco-sensitive areas and environmentally sensitive places).	Provided on page no. 36, 40, 42, and 48.

iii.	Co-ordinates (lat-long) of all four corners of the site.	Provided on page no. 2.
iv.	Google map-Earth downloaded of the project site.	Provided on page no. 7.
v.	Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial Area/ Estate/ Complex, layout of Industrial Area indicating location of unit within the Industrial Area/ Estate.	Provided on page no. 13.
vi.	Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/ greenbelt, in particular.	Provided on page no. 6.
vii.	Land-use break-up of total land of the project site (identified and acquired), government / private – agricultural, forest, wasteland, water bodies, settlements, etc. Shall be included. (Not required for industrial area).	Provided on page no. 22.
viii.	A list of major industries with name and type within study area (10 Km. radius) shall be incorporated. Land use details of the study area.	Provided on page no. 27-28.
ix.	Geological features and Geo-hydrological status of the study area shall be included.	Provided on page no. 29.
x.	Details of Drainage of the project upto 5 km radius of study area. If the site is within 1 km. radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (Mega green field projects).	The area is generally plain and has good slope from North-West to South-East. The area is well drained and takes the entire rain water flows to Hum Khad (Seasonal). The area is not flood prone.
xi.	Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.	Acquisition of land is completed.
xii.	R & D details in respect of land in line with State Government policy.	No R&D is required
5.	**Forest and wildlife related issues (if applicable)**	
i.	Permission and approval for the use of forest land (forestry clearance), if any and recommendations of the State Forest Department (if applicable).	No forest land is involved.

ii.	Land-use map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (in case of projects involving forest land more than 40 ha).	Provided on page no. 28.
iii.	Status of Application submitted for obtaining the stage 1 forestry clearance along with latest status shall be submitted.	NA
iv.	The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon.	NA
v.	Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule 1 fauna, if any exists in the study area.	NA
vi.	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972 to the Standing Committee of the National Board for Wildlife.	NA
6.	**Environmental Status**	
i.	Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.	Provided on page no. 30-32.
ii.	AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	Provided on page no. 34-36.
iii.	Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov., 2009 along with – min. max. average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an Annexure to the EIA Report.	Provided on page no. 37.

iv.	Surface water quality of nearby River (60 m upstream and downstream) and other surface drains at eight locations as per CPCB/MOEF & CC guidelines.	Provided on page no. 44.
v.	Whether the site falls near to polluted stretch of river identified by the CPCB/MOEF&CC.	NO.
vi.	Ground water monitoring at minimum at 8 locations shall b e included.	Provided on page no. 45-46.
vii.	Noise levels monitoring at 8 locations within the study area.	Provided on page no. 38-39.
viii.	Soil Characteristic as per CPCB guidelines.	Provided on page no. 41-43.
ix.	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	Provided on page no. 61.
x.	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.	Provided on page no. 49-54.
xi.	Socio-economic status of the study area.	Provided on page no. 55-60.
7.	**Impact Assessment and Environment Management Plan**	
i.	Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modeling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be well assessed. Details of the model used and the input data used for modeling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.	Provided on page no. 68-74
ii.	Water Quality modeling – in case, if the effluent is proposed to be discharged in to the local drain, then Water Quality Modeling study should be conducted for the drain water taking into consideration the upstream and	Not applicable. As it is a zero discharged plant.

	downstream quality of water of the drain.	
iii.	Impact of the transport of the raw materials and end products on the surrounding environment, shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.	In all about 15-16 trucks shall be required for transportation of Raw material and finished product. Since the existing road is sufficient to cater to this meager increase in transportation, therefore there will be negligible impact.
iv.	A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E (P) Rules.	Provided on page no. 20-21 and page no. 110.
v.	Details of stack emission and action plan for control of emissions to meet standards.	Provided on page no. 109-110.
vi.	Measures for fugitive emission control.	Provided on page no. 109-110.
vii.	Details of hazardous waste generation and their storage, utilization and disposal. Copies of MOU regarding utilization of solid and hazardous waste shall also be included. EMP shall include the concept of waste-minimization, recycle/ reuse/ recover techniques, Energy conservation and natural resource conservation.	Provided on page no. 24 & 110.
viii.	Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	Proper utilization will be done, details provided on page no. 24 & 110.
ix.	Action plan for the green belt development plan in 33% area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.	Provided on page no. 114-115.

x.	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.	Provided on page no. 77-78.
xi.	Total capital cost and recurring cost/ annum for environmental pollution control measures shall be included.	Provided on page no. 93.
xii	Action plan for post-project environmental monitoring shall be submitted.	Provided on page no. 90-91.
xiii	Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.	Provided on separate risk assessment document.
8.	**Occupational Health :**	
i.	Details of existing Occupational & Safety Hazards. What are the exposure levels of above mentioned hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL, so that health of the workers can be preserved.	Provided on page no. 115-116.
ii.	Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays. Audiometry, Spirometry. Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre-placement and periodical examinations give the details of the same. Details regarding last month analyzed data of abovementioned parameters as per age, sex, duration of exposure and department wise.	Proper medical checkup will be done as per the requirement.
iii.	Annual report of health status of workers with special reference to Occupational Health and Safety.	Annual report of health status of workers will be maintained.
iv.	Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers.	Provided on page no. 93.

9.	**Corporate Environment Policy**	
i.	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Provided on page no. 117
ii.	Does the Environment Policy prescribe for standard operating process/ procedures to bring into focus any infringement/ deviation/ violation of the environmental or forest norms/ conditions? If so, it may be detailed in the EIA.	Provided on page no. 117.
iii.	What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	Provided on page no. 118.
iv.	Does the company have system of reporting of non-compliances/ violations of environmental norms to the Board of Directors of the Company and/ or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report.	Environmental Management cell will be responsible.
10.	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.	All these infrastructure facilities are proposed.
11.	**Enterprise Social Commitment (ESC)**	
i.	Adequate funds (at least 2.5% of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.	Provided on page no. 106.
12.	Any litigation pending against the project and/ or any direction/ order passed by any Court of Law against the project. If so, details thereof shall also be included. Has the unit received any notice under the Section-5 of Environment (Protection) Act, 1986 or relevant sections of Air and Water Acts? If so, details thereof and compliance / ATR to the notice (s) and present status of the case.	No litigation is pending against the project.

Specific TOR		
1.	List of existing distillery units in the study area along with their capacity and sourcing of raw material.	No distillery is there within the study area.
2.	Number of working days of the distillery unit.	330 days.
3.	Details of raw materials such as molasses/grains, their source with availability.	Grains will be sourced from local market.
4.	Details of the use of steam from the boilers.	30 TPH
5.	Surface and ground water quality around proposed spent wash storage lagoon, and compost yard.	NA.
6.	Plan to reduce spent wash generation within 6-8 KL/KL of alcohol produced.	Noted and will be complied.
7.	Proposed effluent treatment system for molasses/grain based distillery (spent wash, spent lees, condensate and utilities) as well as domestic sewage and scheme for achieving zero effluent discharge(ZLD)	It's a "Zero Liquid Discharge" (ZLD) plant.
8.	Proposed action to restrict fresh water consumption within 10 KL/KL of alcohol production.	Daily fresh water consumption-9.2 kl/kl of alcohol production.
9.	Details about capacity of spent wash holding tank, material used, design consideration. No. of piezometer to be proposed around spent wash holding tank.	Provided on the plant layout plan.
10.	Action plan to control ground water pollution.	It's a "Zero Liquid Discharge" (ZLD) plant.
11.	Details of solid waste management including management of boiler ash, yeast etc. Details of incinerated spent wash ash generation and its disposal.	Provided on page no. 110.
12.	Details of bio-composting yard(if applicable)	NA.
13.	Action plan to control odour pollution.	Provided on page no. 111.
14.	Arrangements for installation of continuous online monitoring System (24x7 monitoring device)	Noted and will be complied.

Additional TOR		
1.	Public hearing to be conducted and issues raised and commitments made by the project proponent on the same should be included in EIA/EMP report in the form of tabular chart with financial budget for complying with the commitments made.	Public hearing is conducted and enclosed as separate document.
2.	Permission from groundwater board to be obtained.	Applied.

CHAPTER -1

INTRODUCTION

1.1 Purpose of the report

As per the EIA Notification dated 14th September 2006, as amended from time to time; it is mandatory to have the Environmental Clearance for any new industry or the expansion of the industry from Ministry of Environment, Forests and Climate Change (MoEF & CC), Government of India, New Delhi for which EIA is required to be conducted as per the guidelines of MoEF & CC, New Delhi. The purpose of the EIA report is to provide a coherent statement of the potential impacts of proposed project and the measures that should be taken to establish the impacts and suggest mitigation measures. It contains essential information for:

The proponent to implement the proposal in an environmentally and socially responsible manner;

The responsible authority to make an informed decision on the proposal, including the terms and conditions that must be attached to an approval or authorization; and

The public to understand the proposal and its likely impacts on people and the environment.

1.2 Identification of Project and Project Proponent

1.2.1 Project Details

M/s. Rock & Storm Distilleries (P) Limited is proposing to install grain based Distillery having 100 KLPD (RS/ENA/AA) capacity at Village- Goandpur Jai Chand, Nichla & Singa, Tehsil- Haroli and District- Una, Himachal Pradesh. Grain will be used as Raw Material which will be met from local nearby markets. The project is planned to be established over an area of 14 acres. The plant will operate 330 days in a year as plant is grain based. The proposed plant will produce Rectified Spirit/ENA/ Ethanol. The power will be generated with steam during the process.

Screening Category

As per EIA Notification dated 14th Sept., 2006 and amended from time to time, the proposed project falls under Category "A", Project or Activity 5(g).

1.2.2 Identification of Project Proponent

Applicant: Mr. Ashu Rattan Khare,

Address: Office No. 11, Ground floor,
Centra Mall, Industrial Area-I,
Chandigarh

Address for Correspondence: Office No. 11, Central Mall, Industrial Area-I, Chandigarh-160002

1.3 Brief Description of Nature, Size, Location of the Project

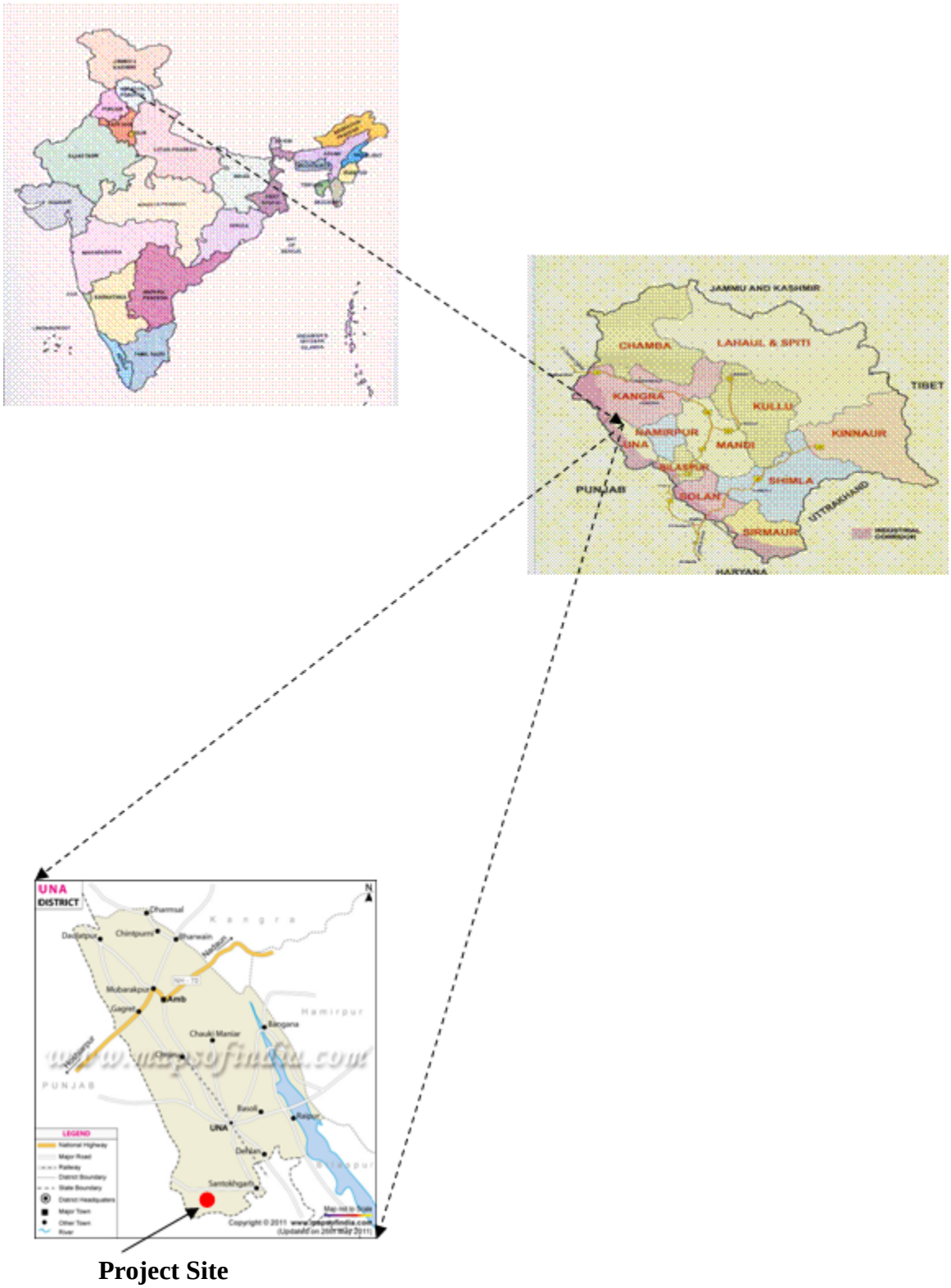
Brief description about the nature, size and location of the project is given in **Table -1.1**.

Table-1.1
Project and Environmental Settings

S. No.	Particulars	Details
1.	**Nature and size of the Project**	100 KLPD grain based unit
2.	**Location details**	
	Village	Goandpur Jai Chand, Nichla & Singa
	Tehsil	Haroli
	District	Una
	State	Himachal Pradesh
	Latitude and Longitude	31°18'51.03" North 76°13'36.33"East
	Topo-sheet No.	H43E3 &H43E7
3.	**Area Details**	
	Total Project Area	14 acres
4.	**Environmental Setting Details (with approximate aerial distance and direction from the project site)**	
	Nearest major settlement	Goandpur (about 3 km)
	Nearest City	Una (about 18 km)
	Nearest Highway	MDR-39 (Nangal- Santokhgarh - Tahliwal Polian Jaijon (HP Boundary) 3 km)
	Nearest Railway Station	Una (about 17 km)
	Nearest Airport	Ludhiana (about 62 km)
	National Parks/ Wild Life Sanctuaries/ Biosphere Reserves/RF and PF within 10km radius	There is no National Parks/ Wild Life Sanctuaries/ Biosphere Reserves/RF and PF within 10 km radius area of project site.
	Nearest Water Bodies	Swan river 8.85 km from site in west direction

S. No.	Particulars	Details
	Seismic Zone	Zone IV
5.	**Cost Details**	
	Project Cost	Rs. 101.0 Crores
	Cost for Environmental Protection Measures	Rs. 7.6 Crores
	Recurring Cost/Annum	Rs. 90 Lakh
6. Basic Requirements of the Project		
	Fresh Water (m^3/day)	922 KLD
	Fuel	Rice Husk-125TPD
	Manpower	250
	Boiler Capacity	30 TPH
	Running Days	330 days

13.1 Key Map, Location map & Photos of the project is given in **Figure-1.1, 1.2 & 1.3.** Google map of the project site is given in **Figure-1.4.**



Project Site

Figure 1.1 Key Map

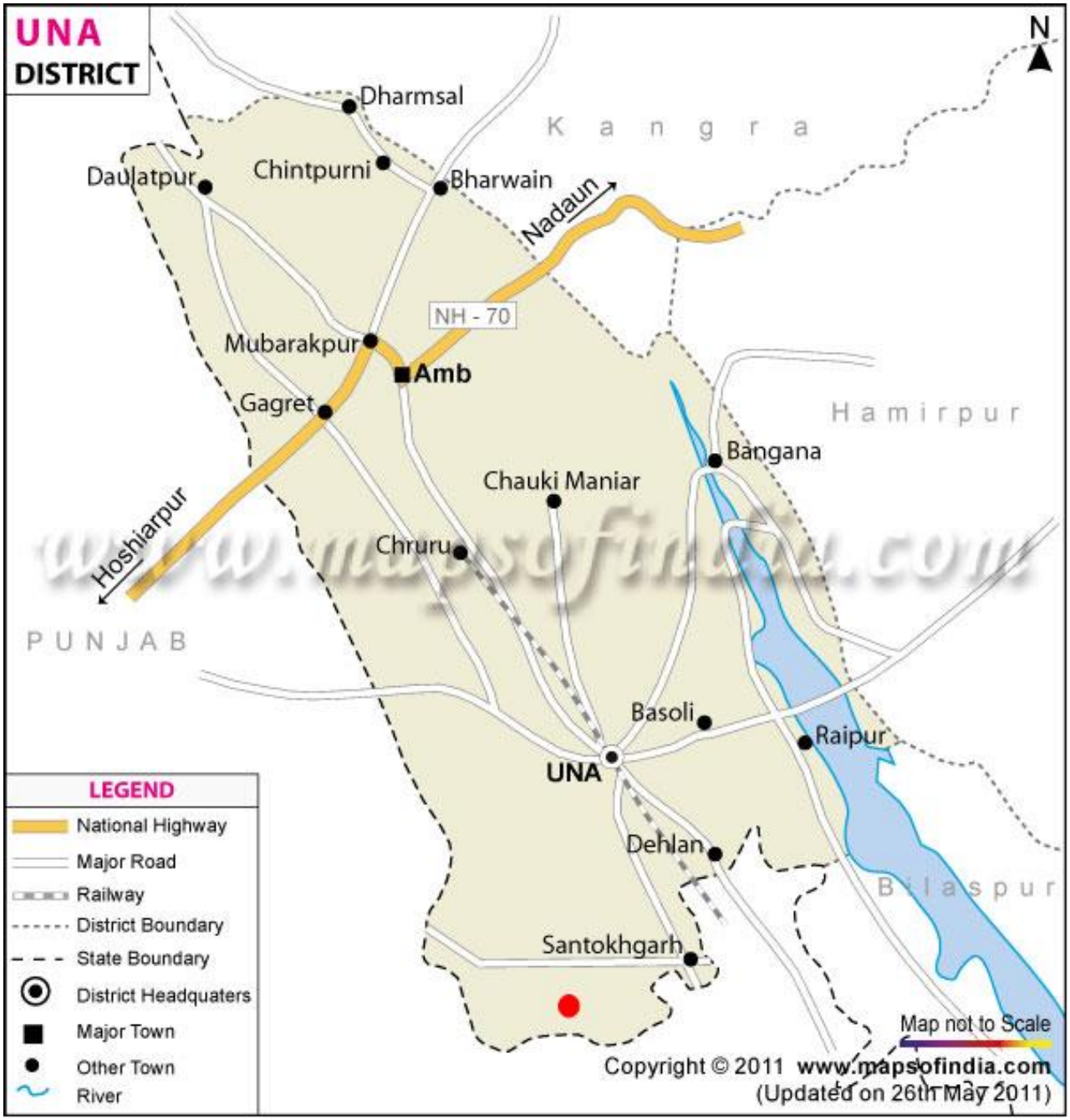


Figure 1.2 Location Map

Figure 1.3 Site Photographs

Figure 1.4 Google Map image of the Project Site

1.3.2 Site Selection

Site selected for the project has some advantageous features. These are:

- Nearby raw material is available.
- Location in rural area ensures adequate availability of manpower at marginally lower Rates.
- There is no National Park, Biosphere Reserves, Tiger Reserves 5 km of study area

Study area map of the project site is presented in **Figure – 1.2** and Google Map is given in **Figure - 1.4.**

1.4 Importance to the Country and Region

Grain based distillation is being used in India for the production of alcohol since ancient days. The proposed project where Rectified Spirit/Extra Neutral Alcohol and Absolute Alcohol will be produced from grains by fermentation and multi pressure distillation technology & it will give better productivity and quality of products. All these products find its use in diverse application ranging from potable liquor to paints & perfumery to renewable source of energy. Keeping in view of the above, M/s. Rock & Storm Distilleries (P) Ltd. has proposed to install 100 KLPD grain based distillery unit.

1.5 Scope of the Study

The Expert Appraisal Committee (Industry 2) of MoEF & CC considered the project at its 2nd meeting held on December 16th-18th, 2015 & 6th meeting held on 30th March to 2nd April, 2016 based on the consideration of the documents submitted and the presentation made by the project proponent, the Committee issued the TORs for preparation of the EIA report.

1.6 Structure of the Report

The entire EIA report is prepared based on the generic structure of EIA document given at APPENDIX III of the Notification No. S.O. 1533 dated 14th September, 2006 at MoEF & CC, New Delhi.

The report has been divided into twelve chapters as described below:

Chapter-1 gives information about the project proponent i.e. M/S Rock & Storm Distilleries (P) Ltd. and the proposed project including its location and

justification/importance, brief details around the surrounding area and details about site selection criteria considered. It also outlines the statutory requirement of obtaining prior Environment Clearance, steps to be followed for the same and basic purpose, scope and methodology of EIA study.

Chapter-2 is Project Description and infrastructure facilities incorporating all industrial and environmental activities of the project proponent for setting up of the proposed project. It also gives information about manufacturing process and raw materials, sources of pollution and details of pollution control facilities to be provided i.e. water and waste water details, air pollution and control system, sludge storage facility, noise control measures etc.

Chapter-3 is Description of the Environment which includes Base Line Environment Study giving details about status of air quality, meteorology, water, noise, land, ecology and socio economic environment of the study area based on information collected through actual field study or from secondary sources.

Chapter-4 is Identification of Impacts (and its mitigation measures), which identifies the impacts of various environmental parameters whether beneficial or deleterious for the construction and operation phase of the project. It also quantifies significant impacts of the proposed project on various environmental components for the construction and operation phase of the project.

Chapter-5 Analysis of Alternatives (Technology and Site) identifies the description of each alternative, Summary of adverse impacts of each alternative, Mitigation measures proposed for each alternative

Chapter-6 is Environmental Monitoring Plan which provides details of monitoring plan of various environmental parameters as well as its frequency of monitoring.

Chapter-7 is Additional Studies which includes Public Consultation, Risk Assessment, Social Impact Assessment, R and R Action Plans

Chapter-8 is Benefits due to the proposed project including improvement in Physical infrastructure, improvement in the social infrastructure, Employment potential –skilled, semi-skilled and others

Chapter -9 is Environmental Cost Benefit Analysis

Chapter-10 Environmental Management Plan (EMP) incorporating measures to be adopted for mitigation of anticipated adverse impacts, if any safety measures, post-project monitoring program for environmental parameters, green belt development etc.

Chapter-11 is the Summary and Conclusion of the proposed Project, includes overall justification of the project

Chapter-12 is profile of consultant engaged for the monitoring and preparation of EIA report.

CHAPTER -2

PROJECT DESCRIPTION

2.1 Type of Project

M/s. Rock & Storm Distillery (P) Limited is proposing to install grain based Distillery having 100 KLPD (RS/ENA/AA) capacity at Village- Goandpur Jai Chand, Nichla & Singa, Tehsil- Haroli and District- Una, Himachal Pradesh. Location and layout plan is given in **Fig 2.1 & 2.2** respectively. Grains will be used as Raw Material which is available from local markets.

As per EIA Notification dated 14th Sep, 2006, as amended from time to time; the project falls under Category "A", Project or Activity 5(g) and therefore, requires Environmental Clearance from MoEF & CC, New Delhi.

2.2 Need/ Justification for the Project

- The raw material is available from local markets.
- It can be converted in valuable products like Rectified Spirit/Extra Neutral Alcohol/Absolute Alcohol.
- The latest technology is adopted with a better productivity and quality of alcohol.
- The unit would be involved in several developmental activities to help farmers.

Justification

- Rectified Spirit/Extra Neutral Alcohol/Absolute Alcohol will be available for IMFL unit.
- Revenue will be generated for the state government.
- Foreign currency will be saved through production of ethanol.
- Employment will be provided to nearby people.
- Development of local region
- Standard of Living of people will improve. People will be skilled.

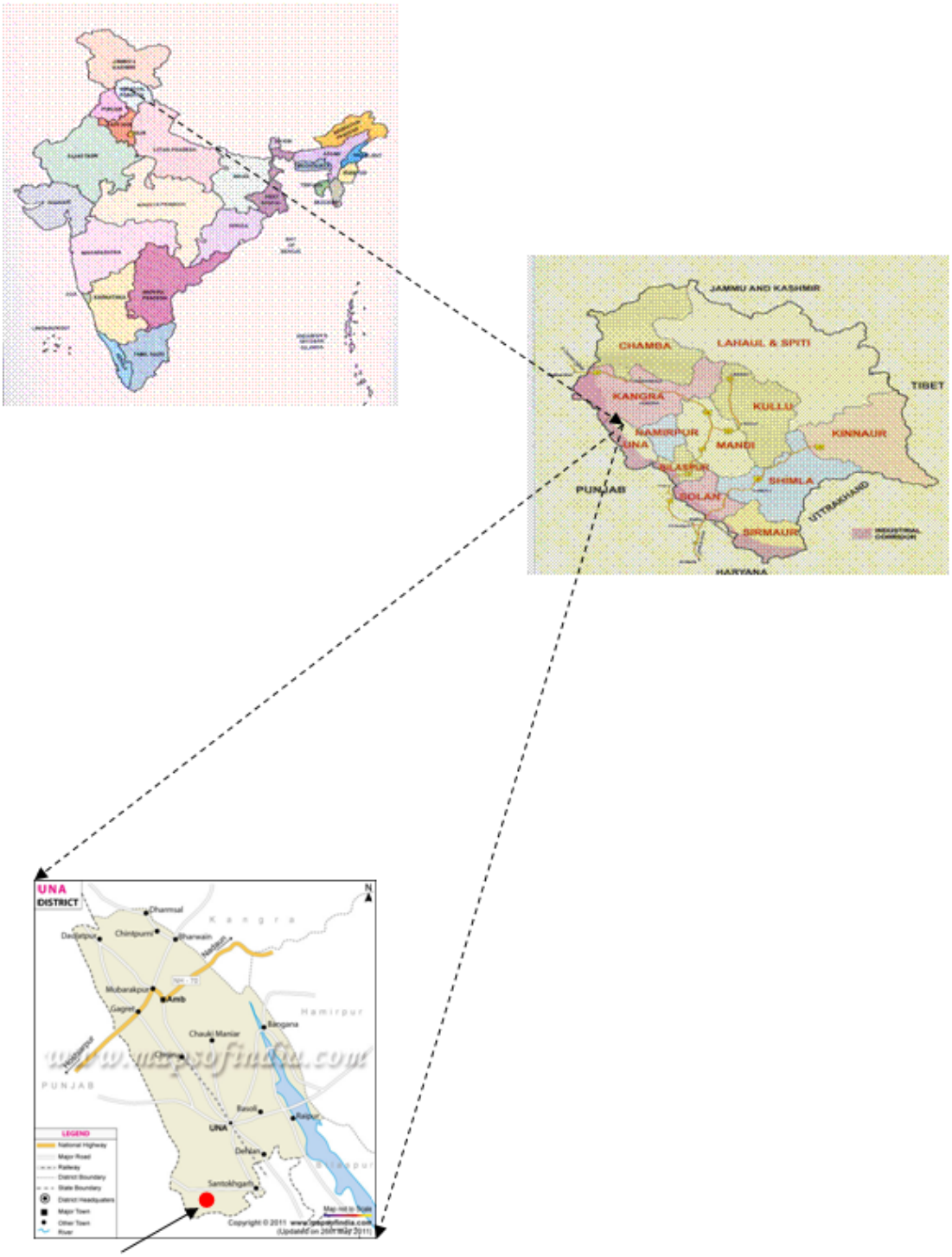


Figure 2.1 Location Plan of The Project

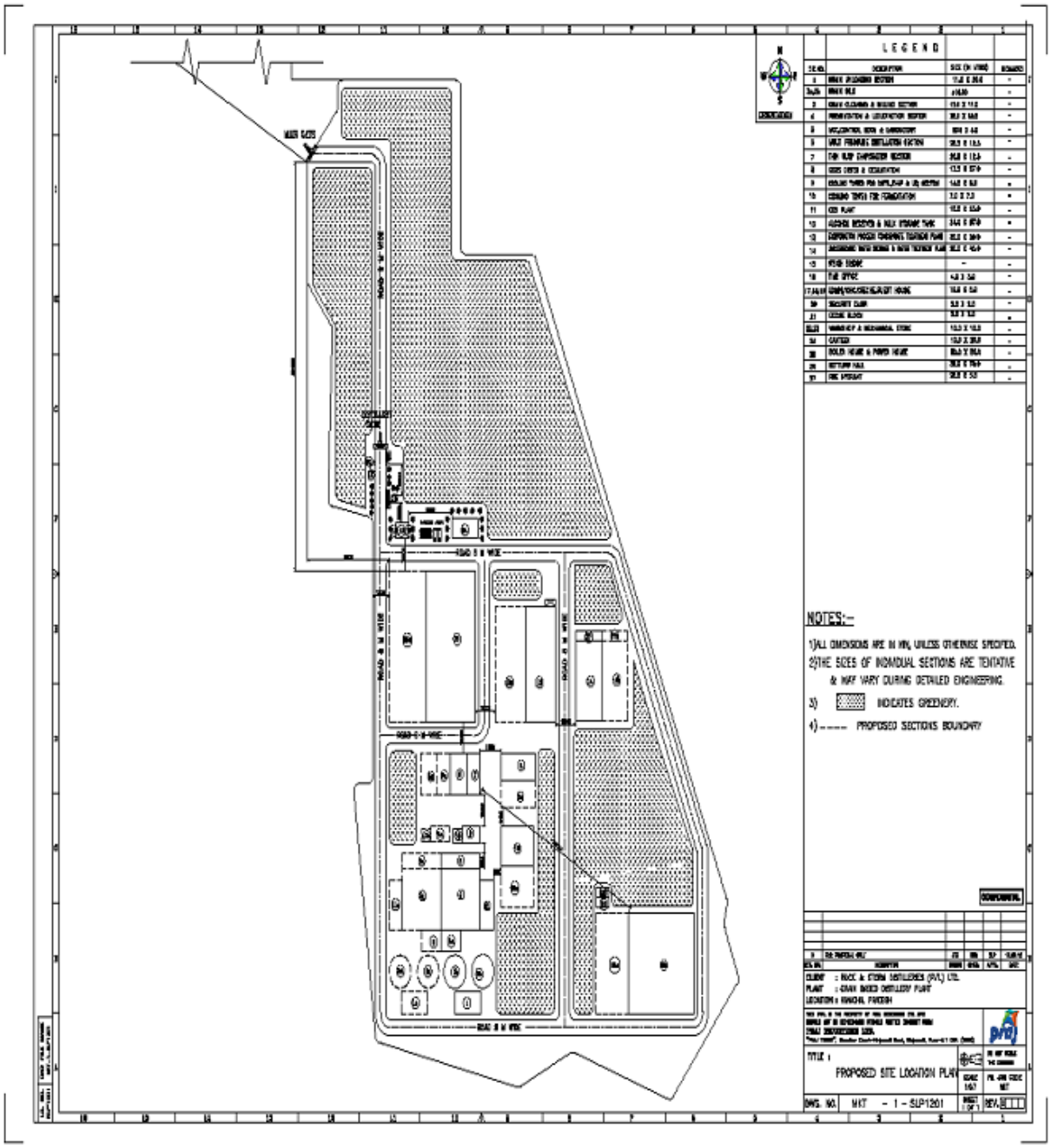


Figure 2.2 Plant Layout

2.3 Demands-Supply Gap

Indian Government had set up an Expert Group headed by the Executive Director of the Centre for High Technology for examining various options of blending ethanol with petrol at terminals/depots. Considering the logistical and financial advantages, this Group had recommended blending of ethanol with petrol at supply locations (terminals / depots) of oil companies. In view of the above, Government vide the Gazette notification of 3rdSeptember, 2002 No. P-45018/28/2000-C.C had mandated that with effect from 1-1-2003, 5% ethanol-doped petrol will be supplied in following nine States and four contiguous Union Territories of Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh, Pondicherry, Daman and Diu, Goa, Dadra and Nagar Haveli and Chandigarh. This was the beginning of ethanol implementation in 1st phase. Government of India further announced to implement the Ethanol programme in 2nd phase. This was intended to supply ethanol blended Gasoline across the country effective the year 2006 and in 3rd phase switching over from the existing 5% to 10% blending of ethanol in selected states.

With implementation of the 5% Ethanol-Blended Petrol (EBP) programme throughout the country still a distant dream due to various complications like ethanol shortages, the variable taxation structure of state governments and regulatory restrictions, the petroleum ministry has decided to defer the proposed rollout of mandatory 10% blending of ethanol, which was expected to take place from October, 2008 onwards.

Table 2.1
Demand and Supply of Ethanol

Projected demand and supply of ethanol for 5% blending in Petrol						
Year	**Petrol Demand (ML)**	**Ethanol Demand (ML)**	**Ethanol production (ML)**	**Ethanol utilization (ML)**		
			Total	**Potable**	**Industry**	**Balance**
2001-02	7.07	416.14	1775	648	600	527
2006-07	10.07	592.72	3785	765	711	2309
2011-12	12.85	756.36	3785	887	844	2054
2016-17	16.4	965.30	3785	1028	1003	1754
Source: Planning Commission (2003)						

2.3.1 Requirements for the Project

Proposed distillery is grain based and will work for 330 days/annum.

Raw Material Requirement

The raw materials required for the Grain based distillery can be broadly categorized as follows:

- Grains
- Enzymes and Chemicals
- Steam
- Water
- Fuel
- Power etc.

2.4 Technology and Process Description

2.4.1 Liquefaction process:

In liquefaction process, starch is hydrolyzed to dextrin. The Liquefaction is carried out in Single Liquefaction Tank. Feedstock Flour is transferred to Pre-masher and mixed with Recycle Streams, thin stillage and liquefying enzyme. Slurry from Pre-masher is taken to Liquefaction tank where temperature is maintained by means of steam. Necessary retention time is maintained in the Liquefaction Tank. Slurry pH is maintained by supplying dilute caustic solution. Contents in Slurry Tank are kept in suspension by Agitation. The Liquefied Slurry is then cooled in Slurry Cooler (wide Gap PHE) and transferred to Pre-fermentation and Fermentation section.

- **HIFERM Fermentation -**

The purpose of fermentation is to convert the fermentable substrate into alcohol. To prepare the mash for fermentation, it is diluted with water. Yeast is added in sufficient quantity to complete fermentation to produce alcohol. At the start of the cycle, the Fermenter is charged with mash and contents of the Yeast Activation Vessel (Pre-fermenter). Significant heat release takes place during fermentation. This is removed by passing the mash through heat exchangers to maintain an optimum temperature. The recirculation pumps also serve to empty the Fermenter into Beer Well. CO_2 evolved during fermentation carries along with it some entrained alcohol. This CO_2 is taken to a CO_2 scrubber where it is washed with water to remove the entrained alcohol. The

scrubbed CO_2 can then be taken to CO_2 plant or vented out. After emptying of Fermenter, it is cleaned with CIP using cleaning nozzles. After that CIP Fermenter is ready for next batch to be filled.

2.4.2 MPR Distillation – "Wash To ENA" Mode

Multi-Pressure Distillation system has eight Distillation columns operating at various pressure conditions. Heat energy from columns operating under high pressure is utilized for columns operating under low pressure to optimize the operation for energy consumption.

Following Columns will be under operation

1. Analyzer Column
2. Degasifying Column
3. Pre-Rectifier Column
4. Extractive Distillation Column
5. Rectifier cum Exhaust Column
6. Recovery Column
7. Simmering Column
8. Molecular Sieve Tanks

Pre-heated fermented wash is fed at the top of the Degasifying column. Analyser Column is provided with Reboiler. Top vapors of Analyser column containing all the alcohol in the wash are sent to Pre-Rectifier column. Rest of the fermented wash flows down the Analyser column and is taken out as thick slops from Analyser column bottom. Low boiling impurities are concentrated in the Pre-Rectifier column. A draw of impure alcohol is taken out from the top of the Pre-Rectifier column. RS draw is taken from the top of Pre rectifier column, which further is sent to Extractive Distillation column. Dilution water is fed to this column. The Extractive Column operates on the principle of inversion of relative volatility. Low boiling impurities are separated in the Extractive Distillation Column & bottom is sent to Rectifier cum Exhaust column. The Rectifier/Exhaust column concentrates the alcohol to 96% v/v. The spirit is drawn from the upper trays of the Rectification Column. Fuel oil build up is avoided in the Rectifier cum exhaust column by withdrawing side streams (fuel oils). ED condensates, fusel oil draw from R/E column are sent to Recovery column where these fusel oils are concentrated and then sent to decanter where these streams are diluted with water and fusel oil rich layer is separated. Washings are sent back to the column to recover alcohol. The spirit Draw from

the Rectifier column is sent to the Simmering column where methanol is separated in the form of a cut from the top and ENA is taken out from the bottom. ENA drawn from the Simmering Column is taken to the receiver after cooling in ENA cooler.

2.4.3 Decantation Section Excluding Decanter Centrifuges

Decantation section comprises of a Centrifuge Decanters for separation of suspended solids from Thick slop coming out of Grain Distillation Plant. Wet cake is removed from bottom of Decanter. Thin slops coming out of Decanter are collected in a tank and partly recycled into the process & Evaporation for further concentration. The concentrated thin slops called as Syrup is mixed with Wet cake and sold in wet form as cattle feed (DWGS) Or the entire mixture can be dried in a DWGS Dryer and then sold in dry form as Cattle feed (DDGS).

Integrated Evaporation:

The suggested treatment scheme is a MULTI EFFECT Evaporation Plant for Thin Slop Evaporation. Shell & Tube type Evaporators with highly efficient liquid distributor working on the principle of Falling Film and Forced circulation Evaporation has been used. The product at the desired concentration of 40%w/w Total Solid is obtained at the outlet of the final effect. Each effect is provided with recirculation cum transfer pumps. The condensate from surface condensers is collected in a common condensate pot. The condensate is transferred for further treatment / drain by using centrifugal pump. The system operates under vacuum. Water-ring vacuum pumps are used to maintain a desired vacuum. Cooling water from cooling tower is used in the surface condensers for condensing the vapors.

DWGS Dryer Section:

Wet distiller's grains shall be fed into the dryer housing at controlled rate through a suitable feeding system. The Rotary Bundle is enclosed in an insulated dryer housing and on its outer flights is fixed. Dry, saturated steam is to be supplied to the bundle through rotary joint at one end & the condensate is discharged through rotary joint mounted of another end. During the course of rotation, these flights pick up the material and shower them on to the tube bundles. The heat transfer is primarily by conduction. The water vapors are exhausted through an Exhaust Blower & passed through a cyclone separator

for separating fines. Dry product partially recycled back to feed conditioner for feed conditioning through Product Screw & Recycle Conveyor. Entire operation of the Dryer is controlled through Local Indication cum Control panel.

System Description for Cooling & Conveying:

- Dry DWGS below product screw is discharged into charging hopper of pneumatic conveying system.
- Rotary feeder feeds it into the conveying line.
- Ambient air is used for conveying.
- The material gets conveyed to product collector & discharged from rotary discharge valve.
- Exhaust air is vented to atmosphere.
- The conveying system is lean phase suction type, using centrifugal blower as prime mover.
- The conveying air quantity is designed considering cooling requirement & to cool the product before discharge

2.4.4 Molecular Sieve Dehydration (MSDH) For Ethanol

Rectified Spirit containing at least 95% v/v alcohol is pumped from RS feed tank to dehydration section. Rectified spirit is preheated in Feed pre heater with the help of product vapors and then fed to top tray of Evaporator Column. The objective of the Evaporator Column is to evaporate rectified spirit. The Evaporator Column operates under pressure. Energy is supplied to the Evaporator Column through Evaporator Column Re-boiler with steam condensing on shell side.

Overhead feed alcohol vapors from the Evaporator Column are then passed through Super heater where alcohol vapors are superheated. Energy for superheating is supplied by steam condensation on shell side of the Super heater.

Superheated hydrous alcohol vapors are sent to twin Adsorbent Beds. The twin Adsorbent Beds operate in cyclic manner. Twin beds are provided to allow for bead regeneration in continuous operation. While one bed is in dehydration mode, the other is in regeneration mode. Depending on feed and product specifications, dehydration-regeneration exchange takes place approximately every few minutes. The feed alcohol

vapors are passed through the bed under dehydration mode. The Adsorbent Bed will absorb moisture present in feed vapors and dehydrated product alcohol vapors are obtained from bottom of the bed.

The product alcohol vapors are then passed through Regeneration Pre-heater and Feed Pre-heater for heat recovery. The Product alcohol vapors are then passed through Product Condenser where product vapors are condensed with the help of cooling water. Condensed product alcohol is collected in product receiver. The Product alcohol from Product Receiver is pumped to Product Cooler where it is cooled with the help of cooling water and then sent for anhydrous alcohol storage.

During regeneration mode, vacuum is applied to the bed under regeneration. A small amount of product alcohol vapors are purged through the bed in regeneration mode under high vacuum, to prepare the desiccant for cycle changeover when this bed goes online. The purged alcohol vapors act as carrier for removal of moisture from the bed. These alcohol vapors along with moisture are obtained from the top of bed. These alcohol-water vapors (regeneration stream) are condensed in Regeneration Condenser, which is attached to Vacuum Educator.

Vacuum is pulled in the system with the help of Vacuum Educator. Regeneration stream is used as motive fluid for Vacuum Educator. The regeneration stream coming from the Regeneration Condenser is pumped, preheated in Regeneration Pre-heater and fed to the Evaporator Column for recovery of alcohol. Moisture present in feed alcohol is removed from the bottom of the Evaporator Column in the form of spent lees.

After one cycle is over, the beds are interchanged, that is, the bed on dehydration mode will be switch over to regeneration mode and the bed on regeneration mode will be switch over to dehydration mode, with the help of automation system.

2.4.5 Utilities

A) Boiler Details:

Boiler with 30 TPH capacities is proposed to be installed. Others details regarding this are mentioned in the table given below:

Table 2.2 Details regarding the Boiler

S.No.	Particular	Details
1	Type of Fuel	**Rice Husk**
2	Capacity of Boiler	**30 TPH**
3	Stack Height	**30 m**
4	Pollution Control Equipment Measures	**ESP**

B) Details regarding the D.G. Sets:

D.G. set of 750 KVA each will be installed for the power backup. Details' regarding the D.G. Set is mentioned in the table given below:

Table 2.3 Details regarding the D.G. Sets

S.No.	Particular	Details
1	No. of DG sets	**1 No. (Silent Type)**
2	Type of Fuel	**HSD**
3	Capacity	**750 KVA**
4	Stack Height	**As per CPCB/SPCB norms**

C) Raw Material and Fuel Requirement

The fuel requirement of the project is given below:

Table 2.4 Raw Material Requirement

Description	Particular	Quantity (TPD)
Raw Material	Grains	275-280
Fuel	Rice Husk	125

2.5 Availability of Water, its Source, Energy/ Power Requirement and Source

2.5.1 Water Requirement

The total fresh water requirement for 100 KLPD Distillery plant will be 922 KL/day Permission from CGWA will be obtained for the extraction of Ground water. Details of water balance is given in **Table 2.3**

Table 2.5 Water Consumption Detail of Proposed Plant

INPUTS	
PROCESS WATER IN LIQN & FERMENTATION	547 m^3
DM WATER FOR RS DILUTION	900 m^3
DM WATER FOR BOILER FEED	624 m^3
SOFT WATER FOR VACUUM PUMP & OTHERS	50 m^3
BLENDING	30 m^3
BOTTLE WASHINGS	10 m^3
SOFT WATER MAKEUP FOR COOLING TOWER	840 m^3
OTHER DOMESTIC USAGE	10 m^3
Total	**3011 m^3**

OUTPUTS	
STEAM CONDENSATE	544 m^3
SPENT LEES PR +RO	160 m^3
SPENT LEES RECTIFER	900 m^3
WATER IN THIN SLOPS & DWG	442 m^3
SOFT WATER FOR VACUUM PUMP & OTHERS	50 m^3
WATER IN PRODUCT (IMFL/CL)	30 m^3
CT EVAPORATION & DRIFT LOSSES	840m^3
BOTTLE WASHING	10 m^3
DOMESTIC CONSUMPTION	10 m^3
BOILER DRIFT AND BLOWDOWN	25 m^3
Total	**3011** m^3

RECYLCE & UTILIZATION STREAMS	
LEES RECYCLE FOR RS DILUTION	720 m^3
STEAM CONDENSATE RECYCLE FOR BOILER	544m^3
SPENT LEES (RECT) - COOLING TOWER MAKEUP	180 m^3
THIN SLOPS RECYCLE TO PROCESS	125 m^3
PROCESS CONDENSATE TO PROCESS	310 m^3
SPENT LEES PRC+FOC	160 m^3
SOFT WATER FOR VACUUM PUMP & OTHERS	50 m^3
TOTAL RECYCLING /RE-UTILIZATIONS OF WATER PER DAY	**2089**m^3
TOTAL FRESH WATER INPUT	**922** m^3

*** NET DAILY FRESH WATER CONSUMPTION-9.2 KL/KL**

2.5.2 Power

- Total Power requirement of the unit will be 2500 KWH.
- One No. 750 KVA DG set is proposed as standby in case of power supply failure.
- 3.0 MW Cogeneration plant is proposed to be installed along with Distillery plant.

2.5.3 Manpower Requirement

The total manpower required for the proposed project is approx. 250 persons which include all Categories of unskilled, semiskilled, skilled personnel and contract labor.

2.5.4 Land Requirement

The total land required for the proposed project is given in **Table 2.4.**

Table 2.6 Land Requirement

S. NO.	Details	Area
1	Type of land	Private
2	Total Land	**56655 m^2**
3	Green area development	18696 m^2
4	Admin office and Excise office	1850 m^2
5	Raw material/Products storage	2550 m^2
6	Utilities	840 m^2
7	Plant & Machinery	3650 m^2
8	Roads/Pavements	6580 m^2
9	Miscellaneous	**22489 m^2**

2.6 Description of Mitigation Measures

Following mitigation measures will be adopted by project proponent to minimize the impact of project on the surrounding environment:

PARTICULARS	DETAILS
Air Quality Management:	
Emissions Management	➢ A stack of adequate height equipped with APCD will be installed with the boiler to control the particulate and gaseous emissions due to combustion of fuel.

- CO_2 generated during the fermentation process will be collected by utilizing CO_2 Scrubbers and will sell to vendor.
- All the roads are asphalted to control the fugitive dust emissions
- Proper servicing & maintenance of vehicles is/will be carried out.
- Green Belt around the periphery and within premises is already in place and same will be maintained.

STANDARDS:

NO. OF STACK	STACK ATTACHED TO	FUEL	APCD	STACK HEIGHT	POLLUTANTS LIMITS
1.	BOILER (30TPH)	RICE HUSK	ESP	30 MTR (GL)	PM – 150 mg/Nm3
2	DG SETS (750KVA)	DIESEL	ACOUSTIC	10 MTR (GL)	PM – 75 mg/Nm3 NO_x – 1458 mg/Nm3

Monitoring Management

Ambient air quality and stack emission will be regularly monitored to ensure that ambient air quality standards and suggested limits on stack emission loads would be met honestly at all the time.

Water Management

Management

- The project will be based on "Zero Effluent Discharge".
- Fresh water requirement of the project will be met by Ground Water & recycled water. Efforts will be made to conserve as much water as possible by recycling and reuse.
- Record of wastewater returned back to process for utilization in Fermentation/cooling tower and to gardening will be kept.
- Process condensate from MEE will be recycled back to the process and use for cooling tower as make up.
- Spent lees generation from distillation column will be recycled partly to the columns for dilution and balance will be used for cooling tower make up.
- Domestic waste water generated from the plant will be treated in Septic Tank. And treated water will be used in green belt development.
- Effluent Treatment Plant will be installed for treatment of waste water.

Noise Management

<table>
<tr><td></td><td></td></tr>
<tr><td>Management</td><td>➢ There will be no danger of noise pollution from plant. The green belt (plantation of dense trees across the boundary) helps in reducing noise levels in distillery plant.
➢ Earmuffs will be used while running the equipments of the plant.
➢ D.G sets will be provided with acoustic enclosure to control the noise level within the prescribed limit.
➢ A high standard of maintenance will be practiced for plant machinery and equipments, which helps to avert potential noise problems.
➢ Personal Protective Equipment like earplugs and earmuffs will be provided to the workers exposed to high noise level.
➢ Regular monitoring of noise level will be carried out.</td></tr>
<tr><td colspan="2">Solid Waste Management</td></tr>
<tr><td>Management</td><td>➢ Fly ash from the Boiler will be used for land filling.
➢ Spent wash generated during operation, will be treated in Multi-effect evaporator. Details of Solid Waste generation are tabulated below:

<table>
<tr><th>SOURCE OF SOLID WASTE</th><th>TYPE</th><th>TOTAL QUANTITY</th><th>DISPOSAL METHOD</th></tr>
<tr><td>Process</td><td>Grain Residue</td><td>80 TPD of DWGS/DDGS</td><td>Dried and sold for cattle feed.</td></tr>
<tr><td>Boiler</td><td>Fly Ash</td><td>20 TPD</td><td>Landfills for low lying area/bricks manufacturer.</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Green belt Management</td></tr>
<tr><td>Management</td><td>➢ Green belt development in and around the plant site helps to attenuate the pollution level.
➢ Out of the total plant area approx. 33% land will be developed as green belt as per Central Pollution Control Board (CPCB) guidelines.</td></tr>
</table>

	➢ Native species will be planted in consultation with the local DFO.
Odor Management	
Management	➢ The remedial measures will be taken such as better house-keeping by regular steaming of all fermentation equipments and same will be followed in future. ➢ Temperature will be kept under control during fermentation to avoid inactivation/ killing of yeast and staling of fermented wash will be avoided

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CHAPTER - 3
DESCRIPTION OF THE ENVIRONMENT

3.1 Introduction

The main objectives of describing the environment, which may be potentially affected, are (i) to assess present environmental quality and the environmental impacts and (ii) to identify environmentally significant factors. The chapter contains information on existing environmental scenario of the proposed project study area.

3.2 Study Area

Various environmental parameters study has been done within 10 Km radius area of the proposed project site.

Table 3.1 Details of Project Site

S No.	Particular	Details and Distance from project site
1.	Location	Goandpur Jai Chand, Nichla & Singa, Haroli, Una,Himachal Pradesh.
2.	Lat	31°18'51.03" North
3.	Long	76°13'36.33"East
4.	Total project area	14 acre
5.	Proposed Plant Capacity	Give detailed capacity
6.	Nearest Railway station	Una (about 17 km)
7.	Air port	Ludhiana (about 62 km)
8.	Highway	MDR-39 (Nangal- Santokhgarh -Tahliwal Polian Jaijon (HP Boundary, 3 km)
9.	Village	Jongpur, Hiran, Makargarh, Bitan, Bathu, Binewal, Mahindwani
10.	City(densely populated area)	Una (about 18 km)
11.	Industrial area	Give nearest industrial area.
12.	Water body	Swan river 8.85 km from site in west direction
13.	NP/ sanctuary/ biosphere reserve	There is no National Parks/ Wild Life Sanctuaries/ Biosphere Reserve.

14.	Reserved Forest	No Reserve forest.
15.	Archaeological monuments	Nil

3.3 Study Period

The ToR presentation for proposed project was held on December 16th-18th, 2015 & on 30th March to 2nd April 2016. During presentation it was informed that baseline data collection would start from 1st October 2015. Baseline study has been conducted for the period of 1st October 2015 to 31st December 2015.

3.4 Components and Methodology

To achieve the objectives of TORs, the team members of Consultant visited the study area and monitored the environmental parameters as per of TOR Letter and accordance with the Guidelines for EIA, issued by the Ministry of Environment, Forests and Climate Change, Government of India. The components of the study are given below:

1. Water Environment;
2. Air Quality and Meteorology;
3. Air Environment;
4. Noise Environment;
5. Land Environment
6. Biological Environment;
7. Socio-economic Environment;
8. Hydrogeology;
9. Geology;
10. Solid and Hazardous Waste;
11. Land Use; and
12. Risk Assessment.

Data Collection Methodology

The baseline information on micro-meteorology, ambient air quality, water quality, noise levels, soil quality and floristic descriptions are largely drawn from the data generated by Laboratory (NABL Accredited). The FAE are also involved in selection of monitoring locations and data collection. Long term meteorological data recorded at the nearest IMD

station, Sundernagar was also collected. Micrometeorological data at site was recorded using automatic weather station. Apart from these, secondary data have been collected from Census Handbook, Revenue Records, Statistical Department, Soil Survey and Land use Organization, District Industries Centre, Forest Department, Central Ground Water Authority, etc.

3.5 Land Use Pattern of the Study Area

(A) Data Used

Indian Remote Sensing satellite, ERDAS image processing software and ARC/GIS software, multi-spectral digital data has been used for the preparation of land use/ land cover map of present study. Survey of India reference map on 1:50,000 scales have been used for the preparation of base map and geometric correction of satellite data. Ground truthing has been carried out to validate the interpretation accuracy and reliability of remotely sensed data, by enabling verification of the interpreted details and by supplementing with the information, which cannot be obtained directly on satellite imagery.

(B) Methodology

The methodology used for the study consists of following components.

Methodology Adopted for Thematic Data Extraction from the Satellite Imageries

ERDAS image processing software and ARC/GIS software were used for the project. ERDAS 9.2 image processing software was used for digital processing of the spatial data. Digital image processing techniques were applied for the mapping of the land use land cover classes of the provided area from the satellite data. Methodology Used for Land use Classification and Mapping is presented in **Figure 3.1.**

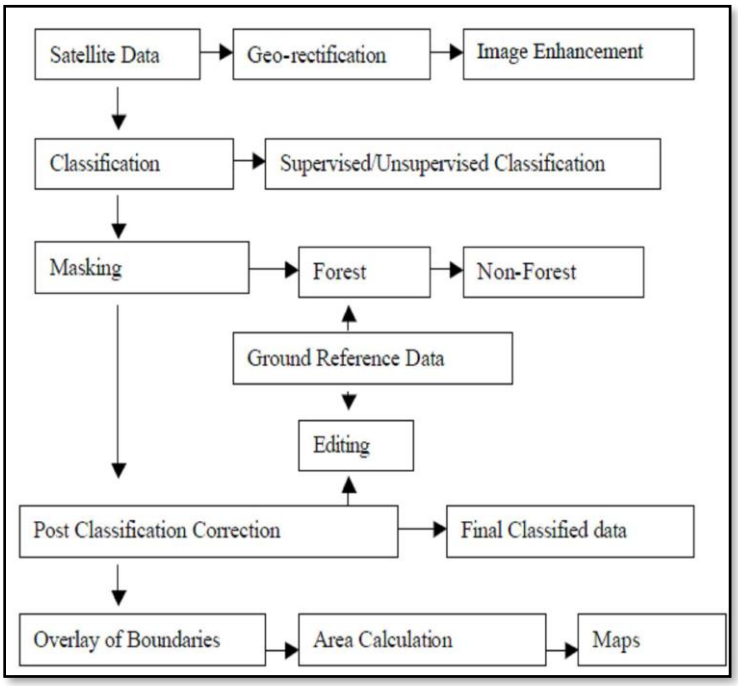


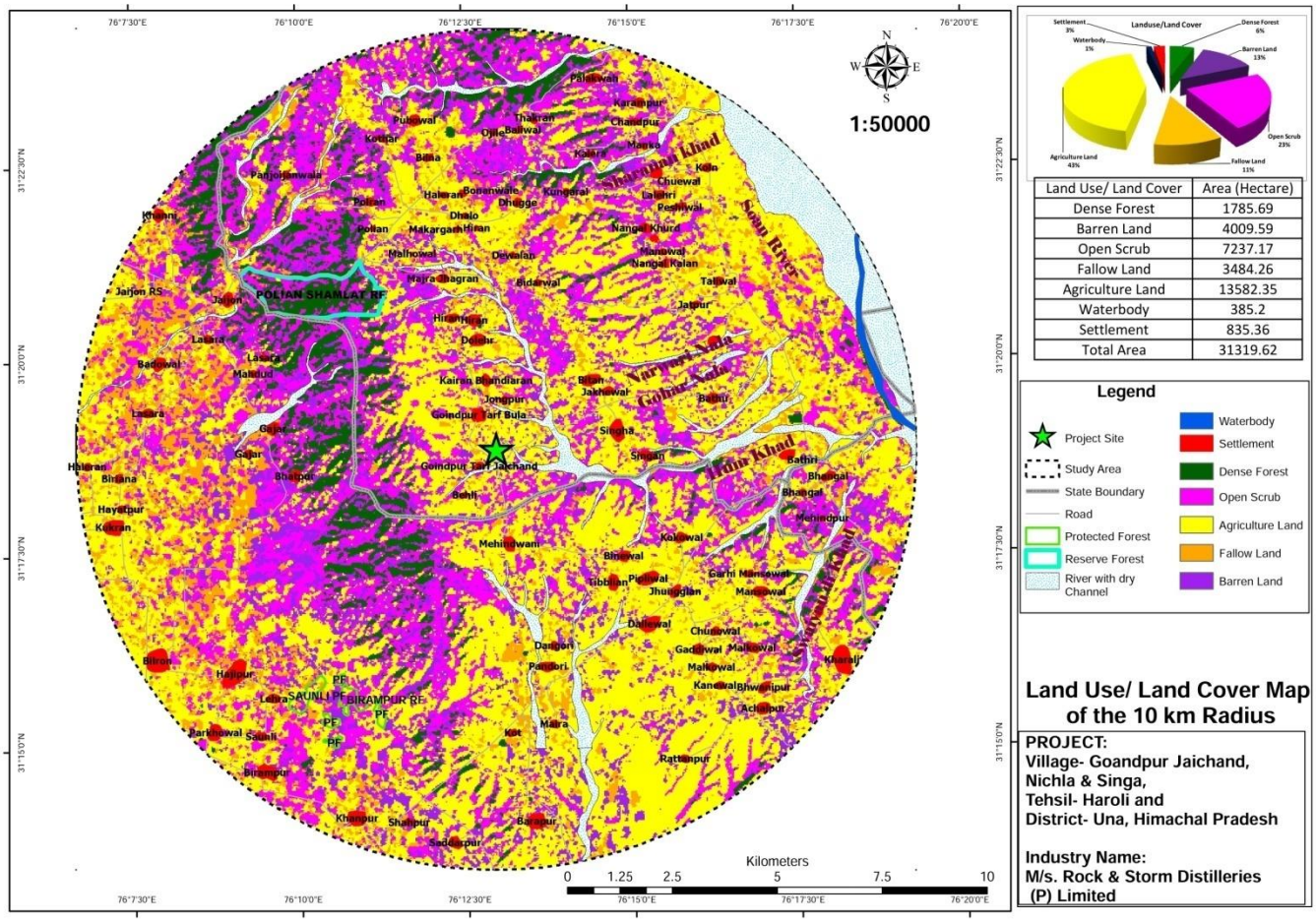
Figure- 3.1: Methodology Used for Land use Classification and Mapping

Results

In the present study, both digital image processing and using visual interpretation technique were used to generate output of Land use cover map of study area **(Figure 3.2)**. The land use pattern of the study area is given in **Table 3.1.**

Table 3.2 Land Use Pattern of the Study Area

Land use	Area (in Hectares)	% Area
Dense Forest	1785.69	6%
Barren Land	4009.59	13%
Open Scrub	7237.17	23%
Fallow Land	3484.26	11%
Agriculture Land	13582.35	43%
Water body	385.2	1%
Settlement	835.36	3%
Total Area	**31319.62**	**100 %**



Land Use/ Land Cover	Area (Hectare)
Dense Forest	1785.69
Barren Land	4009.59
Open Scrub	7237.17
Fallow Land	3484.26
Agriculture Land	13582.35
Waterbody	385.2
Settlement	835.36
Total Area	31319.62

Figure 3.2: Land Use Pattern of the Study Area (10 km Radius from the Project Site)

3.6 Geology

Una District of south himachal Pradesh. Himachal Pradesh was carved out of the erstwhile Hoshiarpur District in September 1972. Situated at an altitude varying between 350-1200m Una District spans between 75Â°58`2" - 76Â°28`25"East Longitude and 31Â°17`52" - 31Â°52`0" North Latitude.

Situated in the east of outer Shivalik, Una is in the south-western part of Himachal Pradesh. Bounded by Kangra, Hamirpur and Bilaspur district of Himachal Pradesh in the North, East and South respectively and by Hoshiarpur district of Punjab in the West, Una lies within North latitude $31^0$17’52" and $31^0$52’0" and East longitude $75^0$58’2" and $76^0$28’25".

Una district covers an area of 1549 sq.kms. In Himalayan foothill zone bounded by plains of Punjab in the west and Solah Singhi Dhar in the east. In the western part also there is a hill range whose maximum height is about 600 mtrs. The ranges tread in a general North West-South East direction and the area between these is a longitudinal valley of the Swan river. The altitudes vary from more than 350 mtrs. to over 1200 mtrs. on the Solah Singhi Dhar. The highest point Bharwain in the first range of hills is 2018 feet. The elevation of the town of Una in the Jaswan Dun, is 1404 feet above the sea level, and may be taken as the mean level of the valley. The breadth of Jaswan Dun Valley ranges from 7 Kms. to 14 Kms. The fort of Solah Singhi which stands on one of the highest points of the west range (3821 feet) is 3896 feet high.

The sub-Himalayan hills commonly known as SOLAH SINGHI or JASWAN DHAR range commences near Talwara on the Beas where the river touches the district running south-east. Its first 14 Kms. are in the Kangra district and its culminating ridge forms the border between the districts of Una and Kangra, passing southwards, it increases steadily in width and elevation until its highest point reach at Bharwain which is 2018 feet above sea level. Here, the regular formations, central range sloping in the series of undulating valley to the Beas on the one side and the Swan on the other changes its character. The range still runs towards Sutlej(Govind Sagar Lake), its north side submerging gradually

into Beas Valley, but on the south it has an abrupt fall of 200 and 300 feet and between the main range and the plains-Jaswan Dun is a wide table land thickly wooded and apparently reveal to divide into natural blocks by numerous deep ravines. This area, some 24 Kms. in length and 21 kms. in width is thickly forested. At a short distance south to Amb, the SOLAH SINGHI range/JASWAN DHAR range recedes eastward ceasing to form the boundary of the district and the plains at this point form a kind of bay in the hills which is shut in by Solah Singhi to the north-east and on the south by another range commencing a few kilometers north of Una. The later runs south in a series of undulating hills, of no considerable height, with an even front towards Jaswan Dun. Across the Sutlej the range breaks into a series of parallel ranges of no more height but rocky and at places precipitous though their slopes are well covered with grass and brush wood. This range is separated from Solah Singhi by Sutlej which for more than 48 Kms runs northwards until it turns westwards into Jaswan Dun.

3.7 Hydrogeology

While Una district is bounded by the river Beas on the north and the river sutlej in the east, the Swan river which is basically seasonal, flows right across the Jaswan Valley towards south until it submerges in the Sutlej river near Anandpur. The Swan river, indeed, is the life belt of the Jaswan Dun Valley which on its course receives innumerable tributaries both from left and right thereby abounds quicksand and is risky to cross when in spate abound.

Una district's area can be divided into two catchment areas, one of Swan river and the other of Lunkhar Khud. Out of the total 1540 sq.kms., a large chunk of 1290 sq.kms. falls in the catchment area of Swan river while the remaining 250 sq.kms. falls in the lap of Lunkhar Khud which ultimately submerges into Govind Sagar reservoir of BHAKRA DAM.

Hydro-geologically, the unconsolidated valley fill or alluvial formations, occurring in the valley area and semi-consolidated sediments belonging to Siwalik Group form aquifer system in the district. Porous alluvial formation forms the most prolific aquifer system in

the valley area, where as the sedimentary semi-consolidated formation form aquifer of low yield prospect.

The ground water in the Siwalik group of rocks occur under the unconfined to semi confined conditions, mainly in the arenaceous rocks viz., sandstone, siltstone, gravel boulder beds etc. The occurrence and movement of ground water is controlled by inter granular pore spaces and also the fracture porosity. Siwalik sediments underlie Hilly/undulating areas, where springs (mostly gravity/contact type) and bowries are the main ground water structures apart from hand pumps. The discharges of the springs, varies from seepages to 0.50 lps. Bowries are dug well type constructions on the hill slopes/ nalas for tapping the seepages. In the low lying areas underlain by Siwalik rocks, dug wells and hand pumps are the main ground water structures that range in depth from 3.00 to 25.00 m bgl, where in depth to water level ranges from 2.50 to 15.00 m bgl. In upland/plateau areas, the water level is generally deep. In Beet area water level is more than 60 m below land surface has been observed.

In Una valley area, the ground water occurs in porous unconsolidated / alluvial formation (valley fills) comprising sand, silt, gravel, cobbles / pebbles etc., and forms prolific aquifer.

Source of water	Water sources of Una (In nos.)
Ground water	832
Surface water	123
Rain Water	1
Traditional Sources	21
Others	116
Total	1093

3.8 Air Environment and Meteorology

3.8.1 Climate

Climate of the district is tropical to temperate in nature as the terrain varies from plains to high hills. Temperature varies from minimum of 4°C in winter to the maximum of 46°C in summer. The area receives rainfall during monsoon period extending from June to September and also non- monsoon period (winter). The annual average rainfall in the area is about 1040 mm with about 55 average rainy days. The winter season starts from the

November and continues till the middle of March. Thereafter the mercury continues rising till the set of Monsoon which starts from the last week of June and continues till the middle of September.

Mean Maximum Temperature	:	46^0C
Mean Minimum Temperature	:	4^0C
Average Annual Rainfall	:	1040 mm

[Source: Ground water information booklet, Una District, Himachal Pradesh. (CGWB)]

Air Pollutants upon discharge to atmosphere pass through a number of mechanisms, which include diffusion and transportation leading to dispersion. These mechanisms are governed by the local atmospheric conditions. All these result in the necessity to collect the meteorological parameters like ambient temperature, wind speed, wind direction, and other weather conditions (relative humidity, atmospheric pressure etc.), which will be ultimately used for the prediction of the ground level concentrations of the air pollutants through mathematical modeling.

For this purpose a temporary auto weather station was installed to record micro meteorological data on wind speed, wind direction, Ambient Temperature, Solar Insulation and Relative Humidity on hourly basis.

The primary data from the site was matched with secondary data of IMD station, Sundernagar for data proofing.

A sophisticated on-site meteorological observatory was established near project site and operated continuously for three months' period (1st October 2015 to 31st December 2015) and additional on January, 2017. The observatory was located about 10 m above the ground level and ensured to be free from any obstruction to wind. Besides, this location was found to be most suitable one being close to the project site. The summary of the on-site data generated in respect of the above parameters for the period mentioned above are presented in **Table-3.2 & 3.2 (a)**. The Wind rose diagram for the entire period is shown in **Figures 3.4 & 3.4 (a).**

3.8.2 Temperature

The monthly maximum and minimum temperatures recorded on-site during the aforesaid monitoring period (1st October 2015 to 31st December 2015) varied between 5.2-34.0 °C

and 2.4 to 10.3°C (January, 2017) . It could be observed that, the pattern of data recorded on-site generally matches with the past data of IMD.

3.8.3 Relative Humidity

The monthly minimum and maximum relative humidity recorded onsite during the said monitoring period varied between 41.1 %- 94.5% (1st October 2015 to 31st December 2015) and 37.2- 96.6 % (January, 2017).

3.8.4 Atmospheric Pressure

The overall minimum and maximum atmospheric pressures recorded on-site during the said monitoring period were 873.3- 881.6 mb. Such values compare well with the past IMD data.

3.8.5 Rainfall

The average annual rainfall at Una is 1040 mm/year (As per IMD). Total 43.6 mm (1st October 2015 to 31st December 2015) and 73.8 mm (January, 2017) rainfall was recorded during the monitoring period.

Table-3.3 Summary of Onsite Meteorological Data – (1st October 2015 to 31st December 2015)

Month	Temperature (°C)			Relative Humidity (%)		Rain Fall (mm)	
	Highest	Lowest	Mean	Highest	Lowest	24-hours Highest	No. of rainy days
October, 2015	34.0	14.0	68.7	91.0	66.0	6.6	7
November, 2015	30.2	9.1	56.2	94.5	38.2	7.0	3
December, 2015	31.3	5.2	41.1	82.4	29.3	2.1	2

Summary of Wind Pattern at the Study Area

Post Monsoon season, 2015	
First predominant wind direction	SW (18.5 %)
Second predominant wind direction	S (6.5 %)
Calm conditions	71.0 %

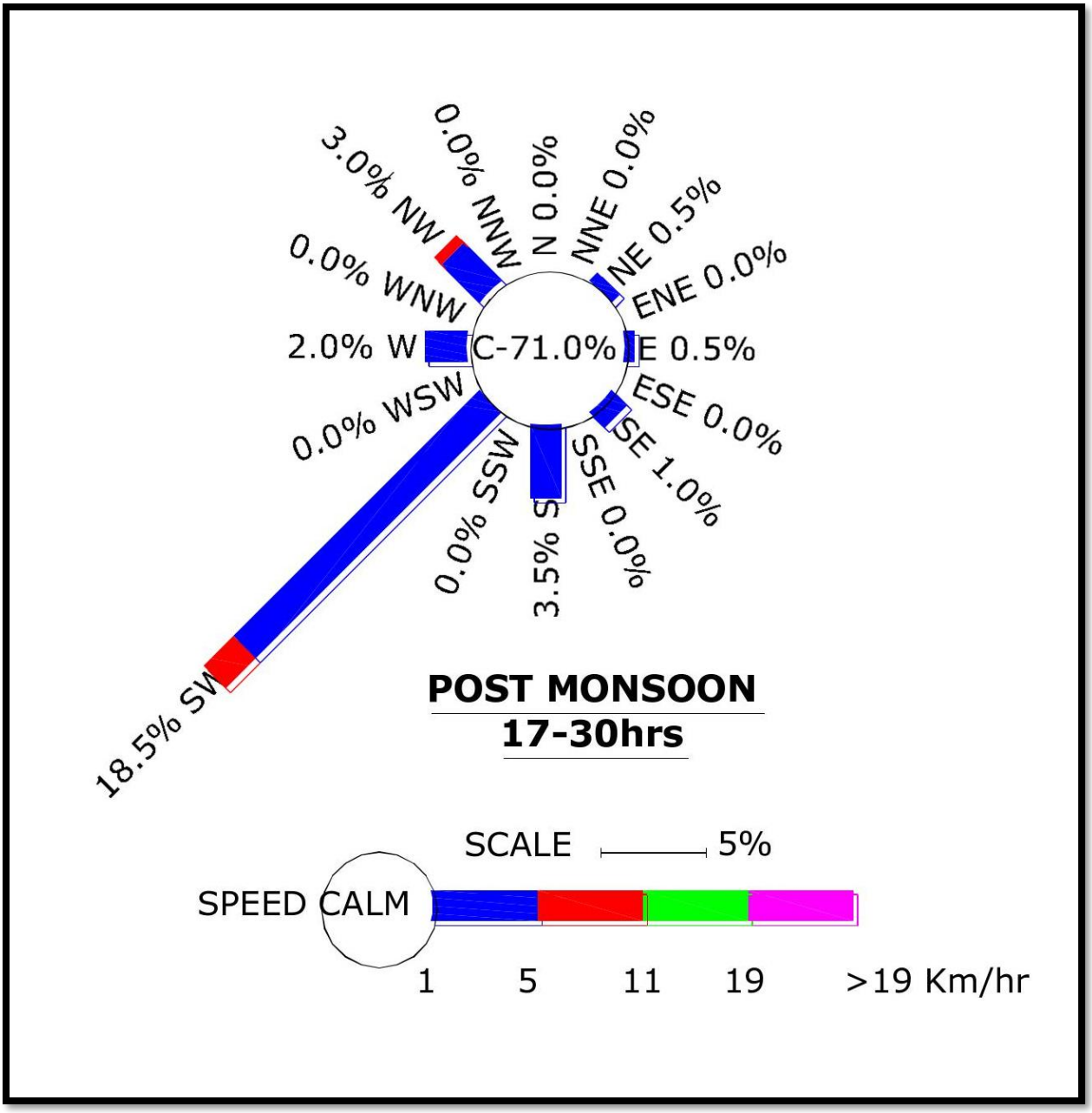


Figure 3.3: Wind rose Diagram

Table-3.4
Summary of Onsite Meteorological Data – (January, 2017)

Month	Wind Speed (kmph)			Temperature (^{0}C)			Relative Humidity (%)			Rain Fall (mm)			Cloud Cover (Octas of sky)
	Mean	Max.	% of calm	Mean (Dry Bulb)	Highest	Lowest	Mean	Highest	Lowest	Total	24-hours Highest	No. of rainy days	Mean
January, 2017	2.4	10.3	12.36	14.25	23.6	4.9	66.9	96.6	37.2	73.8	13.4	4	15

Summary of Wind Pattern at the Study Area

Winter season- January, 2017	
First predominant wind direction	NE (29.8 %)
Second predominant wind direction	N (17.9 %)
Calm conditions	12.36 %

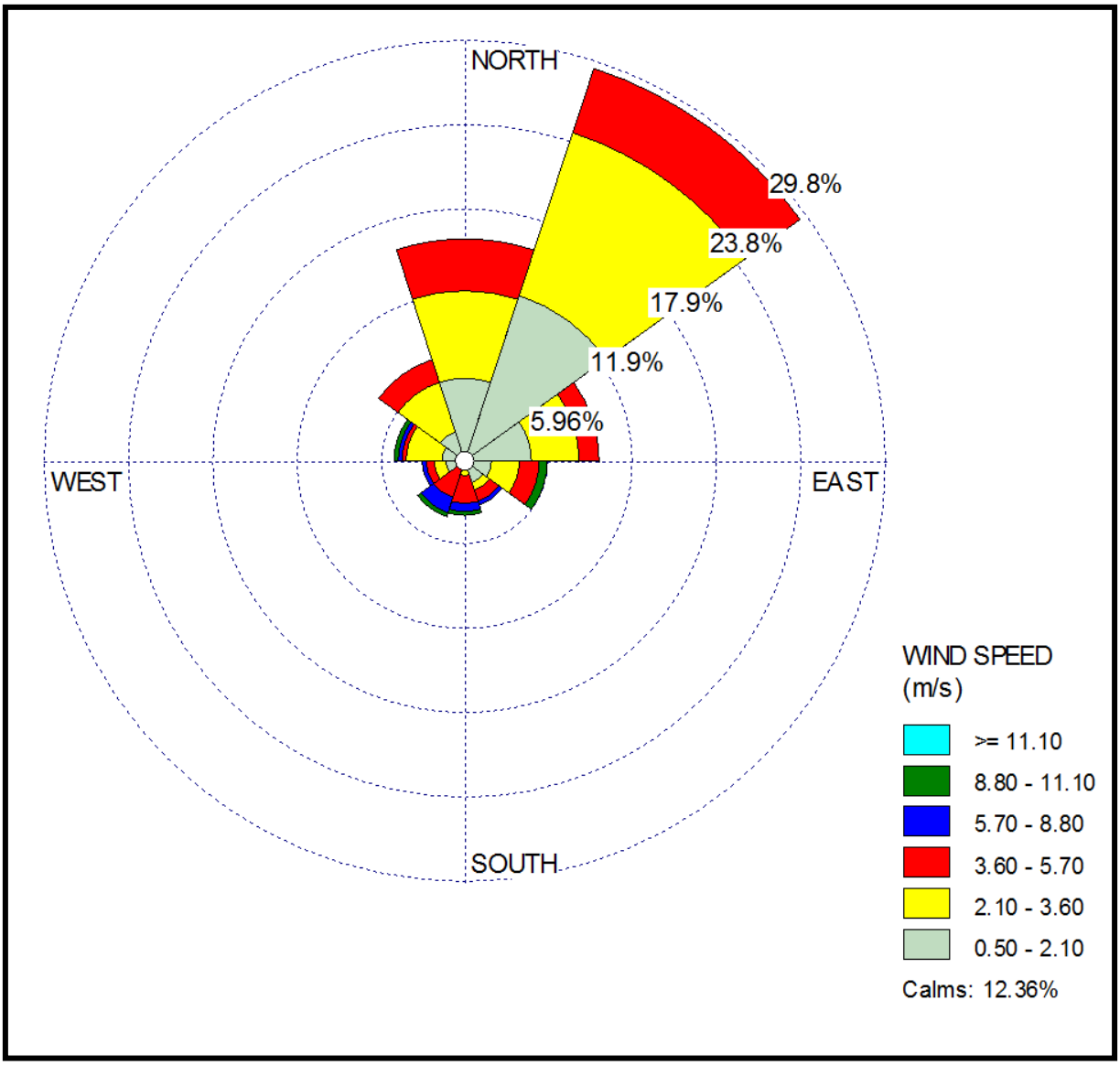


Figure 3.4 : Wind Rose Diagram (January, 2017)

3.9 Ambient Air Quality

The ambient air quality with respect to the study area of 10 km radius around the contract area forms the baseline information. The various sources of air pollution in the region are dust rising from unpaved roads, domestic fuel burning, vehicular traffic, agricultural activities, other industries, etc.

The prime objective of baseline air quality monitoring is to assess existing air quality of the area. This will also be useful in assessing the conformity to standards of the ambient air quality during the operations.

The baseline status of the ambient air quality has been assessed through scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions.
- Topography of the study area.
- Likely impact area.

3.9.1 Ambient Air Quality Monitoring

Ambient air monitoring was carried out for 3 month as per CPCB guidelines in the surrounding areas of the project site to assess the ambient air quality. To know the ambient air quality at a larger distance i.e. in the study area of 10 km. radius, air quality survey has been conducted at 08 locations over a period of Post Monsoon Season and month of January, 2017. Major air pollutants viz, PM_{10}, $PM_{2.5}$, Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2), and Carbon monoxide (CO) representing the basic air pollutants in the region were identified for Ambient Air Quality Monitoring (AAQM). The ambient air quality monitoring stations were set up as par **Table 3.3 and Figure -3.5.**

Table 3.5
Ambient Air Quality Monitoring Sampling Stations

Station	Sampling Location	Aerial distance (Km) and direction from Project Site	Co-ordinates		Sampling Criterion
			Latitude	Longitude	
AAQM1	Project Site	--	31º19’03.70”N	76º13’38.44”E	Centre
AAQM2	Jongpur	1.5 Km, N	31º20’05.80”N	76º13’15.65”E	Down wind
AAQM3	Hiran	5.5 Km, NW	31º21’46.29”N	76º12’46.70”E	Down wind
AAQM4	Makargarh	8.5 Km, N	31º20’58.30”N	76º12’58.01”E	Down wind
AAQM5	Bitan	3.5 Km, NE	31º19’50.34”N	76º14’25.59”E	Down wind
AAQM6	Bathu	7.0 Km, E	31º19’32.70”N	76º16’13.67”E	Cross wind
AAQM7	Binewal	6.5 Km, SE	31º17’24.81”N	76º15’01.68”E	Cross wind
AAQM8	Mahindwani	3.0 Km, S	31º17’40.39”N	76º13’03.23”E	Up wind

3.9.2 Air Sampling Program

As stated earlier, the sampling at the above 08 stations were carried out during Post Monsoon Season i.e. 1st October 2015 to 31st December 2015 and Month of January, 2017. The stations were selected and located with due consideration to the meteorological conditions of the region. The samples were collected as per the CPCB norms during study period.

3.9.3 Baseline Data

Six major air pollutants viz. PM_{10} and $PM_{2.5}$, Sulphur Dioxide (SO_2), Nitrogen Dioxide (NO_2) and Carbon monoxide (CO) were monitored to establish the baseline air quality. The results are given in **Table 3.4 & 3.4 (a)**.

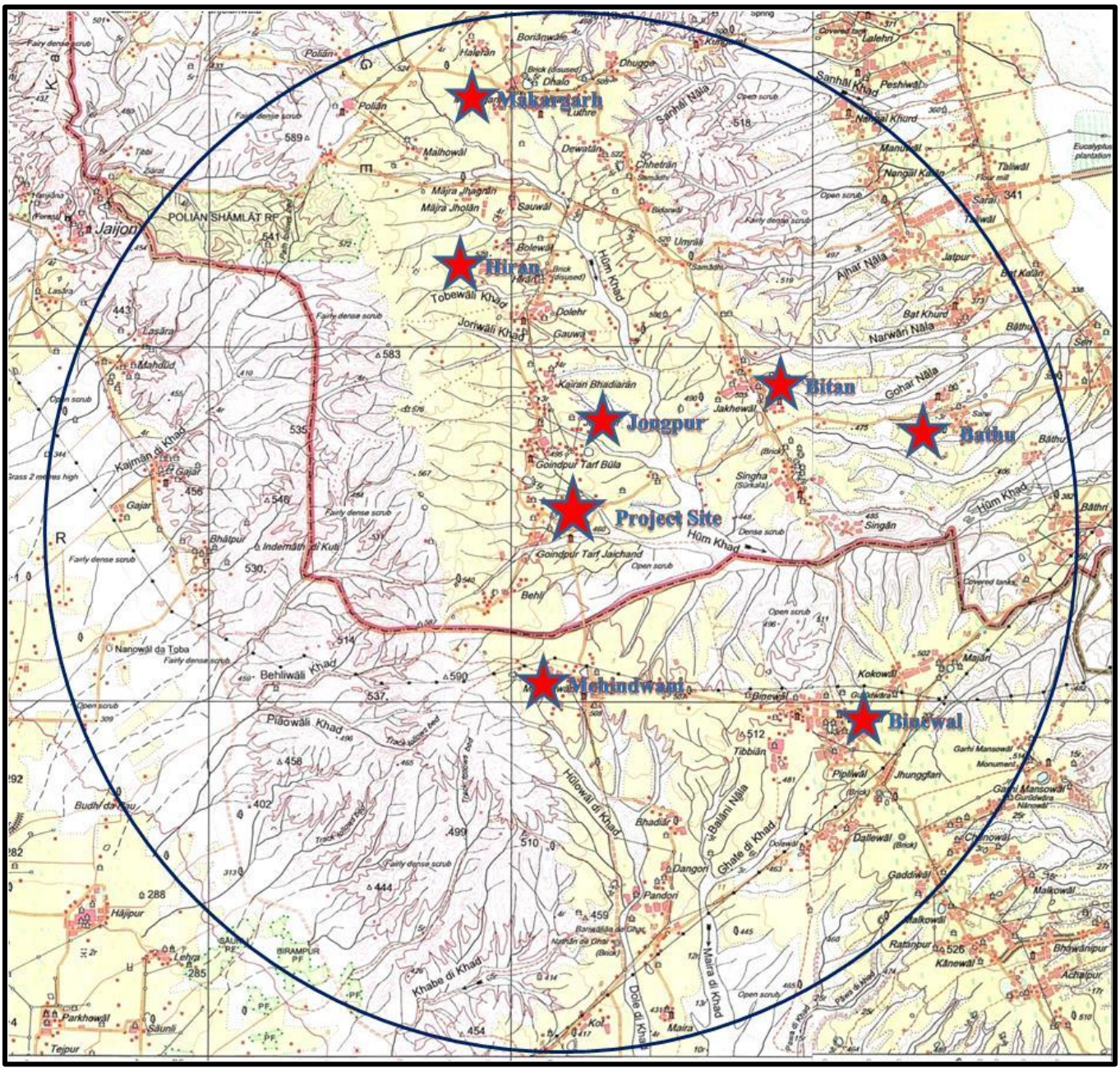


Figure 3.5: Key Plan of Air Monitoring Stations

Table 3.6
Ambient Air Quality Monitoring Results (Oct-Dec, 2015)

Name of Village (s)	PM_{10} ($\mu g/m^3$)		$PM_{2.5}$ ($\mu g/m^3$)		NO_2 ($\mu g/m^3$)		SO_2 ($\mu g/m^3$)		CO (mg/m^3)	
	Max.	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**
Project Site	66.2	52.4	31.6	27.2	19.7	12.1	8.3	5.2	<0.50	<0.50
Jongpur	67.5	54.5	30.0	24.2	18.0	12.0	9.9	3.4	<0.50	<0.50
Hiran	65.9	50.8	36.7	28.7	15.9	10.3	7.9	4.4	<0.50	<0.50
Makargarh	61.3	50.2	37.6	30.1	22.0	20.2	10.0	6.3	<0.50	<0.50
Bitan	68.5	55.6	36.8	28.5	24.0	18.0	7.9	4.5	<0.50	<0.50
Bathu	64.3	54.6	32.6	24.2	19.4	12.1	7.8	6.3	<0.50	<0.50
Binewal	64.9	55.4	39.8	22.8	18.2	14.9	7.5	7.1	<0.50	<0.50
Mahindwani	67.6	52.5	38.8	26.6	18.0	12.0	8.5	6.5	<0.50	<0.50
CPCB Norms	**100**		**60**		**80**		**80**		**04**	

Table 3.7
Ambient Air Quality Monitoring Results (January, 2017)

Name of Village (s)	PM_{10} ($\mu g/m^3$)		$PM_{2.5}$ ($\mu g/m^3$)		NO_2 ($\mu g/m^3$)		SO_2 ($\mu g/m^3$)		CO (mg/m^3)	
	Max.	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**	**Max.**	**Min.**
Project Site	68.8	59.1	31.4	25.4	15.3	12.5	6.8	5.3	0.53	0.50
Jongpur	62.3	58.4	29.8	26.5	15.2	11.6	6.4	4.9	0.53	0.49
Hiran	66.8	57.7	33.7	27.8	12.3	10.5	5.0	4.4	0.50	0.34
Makargarh	61.8	52.4	32.7	24.4	14.6	10.8	6.9	5.6	0.50	0.35
Bitan	69.4	58.3	30.6	24.2	15.4	13.6	5.6	4.5	0.55	0.45
Bathu	66.4	54.6	30.4	25.8	13.6	12.1	6.3	5.9	0.55	0.39
Binewal	67.4	58.5	29.6	24.8	15.1	13.8	7.3	6.1	0.54	0.35
Mahindwani	68.4	58.7	32.6	24.6	13.1	11.6	7.1	5.9	0.54	0.35
CPCB Norms	**100**		**60**		**80**		**80**		**04**	

Conclusion

Ambient Air Quality Monitoring reveals that the minimum and maximum concentrations of PM_{10} for all the 08 AAQM stations during Post Monsoon period i.e. Oct-Dec. 2015 and in the month of January, 2017, were found to be 52.4 $\mu g/m^3$ to 68.5 $\mu g/m^3$ and 52.4

μg/m^3 to 69.4 μg/m^3 respectively. During Post Monsoon period, $PM_{2.5}$ it varies between 22.8 μg/m^3 to 39.8 μg/m^3 and in Jan, 2017, $PM_{2.5}$ varies from 24.2 μg/m^3 to 33.7 μg/m^3.

As far as the gaseous pollutants SO_2 and NO_2 are concerned, the prescribed CPCB limit of 80 μg/m3 for residential and rural areas has never surpassed at any station. The maximum and minimum concentrations of SO_2 were found to be 7.3 μg/m^3 to 5.3 μg/m^3 respectively. The maximum and minimum concentrations of NO_2 were found to be 15.4 μg/m^3 to 10.3 μg/m^3 respectively.

3.10 Noise Environment

Noise often defined as unwanted sound, interferes with speech communication, causes annoyance, distracts from work, disturb sleep, thus deteriorating quality of human environment. Noise Pollution survey has therefore been carried out.

Noise levels were measured in residential areas and other settlements located within 10 km radius around the site.

3.10.1 Noise Analysis within the Study Area

The noise analysis within the study area was recorded using sound level meter. The analysis reveals that the noise's well within the permissible range. The location of Noise level monitoring is presented in **Table 3.5 and Figure 3.8** and the levels recorded are as stated in **Table 3.6 & 3.6 (a).**

Table 3.8 Noise Monitoring Sampling Stations

Station	Sampling Location	Aerial distance (km) and direction from Project Site	Co-ordinates	
			Latitude	Longitude
N1	Project Site	--	31º19'03.70"N	76º13'38.44"E
N2	Jongpur	1.5 Km, N	31º20'05.80"N	76º13'15.65"E
N3	Hiran	5.5 Km, NW	31º21'46.29"N	76º12'46.70"E
N4	Makargarh	8.5 Km, N	31º20'58.30"N	76º12'58.01"E
N5	Bitan	3.5 Km, NE	31º19'50.34"N	76º14'25.59"E
N6	Bathu	7.0 Km, E	31º19'32.70"N	76º16'13.67"E
N7	Binewal	6.5 Km, SE	31º17'24.81"N	76º15'01.68"E
N8	Mahindwani	3.0 Km, S	31º17'40.39"N	76º13'03.23"E

Table 3.9
Noise Monitoring Result (Oct- Dec, 2015)

S. No	Locations	Noise Level Leq. dB (A)	
		Day Time (6:00 a.m. to 10:00 p.m.)	**Night Time (10:00 p.m. to 6:00 a.m.)**
1.	Project Site	52.30	44.10
2.	Jongpur	50.90	42.00
3.	Hiran	49.80	40.70
4.	Makargarh	51.80	39.60
5.	Bitan	52.20	43.10
6.	Bathu	49.50	38.50
7.	Binewal	50.70	41.10
8.	Mahindwani	53.10	42.80
CPCB Standards			
a.	**Residential Area**	**55.0**	**45.0**
b.	**Industrial Area**	**75.0**	**70.0**
c.	**Commercial Zone**	**65.0**	**55.0**
d.	**Silence Zone**	**50.0**	**40.0**

Table 3.10
Noise Monitoring Result (January, 2017)

S. No	Locations	Noise Level Leq. dB (A)	
		Day Time (6:00 a.m. to 10:00 p.m.)	**Night Time (10:00 p.m. to 6:00 a.m.)**
1.	Project Site	50.2	42.2
2.	Jongpur	48.4	41.6
3.	Hiran	50.8	38.4
4.	Makargarh	52.6	36.2
5.	Bitan	50.6	41.2
6.	Bathu	48.4	38.5
7.	Binewal	52.1	36.4
8.	Mahindwani	51.8	38.2
CPCB Standards			
a.	**Residential Area**	**55.0**	**45.0**
b.	**Industrial Area**	**75.0**	**70.0**
c.	**Commercial Zone**	**65.0**	**55.0**
d.	**Silence Zone**	**50.0**	**40.0**

Conclusion

Ambient noise levels were measured at 08 locations around the proposed project site. During Post Monsoon Period, noise level varies from 38.5 to 53.1 Leq dB during day time and during night time. Maximum and minimum noise levels recorded during the day time were 53.1 Leq dB and 49.5 Leq dB respectively and maximum and minimum level of noise during night time were 44.1 Leq dB and 38.5 Leq dB respectively. Thus noise levels at all locations were observed to be within the prescribed limits.

In the month of January, 2017, noise level varies from 36.4 to 52.6 Leq dB during day time and during night time. Maximum and minimum noise levels recorded during the day time were 52.6 Leq dB and 48.4 Leq dB respectively and maximum and minimum level of noise during night time were 42.0 Leq dB and 36.4 Leq dB respectively. Thus noise levels at all locations were observed to be within the prescribed limits.

From the above study and discussions it can be concluded that noise levels in the study area are well within the prescribed limits as prescribed by the CPCB and State Pollution Control Board.

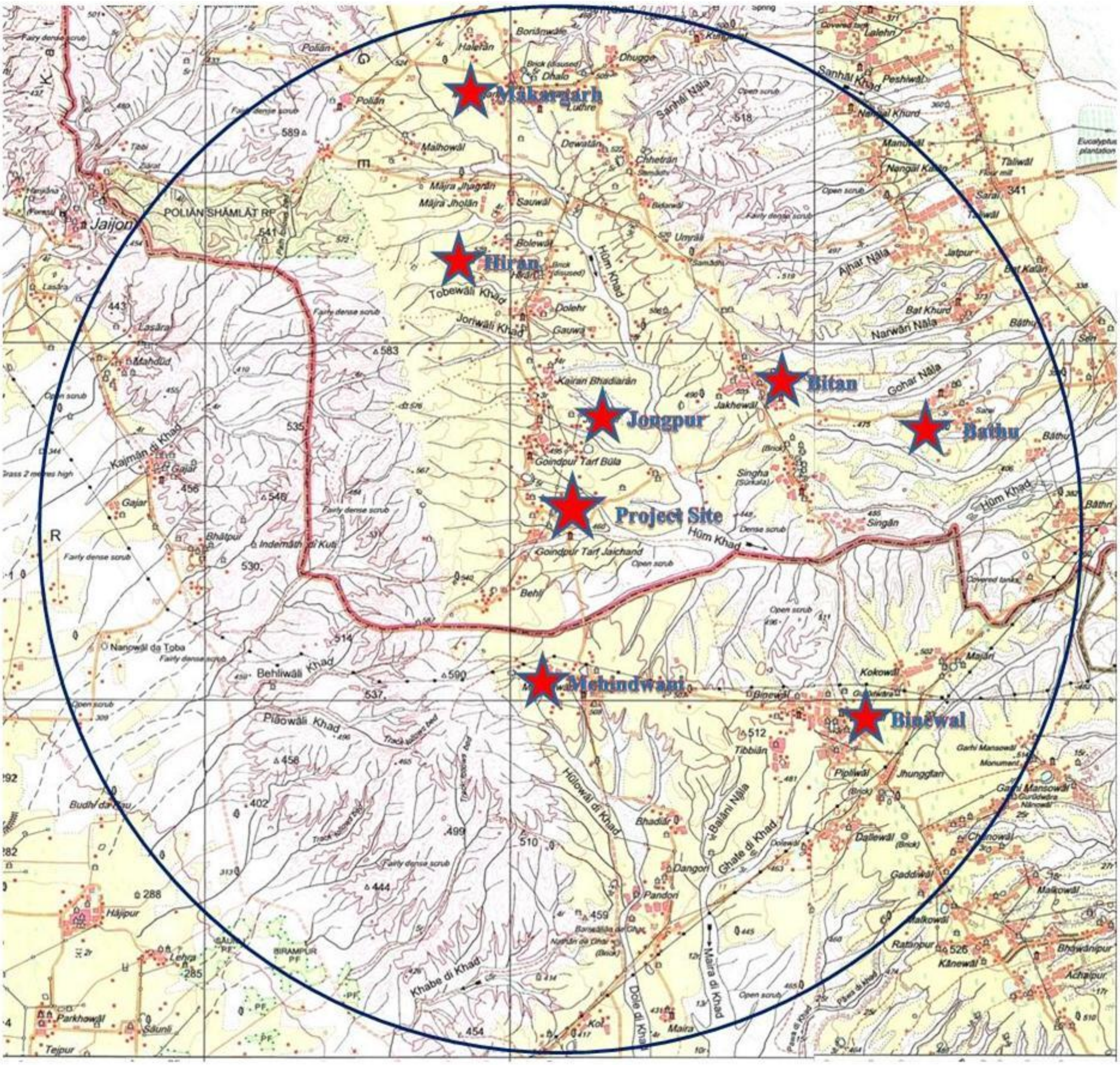


Figure 3.6: Key Plan of Noise Monitoring Station

3.11 Land Environment

3.11.1 Soil Quality and Characteristics

The information on soils has been collected from various secondary sources and also through primary soil sampling analysis of which is described in this section.

For studying the soil profile of the region, **8** locations were selected to assess the existing soil conditions around the contract area representing various land use conditions. The concentrations of physical and chemical parameters were determined.

The sampling locations have been finalized with the following objectives:

- To determine the baseline soil characteristics of the study area; and
- To determine the impact of industrialization on soil characteristics.

Quality of the soil in the area is showing a marked diversity in nature depending upon the parent rock and climatic conditions prevailing in different parts of the district. The analysis results of the soil samples collected are given in **Table-3.7.** Photographs of the sampling location and sampling location map are presented in **Figure 3.10** and **Figure 3.11.** Soil testing results are given in **Table -3.8 & 3.8(a).**

Table 3.11 Soil Monitoring Station Details

Station	Sampling Location	Aerial distance (km) and direction from Project Site	Co-ordinates	
			Latitude	Longitude
S1	Project Site	--	31º19’03.70”N	76º13’38.44”E
S2	Jongpur	1.5 Km, N	31º20’05.80”N	76º13’15.65”E
S3	Hiran	5.5 Km, NW	31º21’46.29”N	76º12’46.70”E
S4	Makargarh	8.5 Km, N	31º20’58.30”N	76º12’58.01”E
S5	Bitan	3.5 Km, NE	31º19’50.34”N	76º14’25.59”E
S6	Bathu	7.0 Km, E	31º19’32.70”N	76º16’13.67”E
S7	Binewal	6.5 Km, SE	31º17’24.81”N	76º15’01.68”E
S8	Mahindwani	3.0 Km, S	31º17’40.39”N	76º13’03.23”E

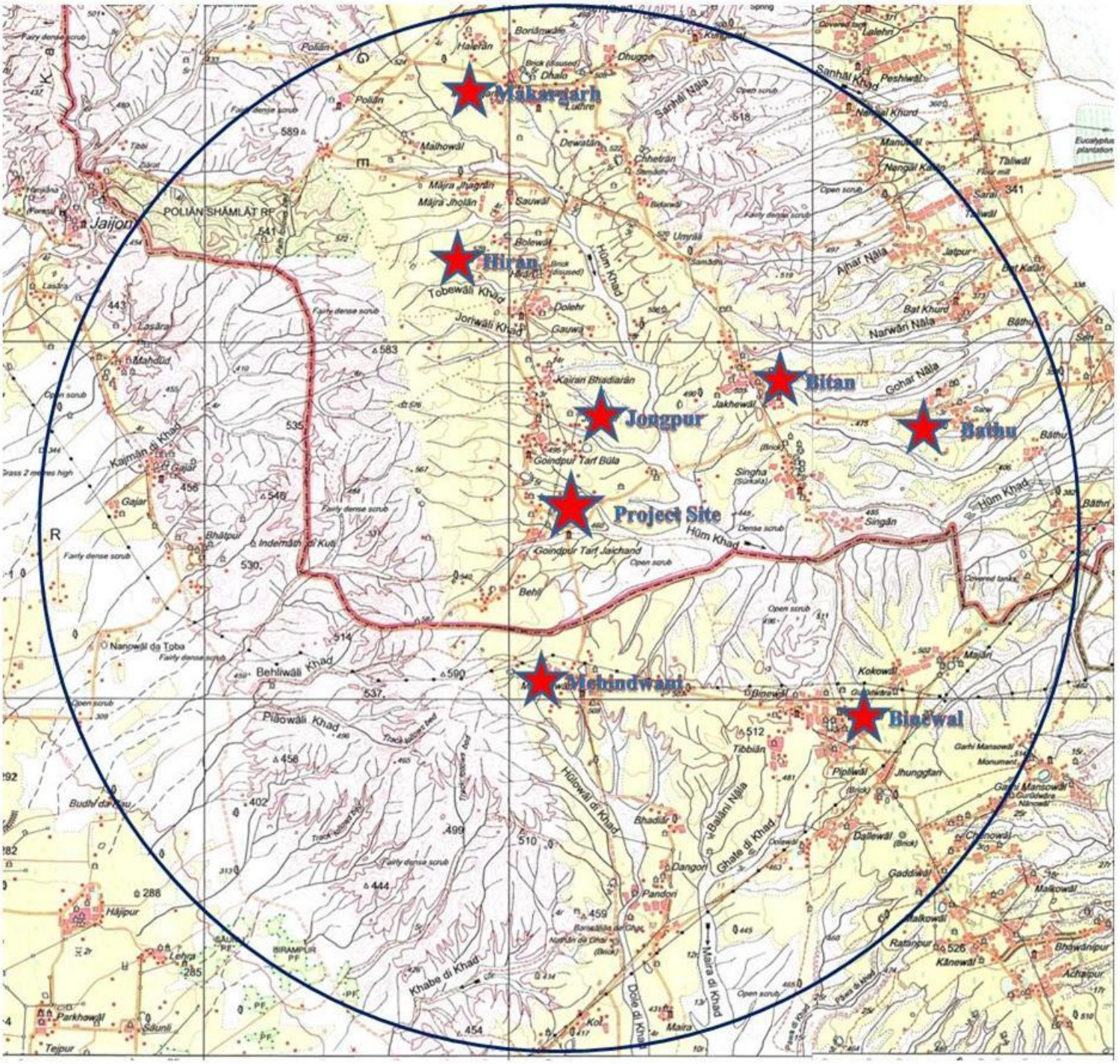


Figure 3.7: Key Plan of Soil Sampling Stations

Table 3.12 Soil Analysis Results (Oct- Dec, 2015)

S. No.	Parameter	Unit	Project Site	Jongpur	Hiran	Makargarh	Bitan	Bathu	Binewal	Mahindwani
1.	pH (at 25 ^{0}C)	--	7.63	7.81	7.45	7.65	7.89	7.53	7.72	7.34
2.	Moisture	% by mass	28.9	30.0	31.0	29.1	30.1	30.5	29.5	27.5
3.	Electrical Conductivity (at 25^{0}C)	mS/cm	0.512	0.712	0.721	0.410	0.610	0.239	0.578	0.579
4.	Calcium as Ca	mg/kg	116.0	114.0	113.1	149.0	169.5	118.1	119.9	136.0
5.	Sodium as Na	mg/kg	15.9	27.0	11.8	17.5	20.4	18.1	19.8	15.4
6.	Potassium as K	Kg/hec.	11.8	15.9	10.4	25.9	21.8	19.0	28.9	16.6
7.	Organic Matter	%	0.25	0.79	0.38	0.31	0.39	0.41	0.29	0.80
8.	Magnesium as Mg	mg/kg	80.9	77.0	79.0	75.8	80.1	60.9	70.0	48.0
9.	Nitrogen as N	kg./hec.	28.3	34.2	31.2	26.3	15.2	18.1	21.9	20.5
10.	Total Phosphorus as P_2O_5	Kg. /hec.	28.9	26.1	31.1	38.9	34.1	35.9	36.2	34.7
11.	Soil Texture	-	Sandy	Sandy clay	Sandy	Sandy	Silty Loam	Sandy	Sandy clay	Sandy Loam
12.	Colour	-	Brownish	Brownish	Brownish	Brownish	Brownish	Brownish	Brownish	Brownish

Conclusion

Soil is the media for supplying the nutrients for plant growth. Nutrients are available to plants at certain pH and pH of soils can reflect by addition of pollutants in it either by air, or by water or by solid waste or by all of these. In order to establish the baseline status of soil characteristics, soil samples were collected at 8 sampling locations.

The analysis results show that soil is basic in nature as pH value ranges from 7.34 to 7.89 with Electrical Conductivity of 0.239 to 0.712 mS/cm. The concentration of Nitrogen, Phosphorus and Potassium has been found to be in good amount in the soil samples. Soil texture is Sandy at project site.

Table 3.13
Soil Analysis Result (January, 2017)

S. No.	Parameter	Unit	Project Site	Test Method
1.	pH **(1: 2.5)**	---	6.87	IS:2720 (P-26)1987, Reff 2007 CPTL/SP-46
2.	Electrical Conductivity **(1:2)**	µmhos/ cm	0.628	IS : 14767:2000 conductivity meter CPTL/SP-47
3.	Soil Texture	---	Sandy loan	IS : 2720 (Part-4)1985
4.	Bulk Density	gm/cc	1.64	IS : 2720 (Part-8)- 1983 CPTL/SP-48
5.	Soil Moisture Content	%	35.9	USEPA Method
6.	Organic Matter	%	0.55	IS : 2720 (Part-22) 2001 CPTL/SP-56
7.	Calcium (as Ca)	mg/Kg	68.0	CPTL/SP-50, Issue Date-04-08-12
8.	Magnesium (as Mg)	mg/Kg	36.0	CPTL/SP-50, Issue Date-04-08-12
9.	Sodium (as Na)	mg/Kg	21.2	CPTL/SP-52, Issue Date-04-08-12
10.	Potassium (as K)	mg/Kg	8.2	CPTL/SP-52, Issue Date-04-08-12
11.	Available Phosphorous	Kg/hac	6.8	CPTL/SP-54, Issue Date-04-08-12

Conclusion

The analysis results of Project site show that soil is basic in nature as pH value is 6.87 with Electrical Conductivity of 0.628 mS/cm. The concentration of Nitrogen, Phosphorus and Potassium has been found to be in good amount in the soil samples. Soil texture is Sandy at project site.

3.12 Water Environment

A) Surface Water

Surface water sampling locations is given in **Table 3.9** and results are given in **Table 3.10 & 3.10(a).** Sampling location is presented in **Figure 3.13.**

Table 3.14 Surface Water Sampling Stations

Station	Sampling Location	Aerial distance (km) and direction from Project Site
Oct- Dec, 2015		
SW1	Hum Khad	2.6 Km, SE
January, 2017		
SW2	Swan River	8.0 Km, E

Table 3.15 Surface Water Sampling Results

S.No.	Parameter	Hum Khad	
		Up Stream	Down Stream
1.	pH (at 25^0C)	7.83	7.76
2.	Color, Hazen	<5	<5
3.	Turbidity	24.10	25.00
4.	Odour	Agreeable	Agreeable
5.	Total hardness as $CaCO_3$ (mg/l)	305.10	301.80
6.	Calcium as Ca (mg/l)	62.30	60.10
7.	Alkalinity as $CaCO_3$ (mg/l)	235.50	242.10
8.	Chloride as Cl (mg/l)	132.10	139.00
9.	Cyanide as CN (mg/l)	ND	ND
10.	Magnesium as Mg (mg/l)	36.37	36.90
11.	Total Dissolved Solids (mg/l)	491.00	494.00
12.	Total Suspended Solids (mg/l)	42.50	40.00
13.	Dissolved Oxygen	7.42	7.65
14.	Sulphate as SO_4 (mg/l)	38.50	37.50
15.	Fluoride as F (mg/l)	0.54	0.54
16.	Nitrate as NO_3(mg/l)	12.80	11.90
17.	Iron as Fe (mg/l)	0.38	0.34
18.	Aluminium as Al (mg/l)	ND	ND
19.	Boron as B(mg/l)	0.78	0.75
20.	Hexa Chromium as Cr^{+6} (mg/l)	ND	ND
21.	BOD (3 days at 27^0C)	12.00	12.80
22.	COD (mg/l)	38.50	39.10
23.	Zinc as Zn (mg/l)	0.35	0.32

24.	Copper as Cu (mg/l)	0.27	0.24
25.	Manganese as Mn (mg/l)	ND	ND
26.	Cadmium as Cd (mg/l)	ND	ND
27.	Lead as Pb (mg/l)	0.21	0.22
28.	Selenium as Se (mg/l)	ND	ND
29.	Arsenic as As (mg/l)	ND	ND
30.	Mercury as Hg (mg/l)	ND	ND

Table 3.16

Surface Water Sampling Results (January, 2017)

S.No.	Parameter	Swan River	Test Method
1.	pH (at 25^0C)	7.08	APHA-4500-H^+ B, 22nd Edition- 2012.
2.	Color, Hazen	<5	APHA-2120 B, 22nd Edition-2012.
3.	Turbidity	<1	APHA-2130 B, 22nd Edition -2012.
4.	Odour	Agreeable	APHA-2150 B, 22nd Edition-2012.
5.	Total hardness as $CaCO_3$ (mg/l)	202.9	APHA-2340 C, 22nd Edition-2012.
6.	Calcium as Ca (mg/l)	55.4	APHA-3500 Ca B, 22nd Edition -2012.
7.	Alkalinity as $CaCO_3$ (mg/l)	323.8	APHA-2320 B, 22nd Edition-2012.
8.	Chloride as Cl (mg/l)	21.3	APHA-4500 Cl'B, 22nd Edition -2012.
9.	Magnesium as Mg (mg/l)	15.4	APHA-2340 B, 22nd Edition -2012.
10.	Total Dissolved Solids (mg/l)	301.0	APHA-2540 C, 22nd Edition -2012.
11.	Dissolved Oxygen	6.9	APHA-4500-O B, 22nd Edition-2012
12.	Sulphate as SO_4 (mg/l)	32.4	APHA-4500 E, 22nd Edition-2012.
13.	Fluoride as F (mg/l)	0.51	APHA 4500 F- D, 22nd Edition 2012 SPANDS Method.
14.	Nitrate as NO_3(mg/l)	0.42	IS: 3025(Part-34), 1988, RA 2003.
15.	Iron as Fe (mg/l)	0.21	IS: 3025(Part-53), 2003 & C/1, 10 Phenanthroline Method.
16.	Boron as B(mg/l)	ND	APHA-4500B C, 22nd Edition-2012.
17.	Total Chromium (as Cr), mg/l	ND	APHA-3111 B, 22nd Edition. -2012.
18.	BOD (3 days at 27^0C)	5.6	IS:3025 (Part -44) 1993
19.	COD (mg/l)	27.4	APHA -5220 B, 22nd Edition-2012
20.	Zinc as Zn (mg/l)	ND	APHA-3030 D, 22nd Edition -2012.
21.	Copper as Cu (mg/l)	ND	APHA-3111B, 22nd Edition -2012.
22.	Manganese as Mn (mg/l)	ND	APHA-3030D & 3111B, 22nd Edition -2012.
23.	Cadmium as Cd (mg/l)	ND	APHA-3030D & 3111B, 22nd Edition -2012.
24.	Lead as Pb (mg/l)	ND	APHA-3030D & 3111B, 22nd Edition-2012.
25.	E.coli, MPN/100ml	Present	IS : 1622-1981 ,MPN Method.
26.	Total Coliform, MPN/100ml	864	IS : 1622-1981 ,MPN Method.

B) Ground Water

The Quality of ground water was studied by collecting **8** water samples from representative hand pumps, tube wells. Sampling points were decided using Google image and field survey. Standard procedures were followed for the sampling and analysis of Physico–chemical parameters of water. **Table 3.11** shows the details of location of water sampling stations and results of different parameters are given in **Table 3.12 & 3.12 (a).** Location map of the sampling location is presented in **Figure 3.12.**

Table 3.17 Ground Water Sampling Stations

Station	Sampling Location	Aerial distance (km) and direction from Project Site	Co-ordinates	
			Latitude	Longitude
W1	Project Site	--	31º19’03.70”N	76º13’38.44”E
W2	Jongpur	1.5 Km, N	31º20’05.80”N	76º13’15.65”E
W3	Hiran	5.5 Km, NW	31º21’46.29”N	76º12’46.70”E
W4	Makargarh	8.5 Km, N	31º20’58.30”N	76º12’58.01”E
W5	Bitan	3.5 Km, NE	31º19’50.34”N	76º14’25.59”E
W6	Bathu	7.0 Km, E	31º19’32.70”N	76º16’13.67”E
W7	Binewal	6.5 Km, SE	31º17’24.81”N	76º15’01.68”E
W8	Mahindwani	3.0 Km, S	31º17’40.39”N	76º13’03.23”E

Table 3.18 Ground Water Analysis Result (Oct- Dec, 2015)

S. No.	Parameter	Unit	Project Site	Jongpur	Hiran	Makargarh	Bitan	Bathu	Binewal	Mahindwani
1.	pH (at 25 ^{0}C)	--	7.92	7.85	7.69	7.67	7.66	7.48	7.61	7.87
2.	Colour	Hazen	<5	<5	<5	<5	<5	<5	<5	<5
3.	Turbidity	NTU	<1	<1	<1	<1	<1	<1	<1	<1
4.	Odour	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Taste	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6.	Total Hardness as $CaCO_3$	mg/l	400.0	440.0	460.0	230.0	215.0	455.0	350.0	185.0
7.	Calcium as Ca	mg/l	64.0	94.0	100.0	46.0	66.0	88.0	50.0	34.0
8.	Alkalinity as $CaCO_3$	mg/l	385.0	445.0	395.0	295.0	255.0	445.0	285.0	195.0
9.	Chloride as Cl	mg/l	82.9	133.6	112.9	76.0	62.2	110.6	96.7	43.7
10	Cyanide as CN	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
11.	Magnesium as Mg	mg/l	57.6	49.2	54.0	27.6	12.0	56.4	54.0	12.0
12.	Total Dissolved Solids	mg/l	549.0	672.0	633.0	427.0	364.0	655.0	502.0	264.0
13.	Sulphate as SO_4	mg/l	58.2	78.9	44.6	46.7	36.5	80.1	40.9	15.2
14.	Fluoride as F	mg/l	0.59	0.72	0.85	0.52	0.80	0.79	0.88	0.67
15.	Nitrate as NO_3	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
16.	Iron as Fe	mg/l	0.25	0.29	0.31	0.30	0.25	0.32	0.27	0.26
17.	Aluminium as Al	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
18.	Boron	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
19	Hexa Chromium as Cr+6	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
20.	Phenolic Compounds	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
22.	Mineral Oil	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
	Anionic Detergents as MBAS	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
23.	Zinc as Zn	mg/l	0.32	0.31	0.46	0.31	0.33	0.35	0.41	0.38
24.	Copper as Cu	mg/l	0.25	0.19	0.31	0.26	0.21	0.22	0.31	0.29

25.	Manganese as Mn	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
26.	Cadmium as Cd	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
27.	Lead as Pb	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
28.	Selenium as Se	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
29.	Arsenic as As	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
30.	Mercury as Hg	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
31.	Total Coliform	MPN/ 100ml	<2/100ml	<2/100ml	<2/100ml	<2/100ml	<2/100ml	<2/100ml	<2/100ml	<2/100ml
32.	E. Coli	MPN/ 100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Conclusion (Oct- Dec, 2015)

Analysis results of ground water reveal the following;

- pH varies from to 7.48 to 7.92
- Total Hardness varies from 185.0 to 460.0 mg/l
- Total Dissolved Solids varies from 269.0 to 689.0 mg/l

A review of the above chemical analysis reveals that water from all sources are within the limits prescribed for drinking water standards promulgated by Indian Standards (IS: 10500).

Table 3.19

Ground Water Analysis Result (January, 2017)

S. No.	Parameter	Unit	Project Site	Jongpur	Hiran	Makargarh	Bitan	Bathu	Binewal	Mahindwani
1.	pH (at 25 ^{0}C)	--	7.72	7.51	7.51	7.58	7.58	7.56	7.49	7.75
2.	Colour	Hazen	<5	<5	<5	<5	<5	<5	<5	<5
3.	Turbidity	NTU	<1	<1	<1	<1	<1	<1	<1	<1
4.	Odour	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Taste	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6.	Total Hardness as $CaCO_3$	mg/l	387	415	470	242.5	218	435	362	193.0
7.	Calcium as Ca	mg/l	85.6	105.6	127.2	66.4	48.8	112.8	88.8	46.4
8.	Alkalinity as $CaCO_3$	mg/l	369	392	371	305.5	255.0	426.8	327	208

9.	Chloride as Cl	mg/l	68.8	72.5	89.7	85.6	69.2	92.8	56.8	57.5
10.	Magnesium as Mg	mg/l	41.2	36.0	36.4	29.7	23.0	36.4	59.7	18.2
11.	Total Dissolved Solids	mg/l	537	598	632	478	330.0	618	492	325
12.	Sulphate as SO_4	mg/l	54.3	83.9	42.6	62.7	39.8	62.8	45.9	32.9
13.	Fluoride as F	mg/l	0.43	0.60	0.51	0.60	0.62	0.58	0.84	0.32
14.	Nitrate as NO_3	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
15.	Iron as Fe	mg/l	0.19	0.24	0.18	0.19	0.13	0.28	0.19	0.25
16.	Aluminium as Al	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
17.	Boron	mg/l	ND	ND	ND	ND	ND	ND	ND	ND
18.	Phenolic Compounds	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
19.	Mineral Oil	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.	Anionic Detergents as MBAS	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
21.	Zinc as Zn	mg/l	0.19	0.25	0.41	0.22	0.22	0.28	0.29	0.30
22.	Copper as Cu	mg/l	0.02	ND	0.03	ND	ND	ND	0.03	ND
23.	Manganese as Mn	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24.	Cadmium as Cd	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
25.	Lead as Pb	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26.	Selenium as Se	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
27.	Arsenic as As	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
28.	Mercury as Hg	mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
29.	Total Coliforms	MPN/ 100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
30.	E. Coli	MPN/ 100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Conclusion (January, 2017)

In the month of January, 2017, analysis results of ground water reveal the following;

- pH varies from to 7.49 to 7.75

- Total Hardness varies from 193.0 to 470.0 mg/l
- Total Dissolved Solids varies from 325.0 to 632 mg/l

During Oct-Dec, 2015 period, analysis results of ground water reveal the following;

- pH varies from to 7.48 to 7.92
- Total Hardness varies from 185.0 to 460.0 mg/l
- Total Dissolved Solids varies from 269.0 to 689.0 mg/l

A review of the above chemical analysis reveals that water from all sources are within the limits prescribed for drinking water standards promulgated by Indian Standards (IS: 10500)

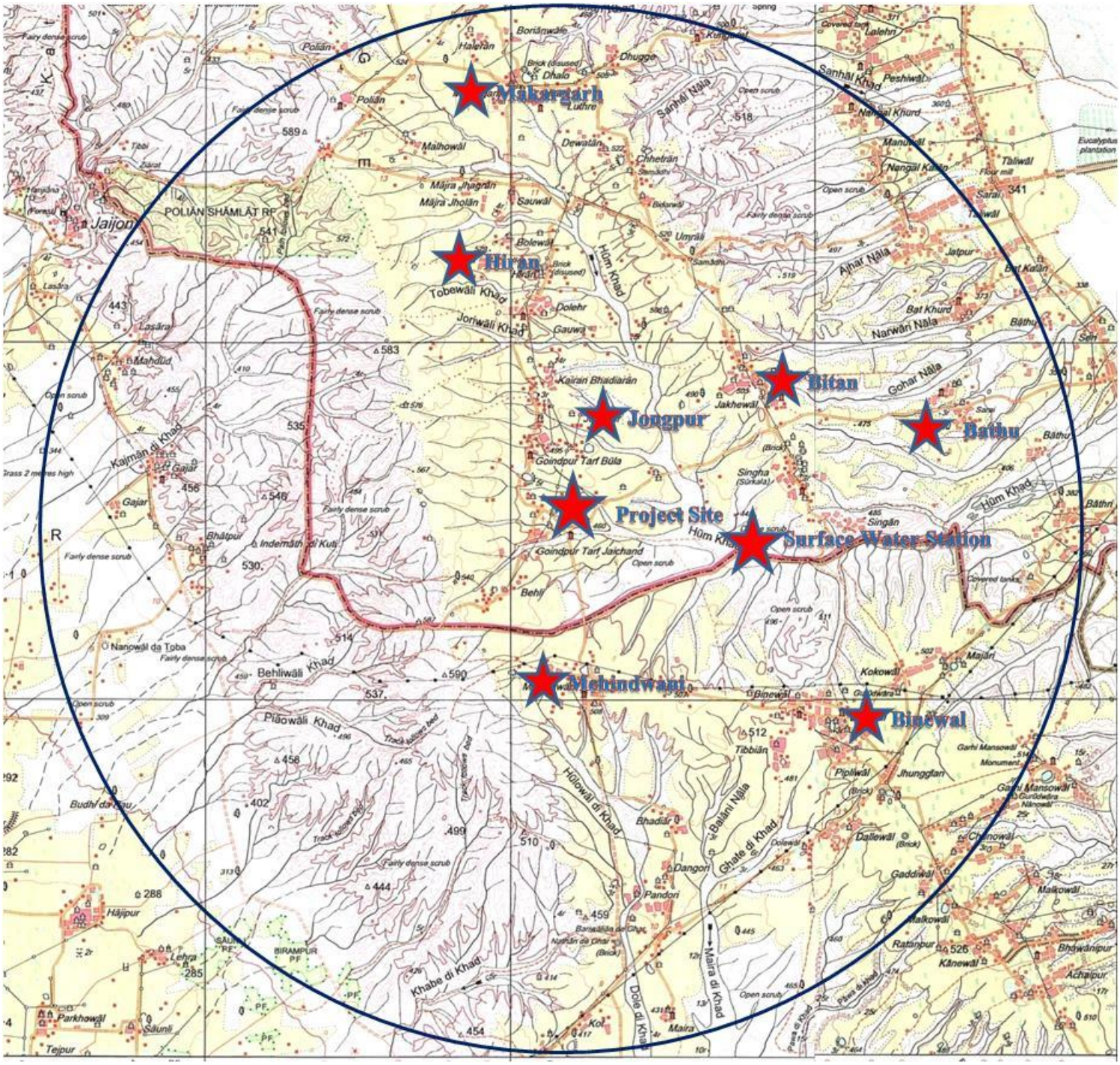


Figure 3.8: Key Plan of Water Sampling Stations

3.13 Biological Environment

Biological diversity comprises the variability of genes, species and ecosystems and is very crucial for maintaining the basic processes on which the life depends. Broadly it can be divided into two types i.e. the floral diversity and faunal diversity. Conservation of the biodiversity is essential for the sustainable development as it not only provides the food, fodder and medicine but also contribute in improvement of essential environmental attributes like air, water, soil, etc.

Before starting any Environmental Impact Assessment study, it is necessary to identify the baseline of relevant environmental parameters which are likely to be affected as a result of operation of the proposed project. A similar approach has been adopted for conducting the study on Biological Environment for this Project. Both terrestrial and aquatic ecosystems have been studied to understand the biological environment.

3.13.1 General Vegetation Study of the area:

The study area comprise of Sub-Tropical Dry Deciduous Vegetation. Several tropical elements can be seen scattered in the area. Species of *Saccharum, Calotropis, Vitex, Zizyphus,* etc. are of common occurrence. Tree species viz. *Acacia catechu, Albizia lebbeck, Dalbergia sissoo, Morus alba,* etc. are found planted along the boundary of the agricultural lands and along the road sides.

Ground vegetation mainly consists of grasses and small shrubs. Among the grasses, *Vetiveria zizanioides, Cenchrus ciliaris* are very common in the area. Useful fodder grasses, *Cynodon dactylon, Eleusine indica, Trifolium alexandrinum,* etc. are present in the proposed project area.

The large weeds which infest uncultivated tracts are *aak (Calotropis procera), arind (Ricinus communis), dhatura (Datura metel)* and *thor (Opuntia stricta).* Other noxious weeds and those which appear in crops are *pohli*or thistle *(Carthamus oxyacantha), shialkanta (Argemone mexicana), kandyari (Solanum virginianum)* and *bhang (Cannabis sativa).*

3.13.2 FLORA OF THE STUDY AREA

Table 3.20: Flora of the Core zone

S.No.	Species	Family	Habit
1	*Dodonaea viscosa*	Sapindaceae	Shrub
2	*Ipomea aquatica*	Convolvulaceae	Shrub
3	*Saccharum munja*	Poaceae	Grass
4	*Cenchrus ciliaris*	Poaceae	Grass
5	*Chrysopogon zizanioides*syn, *Vetiver zizanioides*	Poaceae	Grass
6	*Vitex negundo*	Lamiaceae	Shrub
7	*Zizyphus mauritiana*	Rhamnaceae	Shrub

Table 3.21 :Flora of the Buffer zone

Sl. No	Species	Family	Habit
1	*Abutilon indicum*	Malvaceae	Herb
2	*Acacia catechu*	Fabaceae	Tree
3	*Acacia nilotica*	Fabaceae	Tree
4	*Achyranthes aspera*	Amaranthaceae	Herb
5	*Adhatoda vasica*	Acanthaceae	Shrub
6	*Ageratum conyzoides*	Asteraceae	Herb
7	*Albizia procera*	Mimosaceae	Tree
8	*Barleria cristata*	Acanthaceae	Herb
9	*Bauhinia variegata*	Fabaceae	Tree
10	*Boerhavia diffusa*	Nyctaginaceae	Herb
11	*Bombax ceiba*	Bombacaceae	Tree
12	*Carissa carandas*	Apocynaceae	Shrub
13	*Cassia fistula*	*Fabaceae*	*Tree*
14	*Celtisaustralis*	*Ulmaceae*	*Tree*
15	*Cissampelos pareira*	*Menispermaceae*	*Climber*
16	*Cordia dichotoma*	Boraginaceae	Tree
17	*Cryptolepis buchanani*	Asclepiadaceae	Climber
18	*Dalbergia sissoo*	Fabaceae	Tree
19	*Datura stramonium*	Solanaceae	Shrub
20	*Dicliptera bupleuroides*	Acanthaceae	Herb
21	*Dodonaea viscosa*	Sapindaceae	Shrub
22	*Eucalyptus* sp.	Myrtaceae	Tree
23	*Eupatorium* sp.	Asteraceae	Herb
24	*Euphorbia royleana*	Euphorbiaceae	Shrub

25	*Ficus benghalensis*	Moraceae	Tree
26	*Ficus palmata*	Moraceae	Tree
27	*Ficus religiosa*	Moraceae	Tree
28	*Ficus rumphii*	Moraceae	Tree
29	*Jasminum dispermum*	Oleaceae	Shrub
30	*Lantana camara*	Verbenaceae	Shrub
31	*Mallotus philippensis*	Euphorbiaceae	Tree
32	*Mangifera indica*	Anacardiaceae	Tree
33	*Malva parviflora*	Malvaceae	Shrub
34	*Morus alba*	Moraceae	Tree
35	*Murraya koenigii*	Anacardiaceae	Shrub
36	*Phoenix sylvestris*	Arecaceae	Tree
37	*Populus deltoides*	Salicaceae	Tree
38	*Sida acuta*	Malvaceae	Herb
39	*Solanum nigrum*	Solanaceae	Herb
40	*Terminalia arjuna*	Combretaceae	Tree

3.13.3 FAUNA OF THE STUDY AREA

Table 3.22: Fauna of the Core zone

S.No	Common Name	Scientific Name	Wildlife schedule	IUCN Red List Status
Avian fauna (Bird):				
1	Common Myna	*Acridotheres tristis*	IV	LC
2	Indian roller	*Coracias benghalensis*	IV	LC
3	House Crow	*Corvus splendens*	-	LC
4	Indian Cuckoo	*Cuculus micropterus*	IV	LC
5	Koel	*Eudynamys scolopacea*	IV	NA
6	Little Green Bee-Eater	*Merops orientalis*	-	LC
7	Sparrow	*Passer domesticus*	IV	LC
8	Rose-ringed Parakeet	*Psittacula krameri*	IV	LC
9	Pied Myna	*Sturnus contra*	IV	LC
10	Hoopoe	*Upupa epops ceylonensis*	-	DD
11	Fork-tailed Drongo	*Dicrurusadsimilis*	IV	LC

LC: Least Concern, NA: Not Assessed, DD: Data deficient.

Table 3.23: Fauna of the Buffer zone

S.No	Common Name	Scientific name	Wildlife Schedule	IUCN Red List Status
Mammals:				
1	Field mouse	*Apodemus sylvaticus*	-	LC
2	Golden Jackal	*Canis aureus*	II	LC
3	Wild dog	*Cuonalpinus*	II	DD
4	Indian Palm Squirrel	*Funambulus palmarum*	IV	LC
5	Indian Grey Mongoose	*Herpestes edwardsii*	II	LC
6	Indian hare	*Lepus nigricollis*	IV	LC
7	Rhesus macaque	*Macaca mulatta*	II	LC
8	Fruits bat	*Pteropus conspicillatus*	V	LC
9	Rat	*Rattus rattus*	V	DD
10	Wild pig	*Sus scrofa*	III	LC
Domestic Animals:				
11	Cow	*Bos indicus*		NA
12	Buffalo	*Bos bubalis*		DD
13	Goat	*Capra aegagrushircus*		DD
Avian fauna (Birds):				
1	Jungle Myna	*Acridotheres fuscus*	IV	LC
2	Common Myna	*Acridotheres tristis*	IV	LC
3	Spotted Owlet	*Athene brama*	IV	LC
4	Cattle Egret	*Bubulcus ibis*	IV	LC
5	Red-rumped Swallow	*Cecropis daurica*	-	DD
6	Pied kingfisher	*Ceryle rudis*	IV	DD
7	Blue Rock Pigeon	*Columba livia*	-	LC
8	Oriental Magpie Robin	*Copsychus saularis*	IV	LC
9	Indian roller	*Coracias benghalensis*	IV	LC
10	House Crow	*Corvus splendens*	V	LC
11	Common Cuckoo	*Cuculus canorus*	IV	LC
12	Ashy Drongo	*Dicrurus leucophaeus*	IV	LC
13	Asian Koel	*Eudynamys scolopacea*	IV	NA
14	White-breasted King fisher	*Halcyon smyrnensis*	IV	LC
15	Small Green Bee Eater	*Merops orientalis*	-	LC

16	House Sparrow	*Passer domesticus*	IV	LC
17	Rose ringed Parakeet	*Psittacula krameri*	IV	LC
18	Red vented Bulbul	*Pycnonotus cafer*	IV	LC
19	Spotted Dove	*Streptopelia chinensis*	IV	NA
20	Pied Myna	*Sturnus contra*	IV	LC
21	Marsh Sandpiper	*Tringa stagnatilis*	IV	LC
22	Common Babbler	*Turdoides caudatus*	IV	NA
23	Hoopoe	*Upupa epops ceylonensis*	IV	NA
Reptiles				
1	Common Toad	*Bufo melanostictus*	IV	LC
2	Skipping frog	*Bufo stomaticus*	IV	LC
3	Krait	*Bungarus caeruleus*	IV	NA
4	Banded krait	*Bungarus multicinctus*	-	NA
5	Kashmir Rock Agama	*Laudakia tuberculata*	-	NA
6	Bronze Grass Skink	*Eutropis macularia*		NA
7	Garden lizard	*Calotes versicolor*	-	NA
8	House lizard	*Hemidactylusfrenatus*	-	LC
9	India bull frog	*Hoplobatrachus tigerinus*	-	DD
10	Cobra	*Naja naja*	II	LC
11	Rat snakes	*Ptyas mucosus*	-	NA

LC: Least Concern, NA: Not Assessed, DD: Data deficient.

3.13.4 Waste land:

Most of the areas nearby the Core zone are waste land. Commonly seen plant species in such areas are *Saccharum munja*, *Ipomea aquatic*, *Dodonaea viscose*, *Vitex negundo*, *Cenchrus ciliaris*, etc. These weeds are affecting the agricultural productivity of the region due to fast growth, short life cycle and enormous production of seeds.

Source: *Field Survey Report*

3.14 Socio-Economic Environment

The growth of industrial sectors and infrastructure developments in and around the agriculture dominant areas, villages and towns are bound to create its impact on the socio-economic aspects of the local population. The impacts may be positive or negative depending upon the developmental activity. To assess the impacts on the socio-economics of the local people, it is necessary to study the existing socio-economic status of the local population, which will be helpful for making efforts to further improve the quality of life in the area of study. To study the socio-economic aspects of people in the study area around the proposed project site, the required data has been collected from various secondary sources and supplemented by the primary data generated through the process of a limited door to door socio-economic survey.

3.14.1 Methodology adopted for the Study

The methodology adopted for the study is based on the review of secondary data, such as District Census Statistical Handbooks-2011 and the records of National Informatics Center, New Delhi, for the parameters of demography, occupational structure of people within the general study area of 10-km radius around the proposed project site.

3.14.2 Review of Demographic and Socio-economic Profile - 2011

The sociological aspects of this study include human settlements, demography, social such as scheduled castes and scheduled tribes and literacy levels besides infrastructure facilities available in the study area. The economic aspects include occupational structure of workers.

The salient features of the demographic and socio-economic details are described in the following sections and **Figure 3.14**.

3.14.3 Demography

Distribution of Population

As per 2011 census, the study area consists of 83, 572 persons. The distribution of population in the study area is given in **Table 3.16**. The males and females constitute 50.6and 49.4 % of the study area population respectively.

Table-3.24 Distribution of Population

DEMOGRAPHIC PARTICULARS OF THE STUDY AREA			
S.N.	**Description**	**Number**	**% to Respective Total**
1.	**Gender wise Total Population of the Study Area**	**83, 572**	**100**
	Male	42, 288	50.6
	Female	41, 284	49.4
	Sex Ratio (No. of females per 1000 males)	**976**	
2.	**Sector wise Total Population of the Study Area**	**83, 572**	**100**
	Rural	74, 209	88.8
	Urban	9, 363	11.2
3.	**Gender wise Total Population (0-6 age group)**	**9, 426**	**100**
	Male	4, 954	52.6
	Female	4, 472	47.4
	Sex Ratio of 0-6 age group population (No. of females per 1000 males)	**903**	
4.	**Total Number of Households**	**17071**	
	Average Household size for the study area as a whole	5	
	Highest Household size in the study area	6	
	Lowest Household size in the study area	4	
5.	**Total Population of Schedule Caste Community in the Study Area**	**21, 212**	**100**
	Male	10, 771	50.8
	Female	10, 441	49.2
	Sex Ratio (No. of females per 1000 males)	**969**	
6.	**Total Population of Schedule Tribe Community**	**2, 536**	**100**
	Male	1, 327	52.3
	Female	1, 209	47.7
	Sex Ratio (No. of females per 1000 males	**911**	
7.	**Total Population of General Community (including OBC)**	**59, 824**	**100**
	Male	30, 190	50.5
	Female	29, 634	49.5
	Sex Ratio of General Community population		

	(including OBC) (No. of females per 1000 males	**982**	
8.	**Total Literates in the Study Area**	61, 336	**100**
	Male	33, 451	54.5
	Female	27, 885	45.5
	Overall Literacy Rate in the Study Area	**82.7**	
	Male	89.6	
	Female	75.7	
	Gender Gap in Literacy Rate	13.9	
9.	**Total Workers in the Study Area**	**28891**	**100**
	Male	22255	77.0
	Female	6636	23.0
	Overall Gender Gap in Work Participation Rate	**54.0**	
10	**Total Main Workers in the Study Area**	**20369**	**100**
	Male	17045	83.7
	Female	3324	16.3
	Overall gender gap in work participation rate of Main Workers	**67.4**	
11	**Total Marginal Workers in the Study Area**	**8522**	**100**
	Male	5210	61.1
	Female	3312	38.9
	Overall gender gap in work participation rate of Marginal Workers	22.2	
12	**Total Household Industrial Workers in the Study Area**	**940**	**100**
	Male	760	80.9
	Female	180	19.1
13	**Total Agricultural Workers in the Study Area**	**11560**	**100**
	Male	7912	68.4
	Female	3648	31.6
14	**Total Cultivators in the Study Area**	**7383**	**100**
	Male	4874	66.0
	Female	2509	34.0
15.	**Total Agricultural Labour in the Study Area**	**4177**	**100**
	Male	3038	72.8
	Female	1139	27.2
16	**Total 'Other Workers' in the Study Area**	**16391**	**100**

	Male	13583	82.9
	Female	2808	17.1

Table 3.25
Various Amenities Available in the Study Area

S.No	Amenities	Type	No. of Villages	Number of Facilities	No. of Town(s)	Number of facilities
1.	Educational Institutions	Primary School	53	78	1	5
		Middle School	25	28	1	2
		Secondary School	12	13	1	2
		Senior Secondary School	6	6	1	2
		Adult Literacy	2	2	-	-
		Center University	-	-	1	1
		Gov. Inter College	-	-	1	1
2	Health Facilities	Unani Dispensary	1	1	-	-
		Ayurvedic Dispensary	8	8	-	-
		Primary Health Centre	5	5	-	-
		Health Centre	1	1	-	-
		Family Welfare Centre	1	1	-	-
		Maternal & Child Welfare Centre	8	8	-	-
		Registered Medical practitioner	11	25	-	-
		Subsidized Medical practitioner	1	1	-	-
		Community Health	10	10	-	-

		Workers				
3	Drinking Water	Well	35	-	-	-
		Hand Pump	49	-	1	-
		Tub well	27	-	1	-
		Tap	51	-	1	-
		Tank	12	-	1	-
4	Electricity	Power for Domestic Uses	8	-	1	1902 connection
		Power for Agriculture Uses	1	-	-	-
		Power for Road Light	-	-	1	135 connections
		Power for Commercial Uses	-	-	1	416 connections
		Power for Industrial Uses	-	-	1	84
		All Purposes	52	-	-	-
5	Approach Road	Only Paved Roads	15	-	-	-
		Both Paved and Mud Roads	15	-	1	-
		Paved, Mud & Footpath Roads	20	-	1	-
6	Banks & Credit Societies	Commercial Bank	5	-	1	-
		Cooperative Bank	3	-	-	-
		Agriculture Credit Society	20	-	-	-
7	Communicat -ion Facilities	Bus Services	49	-	1	-

Conclusion

All the basic facilities like road and rail network, medical facilities, post & telegraph, market, drinking water facilities and education facilities are available. The proposed project will be boon for the surrounding area.

3.15 Solid Waste and Hazardous Waste

This is a proposed project. Hence, no solid and hazardous waste observed at site. The proposed generation details are given in **Chapter 4.**

3.16 Risk Assessment

As this project is a proposed project. Hence, no risk at site. The future project risk assessment has been done and given in **Chapter 7.**

3.17 Traffic Study

Traffic study measurements were performed at MDR-39 (Nangal to Polian) to assess impact on local transport infrastructure due to this proposed project. Road and highway studies are given in following table.

Table 3.26 Highways in the Study Area

Name of National/State Highway	Direction	
	Up	Down
MDR-39	Nangal	Tahliwal Polian Jaijon

Total numbers of vehicles per hour under the three categories were determined and given in following table.

Table 3.27 No. of Vehicles per day

S. No.	Vehicles Distribution	Number of Vehicles Distribution/Day
		MDR-39
1.	Cars	160
2.	Buses	50
3.	Two wheelers	300
4.	Three wheelers	25
5.	Trucks	150
6.	Others	250
Total		**935**

Table 3.28
Additional Traffic due to the Project

S. No.	Material	Quantity per Day	Mode of Transportation	Capacity of vehicle	No. of trips per day
1.	Grains	280 TPD	Trucks	40 ton	7
2.	Rice Husk	125 TPD	Lorry	20 ton	6
3.	Alcohols	100 KLPD	Tankers	20 KL	5

CHAPTER-4

ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

4.1 Introduction

This chapter presents identification and appraisal of various impacts from the proposed power plant in the study area. Generally, the environmental impacts can be categorized as either primary or secondary. Primary impacts are those which are attributed directly to the project and secondary impacts are those which are indirectly induced and typically include the associated investment and changed patterns of social and economic activities by the proposed action.

Quantification of assessments in terms of measurable units would be the ideal method for impact assessment. Mathematical models are the best tools to quantitatively describe cause-effect relationships between sources of pollution and different components of environment. However, due to lack of information/data, uncertainties involved and complex interrelationships between various sectors of environment, it is not always possible or at least not easily achievable. In such cases, only qualitative predictions have been made based on experience and judgments.

The Environment Management Plan (EMP) is required to ensure sustainable development in the study area (10 km) of the proposed plant site, hence it needs to be an all encompassive plan for which the proposed industry, Regulating agencies like pollution control board working in the region and more importantly the affected population of the study area need to extend their co-operation and contribution.

The affected environmental attributes in the region are air quality, water quality, soil, land use, ecology and public health. The management action plan aims at controlling pollution at the source level to the extent possible with the available and affordable technology followed by treatment measures before they are discharged. The proposed project would create impact on the environment in two distinct phases:

i. During the construction phase which may be regarded as temporary or short term; and
ii. During the operation phase which would have long term effects.

The construction and operational phase of the proposed project comprises various activities each of which will have an impact on some or other environmental parameters. Various impacts during the construction and operation phase on the environmental parameters have been studied and mitigation measures for the same are discussed briefly below and elaborated in the subsequent sections.

4.2 Construction Phase

This phase involves the activities like erection of civil structures, movement/ removal of old construction, erection of new equipment and machinery, green belt development etc. Air, Noise and Land are likely to be effected by these activities, although Aesthetics and Socio-economic factors are also identified. But the impacts will be marginal and for short term only. The green belt development will have positive impacts. The impacts on different environmental parameters due to proposed project construction are discussed in **Table 4.1.**

Table 4.1
Impact Identification Matrix (Construction Phase)

Activities	Environmental Attributes										
	Air	Noise	Water	Hydro Geology	Geology	Climate	Land	Ecology	Socio Economic	Solid/Hazardous	Risk
Operation of DGs	√	√				√				√	√
Operation of Construction Equipment	√	√	√		√			√		√	√
Traffic	√	√									√
Land Development and Building Construction	√		√	√			√	√	√	√	√
Waste water generated from labour camp			√								

4.2.1 Impact on Land Use

The construction activity would bring immediate changes in the land use pattern of the proposed plant area as well as in the vicinity. The land required for the project will undergo a change due to cutting, stripping, excavation, and leveling, landscaping, loss of

vegetative cover and erection of structures of the proposed project. The impact on land use will be long term and permanent but will be on a smaller scale. Construction of plant will lead to permanent change in land use pattern at the site as a direct impact. The construction activities would attract a sizeable population and influx of population is likely to be associated with construction of temporary hutment for construction work force. However, this will be only a temporary change and shall be restricted to construction period. As soon as the construction phase is over, the land use pattern modified to meet the requirement of construction phase shall be reversed. Development activity also induces changes in land use pattern of the adjoining areas because of the increased availability of infrastructural facilities, increase in commercial value of land etc.

Mitigation Measures

Although, the impact on land use will be long term and permanent it can be considerably reduced by taking following measures:

i. Minimize clearance of trees by appropriate attention during finalizing layout;
ii. Enforcement of restriction for timber and waste disposal etc.; and
iii. The excavation material should be dumped in low lying areas so as to reduce visual impact.

4.2.2 Impact on Soil and Mitigation Measures

Construction activities involving leveling, excavation and removal of existing vegetation would invariably disturb the soil of the area. The impacts on soil during construction phase shall be mainly due to loss of top soil in the construction areas and contamination of the soils of surrounding area due to construction materials such as cement, sand, oils, etc. The disturbances would be more pronounced during the summer and monsoon seasons with strong rains.

However, it shall be temporary and shall be confined to the areas of construction only. Generally, such disturbances are confined to the area of activity i.e. the main plant. Appropriate soil conservation measures associated with improved construction techniques would minimize such impacts. Timely afforestation activities would also contribute positively towards soil conservation.

Apart from localized construction impacts at the plant site, no adverse impacts on soil in the surrounding area are anticipated.

4.2.3 Impact on Air Environment

Impacts of construction activities on air quality are cause for concern mainly in the dry months due to dust particles. The main sources of emission during the construction period are the movement of equipment at site and dust emitted during the leveling, grading, earthworks, foundation works and other construction related activities. The dust emitted during the above mentioned activities depend upon the type of soil being excavated and the ambient humidity levels. The dust generated during the construction activities will however, settle quickly. Therefore, the impact will be for short duration and confined locally to the construction site. The composition of dust in this kind of operation is, however, mostly inorganic and nontoxic in nature.

The impact will be confined within the project boundary and is expected to be negligible outside the plant boundaries. Exhaust emissions from vehicles and equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO_2, NOx and PM.

Mitigation Measures

Proper upkeep and maintenance of vehicles, sprinkling of water on roads and extensive lush green plantation would greatly reduce the impacts during the construction phase.

4.2.4 Impact on Water Environment

Effluents from the construction area mainly contain suspended solids while the sanitary waste from the labour colonies contains suspended as well as organic matter. The loose construction material like sand, cement etc. and excavated earth/construction debris may get washed off during heavy precipitation. This may increase the suspended solid of the receiving water body.

Mitigation Measures

Adequate arrangements for proper drainage and disposal of wastewater and routing of the effluents from construction area through sedimentation basins and provision of proper sanitary facilities with treatment will eliminate these problems of water pollution. Moreover, these impacts will be temporary in nature.

4.2.5 Impact on Noise Environment

The major sources of noise during the construction phase are vehicular traffic, construction equipment like dozers, scrapers, concrete mixers, cranes, generators, pumps, compressors, rock drills, pneumatic tools, vibrators etc. The operation of these equipments will generate noise ranging between 70-90 dB (A). The noise produced during the construction will have significant impact on noise levels in the working environment as well as on personnel operating these machines. However, the construction noise is limited to duration of construction only.

Mitigation Measures

i. Mandatory use of personal protective equipment like ear plugs shall be ensured to mitigate any significant impact of such equipment on personnel operating the machinery.

ii. Long exposure to high noise levels shall be avoided by practicing proper shift arrangement for workers. Similarly, shift arrangements shall be made to avoid long exposure to hand-arm vibration and full body vibration.

iii. Noise making construction activities shall be carried out during day time only.

4.2.6 Impact on Biological Environment

The initial construction works at the project site involving land clearance/cutting, falling and leveling will cause loss of vegetation to some extent. The removal of herbaceous vegetation from the soil and loosening of the top soil generally causes fugitive emission.

Deposition of fugitive dust on pubescent leaves of nearby vegetation may lead to temporary reduction of photosynthesis. Such impacts would, however, be confined mostly to the initial periods of the construction phase and would be minimized through adoption of control measures such as paving and surface treatment, water sprinkling and plantation schemes. The impact would be restricted within the plant boundary. Thus, the impacts of construction activities will be marginal in scale.

The increase in vehicular traffic due to construction coupled with higher noise level due to various constructional activities may drive away the local fauna from project site to neighboring area. However, project site/area does not harbor fauna of significant importance. Hence, the impact on fauna expected to be minimal.

4.2.7 Impact on Socio economic Environment

During construction phase of the proposed project, labors will be required and this requirement will be met from surrounding area. Hence, positive impact will be on Socio economic environment.

4.2.8 Impact of Solid and Hazardous Waste

During construction phase of the proposed project, top soil, construction debris and oil from the machineries will be generated.

Mitigation Measures

i. Top soil will be stacked separately and will be used for green belt;
ii. Construction debris will be used for filling of low laying area; and
iii. Used oil will be sold to CPCB authorized vendor.

4.2.9 Risk Assessment during Construction

During construction activity various risk involved. Hence, detailed study has been done and given in **Chapter 7.**

4. 3 Operational Phase

This phase of the project is important because it generates long-term impacts as the production starts. The primary impacts causing likely deterioration will be in Air, Water, Noise and Land / Soil due to the gaseous emissions, vehicular movement, and discharge of liquid effluent. Identification of impacts during operation phase is given in **Table 4.2.**

Table 4.2
Identification of Impacts during Operation Phase

Activity	Environmental Attribute	Cause	Impact Characteristics			
			Nature	Duration	Reversibility	Significance
Green Belt Development	Ecology	Planting of Trees	Positive	Long Term	Reversible	High Positive Impact
Emissions from various unit processes and vehicular traffic	Air Quality (SPM, SO_2, NOx, CO, HC)	Unit operations, Vehicle Operation and fuel Combustion	Significant Negative	Long Term	Reversible	Low as ambient and stack monitoring , Scrubber Vehicle maintenance will be performed
	Noise levels	Noise generation	Minor Negative	Long Term	Reversible	Low, due to noise

Activity	Environmental Attribute	Cause	Impact Characteristics			
			Nature	**Duration**	**Reversibility**	**Significance**
		from machinery and Vehicles				protection measures, periodical vehicle maintenance
Solid Waste Disposal	Land and Soil	Generation of Solid Waste	Minor Negative	Long Term	Reversible	Low, proper collection and Disposal, Zero discharge
Wastewater Discharge	Water Quality	Generation of Wastewater	Significant Negative	Long Term	Reversible	Low, ETP Shall be provided
DG Set	Air Quality	Exhaust Emissions	Minor Negative	Short Term	Reversible	Low, DG Set is only a standby
	Noise Levels	Noise Generation	Minor Negative	Short Term	Reversible	Low due to Noise Protection measures
Socio-Economic	Employment Generation	Direct and Indirect employment	Positive	Long term	Irreversible	High, new opportunities of income for many families
	Quality of Life	In flow of funds in the region/nation	Positive	Long Term	Irreversible	High, the project will generate employment

This phase includes following activities:

i. Raw material storage
ii. Product manufacturing
iii. Product storage
iv. Transportation
v. Gaseous emission
vi. Effluent discharge
vii. Solid waste generation
viii. Occasional equipment failure / Process upset and related problems
ix. Industrial development
x. Chemical Hazards

xi. Generation of employment opportunity

xii. Contribution to social welfare

4.3.1 Impact on Air Environment

The impact has been predicted separately for operation phase of the project. During operation phase, air emissions both gaseous and fugitive will be on account of process emissions from stacks, transportation of men and material.

Ambient Air Quality Modeling

The sources of air pollution in the process due to the proposed facilities have been identified and quantified. Particulate matter, Sulphur dioxide (SO_2) and Oxides of Nitrogen (NOx) emissions will be the main pollutants. The incremental ground level concentrations from the proposed facilities have been estimated by dispersion modeling.

Details of Mathematical Modeling

Industrial Source Complex Short-Term (ISCST3) dispersion model based on steady state Gaussian plume dispersion, designed for multiple point sources for short term has been used for predicting the ground level concentrations.

The computations deal with major pollutants like Sulphur dioxide and Suspended Particulate Matter and Oxides of Nitrogen.

Model options used for computations

The options used for short-term computations are:

- The plume rise is estimated by Briggs formulae, but the final rise is always limited to that of the mixing layer;
- Stack tip down wash is not considered;
- Buoyancy induced dispersion is used to describe the increasing plume dispersion during the ascension phase;
- Calms processing routine is used by default;
- Wind profile exponents are used by default, 'Irwin';
- Flat terrain is used for computations;
- It is assumed that the pollutants do not undergo any physico-chemical transformations and that there is no pollutant removal by dry deposition;
- Washout by rain is not considered; and

- Cartesian co-ordinate system has been used for computations.

Meteorological input data to the Model

The hourly meteorological data recorded at site is converted to the mean hourly meteorological data as specified by CPCB and the same has been used in the model. In absence of site specific mixing depths, mixing depths published in "Spatial Distribution of hourly Mixing Depths over Indian Region" by Mr. R.N. Gupta have been used.

Model input data

The air pollution modeling carried out represents the worst case scenario. During the normal operating conditions, the pollutant concentration will be much less than the worst case scenario projected in the following paragraphs. The pollutants considered for modeling include sulphur dioxide, suspended particulate matter, Oxides of Nitrogen. The details of the stack and emissions envisaged from the proposed plant are given in **Table-4.3. Presentation of Results**

The simulations were done to evaluate PM, SO_2, and NO_X likely to be contributed by the proposed plant. For the short term simulations, the concentrations were estimated around 1200 receptor points chosen to obtain an optimum description of variations in concentrations over the site in 10-km radius covering 16 directions. The incremental concentrations are estimated for summer season. Meteorological data is attached as **Annexure VI.**

Table-4.3 Details of Stack Emissions

Sr. no.	Stack Parameter	Unit	Boiler	DG Set
1	Height	m	30	10
2	Diameter	m	1.5	0.8
3	Flue gas temp	^0C	135	150
4	Flue gas velocity	m/sec	20	15
5	Volumetric Flow rate	Nm^3/sec	25.82	5.31
Emission Calculation				
A	PM_{10}	g/sec	1.29	0.27
B	SO_2 (worst case)	g/sec	9.26	1.39
C	NOx	g/sec	6.46	1.86

Resultant Concentrations after Implementation

The maximum incremental GLCs due to the proposed project for PM_{10}, SO_2 and NOx are superimposed on the maximum baseline PM, SO_2 and NOx concentrations recorded during the study period in the south direction to arrive at the likely resultant concentrations. The isopleths for pollutants PM, SO_2 and NOx are presented in **Figure-4.1** to **Figure-4.3.**

The resultants and incremental concentrations of PM, SO_2 and NOx are shown in the **Table-4.4.** The predicted GLCs are potentially insignificant and the resultant values are well below the prescribed.

Table-4.4 Resultant GLC'S at Monitoring Locations

All values in **µg/m^3**

Sr. No.	Parameter	Max. Baseline Concentration	Incremental Concentration	Resultant Concentration	CPCB Standards
1	PM_{10}	67.6	1.06	68.66	100
2	SO_2	10.0	5.3	15.3	80
3	NO_x	24.0	5.4	29.4	80

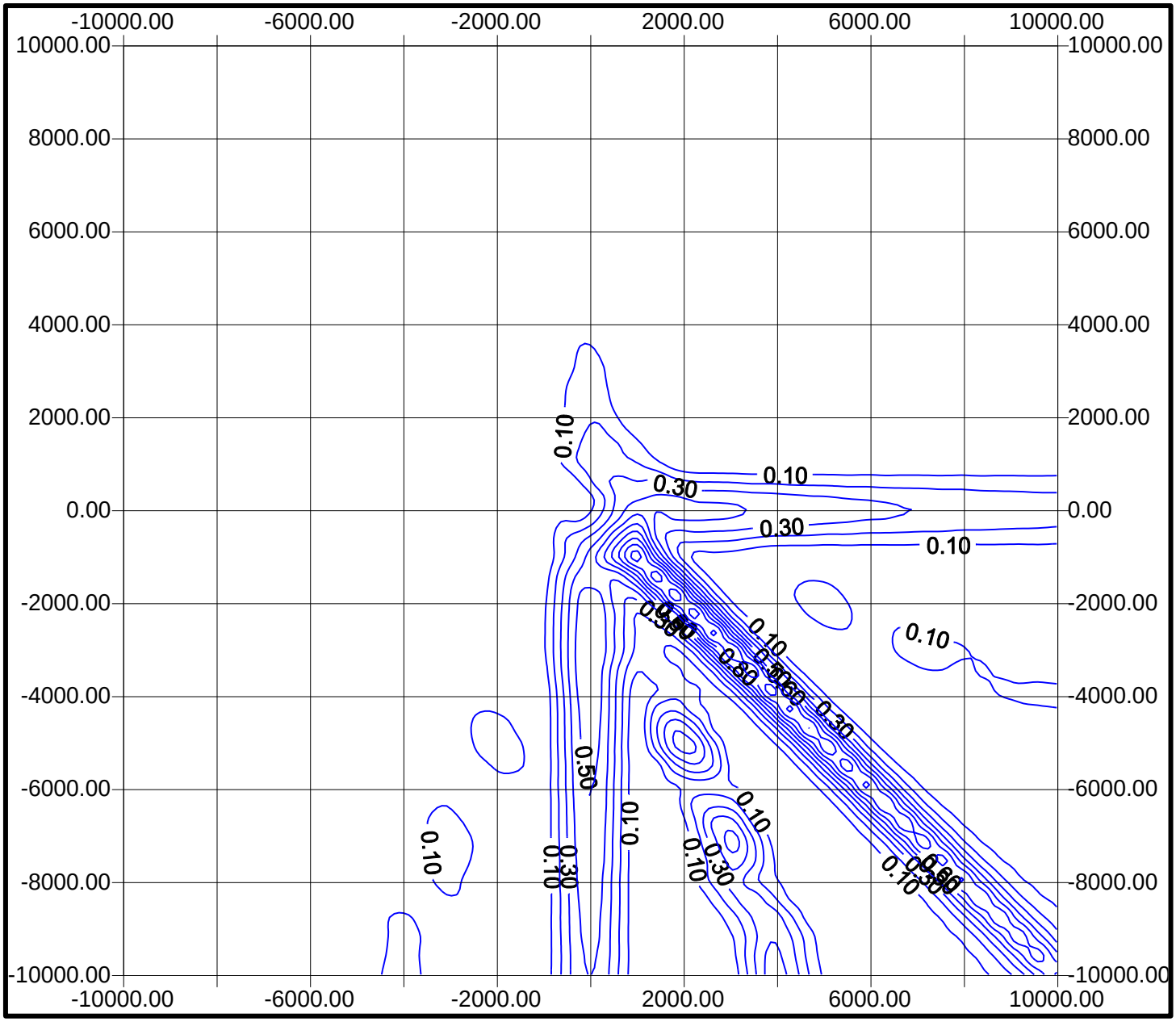


Figure-4.1
Short Term 24 Hourly Incremental GLCs of PM_{10} ($\mu g/m^3$)

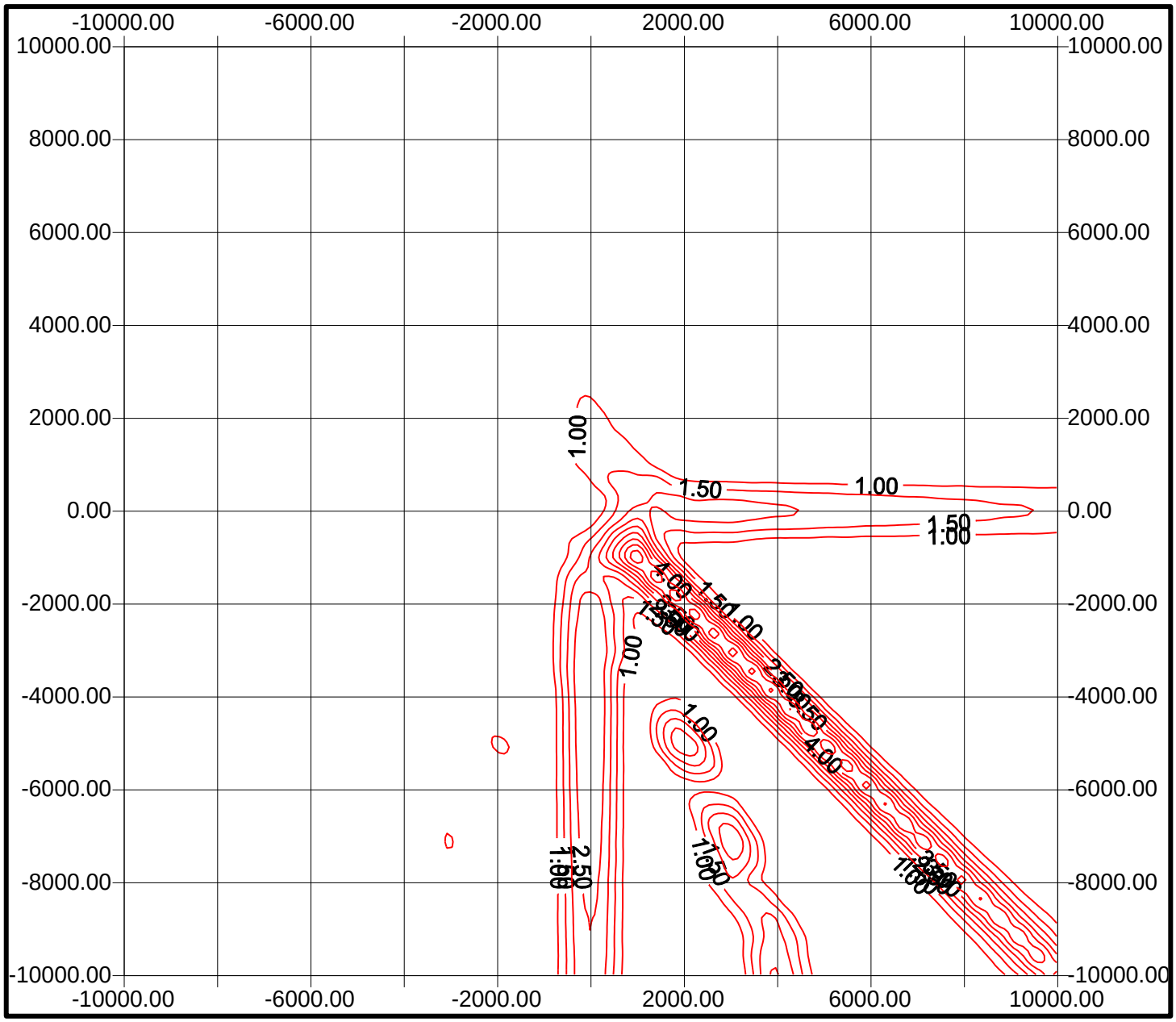


Figure-4.2
Short term 24 hourly Incremental GLCs of SO_2 (µg/m^3)

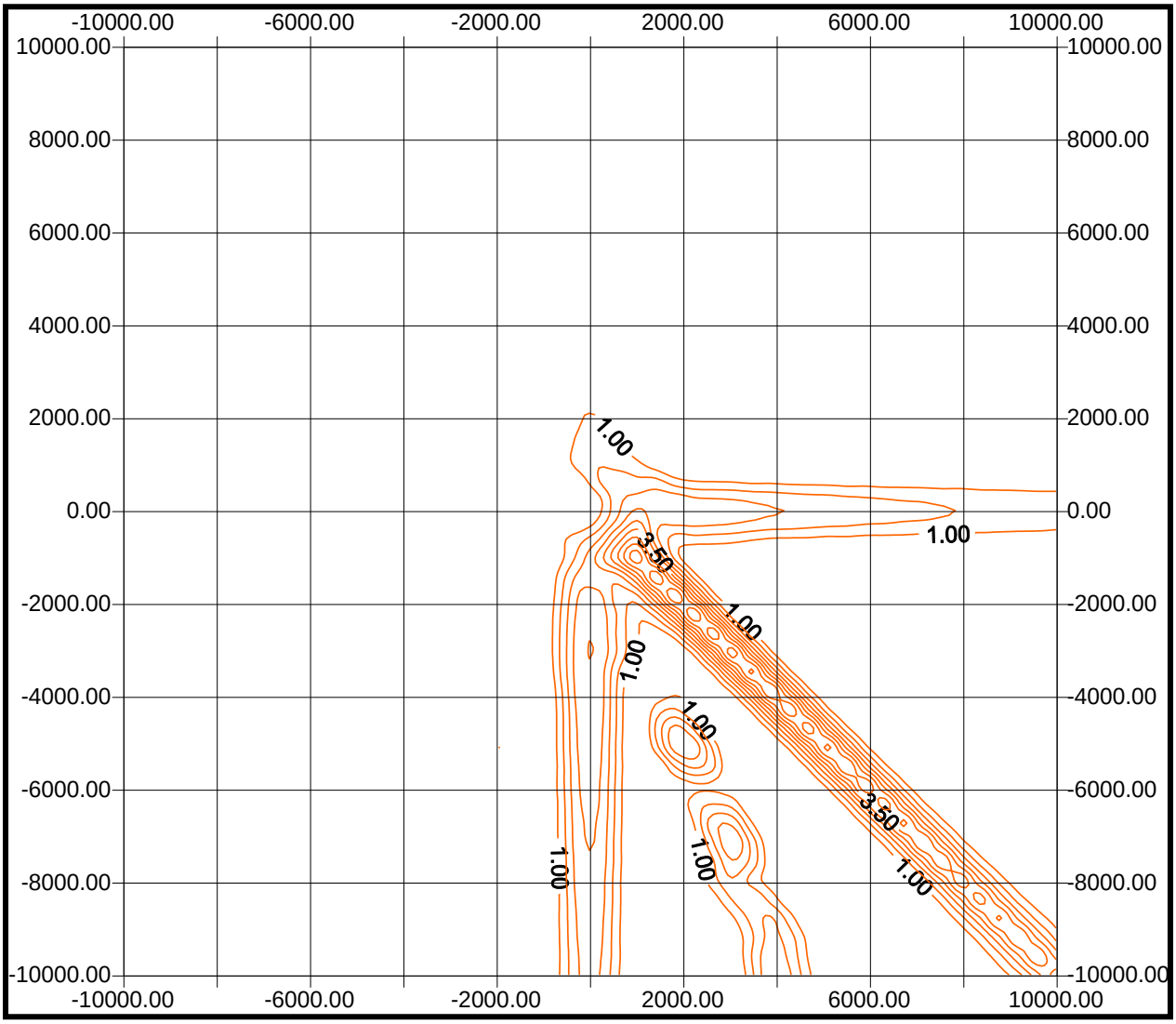


Figure-4.3
Short term 24 hourly Incremental GLCs of NOx (µg/m^3)

Mitigation Measures

Thus the under cited mitigation measures will be adopted:

i. The main raw material and product shall be brought in and dispatched by road in covered trucks;
ii. It will be ensured that the vehicle owners must have valid PUC Certificate;
iii. It will be ensured that vehicles are not overloaded during transportation;
iv. Dust suppression on haul roads will be done at regular intervals;
v. Boiler ash will be transferred in closed bulkers to the end users to avoid any spillage;

Besides this, odour is also a problem in the project due to typical odour compounds:

i. Better housekeeping by regular steaming of all fermentation equipment;
ii. Use of efficient bio-cides to control bacterial contamination;
iii. Control of temperature during fermentation to avoid in-activation / killing of yeast;
iv. Air Treatment Technology will manage aerial emission prior to discharge to the atmosphere via a stack. The stack will be designed with sufficient height (30 m) to aid dispersion to the point where emissions will not impact on any receptors.

4.2.2 Impact on Water Environment

Fresh water requirement (922 KLD) of the plant is proposed to be met by Bore-well and recycled water. The proposed project would have "Zero liquid discharge".

Liquid Waste Handling

(A) WASTE WATER STREAMS

The distillation industry is a water intensive industry and generates considerable amount of Effluent. However, in Grain based Distilleries, most of the Effluent quantities comprise organics including fibers & proteins etc., which are separated by concentration in Multi-Effect Evaporators. The Fibers & Solids thus separated are utilized as Cattle Feed due to their rich fiber & protein content. The Process Condensates with very low volatiles are conveniently recycled back to process use in Liquefaction & Fermentation. The Steam Condensates are recycled back to the Boiler. The manufacturing of ENA generates effluent from the following sources:

1. Process wastewater (Spent Wash): After separation of Suspended Solids for use as Cattle Feed, it is partly recycled & partly evaporated. Thus this stream is not subject to any discharge.
2. Process wastewater (spent lees): This Stream is cooled & neutralized. It is then used for Cooling Tower Water Makeup. This stream is also not subject to any discharge.
3. Blow down from Boiler & Cooling tower: Proposed to be used on Internal Green Belt Development. (Refer table below)
4. Domestic waste water will be disposed through Soak Pit & Septic Tank.
5. Misc. Washings, etc. water stream is expected to evaporate on the floors during washings & partly utilized on Green Belt Development.

(B) Treatment of Effluent

- Grain Slops (Spent Wash) will be taken through Centrifuge Decanters for separation of Suspended Solids separated as Wet Cake.
- Thin Slops from the Decanter Centrifuge are partly recycled back to process (30-35%) and partly taken to Thins Slops Evaporation Plant for concentration of remaining solids to form a thick Syrup. This Syrup is mixed with Wet Cake coming out of Decanter Centrifuge and forms part of Cattle Feed. (Also known as Distillers Wet Grain Soluble -– Collectively known as DWGS)
- DWGS is taken to a dryer operating on steam and is dried to make it DDGS – Distillers Dried Grain Soluble. DDGS is sold as cattle feed.
- The process condensate is cooled and collected into a neutralization tank with sufficient residence time. After Neutralization, this process condensate will be recycled into process and is used for green belt development within the complex.
- Two streams of low BOD lees (White Effluent) comes out is partly used as fermenter washing and then sent for Cooling, treatment and utilized for RS dilution. The second part requires only cooling and can be used as Cooling Tower water makes up directly.
- The sewage generated from the sanitary blocks will be treated in septic tanks and applied on to soak pits and used for irrigation.

- In the study area ground water is utilized for agricultural and domestic activities. Rainfall data shows that the area is having sufficient rainfall. Recharging capacity of ground water is good due to good rainfall.

Treatment of Effluent- Non-Process:

- Domestic Sewage will be disposed through soak pit.
- Other effluents discharged will be treated in ETP.
- Treated water will be stored in sump and shall be further used for Gardening, Ash conditioned and plant washing etc.

Rain Water Harvesting /Recharge Plan

The storm water disposal system for the premises shall be self-sufficient to avoid any collection/stagnation and flooding of water. Storm water drainage plan of the project is enclosed. The amount of storm water run-off depends upon many factors such as intensity and duration of precipitation, characteristics of the tributary area and the time required for such flow to reach the drains. The drains shall be located near the carriage way along either side of the roads. Taking the advantage of road camber, the rainfall run off from roads shall flow towards the drains. Storm water from various plots/shall be connected to adjacent drain by a pipe through catch basins. Adequate numbers of rainwater harvesting pits at selected locations will be constructed, which will catch the maximum run-off from the area.

1. Since the existing topography is congenial to surface disposal, a network of storm water pipe drains is planned adjacent to roads. All building roof water will be brought down through rain water pipes;
2. Proposed storm water system consists of pipe drain, catch basins and seepage pits at regular intervals for rain water harvesting and ground water recharging;
3. Design specifications of the rain water harvesting plan are as follows:
    - Catchments/roofs would be accessible for regular cleaning;
    - The roof will have smooth, hard and dense surface which is less likely to be damaged allowing release of material into the water. Roof painting has been avoided since most paints contain toxic substances and may peel off;

- All gutter ends will be fitted with a wire mesh screen and a first flush device would be installed. Most of the debris carried by the water from the rooftop like leaves, plastic bags and paper pieces will get arrested by the mesh at the terrace outlet and to prevent contamination by ensuring that the runoff from the first 10-20 minutes of rainfall is flushed off.;
- No sewage or wastewater would be admitted into the system;
- No wastewater from areas likely to have oil, grease, or other pollutants has been connected to the system.

Table 4.5 Rain Water Harvesting/Recharge Details

Sr. No.	Particulars	Catchment Area in m^2 (A)	Runoff Coefficient (C)	Rainfall Intensity in m/Annum (I)	Discharge (m^3)
1.	Rooftop area	4400.0	0.85	1.04	3889.6
2.	Green area	18696.0	0.65	1.04	12638.5
3.	Paved area	6580.0	0.20	1.04	1368.6
Total					**17896.7**

Annually about 17896.7 m^3 water will be conserved by rain water harvesting system and will be discharge in ground water through recharge pit.

4.2.3 Impact on Noise Environment

The major noise sources during operation phase will be transportation and operation of DG Sets and other machinery inside the plant. The transportation of raw materials and finished goods to and from the plant will contribute to the noise levels both inside the plant premises as well as outside. The contribution of noise generated from operation of machinery will contribute mostly to the noise levels in the working environment.

Impact on Noise Levels

The main noise generating sources will be Compressors and DG set. The reference noise levels at these sources vary in the range of 65-80 dB (A). The noise levels from the plant units have been computed based on the mathematical model as described below.

- **Mathematical Model for Sound Wave Propagation during Operation**

For an approximate estimation of noise levels in the ambient environment from the source point, a standard mathematical model for sound wave propagation is used. The

sound pressure level generated by noise sources decreases with increasing distance from the source due to wave divergence. An additional decrease in sound pressure level with distance from the source is expected due to atmospheric effect or its interaction with objects in the transmission path.

For hemispherical sound wave propagation through homogenous loss free medium, one can estimate noise levels at various locations, due to different sources using model based on first principles, as per the following equation:

$$L_{p2} = L_{p1} - 20\log\left(\frac{r_2}{r_1}\right) \quad (1)$$

Where Lp_2 and Lp_1 are Sound Pressure Levels (SPLs) at points located at distances r_2 and r_1 from the source. The combined effect of all the sources then can be determined at various locations by the following equation.

$$L_{p(total)} = 10\log\left(10^{(L_{p1}/10)} + 10^{(L_{p2}/10)} + 10^{(L_{p3}/10)} .....\right) \quad (2)$$

Where, L_{p1}, L_{p2}, L_{p3} are noise pressure levels at a point due to different sources.

Based on the above equations a user-friendly model has been developed. The details of the model are as follows:

i. Maximum number of sources is limited to 200;
ii. Noise levels can be predicted at any distance specified from the source;
iii. Model is designed to for flat terrain;
iv. Co-ordinates of the sources in meters;
v. Maximum and Minimum levels are calculated by the model;
vi. Output of the model in the form of isopleths; and
vii. Environmental attenuation factors and machine corrections have not been incorporated in the model but corrections are made for the measured L_{eq} levels.

The major noise generating sources from the proposed plant are listed in **Table- 4.6.** These are considered as input to the noise model.

Table-4.6 Noise Generating Sources in Plant

Sr. No.	Sources	Maximum Noise Levels dB (A)
1	Compressor	75-80
2	Operation of Equipments	70-75
3	DG set	65-70
4	CPP	80-85

- **Presentation of Results**

The model results are discussed below and are represented through contours in **Figure-4.8**.

- **Prediction of Impacts**

The predicted incremental noise levels at the boundary of the plant are in the range 25 to 30 dB (A).

- **Impact on Work Environment (Inside the Plant)**

The equipments with significant continuous noise levels are turbine unit, Cooling tower, air compressor, transformers and boilers. The incremental noise levels inside the plant will vary between 65-85 dB (A) near source to 25-30 dB (A) near plant boundary. Based on the noise levels recorded during baseline study, the resultant noise levels inside the plant will vary between 52.30 -85.7 dB (A), as given in **Table 4.7**.

Table-4.7 Noise Baseline and Incremental Data

Sr. No.	Location	Baseline dB (A)	Maximum Incrémental dB (A)	Minimum Incrémental dB (A)	Max. Résultant dB (A)	Min. Résultant dB (A)
1	Near Source	52.30	85	65	85.70	65.40
2	Plant Boundary	52.30	30	25	52.32	52.30

Inside the plant, the major increase in the noise levels will be near high noise producing equipment which will reduce significantly as the distance to source is increased. It is expected that the impacts on the working personnel will not be significant on account of the high level of automation of these plant equipment, which mean that workers will be exposed for short duration only that too intermittently. In addition to that, ear plugs

wearing will be made as compulsory personnel protective equipment for all employees and visitors.

- **Impact on Community Noise Levels (Outside the Plant)**

The predicted resultant noise levels found near plant boundary vary between 52.30 to 54.32 dB (A), which is dependent on the baseline noise level and the predicted incremental noise level. It is expected that as the distance is further increased, the impact of noise due to operation of proposed plant will deteriorate to negligible levels based on energy loss during sound propagation. Hence, it can be safely concluded that there will be insignificant change in community noise levels outside the plant.

Noise Mitigation Measures

i. Noise level can be reduced by stopping leakages from various steam lines, compressed air lines and other high pressure equipment. The noise produced in valves and piping associated with equipment handling compressible and incompressible fluids shall be attenuated to 75 dB(A) at a distance of 1.0 m from the source by the use of low noise trims, acoustic lagging (insulation), thick-walled pipe work as and where necessary to comply with CPCB noise standards for industrial zones.

ii. All pipes and valves downstream of pressure control valve (including pressure control valve) will be one schedule higher than needed by pressure considerations to attenuate the noise.

iii. By providing padding at various locations to avoid rattling due to vibration;

iv. Providing noise proof cabins to operators where remote control for operating noise generating equipment is feasible;

v. The air compressor, process air blower, pneumatic valves should be provided with acoustic enclosure;

vi. In all the design/installation precautions are taken as specified by the manufacturers with respect to noise control shall be strictly adhered to;

vii. High noise generating sources shall be insulated adequately by providing suitable enclosures;

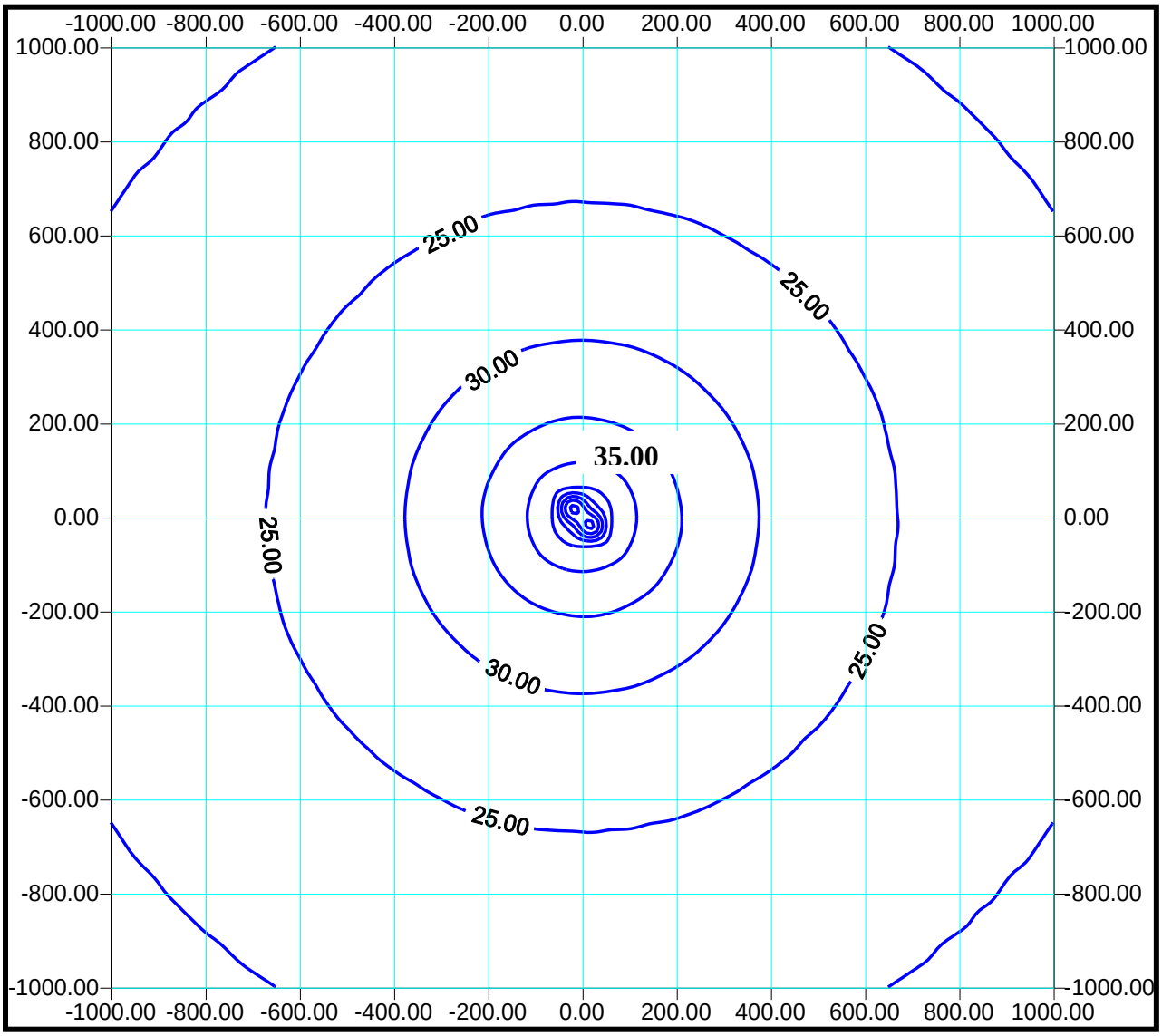
viii. Design and layout of building to minimize transmission of noise, segregation of particular items of plant and to avoid reverberant areas;

ix. Use of lagging with attenuation properties on plant components / installation of sound attenuation panels around the equipment;

x. The noise control system will be designed to form an integral part of the plant;

xi. Other than the regular maintenance of the various equipment, ear plugs/muffs are recommended for the personnel working close to the noise generating units;

xii. All the openings like covers, partitions shall be designed properly; and



Distance in meter

Figure – 4.4 : Noise Dispersion Contour

4.2.4 Impact on Soil Environment

There is no discharge of waste water onto land. The solid wastes shall be segregated according to their properties, packed, transported and stored in a separate impervious storage area demarcated for them. They will then be disposed off according to the requirements of statutory authorities. Hence implementation of project will not have any major effect on the soil environment.

Mitigation

- No toxic /waste water will be disposed directly on land;
- Vegetation will be done on uncovered soil.

4.2.5 Impact on Biological Environment

There are no National Parks and Protected Sanctuaries within the study area, no impact is anticipated on the same. For estimation the adverse impact of the proposed project on sensitive area, air quality modeling has done and Air quality modeling results shows that no adverse impact on sensitive area.

In spite of there being no impact, efforts will be made not only to maintain the ecological balance of the surroundings but also to improve upon the same.

The attributes that are identified to describe ecology are animals, birds, fish, field crops, threatened species, natural vegetation etc. The study area does not have any identified endangered species, Forest, National Park, Sanctuaries and hence there is no question of any adverse impact on the same.

Emphasis will be placed on social forestry programme wherein tree plantation would be undertaken within the plant premises. The tree plantation under this programme would help in absorbing atmospheric heat, noise as well as pollutants.

Hence, all efforts will be put-up by the project proponent to maintain the ecological balance and improve the environment in terms of ecology and Green Belt development.

Industry will follow the zero discharge norms. Hence, no adverse impacts on surrounding ecology.

4.2.6 Impact on Socio-Economic Environment

The proposed project will generate the employment to local people. Thus, the said project will not have any significant impact on Socio-economic pattern of the surrounding region. The project will also generate indirect employment opportunities,

which will contribute to social upliftment of the people in surrounding area.

4.2.7 Impact on Land Environment

The required plant and machinery for the full production capacity will be installed. 14.0 acres land is purchased for the proposed project and land use will be changed from agriculture. Thus, no adverse impact is likely to be generated on the land environment and general aesthetics of the area.

During operational phase, there will not be any effect on land.

Adequate air pollution control equipments at various pollutant generation sources shall be proposed. Adequate height of the stack will help in dispersing the pollutants emitted from the stacks effectively into the atmosphere.

The Hazardous wastes generated from the unit are ETP sludge and used DG Set oils used oil from D.G. Set shall be sold to recyclers. There are no other hazardous wastes. Fly ash will be collected in silos and used for land filling.

4.2.8 Impact on Hydrogeology

During the construction phase of proposed project, water will be required for construction activities at site. This requirement of water will be drawn from the ground water. The exploitation of ground water resources during the construction phase will not have a significant impact on the ground water availability in the area. Drinking water facility will be provided to the construction workers and waste water will be discharged into septic tanks via soak pits. Also there will be no constructional discharge from the site which can have any impact on the water quality. There is no surface water body within the core zone as well as there will be no waste water discharge outside the premises. Thus, it is clear that due to the construction activities there will be no impact on the surface water environment.

Water requirement of the plant is proposed to be met by ground water & recycled water. The proposed grain based distillery would have "Zero Effluent discharge". Thus, it is clear that during operational activities there will be no impact on the ground/surface water environment

4.2.9 Risk Assessment

Detailed risk assessment study is given in **Chapter 7.**

4.2.10 Solid Waste and Hazardous Waste Management

Solid waste and Hazardous waste will be stored separately. Hazardous waste will be send to TSDF site. About 280 m^3 per day filter press will be sent to decanter and 1.0 KL per year used oil will be generated from the plant.

In case of unavailability of rice husk, about 100 TPD coal will be used as a fuel. About 40 TPD ash will be generated from boiler. Bottom ash will be 8.0 TPD and fly ash will be 32TPD. Bottom ash will be used for filling of low laying area and fly ash will be send to bricks manufacturers.

4.2.11 Cultural Environment

The workers working in the industry are of different culture and religion. The interaction and intermingling of all these people will improve the understanding of various cultures. This will definitely improve and strengthen friendliness, brotherhood and unity among them.

4.2.12 Traffic Study

Traffic study measurements were performed at MDR-39 (Nangal to Polian) to assess impact on local transport infrastructure due to this proposed project. Road and highway studies are given in **Table-4.8**.

Table 4.8
Roads and Highways in the Study Area

Name of National/State Highway	Direction	
	Up	Down
MDR-39	Nangal	Tahliwal Polian Jaijon

Traffic data collected continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., heavy motor vehicles, light motor vehicles and two/three wheelers. As traffic densities on the roads are high, two skilled persons were deployed simultaneously at each station during each shift- one person on each of the two directions for counting the traffic. At the end of each hour, fresh counting and recording was undertaken. Total numbers of vehicles per hour under the three categories were determined and given in **Table 4.9.**

Table 4.9
No. of Vehicles per Day

S. No.	Vehicles Distribution	Number of Vehicles Distribution/Day
		MDR-39
1.	Cars	160
2.	Buses	50
3.	Two wheelers	300
4.	Three wheelers	25
5.	Trucks	150
6.	Others	250
Total		**935**

4.2.12.1 Conclusion

The additional load on the carrying capacity of the concern roads is not likely to have any significant adverse affect.

4.2.13 Indirect Impacts

4.2.13.1Impacts on Public Health and Safety

The discharge of waste materials (stack emission, wastewater and solid wastes), from process operations can have potential impact on public safety and health. The impact due to the emission from the proposed plant will be insignificant as the mitigation measures delineated in EMP are strictly followed. The public health and safety is dependent on the effective implementation of control measures suggested for pollution control.

4.2.13.2Management of Public Interests

Based on the analysis of the socio-economic profile of the study area along with the prediction and evaluation of likely impacts arising out of the proposed activity, it has been possible to prepare a feasible environmental management plan. It is felt that this would help in minimizing the adverse impacts on the socio-economic environment to a considerable extent, while at the same time addressing to large extent the aspirations of the community. For the recruitment of semi-skilled and un-skilled workers particularly during construction, preference shall be given to the local people.

The project proponent is equally conscious for socio-economic development and is committed to raise quality of life and social well being of communities where it operates. Its CSR initiatives have been prioritized on local needs, which focus on Health, Education, Sustainable Livelihood, Social Mobilization, Infrastructure Development, Water Harvesting, Agriculture, and Environment Conservation.

CHAPTER -5

ANALYSIS OF ALTERNATIVE SITE

5.1 Introduction

No alternate site has been selected for proposed 100 KLPD capacity grain based distillery at Village- Goandpur Jai Chand, Nichla & Singa, Tehsil- Haroli, District - Una, Himachal Pradesh.

CHAPTER -6

ENVIRONMENTAL MONITORING PROGRAMME

6.1 Introduction

Environmental Monitoring is an essential tool for sustainable development and ensuring effective implementation and monitoring of Environmental management plan and mitigation measures. It is also very essential to keep updating the environmental management system for effective conservation of environment along with ongoing project activities/operation. The environment monitoring plan enables environmental management system with early sign of need for additional action and modification of ongoing actions for environment management, improvement and conservation. It provides exact idea for mitigation measures to be implemented as it is linked with actual distraction of environmental quality due to the project activities. Hence, monitoring of critical parameters of environmental quality is very essential in the routine activity schedule of project operation. An Environmental Monitoring Programme shall be scheduled for the following major objectives:

- Assessment of the changes in environmental conditions, if any, during the project operation/activities.
- Monitoring and tracking the effectiveness of Environment Management Plan and implementation of mitigation measures planned.
- Identification of any significant adverse transformation in environmental condition to Plan additional mitigation measures

6.2 Environmental Management Cell

Apart from having an EMP, it is also necessary to have a permanent organizational set up charged with the task of proposed plant will create a department consisting of officers from various disciplines to co–ordinate the activities concerned with the management and implementation of the environmental control measures.

- Basically this department will undertake to monitor the environmental pollution levels by measuring stack emissions, ambient air quality, water and effluent quality,

noise level etc. either departmentally or by appointing external agencies wherever necessary.

- In case the monitored results of environmental pollution are found exceeding the allowable values, the environmental management cell will suggest remedial action and get these suggestions implemented through the concerned plant authorities. The actual operation and maintenance of pollution control equipment of each unit will be under the respective plant managers.
- The Environmental Management Cell (EMC) will handle of all the related activities such as collection of statistics of health of workers and population of the region, afforestation and green belt development.

6.3 Meteorology

An automatic continuous recording meteorological station would be procured and installed within the plant premises for a proper measurement and record of meteorological parameters. Continuous thermo hydrograph will be used for maintaining the record of ambient temperature and humidity. In addition, minimum and maximum temperatures, atmospheric pressure and rainfall will also be measured daily.

6.4 Monitoring Points / Locations and Components

The environmental monitoring points shall be decided considering the environmental impacts likely to occur due to the operation of proposed project as the main scope of monitoring program is to track, timely and regularly, the change in environmental conditions and to take timely action for protection of environment. The monitoring points/location and components of significance shall be as per **Table 6.1.**

Table 6.1 Post Project Environmental Monitoring Locations

Sr. No.	Environmental Components	Monitoring Points/ Location
1.	Ambient Air	Ambient air quality at minimum 5 locations. 1 location within the plant premises, 1 location in upwind, 2 locations in downwind direction and 1 location in cross wind direction.
2.	Water (Ground Water and Surface Water)	Water quality of the area at minimum 6 locations for each Ground as well as Surface

		water.
	Waste water	• Wastewater from all sources. • Wastewater at different stages of Effluent treatment Process.
3.	Emission	• At Source of emission (Stacks) from Sampling Port/D.G. Sets. • Process emission in workplace area/plants (for each area/plant minimum 2 locations and 1 location outside plant area near vent)
4.	Noise	• At all source and outside the Plant area. • At least 5 points near/around the plant Boundary.
5.	Greenbelt/Vegetation Cover	• Greenbelt Area at Boundary and Garden.
6.	Solid Waste	• Process dust generated and collected as Solid wastes.
7.	Soil	• At least two locations from process area and green belt..

6.5 Monitoring Parameters and Frequency

The monitoring parameters and frequency of monitoring shall be as per **Table-6.2.**

Table 6.2 Parameters and Frequency for Post Project Environmental Monitoring

Sr. No	Item	Parameters	Frequency
1.	Ambient Air quality	PM_{10},$PM_{2.5}$, SO_2, NO_x, CO, etc.	Once in a Month
2.	Stationary Emission from Stack	PM, SO_2, NO_X	Monthly
3.	Process emission	Fugitive gaseous pollutant expected.	Monthly
4.	Water and	pH, Temperature, EC, Turbidity, Total	Monthly

	Wastewater	Dissolved Solids, Calcium, magnesium, Total hardness, Total Alkalinity, Chlorides, Sulphates, Nitrates, DO, COD, BOD, oil and Grease, Metals expected in effluent.	
5.	Treated Sewage / Effluent	pH, BOD, COD, TSS, TDS, oil and Grease, Metals expected in effluent.	Monthly
6.	Noise	Equivalent noise level- dB (A)	Monthly
7.	Soil, Solid wastes and Manure / Compost	pH, Humidity, Texture, Organic matter, N, P, K, Sulphate, Calcium, Magnesium, C:N ratio.	Quarterly
8.	Greenbelt	Number of plantation (Units), Number of Survived plants/ trees, Number of poor plants/ Trees	Ongoing- round the year
9.	Environmental Audit	As per Direction of ISO 14001	Once in a Year

6.6 Monitoring Methodologies

Monitoring of environmental samples shall be done as per the guidelines provided by MoEF & CC / CPCB/ SPCB. The method followed shall be recommended / standard method approved / recommended by MoEF and CC / CPCB.

6.7 Reporting and Documentation

The records of the monitoring program shall be kept on regular basis for all aspects of the monitoring. Separate records for water, wastewater, solid wastes, air emission, soil shall be prepared and preserved regularly.

Immediately upon the completion of monitoring as per the planned schedule, report shall be prepared and necessary documents shall be forwarded to the concerned person.

Methodology of monitoring (sampling and analysis) shall be prepared as separate documents as SOP (standard Operating Procedure) wherever required.

The records showing results / outcome of the monitoring programs shall be prepared as per the requirement of the schedule mentioned above.

Regularly, these documents and records shall be reviewed for necessary improvement of the monitoring plan / mitigation measures / environmental technologies as well as for necessary actions of Environmental Management Cell.

6.8 Budget and Procurement Schedule

On regular basis, Environment Management Cell shall inspect the necessity and availability of the materials, technologies, services and maintenance works. The Cell

shall make appropriate budget for the purpose. Regular record review for any change in financial requirement of environment management shall be done and appropriate budgetary provisions shall be made. Along with other budgets, Budget for environmental management shall be prepared and revised regularly as per requirement. The budget shall include provisions for:

- Environmental Monitoring Program
- Operation and Maintenance of Environmental Technologies / Equipments
- Laboratory works for Environmental management activities
- Emergency Purchase of necessary material, equipments, tools, services
- Greenbelt development
- Social and Environmental Welfare and Awareness programs / training (CSR)
- Annual Environmental Audit.

Budget for Environmental Management Plan

The total capital investment on environmental control measures is envisaged to be about Rs 7.6 Crores out of a total project cost of Rs.90 Lakh. Details are given in **Table-6.3.**

Table 6.3 Cost Details

S. No.	Particulars		Initial Cost (Crores)	Recurring Cost (Lakh)
1.	Air Pollution Control (ESP)		1.6	20.0
2.	Wastewater Treatment	Multiple Effect Evaporators.	3.5	30.0
		ETP and others	0.75	05.0
3.	Fire and Safety		0.60	10.0
4.	Green Belt Development/Solid Waste Disposal		0.40	15.0
5.	Rain Water harvesting		0.25	02.0
6.	Laboratory		0.25	05.0
7.	Occupational Health		0.25	03.0
	Total		**7.60**	**90.0**

CHAPTER -7

ADDITIONAL STUDIES

7.1 Introduction

Distillery Industry (Distillery Plant) is associated with potential hazards that effect to the employee and environment. It would normally require the assistance of emergency services to handle it effectively. The operation shall be taken out under the well management and control by the qualified safety manager.

Disaster management plan has to be formulated with an aim of taking precautionary steps to avert disasters and also to take such action after the disaster which limits the damage to the minimum.

7.2 Risk Assessment

Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both onsite and off-site.

On-site

- Exposure to fugitive dust, noise, and other emissions
- Housekeeping practices requiring contact with solid and liquid wastes
- Emission/spillage etc. from storage and handling

Off-site

- Exposure to pollutants released from offsite/ storage/related activities
- Contamination due to accidental releases or normal release in combination with natural hazard
- Deposition of toxic pollutants in vegetation / other sinks and possible sudden releases due to accidental occurrences

7.2.1 Risk Analysis Methodologies

Risk assessment often requires the synthesis of risk profiles, which represent the probability distribution of total annual loss due to a certain set of events or activities. These assessments usually involve estimation of losses for several sub-classifications of the overall process and synthesis of the results into an aggregate risk profile.

Main risk assessment technologies are:

- Hazard and operability study (HAZOP), and
- Fault Tree Analysis (FTA)

7.2.2 HAZOP Study

The HAZOP study is a systematic technique of identifying hazards of operability problems of a process and lists all possible deviations from normal operating condition and how they might occur. The consequences of the process are assessed and the means available to detect and correct the deviations are examined. Thus, within the entire process all "credible" deviations that could lead to hazardous events or operability problems are identified.

7.2.3 Fault Tree Analysis (FTA)

FTA is primarily a means of analyzing non-identifiable hazards. Hazards of top events (the ultimate happening that is to be avoided) are first identified by other techniques such as HAZOP. Then all combinations of individual failures that can lead to that hazardous event show the logical format of the fault tree. Estimating the individual probabilities and then using the appropriate arithmetical expressions can calculate the top event frequency.

7.3 Disaster Management Plan

7.3.1 Definition

A major emergency in an activity/project is one which has the potential to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption both inside and outside the activity/project. It would normally require the assistance of emergency services to handle it effectively.

7.3.2 Scope

An important element of mitigation is emergency planning, i.e. identifying accident possibility, assessing the consequences of such accidents and deciding on the emergency procedures, both on site and off site that would need to be implemented in the event of an emergency.

Emergency planning is just one aspect of safety and cannot be considered in isolation from the proposed 100 KLPD capacity grain based distillery and hence before starting to prepare the plan, works management will ensure that the necessary standards, appropriate to safety legislation, are in place.

7.3.3 Objective

The overall objectives of the emergency plan will be:

- To localize the emergency and, eliminate it; and
- To minimize the effects of the accident on people and property.

Elimination will require prompt action by operations and works emergency staff using, for example, fire–fighting equipment, water sprays etc.

Minimizing the effects may include rescue, first aid, evacuation, rehabilitation and giving information promptly to people living nearby.

7.3.4 Identification of Hazards

The following types of hazards may be identified at Distillery plant.

- Fire in Electric Panels, Oil room and alcohol storage.
- Waste treatment processes.
- Cleaning of barrels, which have held chemical substances.

To deal the above emergencies, the Emergency Plan is prepared.

7.3.5 Safety Measures for Storage and Handling of Alcohol

The alcohol will be directly fed to the bottling unit mechanically and no manual handling will be involved which will reduce the risk of spillage in the storage area. Following precautionary measures would be taken for safety

- **Handling and Storage;** Keeping away from heat, sparks and open flame, care will be taken for avoidance of spillage, skin and eye contact, well ventilation, Use of approved respirator if air contamination is above acceptable level will be promoted. For Storage and handling following precautions will be taken:

- Keeping away from oxidizers, heat and flames.
- Avoidance of plastics, rubber and coatings in the storage area.
- Cool, dry, and ventilated storage and closed containers.
- Grounding of the container and transferring of equipment to eliminate static electric sparks.

In case of any emergency following measures would be taken:

- **First Aid Measures**: For Skin contact, Eye contact, and Inhalation.
- **Fire Fighting Measures:**

- Use of extinguishing media surrounding the fire as water, dry chemicals (BC or ABC powder), CO_2, Sand, dolomite, etc
- Foam System for firefighting will be provided to control fire from the alcohol storage tank. The foam thus produced will suppress fire by separating the fuel from the air (oxygen), and hence avoiding the fire and explosion to occur in the tank. Foam would blanket the fuel surface smothering the fire. The fuel will also be cooled by the water content of the foam.
- The foam blanket suppresses the release of flammable vapors that can mix with the air.
- Special Fire Fighting Procedures; Keeping the fire upwind. Shutting down of all possible sources of ignition, keeping of run-off water out of sewers and water sources. Avoidance of water in straight hose stream which will scatter and spread fire. Use of spray or fog nozzles will be promoted, cool containers will be exposed to flames with water from the side until well after the fire is out.
- Hazardous Decomposition Products: gases of Carbon Monoxide (CO) and Carbon Dioxide (CO_2).

➢ **Accidental Release Measures;** For Spill Cleanup well Ventilation, Shutting off or removal of all possible sources of ignition, absorbance of small quantities with paper towels and evaporate in safe place like fume hood and burning of these towels in a safe manner), Use of respiratory and/or liquid-contact protection by the Clean-up personnel will be promoted.

7.4 Emergency Planning

7.4.1 General

Disaster Management Plan for an industrial unit is necessarily a combination of various actions which are to be taken in a very short time but in a present sequence to deal effectively and efficiently with any disaster, emergency or major accident with an aim to keep the loss of men, material, plant/machinery etc. to the minimum.

The main functions of the Disaster Management Cell are to prepare a detailed Disaster Management Plan, which includes:

➢ Identification of various types of expected disaster depending upon the type of the

industrial unit.

- Identification of various groups, agencies, departments etc. necessary for dealing with a specific disaster effectively.
- Preparation – by intensive training of relevant teams/groups within the organization to deal with a specific disaster and keep them in readiness.
- Establishment of an early detection system for the disaster.
- Development of a reliable instant information/communication system.
- Organization and mobilization of all the concerned departments/ organizations / groups and agencies instantly when needed.
- A major disaster that can be expected due to fire in this proposed distillery.

7.4.2 Emergency Planning for Disaster due to Fire

Cable rooms, transformer, unit, auxiliary transformers, oil tanks, etc. within the plant are the likely areas for which disaster management plan is to be made to deal with any eventuality of fire. Stores, workshop, canteen and administrative building will be included.

7.4.2.1 Classification of Fire

Class (A)

Fire involving combustible materials like wood, paper, cloth etc.

Class (B)

Fire due to liquid materials like oil, diesel, petroleum products and all inflammables.

Class (C)

Fires involving domestic and industrial gases like butane and propane etc.

Class (D)

Metal fires etc.

Class (E)

Electrical fires due to short circuiting etc.

7.4.3 Need of Establishing a Fire Fighting Group

A small spark of fire may result into loss of machines and the damage by fire may high economic losses. This type of losses can be avoided by preventing and controlling the fire instantly for which fire–fighting group will be established.

Establish which would house and keep in readiness, the following types of equipment and arrangements.

- CO_2 extinguishers
- Dry powder chemical extinguishers
- Foam extinguishers
- 80 mm. spray hoses
- Fire brigade
- Fire hydrant
- Protocol (chemical to combat oil fires).

In order to avoid fire in cable galleries, all the power and control cables of FRLS type (Fire Resistant Low Smoke) will be used.

7.4.4 Inspection

Fire alarm panel (electrical) will cover the entire plant. The inspection group will periodically inspect fire extinguishers in fire stations and machines and other places.

The groups will display emergency telephone number boards at vital points.

The group will regularly carry out general inspection for fire.

7.4.5 Procedure for Extinguishing Fire

The following steps will be taken during a fire accident in the system:

As soon as the message is received about fire, one of the systems will be diverted to the place of the fire accident along with a staff member.

Simultaneously plant fire station will be informed by phone walkie for fire brigades and fire stations of nearby area.

In the meanwhile, the pipe system will be operated to obtain maximum pressure on output. In case cables are within the reach of fire, power supply will be tripped and the cables shifted.

7.4.6 Fire Fighting with Water

Adequate and reliable arrangement is required for fighting the fire with water such as:

1. Provision for Fire brigade and Fire hydrant.
2. Arrangement of pipelines along and around all vulnerable areas.

3. Provision of valves at appropriate points to enable supply of water at the required place/area or divert the same to another direction/pipe line.
4. Provision of overhead tanks which will be providing with the water during power failure and it would work by the gravitational force.

7.4.7 Sources of Water for Fire Fighting

The following two sources of water have been considered for firefighting:

- Overhead Tank
- Raw Water Reservoir

7.4.8 Fire Fighting with Fire Extinguishers

To deal with fire – other than carbonaceous fires, which can be deal with by water – suitable fire extinguishers are required to do the job effectively. It is therefore, necessary to keep adequate number of extinguishers in readiness at easily approachable places. Adequate number of fire stations would be:

- Further, other spray groups from the system will be diverted to the spot.
- In case of fire in the belt, belt will be cut near the burning portion to save the remaining parts.
- After extinguishing the fire, the area will be well prepared for reuse.
- Foam System for firefighting will be provided to control fire from the alcohol storage tank. The foam thus produced will suppress fire by separating the fuel from the air (oxygen), and hence avoiding the fire and explosion to occur in the tank. Foam would blanket the fuel surface smothering the fire. The fuel will also be cooled by the water content of the foam.
- The foam blanket suppresses the release of flammable vapors that can mix with the air.

7.5 On–Site Emergency Plan

7.5.1 Introduction

The views of the possible hazards that can arise out of the daily operations in the distillery plant, various measures are adopted to prevent the occurrence of a major accident. This comprises of:

- Built in safety measures, alarms, trips and interlocks etc.

- Standard safe operating and maintenance procedures permit system etc.
- Training of all the involved staff in normal and emergency operating procedures.
- Training of all employees in safety, fire fighting and first aid.

However, in spite of these precautions, it is required to foresee situation of major accident and plan for taking timely action to minimize the effects of such incident on the safety and health of persons working in the plant as well as those living around the premises.

7.6 Preparation of Plan

7.6.1 Alarm System

A siren shall be provided under the control of Security office in the plant premises to give warning. In case of emergencies this will be used on the instructions to shift in charge that is positioned round the clock. The warning signal for emergency shall be as follows:

– Emergency Siren: Waxing and waning sound for 3 minutes.
– All clear signal: Continuous siren for one minute.

7.6.2 Communication

Walkies and Talkies will be located at strategic locations; internal telephone system EPBX with external telephones would be provided.

7.6.3 Fire Protection System

7.6.3.1 Fire Fighting System

The fire protection system for the unit is to provide for early detection, alarm, containment and suppression of fires. The fire detection and protection system has been planned to meet the above objective an all–statutory and insurance requirement of Tariff Advisory Committee (TAC) of India. The complete fire protection system will comprise of the following.

(a)Fire brigade

Automatic / manual fire detection and alarm system

(b)Fire Hydrant

Fire hydrant will be provided at all around in the plant as per TAC Norms.

(c)Portable fire extinguishers

Various areas of the plant will have one or more of the above system depending upon the particular nature of risk involved in that area.

(d)Portable Chemical Fire Extinguishers

These are intended as a first line of defense, and hence will be stationed at strategic locations in different buildings and also for outdoor facilities. Portable fire extinguishers will be foam type; carbon dioxide type and multipurpose dry chemical (MPDC) type.

(e)Fire Detection and Alarm System

Fire detection and alarm system an effective means of detection, visual indication of fire location and audible alarm of any fire at its incipient stage. This system will comprise fire alarm panels, automatic fire detectors, manual call points and fire siren (hooter).

The main fire alarm panel will provide both visual and audible alarm of fire in any protected areas of the plant.

Manual break glass type fire alarms will be provided at strategic locations where high hazards exits.

Automatic fire detectors will be provided for coal handling areas and in plant areas such as control rooms, switchgear rooms, cable galleries etc.

7.6.4 First Aid

A first aid centre with adequate facilities shall be provided. It shall be maintained round the clock by a compounder cum dresser and a doctor. An Ambulance shall also be provided at site to carry affected people to hospital.

7.6.5 Security

The security requirements of the company premises shall be taken care of by CSO assisted by a Fire In charge. The team, apart from the normal security functions will manage the role required during a disaster management operation as a part of the crisis control team.

7.6.6 Safety

The safety wing led by a Safety Manager will meet the requirement of emergencies round the clock. The required safety appliances shall be distributed at different locations of the plant to meet any eventualities. Poster/placards reflecting safety awareness will be placed at different locations in the plant area.

7.6.7 Evacuation Procedure

As the major hazard is only due to fire, which has more or less localized impact no mass evacuation, procedures are required. Evacuation would involve only the people working very close to the fire area.

7.6.8 Emergency Control Center

Provision is made to establish an Emergency Control Centre (ECC) from which emergency operations are directed and coordinated. This centre is activated as soon as on–site emergency is declared.

The ECC consists of one room, located in an area that offers minimal risk being directly exposed to possible accidents.

During an emergency, the Emergency Management Staff, including the site controller will gather in the ECC. Therefore, the ECC is equipped with adequate communication systems in the form of telephones and other equipments to allow unhampered organisations and other nearby facility personnel.

The ECC provides shelter to its occupants against the most common accidents; in addition, the ECC's communication systems are protected from possible shutdown. The ECC has its own emergency lighting arrangement and electric communication systems operation.

Only a limited and prearranged number of people are admitted to the ECC, when in use. This eliminates unnecessary interference and reduces confusion.

The ECC is always ready for operation and provided with the equipment and supplies necessary during the emergency such as:

- Updated copies of the On–site Disaster Management Plan.
- Emergency telephone numbers.
- The names, phone number, and address of external agencies, response organizations and neighbouring facilities.
- The adequate number of telephone (more than two).
- Emergency lights, Clocks, Personal protective equipment.
- List of fire extinguishers with their type no. and location, capacity, etc.
- Safety helmets – List of quantity and location.

- Status boards/message board.
- Material safety data sheets for chemicals handled at the facility.
- Several maps of the facility including drainage system for surrounding area showing:

❖ Areas where hazardous materials are stored.

❖ Plot plans of storage tanks, routes of pipelines, all water permanent lines etc.

❖ The locations where personal protective equipment are stored.

❖ The position of pumping stations and other water sources.

❖ Roads and plant entrances.

❖ Assembly areas and layout of Hydrant lines.

7.6.9 Communication Equipments and Alarm Systems

This kind of equipment is absolutely vital for notifying accident; make the emergency known both inside and outside of the facility, and coordinating, the response actions among the various groups involved in response operations.

In particular, this equipment is used to communicate within the facility; communicate between the facility and outside organizations; and inform the public.

Different communications systems can vary in effectiveness, depending on the task. The most common types installed in the plant are given below.

7.6.9.1 Sirens

These are audible alarm systems commonly used in facilities. In case of any emergency siren will be operated short intermittently for 1.5 minutes.

An alarm does more than just emergency warning. It also instructs people to carry out specific assignments, such as reach to assembly point for further instructions and actions, or carry out protective measures; this can be achieved only if the people are familiar with the alarm systems and are trained to respond to it.

7.6.10 Personal Protective Equipments

This equipment is used mainly for three reasons; to protect personnel from a hazard while performing rescue/accident control operations, to do maintenance and repair work under hazardous conditions, and for escape purposes. The list of Personal Protective Equipment provided at the facility and their locations are available in ECC.

Effective command and control accomplish these functions necessitates personal trained in this On–site Disaster Management Plan with adequate facilities and equipments and equipment to carry out their duties and functions. These organizations and the facilities required to support their response are summarized in the following subsections.

7.6.11 Procedure for Testing and Updating the Plan

Simulated emergency preparedness exercises and mock fire fighting exercises including mutual aid scheme resources and in conservation with district emergency authority to be carried out time to time.

7.6.12 Disclosure of Information to Worker and Public Awareness System in Existence and Anticipated

- Safety awareness among workers by conserving various training programmes and Seminars, competition, slogans etc.
- Practical exercise.
- Distribution and practices of safety Instructions.
- Safety Quiz contests.
- Display of Safety Posters and Safety Slogans.
- Developing Safety Instructions for every Job and ensuring these instructions/booklets or manuals by the workers.

7.7 Public Consultation

The public hearing for the project was successfully conducted on 27/0/2016. Under the chairman ship of Additional Deputy Commissioner, Una. In which various questions were raised relating to the project by the locals.

CHAPTER -8

PROJECT BENEFITS

8.1 Introduction

As the proposed project is a new, all the major physical infrastructure development shall take place, which will improve the existing infrastructure scenario.

8.2 Employment Potential

Skilled and unskilled manpower will be needed. This will temporarily increase the employment opportunity. Secondary jobs are also bound to be generated to provide day-to-day needs and services to the work force. This will also temporarily increase the demand for essential daily utilities in the local market. The manpower requirement for the proposed project will generate some permanent jobs and secondary jobs for the operation and maintenance of plant. This will increase direct / indirect employment opportunities and ancillary business development to some extent for the local population. This phase is expected to create a beneficial impact on the local socio-economic environment.

The project will benefit the people living in the neighboring villages by giving preference to them in relation to direct employment associated with the various project activities. Construction and operation phase of the proposed project will involve a certain number of laborers. There is a possibility that local people will be engaged for this purpose. The operation phase will involve a number of skilled and unskilled workers. There is a possibility that local people will be engaged for this purpose to the extent possible and hence improve the existing employment scenario of the region.

The following benefits are expected due to the implementation of the said project:

- The easy availability of infrastructure, man power, raw materials will reduce the production cost as well as demand supply gap. The same will bring revenue to the state exchequer by way of Duties and Taxes.
- Purchase of raw materials locally will improve the economic condition of the farmers.
- The development of green belt in and around the plant premises will improve on the aesthetics of the area. Moreover, it will help in reducing the noise levels within the plant boundary.
- The setting up of the proposed plant will help in providing employment to local

people.

- There will be an increase in indirect employment and earnings of the small time shop owners like tea vendors, transporters, etc.
- The implementation of Rain Water Harvesting Scheme will help in increasing the ground water level of the area.

The Project proponent has planned to contribute in socio-economic development of the area and will organize Blood donation camps, Education Programmes, Health camps, Health awareness programmes etc. and will continue to do so.

8.3 Corporate Social Responsibility

Corporate social responsibility is the commitment of businesses to contribute to sustainable economic development by working with the employees, their families, local community and society at large to improve their lives in ways that are good for business as well as overall development. It is a voluntary activity of a company that supports social interests and environmental issues. It is a principle through which the business houses contribute to the welfare of the society and not only maximize their profits. CSR, in fact, is about business giving back to the society. Some of the CSR related activities along-with budget allocated are summarized as **Table 8.1.**

Table 8.1
Breakup of CSR (Corporate Social Responsibility)

Medical Camps	**2.50**
Drinking water supply/Harvesting programme	**3.25**
Adoption of Surrounding Villages (2 ladies Toilet/Village will be constructed)	**7.25**
Public Welfare (Swach Bharat Abhiyan)	**1.50**
Miscellaneous	**2.00**
TOTAL	**Rs 16.5 Lacs**

CHAPTER -9

ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1 Project Cost & Project Appraisal

As per EIA Notification dated 14th September, 2006; as amended from time to time; the Chapter on "Environmental Cost Benefit Analysis" is applicable only, if the same is recommended at the Scoping stage. The total capital project cost of proposed plant is about Rs. 101 Crores and cost on environmental factor will be about Rs. 7.6 Crores.

As per the ToR points issued by MoEF, New Delhi vide letter no. J-11011/234/2015- IA -II (I) dated 29th May , 2016 for the Proposed 100 KLPD grain Based Distillery along with 3.0 MW Cogeneration Power Plant at Village- Goandpur Jai Chand, Nichla & Singa, Tehsil- Haroli & District- Una, Himachal Pradesh; the Environmental Cost Benefit Analysis is not required.

9.2 Schedule of project implementation

The estimated capital cost and financial viability of the present scheme has been worked out on the assumption that the above scheme shall be completed by the end of September, 2017.

9.3 Physical Targets

The financial feasibility and profitability projections along with cash flow for the next 10 years after completion of 100 KLPD distillery project are based on the following physical parameters.

S. No.	Particulars	Unit	Parameters
a.	Installed capacity (In terms of total spirit)	KPD	100.000
b.	Working days	Days	330
c.	Capacity utilization	%	80-90

CHAPTER -10
ENVIRONMENT MANAGEMENT PLAN

10.1 Introduction

The environmental management plan consists of the set of mitigation, management, monitoring and institutional measures to be taken during implementation and operation to eliminate adverse environmental impacts or reduce them to acceptable levels. The present environmental management plan addresses the components of environmental affected during construction of the plant and by the different activities forming part of the manufacturing processes.

Environmental Policy

i. Overall conservation of environment.
ii. Minimization of waste generation and pollution.
iii. Judicious use of natural resources and water.
iv. Safety, welfare and good health of the work force and populace.
v. Ensure effective operation of all control measures.
vi. Vigilance against probable disasters and accidents.
vii. Monitoring of cumulative and long time impacts.
viii. Ensure effective operation of all control measures.

Annual review of the entire system and various environment management as well as process control and monitoring systems shall be done. Environment monitoring shall be done to collect the data on air, water, soil, noise etc. and duly recorded. Environmental Management Plan which shall be implemented is detailed under the following heads.

i. Pollution Control Systems
ii. Waste Minimization and Resource Conservation
iii. Occupational Health and Safety
iv. Socio-Economic Development
v. Greenbelt Development Plan

10.2 Pollution Control System

Detailed study of the pre-project commissioning environment and also the likely (and predicted) implications after the plant commissioning suggests that the following

preventive/control measures are considered necessary to reduce the adverse impact to the utmost practicable limit.

10.2.1 Air Environment

i. Stack height would be approx. 30 m for the boiler for gaseous emission confirming to the CPCB norms. D. G. Sets, stack height of 10 m above the roof level will be maintained.

ii. Stack emission level from boiler will be kept within permissible limit by installation of ESP and online stack emission monitoring will be done.

iii. Ambient air quality and stack emission would be regularly monitored and effective control exercised, so as to keep limits on stack emission loads would be met honestly at all the time.

iv. In order to avoid fugitive emissions from different sources, dust collectors will be provided at material transfer points. Also the roads within the premises will be concreted to avoid vehicular emissions.

v. The ambient air monitoring will be carried out regularly in the work zone and surrounding areas, which shows that ambient air levels of the contaminants, are well below the stipulated norms.

vi. Green belt around the periphery and within premises will be developed which will help in attenuating the pollutants emitted by the plant.

vii. The storage yard for rice husk and coal will be properly covered.

viii. CO_2 Plants will be installed for collection of the CO_2 released during the fermentation process. The CO_2 collected will be sold to various companies.

10.2.2 Action Plan to Control Fugitive Emission

Main source of fugitive emissions is transportation of men and material during operational phase of project. To control fugitive emissions following measures shall be adopted:

i. In order to avoid fugitive emissions from different sources, dust collectors will be provided at material transfer points.

ii. The roads within the premises will be concreted / paved to avoid vehicular emissions.

iii. All transportation vehicles shall carry a valid PUC (Pollution under Control) Certificate.

iv. Proper servicing and maintenance of vehicles will be carried out.

v. Regular sweeping of all the roads and floors will be done.

vi. Adequate green belt shall be developed in the plant area. Green belt act as surface for settling of dust particle and thus will reduce the particulate matter in air.

vii. Ambient air quality will be regularly monitored and effective control exercised, so as to keep emission within the limits. **(Table 10.1).**

Table 10.1 Prevention and Abatement plan of Pollution

S. No.	Emissions Sources	Management measures
1.	Fuel and ash transfer	➢ Mechanized Handling and conveying with proper Hood ➢ Cover Definite Loading Point ➢ Covered transfer points
2.	Vehicular emissions	➢ Paved roads ➢ Regular sweeping ➢ Water sprinkling through mobile tankers
CPCB Guidelines will be followed		

10.2.3 Waste Water Environment

i. The proposed grain based distillery would be based on "Zero Liquid Discharge" (ZLD)

ii. Spent wash will be concentrated in MEE (Multiple Effect Evaporator), than the semisolid waste from MEE (Multiple Effect Evaporator) will be sent to decanter centrifuge and forms cattle feed.

iii. Condensate will be treated in condensate polishing unit and will used as make-up water in cooling tower.

iv. Online effluent quality monitoring system will be installed at the outlet of the unit for measurement of the parameters flow, pH, COD, BOD and TSS etc. and transmission of online data to State Pollution Control Board and CPCB will be done

10.2.4 Solid Waste Environment

i. Boiler ash collected and sold to brick manufacturers.

ii. The other solid wastes expected from the unit are containers, empty drums which are returned to the product seller or sold to authorize buyers after detoxification.

10.2.5 Noise Environment

Various components of industrial operations will cause some amount of noise, which will be controlled by proper maintenance and compact technology.

i. Time to time oiling and servicing of machineries will be done.
ii. Acoustic enclosure for Turbine and D.G. sets will be provided.
iii. Green belt development (plantation of dense trees across the boundary) will help in reducing noise levels in the plant as a result of attenuation of noise generated due to plant operations, and transportation.

10.2.6 Odour Management

The main causes of odour at distilleries are as under:

i. Bad management of fermentation house;
ii. Long retention of fermented wash,
iii. Unattended drains

The remedial measures will be taken such as Better house-keeping by regular steaming of all fermentation equipments; Temperature will be kept under control during fermentation to avoid in-activation/killing of yeast; Staling of fermented wash would also be avoided.

10.2.7 Green Belt Development

Green belt planning will be done with ecological perspectives for distillery plant of M/s. Rock & Storm Distilleries (P) Limited taking into consideration the nature of pollutants, availability of space and dominant wind directions. Recommendations given by expert committee on plantation requirements in the premises of the plant would be fully implemented. This will help in reducing the concentration of pollutants and will also be effective in attenuating noise levels.

M/s. Rock & Storm Distilleries (P) Limited has social obligation to recreate the environmental status by providing thick green cover to suppress fugitive emission and provide aesthetic beauty. Trees form the important part of the biosphere in the Eco-system.

It will be exercised as follows:

i. Green belt development in and around the project site will help in to attenuate the pollution level.

ii. Out of the total plant area 33% land will be utilized for green belt development and plantation will be done as per Central Pollution Control Board (CPCB) Norms.

iii. Native species will be given priority for Avenue plantation.

iv. The periphery will be devoted to generation of green belt area.

Species like *Acacia catechu, Albizia lebbeck, Dalbergia sissoo, Morus alba* will be planted.

Scientific Name	Common name	No. of tress
Acacia Catechu	Senegalia Catechu, Khair	500
Albizia Lebbeck	Albizia Lebbeck, Siris Tree, Saras सरस (Hindi)	500
Dalbergia Sissoo	Indian Rosewood, Shisham	1000
Morus Alba	White Mulberry, Shahtoot	1000
Mangifera India	Mango	700

10.2.7.1 Eco System

Environment, which is the sum of both non-living and living factors existing at a place, interacts and influences the ecology of the area. Ecology is an important component comprising of flora (vegetation and micro plant species) and fauna (wildlife and terrestrial micro organisms).

The biotic or physical factors include topography, soils, climate etc that are influenced by natural perils and/or pollution. On the other hand, biotic factors include living things such as flora, fauna, wildlife and human beings. A change in the physical factors can bring about a change in the biotic factors thereby changing the ecology of the area.

Living beings generally adapted to a particular setting (habitat or ecosystem) and are organized into natural groupings (communities) with mutual dependencies among their members. An ecosystem comprises of both plant and animal populations that involve total nutrient and energy economics associated with the entire system. A series of recognizable ecosystem alterations, called ecological successions, may occur due to certain imposed changes in the natural community.

Living beings show various responses and sensitivities to outside influences resulting in an ecological imbalance or change in habitat or ecosystem. Moreover, changes in pollution levels due to project activities may also alter the ecology of the environment. Project activities may produce adverse ecological impact of direct or indirect nature, which can be either short term or long term, depending on the nature of the action. Although every impacted environment has some recovery potential, the extent of recovery would depend on the type, degree and location of the impact as well as on mitigative measures initiated to achieve recovery.

Generally, short-term impacts are immediate and direct result of environmental changes that may occur at the inception of the proposed project. These changes may be self-corrective through natural recovery processes, after the completion of the construction phase. On the other hand, long-term impacts result from major indirect environmental changes, which are caused during the operational phase of a project.

10.2.7.2 Plantation Techniques

Green belt will be developed within the Plant premises covering a total area of about 33% of total Plant area. The plantation work for green belt development will be carried out as per CPCB guidelines, local species would be preferred.

10.2.7.3 Aftercare and Monitoring

Investment on reclamation would be futile without adequate and timely aftercare. Aftercare includes weeding, soil working, mulching and fertilizing, and if possible, irrigation to promote better growth of the planted seedlings. The vegetated area would be protected from grazing of animals until the plants are above the level of damage. Wherever necessary, fencing would be erected on the boundaries of reclaimed areas.

Monitoring of the programme is the only way to improve both the long-term and short-term planning. It involves two important aspects, namely site investigation and record keeping.

10.2.7.4Baseline data and Potential Impacts of the Study Area

The flora and fauna of an area shows a certain affinity to the existing environmental setting. Due to the proposed facility, there could probably be a change in the environmental surroundings for a short duration due to the construction phase and for a

long term due to the operation of the project activities. Thus, in order to predict the ecological impacts from the proposed project, it is necessary to detail the baseline data.

The potential impacts on the ecology of the study area are discussed below:

i. As no wastewater from the proposed project will be discharged outside the premises, there will be no impact on the ecology of the study area due to wastewater arisen from the proposed project.

ii. The flora and fauna of the area could be disturbed if the various air pollutants discharged from the proposed facility would not be maintained within specified permissible limits. But project authority has already mentioned the adequate stack height, etc. Thus, the potential impact of air emission can be rated as no impact.

iii. Moreover, the proposed green belt would help in reducing the adverse impacts further if any.

iv. On the periphery of the plant a series of trees will also be planted.

10.2.7.5 Recommendation on Green Belt Development

A green belt or tree plantation around the proposed plant shall help to arrest the effects of particulate matter and gaseous pollutants in the area besides playing a major role in environmental conservation efforts. Green belt development and plantation programme for the proposed project shall also be a part of the proposed plan.

For effective control of air pollutants in and around the proposed industry, a suitable green belt will be developed by taking into consideration the following criteria. The green belt would;

a. Mitigate gaseous emissions
b. Have sufficient capability to arrest accidental release.
c. Effective in wastewater reuse.
d. Maintain the ecological balance.
e. Control noise pollution to a considerable extent.
f. Prevent soil erosion.
g. Improve the aesthetics.

Taking the above-mentioned criteria into consideration, the proposed green belt would be covering around 33% of the total area. The green belt would be consisting of shrubs,

trees, avenue trees, revenue trees, crops and potted plants. All the species suggested are pollution tolerant, besides having an aesthetic appeal. All the species suggested are pollution tolerant, besides having an aesthetic appeal. Greenbelt development plan and recommended plant species are given in **Table 10.2 and Table 10.3.**

Table 10.2 Greenbelt Development Plan

Sr. No.	Year	Greenbelt Area (Ha)	Total Plants (@2000/ha)
1	1st Year	0.50	1000
2	2nd Year	0.22	450
3	3rd Year	0.30	600
4	4th Year	0.35	650
5	5th Year	0.50	1000
Total		**1.87 ha (4.62acres)**	**3700**

Table-10.3Specific Plantation for the Distillery Unit

Scientific Name	Common name	No. of tress
Acacia Catechu	Senegalia Catechu, Khair	500
Albizia Lebbeck	Albizia Lebbeck, Siris Tree, Saras सरस (Hindi)	500
Dalbergia Sissoo	Indian Rosewood, Shisham	1000
Morus Alba	White Mulberry, Shahtoot	1000
Mangifera India	Mango	700

The vegetation of varied types has the potentiality to respond to the hazards of pollution. Trees also act as wind breakers and stop the particulate matter from crossing over. The biological role of plants species would be planted in such as way that they are able to control the effects of pollutants. There are strip cultivation, agro-forestry, staggered cultivation, social forestry type of cultivation.

10.2.8 Occupational Health and Safety

Production of distillery involves storage handling and use of several chemicals. Some of these chemicals are toxic and hazardous in nature. Information about these chemicals is therefore important for the safety of the employees and the plant. Besides, the health status of the employees is also important which may be affected due to exposure to these chemicals. The exposures may be sudden and accidental or for a long period. In both of

the cases there will be different health effects. Therefore safety measures dealing with these chemicals are of vital importance and will be followed judiciously.

1. In order to ensure good health of workers, regular health check-up of the plant workers will be carried out.
2. Occupational health surveillance programme will be taken as a regular exercise for all the employees and their records maintained.
3. Proper storage and handling precautions will be taken. The storage area will be cool, dry and well ventilated away from any source of heat, flame or oxidizers.
4. Use of Personal Protective Equipment (PPEs) will be encouraged. Proper training on use of PPEs, characteristics of the material handled and safety precautions to be adopted will be given to the workers.
5. Fire safety measures will be incorporated within the factory premises. All the fire extinguishing media such as water, dry chemicals, CO_2, sand, dolomite, etc. will be kept in vital locations.
6. Mock drills will be arranged for the worker to test the effectiveness of the training program from time to time and the way to react in case of emergency.
7. Safety precautions will be displayed in the premises on the banners, boards etc.
8. Both On-site and Off-site emergency preparedness plan will be drawn.

10.2.9 Personnel Protective Equipments

Goggles:
The workers will be asked to use goggles who work on washing of bottles, filling, sealing of bottles cap for protection of their eyes in case bottles are broken.

Rubber Gumboots:
These will be provided to person who handles sulphuric acid. Full suit having hand-gloves, goggles, helmet and aprons will be provided.

Face Shield Helmet:
The person deputed for welding work will be provided with face shield helmet.

Medical Facilities

The Factory will be provided with the following medical facilities to handle any emergency:

1. Well equipped First Aid Boxes will be provided in each Section of the factory.

2. The First Aid Boxes will be distinctively marked with a Red Cross on green background and contain the following equipment/accessories:

a) Small sterilized dressings.

b) Medium size sterilized dressings

c) Large size sterilized dressings

d) Large size sterilized burn dressings

e) Packets sterilized cotton

f) Snake bite Lancet

g) Pair of scissors

h) Bottle of Potassium Permanganate

i) Bottle containing 2% of alcoholic solution of iodine.

j) Bottle of Sol. Volatile having the dose and mode of administration indicated on the label

k) One copy of first aid leaf-let

l) Bandages

n) Adhesive plaster

o) Triangular bandage

p) Packets of safety pins

q) Supply of suitable splints

r) One tournequet

In case of need factory will be having dispensary to give effective medical facility to workers. In dispensary, sufficient stock of medicines will be available to provide to workers in case of any major emergent situation. We will keep one Registered Medical Practitioner (Qualified Medical Officer) as Incharge of the Dispensary with a Qualified Compounder. A vehicle will be always available to shift the sick/injured person to District Hospital.

10.3 Overall Recommendation and Implementation Schedule

10.3.1 Introduction

The mitigation measures suggested in earlier Chapters 4 are to be implemented so as to reduce the impact on the environment due to proposed project. The implementation of

these recommendations could be done in phases so that, the most important mitigation measures would be implemented first and the mitigation measures, which are less important, could be implemented later.

Along with the implementation of these mitigation measures, monitoring schedule and infrastructural requirements for environmental protection detailed in previous chapter are important for environmental control measures.

10.3.2 Implementation Schedule and Environmental Management Cell.

Proposed plant will be completed within 18 months from zero date. Environmental Management cell structure is given in **Figure 10.1.**

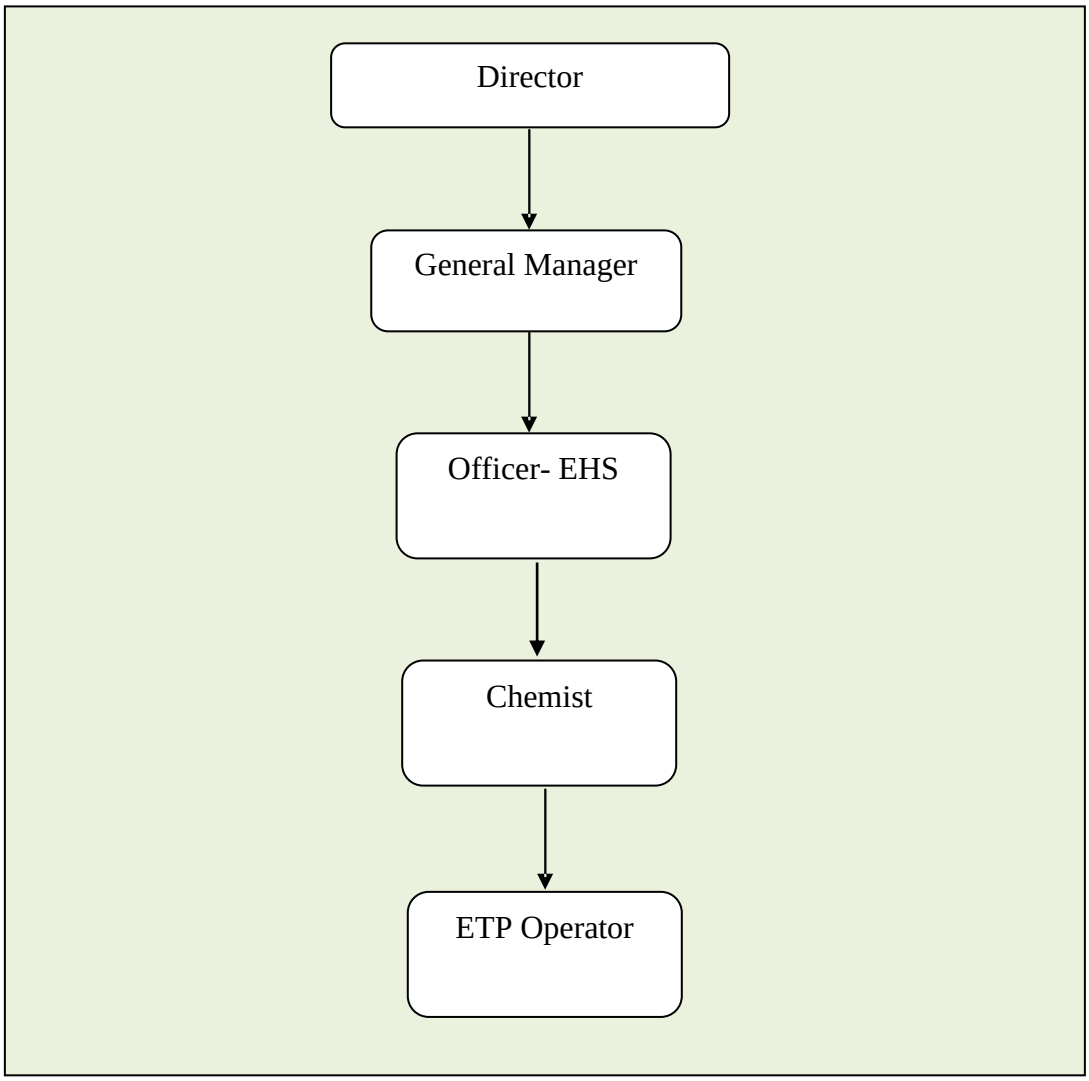


Figure 10.1 Environmental Management Cell

CHAPTER -11

SUMMARY AND CONCLUSION

11.1 Introduction

M/s Rock & Storm Distilleries (P) Ltd**.** is planning to set up 100 KLPD capacity grain based distillery at Village –Goandpur Jai Chand, Nichla & Singa, Tehsil: Haroli, Distt. Una, Himachal Pradesh. The project is planned to be established over an area of 14.0 acre. The plant will operate 330 days in a year and will produce ENA/RS/AA. The power will be generated with steam during the process. As per the EIA notification, 2006 this project falls under Category 'A' and Project or Activity 5(g), hence require Environmental Clearance.

11 .2 Justification for the Implementation of the Project

The following points justify implementation of this project:

- The plant will be maintained as per laid down guidelines.
- The distillery would have a zero discharge as no waste water will be discharged outside the project premises.
- Better maintenance and installation of proper pollution control equipments will help in reducing such emissions.
- Approximately 33% of the total Project area will be covered under plantation.
- CPCB guidelines for fugitive emissions will be followed.
- No forest land is involved.
- No court case/ litigation are pending against this project.
- No National Park, Biosphere Reserve, Wild Life Sanctuary, within the study area.
- Proper care will be taken by incorporating sound-proof enclosures for equipments and providing earmuffs and earplugs for operators.
- The proposed project will generate employment for the local people.
- There will not be major pollution due to the project activity, as the project will be implemented with environment friendly technology.

Mitigation measures to be taken are listed below.

11.3 Mitigation Measures

11.3.1 Air Pollution Control

- ESP will be installed with the boiler with stack of 30 m height.
- Ambient air quality and stack emission would be regularly monitored and effective control exercised, so that the stack emission load limits would be met at all the time.
- Green belt will be developed on 33% area of the total project area which will help in attenuating the pollutants emitted by the plant.
- Adequate measures for control of fugitive dust emissions will be taken.
- All the roads will be asphalted.
- CO_2 Plants will be installed for collection of the CO_2 released during the fermentation process for proposed grain based unit. The CO_2 collected will be sold to various companies as it is food grade quality.

11.3.2 Waste Water Treatment

- Fresh water requirement of the project will be met by ground water.
- The proposed project would be based on "Zero Liquid Discharge (ZLD)".
- MEE system will be provided.
- The sewage generated from the sanitary blocks will be treated in ETP and used for irrigation.
- Rainwater harvesting will be done and the water will be discharge in ground water.

Treatment of Effluent

- Spent Lees from Distillation column and process condensate will be recycled.
- Spent Wash is sent for anaerobic treatment.
- Waste water will be treated in ETP. Treated Water will be used for greenbelt development.

11.3.3 Noise Management

- Green belt development (plantation of dense trees across the boundary) will help in reducing noise levels in the plant as a result of attenuation of noise generated due to plant operations, and transportation.
- Personal protective equipments like ear plugs and ear muffs will be provided to employees working in the noise prone areas.

- Time to time oiling and servicing and O and M of machineries will be done.
- Acoustic enclosure for Turbine and D.G. sets would be used.

11.3.4 Solid Waste Management

- The proposed grain based distillery would be based on "Zero Discharge".
- MEE treated spent wash will be sent to decanters and forms cattle feed.
- Ash from the Boiler will be sold to brick manufactures

11.3.5 Odour Management

- The remedial measures will be taken such as better house-keeping by regular steaming of all fermentation equipments.
- Temperature will be kept under control during fermentation to avoid inactivation/ killing of yeast.

11.3.6 Socio-Economic Environment

M/s Rock & Storm Distilleries (P) Ltd. will actively contribute to improve the socio – economic conditions of the area and also will actively participate in various socio economic activities like; educational campaigns, health check-ups, training programme etc (as per the need) which will lay stress on the overall development of the project site. Following points will be stressed upon:

- During operation the plant will generate employment for local population
- Skilled employees will be recruited through open recruitment process.
- Trained operators and workers in various aspects of EHS (Environment, Health and Safety) will be employed.
- The managers and officers involved in Environment Management Cell would undergo refresher workshop and up-gradation of information on various environmental issues from time to time.
- The industry would help in promoting the activities related to environmental awareness in the nearby villages.

Green Belt Development

- Out of the total project area of area (33%) will be utilized for green belt development.
- Plantation will be done as per Central Pollution Control Board (CPCB) Norms.
- The plantation in and around the project site will help to attenuate the pollution level.

- Native species will be given priority for Avenue plantation.
- The periphery will be devoted to generation of green belt area.
- The plantation would start along with the start of the construction activities of the proposed unit.

11.4 Conclusion

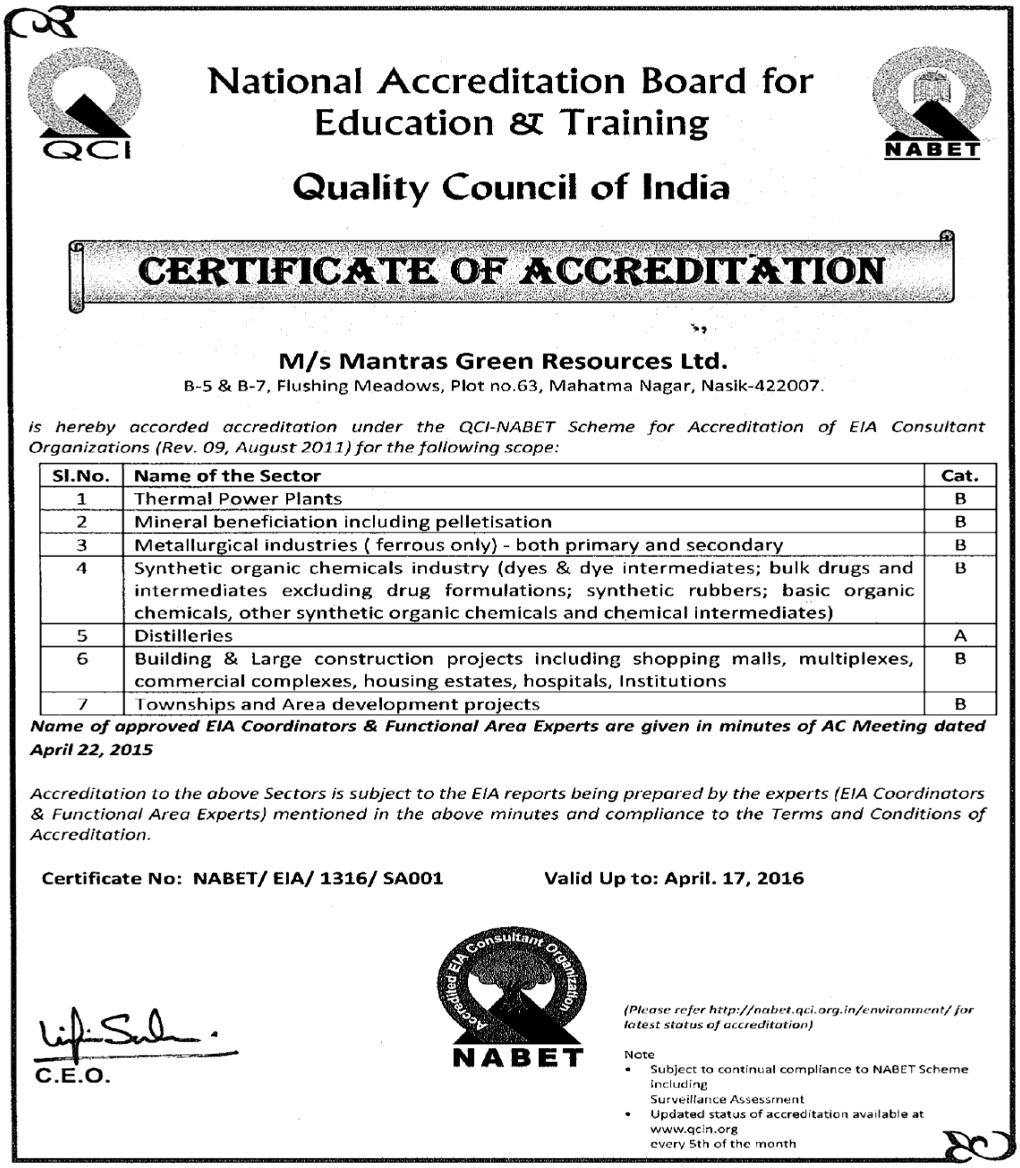
M/s Rock & Storm Distilleries (P) Ltd. will generate a fair amount of direct, indirect and induced employment in the region. The local economy will receive a boost due to employee spending and services generated by the company. Due to the implementation of the project activity there shall be improvement in the standard of living viz. better education, improved health, sanitation facilities etc. This is envisaged as a major positive benefit. The company's management shall recruit semi skilled and unskilled workers from the nearby villages due to availability of local labors. The employment provided due to the proposed project would rapidly increase the social status of the villagers.

CHAPTER -12
DISCLOSURE OF CONSULTANTS ENGAGED

12.1 Disclosure of Consultants Engaged

Mantras Green Resources Limited is an ISO 9001:2008 Certified Organization & Accredited by Quality Council of India / NABET, has been engaged as Environmental consultant for obtaining Environmental Clearance for proposed 100 KLPD Grain based distillery.

Fig 12.1 QCI-NABET Certificate of Mantras Green Resources Limited



National Accreditation Board for Education & Training

Quality Council of India

CERTIFICATE OF ACCREDITATION

M/s Mantras Green Resources Ltd.
B-5 & B-7, Flushing Meadows, Plot no.63, Mahatma Nagar, Nasik-422007.

is hereby accorded accreditation under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations (Rev. 09, August 2011) for the following scope:

Sl.No.	Name of the Sector	Cat.
1	Thermal Power Plants	B
2	Mineral beneficiation including pelletisation	B
3	Metallurgical industries (ferrous only) - both primary and secondary	B
4	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	B
5	Distilleries	A
6	Building & Large construction projects including shopping malls, multiplexes, commercial complexes, housing estates, hospitals, Institutions	B
7	Townships and Area development projects	B

Name of approved EIA Coordinators & Functional Area Experts are given in minutes of AC Meeting dated April 22, 2015

Accreditation to the above Sectors is subject to the EIA reports being prepared by the experts (EIA Coordinators & Functional Area Experts) mentioned in the above minutes and compliance to the Terms and Conditions of Accreditation.

Certificate No: NABET/ EIA/ 1316/ SA001 **Valid Up to: April. 17, 2016**

C.E.O.

NABET

(Please refer http://nabet.qci.org.in/environment/ for latest status of accreditation)

Note
- Subject to continual compliance to NABET Scheme including Surveillance Assessment
- Updated status of accreditation available at www.qcin.org every 5th of the month

Table 12.1 Team page experts involved in the project and their roles and responsibilities

S.No	Name of Expert	Project Role
Mentor		
1	**Dr. U.K. Sharma CEO&CMD**	He is the chairman and Managing Director of the company. He has completed his Ph.D. in Environmental Science with 35 yrs of vast expertise in the field of Environment. He has been involved as a Technical and corporate advisor, Client interaction, technical advisor for conducting Public Hearing and statutory clearances etc. for this project.
EIA Coordinator		
2	**Mr. Madan Prakash (Additional Director)**	He is the Project leader and Additional Director for this project. He has a vast experience in the field of Environmental Clearance. He is a retired MoEF Officer was approved and he is an in-house functional area expert in Ecology & Biodiversity by Quality Council of India (NABET). He has contributed his functional Area Report in the areas of Ecology & Biodiversity and provided the detailed impacts, mitigation measures and designed an effective Environmental Management Plan for this project. He has also guided the team effectively in preparation of EIA report for this project.
	Mrs. Kavita Zog (EIA Coordinator and FAE) Empanelled	**Mrs. Kavita Zog** is a young, dynamic and experienced Environment professional. She has 10 years of experience in environmental Field & environmental clearance. She is an approved EIA Coordinator by QCI-NABET in sector 3, 22, 25 &39. She is has worked for Water Pollution Monitoring network design, Technical assistance during sampling of water, Solid &hazardous waste along with laboratory during baseline data collection. She has contributed her impacts & mitigation measures for Ecology & Biodiversity, Water Pollution & Prevention ,Solid & Hazardous Waste fields & proposing of wastewater treatment technology etc.
Functional Area Expert		
3	**Dr. N. C. Kankal** (EIA Coordinator and FAE) In-House	He is also an approved EIA Coordinator by QCI-NABET in 4 and 7 sectors. He is a retired Principal Scientist from CSIR- NEERI, Nagpur. He has vast experience of 35 years in the field of Biology, Biodiversity and Environmental Science. He is in-house functional area expert in Ecology and Biodiversity (EB) by QCI-NABET. He defended so many projects of different sectors during the service. He contributes as Associate EIA coordination and as a FAE for Ecology & Biodiversity area for this project. He guided to the FAA during sampling, compilation of data and report preparation for this project.
4	**Mrs. Kavita Zog** (EIA	**Mrs. Kavita Zog** is a young, dynamic and experienced Environment professional. She has 10 years of experience in environmental Field & environmental clearance. She is Empanelled - functional area expert in

S.No	Name of Expert	Project Role
	Coordinator and FAE) Empanelled	**Ecology & Biodiversity, Solid hazardous Waste, Water Pollution & Prevention.** She is has worked for Water Pollution Monitoring network design, Technical assistance during sampling of water, Solid &hazardous waste along with laboratory during baseline data collection. She has contributed her impacts & mitigation measures for Ecology & Biodiversity, Water Pollution & Prevention ,Solid & Hazardous Waste fields & proposing of wastewater treatment technology etc.
5	**Mr. Sushil Meshram** (FAE-In-House)	Mr. Sushil Meshram is a QCI-NABET approved In-house Functional Area Expert for Socio-Economic area. He has 6 years of experience in the field of sociology. He has been associated in the field of making EIA since last 4 years. He has involved in Socio-Economic data collection, sampling, social status of the people, health condition, economic status, extrapolation of the population growth, over all impacts and mitigation measures in his functional area for preparation of this Draft EIA report.
6	**Mr. Partho Mukharjee** (FAE AQ and Noise-Empanelled)	Mr. Partho Mukharjee is QCI-NABET approved empanelled expert for Meteorology, Air quality modeling, prediction and Noise Functional areas. He has 15 years of experience in Air Quality Modeling and Noise component. He is very sound in his field. He has involved in contribution of Noise impacts, mitigation measures, Air quality modeling, prediction of impacts, suggesting mitigation measures, designing Environment management plan for the proposed distillery project.
7	**Mr. Miind Kundal** (FAE-HG,GEO,LU,SC Empanelled):	Mr. **Miind Kundal** is a QCI-NABET approved FAE- Land Use, Geology, Hydrogeology, Soil conservation (SC) areas and provided his expertise reports in Geology, Hydrogeology &soil conservation areas for this distillery project & associated with MGRL as an empanelled expert. He has contributed in framing of soil monitoring network, soil sampling along with Laboratory team during baseline data collection, given his comments on analytical reports of this distillery project and contributed his best services in preparation of Draft EIA report.
8	**Mr.Parag Khujnare** (FAE-Ind.SW,GEO, Noise & Vibration Empanelled)	Mr. **Parag Khujnare** is a QCI-NABET approved FAE-Industrial Solid Waste, Geology, & Noise & Vibration areas and provided his expertise reports in Industrial Solid & Hazardous waste, Geology, Noise &Vibration for this distillery project & associated with MGRL as an empanelled expert. He has contributed in framing of Noise monitoring network, soil sampling along with Laboratory team during baseline data collection, given his comments on analytical reports of this distillery project and contributed his best services in preparation of Draft EIA report.
9	**Dr. G.V.A. Ramakrishna** (FAE- LU; HG;	Dr. G.V.A. Ramakrishna has Ph.D. in the field of Geology and has huge experience of 35 years. He was associated as an empanelled expert. He is a

S.No	Name of Expert	Project Role
	GEO:- Empanelled):	QCI-NABET approved expert for Land Use-Land Cover, Geology, Hydrology ground water and water conservation areas and provided his expertise reports in the same areas for this distillery project.
10	**Mr. Harshal Wagh** (FAE- WP and SHW:- In-house)	Mr. Harshal Wagh is a QCI-NABET approved expert for the WP and SHW areas. He has us 10 years of experience in his functional areas and worked with various industrial projects. He has involved in designing of Water quality monitoring locations, guidance during sampling of ground water, surface water during baseline data collection, providing his comments on analytical reports submitted by the lab and designed an effective Environmental Management plan in his study area for this project.
11	**Mrs. Julee Kamble** (FAE-WP In-house)	Mrs. Julee Kamble has provided her assistance and expertise in preparation of Functional Area report in Water Pollution Monitoring, Prevention and control in coordination with Mr. Harshal Wagh.
Functional Area Associates		
12	**Mr. Manideep Tupakula** FAA	Mr. ManideepTupakula is QCI-NABET approved Functional Area Associate in AQ and SHW areas and having 3 years of work experience in these areas. He has involved in client interaction and framing of Air quality sampling locations based on wind pattern, IMD data, preparation of Windrose, Air quality modeling and prediction using ISCST3 software and associated to respective FAE's for sampling, finding anticipated impacts and providing the mitigation measures for this project. He has actively involved in providing technical assistance in conducting public hearing process by coordinating with TNPCB.
15	**Ms. Meena Charbhe** FAA	Ms. MeenaCharbhe is also a QCI-NABET Functional Area Associate in AP and SHW and having 5 years of experience working with these areas. She Associated to the respective FAE's and also assisted in preparation of EIA/ EMP report for this project.
16	**Ms. Seema Yadav** FAA	Ms. Seema Yadav is worked as Functional Area Associate (WP, EB) assisting in Field visit & Sampling and providing her best knowledge and assisting to EC, FAE for preparation of this report.
17	**Ms. Renuka Joshi** FAA	Ms. Renuka Joshi is worked as Functional Area Associate (SHW, EB) assisting in Field visit & Sampling and providing her best knowledge and assisting to EC, FAE for preparation of this report.
18	**Ms. Dakshata Kumbhar** FAA	Ms. Dakshata Kumbhar is worked as Functional Area Associate (AP,NV) assisting in Field visit & Sampling team member and providing her best knowledge and assisting to EC, FAE for preparation of this report.
19	**Mr. Chetan**	Mas. Chetan Jadhav is worked as Functional Area Associate (AP,WP)

S.No	Name of Expert	Project Role
	Jadhav FAA	assisting in Field visit & Sampling team member and providing her best knowledge and assisting to EC, FAE for preparation of this report.
Team Members		
17	**Ms. Surekha Ugale**	Ms. Surekha Ugale is having 4 years of experience. She worked as team member and providing her best knowledge and assisting to EC, FAE for preparation of this report.
18	**Mrs.Surekha Kadam**	Mrs. Sureka Kadam has been involved as a team member and providing her support and assistance to EC and FAE's in preparation of EIA report of this project.
19	**Mrs.Anju Patil**	Mrs .Anju Patil has been involved as a team member and providing her support and assistance to EC and FAE's in preparation of EIA report of this project.
20	**Miss Neha Shinde**	Miss Neha Shinde is worked as Team Member assisting in Field visit & Sampling team member and providing her best knowledge and assisting to EC, FAE for preparation of this report.
21	**Mas.Nikhil Chavan**	Mas**. Nikhil Chavan** is worked as a Team Member assisting in Field visit & Sampling team member and providing her best knowledge and assisting to EC, FAE for preparation of this report.
23	**Miss Pooja Bhujade**	Miss Pooja Bhujade is worked as Team Member assisting in Field visit & Sampling team member and providing her best knowledge and assisting to EC, FAE for preparation of this report.