

Nabinagar Super Thermal Power Project Stage-II(3x800MW) (Summary of Baseline Monitring)

Ambient Air Quality Data

Parameters	AAQ 1	AAQ 2	AAQ 3	AAQ 4	AAQ 5	AAQ 6	AAQ 7	AAQ8	AAQ9	AAQ10
	Nabinagar STPP	Sasna	Akorhi	Madhe	Jasoiya	Tilouthu Village	Charan Kalan	Bisrampur	Karamkila Village	Salaiya Village
PM10 NAAQ Limit 100 µg/m³										
Min	78.3	70.2	71.8	61.2	54.9	71.5	62.4	60.4	68.6	67.8
Max	92.4	88.4	83.4	78.5	70.2	85.2	70.9	77.6	84.0	84.0
98%	91.6	87.1	83.0	76.6	69.8	84.9	70.6	77.0	83.3	83.3
PM2.5 NAAQ Limit 60 µg/m³										
Min	42.5	40.6	35.6	27.8	26.0	37.4	30.5	26.7	31.0	33.0
Max	54.8	52.6	52.6	43.9	40.0	51.8	39.4	40.5	53.2	52.7
98%	53.7	52.5	51.6	42.6	39.1	51.5	39.2	40.1	52.4	52.6
SO2 NAAQ Limit 80 µg/m³										
Min	14.6	11.6	11.6	11.4	8.6	11.8	9.1	9.1	10.5	10.5
Max	22.6	22.1	18.4	17.7	13.1	20.1	17.8	17.5	16.4	14.6
98%	22.5	20.5	18.4	17.2	12.4	19.5	17.1	17.4	16.4	14.6
NO2 NAAQ Limit 80 µg/m³										
Min	24.5	18.6	13.5	12.6	7.7	11.5	11.5	10.8	9.8	8.2
Max	36.2	27.0	24.5	22.6	17.1	26.1	22.4	22.7	21.2	19.0
98%	35.9	26.6	24.0	22.5	16.1	25.4	22.3	22.6	21.2	18.8
CO NAAQ Limit 2.0mg/m³										
Min	0.74	0.74	0.74	0.69	0.69	0.74	0.69	0.74	0.76	0.75
Max	0.94	0.93	0.97	0.97	0.97	0.97	0.96	0.97	0.96	0.96
98%	0.94	0.93	0.96	0.96	0.96	0.96	0.95	0.96	0.95	0.95
O₃ NAAQ Limit 100 µg/m³										
Min	28.3	15.8	17.8	20.8	20.9	24.6	21.0	17.5	20.0	21.8

Parameters	AAQ 1	AAQ 2	AAQ 3	AAQ 4	AAQ 5	AAQ 6	AAQ 7	AAQ8	AAQ9	AAQ10
	Nabinagar STPP	Sasna	Akorhi	Madhe	Jasoiya	Tilouthu Village	Charan Kalan	Bisrampur	Karamkila Village	Salaiya Village
Max	39.3	30.2	28.1	28.1	25.7	34.9	38.3	28.0	44.2	38.4
98%	38.9	29.6	28.1	27.4	25.3	34.5	37.9	27.4	43.9	37.5
Mercury, µg/m ³										
Min	BDL (DL 1.0)									
Max	BDL (DL 1.0)									
98%	BDL (DL 1.0)									
Lead,µg/m ³										
Min	BDL (<0.1)									
Max	BDL (<0.1)									
98%	BDL (<0.1)									
Nickel,µg/m ³										
Min	BDL (<0.001)									
Max	BDL (<0.001)									
98%	BDL (<0.001)									
Ammonia, µg/m ³										
Min	BDL (<20.0)									
Max	BDL (<20.0)									
98%	BDL (<20.0)									
Source: Monitoring/sampling/testing by GCPL and Envirotech East Private Limited, Kolkata										
Source: Monitoring/sampling/testing by Envirotech East Private Limited, Kolkata, Gazette of India Notification, dated 18 th Nov, 2009										
* For CO, O3 & Hg, 8 hourly standard is being considered										

SURFACE WATER QUALITY

Surface Water, March.2024

S. N.	Parameters	SW-1 Indra puri Barrage Downstream	SW-2 Sone River- Tilouthu village (Left bank) Upstream	SW-3 Pond n/v Thumbi village	SW-4 Pond n/n Bara Tetariya	SW-5 Sone River-Right bank Upstream	SW-6 Pond n/v Khaira
1	Temperature, °C	27.16	26.70	27.88	26.42	26.41	27.62
2	Colour, Hazen	<5	<5	<5	<5	<5	<5
3	Turbidity, NTU	4	4	5	1	8	3
4	pH	7.21	7.34	7.11	7.41	7.38	7.44
5	Conductivity, µS/cm	447	364	568	475	412	253
6	Total Dissolve Solids, mg/l	299.49	243.88	386.24	318.25	276.04	169.51
7	Alkalinity as CaCO ₃ , mg/l	204.61	142.61	278.63	174.52	144.80	110.56
8	Total Hardness as CaCO ₃ , mg/l	141.80	149.43	194.80	155.00	152.21	101.82
9	Calcium as Ca, mg/l	36.24	31.33	42.86	37.54	36.41	23.41
10	Magnesium as Mg, mg/l	12.43	17.26	21.28	14.86	14.86	10.52
11	Sodium as Na, mg/l	36.76	38.63	40.25	28.60	42.62	11.11
12	Potassium as K, mg/l	1.62	2.64	1.14	1.24	2.31	0.75
13	Total Suspended Solids	2.10	2.10	3.00	3.10	2.20	3.10
14	Chloride as Cl, mg/l	20.76	47.63	23.68	31.41	54.22	16.21
15	Sulphate as SO ₄ , mg/l	15.92	34.61	20.16	19.62	40.62	8.63
16	Nitrate as NO ₃	5.76	9.62	5.86	4.80	11.41	7.62
17	Fluoride as F, mg/l	0.28	0.34	0.25	0.28	0.36	0.44
18	Phenolic compound as C ₆ H ₅ OH	BDL	BDL	BDL	BDL	BDL	BDL
19	Phosphate, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
20	Silica as Si, mg/l	7.60	8.51	3.73	6.28	14.20	7.11
21	Arsenic as As, mg/l	BDL	BDL	BDL	BDL	BDL	BDL

S. N.	Parameters	SW-1 Indra puri Barrage Downstream	SW-2 Sone River- Tilouthu village (Left bank) Upstream	SW-3 Pond n/v Thumbi village	SW-4 Pond n/n Bara Tetariya	SW-5 Sone River-Right bank Upstream	SW-6 Pond n/v Khaira
22	Cadmium As Cd, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr ⁺⁶	BDL	BDL	BDL	BDL	BDL	BDL
24	Iron as Fe, mg/l	0.36	0.22	0.31	0.16	0.24	0.26
25	Copper as Cu, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
27	Selenium as Se, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
28	Mercury as Hg, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
29	Zinc as Zn, mg/l	0.22	0.42	0.26	0.22	0.46	0.32
30	Dissolved Oxygen, mg/l	5.51	5.70	6.13	5.60	5.60	5.80
31	COD, mg/l	32	22	46	16	26	26
32	BOD, 27°C 3 days, mg/l	8	6	14	5	8	6
33	Oil & Grease, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
34	Total Chromium, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
35	Total Coliforms, MPN/100ml	32	21	29	35	38	38

Surface water, April.2024

S.No	Parameters	SW-1 Indra puri Barrage	SW-2 Sone River- Tilouthu village Upstream	SW-3 Pond n/v Thumbi village	SW-4 Pond n/n Bara Tetariya	SW-5 Sone River Downstream	SW-6 Pond n/v Khaira
1	Temperature, °C	26.17	28.20	27.23	28.20	28.20	27.84
2	Colour, Hazen	<5	<5	<5	<5	<5	<5
3	Turbidity, NTU	6.00	5.00	6.00	5.00	4.00	4.00
4	pH	7.21	7.51	7.15	7.51	7.56	7.32
5	Conductivity, µS/cm	455	393.12	545	393.12	444.96	410
6	Total Dissolve Solids, mg/l	304.85	263.39	410.00	263.39	298.12	274.71
7	Alkalinity as CaCO ₃ , mg/l	184.82	154.01	250.46	154.01	156.38	117.42
8	Total Hardness as CaCO ₃ , mg/l	124.91	161.34	199.29	161.34	164.38	109.63
9	Calcium as Ca, mg/l	34.11	33.84	39.91	33.84	39.32	24.63
10	Magnesium as Mg, mg/l	9.64	18.64	24.18	18.64	16.05	11.68
11	Sodium as Na, mg/l	40.64	41.69	32.86	41.69	46.01	13.21
12	Potassium as K, mg/l	2.10	2.85	1.62	2.85	2.49	1.63
13	Total Suspended Solids	2.10	2.10	3.00	3.10	2.20	3.10
14	Chloride as Cl, mg/l	24.62	51.41	21.68	51.41	58.54	17.32
15	Sulphate as SO ₄ , mg/l	18.64	37.37	23.17	37.37	43.87	11.61
16	Nitrate as NO ₃	6.63	10.39	7.11	10.39	12.31	8.24
17	Fluoride as F, mg/l	0.37	0.37	0.29	0.37	0.39	0.58
18	Phenolic compound as C ₆ H ₅ OH	BDL	BDL	BDL	BDL	BDL	BDL
19	Phosphate, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
20	Silica as Si, mg/l	8.20	9.18	4.11	9.18	15.34	8.80
21	Arsenic as As, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium As Cd, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr ⁺⁶	BDL	BDL	BDL	BDL	BDL	BDL
24	Iron as Fe, mg/l	0.36	0.24	0.28	0.24	0.26	0.32
25	Copper as Cu, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb, mg/l	BDL	BDL	BDL	BDL	BDL	BDL

S.No	Parameters	SW-1 Indra puri Barrage	SW-2 Sone River- Tilouthu village Upstream	SW-3 Pond n/v Thumbi village	SW-4 Pond n/n Bara Tetariya	SW-5 Sone River Downstream	SW-6 Pond n/v Khaira
27	Selenium as Se, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
28	Mercury as Hg, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
29	Zinc as Zn, mg/l	0.52	0.45	0.72	0.45	0.50	0.78
30	Dissolved Oxygen, mg/l	5.21	5.10	5.40	5.20	6.20	5.72
31	COD, mg/l	18.00	23.00	62.00	23.00	28.00	20.00
32	BOD, 27°C 3 days, mg/l	6.21	7.00	18.00	7.00	8.00	6.00
33	Oil & Grease, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
34	Total Chromium, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
35	Total Coliforms, MPN/100ml	26.00	32.00	21.00	Absent	35.00	38.00

Surface Water, May.2024

S. No	Parameters	SW-1 Indra puri Barrage	SW-2 Sone River- Tilouthu village Upstream	SW-3 Pond n/v Thumbi village	SW-4 Pond n/n Bara Tetariya	SW-5 Sone River Downstream	SW-6 Pond n/v Khaira
1	Temperature, °C	27.41	28.40	27.22	28.60	28.50	28.20
2	Colour, Hazen	<5	<5	<5	<5	<5	<5
3	Turbidity, NTU	5.00	5.00	3.00	1.00	5.00	1.00
4	pH	7.34	7.44	7.21	7.38	7.46	7.58
5	Conductivity, µS/cm	427.00	377.40	512.00	492.48	427.16	385.00
6	Total Dissolve Solids, mg/l	286.559	252.85	385.4	329.96	286.20	258.218
7	Alkalinity as CaCO ₃ , mg/l	173.73	147.85	235.43	180.92	150.13	110.35
8	Total Hardness as CaCO ₃ , mg/l	117.42	154.88	187.30	160.73	157.80	103.01
9	Calcium as Ca, mg/l	32.054	32.48	37.506	38.92	37.75	23.124
10	Magnesium as Mg, mg/l	9.06	17.90	22.73	15.41	15.41	10.97
11	Sodium as Na, mg/l	38.20	40.02	30.89	29.65	44.17	12.41
12	Potassium as K, mg/l	1.97	2.74	1.52	1.29	2.40	1.53
13	Total Suspended Solids	2.10	2.10	3.00	3.10	2.20	3.10
14	Chloride as Cl, mg/l	23.12	49.35	20.37	32.56	56.19	16.26
15	Sulphate as SO ₄ , mg/l	17.52	35.87	21.77	20.34	42.11	10.90
16	Nitrate as NO ₃	6.20	9.97	6.67	4.98	11.82	7.74
17	Fluoride as F, mg/l	0.34	0.35	0.27	0.29	0.37	0.54
18	Phenolic compound as C ₆ H ₅ OH	BDL	BDL	BDL	BDL	BDL	BDL
19	Phosphate, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
20	Silica as Si, mg/l	7.70	8.81	3.85	6.51	14.72	8.27
21	Arsenic as As, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
22	Cadmium As Cd, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
23	Chromium as Cr ⁺⁶	BDL	BDL	BDL	BDL	BDL	BDL
24	Iron as Fe, mg/l	0.33	0.23	0.26	0.17	0.25	0.30

S. No	Parameters	SW-1 Indra puri Barrage	SW-2 Sone River- Tilouthu village Upstream	SW-3 Pond n/v Thumbi village	SW-4 Pond n/n Bara Tetariya	SW-5 Sone River Downstream	SW-6 Pond n/v Khaira
25	Copper as Cu, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
26	Lead as Pb, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
27	Selenium as Se, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
28	Mercury as Hg, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
29	Zinc as Zn, mg/l	0.48	0.44	0.67	0.23	0.48	0.73
30	Dissolved Oxygen, mg/l	5.80	5.71	5.80	5.53	6.12	5.61
31	COD, mg/l	16.92	22.00	58.28	20.00	26.00	21.00
32	BOD, 27°C 3 days, mg/l	5.83	6.00	16.92	6.00	8.00	8.00
33	Oil & Grease, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
34	Total Chromium, mg/l	BDL	BDL	BDL	BDL	BDL	BDL
35	Total Coliforms, MPN/100ml	22.00	26.00	33.00	38.00	45.00	35.00

BDL Below detection limit

GROUND WATER QUALITY

Ground Water, March-2024

S. No	Parameters	GW-1 Bara Tetariya	GW-2 Bairiya	GW-3 Anjaniya	GW-4 Khaira	GW-5 Amba	GW-6 Sasna	IS 10500:2012 Acceptable limit	IS 10500:2012 Permissible limit
1	Temperature, °C	27.20	27.86	26.70	27.24	28.04	27.14	--	--
2	Colour, Hazen	<5	<5	<5	<5	<5	<5	5	15
3	Turbidity, NTU	1	2	1	1	3	4	1	5
4	pH	7.29	7.41	7.31	7.36	7.32	7.26	6.5-8.5	No Relaxation
5	Conductivity, µS/cm	578	702	625	554	732	878	--	--
6	Total Dissolve Solids, mg/l	387.26	470.34	418.75	371.22	490.44	588.31	500	2000
7	Alkalinity as CaCO ₃ , mg/l	225.60	294.24	210.63	241.42	277.64	344.81	200	600
8	Total Hardness as CaCO ₃ , mg/l	162.80	215.62	196.91	175.20	255.00	262.33	200	600
9	Calcium as Ca, mg/l	47.62	57.24	54.68	46.6	78.22	81.45	75	200
10	Magnesium as Mg, mg/l	10.63	17.62	14.62	14.26	14.44	14.26	30	100
11	Sodium as Na, mg/l	51.62	61.24	32.68	46.62	48.76	80.62	--	--
12	Potassium as K, mg/l	1.62	2.40	1.88	0.86	4.34	1.44	--	--
13	Total Suspended Solids	BDL	BDL	BDL	BDL	BDL	BDL	--	--
14	Chloride as Cl, mg/l	34.23	41.26	36.80	20.61	50.64	61.24	250	1000
15	Sulphate as SO ₄ , mg/l	37.62	51.62	35.54	41.32	45.61	45.26	200	400
16	Nitrate as NO ₃	4.61	12.76	5.10	6.21	7.46	8.65	45	No Relaxation
17	Fluoride as F, mg/l	0.26	0.32	0.22	0.48	0.47	0.51	1.0	1.5
18	Phenolic compound as C ₆ H ₅ OH	BDL	BDL	BDL	BDL	BDL	BDL	0.001	0.002
19	Phosphate, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	--	--
20	Silica as Si, mg/l	5.24	5.80	5.51	6.81	6.64	5.23	--	--
21	Arsenic as As, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.01	0.05
22	Cadmium As Cd, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.003	No Relaxation

S. No	Parameters	GW-1 Bara Tetariya	GW-2 Bairiya	GW-3 Anjaniya	GW-4 Khaira	GW-5 Amba	GW-6 Sasna	IS 10500:2012 Acceptable limit	IS 10500:2012 Permissible limit
23	Chromium as Cr ⁺⁶	BDL	BDL	BDL	BDL	BDL	BDL	--	--
24	Iron as Fe, mg/l	0.18	0.21	0.12	0.18	0.28	0.38	0.3	No Relaxation
25	Copper as Cu, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.05	1.5
26	Lead as Pb, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.01	No Relaxation
27	Selenium as Se, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.01	No Relaxation
28	Mercury as Hg, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.001	No Relaxation
29	Zinc as Zn, mg/l	0.21	0.24	0.14	0.86	0.34	0.54	5	15
30	Dissolved Oxygen, mg/l	6.72	7.10	8.11	7.12	6.82	6.83	--	--
31	COD, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	--	--
32	BOD, 27°C 3 days, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	--	--
33	Oil & Grease, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.5	No Relaxation
34	Total Chromium, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.05	No Relaxation
35	Total Coliforms, MPN/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Shall not be detectable in any 100 ml sample	

BDL Below detection limit

Ground Water, April-2024

S. No	Parameters	GW-1 Bara Tetariya	GW-2 Bairiya	GW-3 Anjaniya	GW-4 Khaira	GW-5 Amba	GW-6 Sasna	IS 10500:2012 Acceptable limit	IS 10500:2012 Permissible limit
1	Temperature, °C	27.80	27.62	27.50	27.44	28.81	26.48	--	--
2	Colour, Hazen	<5	<5	<5	<5	<5	<5	5	15
3	Turbidity, NTU	1.00	1.00	2.00	2.00	1.00	1.00	1	5
4	pH	7.36	7.07	7.45	7.12	7.32	7.14	6.5-8.5	No Relaxation
5	Conductivity, µS/cm	624.24	870.00	675.00	640.00	712.00	875.00	--	--
6	Total Dissolve Solids, mg/l	418.24	582.90	452.25	428.82	477.04	586.31	500	2000
7	Alkalinity as CaCO ₃ , mg/l	243.65	356.72	227.45	280.60	264.42	357.81	200	600
8	Total Hardness as CaCO ₃ , mg/l	175.84	247.93	212.64	212.41	240.62	274.11	200	600
9	Calcium as Ca, mg/l	51.43	65.83	59.05	57.68	73.82	84.81	75	200
10	Magnesium as Mg, mg/l	11.48	20.26	15.79	16.57	13.63	15.09	30	100
11	Sodium as Na, mg/l	55.75	86.61	35.29	50.52	46.00	76.4	--	--
12	Potassium as K, mg/l	1.75	4.72	2.03	1.84	4.11	2.48	--	--
13	Total Suspended Solids	BDL	BDL	BDL	BDL	BDL	BDL	--	--
14	Chloride as Cl, mg/l	36.94	49.30	39.74	24.43	51.58	72.62	250	1000
15	Sulphate as SO ₄ , mg/l	40.63	58.61	38.38	43.22	55.40	47.26	200	400
16	Nitrate as NO ₃	4.97	15.12	5.51	7.45	10.52	9.65	45	No Relaxation
17	Fluoride as F, mg/l	0.28	0.35	0.24	0.52	0.50	0.62	1.0	1.5
18	Phenolic compound as C ₆ H ₅ OH	BDL	BDL	BDL	BDL	BDL	BDL	0.001	0.002
19	Phosphate, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	--	--
20	Silica as Si, mg/l	5.66	6.24	5.95	5.24	7.62	5.54	--	--
21	Arsenic as As, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.01	0.05
22	Cadmium As Cd, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.003	No Relaxation
23	Chromium as Cr ⁺⁶	BDL	BDL	BDL	BDL	BDL	BDL	--	--

S. No	Parameters	GW-1 Bara Tetariya	GW-2 Bairiya	GW-3 Anjaniya	GW-4 Khaira	GW-5 Amba	GW-6 Sasna	IS 10500:2012 Acceptable limit	IS 10500:2012 Permissible limit
24	Iron as Fe, mg/l	0.19	0.26	0.13	0.24	0.34	0.42	0.3	No Relaxation
25	Copper as Cu, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.05	1.5
26	Lead as Pb, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.01	No Relaxation
27	Selenium as Se, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.01	No Relaxation
28	Mercury as Hg, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.001	No Relaxation
29	Zinc as Zn, mg/l	0.23	0.36	0.15	1.24	0.42	0.66	5	15
30	Dissolved Oxygen, mg/l	7.24	7.72	8.75	6.81	7.11	7.33	--	--
31	COD, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	--	--
32	BOD, 27°C 3 days, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	--	--
33	Oil & Grease, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.5	No Relaxation
34	Total Chromium, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.05	No Relaxation
35	Total Coliforms, MPN/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Shall not be detectable in any 100 ml sample	

BDL Below detection limit

Ground Water, May-2024

S. No	Parameters	GW-1 Bara Tetariya	GW-2 Bairiya	GW-3 Anjaniya	GW-4 Khaira	GW-5 Amba	GW-6 Sasna	IS 10500:2012 Acceptable limit	IS 10500:2012 Permissible limit
1	Temperature, °C	28.10	28.11	27.90	27.60	27.81	28.62	--	--
2	Colour, Hazen	<5	<5	<5	<5	<5	<5	5	15
3	Turbidity, NTU	1.00	1.00	1.00	1.00	2.00	3.00	1	5
4	pH	7.41	7.51	7.38	7.62	7.38	7.38	6.5-8.5	No Relaxation
5	Conductivity, µS/cm	599.27	817.00	648.00	601.00	669.00	822.00	--	--
6	Total Dissolve Solids, mg/l	401.51	547.92	434.16	403.07	448.41	551.08	500	2000
7	Alkalinity as CaCO ₃ , mg/l	233.90	335.31	218.35	263.72	248.53	336.33	200	600
8	Total Hardness as CaCO ₃ , mg/l	168.81	233.00	204.14	199.71	226.22	257.74	200	600
9	Calcium as Ca, mg/l	49.37	61.85	56.69	54.21	69.37	79.71	75	200
10	Magnesium as Mg, mg/l	11.02	19.04	15.16	15.57	12.81	14.18	30	100
11	Sodium as Na, mg/l	53.52	81.40	33.88	47.47	43.24	71.81	--	--
12	Potassium as K, mg/l	1.68	4.41	1.95	1.72	3.85	2.33	--	--
13	Total Suspended Solids	BDL	BDL	BDL	BDL	BDL	BDL	--	--
14	Chloride as Cl, mg/l	35.46	46.34	38.15	22.93	48.48	68.26	250	1000
15	Sulphate as SO ₄ , mg/l	39.00	55.08	36.85	40.60	52.07	44.42	200	400
16	Nitrate as NO ₃	4.77	14.19	5.29	7.01	9.88	9.07	45	No Relaxation
17	Fluoride as F, mg/l	0.27	0.33	0.23	0.49	0.47	0.58	1.0	1.5
18	Phenolic compound as C ₆ H ₅ OH	BDL	BDL	BDL	BDL	BDL	BDL	0.001	0.002
19	Phosphate, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	--	--
20	Silica as Si, mg/l	5.43	5.86	5.71	4.88	7.16	5.17	--	--
21	Arsenic as As, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.01	0.05
22	Cadmium As Cd, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.003	No Relaxation
23	Chromium as Cr ⁺⁶	BDL	BDL	BDL	BDL	BDL	BDL	--	--

S. No	Parameters	GW-1 Bara Tetariya	GW-2 Bairiya	GW-3 Anjaniya	GW-4 Khaira	GW-5 Amba	GW-6 Sasna	IS 10500:2012 Acceptable limit	IS 10500:2012 Permissible limit
24	Iron as Fe, mg/l	0.19	0.24	0.12	0.22	0.31	0.39	0.3	No Relaxation
25	Copper as Cu, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.05	1.5
26	Lead as Pb, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.01	No Relaxation
27	Selenium as Se, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.01	No Relaxation
28	Mercury as Hg, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.001	No Relaxation
29	Zinc as Zn, mg/l	0.22	0.33	0.15	1.10	0.39	0.62	5	15
30	Dissolved Oxygen, mg/l	6.95	7.23	8.40	6.39	6.67	6.86	--	--
31	COD, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	--	--
32	BOD, 27°C 3 days, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	--	--
33	Oil & Grease, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.5	No Relaxation
34	Total Chromium, mg/l	BDL	BDL	BDL	BDL	BDL	BDL	0.05	No Relaxation
35	Total Coliforms, MPN/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Shall not be detectable in any 100 ml sample	

BDL Below detection limit

Noise Parameters Recorded at Different Locations

Name	Location/Village	Day - Leq-dB(A)	Night - Leq-dB(A)
N1	Nabinagar STPP	66.5	44.1
N2	Khaira Village	53.8	41.5
N3	Ankorha Village	66.3	46.2
N4	Madhe Village	54.8	42.9
N5	Narari Khurd	52.8	41.7
N6	Bisrampur	54.2	43.6
N7	Kanker	55.4	41.9
N8	Mahdeva Village	52.8	40.8
N9	Mahuwan Village	54.6	42.0
N10	Sasna	61.2	43.6

DISCUSSION & CONCLUSION

Day Time: The daytime noise levels showed maximum 66.5 dB(A) at Nabinagar STPP to minimum 52.8 dB(A) at Narari Khurd and Mahdeva Village. Whereas in study area two locations (N3 and N10) are observed to be above prescribed limits for residential zones. The minimum noise level observed as 52.8 dB(A) at Mahdeva Village(N8) and Narari Khurd(N5) and maximum noise level is observed as 66.5 dB(A) at Nabinagar STPP (N1). It is observed that the daytime noise levels are high because Nabinagar STPP is an industry and it is nearest to railway line, so noise level observed high. The prescribed limit is 55 dB (A) for rural / residential areas and 75 dB (A) for industrial zones.

Night Time: The night time noise levels showed maximum 46.2 dB(A) Ankorha village to minimum 40.8 dB(A) at Mahdeva Village. In study area, at location (N3) noise levels observed to be above prescribed limits for residential zones. The minimum noise level observed 40.8 dB(A) at Mahdeva Village (N8) and maximum noise level is observed 46.2 dB(A) at Ankorha village (N3). It is observed that the night time noise level observed high at Ankorha village due to nearest to railway line. The prescribed limit is 45 dB (A) for rural / residential areas and 70 dB (A) for industrial zones.

SOIL QUALITY

Physico-Chemical Parameters of Soil Samples

S.No	Parameters	S-1 Ankhori Village	S-2 Mahdeva Village	S-3 Madhe Village	S-4 Ash Dyke Stage-II	S-5 Thum bhi Village	S-6 Salai ya Villa ge	S-7 Kanker	S-8 Khaira Village	S-9 Karamkila Village	S-10 Tilouthu Village
1	pH	7.52	7.13	7.41	7.26	7.34	7.48	7.62	7.54	7.72	7.65
2	Electrical Conductivity, mS/cm	0.77	0.72	0.66	0.85	0.78	0.74	0.68	0.54	0.59	0.92
	Electrical Conductivity µmhos/cm	770	720	660	850	780	740	680	540	590	920
3	Cation Exchange Capacity (CEC), meq/100g	11.3	141	14.9	15.7	13.4	12.6	13.2	12.9	14.3	15.2
4	Available Nitrogen, mg/Kg	240.20	144.60	314.80	190.80	178.60	167.4 0	221.40	268.40	27.20	311.40
4a	Available Nitrogen, Kg/Ha	538.05	323.90	705.15	427.39	400.06	374.9 8	495.94	601.22	60.93	697.54
5	Available Phosphorus, mg/Kg	5.74	5.86	5.1	4.05	5.37	5.44	6.72	4.88	5.51	6.21
5a	Available Phosphorus, Kg/Ha	12.86	13.13	11.42	9.07	12.03	12.19	15.05	10.93	12.34	13.91
6	Available Potassium, mg/Kg	188.60	229.40	180.70	204.60	192.80	177.2 0	194.60	184.20	191.40	186.40
6a	Available Potassium, Kg/Ha	422.46	513.86	404.77	458.30	431.87	396.9 3	435.90	412.61	428.74	417.54
7	Organic Carbon, %	0.67	0.72	0.58	0.62	0.51	0.58	0.64	0.54	0.59	0.48
8	Organic Matter, %	1.15	1.24	0.99	1.07	0.88	0.99	1.10	0.93	1.01	0.83

S.No	Parameters	S-1 Ankhori Village	S-2 Mahdeva Village	S-3 Madhe Village	S-4 Ash Dyke Stage-II	S-5 Thum bhi Village	S-6 Salai ya Villa ge	S-7 Kanker	S-8 Khaira Village	S-9 Karamkila Village	S-10 Tilouthu Village
9	Bulk Density, gm/cc	108	1.11	1.09	1.14	1.15	1.07	1.16	1.19	1.18	1.21
10	Available Moisture, %	7.86	6.54	8.24	7.24	5.62	6.84	5.43	7.34	5.76	4.72
11	Water Holding Capacity, %	41.6	35.7	39.4	32.6	36.2	40.4	44.6	41.6	37.5	38.1
12	Calcium, meq/100g	11.85	9.30	4.85	9.10	22.2	8.55	7.16	8.64	7.64	9.26
13	Magnesium, meq/100g	1.90	1.49	0.77	1.45	3.55	1.37	1.15	1.38	1.22	1.48
	Macronutrients										
14	Copper, mg/kg	0.24	0.22	0.28	0.29	0.23	0.18	0.16	0.24	0.16	0.14
15	Iron, mg/kg	1.68	2.64	3.22	1.18	2.46	1.87	2.65	2.74	3.13	1.64
16	Zinc, mg/kg	0.45	0.42	0.51	0.46	0.55	0.74	0.82	0.61	0.73	0.44
17	Lead, mg/kg	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	Texture	Sandy Loam					Loamy Sand			Sandy Loam	
18	Sand, % by mass	68.6	70.5	71.2	70.6	65.2	76.4	72.4	74.8	71.4	69.4
19	Silt,% by mass	11.8	17.3	11.2	15.4	14.1	13.4	14.2	14.6	12.7	11.4
20	Clay,% by mass	19.6	12.2	17.6	14.0	20..7	10.2	13.4	10.6	15.9	19.2

TRAFFIC SCENARIO

The traffic survey monitoring was carried out to forecast future traffic growth and the burden on the road and environs as a result of the plant's expansion. Measurements of traffic density were taken continuously for 24 hours at T1: Barun-Nabinagar road (connecting road to NH-19) and. This is the route used for product transportation, by visual observation and counting of vehicles in 4 categories, namely, cycle/ motorcycles/ scooters (two-wheelers), passenger cars/vans/ auto-rickshaws (three- wheelers), heavy motor vehicle & Light motor vehicle. Two people were stationed on either side to tally the number of automobiles. The total number of vehicles per hour in each of the four categories was calculated. Traffic Volume count was done at the said location & presented in bellow **Table**.

Table-A, Existing Traffic Scenario

T1: Barun-Nabinagar road (connecting road to NH-19)			
Carrier Type	No. of Vehicle/day (A)	Equivalency factor (B)	No. of PCU/day (A*B)
2 Wheelers	2064	0.5	1032
3-4-Wheeler	816	1	816
LMV	144	1.5	216
HMV	480	3.0	1440
Total	3504	-	3504

Source: (i) Traffic Survey by GCPL (ii) IRC: 106-1990 (iii) IRC: 64-1990

The results of the survey, the existing PCU of each location were compared with the capacity of each type of road as suggested by Indian Road Congress thus determining the existing Level of Service (LoS) for each location. The existing conditions shows **B Level of service** at T1 which implies a zone of stable flow (**Table B**).

Table B: Existing Level of Service

Location	Distance (km)	Direction	V: Volume in 24 hours (PCU)	C: Design capacity in PCU/day	V/C	LoS as per IRC
T1: Barun-Nabinagar road (connecting road to NH-19)	0.80	W	3504	15000	0.23	B
Relation between V/C ratio &LoS						
V/C Ratio	LoS	Performance				

Location		Distance (km)	Direction	V: Volume in 24 hours (PCU)	C: Design capacity in PCU/day	V/C	LoS as per IRC
0.0-0.2	A	Represents a condition of free flow					
0.2-0.4	B	Represents a zone of stable flow					
0.4-0.6	C	The general level of comfort and convenience declines noticeably at this level					
0.6-0.8	D	Represents the limit of stable flow					
0.8-1.0	E	Represents operating condition when traffic volumes are at or close to the capacity level					

TERRESTRIAL ECOLOGICAL SURVEY AND BIODIVERSITY STUDY

Inventory of Trees, Shrubs, Herbs and Climbers recorded from the study area

Sl. No.	Common Name	Scientific Name	Family	Source		
				Survey	Villagers	Forest Officials
Tree Species						
1	Karma	<i>Adina cordifolia</i>	Rubiaceae	✓		
2	Kahua	<i>Terminaliaarjuna</i>	Combretaceae	✓		
3	Piaar	<i>Buchnanialanzan</i>	Anacardiaceae	✓		
4	Batai	<i>Albiziafalcata</i>	Fabaceae	✓		
5	Babool	<i>Acacia nilotica</i>	Fabaceae	✓		
6	Amaltas	<i>Cassia fistula</i>	Leguminosae	✓		
7	Kathmohlee	<i>Bauhinia racemosa</i>	Leguminosae	✓		
8	Kachnar	<i>Bauhinia vahlii</i>	Leguminosae	✓		
9	Aam	<i>Mangiferaindica</i>	Anacardiaceae	✓		
10	Aonla	<i>Emblicaofficinalis</i>	Euphorbiaceae	✓		
11	Bakain	<i>Meliaazedarach</i>	Meliaceae		✓	
12	Datranga	<i>Ehretialaevis</i>	Boraginaceae		✓	
13	Katai	<i>Flacourtiaindica</i>	Bixaceae		✓	
14	Kevati	<i>Ventilagomaderaspatana</i>	Rhamnaceae		✓	
15	Koirala	<i>Bauhinia variegata</i>	Leguminosae	✓		
16	Karanj	<i>Pongamiapinnata</i>	Leguminosae	✓		
17	Kala siris	<i>Albizialebbeck</i>	Leguminosae	✓		
18	Kainsa	<i>Sterculiaurens</i>	Sterculiaceae			✓
19	Khair	<i>Acacia catechu</i>	Leguminosae	✓		
20	Gamhar	<i>Gmelinaarborea</i>	Verbenaceae	✓		
21	Galgala	<i>Cochlospermumreligiosum</i>	Bixaceae			✓
22	Gilchi	<i>Caseariagraveolens</i>	Samydaceae			✓
23	Kakor	<i>Zizyphusxylopyra</i>	Rhamnaceae	✓		

[illegible]

Climbers

Sl. No.	Common Name	Scientific Name	Family	Source		
				Survey	Villagers	Forest Officials
1	Anantmool	<i>Hemidesmus indicus</i>	Asclepiadaceae	✓		
2	Kiwaj	<i>Mucunaprurita</i>	Leguminosae		✓	
3	Dasriya	<i>Ventilagodenticulata</i>	Rhamnaceae	✓		
4	Arhar	<i>Acacia pennata</i>	Mimoseae	✓		
5	Dudhlar	<i>Ichnocarpus frutescens</i>	Apocynaceae	✓		
6	Dhorni	<i>Butea parviflora</i>	Leguminosae		✓	
7	Satavar	<i>Asparagus racemosus</i>	Liliaceae		✓	
Shrubs						
1	Ratair	<i>Combretum roxburghii</i>	Combretaceae	✓		
2	Harsingar	<i>Nyctanthus arbortristis</i>	Oleaceae		✓	
3	Kaner	<i>Nerium oleander</i>	Apocynaceae	✓		
4	Bachita	<i>Urenalobata</i>	Malvaceae	✓		
5	Kasunda	<i>Cassia occidentalis</i>	Caesalpinaceae	✓		
6	Dhataki	<i>Woodfordia fruticosa</i>	Lythraceae		✓	
7	Kandola	<i>Carissa opaca</i>	Apocynaceae		✓	
8	Putoosh	<i>Lantana camara</i>	Verbenaceae	✓		
9	Katihari	<i>Olax scandens</i>	Olacaceae		✓	
10	Khareti	<i>Sidacordifolia</i>	Malvaceae	✓		
11	Chilla	<i>Casuarina tomentosa</i>	Salicaceae	✓		
12	Baer	<i>Zizyphus jujuba</i>	Rhamnaceae	✓		
13	Indrajav	<i>Holarrhena antidysenterica</i>	Apocynaceae		✓	
14	Karhar	<i>Randia dumetorum</i>	Rubiaceae		✓	
15	Datura	<i>Datura stramonium</i>	Solanaceae	✓		
16	Nirgundi	<i>Vitex negundo</i>	Lamiaceae	✓		
HERBS						
1	Dudhi	<i>Euphorbia hirta</i>	Euphorbiaceae	✓		
2	Bankulthi	<i>Atylosia scarabaeoides</i>	Fabaceae			
3	Janglimethi	<i>Sida acuta</i>	Malvaceae	✓		
4	Salparni	<i>Desmodium gangeticum</i>	Leguminosae	✓		

Sl. No.	Common Name	Scientific Name	Family	Source		
				Survey	Villagers	Forest Officials
5	Ratnamala	<i>Indigoferaliniifolia</i>	Fabaceae	✓		
6	Chakora	<i>Cassia tora</i>	Fabaceae	✓		
7	Gokhru	<i>Echinopsechinatus</i>	Asteraceae	✓		
8	Amarbel	<i>Cuscutareflexa</i>	Convolvulaceae	✓		
9	Bantulsi	<i>Hyptissuaveolens</i>	Lamiaceae	✓		
10	Chirchir	<i>Achyranthesaspera</i>	Amaranthaceae	✓		
11	Chia	<i>Lindenbergiaphilippensis</i>	Orobanchaceae	✓		
12	Sadabahr	<i>Catharanthusroseus</i>	Apocynaceae	✓		
13	Satyanashi	<i>Argemonemexicana</i>	<i>Papaveraceae</i>	✓		
Grasses						
1	Needle grass	<i>Aristidaadscensionis</i>	Gramineae	✓		
2	Bamboo	<i>Dendrocalamusstrictus</i>	Gramineae	✓		
3	Kel	<i>Dicanthiumannulatum</i>	Gramineae	✓		
4	Bhurbhusi	<i>Eragrostistenella</i>	Gramineae	✓		
5	Ghaas	<i>Heteropogoncontortus</i>	Gramineae	✓		

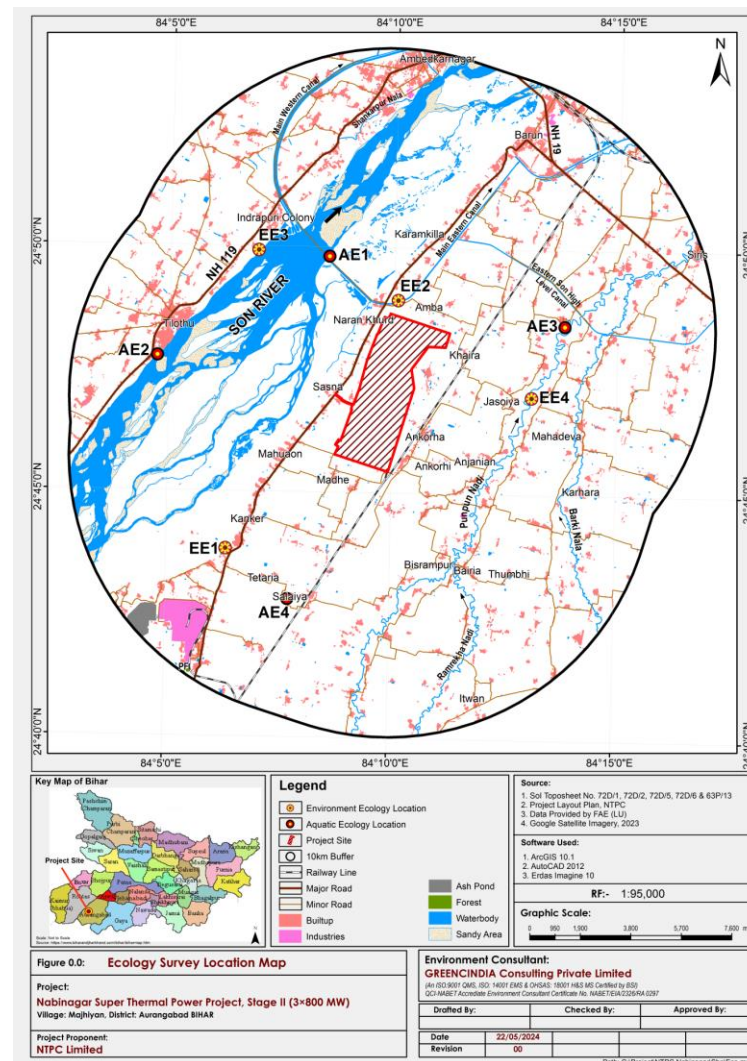


Figure: Terrestrial and Aquatic Ecology Study Locations

Co-ordinates of Terrestrial and Aquatic Ecology Study

Terrestrial Ecology Study Locations					
S. No.	Description	Latitude	Longitude	Distance (in km)	Direction
EE1	(PSS 1) Phyto-sociology sample 1	24°43'49.52"N	84° 6'20.31"E	5.34	SW
EE2	(PSS 2) Phyto-sociology sample 2	24°48'55.99"N	84°10'5.42"E	0.54	N
EE3	(PSS 3) Phyto-sociology sample 3	24°49'54.99"N	84° 6'57.47"E	5.43	NW
EE4	(PSS 4) Phyto-sociology sample 4	24°46'59.20"N	84°13'6.38"E	3.84	E
Aquatic Ecology Study Locations					
AE1	Aquatic sample 1	24°49'48.64"N	84° 8'32.47"E	3.13	NW
AE2	Aquatic sample 2	24°47'44.72"N	84° 4'44.45"E	6.91	W
AE3	Aquatic sample 3	24°48'27.19"N	84°13'49.35"E	4.39	ENE
AE4	Aquatic sample 4	24°42'48.99"N	84° 7'44.29"E	5.67	SWS

The phyto-sociological parameters for different types of vegetation- trees, shrubs and herbs for the three different locations in core zone and three locations in buffer zone is provided in the following tables.

Phyto-sociological analysis of trees in PSS 1 location

S. No.	Botanical Name	Frequency	Abundance	Density	IVI
1	<i>Bauhinia vahlii</i>	20.0	150.0	30.00	52.09
2	<i>Mangifera indica</i>	20.0	100.0	20.00	31.73
3	<i>Emblia officinalis</i>	20.0	200.0	40.00	46.64
4	<i>Melia azadirach</i>	20.0	150.0	30.00	42.54
5	<i>Delonix regia</i>	20.0	150.0	30.00	49.32
6	<i>Azadirachta indica</i>	20.0	100.0	20.00	32.55
7	<i>Zizyphus xylopyra</i>	10.0	200.0	20.00	27.49

8	<i>Holoptelea integrifolia</i>	10.0	100.0	10.00	17.63
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Phyto-sociological analysis of shrubs in PSS 1 location

S. No.	Botanical Name	Frequency	Abundance	Density	IVI
1	<i>Nerium oleander</i>	20	250.00	50.00	88.25
2	<i>Urenalobata</i>	10	200.00	20.00	45.30
3	<i>Cassia occidentalis</i>	20	150.00	30.00	75.80
4	<i>Woodfordia fruticosa</i>	20	150.00	30.00	61.75
5	<i>Carissa opaca</i>	10	100.00	10.00	28.90

Phyto-sociological analysis of herbs in PSS 1 location

S. No.	Botanical Name	Frequency	Abundance	Density
1	<i>Hyptissuaveolens</i>	30	3.33	100
2	<i>Achyranthes aspera</i>	20	5.00	100
3	<i>Lindenbergia philippensis</i>	30	4.33	130

Phyto-sociological analysis of trees in PSS 2 location

S. No.	Botanical Name	Frequency	Abundance	Density	IVI
1	<i>Anogeissulatifolia</i>	20.0	100.0	20.00	35.20
2	<i>Azadirachta indica</i>	20.0	100.0	20.00	28.48
3	<i>Pithecellobium dulce</i>	20.0	100.0	20.00	27.38

4	<i>Butea monosperma</i>	20.0	150.0	30.00	37.86
5	<i>Gardenia turgida</i>	20.0	150.0	30.00	43.74
6	<i>Acacia catechu</i>	20.0	250.0	50.00	52.98
7	<i>Gmelina arborea</i>	10.0	100.0	10.00	15.50
8	<i>Cochlospermum religiosum</i>	20.0	250.0	50.00	58.86

Phyto-sociological analysis of shrubs in PSS 2 location

S. No.	Botanical Name	Frequency	Abundance	Density	IVI
1	<i>Carissa opaca</i>	20	250.00	50.00	63.87
2	<i>Lantana camara</i>	20	250.00	50.00	77.06
3	<i>Oxalys scandens</i>	20	150.00	30.00	54.64
4	<i>Sida cordifolia</i>	30	133.33	40.00	62.70
5	<i>Casuarina tomentosa</i>	20	100.00	20.00	41.73

Phyto-sociological analysis of herbs in PSS 2 location

S. No.	Botanical Name	Frequency	Abundance	Density
1	<i>Indigofera tinctoria</i>	30	1.00	30
2	<i>Cassia tora</i>	20	1.50	30

Phyto-sociological analysis of trees in PSS 3 location

S. No.	Botanical Name	Frequency	Abundance	Density	IVI
1	<i>Adina cordifolia</i>	30.0	200.0	60.00	64.67
2	<i>Terminaliaarjuna</i>	20.0	100.0	20.00	22.24
3	<i>Buchnanialanzan</i>	20.0	150.0	30.00	26.61
4	<i>Albiziafalcata</i>	20.0	150.0	30.00	29.12
5	<i>Acacia nilotica</i>	20.0	100.0	20.00	25.96
6	<i>Cassia fistula</i>	30.0	266.7	80.00	63.25
7	<i>Bauhinia racemosa</i>	20.0	200.0	40.00	37.01
8	<i>Pongamiapinnata</i>	20.0	150.0	30.00	31.14

Phyto-sociological analysis of shrubs in PSS 3 location

S. No.	Botanical Name	Frequency	Abundance	Density	IVI
1	<i>Nerium oleander</i>	30	166.67	50.00	82.36
2	<i>Urenalobata</i>	20	150.00	30.00	60.78
3	<i>Cassia occidentalis</i>	20	200.00	40.00	76.17
4	<i>Woodfordiafruticosa</i>	30	166.67	50.00	80.69

Phyto-sociological analysis of herbs in PSS 3 location

S. No.	Botanical Name	Frequency	Abundance	Density
1	<i>Echinopsechinatus</i>	80	1.25	100

2	<i>Cuscutareflexa</i>	70	1.43	100
3	<i>Hyptissuaveolens</i>	60	2.17	130

Phyto-sociological analysis of trees in PSS 4 location

S. No.	Botanical Name	Frequency	Abundance	Density	IVI
1	<i>Delonixregia</i>	20.0	150.0	30.00	49.32
2	<i>Terminaliaarjuna</i>	20.0	100.0	20.00	22.24
3	<i>Azadirachtaindica</i>	20.0	100.0	20.00	28.48
4	<i>Albiziafalcata</i>	20.0	150.0	30.00	29.12
5	<i>Emblicaofficinalis</i>	20.0	200.0	40.00	46.64
6	<i>Gmelinaarborea</i>	10.0	100.0	10.00	15.50
7	<i>Cochlospermumreligiosum</i>	20.0	250.0	50.00	58.86
8	<i>Pongamiapinnata</i>	20.0	150.0	30.00	31.14

Phyto-sociological analysis of shrubs in PSS 4 location

S. No.	Botanical Name	Frequency	Abundance	Density	IVI
1	<i>Nerium oleander</i>	30	166.67	50.00	82.36
2	<i>Sidacordifolia</i>	30	133.33	40.00	62.70
3	<i>Woodfordiafruticosa</i>	20	150.00	30.00	61.75
4	<i>Carissa opaca</i>	10	100.00	10.00	28.90

Phyto-sociological analysis of herbs in PSS 4 location

S. No.	Botanical Name	Frequency	Abundance	Density
1	<i>Achyranthesaspera</i>	20	5.00	100
2	<i>Cuscutareflexa</i>	70	1.43	100
3	<i>Cassia tora</i>	20	1.50	30

Terrestrial Ecology Study

List of Animals in the study area

Mammals						
S. No.	Scientific Name	Core Zone	Buffer Zone (Aurangabad or Rohtas)	Common Name	Status	
					WPA Amendment 2022	IUCN
1	<i>Maniscrassicaudata</i>	-	R	Pangolin	Schedule I	EN
2	<i>Pantherapardus</i>	-	R	Leopard	Schedule I	VU
3	<i>Melursusursinus</i>	-	R	Sloth Bear	Schedule I	VU
4	<i>Antelope cervicarpa</i>	-	R	Blackbuck	Schedule I	NT
5	<i>Canisaureus</i>	-	R	Jackal	Schedule I	LC
6	<i>Cuonalpinus</i>	-	A, R	Wild Dog/ Dhole	Schedule I	EN
7	<i>Rusa unicolor</i>	-	R	Sambar	Schedule I	VU
8	<i>Hyaenahyaena</i>	-	A, R	Hyna	Schedule I	NT
9	<i>Susscrofa</i>	-	A, R	Wild pig	Schedule II	VU
10	<i>Axis axis</i>	-	A, R	Chital	Schedule II	LC
11	<i>Boselaphustragocamelus</i>	-	A, R	Neel Gai	Schedule II	LC
12	<i>Semnopithecus entellus</i>	-	A, R	Gray Langoor	Schedule II	LC
13	<i>Lepusnigricollis</i>	-	A, R	India hare	Schedule II	LC
Reptiles & Amphibians						

1	<i>Chameleon zeylanicus</i>	-	A, R	Indian Chameleon	Schedule I	LC
2	<i>Python molurus</i>	-	R	Indian Rock Python	Schedule I	NT
3	<i>Python bivittatus</i>	-	R	Burmese Python	Schedule I	VU
4	<i>Hemidactylusbrookii</i>	-	A, R	Lizard	-	LC
5	<i>Ptyas mucosa</i>	-	A, R	Rat Snake	Schedule II	LC
6	<i>Calotesversicolor</i>	-	A, R	Garden Lizard	-	LC
7	<i>Hoplobatrachustigerinus</i>	-	A, R	Bullfrog	Schedule II	LC
8	<i>Duttaphrynusmela</i>	-	A, R	Common Indian Toad	Schedule IV	
Birds						
1	<i>Pavocristatus</i>		A, R	Peafowl	Schedule I	LC
2	<i>Columba livia</i>			Blue Rock Pigeon		LC
3	<i>Corvussplendens</i>			House crow		LC
4	<i>Egrettaquarzetta</i>			Little egret		LC
5	<i>Eudynamysscolopaceus</i>			Asian koel		LC
6	<i>Meropsorientalis</i>			Green Bee Eater		LC
7	<i>Melophuslathamii</i>			Bulbul		LC
8	<i>Passer domesticus</i>			House Sparrow		LC
9	<i>Psittaculakrameri</i>			Rose ringed parakeet		LC
10	<i>Streptopelia</i>			Indian Ring Dove		LC
11	<i>Streptopeliasenegalensis</i>			Little Brown Dove		LC
12	<i>Alcedoatthis</i>			Common kingfisher		LC
13	<i>Upupaepops</i>			Common Hoopeo		LC
14	<i>Coturnixcoromendelica</i>			Rain Quail		LC

Wildlife management is a multidisciplinary field that combines science and art to maintain or modify habitats, wildlife populations, and human activities in order to achieve specific conservation goals. In India, wildlife science is an emerging discipline with a developing scientific knowledge base. Although wildlife management has traditionally been part of mainstream forest management, it demands a distinct scientific approach to address its unique challenges. Effective wildlife conservation aims to prevent biodiversity loss by applying ecological principles—such as carrying capacity, disturbance, and succession—and considering environmental factors like soil science, hydrology, and geography. The ultimate goal is to strike a balance between the needs of wildlife and those of human populations.

The total estimated cost for implementing the Wildlife Management Plan over 5 years is approximately 126 Lakhs INR. The funds will be distributed between the Aurangabad and Rohtas Forest Divisions in a 40:60 ratio, as the Rohtas Forest Division reported a higher number of Schedule I species. Accordingly, Rs. 50.4 Lakhs will be allocated to the Aurangabad Forest Division, while Rs. 75.6 Lakhs will go to the Rohtas Forest Division for conservation activities. The schedule for fund disbursement will be finalized in consultation with the respective forest departments. The Wildlife Conservation Plan was prepared & submitted for its approval from DFO, Dept. of Forest, Govt of Bihar.

Estimated Budget for Implementation of Flora & Fauna Conservation Plan

Component	Items Proposed	Financial Outlay (in Lakhs)					Financial Outlay (in Lakhs)
		1st Year	2nd Year	3rd Year	4th Year	5th Year	
Component 01: Habitat Management							
1	Greenbelt Development/Plantation and Management	2	2	2	2	2	10
2	Water Management (maintenance of ponds/water bodies used by animals), Bird Baths	1	1	1	1	1	5
3	Grassland Management	2	2	2	2	2	10
4	Seed Balls Preparation	2	1	1	1	1	6
5	Sapling Procurement & Distribution	2	2	2	2	2	10
Componenet-02: Fire management							
1	Fire Management Squad	2	2	2	2	2	10
Componenet-03: Wildlife Management							
1	Setting up of animal rescue center, Prevention of Diseases in animals	4	4	4	4	4	20
2	Wildlife Monitoring	2	2	2	2	2	10
Component 04: Awareness Generation & Capacity Building							
1	Awareness Campaign, Garbage Bins, Distribution of Storage Containers to Villages,	2	2	2	2	2	10
2	Mitigation measures for Man Animal Conflict	2	2	2	2	2	10
3	Capacity Building through training	2	2	2	2	2	10
4	Infrastructure Building for the forest department	3	3	3	3	3	15
Total (One hundred Twenty six lakhs)							126

Aquatic Ecology

Inventory of Phytoplankton

SI No.	Phyto-plankton
Cyanophyceae (Blue-green Algae)	
1	Microcystis
2	Anabaena
3	Oscillatoria
4	Nostoc
5	Spirulina
Chlorophyceae (Green Algae)	
1	Chlorella
2	Scenedesmus
3	Pediastrum
4	Spirogyra
5	Volvox
6	Closterium
Bacillariophyceae (Diatoms)	
1	Navicula
2	Nitzschia
3	Fragilaria
4	Cyclotella
5	Asterionella
Euglenophyceae (Euglenoids)	
1	Euglena
2	Phacus
3	Trachelomonas
Dinophyceae (Dinoflagellates)	
1	Ceratium
2	Peridinium

Study of Zooplanktons

Inventory of zooplanktons

Sl. No.	Zooplanktons
Rotifera	
1	<i>Brachionus</i>
2	<i>Keratella</i>
3	<i>Asplanchna</i>
4	<i>Polyarthra</i>
Cladocera	
1	<i>Daphnia</i>
2	<i>Bosmina</i>
3	<i>Moina</i>
Copepoda	
1	<i>Cyclops</i>
2	<i>Diaptomus</i>
3	<i>Mesocyclops</i>
Protozoa	
1	<i>Paramecium</i>
2	<i>Vorticella</i>

Benthic Macro-invertebrates

Inventory of macro invertebrates

Sl. No.	Macro invertebrates
1	<i>Tiara scabra</i>
2	<i>Parregsiavideus</i>
3	<i>Plentala spp.</i>
4	<i>Lymnaeaacuminata</i>

5	<i>Polichaeteyvorm</i>
6	<i>Pilaglobosa</i>
7	<i>Hirudinariagranulosa</i>
8	<i>T. tuberculata</i>
9	<i>Argalaspp</i>
10	<i>Ostracodes spp.</i>

Study of Fishes

Secondary sources and stakeholder consultations and visit to the fish markets were made to create an inventory of the fishes found in and around the study area. The following species were reported to be present.

➤ **Cypriniformes:**

- *Labeorohita* (Rohu)
- *Catlacatla* (Catla)
- *Cirrhinusmrigala* (Mrigal)
- *Puntiusssophore*
- *Amblypharyngodonmola*

➤ **Siluriformes:**

- *Clariasbatrachus* (Magur)
- *Heteropneustesfossilis* (Singhi)
- *Mystusvittatus*

➤ **Perciformes:**

- *Channapunctata* (Spotted snakehead)
- *Anabas testudineus* (Koi)