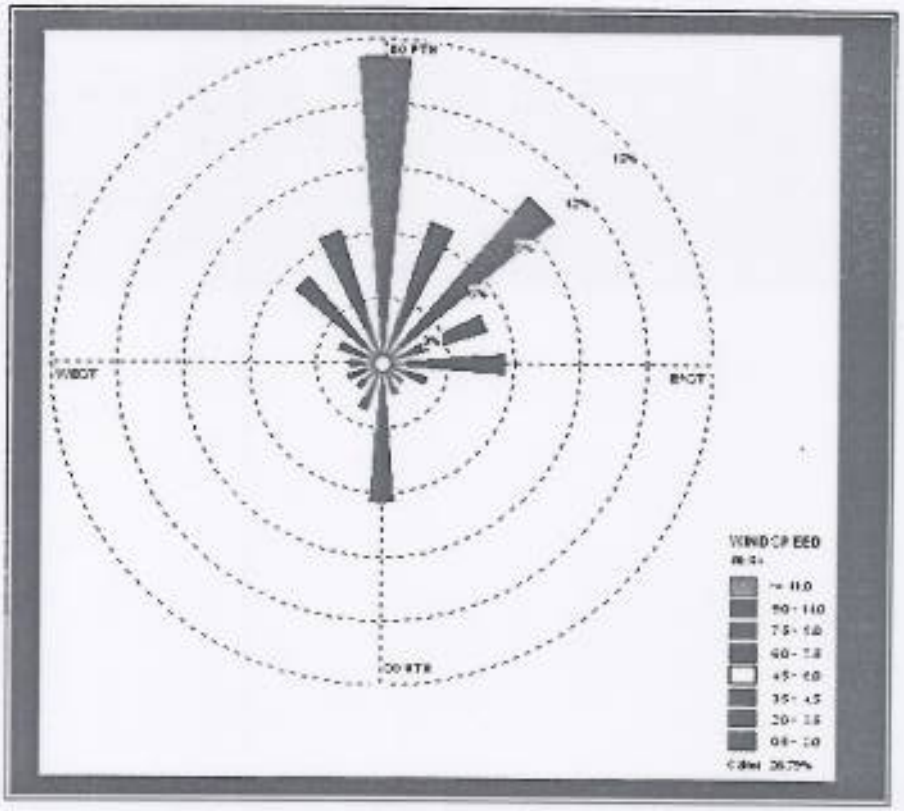


Fig No. 3.6.3 Windrose Diagram for
(February, 2009)

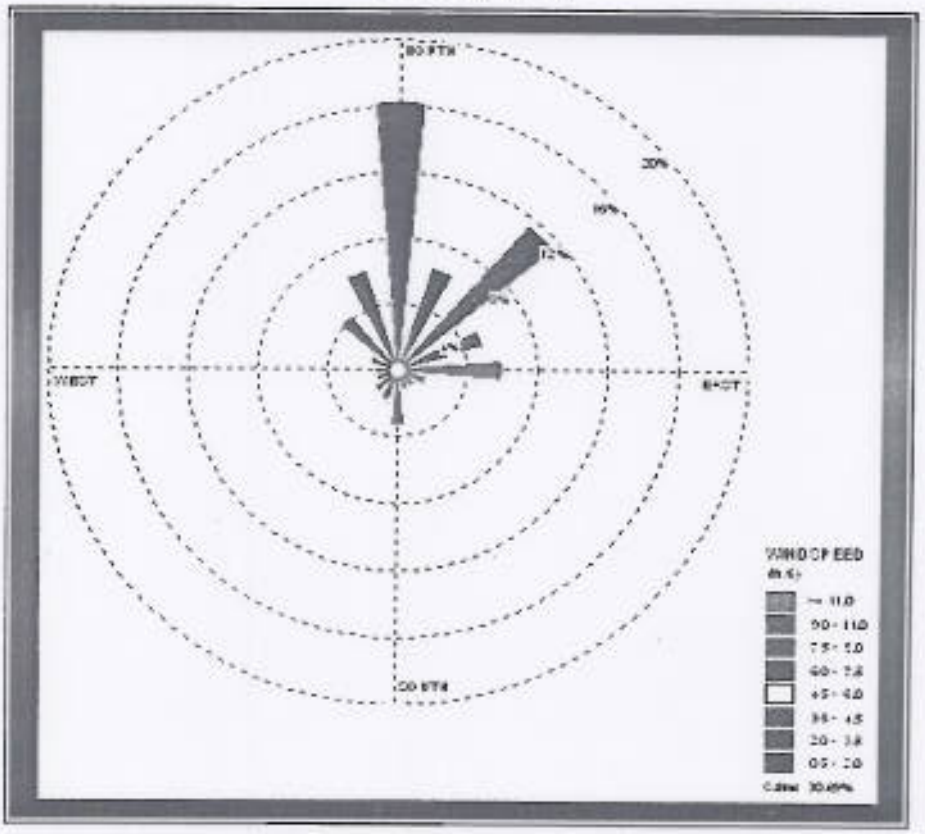


Fig No. 3.6.4 Overall Windrose diagram for
(December, 2008 – February, 2009)

3.7 WATER ENVIRONMENT

The main surface water body in the area is the river Kankshabati is a perennial river, which flows about 13 km away towards southern side from the project Site. Besides, a number of scattered confined water bodies, viz. Tanks, ponds roadside burrows etc. exist within the study area.

3.7.1 Water Quality

Surface Water samples were collected and analyzed at 4 locations during the study period to assess the water quality. Besides, water samples were also collected from four (4) ground water sources during the study period to assess the baseline status of the ground water quality surrounding 10 km periphery of the study area (Please refer **Figure - 3.7.1**).

All the samples were analyzed with respect to physical, chemical and biological parameters including toxic organics and metals, adopting Standard methods. The locations of the sampling points are presented in Table 3.7.1.

3.7.1.1 Surface Water Quality

The water quality monitoring results of pond water has been compiled in Table 3.7.2. The average values are taken in this context.

The pH value of the collected sample was found in the range of (7.1-7.8). Dissolved Oxygen was observed in the range of (5.5-6.1 mg/l). Total Dissolved Solids were found in the range of 174-262 mg/l while Total Hardness was found in the range of 164-213 mg/l. Calcium & Magnesium were found varying in the ranges of 40-54 mg/l and 14-19 mg/l respectively. Oil and grease was below detectable limit (<1.4 mg/l).

Sulphate, Nitrate and Chloride were observed in the ranges of 8-15 mg/l, 1.2-4.0 mg/l and 27-60 mg/l respectively. Iron contents were found in the ranges of 0.2 – 0.55 mg/l.

Heavy metals like copper, lead, mercury, cadmium and chromium were below their respective detection limits.

Conclusion can be drawn in the light of the overall analysis made so far that the surface water in the study area is free of any kind of industrial pollution.

3.7.1.2 Ground Water Quality

The ground water quality monitoring results have been presented in Table 3.7.3, the average values are taken in this context.

pH values were found in the range of (6.9 – 7.6), TDS values ranged between (200 – 287) mg/l, within the permissible limit of 500 mg/l for drinking water.

Total Hardness contents were found ranging between (154 – 206) mg/l, calcium (38 -66) mg/l, Magnesium (7 -14) mg/l, Chloride (38 - 66) mg/l, Sulphate (13 – 22) mg/l, Nitrate (1.5 – 3.1) mg/l Alkalinity (110 – 176) mg/l, Iron (0.3 – 0.6) mg/l. All these parameters were generally within the tolerance limits for drinking water.

Other heavy metals like copper, Chromium, Cadmium, arsenic and lead were below their respective detection limits.

Conclusion can be drawn in the light of the overall analysis made so far that the ground water in the study area is free of any kind of industrial and urban pollution and has been found to be generally fit for human consumption.

Table 3.7.1
Water Quality Monitoring Locations

Sample Code	LOCATION
Surface Water	
SW1	Godapiasol [Pond]
SW2	Kshirkul (Pond)
SW3	Kulpheni (Pond)
SW4	Pechapara (Pond)
Ground Water	
GW1	Godapiasol (Tube Well)
GW2	Bagla (Dug Well)
GW3	Arabari (Tube Well)
GW4	Bagmari (Tube Well)

Table 3.7.2
Surface Water Quality River Water

Sl.No.	Parameter	Unit	SW1	SW 2	SW 3	SW 4
1	Colour		Colourless	Colourless	Colourless	Colourless
2	Odour		Unobj.	Unobj.	Unobj.	Unobj.
3	pH		7.5	7.1	7.8	7.6
4	Conductivity	µmhos/cm	315	393	466	310
5	Dissolved Oxygen	mg/L	6.0	5.9	5.5	6.1
6	Biochemical Oxygen Demand	mg/L	6	4	7	5
7	(3 days at 270C)					
8	Total Coliforms	MPN/100	177	159	396	255
9	Total Dissolved Solids	mg/L	179	222	262	174
10	Oil & Grease	mg/L	<1.4	<1.4	3	2
11	Cyanide (as CN)	mg/L	<0.05	<0.05	<0.05	<0.05
12	Phenol (as C6H5OH)	mg/L	<0.001	<0.001	<0.001	<0.001
13	Total Hardness (as CaCO3)	mg/L	185	177	213	164
14	Chloride (as Cl)	mg/L	42	52	60	27
15	Sulphate (as SO4)	mg/L	8	8	15	10
16	Nitrate (as NO3)	mg/L	2	2	4	1.2
17	Fluride (as F)	mg/L	0.6	0.6	0.95	0.4
18	Calcium (as Ca)	mg/L	42	48	54	40
19	Magnessium (as Mg)	mg/L	15	14	19	16
20	Copper (as Cu)	mg/L	<0.05	<0.05	<0.05	<0.05
21	Iron (as Fe)	mg/L	0.30	0.20	0.55	0.28
22	Manganese (as Mn)	mg/L	<0.05	<0.05	<0.05	<0.05
23	Zinc (as Zn)	mg/L	<0.05	<0.05	<0.05	<0.05
24	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02
25	Arsenic (as As)	mg/L	<0.002	<0.002	<0.002	<0.002
26	Mercury (as Hg)	mg/L	<0.001	<0.001	<0.001	<0.001
27	Lead (as Pb)	mg/L	<0.05	<0.05	<0.05	<0.05
28	Cadmium (as Cd)	mg/L	<0.01	<0.01	<0.01	<0.01
28	Hexavalent Chromium (as Cr+6)	mg/L	<0.05	<0.05	<0.05	<0.05
30	Alkalinity	mg/L	90	129	140	90

Code	Sampling Location
SW1	Godapiasol [Pond]
SW 2	Kshirkul (Pond)
SW 3	Kulpheni (Pond)
SW 4	Pechapara (Pond)

Ref. Annexure – I for Inland Surface Water Quality Standard

Table 3.7.3
Ground Water Quality

Sl.No.	Parameter	Unit	GW1	GW2	GW3	GW4
1	Colour		Colourless	Colourless	Colourless	Colourless
2	Odour		Unobj.	Unobj.	Unobj.	Unobj.
3	Taste		Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	11	8	15
5	pH		7	7.4	7.6	6.9
6	Conductivity	µmhos/cm	409	491	356	510
7	Total Hardness (as CaCO3)	mg/L	154	192	170	206
8	Iron (as Fe)	mg/L	0.35	0.42	0.3	0.6
9	Chloride (as Cl)	mg/L	46	66	38	64
10	Residual Free Chlorine	mg/L	Nil	nil	nil	nil
11	Fluride (as F)	mg/L	0.3	1.1	0.5	0.38
12	Total Dissolved Solids	mg/L	230	277	200	287
13	Calcium (as Ca)	mg/L	50	54	38	66
14	Magnessium (as Mg)	mg/L	7	14	12	10
15	Copper (as Cu)	mg/L	<0.05	<0.05	<0.05	<0.05
16	Manganese (as Mn)	mg/L	<0.05	<0.05	<0.05	<0.05
17	Sulphate (as SO4)	mg/L	13	22	14	18
18	Nitrate (as NO3)	mg/L	2.2	3.1	1.5	3.1
19	Phenol Compounds (as C6H5OH)	mg/L	<0.001	<0.001	<0.001	<0.001
20	Mercury (as Hg)	mg/L	<0.001	<0.001	<0.001	<0.001
21	Cadmium (as Cd)	mg/L	<0.01	<0.01	<0.01	<0.01
22	Arsenic (as As)	mg/L	<0.002	<0.002	<0.002	<0.002
23	Cyanide (as CN)	mg/L	<0.05	<0.05	<0.05	<0.05
24	Lead (as Pb)	mg/L	<0.05	<0.05	<0.05	<0.05
25	Zinc (as Zn)	mg/L	<0.05	<0.05	<0.05	<0.05
26	Hexavalent Chromium (as Cr+6)	mg/L	<0.05	<0.05	<0.05	<0.05
27	Alkalinity (as CaCO3)	mg/L	152	162	110	176
28	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02
29	Total Coliforms	MPN/100	Absent	Absent	Absent	Absent
GW1	Godapiasol (Tube Well)					
GW2	Bagla (Dug Well)					
GW3	Arabari (Tube Well)					
GW4	Bagmari (Tube Well)					

Ref. Annexure – I for Drinking Water Quality Standard

The ground and surface quality monitoring locations are given in **Fig. 3.7.1.**

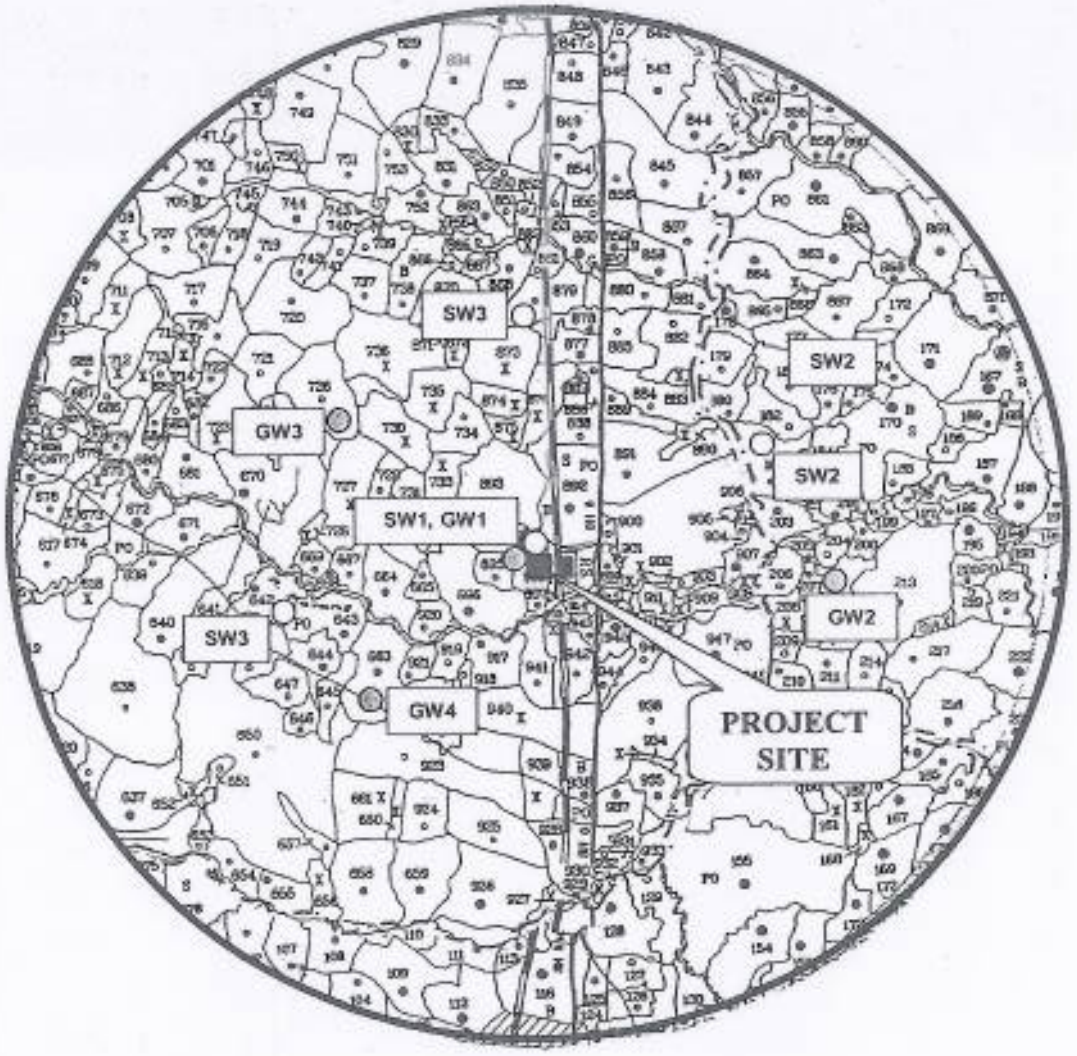
Table 3.7.3
Ground Water Quality

Sl.No.	Parameter	Unit	GW1	GW2	GW3	GW4
1	Colour		Colourless	Colourless	Colourless	Colourless
2	Odour		Unobj.	Unobj.	Unobj.	Unobj.
3	Taste		Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	5	11	8	15
5	pH		7	7.4	7.6	6.9
6	Conductivity	µmhos/cm	409	491	356	510
7	Total Hardness (as CaCO3)	mg/L	154	192	170	206
8	Iron (as Fe)	mg/L	0.35	0.42	0.3	0.6
9	Chloride (as Cl)	mg/L	46	66	38	64
10	Residual Free Chlorine	mg/L	Nil	nil	nil	nil
11	Fluride (as F)	mg/L	0.3	1.1	0.5	0.38
12	Total Dissolved Solids	mg/L	230	277	200	287
13	Calcium (as Ca)	mg/L	50	54	38	66
14	Magnessium (as Mg)	mg/L	7	14	12	10
15	Copper (as Cu)	mg/L	<0.05	<0.05	<0.05	<0.05
16	Manganese (as Mn)	mg/L	<0.05	<0.05	<0.05	<0.05
17	Sulphate (as SO4)	mg/L	13	22	14	18
18	Nitrate (as NO3)	mg/L	2.2	3.1	1.5	3.1
19	Phenol Compounds (as C6H5OH)	mg/L	<0.001	<0.001	<0.001	<0.001
20	Mercury (as Hg)	mg/L	<0.001	<0.001	<0.001	<0.001
21	Cadmium (as Cd)	mg/L	<0.01	<0.01	<0.01	<0.01
22	Arsenic (as As)	mg/L	<0.002	<0.002	<0.002	<0.002
23	Cyanide (as CN)	mg/L	<0.05	<0.05	<0.05	<0.05
24	Lead (as Pb)	mg/L	<0.05	<0.05	<0.05	<0.05
25	Zinc (as Zn)	mg/L	<0.05	<0.05	<0.05	<0.05
26	Hexavalent Chromium (as Cr+6)	mg/L	<0.05	<0.05	<0.05	<0.05
27	Alkalinity (as CaCO3)	mg/L	152	162	110	176
28	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02
29	Total Coliforms	MPN/100	Absent	Absent	Absent	Absent
GW1	Godapiasol (Tube Well)					
GW2	Bagla (Dug Well)					
GW3	Arabari (Tube Well)					
GW4	Bagmari (Tube Well)					

Ref. Annexure – I for Drinking Water Quality Standard

The ground and surface quality monitoring locations are given in **Fig. 3.7.1.**

Fig. 3.7.1 GROUND & SURFACE WATER QUALITY MONITORING LOCATIONS



○ SURFACE WATER

◉ GROUND WATER

GW1- GODAPIASOL	SW1- GODAPIASOL
GW2- BAGLA	SW2- KSHIRKUL
GW3- ARABARI	SW3- KULPHENI
GW4- BAGMARI	SW4- PECHAPARA

3.8 NOISE

A total of ten (10) locations within an area of 10 km radius around the project site have been selected for measurement of ambient noise levels, covering residential, Commercial & sensitive areas. These locations have been displayed in Table 3.8.1.

3.8.1 Major Sources of Noise in the Study Area

The study area is of both industrial & residential in nature. Vehicular movement on the roads is a source of noise in those residential & industrial areas. This increases the ambient noise levels. There are also a number of other domestic noise sources such as television, radio, loud speakers, etc.

3.8.2 Ambient Noise Monitoring

In the present study, a sound level meter has measured sound pressure levels. Since loudness of sound is important for its effects on people, the dependence of loudness on frequency must be taken into account in environmental noise assessment. This has been achieved by using A-weighting filters in the noise measuring instrument which gives a direct reading of approximate loudness. Moreover, A-weighted equivalent continuous sound pressure level (L_{eq}) values have been computed from the values of A-weighted sound pressure level (SPL) measured with the help of a noise meter.

At each location, readings were taken at uniform interval over a twenty-four hours period, divided into day and night shifts. For a particular location daytime L_{eq} has been computed from the SPL values measured between 6.00 A.M to 10.00 P.M and night time L_{eq} from the SPL values measured between 10.00 P.M to 6.00 A.M, such that comparison could be made with the National Ambient Noise Standards.

3.8.3 Noise Levels in the Study Area

The noise levels were monitored at 10 (Ten) locations. Monitoring was done, covering both day and night time.

Noise levels in L_{eq} at the respective locations separately for Day and Nighttimes have been presented in Table 3.8.1.

During the day time, the equivalent noise levels were found to vary in the range of (50.7-56.7) dB (A) while in the night time, the equivalent noise levels were observed to be varying in the range of (38.8.4-43.3) dB (A). The highest value of equivalent noise level pressure was found to be 56.7 dB (A) Near Anandapur Market, while the lowest value was found to be 38.8 dB (A) at Teghari High School.

As usual, the day time noise levels were found to be higher than those, observed at night level.

Table 3.8.1
Equivalent Noise Level in the Study Area, Leq in dB(A)

S.N	LOCATION	JAN,09	
		DAY	NIGHT
RESIDENTIAL	KHANRA SAI	56.3	41.2
	NARASHINGHAPUR	54.9	38.8
	DANMARI	50.7	39.5
	JAGYESWARPUR	56.5	42.3
	KRISHNA NAGAR	55.9	38.9
	BHABRIGERE	54.1	40.9
SENSATIVE	TEGHARI HIGH SCHOOL	52.2	38.8
	MAUPAL HIGH SCHOOL	52.7	41.9
COMMERCIAL	ANANDAPUR MARKET	56.7	42.3
	GODAPIASOL MARKET	57.3	43.1

N.B. **Day time is reckoned between 0600 HOURS TO 2200 HOURS**
Night Time is reckoned between 2200 HOURS TO 0600 HOURS

3.9 ECOLOGY

The concept of ecology has been increasingly used as conceptual focus for conservation policy and to measure species extinction and ecosystem loss in response to natural and human induced selection pressures. Thus, in any environmental analysis where integration of ecological thoughts into planning process is required, such kind of analysis of biological environmental status survey is very significant. So, this type of assessment includes evaluation of both the terrestrial & aquatic ecology.

3.9.1 Flora

Biological environment is a good bio-indicator of changing environmental quality. Thus, an understanding of biodiversity of an area is very significant for environmental impact assessment related to any project.

Natural flora and fauna are key features of an environment since they form a distinctive community having mutual dependencies among their genetic, species or ecological diversity and show diverse degree of responses and sensitivities to physical (abiotic) influences.

In this context, an assessment of the status of existing terrestrial ecosystem was made and discussed in the following sections.

The study area covers 10 km radius around the project site. Most of the study area is covered by agriculture land interspersed with fallow land and barren land. There is fairly dense forest in NW direction of the proposed plant site beyond Kasai River. The tree density ranges from 1000 to 2000 trees per hectare.

The plant species commonly found in the area is given in Table 3.9.1. The most common species in the area are Siris (*Albizzia lebbeck*), Neem (*Azadirachta indica*), Mango (*Mangifera indica*), Jarul (*Lagersroemia speciosa*), Simul (*Bombax ceiba*) etc.

Table: 3.9.1
Plants found in study area

Sl. No.	Botanical name	Common name
1.	*Acacia suma*	Sankanta
2.	*Adina cordifolia*	Haldu
3.	*Aegele marmelos*	Bel
4.	*Albizzia lebbeck*	Siris
5.	*A. procera*	Koroi
6.	*Anona reticulata*	Nona
7.	*Butea frondosa*	Palash
8.	*Erytrina stricta*	Madar
9.	*Ficus bengalensis*	Bat (Banyan)
10.	*F. glomerata*	Gular
11.	*Gmelina arborea*	Gamar
12.	*Madhuca Indica*	Mahua
13.	*Mangifera indica*	Aam(Mango)
14.	*Azadirachta indica*	Neem
15.	*Moringa pterygosperma*	Sajina
16.	*Phoenix sylvestris*	Khejur (Date Palm)
17.	*Schelichera trijuga*	Kusum
18.	*Shorea robusta*	Sal
19.	*Spondias mangifera*	Amra
20.	*Tamarindus indica*	Tamarind
21.	*Emblica officinalis*	Amla
22	*Dalbergia sissoo*	Sissoo
23	*Terminalia arjuna*	Arjun
24	*Polyalthia longifolia*	Ashok
25	*Terminalia belerica*	Bahera
26	*Bombax ceiba*	Simul
27	*Lagersroemia speciosa*	Jarul
28	*Acacia auriculiformis*	Akashmoni
29	*Artocarpus heterophullus*	Jackfruit
30	*Psidium guayava*	Guava
31	*Alstonia scholaris*	Chatim
32	*Musa sapientum*	Banana
33	*Polyalthia longifolia*	Debdaru
34	*Acacia catechu*	Supari
35	*Carica papaya*	Papaya
36	*Bugenia jambolans*	Black Berry
37	*Citrus aurantifolia*	Lime
38	*Eucalyptus globosus*	Eucalyptus

3.9.2 Fauna

The common animal found in the study area is given Table 3.9.2.

The large number of trees in the study area makes a suitable habitat for birds. Although there is a forest in the study area, wild life is sparse. As per records of forest department, deer and wild bores were found in the study area. Hares are common in the forest. Jackals and mongoose are found all over the study area. In the forest there are wild cats and Hyaenas, which also prey on cattle and poultry in villages at the edge of forests.

Table 3.9.2
List of Fauna Observed in Study Area

Sl. No.	Scientific name	Local Name	Conservation Status: Schedule No. of Wildlife (Protection) Act
Mammals			
1	*Herpestres edwardsii*	Common Mongoose	II
2	*Canis aurius*	Jackal	IV
3	*Rousettus leschenaultia*	Fruit Bat	V
5	*Bandicota benghalensis*	Common Indian Rat	V
6	*Funumbuls palmarum*	Squirrel	IV
7	*Mus rattus*	Indian Rat	V
8	*Hystrix indica*	Porcupine	IV
9	*Mus musculus*	Common mouse	V
12	*macaca mulata*	Monkey	II
13	*Herpestris javanicus*	Small mongoose	II
17	*Hyna hyna*	Hyena	I
Reptiles			
1	*Varanus varanus*	Tree monitored lizard	II
2	*Xenochrophis sp*	Keel back	II
3	*Naja naja*	Monocellate cobra	I
4	*Vipera russelli*	Russel's viper	II
Amphibians			
1	*Rana tigrina*	Common frog	IV
2	*Bufo melanosticus*	Toad	IV
3	*Hyla* sp.	Tree frogs	IV
Aves			
1	*Acridotheres tristis*	Common myna	IV
2	*Alcedo athis*	Common Kingfisher	IV
3	*Arachnotehra longisirostris*	Little spider hunter	IV
4	*Ardea grayii grayii*	Paddy bird	IV
5	*Ardea purpurea manilensis*	Eastern purple heron	IV
6	*Ardeo grayeli*	Pond Heron	IV
7	*Ardes alba*	Larger egret	IV

Table 3.9.2 (Contd....)
List of Fauna Observed in Study Area

Sl. No.	Scientific name	Local Name	Conservation Status: Schedule No. of Wildlife (Protection) Act
8	*Athene brama*	Spotted owl	IV
9	*Bubulcus ibis*	Cattle Egret	IV
10	*Egretta garzetta*	Little Egret	IV
11	*Caprimulgus indicus*	Indian night jar	IV
12	*Copsychus saularis*	Southern magpie robin	IV
13	*Coracias benghalensis*	Indian roller	IV
14	*Orthotomus sutorius*	Tailor bird	IV
15	*Passer domesticus*	House sparrow	V
16	*Halcyon sumyrnessis fusca*	Indian white breasted Kingfisher	IV
17	*Haliastur indus*	Brahmny kite	IV
18	*Nicticorax nycticorax*	Night heron	IV

3.9.3 Aquatic Ecology

3.9.3.1 Study Conducted

The nearest river is Kasai. The abundance or absence of certain organisms thus often serves as the indicator of a healthy or polluted aquatic environment. The nature and quality of such biological species in a particular environment depend on various physico-chemical characteristics of water such as pH, conductivity, nutrients, BOD etc.

3.9.3.2 Fish

Mainly the some brackish water fish have been reported from the waters of Kasai river and some typically fresh water fish occur in the different ponds of the area. The lost of the fish found in the study area has been shown in Table 3.7.3.

Table-3.9.3
List of Common Fish Fauna in the Study Area

Sl. No.	Scientific Name	Common Name
Freshwater Fish		
1	*Catla catla*	Katla
2	*Labeo rohita*	Rohu
7	*L calbasu*	Kalbasu
8	*Notopterus chitala*	Chital
9	*Lates calcerifer*	Bhetki
10	*Clarias batrachus*	Magur
12	*Anabas testudinius*	Koi
13	*Cirrhina mrigala*	Mrigel

3.9.3.3 **Phytoplankton**

Phytoplankton is the primary producers of an ecosystem and thus helps maintain DO of a water body. Any reduction in number of phytoplankton would ultimately affect the whole ecosystem. A known volume of sample (50 Ltrs.) is collected using plankton net. The use of plankton nets involves filtering large quantity of water through the nets, the water is filtered through the sides and the planktons can be concentrated in a bottle connected at the lower end of the net (ref. Table – 3.9.4).

3.9.3.4 **Zooplankton**

Zooplankton in this river mainly consists of rotifers, cladocera, copepodes and ostracods. Rotifers were found to be the most dominant zooplankton in all the seasons at all stations (ref. Table – 3.9.4).

Table 3.9.4
List of Planktons

LIST OF PHYTOPLANKTONS OBSERVED	LIST OF ZOOPLANKTONS OBSERVED
• Centric diatom	• *Cypris* sp
• *Thalassiothrix* sp	• *Daphnia* sp
• *Dinoflagellates*	• *Bosmina* sp
• *Microcystis* sp	• *Nauplius* sp
• *Zygnema* sp	• *Mysis* sp
• *Spirogyra* sp	• *Microcystis* sp
• *Chara* sp	• *Paramoecium* sp
• *Oedogonium* sp	• *Cypris* sp

3.9.3.5 Benthic Macro-Invertebrates

The benthic organisms are the best organisms for the biomonitoring of any water body due to its static nature in its habitat and unlike the plankton (both zoo and phyto), whose abundance or presence mainly depend at the mercy of current. This group was represented by Polycheata, Insects, Gastropods and Pelacypoda (ref. Table – 3.9.5).

Table 3.9.5
List of Benthos

Sl. No.	Phytobenthos	Zoo benthos
1.	*Anabaena* sp	*Vivipera* sp
2.	*Closterium* sp	*Lymnaea* sp
3.	*Oedogonium* sp	*Oragon* sp
4.	*Amphora* sp	*Chironomus* sp

3.10 DEMOGRAPHY & SOCIO-ECONOMICS

The Baseline Demographic and Socio economic characteristics with regards to demography, literacy and occupational status have been described, based on the Primary Census Abstract, 2001, while the relevant details of the Infrastructure Facilities have also been extracted from the Primary Census Abstract, 2001 The proposed project is located in Medinipur district of West Bengal. 252 villages of

Medinipur district fall under the area of 10 km. radius around the proposed project. A comparative assessment has been made for the respective demographic aspects, based on the year 2001 data, which has been discussed in the following sections.

The study area is High density populated with the total population of 1,29,986 (as per 2001 Census). Scheduled Caste (SC) and Scheduled Tribe (ST) population is about 17.03% and 17.88% of the total population respectively. The sex ratio is about 963 females per 1000 males. The overall literacy rate is about 53.6%. Male literacy rate is 60.4% and female literacy rate is 39.6%. The primary sources of drinking water are tube wells, Well, Supply water.

3.10.1 Demographic Aspects

3.10.1.1 Distribution of Population

The total population of the study area was 1,29,986 as per Census Data of 2001. The distribution of the total population in the study area is presented in Table 3.10.1 (Based on 2001 Census Data). The average family size is 5.6.

Table 3.10.1
Distribution of Population in the Study Area

Particulars	2001
NO OF HOUSEHOLDS	24685
TOTAL POPULATION	129986
MALE POPULATION	66230
FEMALE POPULATION	63756
Average Family Size	5.6

3.10.1.2 Social Structure

In 2001, about 17.03% of the total population belonged to Scheduled Castes (SC). Similarly, 17.88% of the total population belonged to Scheduled Tribes (ST). The distribution of population in the study area by social structure is presented in Table 3.10.2 (Based on 2001 Census Data).

Table 3.10.2
Distribution of Population by Social Structure in the Study Area

Particulars	2001
Total Scheduled Castes	22131
Male Scheduled Castes	11254
Female Scheduled Castes	10877
Total Scheduled Tribes	23237
Male Scheduled Tribes	11733
Female Scheduled Tribes	11504

3.10.1.3 Literacy Levels

The literacy rate was 53.7 % of the total population in 2001. The male literacy rate was 60.0% (of total Literates), whereas corresponding figures for the female literacy rate was 38.0% (of total Literates) in 2001 .The details are presented in Table 3.10.3.

Table 3.10.3
Distribution of Literates in the Study Area

S. No.	Particulars	2001
1	Total Literates	69713
2	Male Literates	42139
3	Female Literates	27574

3.10.1.4 Occupational Structure

The occupational structure of people in the study area is studied with reference to main workers and marginal workers. The main workers include 10 categories of workers defined by the Census Department, which consists of cultivators, agricultural laborers, those engaged in live-stock, forestry, fishing, mining and quarrying; manufacturing, processing and repairs in household industry; and other than household industry, construction, trade and commerce, transport and communication and other services. The marginal workers are those workers, engaged in some work for a period of less than six months during the reference year prior to the census survey.

Altogether, the total workers were 40.3 % of the total population in 2001 whereas the main workers are 71.8%, marginal workers are 28.2% and the non-workers were 59.7 % of the total population in 2001. The distribution of workers in the study area by occupation

structure is presented in Table 3.10.4 (Based on 2001 Census Data), ratio of male- female worker and the distribution of the total workers (Cultivator, Agricultural, Household and Others).

Table 3.10.4
Occupational Structure in the Study Area

SL No	Occupation	Number
1	Total workers	52325
	Male	35883
	Female	16442
2	Main workers	37553
	Male	30518
	Female	7035
3	Marginal workers	14772
	Male	3332
	Female	9407
4	Non workers	77661
	Male	30347
	Female	47314

3.10.1.5 **Infrastructure Facilities**

Many of the villages in the study area have primary schools, middle schools and secondary schools. Medical facilities (primary health centre, allopathic & homeopathic dispensary, maternity and child welfare centre) are good enough in the study area. Water supply in the study area is mainly from taps, well, tube well and hand pumps. Electricity is being supplied for domestic, agriculture, industrial and public lighting purposes. Electricity and telephone connections are available within the study area.

FIGURE - 3.10.1
DISTRIBUTION OF MALE AND FEMALE IN THE TOTAL POPULATION OF THE STUDY AREA

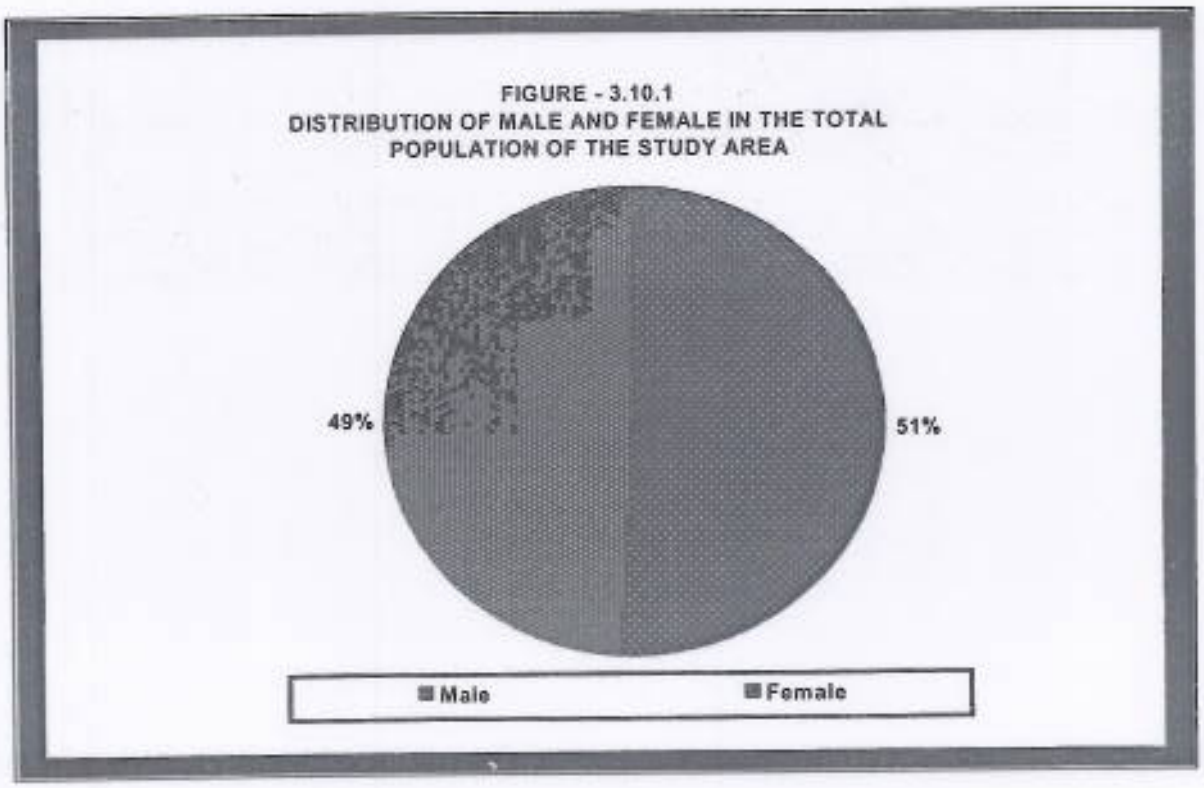


FIGURE - 3.10.2
DISTRIBUTION OF GENERAL, SCHEDULE CASTE AND SCHEDULE TRIBE IN THE STUDY AREA

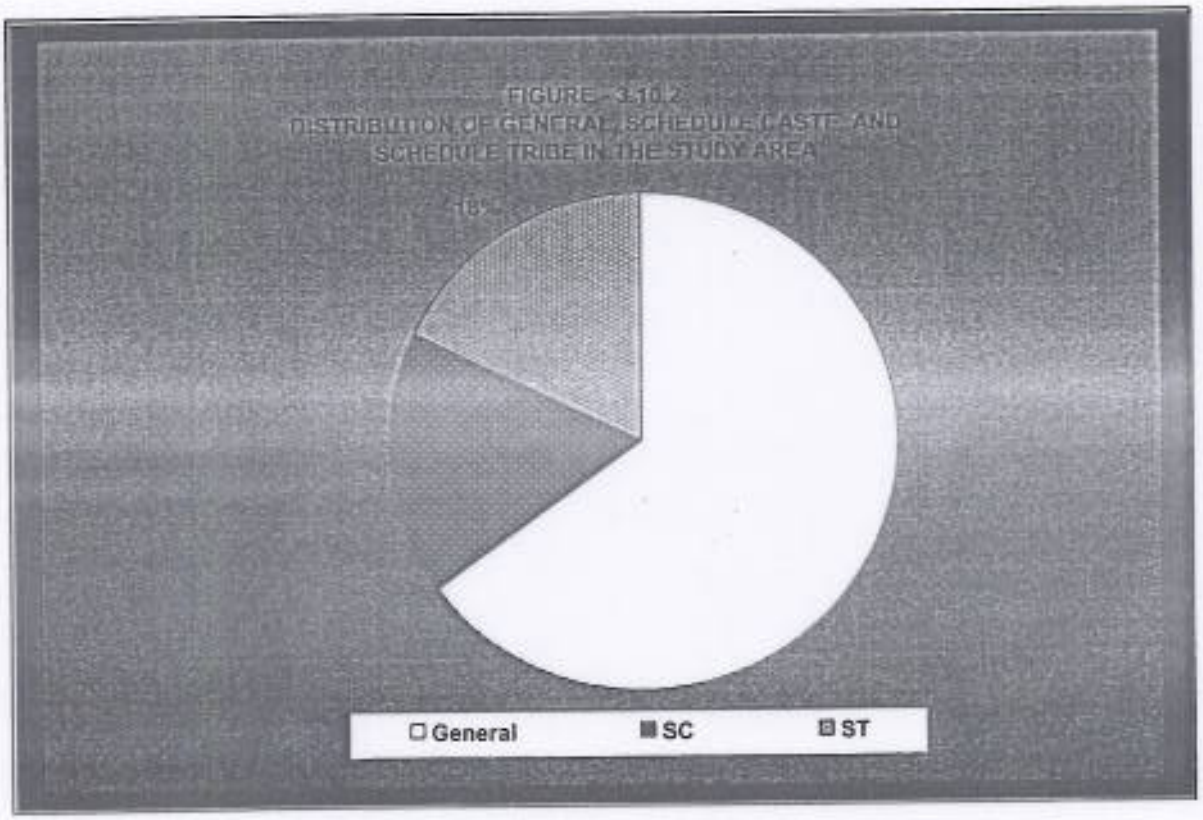
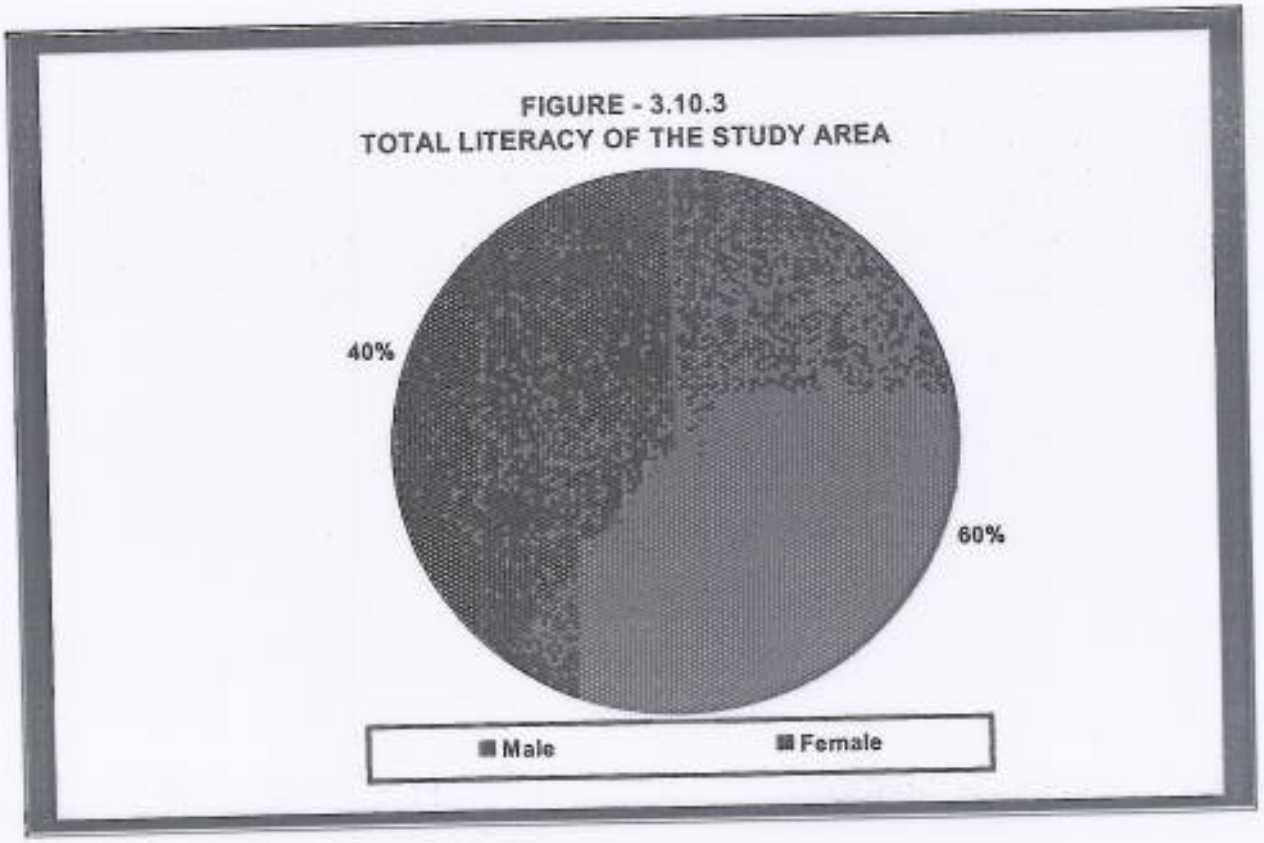
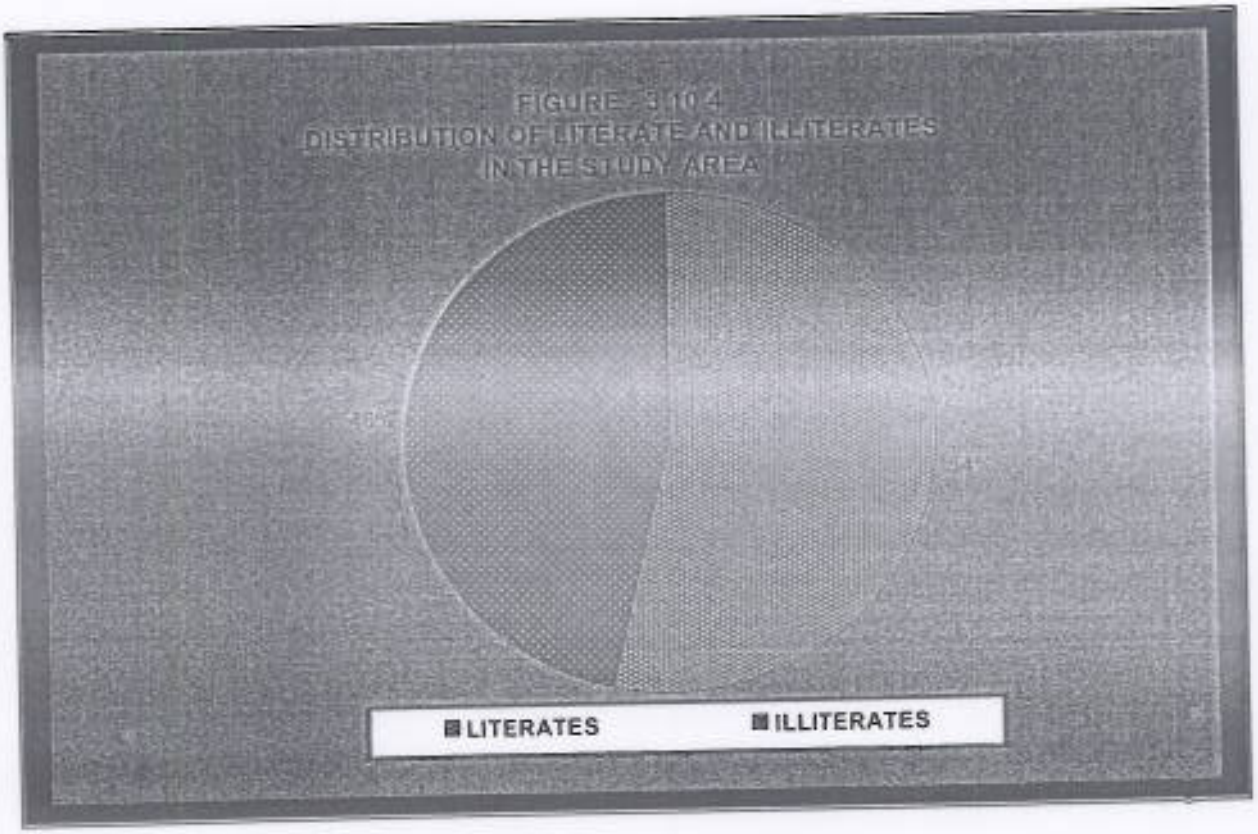


FIGURE - 3.10.3
TOTAL LITERACY OF THE STUDY AREA





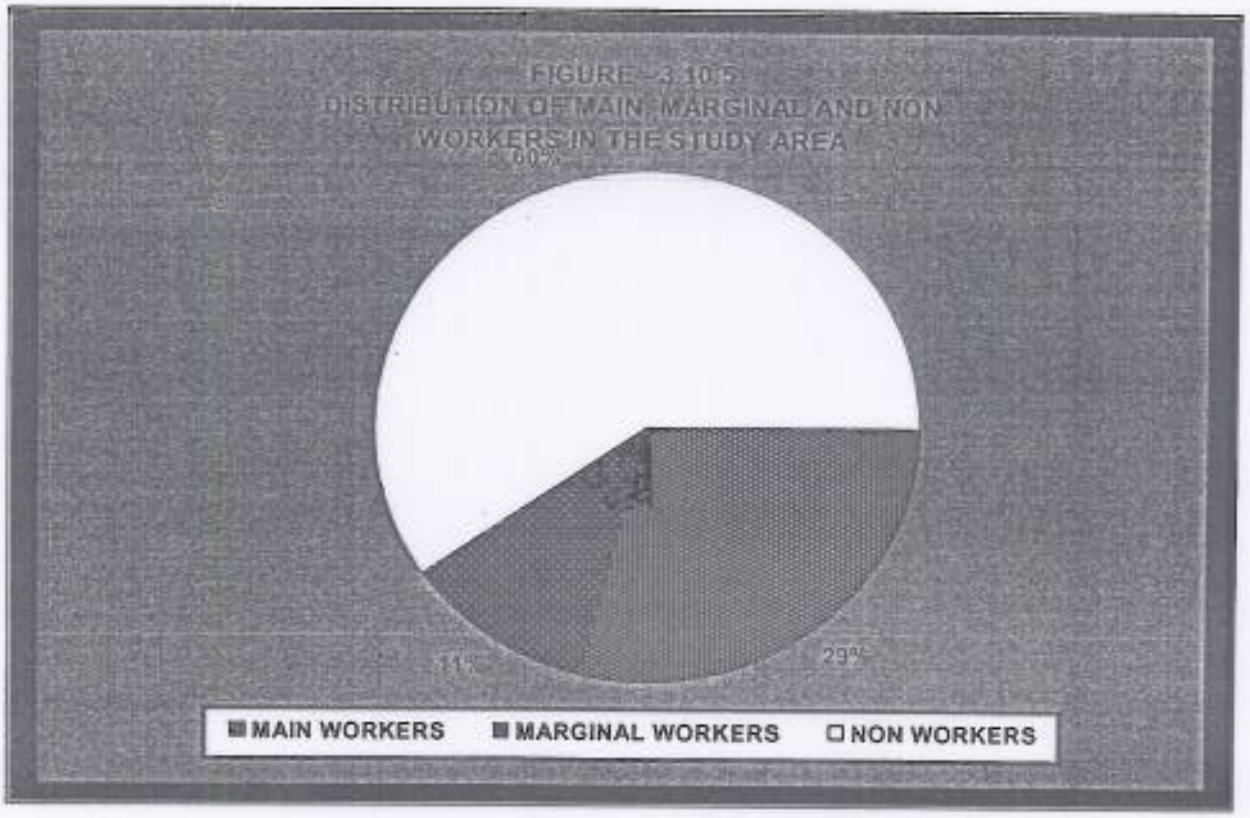


FIGURE - 3.10.5
DISTRIBUTION OF MAIN, MARGINAL AND NON WORKERS IN THE STUDY AREA
60%
11%
29%
MAIN WORKERS
MARGINAL WORKERS
NON WORKERS

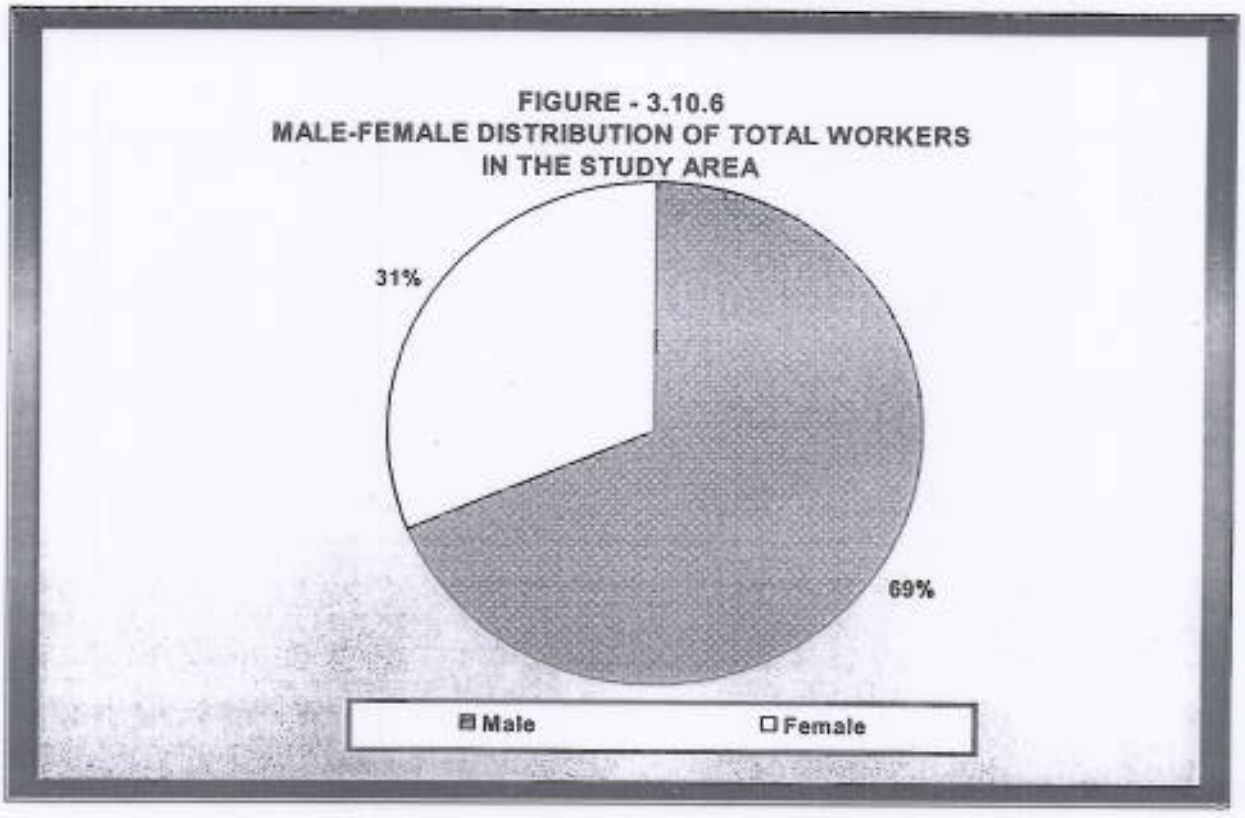


FIGURE - 3.10.6
MALE-FEMALE DISTRIBUTION OF TOTAL WORKERS IN THE STUDY AREA
31%
69%
Male
Female

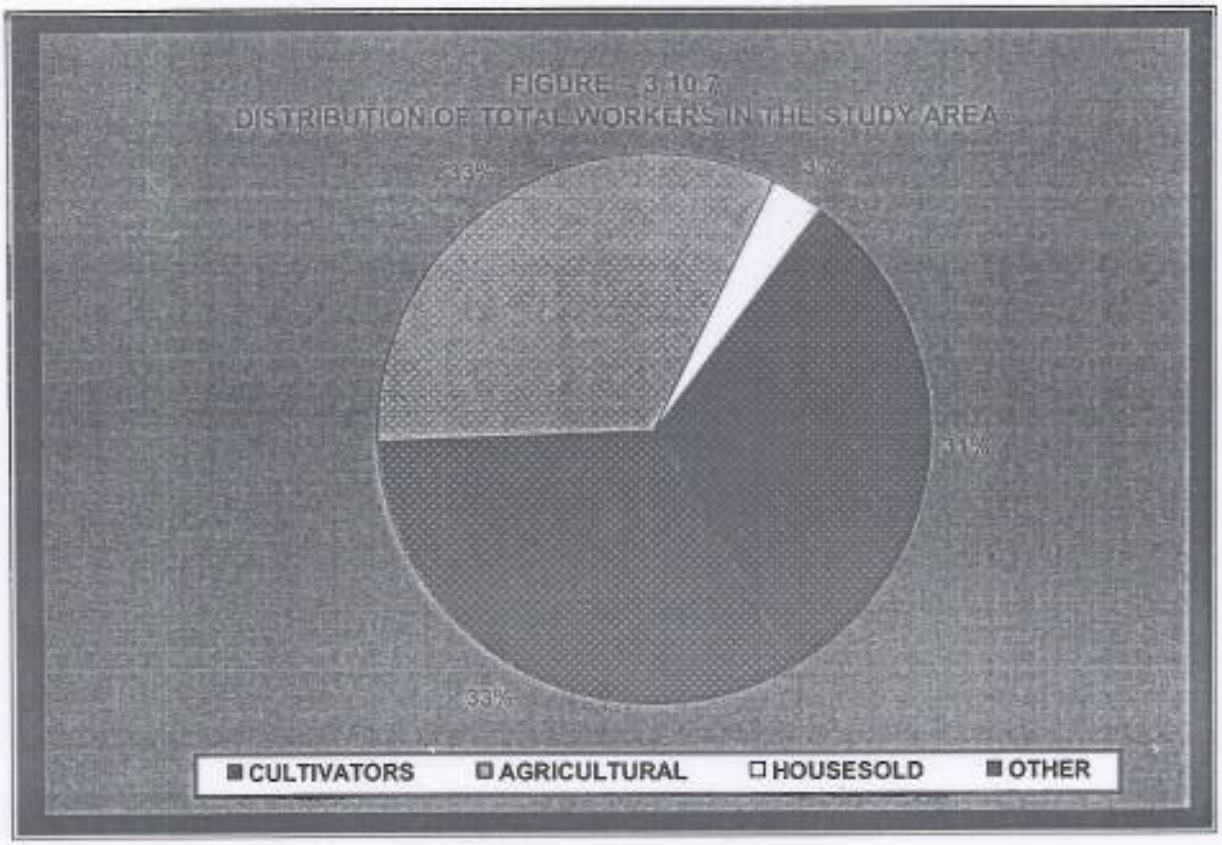


FIGURE - 3.10.7
DISTRIBUTION OF TOTAL WORKERS IN THE STUDY AREA
33%
3%
31%
33%
CULTIVATORS
AGRICULTURAL
HOUSESOLD
OTHER

CHAPTER 4.0
ENVIRONMENTAL IMPACT PREDICTION

CHAPTER 4.0
ENVIRONMENTAL IMPACT PREDICTION

4.1 INTRODUCTION

Prediction is the process of determining the nature and extent of the environmental changes that will result from a proposed activity.

Prediction is a crucial element in the procedure of EIA. The predicted values for environmental variables form the basis for the assessment of the environmental feasibility of the proposed activity, for the judgement of alternatives and for the evaluation of the effectiveness of mitigating measures.

4.1.1 Identification of Impacts

The identification of impacts starts with the collection and analysis of the basic data on the project, and on the environment as far as it is likely to be affected.

4.1.2 Sources of Impacts

The data on the project was collected, and from these were derived the ultimate sources of impact. As this forms the vital source of impact prediction, a careful consideration of the project activities were undertaken.

All the phases of the project viz. planning, construction, operation and post operation phases were taken into account since each phase had its own component activities.

4.1.3 Prediction of Impacts

Starting point for the prediction of impacts is the cause-effect network. A preliminary assessment of predicted impacts was executed to identify the importance of all direct, indirect and higher-order potential effects. Only certain identified potential effects were analyzed in detail.

The construction and operational phases of the proposed project comprises various activities each of which may have an impact on some or other environmental parameters. Various impacts during the construction and operation phases on the environment have been studied to estimate the impacts on the environmental attributes and are discussed in the subsequent sections.

4.2 IMPACTS DURING CONSTRUCTION PHASE

4.2.1 Impact on Air quality

The main sources of emission during the construction period are the movement of equipment at site and dust emitted during earthwork, foundation works, and exhaust emissions from vehicles / equipment deployed during the construction phase thus resulting in marginal increase in the levels of SO_2, NO_X, SPM, CO and unburnt hydrocarbons.

The impact will be for short duration and confined within the project boundary and expected to be negligible outside the plant boundaries. The impact will, however, be reversible, marginal and temporary in nature. Proper upkeep and maintenance of vehicles, sprinkling of water on roads and construction site, sufficient vegetation in the area etc are some of the measures that greatly reduce the impacts during the construction phase.

4.2.2 Impact on Noise levels

Heavy construction traffic for loading and unloading, fabrication and handling of equipment and materials are likely to cause an increase in the ambient noise levels. The areas affected are those close to the site.

However, the noise will be temporary and will be restricted mostly to daytime.

The noise control measures during construction phase include provision of caps on the equipment and regular maintenance of the equipment.

Overall, the impact of generated noise on the environment is likely to be insignificant, reversible and localized in nature and mainly confined to day time.

4.2.3 Impact on Water quality

Impact on water quality during construction phase may be due to non-point discharges of solid from soil loss and sewage generated from the construction workforce stationed at the site. However, due to the construction being carried out on the flat terrain, the soil losses will be negligible. Further, the construction of the plant will be more related to civil construction, mechanical fabrication, assembly and erection; hence the water requirements would be small. Since, most of the construction work force will constitute floating population, the demand for water and sanitation facilities will be small and it will be managed by providing drinking water facility and sanitation facilities at the site during construction phase.

The overall impact on water environment during construction phase in the proposed plant is likely to be short term and insignificant.

4.2.4 Impact on Land use

The project under consideration will take place on a barren land which has been earmarked for the purpose. Moreover, best land use planning will be made to ensure least detrimental impact on the existing land use of the site and the neighbourhood.

4.2.5 Impact on Soil

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

4.2.6 Impact on Terrestrial Ecology

The impacts will be primarily confined to the proposed site during initial periods of the construction phase and will be minimized through adoption of mitigative measures like surface treatment, water sprinkling and appropriate plantation program.

4.2.7 Demography and Socio-economic

The proposed plant will provide either direct or indirect job opportunities to the local population as far as possible. There will be some migration of labour force from outside the study area during construction phase, which may put some pressure on the local settlements and resources. However, this impact is envisaged to be marginal and temporary in nature.

4.3 IMPACTS DURING OPERATIONAL PHASE

The following activities related to the operational phase will have varying impacts on the environment and are considered for impact assessment:

- Air Environment
- Noise Environment
- Water Environment
- Land Environment
- Biological Environment
- Socio-economic Environment

4.3.1 Air Environment

The Main air pollutant from the process and non-process emissions would be SPM. A number of systems have been proposed for air pollution control which will provide safe environmental conditions in the working area and will ensure acceptable air quality in the surrounding area of the plant. Efficient collection of dust at sources, their dedusting with efficient filters and recycling the dust to the process would be the prime objective.

The main dust sources of the manufacturing process would be -

- Coal grinding
- Cement grinding

For drying of coal in the drying-cum-grinding process, hot gas would be used and dedusted by a fabric filter and the dust content of the cleaned gas would be about 50 mg/Nm^3.

The cement-grinding unit would be provided with bag filters. The dust content in the exhaust air would be less than 50 mg/Nm^3.

Dry fog dust suppression system, bag filters etc. would be provided in various sections of material handling and processing units for controlling air pollution. Some other actions that would in general be taken in this respect are -

- Conveying of clinker from wagon tippler to stacker will be made through locally covered single over land belt conveyor.
- Separate closed conveying system for additive will be provided.
- All silos will be equipped with closed mechanical or pneumatic conveying system.
- Bag House will be installed for control of particulate emission at the cement mill.

- All transfer points and loading or unloading points will be provided with bag filter./Dust suppression system
- Pneumatic conveying system for fly ash handling will be used, to avoid generation of fugitive dust.

As such, with such elaborate control measures in place there will be insignificant impact on the ambient air quality of the area.

4.3.1.1 **Sources of Emissions**

The major sources of emission from the proposed project have been presented in **Table 4.1**.

Stack emissions would be constituted of mainly Particulate matters, SO_2 & NOx. One stack which will be connected to Cement mill has been considered.

TABLE 4.1
STACK & EMISSION CHARACTERISTICS

Description	Cement Mill
No. of Stack	1
Stack height (m)	50
Internal diameter at Stack Top (m)	1.5
Exit velocity of flue gas (m/s)	10
Temp. of flue gas degree (°C)	120
Flue gas flow rate (Nm^3/Hr)	44,212
SPM emission rate (mg/Nm^3)	50
SPM emission rate (kg/Hr)	2.21
SO_2 emission rate (kg/Hr)	64
NOx emission rate (kg/Hr)	30

4.3.1.2 **Air Quality Dispersion Modelling**

Selection of Model

The plant operation will emit gaseous pollutants through stack, which have the potential to deteriorate the air quality of the area. In order to evaluate the impact on ambient air quality due to such releases, the ground level concentrations (GLCs) as a result of the plant emissions have been evaluated through mathematical modelling using computer aided techniques.

Upon discharge to atmosphere, the emissions from sources are subjected to transport and diffusion processes which together are termed as dispersion. The processes which govern the atmospheric dispersion of pollutants are plume rise, transport by wind, and diffusion by turbulence and a number of physico-chemical processes such as gravitational settling, deposition, chemical reactions, transformation, decomposition and wash out.

The computation has been made applying ISCST3 of USEPA, which is most widely used and also recommended by CPCB (PROBES/70/1997-98). The model is based on some assumption such as steady state conditions, continuous homogeneous flow, inert passive pollutants, no ground absorption and a Gaussian distribution of the plume in both horizontal and vertical planes.

4.3.1.3 **Data Used for Modelling**

Stack and emission data as presented in **Tables-4.1** have been used as inputs to the model. The prediction of GLCs and corresponding impacts has been made for the emission figures mentioned therein.

The hourly meteorological data like ambient temperature, wind speed and wind direction used for air quality modelling have been taken from such data generated through continuous on-site monitoring during (December 2008 – February 2009) representing the winter season.

The hourly occurrence of various atmospheric stability classes has been determined from the on-site hourly wind speed and cloud cover data using the insolation based stability classification.

The Mixing Height data were taken from one of the published documents i.e., "Spatial Distribution of Hourly Mixing Depth over Indian Region" of R. N. Gupta, applicable for Kolkata region.

4.3.1.4 **Modelling Procedure**

Modelling exercise has been performed for 1 (one) stack connected to Cement mill.

The actual location of the emission source have been defined in a Cartesian co-ordinate (x,y) system, with Absolute Reference Point being the stack, attached to packing plant.

As recommended by CPCB, radial pattern of receptor locations has been implemented using the polar (r,θ) co-ordinate system with origin at the ARP of the Cartesian co-ordinate system. The locations of the receptors have then been defined with respect to 16 radial directions (N to NNW angle θ of such directions measured clockwise from North) and radial distance 'r' from the ARP.

The receptors are selected in such a way that more receptors are located close to the maximum concentration point. The maximum distance covered is 10 km., which has been seen adequate to cover the maximum concentrations for this particular situation.

In order to compute the 24 hourly concentrations due to the operation of the proposed project, the hourly meteorological data recorded at the site meteorological observatory set up near the project site was used. The model was used to compute the 24-hour concentrations for each day for the winter season.

4.3.1.5 **Discussion on Modelling Results**

The predicted maximum GLCs of SPM, SO_2 & NOx are presented in **Table – 4.2**. The isopleths of SPM, SO_2 & NOx have been depicted in **Figures - 4.1, 4.2 & 4.3.**

TABLE – 4.2
PREDICTED MAXIMUM GLCS OF VARIOUS POLLUTANTS

Pollutants	Max. GLC ($\mu g/m^3$)	Direction	Distance (km)
SPM	0.342	SW	0.6
SO_2	8.758	SW	1.0
NOx	4.676	SW	0.6

Hence, the maximum incremental values of SPM, SO_2 & NOx would be about 0.34, 8.758 & 4.676 $\mu g/m^3$ respectively, which will occur at a distance of 0.5 - 1 km. in SW direction w.r.t. the ARP. However, it may be observed that these values have been attained only on one day in the summer season.

It may also be noted that the modelling results depict the worst case scenario as washout due to rain has not been considered and deposition on other forms of structures as buildings, trees etc. have not been taken into account. Thus, in actuality, these pollutant concentrations are expected to be relatively lower than the predicted values.

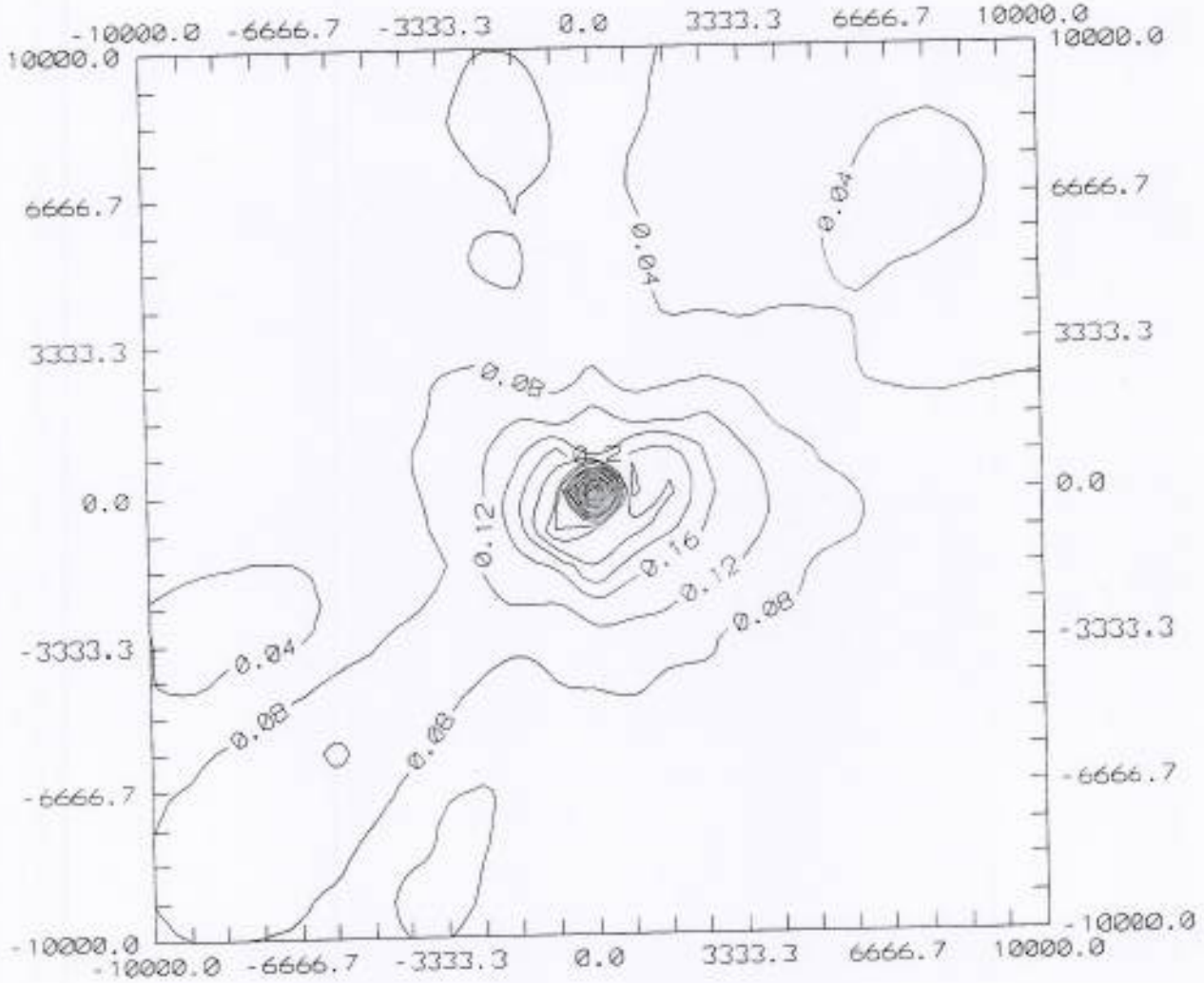


FIGURE - 4.1
ISOPLETHS OF SPM

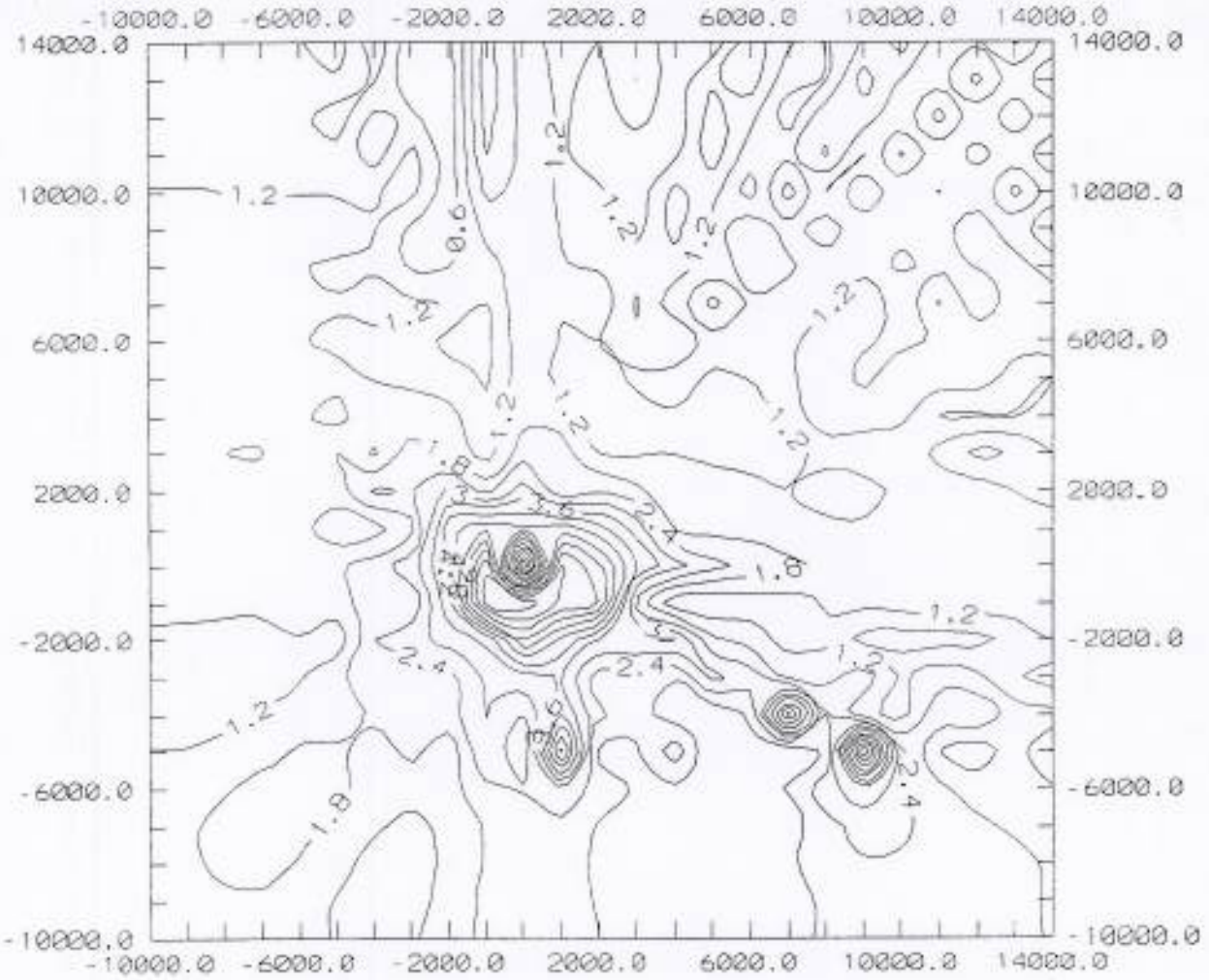


FIGURE - 4.2
ISOPLETHS OF SO2

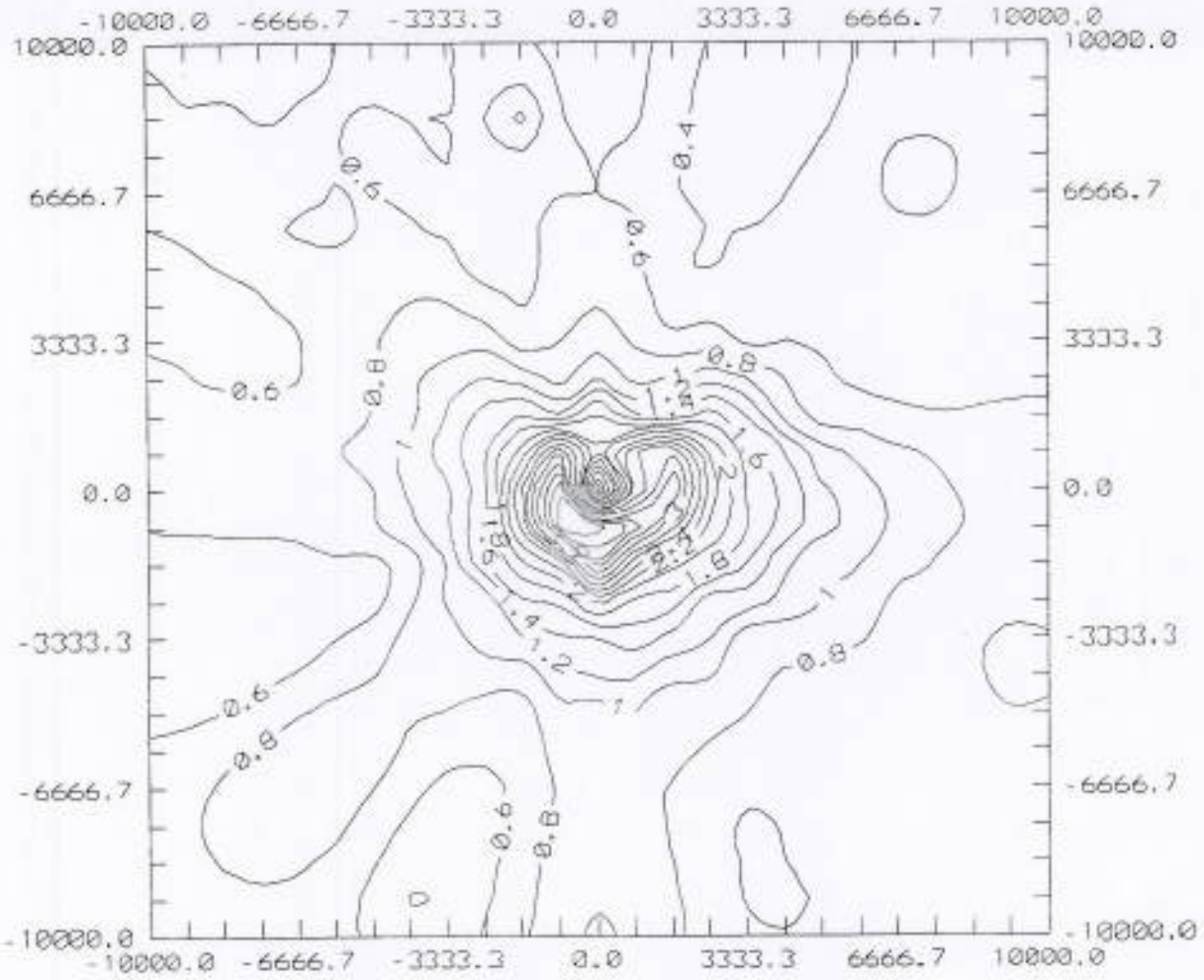


FIGURE - 4.3
ISOPLETHS OF NOx

4.3.2 Surface and Ground Hydrology

Water requirement in cement manufacturing is very low compared to other industries. Whatever water is put into the process goes along with the product. As such, no wastewater is expected from the process. Make up water will be needed in the cooling system. Water will be needed in dust suppression, domestic usage and some miscellaneous purposes. Treated wastewater from the miscellaneous purposes and domestic sectors will be used for non-critical purposes in the plant premises, thereby reducing the daily fresh water drawal and creating a zero discharge scenario.

Ground water will be used for meeting the daily water demand of the plant. The neighbourhood of the site does not have any dependable surface water source and ground water is the primary source of water in the area. Ground water will be drawn only on getting consent from the concerned body (State water Investigation Directorate). As per normal practice the Directorate, issues their Consent considering all relevant aspects. Thus no impact on ground water hydrology is expected due to this project.

State Public Health Engineering Department (PHED) is planning to set up a water supply system based on surface water drawn from Kanksabati river to feed the existing and future water users in the area. Departmental studies to this effect are in progress. Once this system is put into operation OCL will switch over to this system.

4.3.3 Soil Environment

The proposed project during its operation stage is not going to generate any solid waste. Infact, the process will make use of fly ash and slag which are rejects from other industries.

The organic sludge generated in the sewage treatment plant will be used as manure for green belt development.

Thus no impact on the soil and land environment are expected due operation of the project.

4.3.4 **Biological Environment**

The project under consideration will be set-up in an area, which does not have biological wealth of importance, and hence will not impede or disturb any existing biota. Further, the emissions that would be generated will consist of only dust, which will be collected in high efficiency bag filter and only clean air will be let out to the environment.

Hence no negative impact on the existing biota is envisaged due to emissions from the proposed project.

4.3.5 **Noise Environment**

The noise level within the plant building at a distance of one metre from the source will be maintained at less than 85 dB(A).

The ambient noise levels at plant boundary will less than the permissible levels by development of green belt, which will result in absorbing about 50% of the noise.

4.3.6 **Landscape**

There will be a transformation of land use from barren land to industrial activity. OCL has proposed its facility in an area earmarked for industrial development, and following a well designed Master Plan. Thus, impact on the existing landscape will be negligible.

4.3.7 **Socio-economy**

The proposed project is likely to generate direct and in-direct job opportunities. The plant surroundings is likely to experience certain developmental activities. These will have positive impact on the socio-economic environment of the area.

4.3.8 **Human Health & Welfare**

Risks to human health arise in the first place from major accidents. In the shop floor OCL will have sufficient precautions inbuilt to prevent any accidents from occurring.

Proposed project will result to a large extent in positive impacts and will have negligible impact on physico-chemical and biological environment.

CHAPTER 5.0
ENVIRONMENTAL MANAGEMENT PLAN

CHAPTER 5.0
ENVIRONMENTAL MANAGEMENT PLAN

5.1 EMP BASIC CONTENT

OCL has proposed to take care of its surrounding environment by following proper technology to minimise resource depletion and pollution. OCL has not only proposed to install state of art technology but will also adopt good Environmental Management System in order to make optimum utilization of the facility. The highlight of various EMP measures are enumerated below.

In order to mitigate the adverse impacts of the project, Environment Management plan (EMP) is delineated for each environmental component. The EMP includes formulation, implementation and monitoring of environmental protection measures during construction and after commissioning of the proposed project. The EMP is delineated to be dealt with in the following phases:

- Construction Phase
- Operational Phase

5.2 ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION PHASE

The proposed project site is a barren land earmarked for industrial development. The topography of the plant site is generally plain, and no cutting of trees is anticipated.

5.2.1 Air

The proposed project do not involve any grading operations, and hence no dust will be generated. However, requisite measures are proposed to control any stray dust by sprinkling of water. The roads in the plant premises will be black topped. However, sprinkling of water will control any trace of dust generated.

5.2.2 **Sanitation**

It is proposed to provide proper and sufficient sanitation facilities at the site during construction phase to maintain adequate hygienic conditions. These facilities are proposed to be connected to well designed, and maintained septic tanks to avoid any adverse impact.

5.2.3 **Noise**

The community impact due to noise during construction phase will be negligible, since the plant is located in an Industrial area devoid of any major settlements nearby. However, onsite workers exposed to excessive noise will be provided with noise protection devices like earplugs, earmuffs etc.

5.2.4 **Construction Equipment and Waste**

It is proposed to maintain the vehicles properly to minimise exhaust emissions from the gasoline or diesel powered construction vehicles. It is also proposed to locate the vehicle maintenance area in such a manner as to prevent contamination of ground water by accidental spillage of oil etc. It is proposed to prohibit unauthorised dumping of oily waste etc.

5.2.5 **Storage of Hazardous Material**

The following hazardous materials are anticipated to be stored at the site during construction:
Petroleum spirit
Diesel and Lubricating oil
LPG and Other compressed gases
Paint materials

It is proposed to store these materials as per prescribed safety standards.

5.2.6 Site Security

A construction site may form a potentially hazardous environment. Hence to ensure that the workers are not exposed to these hazards, the site is proposed to be properly fenced.

5.2.7 Land Environment

Construction workers will be provided with fuel to prevent felling of trees.

5.3 POST PROJECT OPERATIONS

The main sources of air, water, and noise pollution that could be expected from different plant operations

A	Fugitive Dust	Due to material handling and movement of trucks carrying raw Materials and also during transportation of finished products.
B	Noise emission	Due to operation of different plants and machineries.
C	Waste water discharges	The plant will operate under zero discharge mode thus there is no scope for water pollution due to this project.

An effective EMP with advanced technologies to minimise environmental pollution, to minimise use of natural resources, to effectively recover and reuse vital raw materials, to maintain a clean ambience form the crux of corporate policy adopted by OCL. The highlight of various EMP measures is enumerated below.

5.3.1 Air Environment

The Main air pollutant from the process and non-process emissions would be SPM.

A number of systems will be installed for air pollution control which will provide safe environmental conditions in the working area and will ensure acceptable air quality in the surrounding area of the plant.

Efficient collection of dust at sources, their dedusting with efficient filters and recycling the dust to the process would be the prime objective.

For drying of coal in the drying-cum-grinding process, hot gas would be used and dedusted by a fabric filter and the dust content of the cleaned gas would be about 50 mg/Nm^3.

The cement-grinding unit would also be provided with bag filters. The dust content in the exhaust air would be less than 50 mg/Nm^3.

Dry fog dust suppression system, bag filters etc. would also be provided in various sections of material handling and processing units for controlling air pollution. Some other actions that would in general be taken in this respect are -

- Conveying of clinker from wagon tippler to stacker will be made through locally covered single over land belt conveyor.
- Separate closed conveying system for additive will be provided.
- All silos will be equipped with closed mechanical or pneumatic conveying system.
- Bag House will be installed for control of particulate emission at the cement mill.
- All transfer points and loading or unloading points will be provided with bag filter./Dust suppression system
- Pneumatic conveying system for fly ash handling will be used, to avoid generation of fugitive dust.

5.3.1.1 **General measures taken to control Fugitive Emissions**

To control fugitive emissions from process units in the plant, the following measures are proposed.

- Proper maintenance and tarring of roads inside the factory.
- Preventive maintenance of valves and other equipments.
- Development of green belt on all sides within the project boundary, and community plantation around the unit with help of local area development authorities will help in attenuating the fugitive emissions of pollutants from the unit.
- Ambient air quality and stack/fugitive emissions proposed to be monitored regularly.
- In-plant training will be provided to the plant personnel on operation and maintenance of dust collectors, techniques of dust emission measurements, particle size analysis etc.
- Effective operation and maintenance of pollution control system is proposed to contain the emissions/keep them within the WBPCB/CPCB limits
- A good house keeping consisting of simple, obvious task of cleaning up spills, removing accumulations around processing equipment and in general keeping things neat and clean will form a part of normal operation and maintenance procedure

Suggested control measures for arresting fugitive dust emissions along with the envisaged pollution control equipment are adequate and will help to have a healthy and cleaner environment inside the plant thereby improve the productivity and the efficiency of the workers as well as that of plant machinery.

5.3.2 **Noise Emissions**

In general following measures will be taken to control noise to level within the permissible limit at the boundary of plant.

i. Noise generating sources and their platforms would be maintained properly to minimise noise and vibration.
ii. Attempts would be made to restrict high noise operation viz., restarting after shutdown etc. during day time to reduce community annoyance.

iii. Automatic door closures would be provided for control cabins and plant laboratories.
iv. The vent valves will be equipped with silencers/mufflers.
v. Ear muffs / plugs would be provided for personnel working near the noisy machines.
vi. Noise barriers would be provided in the form of trees in green belt area.
vii. Training would be imparted to plant personnel to generate awareness about damaging effects of noise.

In addition to proper maintenance of the equipment, construction of compound wall and development of thick green belt will absorb more than 50% of the noise generated and hence abate any impact on the community.

5.3.3 Water Environment

5.3.3.1 Wastewater Management

No process wastewater is expected from the manufacturing process.

Domestic wastewater generated in the plant area would be treated in a well designed sewage treatment plant (S.T.P) before being used in suitable non-critical purposes within the plant premises.

Drainage & Rain water Harvesting

The proposed project will have a properly designed drainage system. Rain water intercepted through these drains will be taken into a water reservoir. There will be an arrangement for letting out the excess rain water run-off into the nearby water course. Rain water so stored would be used for non-critical purposes within the plant.

5.3.4 Land Environment

i. Selected tree species, primarily of native origin would be planted in the area after considering attenuation factors for air pollutants.
ii. Desirable beautification and land-scaping practices would be followed.
iii. Efficient soil conservation, irrigation management, would be advocated in and around the plant site.

5.3.5 Green Belt Development

Green belt is an important sink for air pollutants. Trees also absorb noise and by enhancing the green cover, improve the ecology and aesthetics and affect the local micrometeorology. Trees also have major long-term impacts on soil quality and the ground water table. By using suitable plant species, green belts can be developed in strategic zones to provide protection from emitted pollutants and noise.

Plant species selected for green belt should be able to flourish in the area and must also have rapid growth rate, evergreen habit, large crown volume and small / pendulous leaves with smooth surfaces. All these traits are difficult to get in a single species. Therefore a combination of these is sought while selecting trees for green belt. In the proposed plant, green belt will be developed in vacant areas, around office buildings, around stores, along the side of roads, along the plant's boundaries and around the waste dump area.

OCL has planned an extensive green cover in project site. The data on area of green cover, survival rate etc be compiled for periodic review.

OCL shall plant trees in almost all possible locations and continuously encourage others to plant trees in their garden, locality etc. However following plan shall also be made for future program.

- Annual plans for tree plantation with specific number of trees to be planted shall be made.

- The fulfillment of the plan shall be monitored every six months.
- A plan for post plantation care will be reviewed in every monthly meeting. Any abnormal death rate of planted trees shall be investigated.
- Watering of the plants, manuring, weeding, hoeing will be carried out for minimum 3 years

Selection of Species

The species for plantation have been selected on the basis of soil quality, place of plantation, chances of survival, commercial value (timber value, ornamental value, etc.), etc. It is to be noted that only indigenous species will be planted. Exotic species such as Eucalyptus and Australian Acacia will not be planted. The species will be selected in consultation with State Soil Conservation Department. Mixed plantations will be done keeping optimum spacing between the saplings. Along Plant Boundary The row of plants facing plant should be smaller species and those facing outside should be taller species. The species suggested for plantation is:

Small Species

Kaneer (Nerium sp.)
Prosopis (Prosopis juliflora)
Bougainvellea (Bougainvillea spp.)
Ber (Zizyphus spp.)
Gulmohar (Delonix regia)
Duranta (Duranta sp.)
Kamayani (Murriya exocitica)
JBILayati Babool (Prosopis juliffera)
Babool (Acacia arabica)

Tall Species

Amaltas (Cassia fistula)
Siris (Albizzia lebbeck)
Neem (Azadirachta indica)
Druping Ashok (Polyalthia longifoila)

Mango (Mangifera indica)
Peepal (Ficus religiosa)
Arjun (Terminalia arjuna)
Jackfruit (Artocarpus heterophylla)
Palash (Butea spp)
Cassia (Cassia siamea)
Bottle brush (Callistemon lanceolatus)

Road Side Plantation

Avenue plantation should include the following species:
Siris (Albizzia lebbeck)
Gulmohar (Delonix regia
Imli (Tamarindus indica)
Siris (Albizzia lebbeck)
Neem (Azadirachta indica)
Druping Ashok (Polyalthia longifoila)
Mango (Mangifera indica)
Peepal (Ficus religiosa)
Bargad (Ficus bengalisis)
Arjun (Terminalia arjuna)
Cassia (Cassia siamea)

Around Various Shops

Small and medium sized species are suggested for plantation around different units and those should be planted depending on the vertical height and lateral space available for the plant growth. The species selected will be from the following:

Small Species

Ber (Zyziphus sp.)
Sharifa (Annona squamosa)
Prosopis (Prosopis sp.)
Cassia (Cassia auriculata)
Duranta (Duranta sp.)
Kamayani (Murrya exotica)

Medium Size Species

Kaner (Nerium sp.)
Amaltas (Cassia fistula)
Subabool (Leucaena leucocephala)
Cassia (Cassia alata)
Babool (Acacia arabica)

Around Office and Other Buildings

Plantation will be done around various shops, stores and other buildings, along the side of connecting roads. Species suggested for plantation are as follows:

Cassia (Cassia javanica)
Amaltas (Cassia fistula)
Cassia (Cassia siamea)
Amaltas (Cassia fistula)
Arjun (Terminalia arjuna)
Lagerestromea (Lagerestromea flosregennae)
Peltophorum (Peltophorum feruginium)
Gulmohar (Delonix regia)
Druping Ashok (Polyalthia longifoila)

Stretch of Open land

Green belt will be developed in vacant areas. Species suggested for such areas are:
Siris (Albizzia lebbeck)
Pakur (Ficus racemosa)
Gulmohar (Delonix regia
Imli (Tamarindus indica)
Peltophorum (Peltophorum feruginium)
Gulmohar (Delonix regia
Siris (Albizzia lebbeck)
Neem (Azadirachta indica)
Mango (Mangifera indica)

Peepal (Ficus religiosa)
Bargad (Ficus bengalisis)
Arjun (Terminalia arjuna)
Cassia (Cassia siamea)

5.3.6 Socio-Economic Environment

Environment Management Plan is prepared to mitigate the adverse impacts and to ensure that the maximum benefits are achieved without hampering the environment quality and also without deteriorating quality of life of the people in the area. The measures suggested for an effective EMP are:

- Local people would be encouraged for setting up auxiliary and ancillary industries.
- Assistance in developing infrastructure facilities in the nearby villages, which have these facilities in an inadequate proportion
- Attempts would be made for developing schemes for better water supply
- Health camps for general health, eye check up, family planning awareness etc. would be encouraged.

It is expected that implementation of aforementioned measures would definitely help in improving the socio-economic condition of the local population.

5.4 IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

The mitigation measures suggested above would be implemented so as to reduce the impact on environment due to operations of the proposed unit. In order to facilitate easy implementation, mitigation measures are phased as per the priority

Implementation Schedule

Sl. No.	Recommendations	Time Requirement (months)
1.	Air pollution control measures	Before commissioning of respective unit.
2.	Water pollution control measures	Before commissioning of the plant
3.	Noise control measures	Along with the commissioning of the plant
4.	Ecological preservation and upgradation including greenbelt development	Stage wise implementation

5.4.1 Cost of Environmental Management Plan

An indicative break-up of amount proposed towards capital cost of environmental control measures is presented below

Sl.No	Description	Amount proposed (Rupees in Crores)
1.	Wastewater management facilities	2.00
2.	Air pollution abatement facilities	18.00
3.	Green belt	2.75
4.	Personnel Protective Equipment	0.05
5.	Miscellaneous	2.20
	Total	**25.00**

5.5 POST STUDY MONITORING PROGRAMME

Various measures have been suggested in the EMP for mitigation of impacts. These have to be implemented according to the suggestions and monitored regularly to prevent any lapse.

A large part of the sampling and measurement activity will be concerned with long term monitoring aimed at providing an early warning of any

undesirable changes or trends in the natural environment that could be associated with the project site.

5.5.1 **Air Quality**

Three ambient air quality monitoring stations (AAQMS) will be set up around the project site.

5.5.2 **Drainage System**

The effectiveness of the drainage system depends on proper cleaning of all drainage pipes/channels. Regular checking will be done to see that none of the drains are clogged due to accumulation of sediments etc. The clogged drains will be cleaned as soon as possible, preferably the same day to ensure their effectiveness. This checking and cleaning will be rigorous during the monsoon season, especially if rains are forecast.

5.5.3 **Water Quality**

Raw water will be monitored once a month. Drinking water being supplied inside the plant will be monitored at least once a month. Sampling parameters shall conform to IS 10500 or as per the directives of West Bengal State Pollution Control Board. Although there are no effluent discharge outside the plant boundary, but wastewater after treatment shall be analysed atleast once in three months for parameters like BOD, pH, SS and Coliforms or as advised by WBPCB.

5.5.4 **Noise Level**

Noise level shall be monitored around the plant boundary (for which atleast 6 stations shall be identified) atleast once in a month or as suggested by WBPCB.

5.5.5 Occupational Health

Routine medical examination of personnel shall be carried out as a systematic programme.

5.5.6 Laboratory Facilities

A suitable analytical laboratory which is recognised by the WBPCB shall be contracted for carrying out the necessary environmental monitoring.

5.6 UPDATING OF THE EMP

The periodicity and extent of monitoring will however be governed by the directives of WBPCB and prevailing regulations. The action plan of EMP will be updated every year with respect to the results achieved and to plan activities for the next year.

5.7 ENVIRONMENTAL MANAGEMENT CELL

A three member environmental cell will be responsible for all the issues of environment viz.,

- Liasoning;
- Environmental Monitoring;
- Environmental Training & Awareness;
- Maintenance of Pollution abatement equipments;
- Maintenance of green belt;
- Implementation of Environmental Management System; and
- Upgrading applicable environmental information with respect to manufacturing facility.
- Attending to the requirements of the State Pollution Control Boards and other statutory bodies in the field of environmental protection.

5.8 OCCUPATIONAL SAFETY AND HEALTH

Maintenance of occupational safety and health is very closely related to productivity, good employer employee relationships and good relationships among all on board personnel.

The main factors of occupational health in the plant are dust, heat and noise.

Following measures will be undertaken in the installation for occupational safety and health of workers.

- Inspection and maintenance of pollution control systems will be undertaken only after checking that the equipment has been properly shut down or with permission of authorised officer.
- Immediate removal of waste accumulated in working areas.
- Insulation of hot surfaces.
- All safety measures will be strictly implemented. Fire fighting equipment will be tested regularly to ensure their full serviceability. Contingency plans drawn up to deal with accidents will be rehearsed by all personnel.
- Training of employees for use of safety appliances and first aid.
- Routine medical examination of personnel shall be carried out as a systematic programme at plant.

5.9 HOUSE KEEPING

Proper house keeping is an essential part of sound environmental management. It will be rigorously seen that there is no accumulation of wastes, especially combustible wastes inside the plant area. In summer

dry grasses & vegetation growing inside the plant area will be cut and removed. All fire fighting equipment and warning devices will be kept in perfect working conditions.

It will be seen that all personnel are aware of the implications of environmental pollution and simple practices to avoid pollution.

CHAPTER 6.0
ENVIRONMENTAL IMPACT ASSESSMENT

CHAPTER 6.0 ENVIRONMENTAL IMPACT ASSESSMENT

6.1 INTRODUCTION

Environmental impact statement is delineated for the following five basic environmental components that are likely to be affected or benefited due to the proposed project.

- Air environment;
- Noise environment;
- Water environment;
- Land & biological environment; and
- Socio-economic environment.

6.2 AIR ENVIRONMENT

Status of the ambient air quality during construction phase is limited to dust emission of fugitive nature.

Impact scenario of air component due to the emission from the proposed project is marginal. The predicted concentrations are well within the standards prescribed by CPCB. However, the small amounts of air pollutants emanating from the plant will be controlled by appropriate mitigation measures. Vegetation and human settlements in the vicinity of the project are not likely to get affected. A comprehensive green belt to mitigate the impact of fugitive emissions and also provides dense foliage through a variety of trees and shrubs. Net impact from the changed scenario of emissions (point & fugitive) due to the proposed project will be marginal and insignificant to cause any adverse impact on human health and vegetation in and around the area.

6.3 WATER ENVIRONMENT

As already elucidated in the foregoing Chapters the cooling water is a closed loop re-circulating system, and only make-up water will need to be added on a daily basis. The domestic sewage, will be treated in a sewage treatment facility. Treated sewage meeting the relevant standards will be used for dust supression, green belt development etc. Hence the impact on the water environment due to the proposed project will be negligible.

6.4 NOISE ENVIRONMENT

As stated in the foregoing chapters, noise levels of all equipments in the Plant Operations of OCL will be maintained to within the permissible limits. More-over the noise level at the plant boundary upon the plant becoming operational will be <75 dB(A), which is in line with the National Ambient Noise Quality Standards. Hence, the impact on the noise environment due to proposed unit will be negligible.

6.5 LAND AND BIOLOGICAL ENVIRONMENT

The proposed project upon becoming operational will result in more positive utilisation of the land. Quality of emissions and treated wastewater will be maintained to within permissible limits, and hence no impact is envisaged on the existing flora & fauna.

More-over, development of wide green belt along the plant boundary will accrue rich bio-diversity to the existing flora and fauna, thus resulting in significant positive impact.

6.6 SOCIO-ECONOMIC ENVIRONMENT

Some people will be appointed directly and many will be indirectly employed in the unit when the plant goes into operation. Indirect benefits will also accrue to a large extent around the project site. Support services in commerce, transport and ancillary workshops would further enhance employment potential. Thus there will be significant positive impact on the socio-economic environment of the neighbourhood due to the project under consideration.

ANNEXURES

Table - 1

Tolerance Limits for Inland Surface Waters (as per IS:2296)

SN	Parameter and Unit	Class-A	Class-B	Class-C	Class-D	Class-E
1	Colour (Hazen Units)	10	300	300	-	-
2	Odour	Unobject	-	-	-	-
3	Taste	Tasteless	-	-	-	-
4	pH (max) (min:6.5)	8.5	8.5	8.5	8.5	8.5
5	Conductivity (25°C) (µmhos/cm)	-	-	-	1000	2250
6	DO (mg/L)(min)	6	5	4	4	-
7	BOD (3 days at 27°C) (mg/L)	2	3	3	-	-
8	Total Coliforms (MPN/100 mL)	50	500	5000	-	-
9	TDS (mg/L)	500	-	1500	-	2100
10	Oil and Grease (mg/L)	-	-	0.1	0.1	-
11	Mineral Oil (mg/L)	0.01	-	-	-	-
12	Free Carbon Dioxide (mg/L CO_2)	-	-	-	6	-
13	Free Ammonia (mg/L as N)	-	-	-	1.2	-
14	Cyanide (mg/L as CN)	0.05	0.05	0.05	-	-
15	Phenol (mg/L C_6H_5OH)	0.002	0.005	0.005	-	-
16	Total Hardness (mg/L as $CaCO_3$)	300	-	-	-	-
17	Chloride (mg/L as Cl)	250	-	600	-	600
18	Sulphate (mg/L as SO_4)	400	-	400	-	1000
19	Nitrate (mg/L as NO_3)	20	-	50	-	-
20	Fluoride (mg/L as F)	1.5	1.5	1.5	-	-
21	Calcium (mg/L as Ca)	80	-	-	-	-
22	Magnesium (mg/L as Mg)	24.4	-	-	-	-
23	Copper (mg/L as Cu)	1.5	-	1.5	-	-
24	Iron (mg/L as Fe)	0.3	-	50	-	-
25	Manganese (mg/L as Mn)	0.5	-	-	-	-
26	Zinc (mg/L as Zn)	15	-	15	-	-
27	Boron (mg/L as B)	-	-	-	-	2
28	Barium (mg/L as Ba)	1	-	-	-	-
29	Silver (mg/L as Ag)	0.05	-	-	-	-
30	Arsenic (mg/L as As)	0.05	0.2	0.2	-	-
31	Mercury (mg/L as Hg)	0.001	-	-	-	-
32	Lead (mg/L as Pb)	0.1	-	0.1	-	-
33	Cadmium (mg/L as Cd)	0.01	-	0.01	-	-
34	Chromium (VI) (mg/L as Cr)	0.05	0.05	0.05	-	-
35	Selenium (mg/L as Se)	0.01	-	0.05	-	-
36	Anionic Detergents (mg/L MBAS)	0.2	1	1	-	-
37	PAH (mg/L)	0.2	-	-	-	-
38	Pesticides (µg/L)	Absent	-	-	-	-
39	Insecticides (mg/L)	-	-	Absent	-	-
40	Alpha Emitters (10^{-6}µc/mL)	0.001	0.001	0.001	0.001	0.001
41	Beta Emitters (10^{-6}µc/mL)	0.01	0.01	0.01	0.01	0.01
42	Percent Sodium (%)	-	-	-	-	60
43	Sodium Absorption Ratio	-	-	-	-	26

Class-A: Drinking water source without conventional treatment but after disinfection.
Class-B: Outdoor bathing.
Class-C: Drinking water source with conventional treatment followed by disinfection.
Class-D: Fish culture and wild life propagation.
Class-E: Irrigation, industrial cooling and controlled waste disposal.

Table - 2
Drinking Water Quality Standards (as per IS:10500)

Sl No	Parameter and Unit	Desirable Limit	Permissible Limit in Absence of Alternate Source
1	Colour (Hazen units)	5	25
2	Odour	Unobjectionable	-
3	Taste	Agreeable	-
4	Turbidity (NTU)	5	10
5	PH	5-8.5	No relaxation
6	Total Coliforms (MPN/100 mL)	nil	-
7	Pathogenic Organisms or Virus	nil	-
8	TDS (mg/L)	500	2000
9	Mineral Oil (mg/L)	0.01	0.03
10	Free Residual Chlorine (mg/L)	0.2	-
11	Cyanide (mg/L as CN)	0.05	No relaxation
12	Phenol (mg/L C_6H_5OH)	0.001	0.002
13	Total Hardness (mg/L as $CaCO_3$)	300	600
14	Total Alkalinity (mg/L as $CaCO_3$)	200	600
15	Chloride (mg/L as Cl)	250	1000
16	Sulphate (mg/L as SO_4)	200	400
17	Nitrate (mg/L as NO_3)	45	100
18	Fluoride (mg/L as F)	1	1.5
19	Calcium (mg/L as Ca)	75	200
20	Magnesium (mg/L as Mg)	30	100
21	Copper (mg/L as Cu)	0.05	1.5
22	Iron (mg/L as Fe)	0.3	1
23	Manganese (mg/L as Mn)	0.1	0.3
24	Zinc (mg/L as Zn)	5	15
25	Boron (mg/L as B)	1	5
26	Aluminium (mg/L as AL)	0.03	0.2
27	Arsenic (mg/L as As)	0.05	No relaxation
28	Mercury (mg/L as Hg)	0.001	No relaxation
29	Lead (mg/L as Pb)	0.05	No relaxation
30	Cadmium (mg/L as Cd)	0.01	No relaxation
31	Chromium (VI) (mg/L as Cr)	0.05	No relaxation
32	Selenium (mg/L as Se)	0.01	No relaxation
33	Anionic Detergents (mg/L MBAS)	0.2	1
34	PAH (mg/L)	nil	-
35	Pesticides (µg/L)	Absent	0.001
36	Alpha Emitters (10^{-6}µc/mL)	nil	0.0001
37	Beta Emitters (10^{-6}µc/mL)	nil	0.001

Table - 3
General Standards for Discharge of Effluents
[as per Environment (Protection) Rules, 1986]

Sl No	Parameter and Unit	Inland Surface Water	Public Sewers	Land for Irrigation	Marine Coastal Water
1	Temperature (°C)	#	-	-	#
2	Colour and Odour	$	-	$	$
3	PH	5.5-9.0	5.5-9.0	5.5-9.0	5.5-9.0
4	BOD (3 days at 27°C) (mg/L)	30	350	100	100
5	COD (mg/L)	250	-	-	250
6	Bio-assay (% 96-hrs Survival)	@	@	@	@
7	TSS (mg/L)	100	600	200	100*
8	SS Particle size(pass IS Sieve)	850	-	-	&
9	Oil and Grease (mg/L)	10	20	10	20
10	Total Residual Chlorine (mg/L)	1	-	-	1
11	Nitrate Nitrogen (mg/L as N)	10	-	-	20
12	Ammonia Nitrogen (mg/L N)	50	50	-	50
13	Kjeldahl Nitrogen (mg/L as N)	100	-	-	100
14	Free Ammonia (mg/L as N)	5	-	-	5
15	Cyanide (mg/L as CN)	0.2	2	0.2	0.2
16	Phenol (mg/L C_6H_5OH)	1	5	-	5
17	Fluoride (mg/L as F)	2	15	-	15
18	Sulphide (mg/L as S)	2	-	-	5
19	Dissolved Phosphate (mg/L P)	5	-	-	-
20	Copper (mg/L as Cu)	3	3	-	3
21	Iron (mg/L as Fe)	3	3	-	3
22	Manganese (mg/L as Mn)	2	2	-	2
23	Zinc (mg/L as Zn)	5	15	-	15
24	Nickel (mg/L as Ni)	3	3	-	5
25	Vanadium (mg/L as V)	0.2	0.2	-	0.2
26	Arsenic (mg/L as As)	0.2	0.2	0.2	0.2
27	Mercury (mg/L as Hg)	0.01	0.01	-	0.01
28	Lead (mg/L as Pb)	0.1	1	-	1
29	Cadmium (mg/L as Cd)	2	1	-	2
30	Chromium (VI) (mg/L as Cr)	0.1	2	-	1
31	Chromium (Total) (mg/L as Cr)	2	2	-	2
32	Selenium (mg/L as Se)	0.05	0.05	-	0.05
33	Alpha Emitters (10^{-6}µc/mL)	0.1	0.1	0.01	0.1
34	Beta Emitters (10^{-6}µc/mL)	1	1	0.1	1

\# Shall not exceed 5°C above the receiving water temperature.
$ All efforts should be made to remove colour and unpleasant odour as far as practicable.
@ 90% survival of fish after 96 hours in 100% effluent.
* For cooling water effluent 10% above TSS of influent.
& (a) Floatable solids 3 mm, (b) Settleable solids 850 micron.

Table - 4

National Ambient Air Quality Standards

[as per Environment (Protection) Rules, 1986]

Pollutant	Time Weighted Average	Concentration ($\mu g/m^3$) in Ambient Air		
		Industrial Area	Residential, Rural and Other Areas	Sensitive Area
Sulphur Dioxide (SO_2)	Annual*	80	60	15
	24 Hours**	120	80	30
Oxides of Nitrogen (as NO_2)	Annual*	80	60	15
	24 Hours**	120	80	30
Suspended Particulate Matter (SPM)	Annual*	360	140	70
	24 Hours**	500	200	100
Respirable Particulate Matter (RPM) (size less than 10 μm)	Annual*	120	60	50
	24 Hours**	150	100	75
Lead (Pb)	Annual*	1	0.75	0.5
	24 Hours**	1.5	1	0.75
Ammonia	Annual*	100	100	100
	24 Hours**	400	400	400
Carbon Monoxide (CO)	8 Hours**	5000	2000	1000
	1 Hour	10000	4000	2000

* Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24-hourly at uniform interval.

** 24-hourly/8-hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days.

Table - 5

Ambient Air Quality Standards in respect of Noise

[as per Noise Pollution (Regulation and Control) Rules, 2000]

Area Code	Category of Area	Limits in dB(A) L_{eq}*	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Notes:

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is defined as an area comprising not less than 100 metres around hospitals, educational institutions and courts. The silence zones are zones which are declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.

* dB(A) L_{eq} denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District & CD Block	No of House Hold	Total Population			Total SC	Total ST	Total Literate	otal Worker	Total Main Workers			
			Total	Male	Female				Total	Total	Male	Female	
	District West Midnapur & Block Keshpur												
1	Nimkol	9	57	32	25	0	0	25	16	14	14	0	
2	Pebua	86	557	256	301	0	0	318	140	128	118	10	
3	Chanda Bila	100	636	281	355	175	0	361	223	170	130	40	
4	Dotal	56	290	147	143	65	0	185	101	82	69	13	
5	Kharga Diha	80	482	252	230	82	21	320	210	121	109	12	
6	Panite Ghari	54	395	214	181	336	0	191	223	94	91	3	
7	Shiris Bani	49	347	174	173	101	12	170	194	77	74	3	
8	Kontai	315	2161	1098	1063	1337	3	853	583	529	515	14	
9	Kali Nagar	51	292	146	146	197	0	89	124	69	59	10	
10	Dudiabandi	129	916	446	470	326	0	372	403	223	207	16	
11	Gobardda	119	787	403	384	225	73	295	352	199	163	36	
12	Ghosh Khira	18	140	79	61	16	12	80	65	34	33	1	
13	Amla Bani	65	439	218	221	119	0	211	114	109	109	0	
14	Kharpuri	55	400	203	197	290	0	236	99	99	99	0	
15	Dhamsai	142	854	443	411	31	0	416	237	201	195	6	
16	Dara	73	448	217	231	0	0	322	123	115	112	3	
17	Anandapur	1857	11486	5779	5707	1150	14	6074	3152	2656	2377	279	
18	Gopal Nagar	49	317	154	163	0	0	157	99	83	74	9	
19	Ganta	47	298	143	155	0	159	86	103	88	60	28	
20	Teghari	218	1428	718	710	17	187	654	467	385	328	57	
21	Mejura	255	1704	899	805	740	135	775	515	469	400	69	
22	Putigerya	12	70	44	26	63	0	29	28	7	7	0	
23	Kashi Danga	8	44	23	21	32	0	23	15	15	14	1	
24	Chanda Bila	35	258	132	126	0	218	73	100	81	45	36	
25	Manta Bani	63	377	184	193	0	269	150	146	98	64	34	
26	Dhakkata	93	573	269	304	0	493	235	231	100	81	19	
27	Asta Kola	16	136	72	64	29	32	67	44	33	26	7	
28	Betbani Radha Khauki	23	130	67	63	0	0	74	45	34	32	2	
29	Pukhur Kona	66	355	178	177	0	5	150	122	71	70	1	
30	Ramakata	58	289	147	142	0	0	122	93	74	66	8	
31	Raghunath Chak	17	86	44	42	0	0	45	40	29	19	10	
32	Kshirkul	75	509	269	240	0	344	227	187	140	115	25	
33	Deulbar	81	495	229	266	0	0	233	147	110	108	2	
34	Palbani	31	183	93	90	0	0	43	70	45	44	1	
35	Renuar	147	1054	540	514	0	46	436	317	218	211	7	
36	Kanch Gerya	101	709	395	314	0	6	296	237	124	122	2	
37	Jaora Paikan	54	319	160	159	0	0	185	88	80	74	6	
38	Nagda	242	1601	771	830	51	0	493	417	343	331	12	
39	Ganga Para	17	96	47	49	0	0	41	21	20	20	0	

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District & CD Block	No of House Hold	Total Population			Total SC	Total ST	Total Literate	otal Worker Total	Total Main Workers			
			Total	Male	Female					Total	Male	Female	
	District West Midnapur & Block Keshpur												
40	Santarya	43	278	134	144	0	0	126	116	58	54	4	
41	Khudibisi	55	366	194	172	0	0	207	93	91	87	4	
42	Gangashini	26	180	77	103	0	0	107	46	42	42	0	
43	Kumira	48	271	124	147	0	0	65	103	58	52	6	
44	Bara Baruj	144	870	452	418	35	0	512	246	227	223	4	
45	Udai Chak	6	43	17	26	0	0	28	9	8	8	0	
46	Binjuria	129	722	389	333	0	0	229	341	212	164	48	
47	Bara Duary	4	18	10	8	0	0	15	7	7	5	2	
48	Chhoto Baruj	74	549	265	284	0	0	207	190	181	142	39	
49	Khanra Sai	33	235	117	118	0	0	75	99	58	50	8	
50	Mohanpur	76	415	198	217	0	0	250	141	127	110	17	
51	Jabar Danga	15	140	68	72	0	0	82	31	26	26	0	
52	Jambani	78	438	216	222	0	98	154	178	109	97	12	
53	Chauki Ghata	52	321	157	164	0	262	74	118	67	57	10	
54	Bagla	165	967	493	474	136	34	349	456	215	204	11	
55	Khas Jangal	118	684	329	355	0	176	228	234	200	150	50	
56	Uttar Tasarara	17	110	58	52	0	96	37	38	26	21	5	
57	Amsol	30	151	73	78	0	17	28	60	38	36	2	
58	Kapta Bankati	149	1149	564	585	0	0	494	275	206	188	18	
59	Bagasol	49	394	210	184	0	0	103	71	66	64	2	
60	Karia Sol	23	122	56	66	0	0	22	56	51	26	25	
61	Kamar Gerya	78	411	219	192	0	0	247	131	77	75	2	
62	Khasla	67	570	300	270	0	0	150	147	113	112	1	
63	Charka	476	3669	1857	1812	15	46	1558	820	662	635	27	
	TOTAL	6941	44791	22543	22248	5568	2758	20479	13897	10492	9413	1079	
	District West Midnapur & Block Salboni												
1	Nutandihi	71	403	209	194	0	0	177	105	94	92	2	
2	Garmal	253	1407	695	712	205	719	643	652	350	270	80	
3	Karamarsolurf Kalibasa	44	305	154	151	0	116	133	128	55	48	7	
4	Radhamohanpur	2	7	4	3	0	0	5	2	2	1	1	
5	Mirga	156	958	466	492	0	423	376	381	358	226	132	
6	Jara	120	728	352	376	35	424	273	374	302	167	135	
7	Kunjami Goaldihi	117	692	369	323	28	79	427	196	166	158	8	
8	Barapatharkumkumi	157	824	424	400	86	190	440	307	307	232	75	
9	Jorakusmi	57	355	175	180	0	234	145	133	133	79	54	
10	Susnibari	27	177	84	93	0	79	74	70	68	37	31	
11	Chhotapatharkumkumi	12	70	29	41	0	30	41	27	26	20	6	
12	Tarashuli	25	125	64	61	0	10	53	67	49	32	17	

Socio-economic Data of the Study Area ;

Annexure-II

S. N.	District & CD Block	No of House Hold	Total Population			Total SC	Total ST	Total Literate	otal Worker	Total Main Workers			
			Total	Male	Female				Total	Total	Male	Female	
	District West Midnapur & Block Salboni												
13	Mugardihi	24	143	77	66	0	83	65	56	56	27	29	
14	Khasjangal	58	371	181	190	0	208	171	168	160	79	81	
15	Khir Suli	29	202	105	97	0	181	100	110	97	53	44	
16	Telimuri	1	12	4	8	0	10	5	5	4	3	1	
17	Gaighata	69	426	202	224	1	139	222	93	69	63	6	
18	Kharika Suli	141	902	471	431	19	316	416	346	200	154	46	
19	Gadamaull	53	348	178	170	75	41	182	155	153	81	72	
20	Saora	187	1126	552	574	194	16	471	415	374	231	143	
21	Sonakara	199	1133	583	550	499	0	465	537	472	274	198	
22	Chingrisol	22	144	73	71	0	116	53	58	39	35	4	
23	Bagmari	116	696	378	318	0	335	303	249	177	166	11	
24	Narasinghapur	117	737	391	346	1	123	366	349	289	194	95	
25	Bhagabati Chak	47	260	134	146	0	63	124	80	78	62	16	
26	Tangasol	16	105	51	54	0	88	31	30	24	21	3	
27	Bamunband	23	137	69	68	66	48	47	66	15	14	1	
28	Gaighata Jugdiha	41	243	135	108	33	79	146	120	28	26	2	
29	Baradiha	71	387	204	183	55	210	165	182	47	44	3	
30	Kashijora	236	1399	735	664	105	470	546	616	319	249	70	
31	Jalahaari	154	919	468	451	233	104	510	370	211	186	25	
32	Maupal	212	1226	606	620	348	165	578	426	400	278	122	
33	Bhatmor	169	980	492	488	404	43	509	336	257	214	43	
34	Chhota Bhursa	65	378	211	167	113	48	187	143	97	94	3	
35	Bara Bhursa	47	309	148	161	129	6	122	106	103	68	35	
36	Deul Kunda	122	744	380	364	137	161	385	317	245	193	52	
37	Baikunthapur	59	389	192	197	0	158	169	160	76	74	2	
38	Mahishara	18	105	50	55	0	0	63	46	23	22	1	
39	Sadanandapur	45	317	180	137	81	53	121	104	103	72	31	
40	Janakpur	32	205	106	99	0	161	57	100	37	36	1	
41	Asurkhuli	25	183	95	88	0	119	55	71	51	38	13	
42	Jaspur	60	341	182	159	119	155	118	147	147	76	71	
43	Deuli	48	274	138	136	10	10	118	115	106	59	47	
44	Baramesa	107	658	333	325	146	0	277	309	210	141	69	
45	Pirrakuli	120	800	390	410	0	100	360	308	166	134	32	
46	Karamsol	29	191	107	84	0	79	61	84	67	40	27	
47	Parasia	22	121	71	50	0	4	53	62	43	25	18	
48	Ghagrasol	41	252	122	130	0	43	141	114	101	54	47	
49	Salgeria	36	206	110	96	0	39	99	102	30	29	1	
50	Masru	47	233	119	114	27	0	103	123	96	51	45	
51	Nitaipur	2	10	6	4	4	0	3	5	5	2	3	

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District	No of House	Total Population			Total	Total	Total	otal Worker	Total Main Workers			
	& CD Block	Hold	Total	Male	Female	SC	ST	Literate	Total	Total	Male	Female	
	District West Midnapur & Block Salboni												
52	Banshkopna	56	319	151	168	51	138	132	160	102	60	42	
53	Khairisol	10	56	28	28	0	52	38	22	12	8	4	
54	Radhagobindapur	12	65	32	33	0	18	31	39	16	14	2	
55	Jaynagar	3	21	11	10	0	20	16	18	12	9	3	
56	Barju	59	366	194	172	0	327	96	195	110	84	26	
57	Arabari	17	95	51	44	0	83	20	58	20	20	0	
58	Pathar Chati	14	90	42	48	0	77	25	32	27	19	8	
59	Hiradihi	31	207	107	100	0	175	77	77	43	36	7	
60	Chandan Kath	82	561	304	257	253	117	228	218	103	97	6	
61	Chantibandh	9	59	31	28	0	50	24	29	16	13	3	
62	Ramraydi	50	291	146	145	0	146	105	129	55	50	5	
63	Nutandihi	33	185	92	93	0	156	74	40	40	36	4	
64	Bhaukmari	8	39	14	25	0	32	7	21	10	8	2	
65	Sitanathpur	57	355	192	163	0	111	166	178	70	66	4	
66	Baragada	80	493	255	238	119	0	312	126	123	115	8	
67	Palaibani	109	583	300	283	167	0	303	369	252	144	108	
68	Durgadaspur	3	16	7	9	0	0	10	9	6	4	2	
69	Banshkona	9	61	36	25	19	0	28	27	25	13	12	
70	Gakulpur	41	258	136	122	0	159	130	132	100	49	51	
71	Katalkuli	98	606	302	304	0	0	338	212	201	151	50	
72	Lengtisol	52	295	150	145	83	172	109	135	71	63	8	
73	Bagbasa	137	788	385	403	198	291	302	345	203	146	57	
74	Saraswatipur	24	163	71	92	26	0	71	71	29	25	4	
75	Pachakua	273	1225	640	585	43	55	621	543	300	283	17	
76	Dhansol	93	624	362	262	57	75	378	229	136	107	29	
77	Dubrajpur	11	62	33	29	7	5	29	26	22	12	10	
78	Biridanga	12	76	35	41	0	0	28	31	15	14	1	
79	Jhar Bhanga	231	850	452	398	23	8	542	266	222	216	6	
80	Tyangrasol	8	68	38	30	0	53	3	25	17	11	6	
81	Birbhanpur	43	267	128	139	185	2	91	124	53	50	3	
82	Uparkamala	70	423	213	210	152	21	197	106	59	54	5	
83	Kamala Kismat	4	26	12	14	21	0	7	11	5	4	1	
84	Turepara	141	880	445	435	595	4	486	232	79	74	5	
85	Bankibandh	192	1145	591	554	0	243	556	475	343	249	94	
86	Tildanga	66	400	207	193	237	18	198	136	94	74	20	
87	Jambani	15	76	49	27	0	21	34	27	14	12	2	
88	Bara Bakhra	14	102	55	47	53	26	40	44	25	21	4	
89	Shal Dahara	114	671	347	324	0	150	351	258	161	150	11	
90	Chensol	22	141	82	59	23	0	81	49	32	30	2	

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District & CD Block	No of House Hold	Total Population			Total SC	Total ST	Total Literate	otal Worker Total	Total Main Workers			
			Total	Male	Female					Total	Male	Female	
	District West Midnapur & Block Salboni												
91	Bhad Kuri	34	196	100	96	12	0	87	47	27	26	1	
92	Madhupur	29	200	108	92	0	11	92	59	25	25	0	
93	Krishnapur	27	173	85	88	6	0	88	39	39	37	2	
94	Dakshinsol	55	313	161	152	101	0	171	88	79	71	8	
95	Mahishlot	7	43	24	19	0	0	32	11	8	8	0	
96	Kadalawa	1	6	2	4	0	0	3	4	2	2	0	
97	Brindabanpur	2	8	6	2	0	0	5	5	3	3	0	
98	Nadarya	99	623	324	299	178	0	345	159	75	69	6	
99	Saiyadpur	144	982	502	480	0	44	536	198	151	144	7	
100	Benachapra	196	1154	601	553	409	23	621	320	316	255	61	
101	Jaynarayanpur	22	143	73	70	78	0	41	55	53	32	21	
102	Sarasbedya	117	722	348	374	83	0	371	293	141	130	11	
103	Arabari	7	42	18	24	0	0	19	15	4	4	0	
104	Srikrishnapur	19	96	49	47	0	13	51	60	22	20	2	
105	Jamdedya	143	843	447	396	290	0	514	284	216	188	28	
106	Ashna Shuli	127	802	403	399	0	12	433	402	242	177	65	
107	Hatmari	97	581	309	272	219	68	333	170	140	122	18	
108	Gaighata	134	769	398	371	113	102	472	240	168	157	11	
109	Kulpheni	91	534	272	262	301	2	201	204	190	118	72	
110	Sundra	41	327	151	176	0	0	159	60	59	58	1	
111	Rajbandh	26	161	80	81	130	0	62	36	36	27	9	
112	Ahammadpur	11	79	38	41	0	65	13	18	18	13	5	
113	Metal	79	453	227	226	141	0	212	150	71	65	6	
114	Maheswaripur	15	90	48	42	0	81	33	38	37	24	13	
115	Danmari	35	219	116	103	0	0	156	72	64	64	0	
116	Shyamchandpur	47	260	135	125	0	166	91	80	64	48	16	
117	Jagyeswarpur	25	171	90	81	4	83	69	85	79	48	31	
118	Sitarampur	67	409	214	195	33	72	195	219	219	121	98	
119	Khas Jangal	103	619	325	294	0	0	142	259	51	50	1	
120	Godapiasol	258	1468	765	703	495	121	861	579	498	359	139	
121	Pathrajuri	156	1042	545	497	503	105	550	386	266	230	36	
122	Rana	52	323	180	143	0	213	119	124	64	55	9	
123	Benucha	315	1790	907	883	97	607	769	659	414	355	59	
124	Jamdargar	75	437	211	226	12	124	193	138	72	65	7	
125	Kulapachhuria	168	904	461	443	126	74	445	289	127	108	19	
126	Saraswatipur	31	199	96	103	8	0	137	66	58	51	7	
127	Mangalmari	45	272	115	157	0	0	115	55	54	51	3	
128	Dalkati	8	50	28	22	0	0	6	25	10	10	0	
129	Shibakata	27	145	73	72	0	0	34	66	9	9	0	

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District	No of House	Total Population			Total	Total	Total	otal Worker	Total Main Workers		
	& CD Block	Hold	Total	Male	Female	SC	ST	Literate	Total	Total	Male	Female
	District West Midnapur & Block Salboni											
130	Saula	188	1195	613	582	0	9	593	360	294	265	29
131	Durbbagere	1	5	3	2	0	0	5	1	0	0	0
132	Kamarmuri	27	144	75	69	12	0	101	37	25	23	2
133	Chaita	184	1089	551	538	315	120	594	439	255	234	21
134	Phulber	1	6	4	2	0	0	4	1	1	1	0
135	Belia	18	106	51	55	0	0	78	27	27	24	3
136	Kuchakala	6	28	15	13	0	18	13	8	7	6	1
137	Betkundri	64	404	199	205	0	226	197	137	94	86	8
138	Krishna Nagar	117	703	324	379	259	262	195	204	90	83	7
139	Chaksrinath	18	91	44	47	0	0	51	42	27	21	6
140	Pirchak	2	20	13	7	0	18	2	9	6	5	1
141	Dhanyasol	41	299	162	137	1	0	185	162	109	82	27
142	Koredan	230	1412	714	698	690	0	493	589	445	317	128
143	Kuturia	171	993	473	520	173	23	425	311	236	205	31
144	Ghurnidaha	1	5	2	3	0	0	4	2	1	0	1
145	Bhandarmur	15	88	47	41	68	8	17	24	20	17	3
146	Meteldebighata	52	285	146	139	0	0	62	80	58	52	6
147	Belijuri	178	1067	536	531	345	115	364	437	188	178	10
148	Khasjangal	3	21	10	11	17	0	7	7	3	3	0
149	Baharkala Berya	116	709	380	329	17	195	279	266	253	184	69
150	Bhabrigere	80	499	255	244	16	0	166	102	102	98	4
151	Jambani	59	343	186	157	26	0	190	92	91	85	6
152	Chanibani	88	521	263	258	86	21	156	135	83	81	2
153	Kismatdhopasol	1	2	2	0	0	0	2	2	2	2	0
154	Gabru	198	1200	626	574	90	44	716	373	343	253	90
155	Kismat Bankati	24	151	79	72	0	0	70	61	57	30	27
156	Karnagar	464	2826	1449	1377	54	184	829	1216	1148	686	462
157	Chandua	16	76	35	41	0	67	11	35	24	14	10
158	Khayerrulyachak Phulpahari	378	1995	994	1001	57	0	1404	653	560	441	119
159	Khayerbani	89	425	202	223	8	0	292	152	123	107	16
160	Kunaburi	43	302	161	141	0	78	157	75	73	62	11
161	Bhagabatichak	43	260	141	119	53	124	144	113	58	43	15
162	Khasjangal	90	576	289	287	326	40	266	249	167	116	51
163	Amratala	12	68	35	33	58	0	30	35	14	13	1
164	Bhalka Chak	88	567	279	288	141	0	335	191	96	92	4
165	Dakshin Amchhatagolapi Chak	274	1509	781	728	160	568	690	542	303	252	51
166	Uttar Amchhata	42	263	143	120	190	0	103	92	33	30	3
167	Khasjangal Cantonment	779	4350	2199	2151	1143	982	2438	1168	1033	891	142
168	Talkui	212	1091	581	510	32	105	729	281	266	232	34

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District & CD Block	No of House Hold	Total Population			Total SC	Total ST	Total Literate	otal Worker	Total Main Workers			
			Total	Male	Female				Total	Total	Male	Female	
	District West Midnapur & Block Salboni												
169	Asasgar	481	2627	1332	1295	529	25	1652	830	660	515	145	
170	Kangalganj Patna	90	501	251	250	204	96	178	159	80	56	24	
171	Jamunabali Basantpur	108	549	294	255	33	11	339	163	91	83	8	
172	Baharbarua	34	176	83	93	151	0	63	73	2	2	0	
173	Barua	587	3358	1726	1632	438	713	1722	1212	900	760	140	
174	Kaoamari	39	210	108	102	0	178	39	107	90	45	45	
175	Chandipur	125	793	407	386	383	108	312	380	53	52	1	
176	Satgerya	156	927	488	439	17	321	268	206	206	194	12	
177	Shankati	232	1358	710	648	53	467	669	315	255	236	19	
178	Shiromani	438	2622	1375	1247	294	1207	813	1142	876	579	297	
179	Bishra	346	2121	1092	1029	764	602	742	933	537	471	66	
	TOTAL	16238	95275	48743	46532	16207	18025	45028	35136	24944	19321	5623	
	District West Midnapur & Block Midnapore												
1	Tasarara	91	884	501	383	149	536	463	246	70	62	8	
2	Dharmmapur	114	641	326	315	0	0	341	176	171	170	1	
3	Gobrasol	20	124	70	54	0	108	36	50	21	18	3	
4	Magurgerya Chhota	139	910	441	469	0	741	127	395	223	159	64	
5	Chuasol	67	428	220	208	0	0	78	154	67	62	5	
6	Mahdebchak	116	764	371	393	0	637	211	347	336	179	157	
7	Banpura	421	2986	1496	1490	185	201	1418	973	626	560	66	
8	Ajodhya Nagar	344	2476	1317	1159	0	7	943	528	369	351	18	
9	Jamirara	16	111	56	55	0	91	47	58	23	20	3	
10	Kumarpur	178	1062	534	528	22	133	542	365	211	203	8	
	TOTAL	1506	10386	5332	5054	356	2454	4206	3292	2117	1784	333	

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District & CD Block	Total Marginal Workers			Total Non Workers			Main Cultivators			Main Agricultures		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
	District West Midnapur & Block Keshpur												
1	Nimkol	2	1	1	29	9	20	14	14	0	0	0	0
2	Pebua	12	8	4	337	96	241	59	57	2	51	47	4
3	Chanda Bila	53	9	44	337	105	232	99	83	16	37	25	12
4	Dotal	19	1	18	161	63	98	48	45	3	15	11	4
5	Kharga Diha	89	31	58	225	87	138	73	70	3	12	10	2
6	Panite Ghari	129	43	86	113	44	69	64	64	0	25	23	2
7	Shiris Bani	117	33	84	104	41	63	33	33	0	36	33	3
8	Kontai	54	19	35	1272	414	858	452	445	7	26	25	1
9	Kali Nagar	55	13	42	130	55	75	44	39	5	15	12	3
10	Dudiabandi	180	16	164	381	159	222	176	167	9	32	26	6
11	Gobardda	153	25	128	307	144	163	157	139	18	34	17	17
12	Ghosh Khira	31	3	28	59	35	24	31	31	0	3	2	1
13	Amla Bani	5	4	1	266	78	188	104	104	0	3	3	0
14	Kharpuri	0	0	0	250	79	171	97	97	0	1	1	0
15	Dhamsai	36	9	27	482	174	308	61	61	0	125	123	2
16	Dara	8	6	2	273	80	193	93	91	2	9	9	0
17	Anandapur	496	295	201	6853	2371	4482	303	285	18	435	401	34
18	Gopal Nagar	16	2	14	174	60	114	54	47	7	2	0	2
19	Ganta	15	1	14	149	58	91	83	56	27	5	4	1
20	Teghari	82	1	81	746	280	466	193	183	10	103	74	29
21	Mejura	46	14	32	957	369	588	130	126	4	165	121	44
22	Putigerya	21	8	13	35	24	11	6	6	0	1	1	0
23	Kashi Danga	0	0	0	24	7	17	15	14	1	0	0	0
24	Chanda Bila	19	11	8	119	54	65	37	15	22	25	13	12
25	Manta Bani	48	14	34	164	70	94	45	26	19	35	21	14
26	Dhakkata	131	34	97	262	119	143	52	38	14	5	4	1
27	Asta Kola	11	5	6	69	30	39	15	14	1	12	6	6
28	Betbani Radha Khauki	11	0	11	66	23	43	29	28	1	1	1	0
29	Pukhur Kona	51	18	33	191	67	124	46	46	0	9	8	1
30	Ramakata	19	7	12	161	56	105	65	60	5	6	3	3
31	Raghunath Chak	11	4	7	39	18	21	8	6	2	20	12	8
32	Kshirkul	47	3	44	245	110	135	44	43	1	84	61	23
33	Deulbar	37	2	35	286	97	189	34	33	1	51	50	1
34	Palbani	25	4	21	86	32	54	42	41	1	1	1	0
35	Renuar	99	36	63	561	200	361	151	149	2	56	52	4
36	Kanch Gerya	113	45	68	351	156	195	57	57	0	41	41	0
37	Jaora Paikan	8	4	4	186	60	126	29	29	0	14	14	0
38	Nagda	74	20	54	885	286	599	139	138	1	177	167	10
39	Ganga Para	1	1	0	59	18	41	9	9	0	9	9	0

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District	Total Marginal Workers			Total Non Workers			Main Cultivators			Main Agricultures		
	& CD Block	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
	District West Midnapur & Block Keshpur												
40	Santarya	58	6	52	130	59	71	27	26	1	30	27	3
41	Khudibisi	2	0	2	213	72	141	57	57	0	11	11	0
42	Gangashini	4	3	1	106	26	80	35	35	0	3	3	0
43	Kumira	45	5	40	123	48	75	38	35	3	20	17	3
44	Bara Baruj	19	2	17	501	156	345	126	126	0	48	45	3
45	Udai Chak	1	0	1	27	7	20	2	2	0	1	1	0
46	Binjuria	129	22	107	299	153	146	99	85	14	88	64	24
47	Bara Duary	0	0	0	10	4	6	3	3	0	2	1	1
48	Chhoto Baruj	9	2	7	272	80	192	84	81	3	83	47	36
49	Khanra Sai	41	8	33	96	40	56	28	24	4	18	14	4
50	Mohanpur	14	3	11	225	66	159	69	67	2	34	20	14
51	Jabar Danga	5	2	3	86	30	56	14	14	0	5	5	0
52	Jambani	69	2	67	191	82	109	61	58	3	26	23	3
53	Chauki Ghata	51	5	46	144	65	79	30	27	3	35	29	6
54	Bagla	241	45	196	360	168	192	193	187	6	20	16	4
55	Khas Jangal	34	7	27	347	128	219	47	45	2	129	82	47
56	Uttar Tasarara	12	2	10	58	26	32	23	21	2	3	0	3
57	Amsol	22	2	20	75	28	47	28	27	1	10	9	1
58	Kapta Bankati	69	38	31	673	240	433	33	33	0	42	42	0
59	Bagasol	5	3	2	240	98	142	11	10	1	29	29	0
60	Karia Sol	5	2	3	48	18	30	3	2	1	47	23	24
61	Kamar Gerya	54	36	18	231	83	148	37	37	0	21	21	0
62	Khasla	34	18	16	318	117	201	13	12	1	43	43	0
63	Charka	158	115	43	2166	785	1381	264	258	6	108	108	0
	TOTAL	3405	1078	2327	24333	8807	15526	4516	4261	255	2537	2111	426
	District West Midnapur & Block Salboni												
1	Nutandihi	11	10	1	250	82	168	86	84	2	1	1	0
2	Garmal	302	74	228	575	266	309	92	85	7	138	94	44
3	Karamarsolurf Kalibasa	73	16	57	126	62	64	3	3	0	49	44	5
4	Radhamohanpur	0	0	0	5	3	2	0	0	0	2	1	1
5	Mirga	23	1	22	435	174	261	107	100	7	210	93	117
6	Jara	72	13	59	233	117	116	30	30	0	168	89	79
7	Kunjami Goaldihi	30	20	10	424	156	268	136	132	4	2	2	0
8	Barapatharkumkumi	0	0	0	428	149	279	86	83	3	168	101	67
9	Jorakusmi	0	0	0	168	70	98	21	18	3	105	54	51
10	Susnibari	2	0	2	80	35	45	18	14	4	44	19	25
11	Chhotapatharkumkumi	1	0	1	34	6	28	7	7	0	16	10	6
12	Tarashuli	18	1	17	43	23	20	24	20	4	20	8	12

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District	Total Marginal Workers			Total Non Workers			Main Cultivators			Main Agricultures		
	& CD Block	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
	District West Midnapur & Block Salboni												
52	Banshkopna	58	25	33	118	51	67	34	32	2	55	18	37
53	Khairisol	10	4	6	30	14	16	9	7	2	0	0	0
54	Radhagobindapur	23	6	17	21	9	12	8	8	0	1	1	0
55	Jaynagar	6	2	4	2	0	2	4	3	1	0	0	0
56	Barju	85	26	59	132	63	69	17	16	1	85	65	20
57	Arabari	38	10	28	25	14	11	17	17	0	1	1	0
58	Pathar Chati	5	0	5	45	16	29	7	7	0	18	10	8
59	Hiradihi	34	15	19	98	39	59	20	20	0	18	11	7
60	Chandan Kath	115	38	77	268	126	142	22	22	0	65	61	4
61	Chantibandh	13	2	11	21	10	11	3	3	0	11	9	2
62	Ramraydi	74	13	61	121	62	59	11	10	1	36	34	2
63	Nutandihi	0	0	0	116	40	76	36	32	4	0	0	0
64	Bhaukmari	11	1	10	11	4	7	1	1	0	8	6	2
65	Sitanathpur	108	33	75	132	67	65	9	9	0	50	48	2
66	Baragada	3	3	0	304	102	202	112	106	6	1	0	1
67	Palaibani	117	47	70	158	82	76	128	97	31	61	22	39
68	Durgadaspur	3	0	3	5	2	3	2	1	1	3	2	1
69	Banshkona	2	0	2	26	17	9	10	4	6	15	9	6
70	Gakulpur	32	16	16	100	59	41	37	25	12	58	21	37
71	Katalkuli	11	2	9	309	106	203	73	70	3	115	70	45
72	Lengtisol	64	9	55	121	58	63	23	21	2	45	39	6
73	Bagbasa	142	50	92	348	151	197	55	50	5	82	46	36
74	Saraswatipur	42	10	32	66	29	37	22	19	3	0	0	0
75	Pachakua	243	70	173	512	201	311	87	84	3	7	6	1
76	Dhansol	93	9	84	324	205	119	79	64	15	19	11	8
77	Dubrajpur	4	0	4	27	16	11	14	8	6	5	2	3
78	Biridanga	16	2	14	31	14	17	7	6	1	5	5	0
79	Jhar Bhanga	44	19	25	450	146	304	5	5	0	0	0	0
80	Tyangrasol	8	2	6	28	14	14	0	0	0	17	11	6
81	Birbhanpur	71	17	54	98	42	56	3	3	0	24	22	2
82	Uparkamala	47	38	9	248	84	164	15	15	0	2	2	0
83	Kamala Kismat	6	2	4	10	4	6	0	0	0	5	4	1
84	Turepara	153	142	11	523	169	354	38	38	0	5	5	0
85	Bankibandh	132	32	100	509	231	278	84	81	3	199	114	85
86	Tildanga	42	16	26	209	85	124	14	13	1	22	17	5
87	Jambani	13	6	7	37	22	15	2	2	0	5	3	2
88	Bara Bakhra	19	3	16	39	22	17	2	2	0	14	12	2
89	Shal Dahara	97	14	83	328	143	185	131	126	5	7	5	2
90	Chensol	17	13	4	74	28	46	14	14	0	2	2	0

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District	Total Marginal Workers			Total Non Workers			Main Cultivators			Main Agricultures		
	& CD Block	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
	District West Midnapur & Block Salboni												
91	Bhad Kuri	20	12	8	118	44	74	12	11	1	1	1	0
92	Madhupur	34	19	15	110	44	66	16	16	0	0	0	0
93	Krishnapur	0	0	0	111	36	75	21	20	1	15	14	1
94	Dakshinsol	9	3	6	187	71	116	17	16	1	9	8	1
95	Mahishlot	3	0	3	27	14	13	0	0	0	0	0	0
96	Kadalawa	2	0	2	1	0	1	1	1	0	0	0	0
97	Brindabanpur	2	0	2	2	2	0	3	3	0	0	0	0
98	Nadarya	84	63	21	392	152	240	37	35	2	0	0	0
99	Saiyadpur	47	32	15	642	245	397	9	9	0	23	21	2
100	Benachapra	4	3	1	691	258	433	107	106	1	121	66	55
101	Jaynarayanpur	2	1	1	63	28	35	19	13	6	30	15	15
102	Sarasbedya	152	21	131	332	154	178	53	53	0	68	59	9
103	Arabari	11	3	8	20	7	13	4	4	0	0	0	0
104	Srikrishnapur	38	8	30	31	18	13	5	5	0	8	8	0
105	Jamdedya	68	32	36	456	170	286	47	45	2	70	52	18
106	Ashna Shuli	160	26	134	296	140	156	124	92	32	78	48	30
107	Hatmari	30	22	8	344	125	219	44	44	0	59	45	14
108	Gaighata	72	45	27	435	146	289	72	70	2	30	22	8
109	Kulpheni	14	11	3	258	106	152	31	25	6	130	66	64
110	Sundra	1	0	1	215	71	144	25	24	1	0	0	0
111	Rajbandh	0	0	0	102	42	60	35	26	9	0	0	0
112	Ahammadpur	0	0	0	47	18	29	14	9	5	1	1	0
113	Metal	79	45	34	242	91	151	48	47	1	9	7	2
114	Maheswaripur	1	1	0	43	18	25	35	22	13	0	0	0
115	Danmari	8	8	0	124	33	91	32	32	0	17	17	0
116	Shyamchandpur	16	5	11	135	58	77	5	5	0	42	28	14
117	Jagyeswarpur	6	0	6	66	33	33	0	0	0	79	48	31
118	Sitarampur	0	0	0	136	63	73	9	4	5	203	111	92
119	Khas Jangal	208	101	107	264	123	141	8	8	0	0	0	0
120	Godapiasol	81	35	46	740	287	453	47	41	6	251	137	114
121	Pathrajuri	120	34	86	508	201	307	37	36	1	114	88	26
122	Rana	60	21	39	151	77	74	14	14	0	38	34	4
123	Benucha	245	78	167	917	375	542	101	97	4	143	109	34
124	Jamdargar	66	34	32	232	81	151	7	6	1	37	32	5
125	Kulapachhuria	162	94	68	503	205	298	11	9	2	25	15	10
126	Saraswatipur	8	5	3	116	31	85	8	8	0	6	5	1
127	Mangalmari	1	1	0	169	46	123	16	15	1	20	20	0
128	Dalkati	15	1	14	19	12	7	1	1	0	6	6	0
129	Shibakata	57	27	30	61	26	35	3	3	0	0	0	0

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District	Total Marginal Workers			Total Non Workers			Main Cultivators			Main Agricultures		
	& CD Block	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
	District West Midnapur & Block Salboni												
130	Saula	66	38	28	663	225	438	138	134	4	79	57	22
131	Durbbagere	1	1	0	4	2	2	0	0	0	0	0	0
132	Kamarmuri	12	9	3	92	33	59	9	9	0	7	6	1
133	Chaita	184	66	118	498	173	325	93	84	9	74	70	4
134	Phulber	0	0	0	4	2	2	1	1	0	0	0	0
135	Belia	0	0	0	67	21	46	18	18	0	0	0	0
136	Kuchakala	1	0	1	17	8	9	6	5	1	1	1	0
137	Betkundri	43	9	34	214	80	134	29	29	0	30	24	6
138	Krishna Nagar	114	43	71	387	152	235	51	50	1	5	5	0
139	Chaksrinath	15	1	14	40	17	23	14	9	5	3	2	1
140	Pirchak	3	2	1	9	5	4	3	2	1	3	3	0
141	Dhanyasol	53	7	46	103	52	51	80	59	21	4	2	2
142	Koredan	144	22	122	635	277	358	38	37	1	286	171	115
143	Kuturia	75	1	74	545	207	338	16	14	2	112	93	19
144	Ghurnidaha	1	1	0	3	1	2	0	0	0	0	0	0
145	Bhandarmur	4	1	3	54	24	30	1	1	0	4	2	2
146	Meteldebighata	22	4	18	163	66	97	3	3	0	0	0	0
147	Belijuri	249	70	179	471	215	256	59	56	3	64	59	5
148	Khasjangal	4	0	4	10	4	6	0	0	0	3	3	0
149	Baharkala Berya	13	1	12	356	149	207	38	26	12	66	31	35
150	Bhabrigere	0	0	0	324	118	206	75	72	3	20	20	0
151	Jambani	1	0	1	212	77	135	60	57	3	17	16	1
152	Chanibani	52	24	28	314	120	194	6	6	0	66	64	2
153	Kismatdhopasol	0	0	0	0	0	0	0	0	0	0	0	0
154	Gabru	30	10	20	683	286	397	104	97	7	161	93	68
155	Kismat Bankati	4	1	3	71	41	30	0	0	0	57	30	27
156	Karnagar	68	31	37	1233	531	702	423	274	149	587	318	269
157	Chandua	11	5	6	32	12	20	5	3	2	19	11	8
158	Khayerrulyachak Phulpahari	93	64	29	1146	395	751	2	2	0	2	1	1
159	Khayerbani	29	3	26	224	71	153	4	4	0	9	8	1
160	Kunaburi	2	2	0	186	76	110	22	19	3	16	9	7
161	Bhagabatichak	55	23	32	116	57	59	13	12	1	6	4	2
162	Khasjangal	82	23	59	259	114	145	6	6	0	44	20	24
163	Amratala	21	7	14	24	11	13	0	0	0	4	4	0
164	Bhalka Chak	95	61	34	297	92	205	4	4	0	1	1	0
165	Dakshin Amchhatagolapi Chak	239	120	119	775	313	462	20	13	7	9	6	3
166	Uttar Amchhata	59	38	21	131	55	76	0	0	0	0	0	0
167	Khasjangal Cantonment	135	75	60	2701	996	1705	50	40	10	28	21	7
168	Talkui	15	13	2	696	268	428	16	15	1	18	13	5

Socio-economic Data of the Study Area :

Annexure-II

S. N.	District & CD Block	Total Marginal Workers			Total Non Workers			Main Cultivators			Main Agricultures		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
	District West Midnapur & Block Salboni												
169	Asasgar	170	135	35	1507	532	975	9	9	0	6	6	2
170	Kangalganj Patna	79	53	26	271	104	167	18	11	7	1	0	1
171	Jamunabali Basantpur	72	56	16	335	125	210	17	14	3	2	2	0
172	Baharbarua	71	45	26	88	31	57	0	0	0	0	0	0
173	Barua	312	130	182	1745	622	1123	260	244	16	109	74	35
174	Kaoamari	17	7	10	71	34	37	8	6	2	77	34	43
175	Chandipur	327	142	185	275	144	131	26	26	0	1	1	0
176	Satgerya	0	0	0	590	218	372	21	21	0	155	143	12
177	Shankati	60	58	2	874	323	551	110	98	12	91	85	6
178	Shiromani	266	82	184	1118	513	605	243	169	74	495	299	196
179	Bishra	396	67	329	687	393	494	186	175	11	258	205	53
	TOTAL	10192	3792	6400	47741	19228	28513	7266	6240	1026	8821	5568	3233
	District West Midnapur & Block Midnapore												
1	Tasarara	176	54	122	541	340	201	2	2	0	172	50	122
2	Dharmmapur	5	3	2	383	114	269	0	0	0	5	3	2
3	Gobrasol	29	4	25	58	38	20	6	0	6	23	4	19
4	Magurgerya Chhota	172	42	130	377	179	198	16	5	11	156	37	119
5	Chuasol	87	15	72	195	99	96	13	2	11	74	13	61
6	Mahdebchak	11	5	6	290	131	159	3	2	1	8	3	5
7	Banpura	347	150	197	1597	590	1007	25	20	5	152	88	64
8	Ajodhya Nagar	159	147	12	1536	599	937	34	34	0	40	37	3
9	Jamirara	35	11	24	37	18	19	18	4	14	11	3	8
10	Kumarpur	154	64	90	573	204	369	64	18	46	56	30	26
	TOTAL	1175	495	680	5587	2312	3275	181	87	94	697	268	429