DRAFT REPORT

SEPTEMBER, 2022

M/s SATVIK ENTERPRISES LIMITED

ENVIRONMENTAL IMPACT ASSESSMENT

For

INSTALLATION OF FERRO-ALLOY PLANT (SAF 2X9 MVA)
AND CHROME ORE BRIQUETTE PLANT (10 TPH)

At

Mouza: Sahebdihi, P.O. : Hat -Asuria, PS: Barjora,
District: Bankura, West Bengal

Envirotech

Envirotech East Pvt. Limited

An ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Company
Inhouse Laboratory Recognised by Ministry of Environment, Forest & Climate Change, Govt. of India
Accreditated by NABET, Quality Council of India as an EIA Consultant
NABET Certificate No.: NABET/EIA/2124/SA 0145
Baseline Monitoring Period: 1st March, 2022 – 31st May, 2022
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An ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified Company

- **Laboratory Recognized by MoEF&CC, Govt. of India**
- **Laboratory Recognized by West Bengal Pollution Control Board**
- **Accredited EIA Consultant by QCI-NABET**

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CIN NO : U74210WB1989PTC047403

Date: 16th September, 2022

TO WHOM IT MAY CONCERN

Subject: Proposed Installation of Ferro-Alloy Plant (SAF 2x9 MVA) and Ferro-Chrome Briquetting Plant (10 TPH) at Mouza: Sahebdihi, P.O. : Hat -Asuria & PS: Barjora, District: Bankura in West Bengal by M/s Satvik Enterprises Limited

Refer: File No. J-11011/154/2022-IA-II(IND-I)
Proposal No. IA / WB / IND / 286081 / 2022

We do hereby declare that we, M/s Envirotech East Pvt. Ltd. have undertaken the Environmental Impact Assessment Study for the subject job, as per the EIA Notification, 2006 and in compliance with the finalized Terms of Reference, issued by Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India vide its letter (Ref. File No. J-11011/154/2022-IA-II(IND-I)) dated 18th August, 2022. The prescribed TORs have been complied with and that the data submitted is factually correct.

For **Envirotech East Pvt. Ltd.**

(Asoke Kumar Banerjee)
Director

SATVIK ENTERPRISES LIMITED

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FAX : (033) 4064 6480 ❑ E-MAIL : info@satvikindia.com
Website : www.satvikindia.com

Date: 16th, September, 2022

TO WHOM IT MAY CONCERN

Subject: **Proposed Installation of Ferro-Alloy Plant (SAF 2x9 MVA) and Ferro-Chrome Briquetting Plant (10 TPH) at Mouza: Sahebdihi, P.O. : Hat -Asuria & PS: Barjora, District: Bankura in West Bengal by M/s Satvik Enterprises Limited**

Refer: **File No. J-11011/154/2022-IA-II(IND-I)**
Proposal No. . IA / WB / IND / 286081 / 2022

This is to certify that we, **M/s Satvik Enterprises Limited** have gone through the entire Environmental Impact Assessment report, prepared by M/s Envirotech East Pvt. Ltd., Kolkata as per the EIA Notification, 2006 and in compliance with the finalized Terms of Reference, issued by Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India vide its letter (Ref. File No. J-11011/154/2022-IA-II(IND-I)) dated 18th August, 2022 for the above-mentioned project. The Information/data as given in the EIA report has been checked at our end and is found to be factually correct in all respect.

Thanking you,

Yours Sincerely,
for **Satvik Enterprises Limited**

Vikash Agarwal
Managing Director

WORKS:
Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora,
District: Bankura, West Bengal

ISO 9001 : 2015

DECLARATION

Declaration by Experts contributing to the EIA report for Proposed Installation of Ferro-Alloy Plant (SAF - 2x9 MVA) by installation of (SAF – 2x9 MVA) Sub Merged Arc Furnace and Ferro-Chrome Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal by M/s Satvik Enterprises Limited.

This project falls under Sl. No. 3(a), [i.e., Metallurgical industries (ferrous & non-ferrous) - both Primary and Secondary] of Category "A" of the list of the projects of the schedule shall require prior Environmental Clearance from Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt.of India.

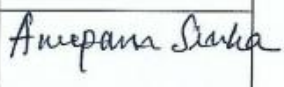
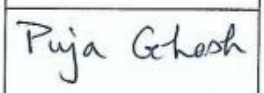
We, hereby, certify that we were part of the EIA team in the following capacity that developed the above EIA.

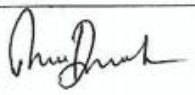
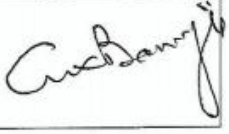
EIA Co-ordinator : Metallurgical Industries (Ferrous & Non-ferrous)

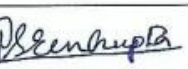
Name : Mr. T. Kundu

DECLARATION BY EIA CO-ORDINATORS / FUNCTIONAL AREA EXPERTS INVOLVED IN THE PREPARATION OF EIA REPORT

Discipline	Name of Expert	Key Qualifications indicating area of specialization relevant to the respective discipline	Involvement (Period & Task)	Signature
EIA Coordinator : Mr. T. Kundu		Bachelor of Technology (Chemical Engineering)	July, 2022 to till date Assessment & identification of the overall project, co-ordination with respective functional area experts, finalisation of action plans for the overall preparation of EIA report	
Functional Area Experts involved:				
Air Pollution	Mr. T. Kundu	Bachelor of Technology (Chemical Engineering)	July, 2022 to till date Finalization of monitoring locations for Ambient Air Quality Monitoring, evaluation of Ambient Air Quality results, suggestions & finalization of air pollution control measures, with client and contribution to overall EIA report preparation.	
Meteorology	Mr. A. K. Sinha	P.G. Diploma in Environmental Science and Technology	July, 2022 to till date Identification of air emission sources and their inventorisation, prediction of cumulative impacts on ambient air quality due to all identified point & mobile sources, suggestions & finalization of mitigation measures with project proponent and	

			contribution to overall EIA report preparation.	
Water Pollution Control	Mr. Asoke Kumar Banerjee	M.Sc. (Chem.)	July, 2022 to till date Finalization of sampling locations for surface water and ground water quality monitoring, evaluation of water quality results, analysis of water balance, identification of sources for wastewater generation and give suggestions on suitable water pollution control, exploring the ways for conservation of water, identification & assessment of impacts, finalization of mitigation measures with project proponent and contribution to overall EIA report preparation.	
Hydrology	Dr. Somenath Bhattacharya	Ph.D in Geology	July, 2022 to till date Assessment of existing Geology and hydrology of the area, Understanding and representing groundwater conditions, finalization of groundwater sampling locations, finalization of survey findings, identification of probable impact due to proposed industrial activity, suggestion of mitigation measures and contribution to overall EIA report preparation.	
Ecology & Bio-diversity	Dr. (Mrs.) Anupam Sinha	Ph.D in Botany	July, 2022 to till date Assessment of the existing Ecology & Bio-diversity with proper emphasis on eco-sensitive locations, assessment of possible impacts to the biological and	
	Ms. Puja Ghosh (TM)	M.Sc in Environmental Science		

			ecological environment of the area due to the proposed industrial activity and EIA report preparation.	
Noise & Vibration	Mr. R.K. Dasgupta	Bachelor of Engineering (Mechanical)	July, 2022 to till date Finalization of noise sampling location and analysis of data, identification of impacts, suggestions & finalization of suitable mitigation measures with client and contribution to overall EIA report preparation.	
Land Use	Dr. Somenath Bhattachary ya	Ph.D in Geology	July, 2022 to till date Site visit, supervising development of land use maps of study area using GIS tools, finalization of landuse maps, based on ground truth verification, identification of any probable changes due to the proposed industrial activity and contribution to EIA report preparation.	
Solid & Hazardous Waste	Mr. Asoke Kumar Banerjee	M.Sc. (Chem.)	July, 2022 to till date Identification of potential solid & hazardous waste generating sources and their inventorisation, finalization of waste management strategies, identification of impacts, finalization of mitigation measures with project proponent and contribution to overall EIA report preparation.	
Soil Conservation	Mr. Asoke Kumar Banerjee	M.Sc. (Chem.)	July, 2022 to till date Finalization of soil sampling	

			locations, identification of potential sources of impacts due to project, finalization of suitable mitigation measures with project proponent and contribution to overall EIA report preparation.	
Risk & Hazard	Mr. T. Kundu	Bachelor of Technology (Chemical Engineering)	July, 2022 to till date Identification of major hazards, assessment of risks associated with the proposed project, quantification of the identified risks with the help of the standard software. preparation of on-site and off-site emergency plan and contribution to overall EIA report preparation.	
Socio-economics	Prof. Pabitra Sengupta	M.Sc. (Economics)	July, 2022 to till date Field survey, assessment of the existing socio-economic scenario of the area, assessment of possible changes to socio-economics of the area due to the proposed project and contribution to overall EIA report preparation.	

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ANNEXURE	DESCRIPTION
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IIA, B & C	Land Documents
III	Documents on Water Permission
IV	Documents on Power Agreement
VA & B	Ambient Air Quality Data
VI	Corporate Environmental Policy
VII	Relevant Indian Standards
VIII	Contour Map
IX	Green Belt Plantation Plan
X	Road & drainage Map

CHAPTER-1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

M/s Satvik Enterprises Limited, a Private Limited Company, was incorporated on 6th May, 1997, having its registered office at 1, Park lane, Kolkata - 700 016 in West Bengal. The Company emerged as one of the players in Ferro Alloy Industry in West Bengal after successful implementation and operation of their plant at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Dist.: Bankura, West Bengal. The company has earned an appreciative clientele in the Indian market as well as overseas markets. The quality and performance of company's product in the global market are well recognized.

Directors of the company are Mr. Vikash Agarwal, Mrs. Amita Agarwal, Mr. Arvind Kumar Ojha, Mr. Puneet Gupta & Ms. Ankita Banerjee.

M/s Satvik Enterprises Limited, proposes to set up a ferro-alloy plant by installation of 2x9 MVA Submerged Arc Furnaces along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal.

As per EIA Notification 2006, published on 14th September 2006, all projects or activities, including expansion and modernization of existing projects or activities or change in Product Mix, falling under Category 'A' in the Schedule shall require prior Environmental Clearance from Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India.

This proposed project falls under Sl. No. 3(a), Category "A" of the list of the projects of the schedule (i.e., Metallurgical industries (ferrous & non-ferrous) under Secondary metallurgical processing industry).

Accordingly, the Company submitted an online TOR application along with filled up 'Form-1' in the prescribed format and Pre-feasibility Report to MoEF&CC for seeking prior Environmental Clearance for the proposed project vide proposal no. **IA/WB/IND/286081/2022 dated 05th August, 2022**. The proposal was considered under the provisions of EIA Notification 2006, as amended, the Standard TOR issued vide letter

[**Ref. No. J-11011/154/2022-IA.II(IND-I)**] dated 18th August, 2022, with mention of the Terms of Reference (ToR) (**Annexure-I & Table – 1.3**) for the purpose of preparing Environment Impact Assessment (EIA) report and Environment Management Plan (EMP) for obtaining prior environment clearance.

As advised by the Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India, the Draft EIA/EMP Report was prepared, accommodating all the components, based on finalized ToRs for its submission to West Bengal Pollution Control Board (WBPCB) for the conduct of Public Hearing/Consultation.

This EIA Report is prepared on the basis of the available secondary data/ literature along with the on-site data during the period (**1st March, 2022 to 31st May, 2022**) representing summer season, generated through on-site monitoring of relevant environmental components and parameters.

M/s Satvik Enterprises Limited proposes to install 2x9 MVA Submerged Arc Furnaces along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal.

The proposed units with rated capacity per annum are presented in **Table-1.1**.

TABLE-1.1
PROJECT SCENARIO

	Units	Capacity
Proposed	Submerged Arc Furnaces (2x9 MVA)	32,800 TPA Si-Mn or 44,400 TPA Fe-Mn or 15,200 TPA Fe-Si or 33,600 TPA Fe-Cr
	Ferro-Chrome Briquetting Plant	10 TPH

1.2 IDENTIFICATION OF THE PROJECT

M/s Satvik Enterprises Limited proposes to install 2x9 MVA Submerged Arc Furnaces along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal.

The proposed units with rated capacity per annum are presented in **Table-1.1**.

The proposed project will be installed on total 2.18 hectares (5.38 acres) of land, which has been acquired and is in possession of the Company. Most of the facilities are available for setting up of the proposed project such as Electricity, Water, Transportation of Raw Materials and Finished Goods etc. Skilled and unskilled workers are easily available.

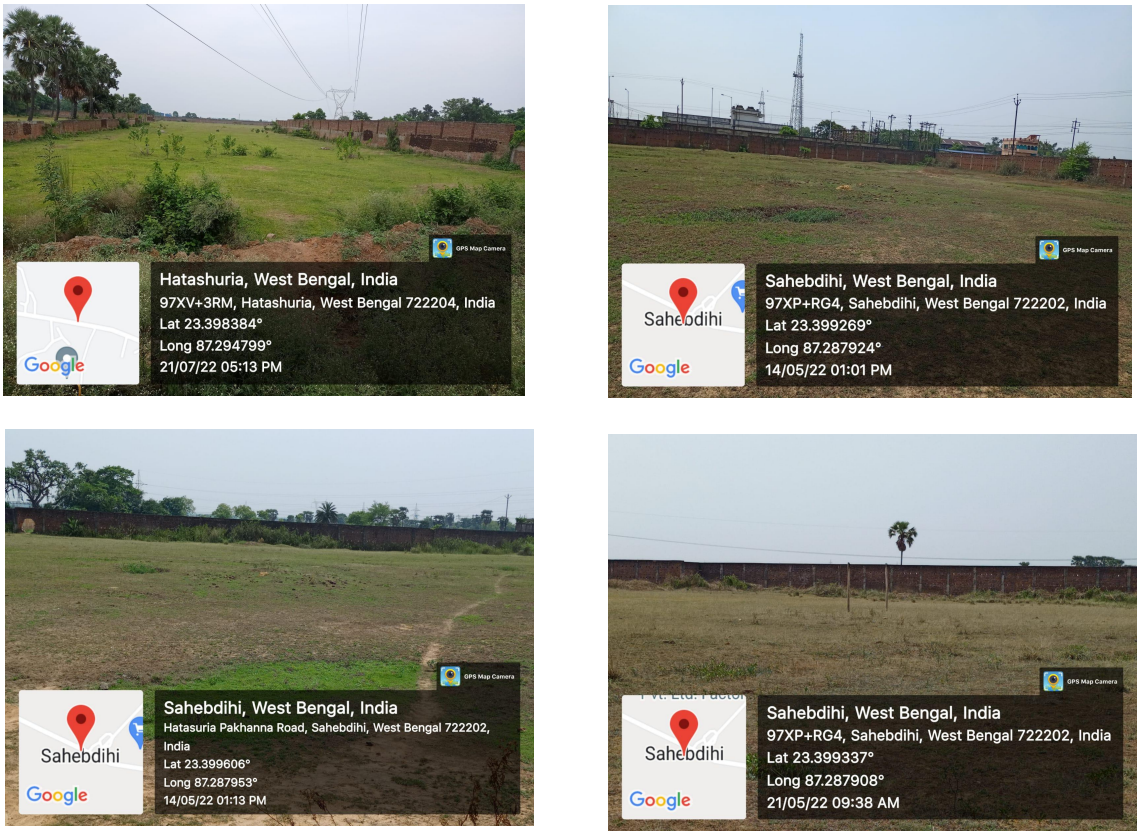


FIGURE-1.1: PROPOSED PROJECT SITE

1.3 PROJECT PROPONENT

M/s Satvik Enterprises Ltd., a Private Limited Company, was incorporated on 06/05/1997, having its registered office at 1, Park Lane, Kolkata 700 016 in West Bengal. The Company emerged as one of the players in Ferro Alloy Industry in West Bengal after taking decision to install the plant at Mouza: Sahebdihi, P.O.: Hat-Asuria, PS: Barjora, Dist.: Bankura, West Bengal.

Directors of the company are Mr. Vikash Agarwal, Mrs. Amita Agarwal, Mr. Arvind Kumar Ojha, Mr. Puneet Gupta & Ms. Ankita Banerjee.

M/s Satvik Enterprises Ltd. is a well-known and fast-growing Industrial company with manufacturing facilities in the state of West Bengal. The Company has achieved a turnover of Rs. Rs. 326.67 Crore during the FY 2020-2021. The company has earned an appreciative clientele in the Indian market as well as overseas markets. The quality and performance of company's product in the global market are well recognized.

The directors have a rich heritage in the form of a sound industrial background, with a about decade experience in ferro alloys Industry.

The group as a whole currently enjoys a respectable position as far as the manganese alloys industry is concerned. This new project being undertaken will further consolidate the group's position in the entire basket of ferro alloys.

The ideal location selected on the basis of closeness to raw material source, availability of inexpensive quality power and proximity to the port as well as the upcoming new steel destination of India will render a huge advantage for the company.

1.4 BRIEF DESCRIPTION OF THE PROJECT

1.4.1 Nature of the Project

M/s Satvik Enterprises Ltd. proposes to set up a Ferro Alloy Plant through installation of 2x9 MVA SAFs along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Dist.: Bankura, West Bengal.

The proposed Steel Plant project of **M/s. Satvik Enterprises Ltd.** falls under Sl. No. 3(a), Category "A" of the list of the projects of the schedule (i.e., Metallurgical industries (ferrous & non-ferrous) under Secondary metallurgical processing industry).

1.4.2 Size

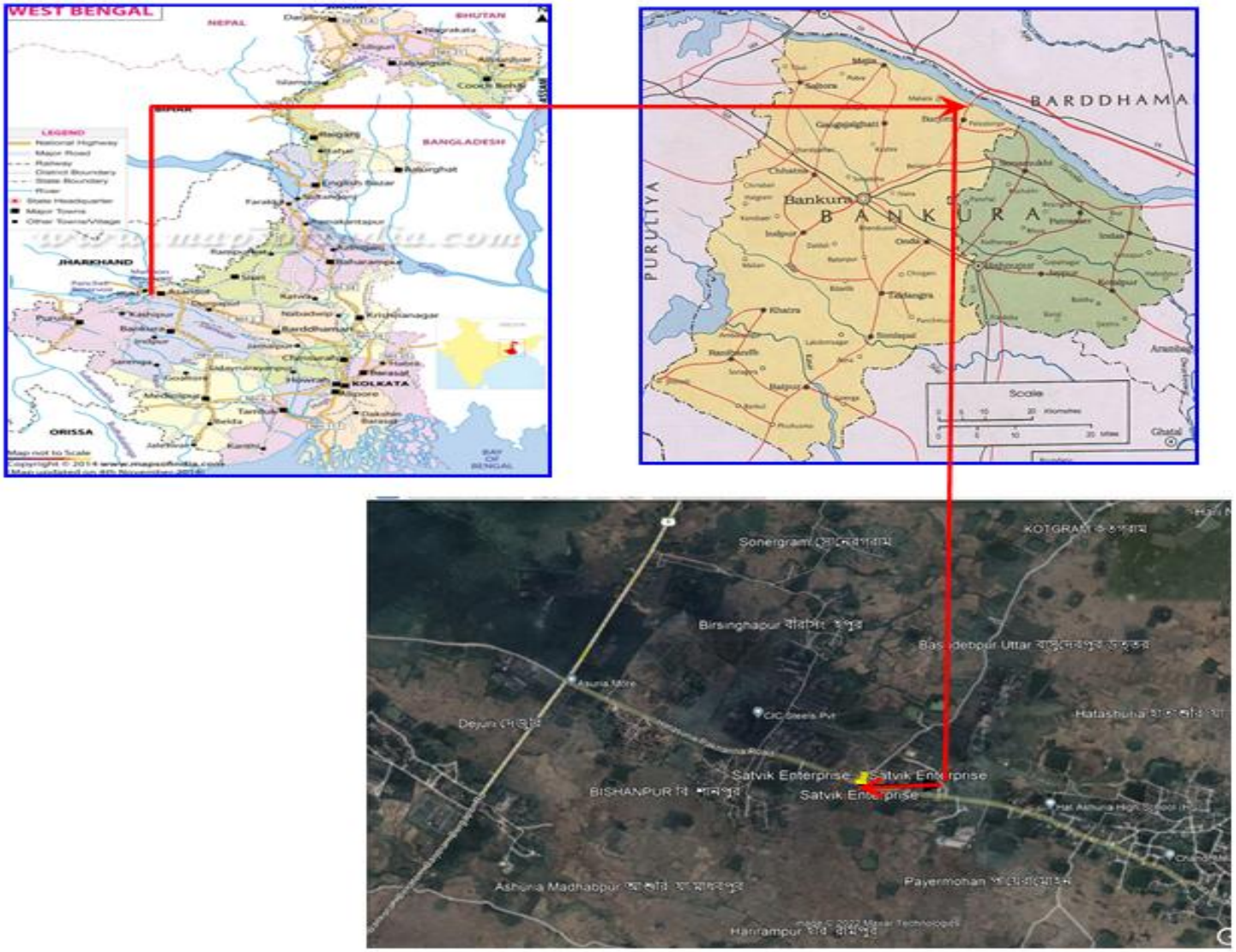
M/s Satvik Enterprises Ltd. proposes to set up a Ferro Alloy Plant through installation of 2x9 MVA SAFs along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Dist.: Bankura, West Bengal.

The proposed units with rated capacity per annum are presented in **Table-1.1**.

1.4.3 Location of Project Site

The project site is located at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Dist.: Bankura, West Bengal. The geographical co-ordinates of the project site are varying between Latitude: 23°23'54.60"N to 23°24'59.32"N and Longitude 87°17'15.69"E to 87°17'24.19"E with Above Mean Sea Level 272 ft (83m).

Google Map of the project site location & its surroundings is shown in **Figure-1.3(a)** and **Figure-1.3(b)** and the Toposheet Map showing the project site and its surrounding is in **Figure-1.4**.



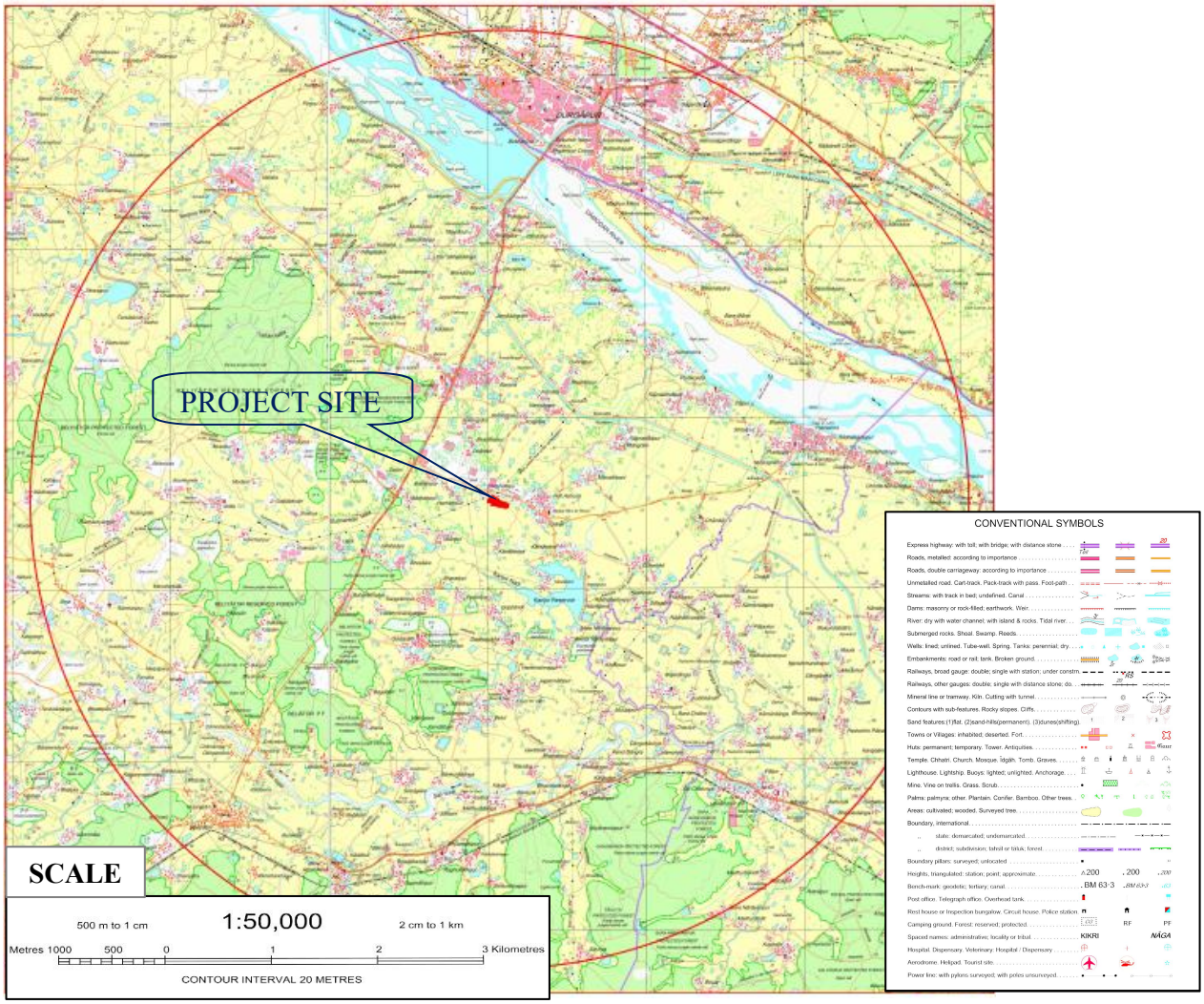
Project Site:
Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura West Bengal

Site Co-ordinate:
Latitude 23°23'54.60"N to 23°24'59.32"N and
Longitude 87°17'15.69"E to 87°17'24.19"E

Mean Sea Level : 272 ft (83m)

Figure-1.3(a) Project Site Location & Its Surroundings

Figure-1.3(b) Surrounding of the Project Site



Project Site:
Mouza:Sahebdihi, PO: Hat Asuria, PS: Barjora, Pin: 722204, District: Bankura, West Bengal

Site Co-ordinate:
Latitude 23°23'54.60"N to 23°24'59.32"N and
Longitude 87°17'15.69"E to 87°17'24.19"E

Mean Sea Level : 272 ft (83m)

Figure-1.4 TOPOSHEET MAP OF THE PROJECT SITE & ITS SURROUNDING AREA

The project site is surrounded by Paschim Bardhaman in the North, Purulia in the West and Paschim Medinipur in the South.

1.4.4 Communication

EXISTING ROAD CONNECTIVITY

Bulk of the raw materials and products shall be transported in the plant from outside or from the plant to outside by Road through trucks. State Highway-9 (Durgapur-Bankura connecting State Highway) is passing at a distance of about 1.7 Km from the Project site in West-north-west direction and National Highway-2 is passing at about 13.5 Km from the Project site in North North-east direction.

Details of roads surrounding the project site are describing below:

a) Durgapur Bankura State Highway - 9 (SH-9):

Durgapur - Bankura connecting State Highway - 9 (SH-9) is a two lane road with approx. 12 m width and can well accommodate existing traffic load. This Highway originates at Durgapur Expressway, Durgapur and ultimately meet National Highway - 60 (NH-60) at Bankura. This Highway is passing at a distance of about 1.7 Kms from the Project site in West-north-west direction.

b) Hatasuria - Pakhanna Road:

Hatasuria - Pakhanna road is a two lane road with approx. 7 m width. This road originates from the State Highway - 9 at Hatasuria More and connects Sonamukhi-Pakhana road at Kuldanga More Chowrasta near Rangamati village. This road is passing adjascent to the project site in North direction w.r.t. the Project Site.

The Road connectivity map on Google is presented in **Figure-1.5 A & B**.

The Photographs of the State Highway - 9 and Hatasuria - Pakhanna road adjacent to the Project Site are presented in **Figures-1.6, 1.7 and 1.8** respectively.

FIGURE-1.5A
ROAD CONNECTIVITY MAP

FIGURE-1.5B
ROAD CONNECTIVITY MAP

FIGURE-1.6
Durgapur-Bankura connecting State Highway - 9

FIGURE-1.7
Hatasuria - Pakhanna Road

The project site already has proper road linkage for transport of materials and equipment. Durgapur Railway Station is about 10 km from the project site.

State Highway-9 (Durgapur-Bankura connecting State Highway) is passing at a distance of about 1.7 Km from the Project site in West-north-west direction and National Highway-2 is passing at about 13.5 Km from the Project site in North North-east direction.

The nearest Airport is Kaji Nazrul Islam Airport, Andal which is located at about 23.0 Km away in NNW direction from the project site. The important Airport - Netaji Subhas Chandra Bose International (NSCBI) Airport, Kolkata, is situated at about 144 Km distance in South-east direction w.r.t. project site. The project site has good connectivity with sea port of Kolkata, Haldia, Paradip and Vishakhapatnam.

The important river near the Project site is the River Damodar flowing at a distance of 6.7 Km from the Project site in North-east direction. The nearest important town - Barjora is located at about 3.0 Km away in NNW direction from the Project site. Bankura, the District Head Quarter is located at around 30.0 Km distance in South-west direction from the project site.

There is no eco-sensitive area like National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals etc. within 10 km radius study area around the Project site. The location of project site on Google view and 10 km radius study area is presented in Figure-1.9 & 1.10 respectively.

FIGURE 1.9: LOCATION OF PROJECT SITE ON GOOGLE MAP

PROJECT SITE LOCATION ADDRESS:

Mouza: Sahebdihi, P.O. Hat-Asuria, P.S. Barjora, District Bankura, West Bengal

PROJECT SITE CO-ORDINATE:

Latitude 23°23’54.60"N to 23°24’59.32"N and
Longitude 87°17’15.69"E to 87°17’24.19"E

Mean Sea Level : 272 ft (83m)

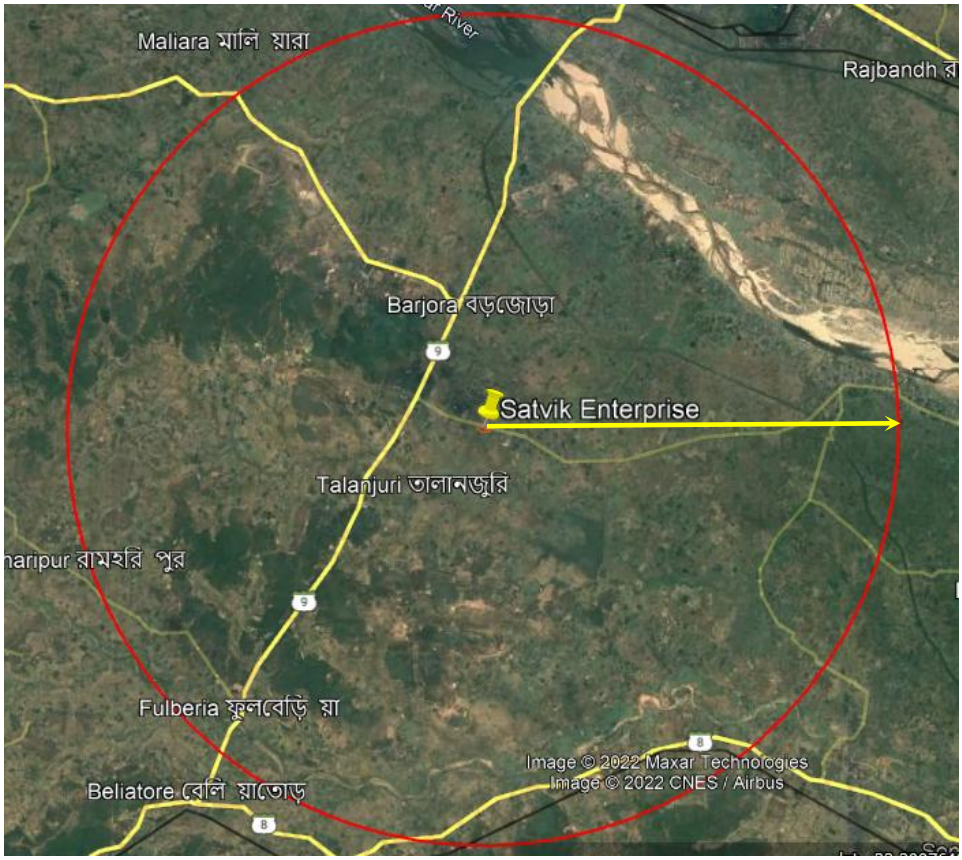


FIGURE 1.10: 10 KM RADIUS STUDY AREA

1.4.5 Importance to country & region

The global steel production has increased continuously over the last few years and this trend is expected to continue in the years to come. The global crude steel output has been growing at about 5% and is expected to grow at a similar rate overall. The steel growth in India has been higher and is expected to grow @ 7% till 2030 by when the production is expected to reach about 230 million tonnes. This consistent growth of crude steel production will have a direct correlation with the demand for ferro alloys i.e. Ferro Chrome, Silico Manganese, Ferro Manganese and Ferro Silicon.

The production of ferro alloys is concentrated in a few pockets like India, China, South Africa and the CIS. South African production has been hampered due to logistics, power and political considerations. China is the biggest producer of ferro alloys in the world but its government is discouraging exports due to the power intensive nature of the product with an export duty of 20%. India enjoys a number of

advantages that make it a favourable location for global supply.

India is fortunately endowed with good reserve of ores such as Mn Ore, Chromite, Quartz, etc., which are suitable for Ferro Alloy production. As such, it is a right place for ore based Ferro Alloys production. Low grade Manganese ore is available from Orissa (Barbil) and Bellary sector. High grade Manganese Ore will be procured from Nagpur sector and will also imported from Australia / South Africa. Chrome Ore is available from Orissa (Barbil). Quartz/Quartzite is abundantly available across the country. Barjora is about 400 - 1000 km from mines and 250 km from Haldia port (for imports). Uninterrupted power at very competitive rates are supplied by Damodar Valley Corporation (Power utility) in this area. Besides, the area has good infrastructural facilities and proximity to other minor indigenous raw materials, making it an attractive location for a Ferro Alloy plant.

M/s Satvik Enterprises Limited has drawn up a growth plan with the objective of increasing its market share in Indian ferro-alloy industry. Keeping all these in mind, the Company has planned to increase its existing ferro alloy production capacity in a more environment friendly way to set up 2x9 MVA Submerged Arc Furnaces along with Briquette Plant at Mouza: Sahebdihi, P.O.: Hat Asuria, P.S. Barjora, Dist.: Bankura, West Bengal.

1.5 BRIEF LEGAL FRAMEWORK FOR EIA STUDY

1.5.1 Procedure for Environmental Clearance

Environmental clearance of any new project or expansion of existing projects is now done as per the new notification of the Ministry of Environment, Forest and Climate Change (MoEF&CC), Govt. of India dated 14th September 2006. The new notification requires prior environmental clearance of all projects from competent central govt. or state govt. authorities, as may be the case. The projects are now classified into Category “A” or Category “B” projects based on spatial extent of potential impacts on human health and natural & man-made resources. The Category “A” projects require prior clearance by the MoEF&CC, Govt. of India while the Category “B” projects have to get clearance from the State level Environment Impact Assessment Authority (SEIAA), constituted by the Central Government for this purpose.

This project of **M/s Satvik Enterprises Limited** falls under Sl. No. 3(a), Category "**A**" of the list of the projects of the schedule (i.e., Metallurgical industries (ferrous & non-ferrous) under Secondary metallurgical processing industry).

The environment clearance procedure for new projects will require maximum of four stages all of which may not be applicable to all the projects. These four stages in sequential order are as follows:

Stage 1 - Screening: It refers to the definite assignment of environmental category to projects or activities where the same is not completely specified. In case of Category 'B' projects scrutiny of application at State level to categorize project in 'B1' or 'B2' is done. The B2 projects do not require EIA Reports. The present project is categorized as Category 'A' project and thus, this stage is not applicable.

Stage 2 - Scoping: It refers to the process by which the Expert Appraisal Committee in the case of Category 'A' projects and State-level Expert Appraisal Committee in the case of Category 'B1' projects determine detailed and comprehensive Terms of Reference (ToR) addressing all relevant environmental concerns for the preparation of an EIA report in respect of the project for which prior environmental clearance is sought. The ToR for this project was granted on 18th August, 2022.

Stage 3 - Public Consultation: It refers to the process by which concern of local people and other stakeholders are ascertained and their views taken regarding the project. The Public Consultation takes place in two steps: Public hearing and written responses.

Stage 4 - Appraisal: This refers to detailed scrutiny by the Expert Appraisal Committee or State Level Expert Appraisal Committee of the application and other documents like the final EIA report. The final EIA report for this project will be prepared after Public Hearing for the final appraisal by EAC for grant of Environment Clearance.

The steps of Environmental Clearance for proposed project is shown in **Figure-1.11**.

BOX 1.1: SCOPE OF THE STUDY

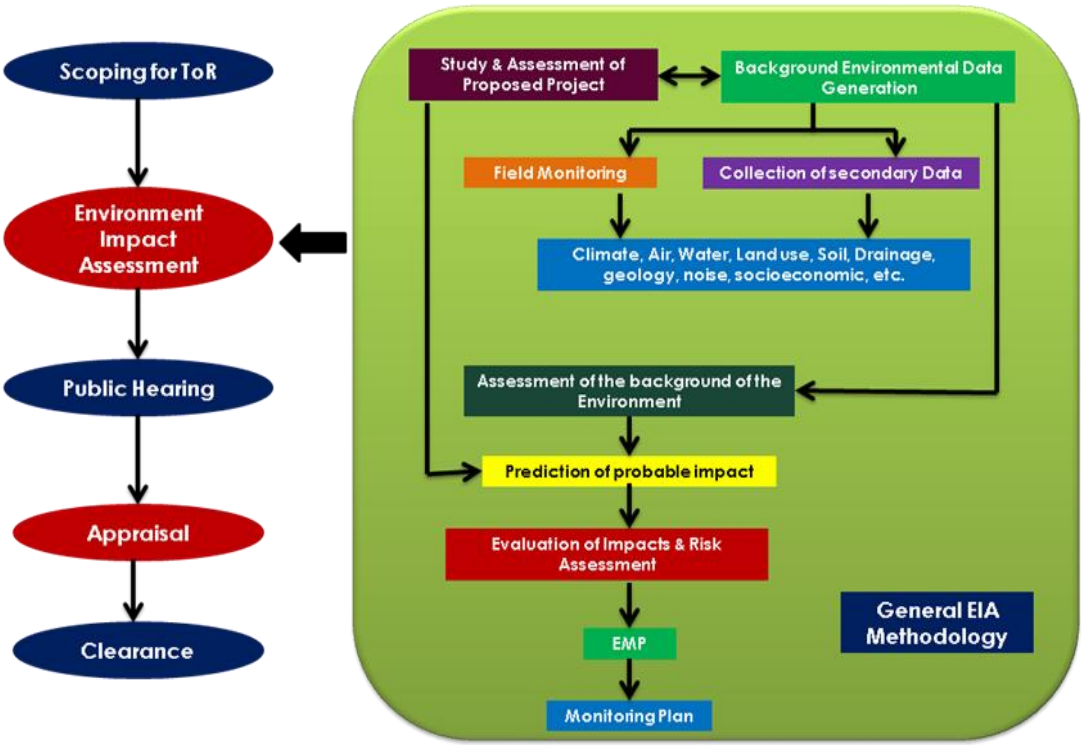
- To conduct literature review and collect the data relevant to study area
- Project appreciation in terms of its environmental pollution potential and detrimental impacts on different environmental attributes.
- To undertake environmental monitoring so as to establish the baseline environmental status of the study area
- To identify existing pollution load due to various activities in the ambient levels
- To identify the basic environmental status including the meteorological parameters and socio-economic environment of the proposed study area
- To predict incremental levels of pollutants in the study area due to the proposed plant activities
- To evaluate the predicted impact on the various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact methodologies
- To prepare an environmental management plan outlining the measures for improving the environmental quality for environmentally sustainable development
- To identify critical environmental attributes required to be monitored

1.5.2 Post Environmental Clearance Monitoring

For category "A" projects, the project proponent shall prominently advertise in the newspapers indicating that the project has been accorded environmental clearance and the details of MoEF&CC website where it is displayed.

The project management shall submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions in hard & soft copies to the regulatory authority concerned on 1st June and 1st December of each calendar year. All such reports shall be public documents. The latest such compliance report shall be displayed on the web site of the concerned regulatory authority.

FIGURE 1.11: STEPS OF ENVIRONMENTAL CLEARANCE FOR PROPOSED PROJECT



1.5.3 Important Environment Legislations

The environmental regulations, legislations and policy guidelines and control that may impact the project are the responsibility of a variety of Government agencies. The principal environmental regulatory agency in India is the Ministry of Environment, Forest and Climate Change (MoEF&CC), New Delhi. MoEF&CC formulates environmental policies and also accords environmental clearances for different projects.

Many State and Central legislations have a bearing on environment but laws on environment protection have been notified recently. These legal enactments can be broadly classified in the terms of focus areas, viz. pollution, natural resources and linkages between pollution and natural resources. The important environmental legislations related to environmental clearance for new projects are briefly described in the **Table-1.2**.

The MoEF&CC is the nodal agency to set up policy and standards for the protection of environment, along with Central Pollution Control Board (CPCB). This includes air, noise, water and hazardous waste standards. The relevant standards, which are of significance to the proposed project, are discussed in the section below.

TABLE: 1.2: KEY ENVIRONMENTAL LEGISLATION

Name	Scope and Objective	Key areas	Operational Agencies/ Key Players
Water (Prevention and Control of Pollution) Act 1974	To provide for prevention & control of water pollution and enhancing water quality	Control of sewage and industrial effluent discharges	Central and State Pollution Control Boards
Air (Prevention and Control of Pollution) Act 1981	To provide for the prevention and control of air pollution	Controls emission and air pollutants	Central and State Pollution Control Boards
Forest Conservation Act 1980	To halt rapid deforestation & resulting environment degradation	Restriction on de-reservation & use of forest for non-forest purpose	Central Government
Environment Protection Act 1986; Environment Protection Rules, 1989.	To provide for the protection and improvement of environment	An umbrella Legislation; supplements pollution laws	Central Govt. MoEF&CC, can delegate power to Dept. of Environment
EIA Notification, New Delhi 14th September, 2006	To provide Guideline for EIA Study	EIA Study	Central Government, nodal agencies MoEF&CC, State governments
Noise Pollution (Prevention & Control) Rules 2000	To control and take measures for abatement of noise and ensure that level does not cross standard	Noise in urban area and around industrial sites	Central Government, nodal agencies MoEF&CC, State governments
Solid Waste Management Rules, 2016	To prescribe procedures for handling and disposal of solid waste	Any facility producing hazardous waste	Central Government, nodal agencies MoEF&CC, State governments
Hazardous Waste (Management, Handling &	To impose restrictions and prescribe procedures for management,	Any facility producing hazardous waste	Central and State Pollution Control Boards

TABLE: 1.2: KEY ENVIRONMENTAL LEGISLATION			
Name	**Scope and Objective**	**Key areas**	**Operational Agencies/ Key Players**
Transboundary Movement) Rules, 2016	handling and disposal of hazardous waste		
Public Liability Insurance Act, 1991	To provide for public liability- insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto	To provide public liability insurance during risk material handling	Central Government, Nodal Agencies MoEF&CC, State Govt.
E-Waste (Management) Rules, 2016	To prescribe procedures for handling and disposal of E-Waste	Any facility producing E-Waste	Central and State Pollution Control Boards

Source: Central Pollution Control Board, New Delhi

1.5.4 Pollution Standards

The Environment (Protection) Rules 1986 and its subsequent amendments have set certain pollution standards. These standards are generally applicable to air environment, noise environment and water environment. The ambient quality of air, water & wastewater and noise standard are provided as **Annexure-IX**.

1.6 SCOPE OF STUDY- DETAILS OF REGULATORY SCOPING CARRIED OUT AS PER TERMS OF REFERENCE

The Environmental Impact Assessment and Environment Management Plan for the proposed project addressing the environment related issues have been prepared in accordance with the requirements of terms of reference (TOR) prescribed by MoEF&CC, Govt. of India.

The study evaluates the prevailing environmental conditions. The adverse impacts have been identified and possible mitigation

measures have been drawn in order to protect the environment. In order to carry out the study, the baseline environmental scenario has been established.

The main objectives of the present EIA/EMP study are briefly summarized below:

- To establish the baseline environmental scenario.
- To identify, predict and assess the impacts of proposed future project on the environment.
- To prepare a detailed action plan for implementation of mitigative measures.
- To suggest preventive measures to minimize adverse impacts and to maximize beneficial impacts.
- To suggest a monitoring programme to evaluate the effectiveness of mitigative measures.
- To suggest the formation of a core group responsible for implementation of the EMP.
- To prepare a capital cost estimate for environment management plan.
- To address the concerns of disaster management, CSR and points raised in public hearing.

The scope of the present study is to conduct EIA covering all the disciplines of environment and field monitoring in relevant disciplines over one full season of 3 (three) months (excluding monsoon months). The draft EIA report has been prepared as per the MoEF&CC Notification dated 14.09.2006. After completion of the Public Consultation, all the environmental concerns expressed during the Public Consultation process shall be addressed and appropriate changes in the draft EIA Report will be made accordingly to formulate the Final EIA Report.

Secondary and primary data collection was done comprising of, but not restricted to the following:

- Long Term Climatic data from Indian Meteorological Department (IMD) for available previous decade
- Geo-hydrological aspects based on available data from various sources
- Identification of water bodies, hills, roads etc. within 10 km radius

- Details of fauna, flora, information in forests, major habitats, sanctuaries, sensitive places within a distance of 10 km from the project site (including forest details).
- Major industries within 10 km radius.
- Historical monuments and sanctuaries within 10 km radius.
- Land use pattern within core zone and buffer zone (10 km radius around the core zone), Cropping pattern.
- Demography and Socio-economic based on last available Census data for entire study area

The preparation of EIA/EMP has been done as per the generic structure prescribed in EIA Notification dated 14th September 2006.

In line with the TOR, baseline environmental data was generated as shown below,

Description	No. of Locations
Air Ambient air monitoring (24 hourly samples), twice a week for 3 months for one season Parameters : PM_{10}, $PM_{2.5}$, SO_2, NO_2 & CO	8
Meteorological parameters measured at hourly duration simultaneously at one air monitoring station for 3 months for Wind speed, direction, Relative humidity, Temperature etc.	1
Water Water sample from various surface and ground water in the study area and tested for physical, chemical & biological parameters	10 (Surface Water) & 9 (Ground Water)
Soil	4
Noise Hourly readings taken for 24 hours (Leq.)	10

1.7 STATUS OF LITIGATIONS

There are no litigations/ court cases pending against the project.

1.8 COMPLIANCE OF TERMS OF REFERENCE (TOR)

The Company submitted an online TOR application along with filled up 'Form-1' in the prescribed format and Pre-feasibility Report to MoEF&CC for seeking prior Environmental Clearance for the proposed project vide proposal no. **IA/WB/IND/286081/2022, dated 18th August, 2022**. The proposal was considered under the provisions of EIA Notification 2006, as amended, the Standard TOR

issued vide letter [**Ref. No. J-11011/154/2022-IA.II(IND-I)**] dated 18th August, 2022, with mention of the Terms of Reference (ToR) (**Annexure-I**) for the purpose of preparing Environment Impact Assessment (EIA) report and Environment Management Plan (EMP) for obtaining prior environment clearance.

CHAPTER-2.0
PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

M/s Satvik Enterprises Limited, proposes to set up a ferro-alloy plant by installation of 2x9 MVA Submerged Arc Furnaces along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal.The proposed units with rated capacity per annum are presented in **Table-2.1**.

TABLE - 2.1
PROJECT SCENARIO

	Units	Capacity
Proposed	Submerged Arc Furnaces (2x9 MVA)	32,800 TPA Si-Mn or 44,400 TPA Fe-Mn or 15,200 TPA Fe-Si or 33,600 TPA Fe-Cr
	Ferro-Chrome Briquetting Plant	10 TPH

The principal features or highlights of the proposed project of **M/s Satvik Enterprises Limited**, under study are as follows:

Location	Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Pin: 722204, District: Bankura in West Bengal Its geographical co-ordinates of the project site are Latitude: 23°23'54.60"N to 23°24'59.32"N and Longitude 87°17'15.69"E to 87°17'24.19"E with Above Mean Sea Level 272 ft (83m).
Land requirement	The proposed project will be installed on total 2.18 hectares (5.38 acres) of land, which has been acquired and is in possession of the Company.
Raw water requirement & source	Water to the tune of 70 KLD will be needed for the proposed project. Source: Barjora Panchayat Samity
Power requirement	Proposed power requirement will be about 16 MVA. Source: DVC (Damodar Valley Corporation)

Effluent generation & disposal	The plant will be designed as a zero liquid discharge plant. The water will be recirculated through cooling and treatment. The entire wastewater will be recycled for various purposes inside the plant. Domestic wastewater will be treated in Sewage Treatment Plant (STP). Treated wastewater will be used for greenbelt purpose inside the plant premises.
Air pollution control	Adequate control measures like bag filters, dust suppression system & Stacks of adequate height at relevant points will be installed.
Solid Waste Management	➢ Slag generated during Ferro Manganese production will be used as a raw material for Silico Manganese production. ➢ Slag generated during Silico Manganese will be used for road construction / land filling. ➢ Ferro Chrome slag after chrome recovery through the Jigging process will be used in land filling / road construction purpose after TCLP test. ➢ Ferro Silicon Slag will be used in cement industries as a raw material & used for medium carbon silico manganese production purpose. ➢ Domestic solid waste from the plant and staff quarters will be disposed of suitably in consultation with the concerned Authority.
Manpower	180 persons (both regular and contractual)
Project cost	Rs. 36.53 Crores

2.2 NEED OF THE PROJECT

M/s Satvik Enterprises Limited has drawn up a growth plan with the objective of increasing its market share in Indian Ferro Alloy industry. Keeping all these in mind, the Company proposes to set up 2x9 MVA SAFs for production of 32,800 TPA Silico Manganese (Si-Mn) or 44,400 TPA Ferro Manganese (Fe-Mn) or 15,200 TPA Ferro Silicon (Fe-Si) or 33,600 TPA Ferro Chrome (Fe-Cr) along with 10 TPH Briquetting Plant at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal.

2.3 LOCATION OF PROJECT SITE

The proposed project site is located within the plant premises at Mouza: Sahebdihi, P.O.: Hat-Asuria, P.S.: Barjora, Dist.: Bankura, West Bengal. The geographical co-ordinates of the project site are varying between Latitude: 23°23'54.60"N to 23°24'59.32"N and Longitude 87°17'15.69"E to 87°17'24.19"E with Above Mean Sea Level 272 ft (83m).

Project Site:
Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Pin: 722204, District: Bankura West Bengal

Site Co-ordinate:
Latitude 23°23'54.60"N to 23°24'59.32"N and
Longitude 87°17'15.69"E to 87°17'24.19"E

Mean Sea Level : 272 ft (83m)

The project site already has proper road linkage for transport of materials and equipment. Durgapur Railway Station is about 10 km from the project site.

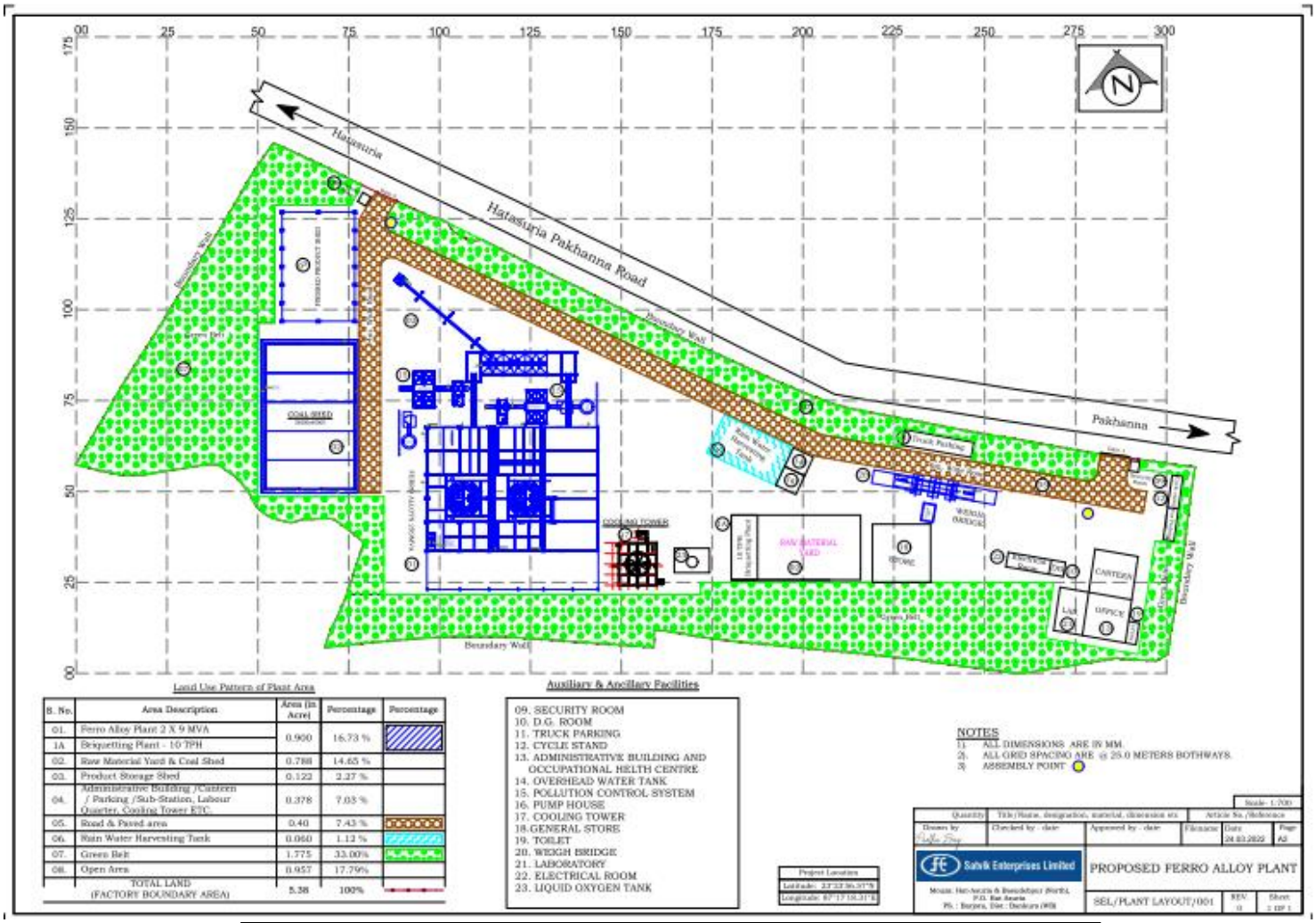
State Highway-9 (Durgapur-Bankura connecting State Highway) is passing at a distance of about 1.7 Km from the Project site in West-north-west direction and National Highway-2 is passing at about 13.5 Km from the Project site in North North-east direction.

The nearest Airport is Kaji Nazrul Islam Airport, Andal which is located at about 23.0 Km away in NNW direction from the project site. The important Airport - Netaji Subhas Chandra Bose International (NSCBI) Airport, Kolkata, is situated at about 144 Km distance in South-east direction w.r.t. project site. The project site has good connectivity with sea port of Kolkata, Haldia, Paradip and Vishakhapatnam.

The important river near the Project site is the River Damodar flowing at a distance of 6.7 Km from the Project site in North-east direction. The nearest important town - Barjora is located at about 3.0 Km away in NNW direction from the Project site. Bankura, the District Head Quarter is located at around 30.0 Km distance in South-west direction from the project site.

2.4 PLANT LAYOUT

The plant layout showing the proposed facilities with 33% Greenbelt area has been shown as **Figure-2.1**.



S. No.	Area Description	Area (in Acre)	Percentage	Percentage
01.	Ferro Alloy Plant 2 X 9 MVA	0.900	16.73 %	
1A	Briquetting Plant - 10 TPH			
02.	Raw Material Yard & Coal Shed	0.788	14.65 %	
03.	Product Storage Shed	0.122	2.27 %	
04.	Administrative Building /Canteen / Parking /Sub-Station, Labour Quarter, Cooling Tower ETC.	0.378	7.03 %	
05.	Road & Paved area	0.40	7.43 %	
06.	Rain Water Harvesting Tank	0.060	1.12 %	
07.	Green Belt	1.775	33.00%	
08.	Open Area	0.957	17.79%	
	TOTAL LAND (FACTORY BOUNDARY AREA)	5.38	100%	

FIGURE-2.1 PLANT LAYOUT

The landuse breakup of the project site has been presented in **Table - 2.2** below.

Table-2.2 : LANDUSE BREAKUP

S. No.	Area Description	Area (in Acre)	Percentage
01.	Ferro Alloy Plant 2 X 9 MVA	0.900	16.73 %
1A	Briquetting Plant - 10 TPH		
02.	Raw Material Yard & Coal Shed	0.788	14.65 %
03.	Product Storage Shed	0.122	2.27 %
04.	Administrative Building /Canteen / Parking /Sub-Station, Labour Quarter, Cooling Tower ETC.	0.378	7.03 %
05.	Road & Paved area	0.40	7.43 %
06.	Rain Water Harvesting Tank	0.060	1.12 %
07.	Green Belt	1.775	33.00%
08.	Open Area	0.957	17.79%
	TOTAL LAND (FACTORY BOUNDARY AREA)	5.38	100%

2.5 PROJECT PERIOD

The installation of proposed ferro alloy plant along with utilities and services require co-operation for procurement of equipment, equipment foundations, award of all contracts and supervision of all construction jobs at plant site. The factors which are responsible for timely implementation of the project are:

- Arrangement of proper finance for the project.
- Finalization of layout of the proposed plant.
- Design of utilities and services.
- Placement of orders for plant and machinery.
- Arrangements for Govt. sanctions and supply of power.
- Recruitment of personnel.

As per an initial estimate around 36 months will be needed for implementation of the project.

2.6 RAW MATERIALS

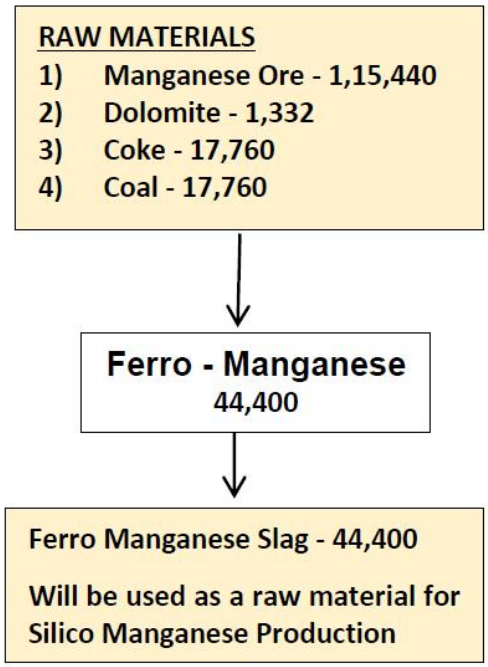
The major raw material, which will be handled, consists of Manganese Ore, Chrome Ore, Coke, Coal, Dolomite, Quartzite etc. The Manganese Ore can be imported from Australia / South Africa and also can be sourced from Barbil / Nagpur / Bellary region in the Country. Chrome Ore can be sourced from Orissa. Coal and Coke can be sourced from West Bengal and Jharkhand and can also be imported from China / Ukrain, Charcoal can be sourced from Andhra / Tamil Nadu, Lam Coke can be imported from China, Dolomite can be sourced from Orissa / Chhatisgarh and Quartzite can be sourced from West Bengal and Andhra Pradesh. etc.

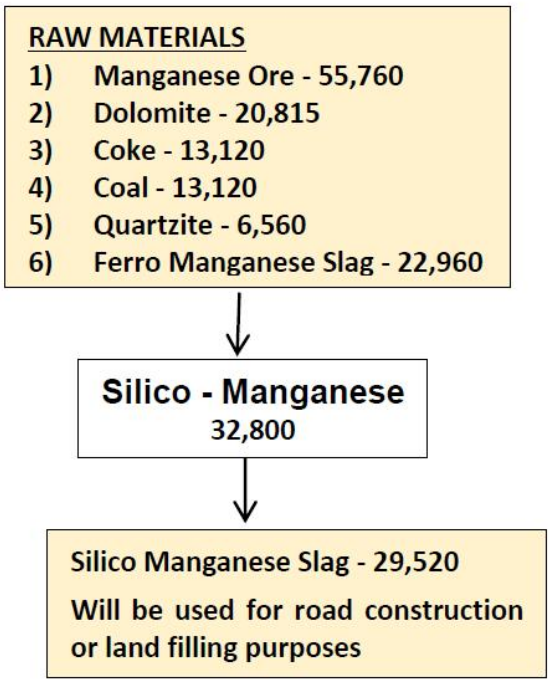
The annual requirement of major raw materials, which will be required for the proposed project is presented in the material balance diagram as presented below in Table-2.3. Raw materials will be received at plant site by road. All the trucks for raw material and finished product transportation shall comply with the applicable environmental norms.

Table - 2.3
LIST OF RAW MATERIALS

Sl No.	Items	Source	Raw Material Requirement
			MT
A	FOR PRODUCTION OF SILICO MANGANESE		
1	Manganese Ore	Imp: Australia / South Africa	55,760
2	Fe - Mn Slag	Dom: Balaghat / Barbil / Bellary	22,960
3	Coal	Own Generation / West Bengal	13,120
4	Coke	West Bengal / Jharkhand	13,120
5	Quartz	West Bengal / Jharkhand	6,560
B	FOR PRODUCTION OF FERRO MANGANESE		
1	Manganese Ore	Imp: Australia / South Africa	1,15,440
2	Coal	Dom: Balaghat / Barbil / Bellary	17,760
3	Coke	Imp: China Dom: West Bengal / Jharkhand / Assam	17,760
4	Dolomite	Orissa / Chhatisgarh	1,332
C	FOR PRODUCTION OF FERRO SILICON		
1	Quartz	West Bengal / Andhra Pradesh	25,840
2	Mill Scrap	West Bengal / Jharkhand	6,536
3	M S Scrap	West Bengal / Jharkhand	304
4	Charcoal	Andhra Pradesh / Tamilnadu	13,680
5	Lam Coke	Imp: China Dom: West Bengal / Jharkhand / Assam	8,360
D	FOR PRODUCTION OF FERRO CHROME		
1	Chrome Ore	Orissa	87,360
2	Coke	Imp: China Dom: West Bengal / Jharkhand / Assam	13,440
3	Coal	West Bengal / Jharkhand	6,048

4	Quartz	West Bengal / Andhra Pradesh	672
5	Dolomite	Orissa / Chhatisgarh	672
6	Lime	Orissa / Chhatisgarh	840
7	Molasses	Uttar Pradesh	2,016





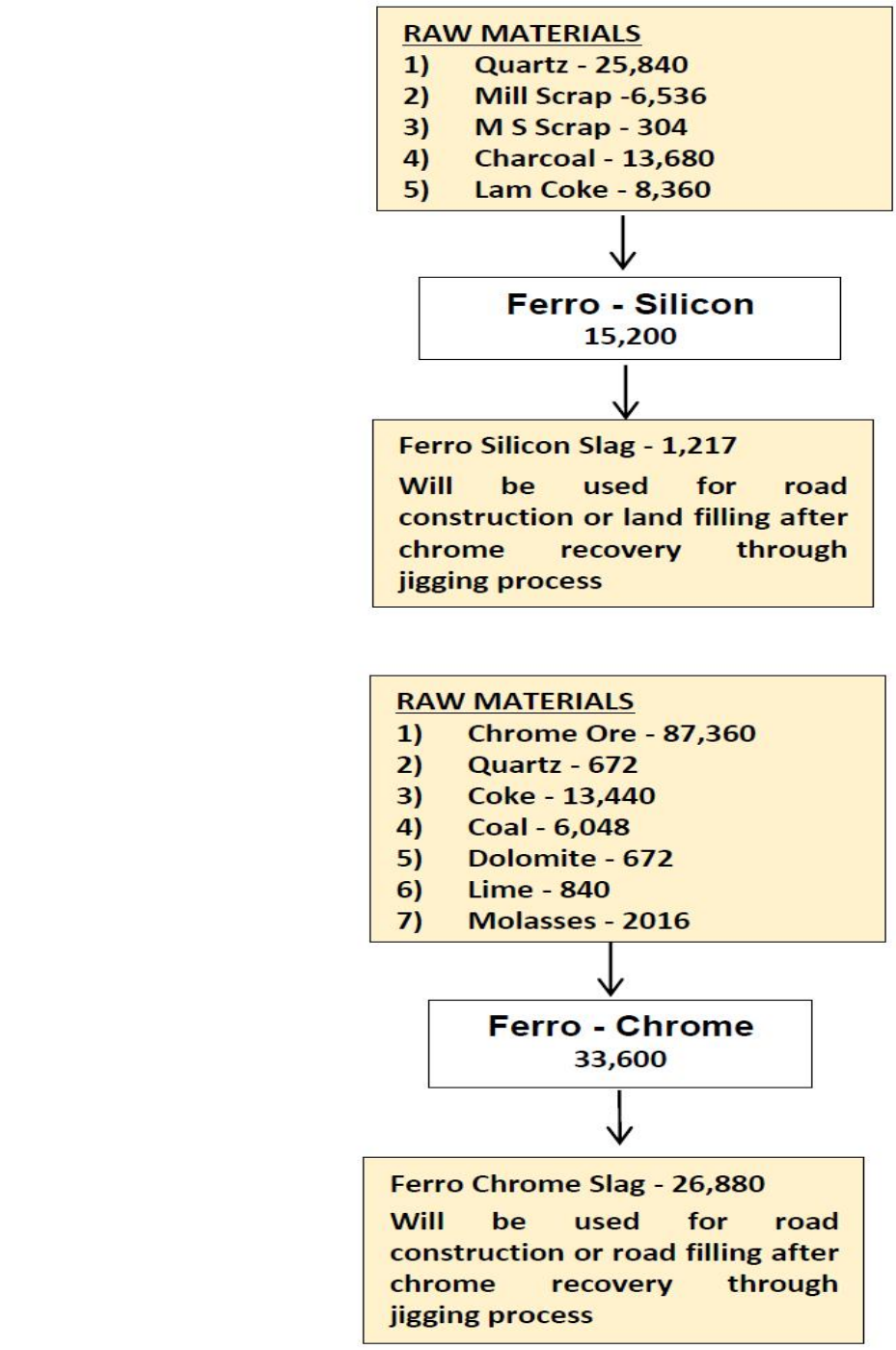


FIGURE - 1.2 : MATERIAL BALANCE DIAGRAM

2.7 TECHNOLOGY AND PROCESS DESCRIPTION

2.7.1 FERRO ALLOY PLANT

Process technology selection and manufacturing route are very crucial for achieving efficiency and economy. This project envisages setting up of a Ferro Alloy plant wherein suitable and sized material will be produced.

This plant shall be designed for production of Ferro Alloys (Ferro Chrome, Silico Manganese, Ferro Silicon & Ferro Manganese). The standard grade of Ferro Chrome has Cr content of ~60% and Silico Manganese has Mn content of ~60% and Si content of 14-15%.

The production of Ferro alloys is a continuous slagging process. The oxides of chromium, manganese, iron, silicon, phosphorous etc. contained in the ore is reduced by the carbon present in coke/coal in a submerged electric arc furnace. The reduction of oxide is accompanied by evolution of gases at furnace top.

Silico Manganese/Ferro Chrome

Silico Manganese is an alloy of manganese with silicon & iron. Ferro Chrome is an alloy of chromium with iron & silicon with silicon present in smaller quantities. Ferro alloys are widely used in metallurgy as a complex reducer and alloying additive in making various grades of steel, with ferro chrome usage limited largely to stainless steel production, but in significantly higher quantities.

The concept of the use of Silico manganese instead of ferro manganese and ferro silicon pure into the steel is due to its cost effectiveness, as ferro manganese and ferro silicon require purer raw materials, which are costlier. Moreover, silico manganese goes for production of refined grades of Ferro manganese i.e. low and medium carbon ferro manganese. Ferro manganese, on the other hand is used where Si content in the finished steel has to be controlled accurately as is the case in steel flat products (sheets and plates).

Silicides of Manganese are more stable compounds than carbides. Therefore, the higher the Si content in manganese alloys, lower is the carbon content.

Ferro alloys are produced by reduction of ores by the carbon contained in coke and coal.

The chemical reactions taking place are as follows:-

Decomposition:	$4MnO_2$	=>	$2\ Mn_2O_3 + O_2$	(at 430°C)
	$6Mn_2O_3$	=>	$4\ Mn_3O_4 + O_2$	(at 950°C)
Reduction:	$Mn_3O_4 + C$	=>	$3\ MnO + CO$	
	$MnO + C$	=>	$Mn + CO$	(at 1430°C)
	$2Cr_2O_3$	=>	$2\ Cr + 3\ O_2$	(at 1780°C)
	$SiO_2 + C$	=>	$Si + CO_2$	(at > 1500°C)

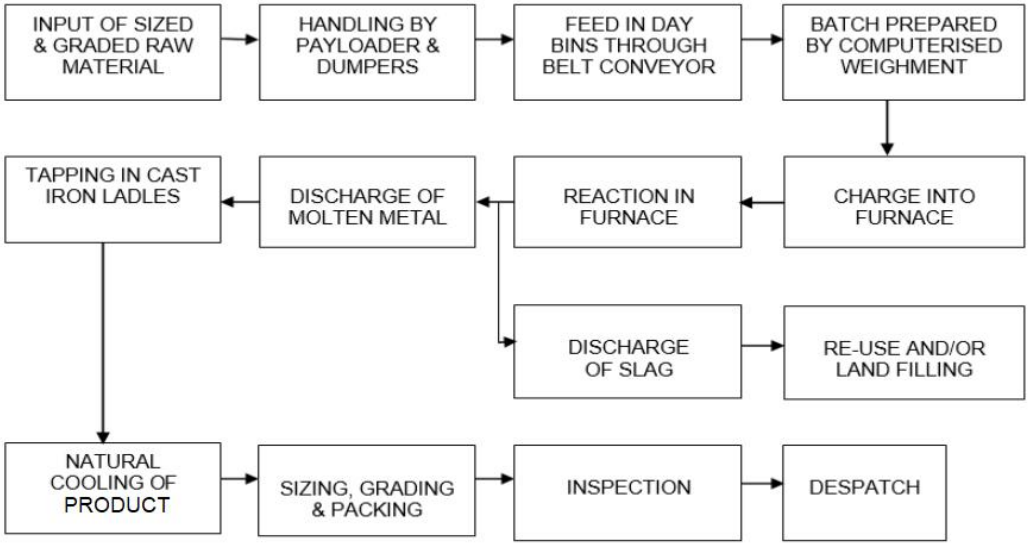
The Cr, Mn and Si thus formed join the alloy.

The excess SiO_2, Al_2O_3, oxides of calcium and Magnesium get generated during the process and join the slag. 0.8 – 1.2 Tonne of slag produced per tonne of alloy. This would be used for land filling purposes. Fluxes may be added to control the slag fluidity.

Metal (Alloy) and slag are tapped simultaneously 3 - 4 times per shift.

Selection of Plant Capacity

Ferro Chrome, Silico Manganese, Ferro Silicon and Ferro Manganese are typically smelted in 5000 - 18000 KVA closed top submerged electric arc furnaces with transformer secondary voltage 100 – 200 V. The plant will have 2 submerged arc furnaces of 9 MVA working for 330 days in a year and 3 shifts per day.



PROCESS FLOW CHART OF FERRO ALLOY PLANT

Fourth Hole Fume Extraction System

The fourth hole fume extraction method is similar to water cooled elbows, except another hole, in addition to the three holes for the electrodes, is located in the furnace rooftop. A space between the ductwork and the fourth holes allow for the combustion of the gases. The gases are withdrawn from the furnace by suction through the fourth hole.

After getting cleaned through bag-house the fume enters ID fans and being sent to chimney through which it is released in the atmosphere at safe height.

Typical Operation Of Fume Extraction Systems Of Ferro Alloy Furnaces

The Furnace will come with a Smoke Collection Hood of Low Hood Design, which will prevent any fugitive gas emissions. The gas emissions emanating from the furnaces will be collected by the smoke collection hoods and passed on to a smoke chimney/stack by natural draft. The smoke chimney has a butterfly valve just a little above the top of the smoke hood with the help of which, the gas emissions shall be directed to the Air Pollution Control equipment. These gases from the point of Butterfly valve shall be sucked by means of a powerful I.D. (Induced Draft) fan into the Pollution Control Equipment. Sparks if any in gas stream will be extinguished in ductwork, bends & in Heat Exchanger (Forced Draft Cooler) due to changes of direction. First, gases will be passed through a tubular forced draft cooler where they get cooled by atmospheric air being blow over the tubes with the help of axial cooling fans. The much heavier particles in the gases get settled at the bottom of the cooler. The gas with the remaining heavier particles goes to a multi-chamber Bag Filter System after which the I.D. fan is installed. When the gas will pass through the filter bags, the dust present in the gases shall be trapped by these bags and only clean gas will come out of the Bag Filter. This clean gas is then released through the stack to atmosphere.

Bag House Cleaning: During this process, the bags in the multi-chamber bag filter house will collect fume dust and need to be cleaned. The Bag house cleaning is “OFF LINE” (with one compartment isolated) and “ON – DEMAND” on the basis of pressure drop across the bag house. When the pressure drop will exceed the set point, Master

controller shall close the Poppet damper at the outlet of the compartment and start cleaning the bags till the pressure drop reaches lower set point. Cleaning shall be done by compressed air pulses so that the dust accumulated on the bags surface gets shrugged off and gets collected into a collection hopper provided at the bottom of the bag filter housing. After reaching lower set point, cleaning shall stop and Poppet damper shall open. This cleaning operation shall be done in a sequential fashion as and when pressure drop shall exceed preset limits. This loop shall ensure optimum cleaning of the filter bags to improve bag life and reduce emission levels. Accordingly, one chamber after another will get cleaned in a pre-determined cycle.

Tapping Fumes Fan (Booster Fan): We consider the tapping fumes fan for each furnace, as it works on positive as well as negative pressure, it will suck the fumes from tap hole and will push it towards the bag filter.

2.7.2 BRIQUETTE PLANT FOR CHROME ORE

M/s Satvik Enterprises Limited is planned to install Briquette Plant of capacity 1x10 TPH (70,000 TPA) for production of Chrome Ore Briquette from Chrome fines which will be used in Ferro Chrome production.

Briquetting is a process of agglomeration of ore fines into useful material for feeding into the metallurgical furnaces. The process is applicable for chrome ores.

If fines are fed directly, a substantial part of it remains unreacted and passes into the slag phase and a significant fraction is also carried by the furnace waste gases to be subsequently recovered in the pollution control equipment. It also reduces the porosity of the charge, thereby obstructing the smooth passage of furnace waste gases and frequently leads to the choking of the furnace.

For production of chrome ore briquettes, chrome ore fines are mixed with burnt lime and molasses and churned in a mixer for homogenization. Here, water is added to enable the lime to hydrate and develop better binding properties. This moist charge mix is then

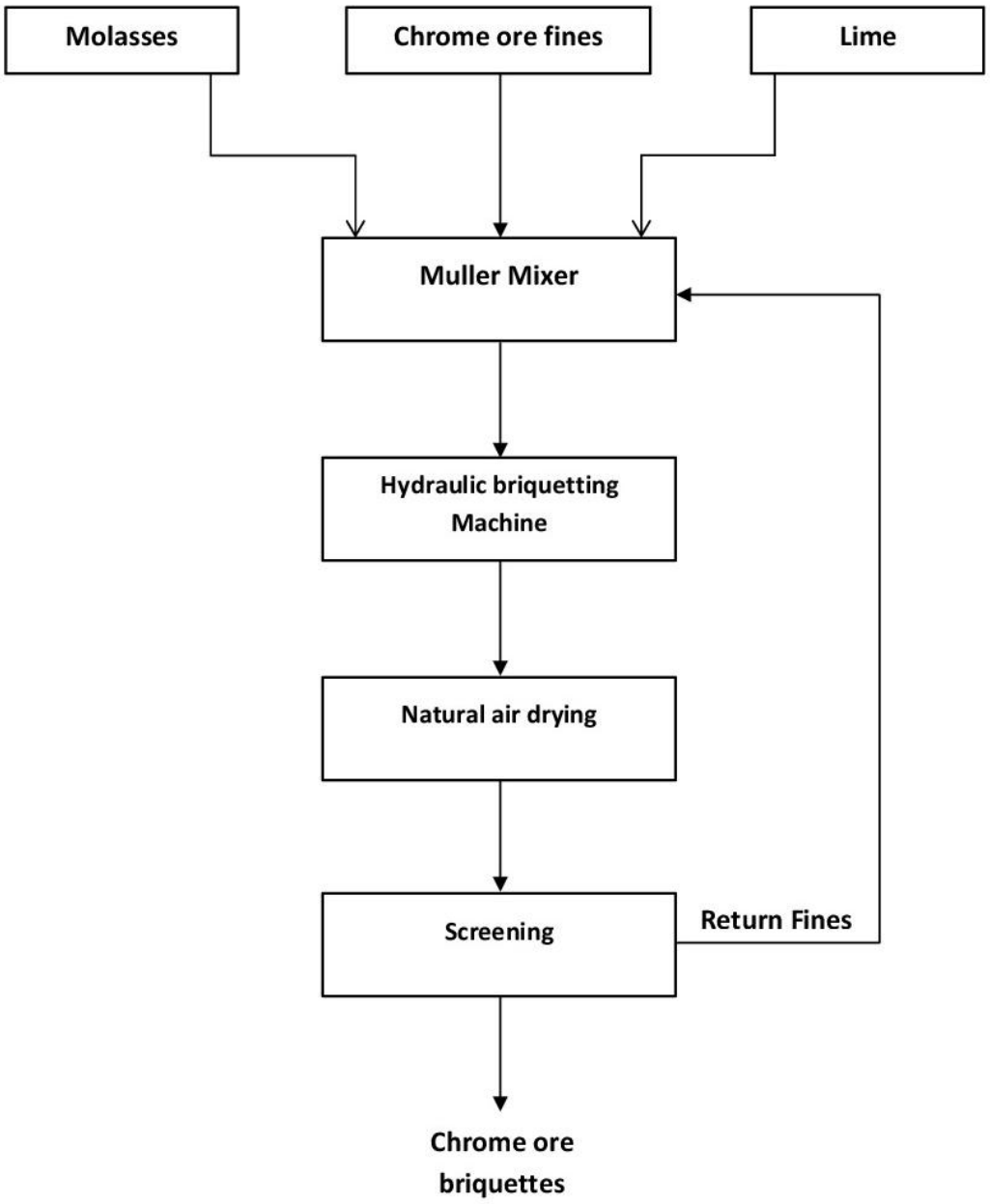
passed through a rotating drum briquetting press. The charge is compressed in between the 2 drums and is discharged in the form of briquettes, the shape and size being determined by the gap between the roller drums and the groves on the periphery. The briquettes are then air dried for 48-72 hours. After screening, the briquettes are ready to be fed to the furnace. The fines produced in the process are recycled.

Briquetting is an environmental friendly process as it:

- Reduces emission of metallurgical furnaces
- Reduces requirement of lumpy ores which when processed at the mine site also causes some amount of air and water pollution
- Is a zero discharge and zero emission process

Mass balance

INPUT		OUTPUT	
Chrome ore fines	1000 kg	Briquettes	1000 kg
Lime	25 kg	Water vapour	100 kg
Molasses	60 kg		
Water	15 kg		
TOTAL	1100 kg	TOTAL	1100 kg



PROCESS FLOW CHART OF BRIQUETTE PLANT

2.8 UTILITIES

2.8.1 Storage Facilities

Raw materials like Chrome & Manganese Ore, Coal, Coke, Quartz, Dolomite etc.. will be stored in the raw material yard from where they will be conveyed to the stock house kept in day bins by feeding into ground hopper and conveyors.

2.8.2 Air Conditioning system

The air-conditioning system is proposed to be designed to maintain the following conditions in the spaces serviced:

25±2°C dry bulb temperature and 55±5 percent relative humidity for control rooms, control pulpits, computer rooms, PLC rooms, laboratory etc.

2.8.3 Oxygen System

Oxygen required for general purpose welding and cutting operations shall be met by oxygen cylinder which shall be provided near the respective plant units. The cylinders shall be provided with necessary cylinder valve and suitable manifold to a distribution piping network upto the respective consumption points. A liquid oxygen Tank of 3 - 5 KL will be installed for Top hole opening purpose.

2.8.4 Power

The estimated power requirement of the proposed units is around 16 MVA. The power requirement will be met from Damodar Valley Corporation (DVC). Unit wise power breakup for the proposed project is as follows.

SL. No.	UNIT	POWER CONSUMPTION (IN MVA)
1.	Ferro Alloy Plant	15.00
3.	Briquette Plant	0.25
4.	Auxiliary & other loads	0.75
TOTAL		16.00

2.9 WATER SUPPLY FACILITIES

As per an initial estimate, water to the tune of 70 KLD will be required for the proposed project. The raw water will be sourced from Barjora Gram Panchayat Samity.

Unit wise break-up of the make-up water requirement for Overall Project

Sl. No.	Description	Daily water Demand (in KLD)
3.	Ferro Alloy Plant (2x9 MVA SAFs)	34.0
4.	Chrome Ore Briquette Plant (10 TPH)	30.0
5.	Domestic	6.0
TOTAL		**70.0**

Raw water treatment plant will be installed for pretreatment of raw water and the clarified water will be pumped through MS pipeline to the proposed units.

Drinking water system

Raw water after necessary clarification and filtration through gravity filter will be disinfected and stored in the drinking water storage tank and will be pumped to an overhead tank. Drinking water from this overhead tank will be supplied to various consumers of the ferro alloy plant by means of a piping network, completed with valves, fittings and appurtenances.

Fire fighting water system

The fire fighting water network will be provided with adequate number of yard hydrants and in-shop landing valves to combat fire hazards in the plant.

To ensure availability of water at designed pressure for fire fighting, electric motor driven and standby diesel engine driven pump sets will be provided. Main electrical driven fire fighting pumps and diesel engines driven standby fire fighting pumps will be provided for fire fighting purpose. In case of fire, the main firefighting pump will pump firefighting water to the hydrants. An independent piping network will be provided complete with pipelines, valves, hydrants, fittings and appurtenances for the said purpose.

Raw water treatment and filtration plant

A raw water pump house of RCC construction along with treatment plant, filtration plant and make-up water pump house is proposed to be provided at raw water reservoir to meet the make-up water requirement of these units. Make-up water will be pumped through MS pipeline to different plant consumers.

Overhead tanks

Overhead tanks will be provided for supply of emergency water to critical consumers for a short duration in the event of interruption in normal cooling water supply. The overhead tanks will be multi-compartment type, each compartment serving emergency water requirements of individual consumers.

Water Pollution Control and Conservation

Extensive recycling has been adopted in the design of plant water systems. Quality of circulating water will be maintained through dosing of conditioning chemicals for controlling corrosion, scale deposit and microbial growth. Treated wastewater will be re-used in the plant. As such, the plant will adopt zero discharge concept.

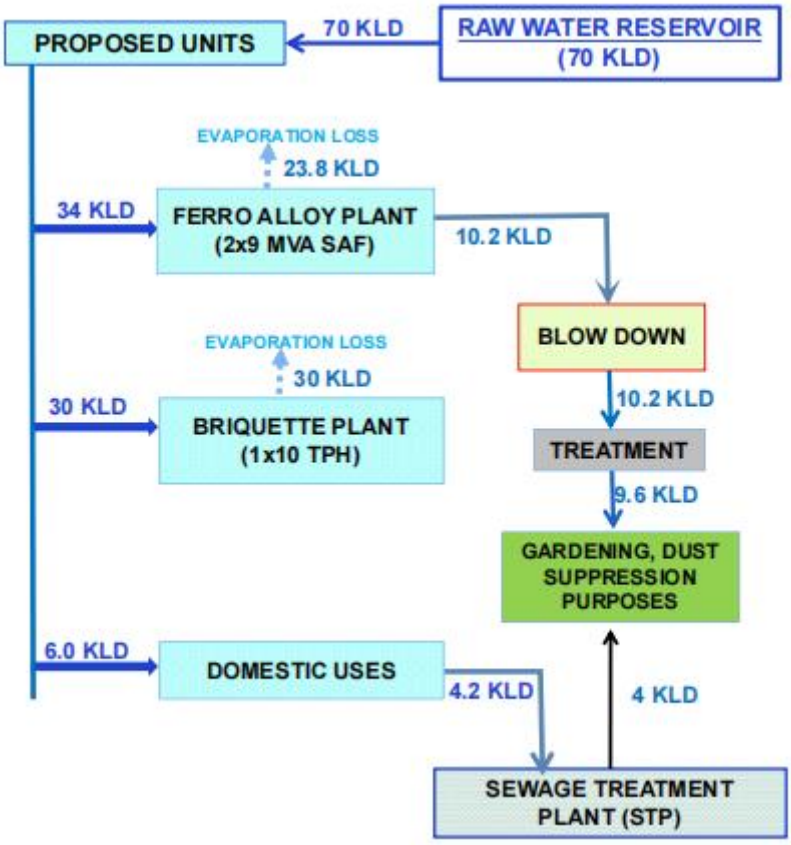


FIGURE-2.3: WATER BALANCE DIAGRAM

2.10 FIRE FIGHTING FACILITIES

Many working premises in a ferro alloy plant have hazardous and fire prone environment. To protect the working personnel, equipment and machineries, fire fighting measures have been planned for the proposed project.

Fire protection facilities

In order to combat any occurrence of fire in plant premises, the following fire protection facilities have been envisaged for the various units of the plant.

Portable fire extinguishers

All plant units will be provided with adequate number of portable fire extinguishers to be used as first aid fire appliances. The distribution and election of extinguishers will be done in accordance with the requirement of IS: 2190-91.

Hydrant system

A fire hydrant network system has been envisaged for the proposed project. Internal hydrants will be provided at suitable locations and different hydrants will be provided normally along the road and in the close vicinity of the units to meet the additional requirement of water for extinguishing fire.

Automatic system

For oil cellars control rooms and computer rooms, automatic fire extinguishing system has been envisaged.

2.11 MANPOWER PLANNING

Operation and maintenance of proposed plant require human resources in different categories like managers, engineers of different discipline like metallurgical, mechanical, electrical, electronics, computer, civil, structural, chemical, etc., highly skilled, skilled and semi-skilled work force in different disciplines, commercial, accountants and financial managers, unskilled labour force, clerical, security personal, etc.

Factory human resources

In order to operate and maintain the plant facilities, including its technical and general administration needs, the estimated manpower requirement for the overall project has been estimated to be 180 persons (Both Contractual & Permanent).

The above estimate covers the top management, middle and junior level executives and other supporting staff.

2.12 SOLID WASTE MANAGEMENT

The main solid waste will be generated from the proposed units is slag from Furnaces, dust from Bag Filters etc.. The various waste materials arising out of the technological processes would be re-utilised to the extent possible. The hazardous waste generation from the factory will be Used/ Spent Oil. Used oils removed from machineries, gear boxes, compressors etc. and sludge will be collected in drums and temporarily stored in specifically earmarked areas. They will be disposed through the approved agencies. As such no major hazardous waste will be generated from the process.

Solid waste generation and its disposal from the units are as follows:

Sl. No.	Solid Waste	Proposed Quantity (TPA)	Utilization or Management
1	Ferro Manganese Slag	44,400	Used as a raw material for Silico Manganese Production
2	Silico Manganese Slag	29,520	Used for road construction or land filling purposes
3	Ferro Silicon Slag	1,217	Used for cement industries as a raw material & used for medium carbon silico manganese production purpose.
4	Ferro Chrome Slag	26,880	Used for road construction or land filling purposes after chrome recovery through Jigging Process and after TCLP test.

Compositions of various slags are given below :

Ferro Manganese Slag:	Silico Manganese Slag:	Ferro Chrome Slag:	Ferro Silicon Slag:
MnO: 26% (min)	MnO: 14%	Cr_2O_3: 10%	SiO_2: 72%
SiO_2: 30%	SiO_2: 40%	SiO_2: 29%	FeO: 11.8%
FeO: 1.5%	FeO: 1.5%	FeO: 1.5%	Al_2O_3: 6.6%
Al_2O_3: 16%	Al_2O_3: 18%	Al_2O_3: 23%	CaO: 5%
CaO: 20%	CaO: 20%	CaO: 8%	MgO: 1.2%
MgO: 6%	MgO: 6%	MgO: 25%	

The total slag storage capacity inside the plant shall be equivalent to the maximum 90 days' quantity.

2.13 POLLUTION CONTROL MEASURES

Raw material handling area: Fugitive dust emissions generating from the handling and stockpiling of raw material in open stockyards would be controlled by water sprinkling. All closed zone working areas such as conveyor transfer points, dust generation points, would be provided with multiple dust extraction (DE) systems at several emission points to control the fugitive dust emissions. DE system shall consist of suction hood followed by bag filter, ducts, extraction fans and stacks of appropriate height. The stack shall be provided with sampling port at appropriate location.

System design & selection of proper equipment for Air Pollution Control plants for the project shall be done.

Improvised Air pollution Control schemes shall be implemented for critical areas. Design parameters and layout drawings of Air pollution control systems of Original Equipment Manufacturers on behalf of the plant management shall be done. Workshops for proper Operation & Maintenance of plant to achieve best possible stable performance shall be conducted.

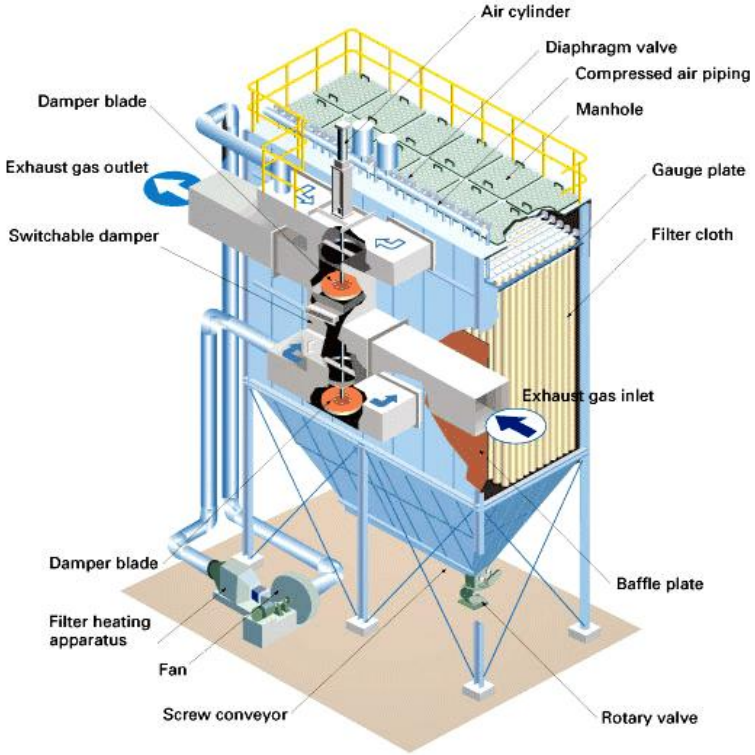
Probable sources of pollution and mitigation measures for pollution have been tabulated below in **Table-2.4.**

TABLE-2.4

PROBABLE SOURCES OF POLLUTION & THEIR MITIGATION MEASURES

Probable Pollution Sources	Mitigation Measures
Ferro Alloy Plant:	
Fumes from SAF	Bag Filters (Proposed: 2 Nos.)
	Dust Suppression Systems (Fixed & Mobile water Sprinklers)
Raw Material Handling Area	Bag Filter (Proposed: 1 No.)
Briquette Plant:	
Dust from Process	Bag Filter (Proposed: 1 No.)
	Dust Suppression System (Fixed & Mobile water Sprinklers)

The filter bags attached to the furnaces will be capable of controlling emission from stacks of furnaces to the desired levels. Over the period of time, bags get damaged and require replacements. Any higher emission recorded by online monitoring system installed at the stacks require immediate inspection and replacement of filter bags to control the emission within desired limits.



CROSS SECTIONAL VIEW OF BAG FILTER

2.14 CONTROL OF FUGITIVE EMISSIONS AT VARIOUS AUXILIARY FACILITIES INSIDE THE PLANT

The unit will install air pollution control equipment to control particulate matter emissions. Fugitive emissions from the proposed plant would be significant as there will be air pollution due to activities like material handling and transfer points of materials and movement of vehicles. These operations generate large quantity of dust. Specific instances of fugitive dust generation may include dust blown by wind from the raw-materials stockpile, dust caused by vehicular traffic within the factory, dust leakage from conveyors, conveyor transport points, storage hoppers and packers etc.. Control measures like good housekeeping, proper maintenance, wetting of dusty areas, use of enclosed storage wherever feasible etc., would considerably reduce fugitive dust.

For the purpose of effective prevention and control of fugitive emissions, following efforts will be made:

- Storage area shall be clearly earmarked.
- Enclosure shall be provided for all the loading & unloading operations, if possible.
- All transfer points shall be fully enclosed.
- Airborne dust shall be control by sprinkling of water.
- All roads shall be paved on which movement of raw materials or products will take place.
- Preventive measures shall be employed to minimize dust build up on road.
- Conveyors shall be provided with conveyor cover.
- Maintenance of air pollution control equipment shall be done regularly.
- All the workers shall be provided with disposable dust mask.
- 33% Green belt will be developed around the plant to arrest the fugitive emissions.
- Regular training shall be given to the personnel operating and maintaining fugitive emissions control systems.

The fugitive emission will be monitored at following locations within plant area as per CPCB guidelines. Details of such locations are given below,

TABLE-2.5 : LOCATION OF FUGITIVE EMISSION MONITORING

SR. NO.	AREA	MONITORING LOCATION
1	Raw material handling area	Transfer points
2	Day bin area	Feeder area, Mixing area, Transfer points
3	Product processing area	Furnace area
4	Other areas	As per SPCB guidelines

There will be Dust Extraction/Dust Suppression Systems/Foggy Dust Arresters to control fugitive emissions at Furnace Tapping Points, raw material handling section and various other facilities inside the plant.

With the implementation of all the above control measures, the gaseous emissions shall be contained within the acceptable limits, thus ensuring the full compliance to National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009.

2.15 WASTEWATER MANGEMENT

Around 10.2 cu.m/day industrial wastewater and around 4.2 cu.m/day domestic wastewater will be generated after implementation of the proposed project. The prevention and control of water pollution aim at conserving make-up water by recycling the wastewater after treatment. The wastewater, likely to be generated from the proposed plant is:

- Underflow from Raw Water Clariflocculator
- Backwash Waste from Filtration Plant
- Run-off water from Raw Material Storage Yards
- Cooling Tower Blow-down
- Canteen Effluents

Sludge from Raw Water Clariflocculator and Backwash from Filtration Plant will be led to a thickener for removing suspended solids. The overflow from the thickener will be reused in the plant water system. The Sludge from the thickener will be dried and dumped.

Cooling Tower Blow-down from various recirculation systems will be cascaded for reuse in gardening and dust suppression.

Efforts will be made to harvest rainwater in the plant. Run-off water from the office areas, shop roofs will be collected and stored for future use.

The plant will be designed as a zero discharge plant as far as the process effluents are concerned. The water will be recirculated through cooling and treatment. No plant effluent will be discharged outside the plant premises. The entire waste water will be recycled for various purposes inside the plant.

Domestic effluent from the various buildings / sheds of the plant will be conveyed through separate drains to septic tanks. The effluent from the septic tank will be disposed of through soil percolation by providing dispersion trenches / soak pit.

The list of water pollution control systems envisaged are summarized in Table-2.6.

Table-2.6
List of Water Pollution Control Systems

Source	Pollutants	Control/Disposal System
Raw material handling yard	Surface runoff containing free minerals too as suspended Solids	Catch Pits (to recover the minerals from sedimentation and reuse.)
Raw Water Treatment Plant	Suspended Solids along with Biomass	Clarifier, Thickener, Sludge Pond.
Cooling Tower & Boiler Blow down	Temperature, Dissolved Solids, Free Cl and TSS	Reused in the plant area.
Canteens, Toilets	BOD, O & G, TSS/TDS.	Sewage Treatment Plant (STP)

Sewage Treatment Plant (STP)

Sewage from the various building in the plant will be routed through sewage treatment plant (STP) and treated waste water will be used for green belt development within the premises.

Sewage treatment plant based on SBR technology is proposed to be set-up in the proposed project. A well-designed sewer network will collect wastewater from different sections of the plant area. The sewer network will convey the wastewater into the proposed STP.

STP Details

The proposed STP will be designed for treatment of raw sewage during operation phase to maintain the desired quality of treated wastewater. The expected characteristics of raw sewage are as follows:

Sr. No.	Parameter	Concentration
1.	pH	6.5 – 8.5
2.	BOD	250 – 300 mg/l
3.	TSS	200 – 250 mg/l

The expected characteristics of the treated sewage on adopting the scheme of treatment are as follows:

Sr. No.	Parameter	Concentration
1.	pH	6.5 – 8.0
2.	BOD	<5 mg/l
3.	TSS	<10 mg/l

2.16 RAIN WATER HARVESTING

The entire land of the plant area has to be leveled in such a way that Rain Water flows down to the RCC constructed Rain Water storage tank. Water will enter into the storage tank through filter bed. Filter bed will be made with different size of gravels and core sand. The filtrate water will be stored in the tank. The same water will be rinsed for greenery purpose through water pump and motor. The residue of the filter bed will be removed manually from time to time.

Rain Water harvesting potential:

Total Project Area –2.18 hectares (5.38 acres)

Average annual rain fall in the project area - 1400 mm

Average annual monsoon rain fall - 80% of 1400 mm = 1120 mm (say)

Volume of surface run off in the plant campus = 2.18 x 1.12 x 0.4 ham,

= 0.97664 ham say 0.0097 mcm

Rain water harvesting potential of the plant campus – 0.0097 mcm

Around 600 cu.m of water therefore can be conserved within the proposed plant. Considering the average depth of 2.5 m in storage tanks, area for surface storage involves around 0.02 ha (0.06 acres) which is 1% of the project area.

Rain Water Harvesting through Ground Water recharging

Apart from Surface storage of rain water, there is plan for rain water harvesting through recharging of ground water in the surrounding villages.

Ground Water Recharging System:

There will be Single Silt Trap Chamber of 4 feet diameter. Single Recharge chamber of 2-3 meter depth with 30-60 meter Boring inserted with specially perforated 6" Diameter PVC Pipe Rain water harvesting with Injection Recharging system will be provided.

Potential:

Underground water recharging rate will be @ 15 m^3/Hour or 360 KLD. In normal course of rainfall, rain water will be recharged and excess water will overflow. In case of abnormal huge rainfall, the excess water will be passed through overflow drainage system. The above Single System can recharge rain water upto 48,600 cu.m/Annum.

The company will develop 2 ponds in the nearby villages to store around 60,000 cu.m. rain water.

To recharge 48,600 cu.m rain water, 4 recharging systems shall be installed in the nearby village.

Table-2.26 : Rain Water Harvesting

Description	Water Volume
Water Conservation through RWH:	
RWH through surface storage inside the plant area.	600 cum
RWH through Surface Water Storage out side the plant by creating two (2) Nos. of Ponds (@ 30,000 cu.m of each pond) in the nearby villages.	60,000 cum
RWH through ground Water recharging in the surrounding villages (4 nos. Recharging system @2.5 lakhs each) Total cost - 10 Lakhs	1,94,400 cum
Total Harvested Rain Water	**2,55,000 cum**

So, the scheme for rain water harvesting system for the overall project is equal to 100% of annual water consumption.

2.17 STORM WATER MANAGEMENT

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 sludge/sediments. The clogged drains will be cleaned as soon as possible, preferably the same day. The catch-pits linked to the storm water drainage system from the raw material handling areas will be regularly checked and cleaned to ensure their effectiveness. This checking and cleaning will be rigorous during the monsoon season, especially at the time of heavy rains forecast.

2.18 LAND & GREENBELT DEVELOPMENT

Proposed project will be installed on 2.18 hectares (15.38 acres) of land, majority of which is under the possession of the company. As the land is already acquired, the question of rehabilitation and resettlement is not an issue for the proposed project.

Trees filter particulates and are effective as sink of pollutants. Tree also reduces noise level and regulates the oxygen balance in the area by consuming released carbon dioxide. Hence, green development shall be part of pollution control measure adopted in the open spaces in the plant area.

In order to enhance land use as well as to compensate for any loss in ecology during construction, adequate plantation programmes in and around the project site have been planned and shall be adopted with plantation of adequate number of trees.

Considering the need of open space for fire fighting and safety requirement, greenbelt has been planned along the periphery in addition to small patches of green area in the unutilized open space, roadside tree plantation and grass lawns. The peripheral green belt varies in width to suit the plant design requirement. The greenery is shown in the plant layout (refer **Figure-2.1**).

Maintenance of the existing Green belt shall be taken up starting from the construction phase of the proposed project.

Out of the total plant area of 2.18 hectares (15.38 acres), 0.72 Hectares (1.78 acres, 33% of the total area) shall be covered under Green Belt. Around 1,800 number of trees (@2500 nos. of tree per hectares) has been considered under plantation programme in greenery development.

2.19 CHARTER ON CORPORATE RESPONSIBILITY FOR ENVIRONMENTAL PROTECTION (CREP): INTEGRATED IRON & STEEL INDUSTRY

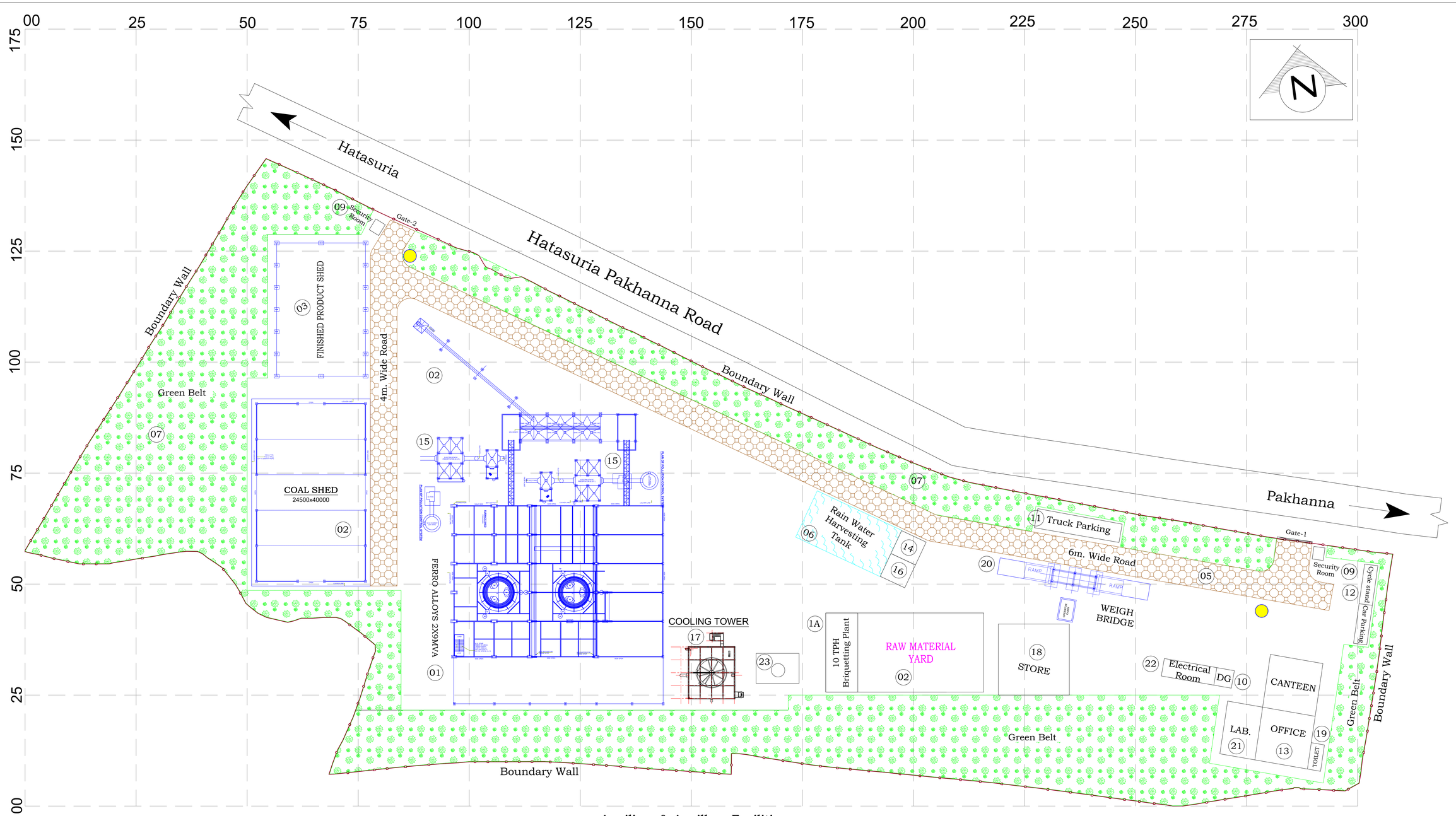
The Charter on Corporate Responsibility (CREP) as laid down by Central Pollution Control Board (CPCB) for Iron and Steel Industry will guide the production in the proposed steel plant.

Management Initiatives for Charter of Corporate Responsibility as follows:

SN	Unit / Item	Responsibilities	Extent of fulfillment
1.	Stack & AAQ	Installation of Continuous stacks monitoring system & its calibration in major stacks and setting up of the online ambient air quality monitoring Stations.	Will be complied
2.	APCS	To operate the pollution control equipment efficiently and to keep proper record of run hours, failure time and efficiency with immediate effect.	Will be complied

2.20 PROJECT COST

DESCRIPTION	COST
Total Capital Cost of the Project	Rs. 36.53 Crores
Total Capital Cost for Environmental Pollution Control Measures	Rs. 2.6 Crores
Recurring Cost / annum for Environmental Pollution Control Measures including cost of electricity	Rs. 0.26 Crores



Land Use Pattern of Plant Area

S. No.	Area Description	Area (in Acre)	Percentage	Percentage
01.	Ferro Alloy Plant 2 X 9 MVA	0.900	16.73 %	
1A	Briquetting Plant - 10 TPH			
02.	Raw Material Yard & Coal Shed	0.788	14.65 %	
03.	Product Storage Shed	0.122	2.27 %	
04.	Administrative Building /Canteen / Parking /Sub-Station, Labour Quarter, Cooling Tower ETC.	0.378	7.03 %	
05.	Road & Paved area	0.40	7.43 %	
06.	Rain Water Harvesting Tank	0.060	1.12 %	
07.	Green Belt	1.775	33.00%	
08.	Open Area	0.957	17.79%	
	TOTAL LAND (FACTORY BOUNDARY AREA)	5.38	100%	

Auxiliary & Ancillary Facilities

09. SECURITY ROOM
10. D.G. ROOM
11. TRUCK PARKING
12. CYCLE STAND
13. ADMINISTRATIVE BUILDING AND OCCUPATIONAL HELTH CENTRE
14. OVERHEAD WATER TANK
15. POLLUTION CONTROL SYSTEM
16. PUMP HOUSE
17. COOLING TOWER
18.GENERAL STORE
19. TOILET
20. WEIGH BRIDGE
21. LABORATORY
22. ELECTRICAL ROOM
23. LIQUID OXYGEN TANK

NOTES

1). ALL DIMENSIONS ARE IN MM.
2). ALL GRID SPACING ARE @ 25.0 METERS BOTHWAYS.
3) ASSEMBLY POINT

Project Location
Latitude: 23°23'56.57"N
Longitude: 87°17'18.31"E

Scale- 1:700

Quantity	Title/Name, designation, material, dimension etc		Article No./Reference		
Drawn by: Partha Bag	Checked by - date	Approved by - date	Filename	Date: 24.03.2022	Page: A2

Satvik Enterprises Limited

Mouza: Hat-Asuria & Basudebpur (North),
P.O. Hat Asuria
PS. : Barjora, Dist.: Bankura (WB)

PROPOSED FERRO ALLOY PLANT

SEL/PLANT LAYOUT/001 | REV. 0 | Sheet 1 OF 1

CHAPTER-3.0
BASELINE ENVIRONMENTAL SCENARIO

3.1 GENERAL

3.1.1 LOCATION OF THE PROJECT SITE

M/s Satvik Enterprises Limited, proposes to set up a ferro-alloy plant by installation of 2x9 MVA Submerged Arc Furnaces along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal for the production of 32,800 TPA Si-Mn, 44,400 TPA Fe-Mn, 15,200 TPA Fe-Si and 33,600 TPA Fe-Cr. The geographical co-ordinates of the project site are varying between Latitude: 23°23'54.60"N to 23°24'59.32"N and Longitude 87°17'15.69"E to 87°17'24.19"E with Above Mean Sea Level 272 ft (83m). The Location Map and the Google view point have been presented in **Figure-3.1.1** and **Figure-3.1.2** respectively.

3.1.2 TRANSPORTATION:

The project site already has proper road linkage for transport of materials and equipment. Durgapur Railway Station is about 10 km from the project site. State Highway-9 (Durgapur-Bankura connecting State Highway) is passing at a distance of about 1.7 Km from the Project site in West-north-west direction and National Highway-2 is passing at about 13.5 Km from the Project site in North North-east direction. The nearest Airport is Kaji Nazrul Islam Airport, Andal which is located at about 23.0 Km away in NNW direction from the project site. The important Airport - Netaji Subhas Chandra Bose International (NSCBI) Airport, Kolkata, is situated at about 144 Km distance in South-east direction w.r.t. project site. The project site has good connectivity with sea port of Kolkata, Haldia, Paradip and Vishakhapatnam.

SURROUNDINGS OF THE PROJECT SITE:

The important river near the Project site is River Damodar flowing at a distance of 6.7 km from the Project site in north-eastern side. The nearest important town - Barjora is located at about 3.0 Km away in NNW direction from the Project site. Bankura, the District Head Quarter is located at around 30.0 Km distance in South-west direction from the project site.

COVERAGE OF THE STUDY AREA

The EIA is aimed at determining the environmental impacts on the "Study Area", which encompasses all areas falling within a radius of 10 km around the proposed project site. The entire 10 km radius study area around the proposed project comprises of a total of 181 villages of Bankura district and 7 Wards of Durgapur Municipal area under Burdwan District. A part of Ghutgaria & Barjora town also falls within the study area.

PHYSIOGRAPHY

Bankura District is situated between 22°38' and 23°38' north latitude and between 86°36' and 87°46' east longitude. It has an area of 6,788 square kilometers. The District is covered by crystalline rocks of Precambrian age. Granite, gneiss, mica, schist, anthracite etc. are the principle types of rock in this district. The study area lies within a thick mantle of laterite generally mountainous and undulating. Barjora Coalfield is one of the important coalfield in West Bengal, is situated in the study area. The average elevation of the study area is 250 ft.

There is no eco-sensitive area like National Park / Wildlife Sanctuary / Tiger Reserve / Elephant Reserve / Core Zone of Biosphere Reserve / Habitat for Migratory birds etc. within 10 km radius study area around the Project site. Barjora protected forest is the nearest protected forest w.r.t. the project site. The 10 km radius Study area map of the project site has been presented in **Figure-3.1.3.**

The major environmental disciplines studied in this EIA report include Geology and Geo-hydrology, Land Use, Soil, Meteorology, Ambient air Quality, Surface and Ground Water Quality, Noise, Ecology, Demography and Socio-Economic Status.

This EIA Report is prepared on the basis of the available secondary data/ literature along with the on-site data during the period (**1st March, 2022 to 31st May, 2022**) representing summer season, generated through on-site monitoring of relevant environmental components and parameters.
The following chapters present the detailed discussion on the field data, generated for soil, meteorology, water quality, air quality, noise, ecology and socio-economic during the period **1st March, 2022 to 31st May, 2022,** along with the relevant secondary data, collected from various agencies on the relevant disciplines.

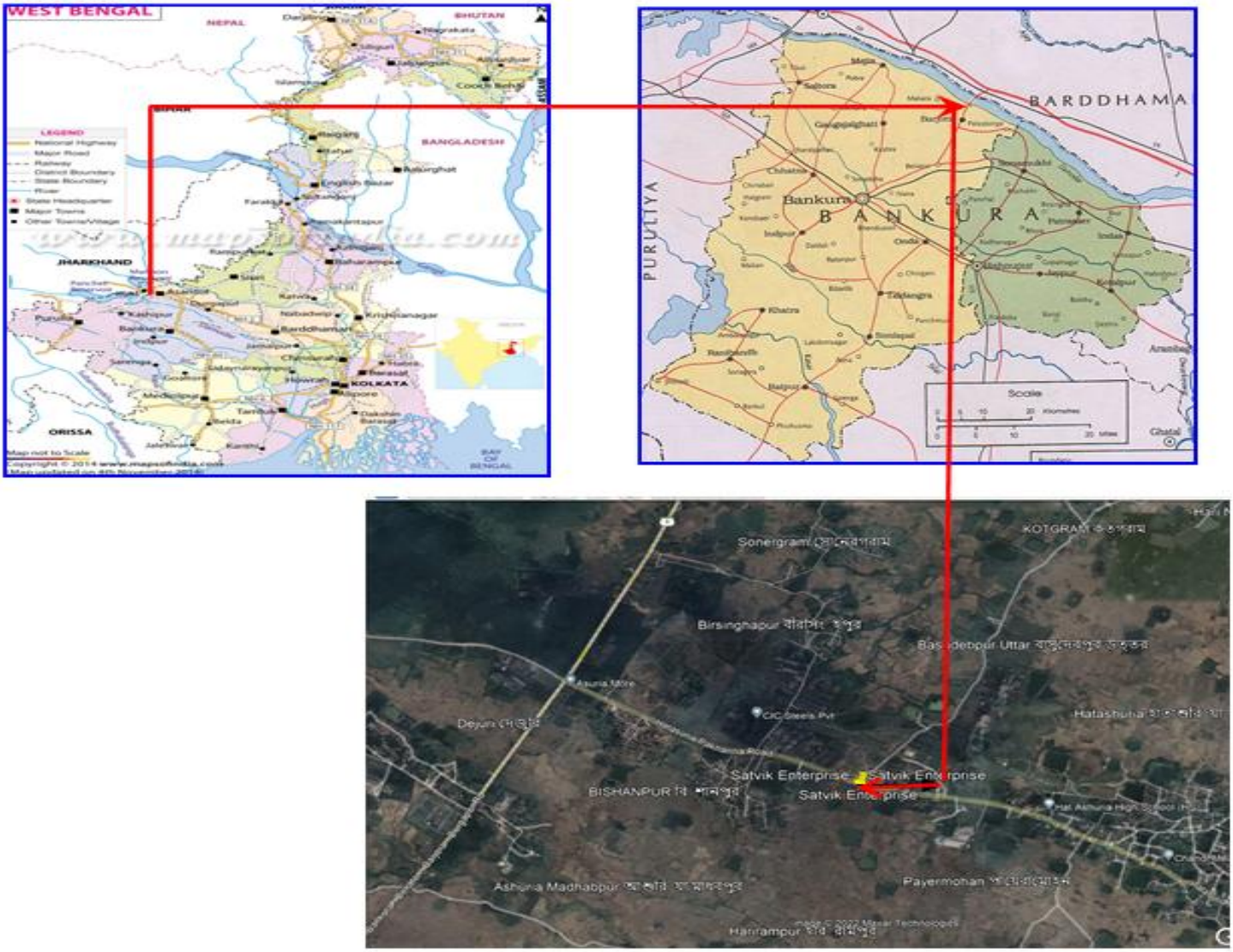


FIGURE-3.1.1: SITE LOCATION MAP

Project Site :Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura West Bengal

Site Co-ordinate:
Latitude 23°23’54.60"N to 23°24’59.32"N and
Longitude 87°17’15.69"E to 87°17’24.19"E

Mean Sea Level : 272 ft (83m)

FIGURE: 3.1.2: PROJECT SITE ON GOOGLE MAP

PROJECT SITE:

Village: Mouza: Basudebpur (North), PO: Hat Asuria, PS: Barjora, Pin: 722204
District: Bankura West Bengal

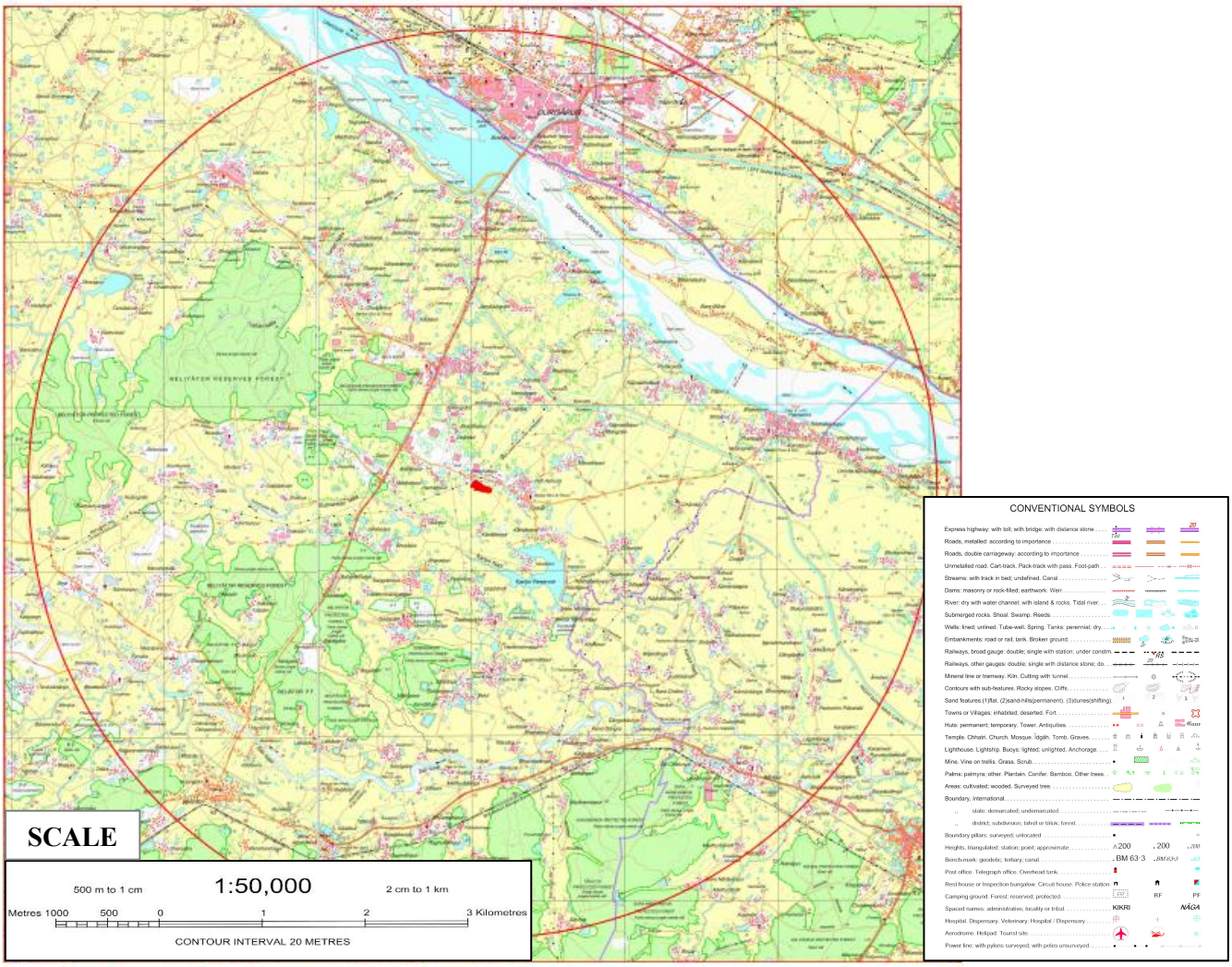


FIGURE-3.1.3 : TOPOSHEET MAP
PROJECT SITE & ITS SURROUNDING AREA

Project Site:
Mouza:Sahebdihi, PO: Hat Asuria, PS: Barjora, Pin: 722204, District: Bankura, West Bengal

Site Co-ordinate:
Latitude 23°23'54.60"N to 23°24'59.32"N and
Longitude 87°17'15.69"E to 87°17'24.19"E

Mean Sea Level : 272 ft (83m)

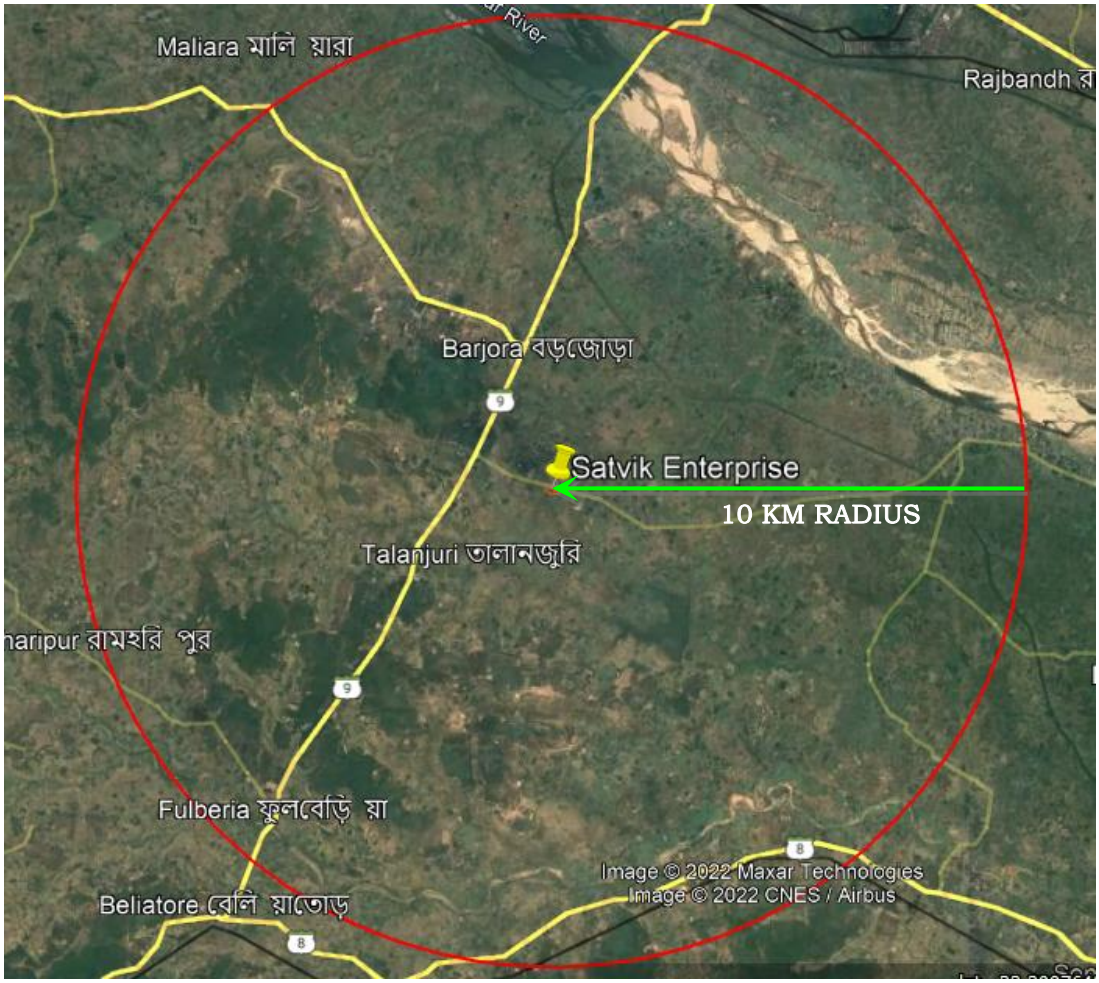


FIGURE-3.1.3: 10 KM RADIUS STUDY AREA

3.2 GEO-HYDROLOGY OF THE STUDY AREA

3.2.1 GROUND WATER GEOHYDROLOGY

Ground-water in the study area occurs both under water-table condition and confined condition. Ground-water in the near surface aquifers occur under water-table condition and in deep aquifers, under confined or sub-artesian condition in favourable terrain. The primary source of ground-water is rainfall, a part of which is lost as evaporation and transpiration and another part moves as surface run-off and remaining part percolates into the ground from direct rainfall or by lateral infiltration from surface water-bodies to form saturated ground-water zone.

In the western sector of the study area comprising mainly crystalline rock, ground-water occurs in the weathered mantle of varying thickness from 6 meters to 15 meters under water-table condition. As the water-bearing formations are discontinuous and at places ground-water is held under pressure in the fractured conduits, some water is also retained in the thin cover of soil and alluvium mantling stream channel.

Middle sector of the study area is covered by laterite and older alluvium, ground-water occurs in the moderately thick to thin aquifers under unconfined to semi-confined condition. In this region, the ground-water is mainly abstracted through open dug well with limited number of low-duty tube wells. The yield of such low-duty tube wells (75 meters to 100 meters depth) varies from (20 – 25) m^3/hour. One cusec medium-duty production tube wells are also feasible in specific location within the depth of 150 meters bgl.

In the eastern part of the study area alluvial area is found where ground-water occurs under confined condition below a blanket of clay whose thickness varies around 10 meters. Medium-duty tube-wells are also feasible here. Here several saturated granular zones are likely to occur in the depth span of 40 meters to 200 meters bgl discharging (90 – 180) m^3/hour.

Depth of water level:

The water level condition is somewhat good at Barjora Block. The average water level in the Barjora block ranges between 2.80 mbgl to 5.0 mbgl in the pre-monsoon season and 1.62 mbgl to 2.62 mbgl in the post-monsoon season. The infiltration rate is good, nearly 10 to 15 percent.

In the year 2001-2002 it has been observed that during the pre-monsoon period there was a great variation in water-level in different part of the

district. In a very small part of Patrasayer and Simlapal blocks the water-level was below 3 mtrs below ground level (BGL). In some of the spots auto-flow faintly existed. In a large part of Sonamukhi, Patrasayer, Indus, Barjora, Mejia, Simlapal, Taldangra and a small part of Raipur, water-level was between 3 to 6 mtrs BGL. The water level was above 10 mtrs BGL in the south-western part of Ranibandh and Raipur, western part of Chhatna and Khatra, eastern part of Joypur, Bishnupur and western part of Kotulpur and Indus and in some patches of Taldangra, Onda and Barjora. In rest of the District, water-level was between 6 mtrs and 10 mtrs BGL.

Annual fluctuation of water level:

Annual rate of water-level fluctuation is maximum in Chhatna, Ranibandh, Raipur, Bishnupur, Jaypur, Indus and Kotulpur (4 mts. to 6 mts.). There are some patches in Bankura-I, Bankura-II, Barjora, Gangajalghati and Khatra, where the fluctuation is between 4 mts. to 6 mts. In rest of the district the annual water-level fluctuation is 2 mts. to 4 mts. In central Taldangra water-level fluctuation is negligible.

Water Harvesting:

There is a vast scope for increasing groundwater recharge in the district by construction of various water harvesting structures such as percolating tanks, sub-surface dykes, gully plugging etc. to store the excess run off. These structures would not only help in recharging the groundwater but also reduce soil erosion and increase soil moisture content.

Water Level condition at different hydro-geomorphic zones in Bankura District with indication of the project site has been presented in **Table-3.2.1** and Depth of Ground Water Level map of Bankura District with indication of the project site has been presented in **Figure-3.2.4.**

Ground-Water Resource Map of Bankura District with indication of the project site has been presented in **Figure-3.2.5.**

Table-3.2.1

Water-level condition from 1998 to 2002 at different hydro-geomorphic zones in Bankura district

Rock type	Hard rock area in the west	Hard rock fringe area of the middle	Alluvial area of the east
Blocks covered	Bankura I, Bankura-II, Chhatna, Saltora, Gangajalghati, Indpur, Khatra, Ranibandh, Mejia (part), and Raipur (part)	Bishnupur, Onda, Barjora, Simlapal, Taldangra, Mejia (part), eastern part of Sarenga	Bishnupur, Joypur, Kotulpur, Sonamukhi, Patrasayer and Indus
Area in Sq. Km.	2904	2129	1848
Average depth to water-level condition (from 1998 to 2002)	7 mts. to 8 mts.	7.54 mts.	6.35 mts.
Fluctuation (average)	0.85 mt.	1.52 mt.	1.72 mt.

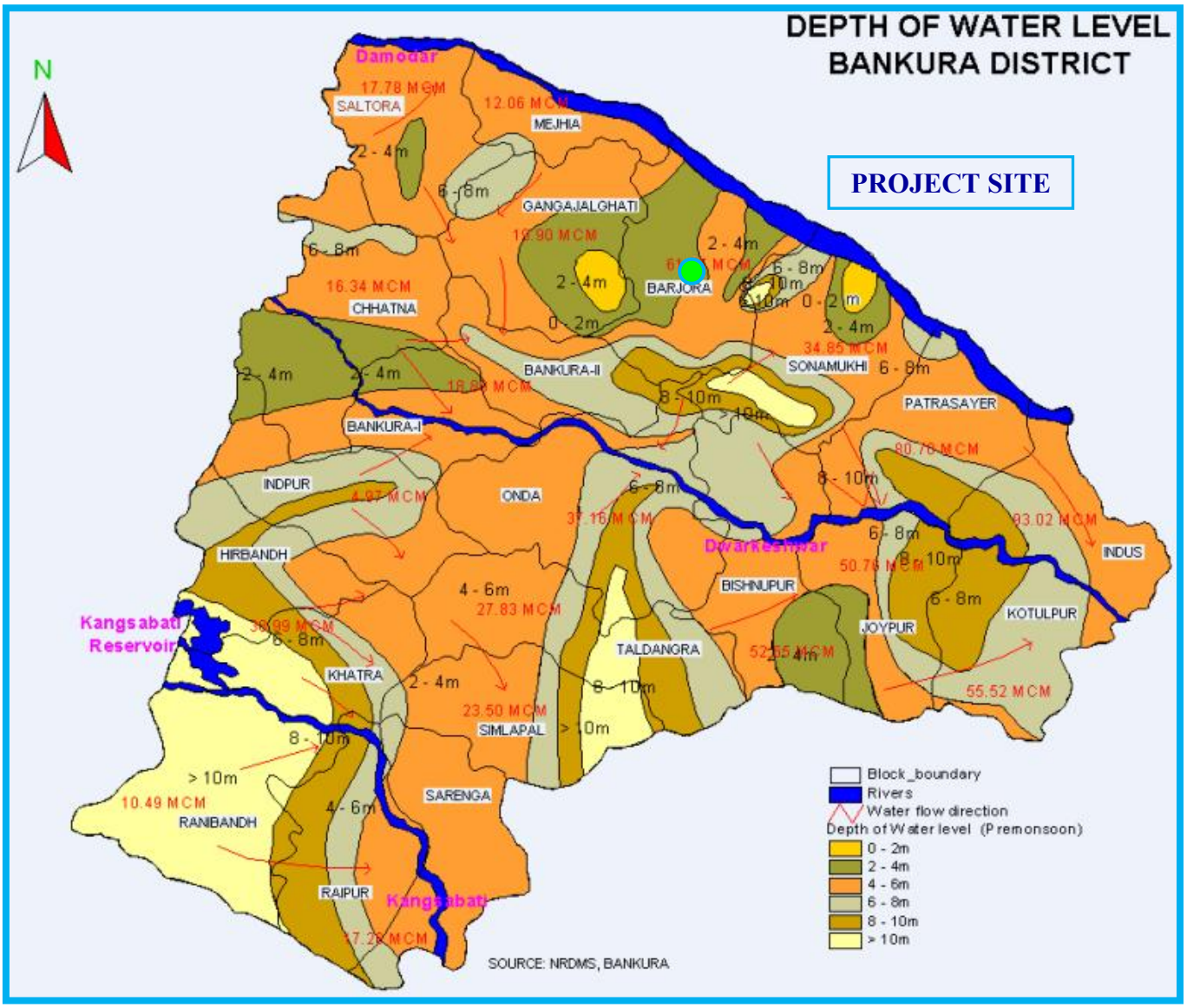


FIGURE-3.2.4:
DEPTH OF GROUND WATER LEVEL OF BANKURA DISTRICT

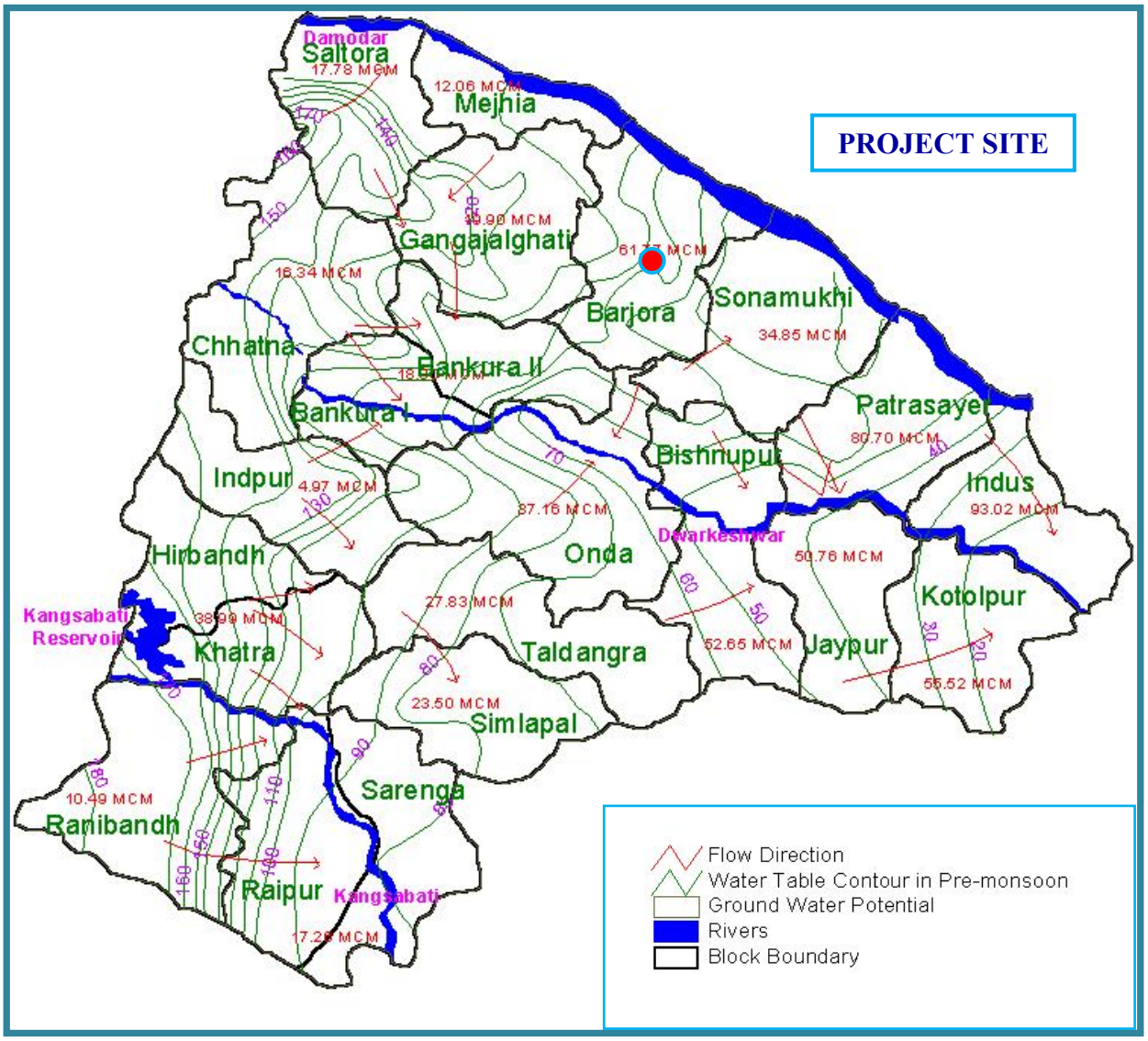


FIGURE-3.2.5:
GROUND WATER RESOURCE MAP OF BANKURA DISTRICT

3.2.2 SURFACE WATER HYDROLOGY

The drainage basin is a fundamental geomorphic unit and the watershed acts as a area of source for precipitation that eventually provide to the stream channels by various path. The drainage basin morphology being an important aspect of geomorphic analysis has been undertaken in the present context to determine the various properties of form elements, their distributional variation, interrelationship, determination of correlation coefficients etc. Means of geohydrology and ground water exploration to identify and to locate the zone of recharge of groundwater in a particular river basin or a catchment. Geological set up is

established to know about surface and subsurface nature of terrain. Topographic and surface features are mapped in order to determine from highest to lowest area, where water from different higher places can move and accumulate. These particular zones are present in various terrains. For ground water exploration, the identification of such places from the entire area, are thus selected.

Drainage Network:

Drainage network analysis is important for geohydrological studies. Drainage pattern reflects the surface characteristic as well as subsurface formation. Drainage density indicates closeness of channel as well as the nature of surface materials. More the drainage density, higher would be runoff. Thus, the drainage density characterizes the runoff in the area or in other words, the quantum of relative rainwater that could have infiltrated. Hence lesser the drainage density, higher is the probability of recharge or potential groundwater zone. Hence, drainage density is an important index in geo-hydrological studies, and can be evaluated from the satellite images or others.

River Basin:

A river basin is the land portion drained by a river and its tributaries. It encompasses the land surface dissected and drained by many streams and creeks that flow downhill into one another. A river basin collects water from an area then moves it through the water system, where it eventually empties into an ocean or sea. A river basin is generally composed of many areas which are called watersheds.

The River basin is a logical unit of focus for studying the movement of water within the hydrological cycle, because the majority of water that discharges from the basin outlet originated as precipitation falling on the basin. A portion of the water that enters the groundwater system beneath the river basin may flow towards the outlet of another drainage basin because groundwater flow directions do not always match those of their overlying drainage network. Measurement of the water discharge from a basin may be made by a stream gauge located at the basin's outlet.

Drainage Density:

The drainage density is an important indicator of the linear Scale of landform elements in stream eroded topography. It is the ratio of total channel segment lengths cumulated for all orders within a basin area, which is expressed in terms of km/sq.km. The drainage density indicates

the closeness of channels providing a quantitative measure of the average length of stream channel for the whole basin. It has been observed from drainage density measurements made over a wide range of geological and climatic types that a low drainage density is more likely to occur in regions of highly resistant of highly permeable subsoil material under dense vegetative cover and where relief is low. High drainage density is the resultant of weak or impermeable subsurface material, sparse vegetation and mountainous relief. Low drainage density leads to coarse drainage texture while high drainage density leads to fine drainage texture.

Stream frequency:

The stream frequency or channel frequency has been defined as the number of streams per unit of area. It directly depends on the size of the drainage area. A large basin may contain as many finger tip tributaries per unit of area as a small drainage basin, and in addition, it usually contains a larger stream or streams.

Damodar River:

The River Damodar is an ephemeral river, that means the river mainly flows in the rainy season. The River flows at a distance of 5.7 Kms from the Project site in North-east direction. Damodar River rises in the Palamau hills of Chota Nagpur at an elevation of about 609.75 meters. It flows in a south-easterly direction entering the deltaic plains below Raniganj. Near Burdwan the river abruptly changes its course to a southerly direction and joins Hooghly River about 48.27 km below Kolkata. The total length of Damodar River is about 547 km. The principal tributary of Damodar River is Barakar. Other tributaries and sub-tributaries are Konar, Bokaro, Haharo, Jamunia, Ghari, Guaia, Khadia and Bhera. There are five dams in the Damodar valley. These are Maithan dam, Panchet dam, Konar dam, Tilaiya dam and Tenughat dam. There is a barrage on Damodar River at Durgapur. For the five sub-catchments, namely Tilaiya, Maithan, Konar, Panchet and Durgapur the average annual precipitations are 1,117.7 mm, 1,320.8 mm, 1,141.7 mm, 1,142.0 mm and 1,320.8 mm respectively.

During nine dry months the river Damodar is allowed to maintain a perennial flow by regulating the reservoir sluices. Efforts are made to maintain the flow rate of 570 cusecs above Punchet dam, 430 cusecs for the next stretch up to Durgapur and below Durgapur 100 to 200 cusecs. Damodar River is a rain fed torrential river. The river catchment is

characterized by a prolonged dry season followed by turbulent monsoon with the annual runoff, 11,385 million m^3 of water.

The River Basin of Damodar River has been presented in **Figure- 3.2.6**.

FIGURE-3.2.6:
RIVER BASIN OF DAMODAR RIVER

Drainage system of the 5 Kms radius of the study area:

There are several types of water bodies within 5 Kms radius of the study area. A major Irrigation Sluice originated from River Damodar flowing at a distance of 6.7 Km from the Project site in North-east direction. The nearest distance of this Damodar Irrigation Sluice is about 2.3 Kms in NE direction from the Project Site. There are also several Nalas within the 5 Kms radius of the study area. The major Nalas are the Subhankari Nala and the Kanjor Nala. These two Nalas fall into a Irrigation Reservoir called Kanjor Reservoir. The nearest distances of the Subhankari Nala and Kanjor Nala are 2.1 Kms in South direction and 2.9 Kms in SSW direction respectively w.r.t. the Project Site. The Kanjor Reservoir is located around 4.0 Kms distance in SSE direction from the Project Site. There are also several unnamed small Nalas located within the 5 Kms radius of the study area. A small irrigation canal named Feeder Canal originates from the Damodar Irrigation Sluice near Kamalpur and meets the Kanjor Reservoir. The nearest distance of the Feeder Canal is about

3.0 Kms in ESE direction from the Project Site. Besides, there are also several big, medium and small sized artificial or natural ponds located within 5 Kms radius of the study area. The Drainage Map of 5 Kms radius of the study area is presented in **Figure-3.2.7**.

Other water bodies within 10 Kms radius of the study area:

Sali River:
Another important river in the study area is Sali River, which is an important tributary of Damodar River that drains the northern part of Bankura district in West Bengal. It originates a few miles west of Kora hill, halfway between Mejia and Bankura and joins Damodar at Somsar village in Indas police station. It is a rain-fed river. The nearest distance of the Sali river from the Project Site is 7.7 Kms in SSE direction.

There are also two important Nalas beyond 5 Kms radius, but within the 10 Kms radius study area. Barjora Nala originates from the River Damodar near the village Pratappur and Tartora Nala originates from the Barjora Nala near the village Chak-Kulbana and enters into Barjora Forest. Besides, there are many ponds, ditches, small canals, wetlands etc. Which are found within the 10 Kms radius study area, form the surface hydrological system.

The Drainage map of the study area is presented in **Figure-3.2.7**.

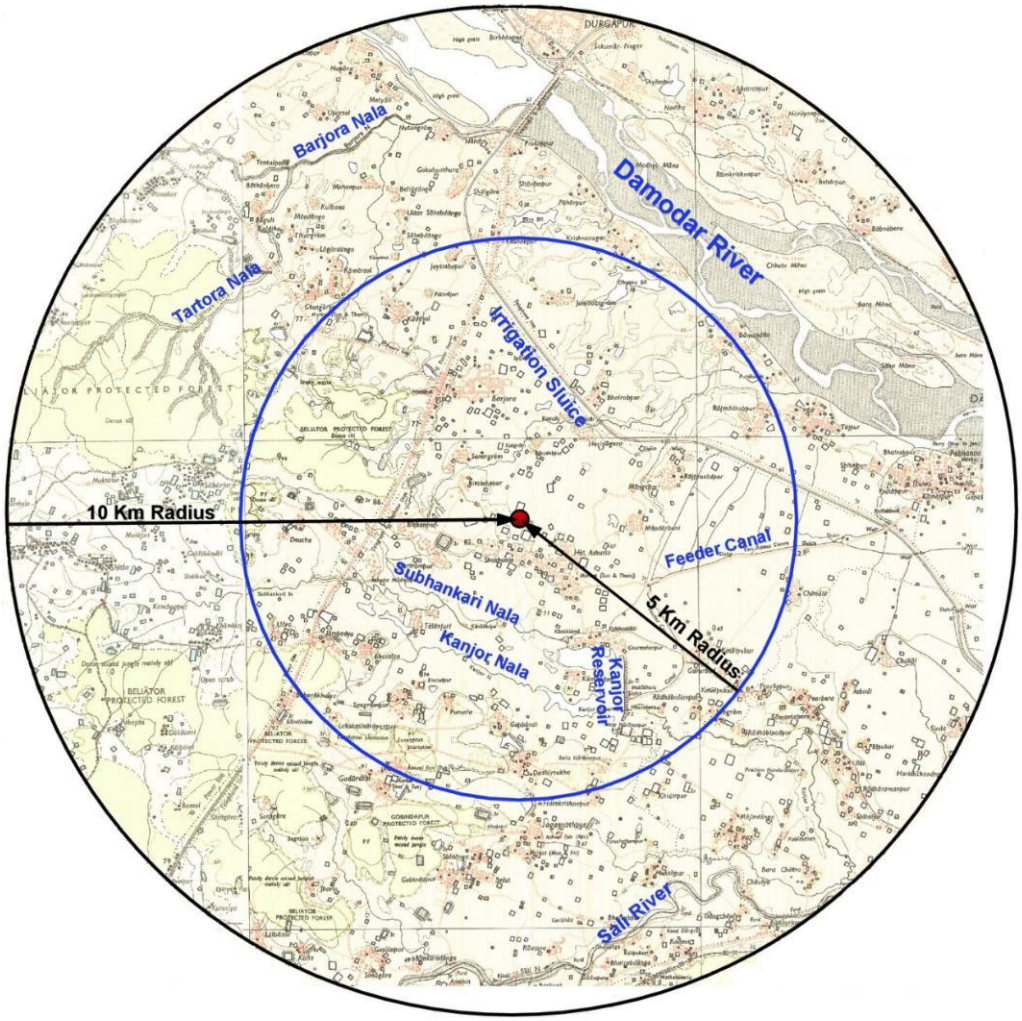
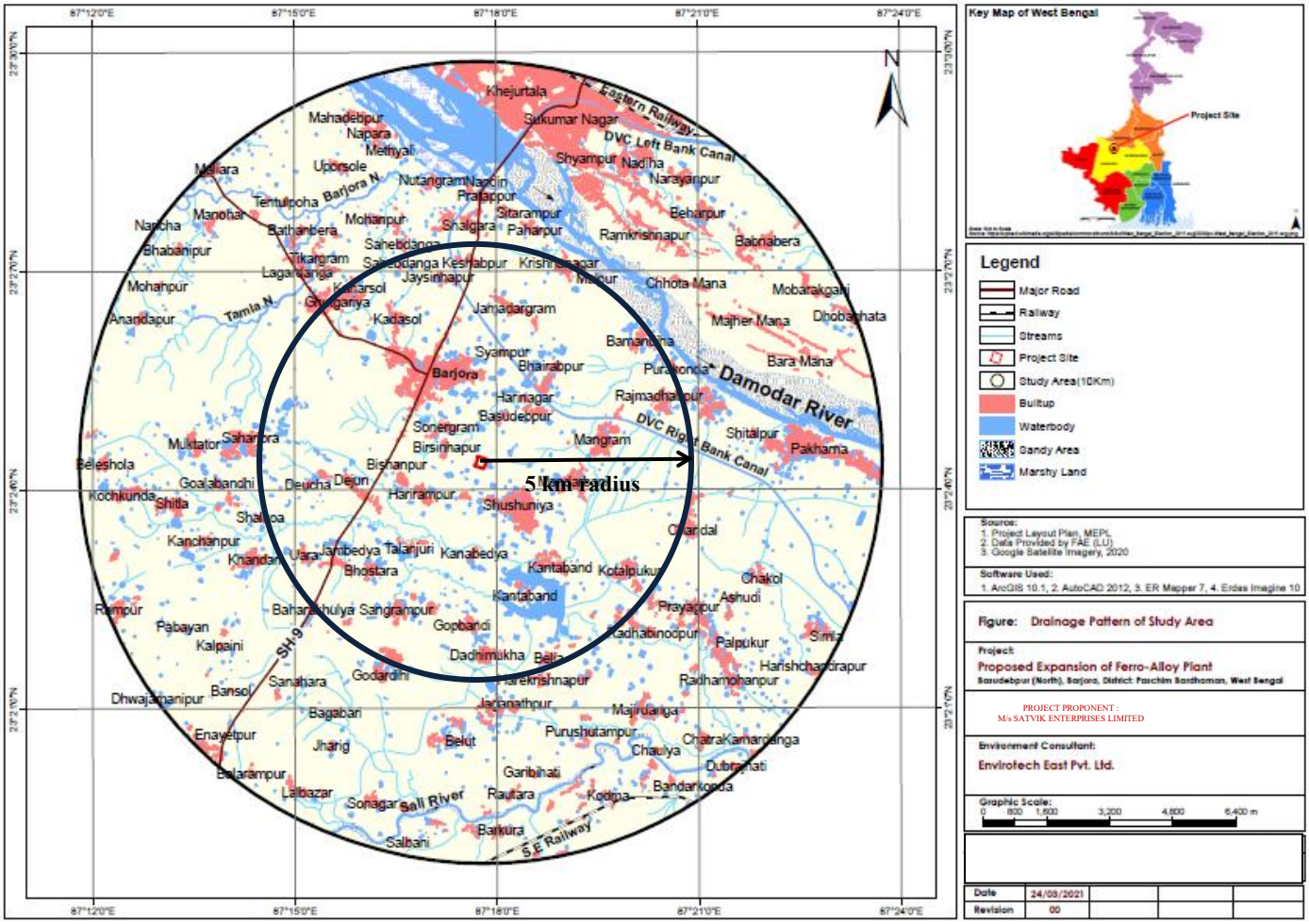


FIGURE-3.2.7
DRAINAGE MAP OF 5 KMS RADIUS OF THE STUDY AREA


Key Map of West Bengal
Project Site
Legend
Major Road
Railway
Streams
Project Site
Study Area(10Km)
Builtup
Waterbody
Sandy Area
Marshy Land
5 km radius
Damodar River
DVC Left Bank Canal
DVC Right Bank Canal
Eastern Railway
S.E Railway
Barjora
Sali River
Source:
1. Project Layout Plan, MEPL
2. Data Provided by FAE (LU)
3. Google Satellite Imagery, 2020
Software Used:
1. ArcGIS 10.1, 2. AutoCAD 2012, 3. ER Mapper 7, 4. Erdas Imagine 10
Figure: Drainage Pattern of Study Area
Project
Proposed Expansion of Ferro-Alloy Plant
Sasudebpur (North), Barjora, District: Paschim Bardhaman, West Bengal
PROJECT PROPONENT :
M/s SATVIK ENTERPRISES LIMITED
Environment Consultant:
Envirotech East Pvt. Ltd.
Graphic Scale:
0 800 1,600 3,200 4,800 6,400 m
Date 24/03/2021
Revision 00

3.3 FLOOD HAZARD ZONATION MAPPING

Flood hazard zonation mapping as depicted in **Figure-3.3.1** has been prepared following an integration of overall assessment throughout West Bengal. Basically, five districts of West Bengal have been identified to have the probability to be affected by flood. These districts are (1) North 24 Parganas, (2) Nadia, (3) Mursidabad, (4) South 24 Parganas and (5) Medinipur. Cluster analysis of Flood Hazard Zones has been shown in **Table-3.3.1**.

The study area does not come under flood hazard zone. No flood hazard has been recorded in the area till date. Flood Hazard Zonation Mapping of West Bengal with indicating of the study area has been presented in **Figure-3.3.1**.

Table-3.3.1
Cluster Analysis of Flood Hazard Zones

Districts	No. of Sub-Divisions	Vulnerable Sub-Divisions	Major Rivers
North 24 Parganas	05	3 Barrackpore 4 Bashirhat	Jamuna Bhagirathi Ichhamati
Nadia	03	5 Nadia Sadar	Jalangi Hugli Ganga
Murshidabad	05	6 Lalbagh 7 Kandi 8 Jangipur	Bhagirathi Ganga
South 24 Parganas	02	9 Diamond Harbor	Rupnarayan Hugli Damodar
Medinipur (East + West)	4+4=8	10 Haldia 11 Kanthi 12 Tamluk 13 Ghatal	Kasai Hugli Subarnarekha Rupnarayan

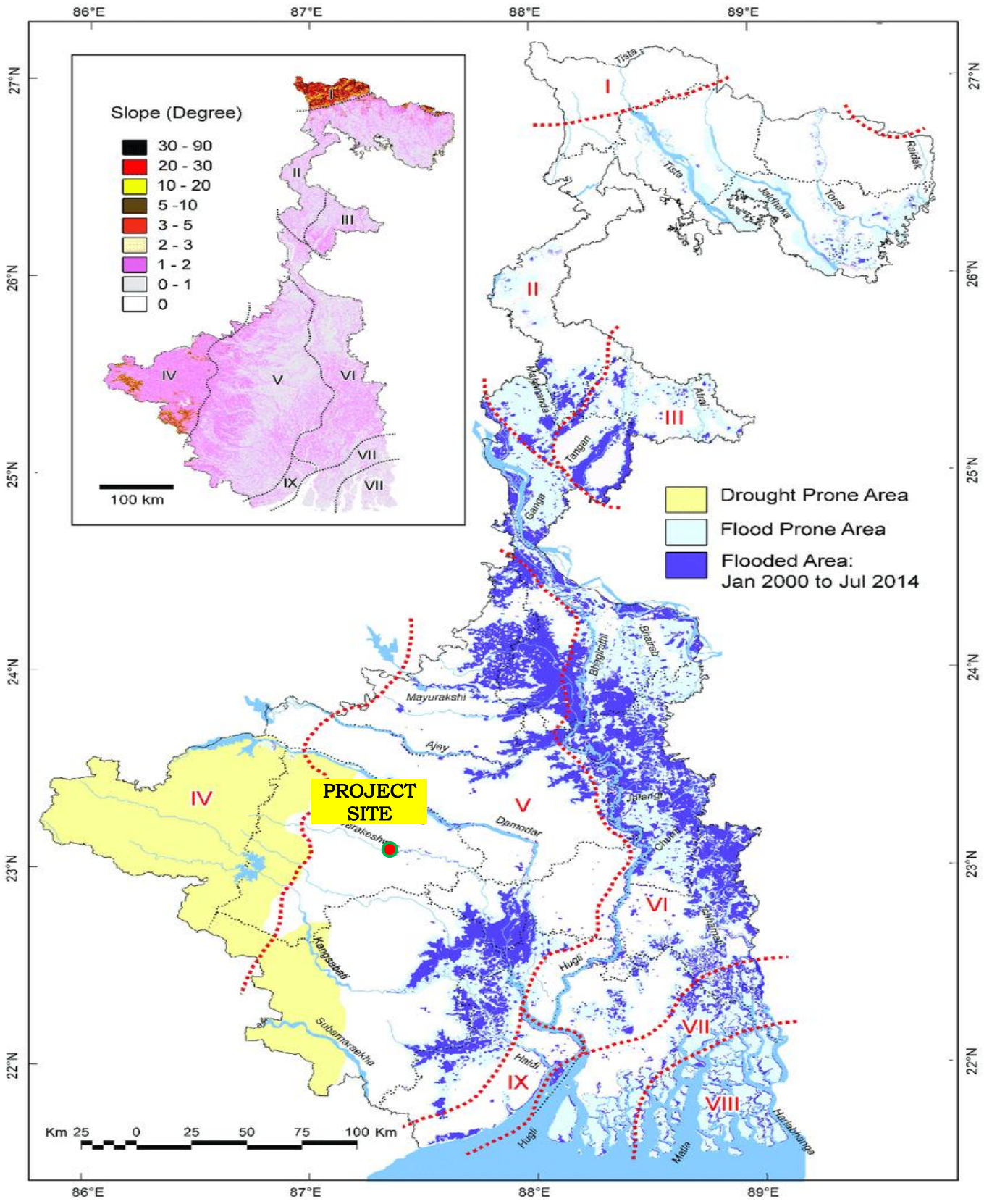


FIGURE-3.3.1:
FLOOD HAZARD ZONATION MAPPING OF WEST BENGAL

3.3.1 SEISMIC HISTORY OF THE STUDY AREA

West Bengal experiences earthquakes at a relatively lower frequency of the seismic hazard zonation map. According to the IMD catalogue regions are divided in the seismic zones II–V (low damage to very high damage), corresponding to PEAK GROUND ACCELERATION (PGA) of 0.1, 0.2 and 0.25 (1 g = 980 Gal2) respectively.

According to IS: 1893-1984, the study area falls under **Zone-III**. It means that the area is covered under "low hazard zone". The region has considerable area close to river basins and deltas that are characterized by Holocene alluvium deposits, which are likely to soften and hence are susceptible to liquefaction during an earthquake. There is no major earthquake episode recorded in the study area till date. Seismicity map of West Bengal with indication the study area has been presented in **Figure-3.4.1.**

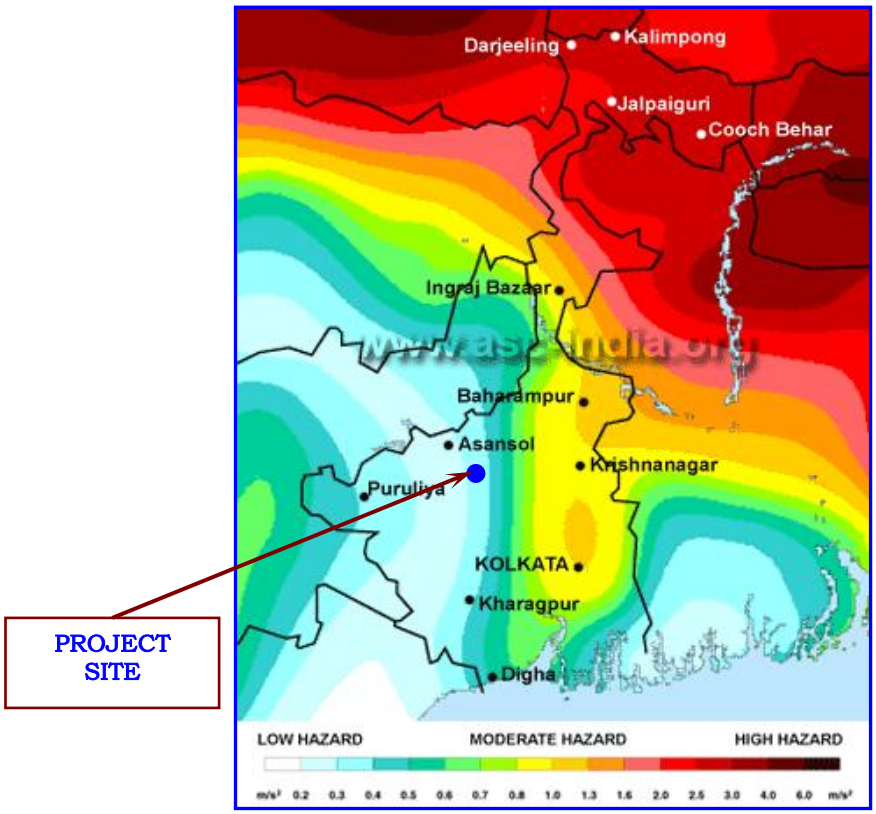


FIGURE – 3.3.1:
SEISMICITY MAP OF WEST BENGAL WITH INDICATION OF THE STUDY AREA

3.4 MAJOR INDUSTRIES IN 10 KMS RADIUS AREA AROUND THE PROJECT SITE

There are following industries found within the 10 km radius area around the project site:

Location of Industries within 10 Kms radius study area is presented below:

TABLE-3.4.1
LIST OF INDUSTRIES WITHIN THE STUDY AREA

SL. NO.	NAME OF INDUSTRY	TYPE OF INDUSTRY	DISTANCE (IN KMS.)	DIRECTION
1	M/s. Metsil Exports Pvt. Ltd.	Ferro Alloy	0.2	N
2	M/s. CIC Steels Pvt. Ltd.	Steel	0.67	NW
3	M/s. CIC Steels Pvt. Ltd.	Steel	0.67	NW
4	M/s. Joyous Block & Pannels Pvt. Ltd.	Fly Ash Bricks	0.92	S
5	M/s. Ma Durga Flour Mill Ltd.	Mill	0.3	N
6	M/s. Kansabati Cooperative Spinning Mill	Mill	2.22	W
7	M/s. Kalimata Ispat Industries Pvt. Ltd.	Iron & Steel	1.3	WSW
8	M/s. M.B. Ispat Corporation Ltd.	Iron & Steel	1.8	WNW
9	M/s. Rishav Sponge Pvt. Ltd.	Iron & Steel	2.5	WNW
10	M/s. Shristi Ispat & Alloys Ltd.	Ferro Alloy	2.5	WNW
11	M/s. B.D.G Metal and Power Ltd.	Iron & Steel	3.9	WNW
12	M/s. Nilkamal Plastics Limited	Steel	4.0	NW
13	M/s. Steelex	Ferro Alloy	4.3	NW
14	M/s. Expandable Enterprises Pvt. Ltd.	Steel	4.2	NW
15	M/s. Xpro India Ltd.	Plastic	4.6	NW
16	M/s. Sonic Thermal Pvt. Ltd.	Ferro Alloy	4.7	NW
17	M/s. Surya Alloy Industries Ltd.	Ferro Alloy	4.9	NW
18	M/s. Shree Ramrathi Steel Pvt. Ltd.	Iron & Steel	5.0	WNW
19	M/s. Supersmelt Industries Pvt. Ltd.	Iron & Steel	5.2	WNW
20	M/s. Gupta Industries Pvt. Ltd.	Plastic	5.2	NW
21	M/s. H.P. Ispat Pvt. Ltd.	Iron & Steel	5.3	NW
22	M/s. Rattan Ispat Pvt. Ltd.	Iron & Steel	5.3	NW
23	M/s. Pimespack Pvt. Ltd.	Woven Sacks	6.1	NW
24	M/s. Royal Fab Teflon Pvt. Ltd.	Woven Sacks	5.9	NW
25	M/s. SBIW Steels Pvt. Ltd.	Iron & Steel	5.6	NW
26	M/s. Embee Ferro Alloys Pvt. Ltd.	Ferro Alloy	5.7	NW
27	M/s. Arjan Das & Sons Pvt. Ltd.	Iron & Steel	5.8	NW
28	M/s. Inox Gases Ltd.	Gas	5.82	NW
29	M/s. Cosmic Ferro Alloys	Ferro Alloy	6.1	NW
30	M/s. Lalwani Ferro Alloys Pvt. Ltd.	Ferro Alloy	6.3	WNW
31	M/s. Amit Ferro Alloys Pvt. Ltd.	Ferro Alloy	6.3	WNW
32	M/s. Jay Maa Ambey Pvt. Ltd.	Iron & Steel	6.3	WNW
33	M/s. Lalwani Industries Ltd.	Ferro Alloy	6.3	WNW
34	M/s. Mann Concast Pvt. Ltd.	Iron & Steel	6.6	WNW

3.5 LANDUSE

3.5.1 INTRODUCTION

M/s Satvik Enterprises Ltd. is located at Mouza: Sahebdihi, P.O.: Hat-Asuria, P.S.: Barjora, Dist.: Bankura in West Bengal.The geographical co-ordinates of the project site are varying between Latitude: 23°23'54.60"N to 23°24'59.32"N and Longitude 87°17'15.69"E to 87°17'24.19"E with Above Mean Sea Level 272 ft (83m). The important river near the Project site is River Damodar flowing at a distance of 6.7 km from the Project site in north-eastern side.

3.5.2 METHODOLOGY

INPUT DATA

Remote Sensing Data

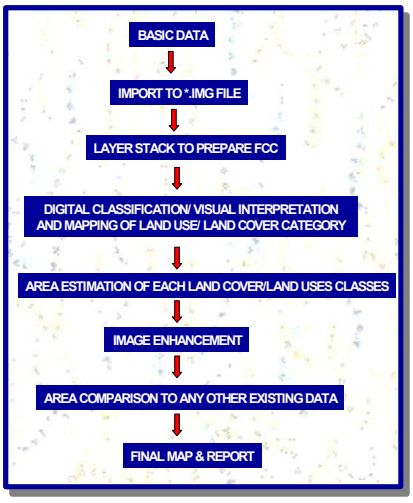
To study and map the land use pattern of the 10 km radius study area, IRS1D LISS IV multispectral imagery with center at the project site has been used as input data. The spatial resolution of the satellite data is 5.8 m. The bands used as input data for the current study have these following features:

Band 2: 0.52 - 0.59 µm (green).

This band corresponds to the green reflectance of healthy vegetation and is spanning the region between the blue and red chlorophyll absorption bands.

Band 3: 0.62 - 0.68 µm (red).

This red chlorophyll absorption band of healthy green vegetation is one of the most important bands for vegetation discrimination. In addition, it is useful for soil-boundary and geological boundary mapping. Band 3 may exhibit more contrast than bands 1 and 2 because the effect of the atmosphere is reduced. The 0.69 m cut-off represents the beginning of a spectral region from 0.68 to 0.75 m where vegetation reflectance crossovers occur that can reduce the accuracy of vegetation studies.



Band 4: 0.77 - 0.86 µm (near infrared).

For reasons discussed above, the lower cut-off for this band was placed above 0.75 m. This band is especially responsive to the amount of vegetation biomass present in a scene. It is useful for identification of vegetation types, and emphasizes soil-crop and land-water contrasts.

Secondary Data

The secondary database considered for validation and geo-referencing of the image is as follows:

- Survey of India topographical map (1:50,000)
- District Planning Series Map, NATMO, 1998.

Waste Land Atlas of India, 2000.

3.5.3 DIGITAL IMAGE PROCESSING

Image Rectification:

The satellite images are given in BSQ (Band Sequential) format. These are imported to Erdas environment. Then geometric correction applied to the images to correct the distorted image data to create a more faithful representation of original scene. Image rectification procedures are often termed 'pre-processing' operations because they normally precede further manipulation and analysis of the image data to extract specific information.

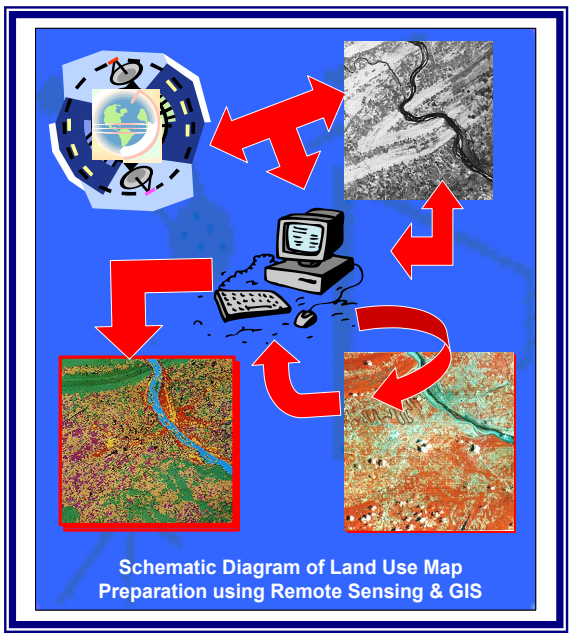


Image Enhancement

This procedure is applied to the images in order to more effectively display or record the data for subsequent visual interpretation. High pass filter used to visualize more correctly the linear features such as, roads, rail, canal, river etc. Histogram Equalization was used to distinguished area of the same tone.

Visual Interpretation & Land Use Mapping

Satellite imagery contains detail records of features on the ground at the time of satellite overpass. An image interpreter systematically examines the images for generating the information required by him. Other supporting materials such as published maps and reports from various sources will increase the accuracy of the interpretation. The chain of process in visual interpretation of the shape and pattern in an image begins with detection. There are certain fundamental characteristics seen on images which aid in the visual interpretation of satellite imagery. These are tone/ color, size, shape, texture, pattern, location, association,

resolution and season. Visual interpretation is subjective and differs from person to person and also upon the season, scale, spectral bands, spatial resolution, overall image contrast & quality of the data.

Step - I	Layer stacking of three distinct file into a single file and create FCC
Step - II	Select an appropriate band used throughout the analysis. An examination of the three bands shows that the one visible band (2) provides less evidence of the various water surfaces across the image. Band 4, the near infrared band, clearly separates water bodies from other surfaces. Band 3 help to distinguish vegetation cover.
Step - III	Digital classification: Un-supervised ISO data classification carried out considering green, red, NIR bands with 5 iteration and expected number of classes 50
Step - IV	Aggregation of classes obtain through this classification session into classes having significance on the physical world was then carried out based on DN value.
Step - V	Visual interpretation is also done since digital classification only consider pixel values not the geographic location, association, shape, etc.
Step -VI	Area Calculation of each Land Use/Land Cover Classes
Step- VII	Comparison with some reference data and sample ground validation
Step - VIII	Final Map and Report

The procedure for mapping for land use from satellite imagery of different season & on different scale is well established. Several parameters like terrain, climatic conditions, socio-economic trends, and environmental influences etc. play a vital role in the existence of various land use categories.

3.5.4 SOFTWARE USED

The sensitivity of the environment i.e. exiting land use is studied through Geographical Information System (GIS). Geographic Information Systems (GIS) is a scientific technique, which has revolutionized the way that land is inventoried, managed, planned, and studied. GIS provides the theories and methods for organization and analysis of original measurements of location and secondary spatial data, as well as topography. As an information system GIS provides for the organization, storage, analysis, modeling, mapping, and display of physical and biological data, as well as the distribution of cultural or socio-economic data. GIS applications are diverse. They include determining the suitability of land for different uses, planning future land uses for different objectives, analyzing land and land-cover properties for both resource inventories and scientific

studies, and sitting of industries. For the present study, the following soft-wares have been used:

(i) Erdas Imagine 8.4
(ii) Arc Info 9.0
(iii)Arc View 3.2

3.5.5 LAND USE PATTERN OF THE STUDY AREA

The land use categories are taken into six major categories and all the 11 categories have been described under them. These six major categories with sub categories are described in the following table:

MAJOR CATEGORIES	SUB CATEGORIES
Built up land	Urban Settlement, Village Settlement, Industry
Agricultural land	Land for Agricultural activities
Forest	Open Forest, Plantations (Mixed Urban)
Wasteland	Land with scrub, Land without scrub, Swampy area
Water bodies or Rivers	Water bodies like Ponds/lakes/tanks/ River /reservoir etc.
Transport and other drainage network	Roads, Railways, Drainage network

The land use / land cover of the region can be divided into 11 categories. The categories of land use/ land cover for the proposed study area are shown in the following table and are elaborated in the following pie diagram:

Sl. No.	Land Use Classification	Area in Hectare	Area in Percentage
1	Builtup	1990.95	6.1
2	Forest	4185.25	12.9
3	Waterbody	1759.94	5.4
4	Open Scrub	4883.67	15.1
5	Sandy Area	999.32	3.1
6	Mining Activity	243.55	0.8
7	Industry	218.04	0.7
8	Brick Field	28.85	0.1
9	Marshy Land	305.46	0.9
10	Agriculture Land	17777.02	54.9
TOTAL		**32392.05**	**100.0**

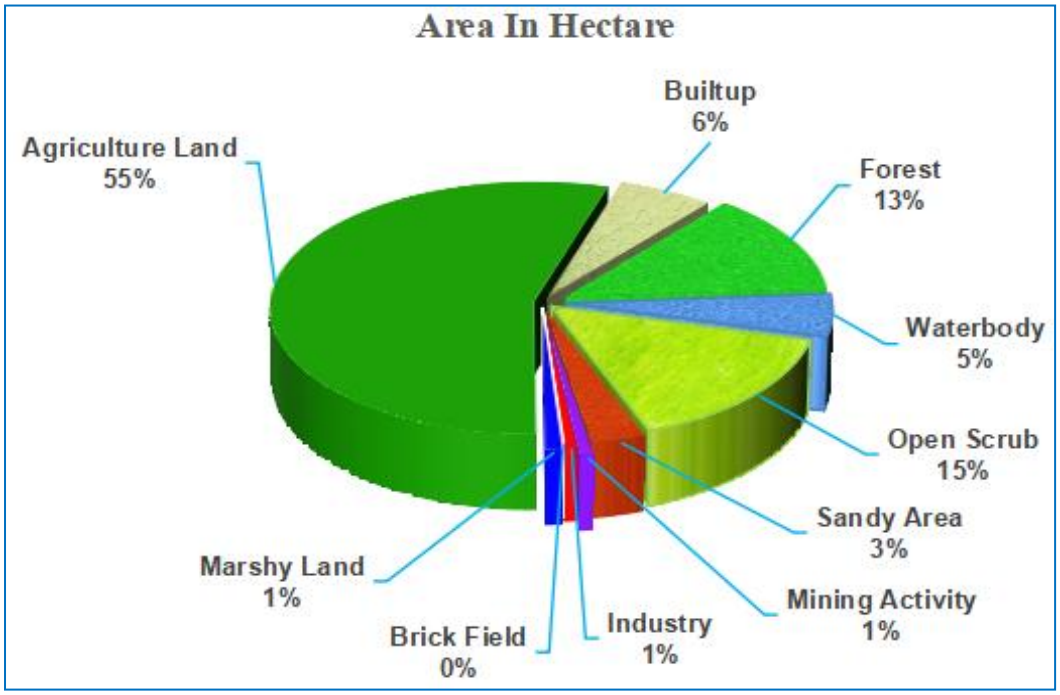


FIGURE – 3.5.1:
LAND USE CLASSIFICATION IN THE STUDY AREA

The prominent land use in the study area is as follows:

Built-up land:
Out of total study area, built-up land covers about 6.1% of the total study area including the following land use classes:

Towns and Villages	Under this category the towns falling in the influence area are taken into consideration. Major urban settlements like Durgapur, AVB Township and its surrounding areas like Sagarbhanga, Mamra, Madhabpur. Phuljhari Township, Mobarakganj etc are the township areas are located in the north and north-eastern side of the project site. The town is the main built up areas which are present in the study area and all are easily accessible through road network. These township areas with its surrounding areas are located about 5 to 10 km away from the site. Some major village settlements are Mayabazar, Barjora, Bhairapur, Malbona, Maliara, Kumarsol, Kadasol, Palashban, Gopalpur, Kotalpur, Rajprasadpur etc. These villages are mostly located in the South, west and eastern part of the site. The total area under this land use is 1990.95 Hectare which is 6.1% of the total study area.

Industry	Only one part in the 10 km study area is industrialized. The industries are mostly located in a clustered way at this region. Except the Iron & Steel Industry there are some other small industries in this region. This region covers 218.04 Hectare of area which is only 0.7% of the total study area.

Agricultural land:

The area has only one single cropped land. This type of land use covers the maximum area of about 17777.02 Hectare which is 54.9%. Agriculture is the predominant feature of the land use of the study area.

Forest/vegetation:

Forest also has three divisions. One is Forest Area, Open Scrub and another is Marshy Land. The total area of forest/vegetation is around 4185.25 Hectare which is the 12.9% of the total study area.

Forest	Prominent forest area of Beliator forest is located in the south-western direction of the site which is about 1 to 2 km away. Another part of this forest is located about 8 km away in the same south western direction. These forest are tropical dry deciduous type and not very dense. This forest area in total covers about 4185.25 Hectare area which is 12.9 % of the total study area.
Open Scrub	The land with the scrubs is that where the natural vegetation is there but with a very few growth of grass. This covers an area of 4883.67 Hectare i.e. 15.1% of the total land of study area. This category of land cover is spread within the agricultural land in the whole study area.
Marshy Land	This covers an area of 305.46 Hectare i.e. 0.9% of the total land of study area.

Water bodies:

River including Water bodies (ponds/Lakes/ Reservoir)	River Damodar is passing from the north direction of the site. The river is flowing toward south-east which shows that the land slopes to south west. These are the natural resources of water found in whole the region in the scattered form in various sizes. These water bodies are mainly used for domestic purposes but not for drinking purpose. These sources are also

	used for irrigation purposes in the area. The area covered by these water bodies is 1759.94 Hactare of area which is 0.96% of the total land use.

Sandy Area:
This type of land use covers the maximum area of about 999.32 Hectare which is 3.1%.

Mining Activity:
This type of land use covers the maximum area of about 243.55 Hectare which is 0.8%.

Brick Field:
This type of land use covers the maximum area of about 28.85 Hectare which is 0.1%.

Overall Observation & Conclusion:
The area has only one single cropped land. This type of land use covers an area of about 17777.02 Hectare which is 54.9% of the total study area. Agriculture is the predominant feature of land use of the study area. The total area of forest/vegetation is around 4185.25 Hectare which is 12.9% of the total study area. Out of total study area, built-up land covers about 6.1% of the total study area. Sandy areas cover an area of about 999.32 Hectare which is 3.1% of the total study area. The area covered by water bodies is 1759.94 Hectare which is 0.96% of the total land use. 243.55 Hectare which is 0.8% of the total study area is covered by mining activities. Brick fields cover an area of about 28.85 Hectare which is 0.1% of the total study area.

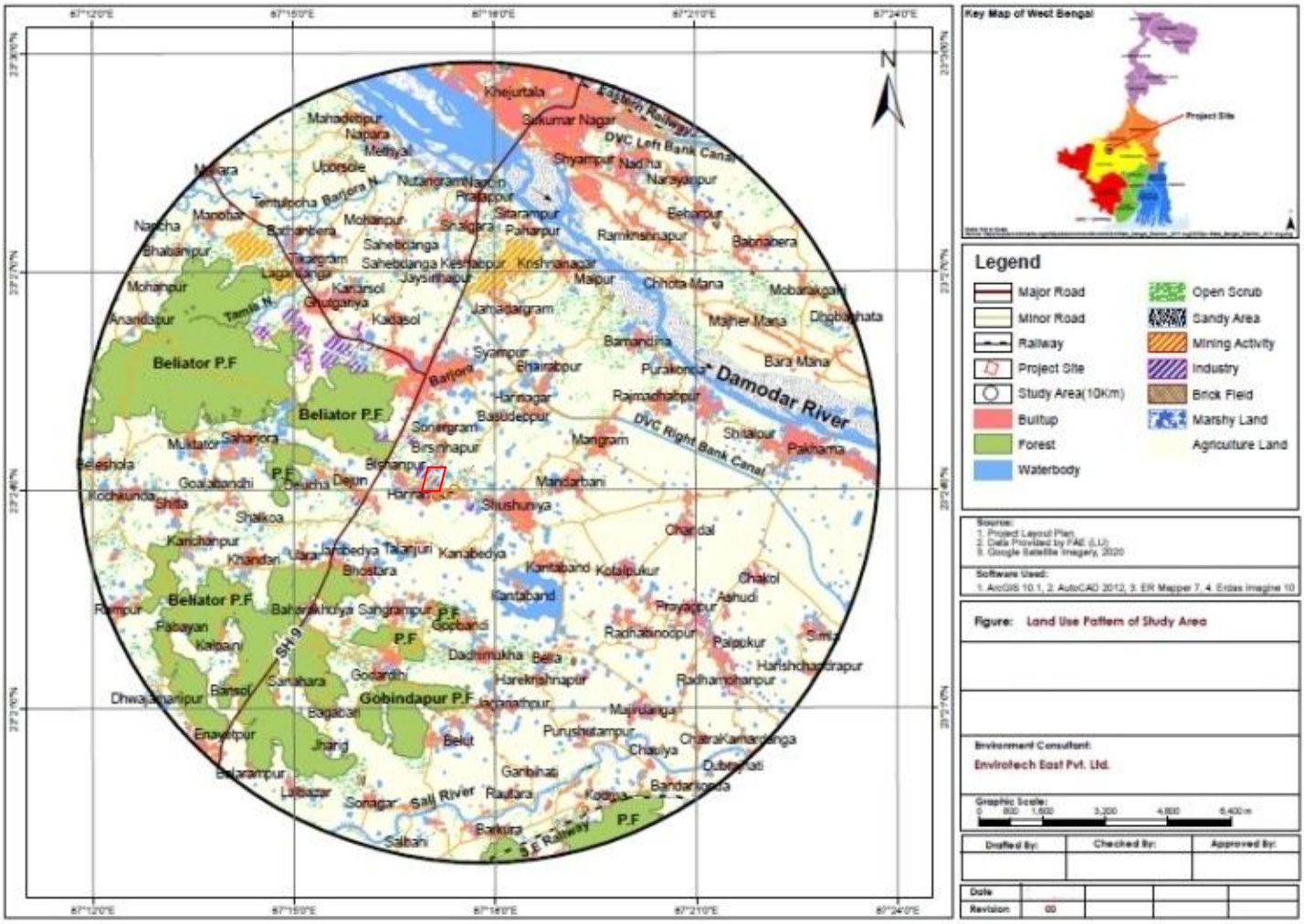


Fig. No. - 3.5.2
LAND USE CLASSIFICATION IN THE STUDY AREA

3.6 SOIL

Soil may be defined as a thin layer of earth's crust that serves as a natural medium for the growth of plants. It is the unconsolidated mineral matter that has been subjected to and influenced by genetic and environmental factors such as parent materials, climate, organisms and physico-chemical action of wind, water and sunlight, all acting over a period of time. Soil differs from the parent materials in the morphological, physical, chemical and biological properties. Also soil differs among themselves in some or all the genetic or environmental factors, therefore, some soils are yellow, some are black, some are reddish, some are coarse textured. They serve as a reservoir of nutrients for plants and crop and also provide mechanical anchorage and favorable tilth.

3.6.1 FIELD STUDY, SAMPLING & ANALYSIS

To assess the impacts of the industrial and urban activities on the soils in the study area, the physico-chemical characteristics of soils within the study area have been examined by obtaining soil samples from selected points and analysis of the same.

Four (4) sampling stations were selected for studying soil characteristics, which has been shown in **Table-3.6.1**. Stations have been spread over the study area, keeping in view the vegetative cover, soil types and maximum deposition of pollutants emitted through stacks, which would accord an overall idea of the soil characteristics within the study area.

The samples were collected once in the study period in the month of May, 2022. A number of parameters were determined which are indicative of physical, chemical and fertility characteristics. The physico-chemical characteristics of the soils in the study area, as obtained from the analysis of the soil samples, are presented in **Table-3.6.2.**

Table-3.6.1 : Soil Sampling Locations in the Study Area

Code	Sampling Location	Sampling Season	Latitude	Longitude
SQ-1	Sonergram	April, 22 (05.04.22)	23°24'52.29"N	87°17'7.91"E
SQ-2	Rajmadavpur		23°25'2.95"N	87°19'51.06"E
SQ-3	Gururbad		23°22'15.71"N	87°20'55.90"E
SQ-4	Unara		23°21'16.68"N	87°15'1.93"E

FIGURE-3.6.1 : SOIL QUALITY SAMPLING LOCATIONS

Sample code	Location Name
SQ-1	Sonergram
SQ-2	Rajmadavpur
SQ-3	Pear Bera
SQ-4	Saragara

3.6.2 CHARACTERISTICS OF SOIL IN THE STUDY AREA

Soil of the study area can be classified into three categories viz. i) Red soils, ii) Alluvial soils and iii) Lateritic soils.

Red soil has limited distribution in the north-western part of the area. They are the red coloured sedentary soils found mainly on laterite supporting Sal vegetation. They are also found along the margins of small hills base of vegetation. They are free from calcium carbonate ($CaCO_3$), low in base exchange capacity and a highly unsaturated base.

The alluvial soils have wide distribution in the eastern, central and south-eastern parts of the area. They are grouped according to Damodar - Rajmahal riverine, Damodar flatlands, Damodar highlands etc. The older alluvium amongst them is unaffected by floods and siltation whereas the younger or never alluvium, found mostly in Damodar flatland areas are enriched by silt deposition during floods.

The laterite soil has wide distribution in the central, western and southwestern parts of the area. Such soils are distinguished from the red soils by the occurrence of ferruginous concretions in a definite layer.

According to textural type, soils of the area can be classified as following types – a) Sandy, b) Sandy loam, c) Loam, d) Sandy clay loam and f) clay. Clay, clay dominated loam and loam are mostly confined to the flood plain of the Damodar and other small river valleys. The area as a whole is covered by loam and sandy loam

3.6.2.1 Physical Characteristics

The physical properties examined include colour, texture, bulk density, porosity and water holding capacity. Colour of soils was observed generally as Reddish Brown. It is well documented that soils ranging between Brownish to Reddish are generally acidic with low in Nitrogen, Calcium, Phosphate and other plant nutrients.

Soils having larger particles usually have higher bulk density than those of smaller particles. Porosity of soils in the study area varied between (34.9 - 37.1)% which is in normal range for such soils. Water Holding Capacity of these soils ranged between (36.3– 38.8)%.

3.6.2.2 Chemical Characteristics

The soils were almost neutral pH range (6.5 - 6.9). Electrical conductivity (EC) was found varying between (415 - 524) µmhos/cm. Ranges of sodium in the soils varied between (111 - 132) mg/kg. In soils, sodium generally occurs as NaCl, Na_2SO_4 and sometimes, as Na_2CO_3 and other soluble salts. In comparison to sodium, potassium levels were slightly low. Range of potassium varied between (86 - 117) mg/kg. Cation Exchange Capacity (CEC) varied between (21.2 – 23.3) meq/100 gm.

3.6.2.3 Fertility Status of Soil

The observed level of pH (6.5 – 6.9) is not expected to hinder the growth of agricultural crops. Soils were observed to possess appreciable level of Potassium, Nitrogen, and Phosphorous which indicate moderate to good fertility or agricultural potential of the soils. The levels of other elements were appreciably good. Thus, the overall fertility status of the soils within the study area is reasonably good and is not expected to be detrimental to the growth of agricultural and forest crops.

The prevailing edaphic, hydrological and climatological conditions favour production of paddy and quite a good number of other crops. The prime agricultural crop paddy is grown during both of the Kharif and Rabi seasons.

TABLE-3.6.2
RESULTS OF SOIL QUALITY MONITORING IN THE STUDY AREA

SL.NO.	PARAMETERS	UNIT	SAMPLING LOCATIONS			
			SQ-1	SQ-2	SQ-3	SQ-4
PHYSICAL CHARACTERESTICS						
1	**TEXTURE**		**Clay Loam**	**Clay Loam**	**Clay Loam**	**Sandy Clay Loam**
a)	Sand (0.02 - 2.0 mm)	%	49	42	45	51
b)	Silt (0.002 - 0.02 mm)	%	24	28	24	21
c)	Clay (<0.002 mm)	%	27	30	31	28
2	Permeability	cm/hr	0.8	0.9	0.7	1.1
3	POROSITY	%	35.5	37.1	36.8	34.9
4	WATER HOLDING CAPACITY	%	36.3	37.9	38.8	37.2
CHEMICAL CHARACTERESTICS						
1	pH	-	6.6	6.9	6.8	6.5
2	EC	µmhos/cm	524	415	506	469
3	Sodium (as Na)	mg/kg	132	111	126	131
4	Potasium (as K)	mg/kg	117	86	111	116
5	CEC (meq/100 gm)	mg/kg	21.2	22.4	23.3	22
6	SAR	-	1.5	1.3	1.4	1.5

Conclusion:

Loamy texture of the soil of this area along with sufficient level of organic matter renders moderate productivity of agricultural crops.

As per FAO-UNESCO soil classification, this soil is of Ultisols and is suitable for rice, pulses, vegetables, etc. It is also home for beneficial organisms, worms etc. which, in turn, help in plant growth. The nutrients and soil structure increases the sustainability of top soil and as such, no impact from the local industries have been observed.

3.7 METEOROLOGY

3.7.1 SEASONS

The climate of the project area is humid and tropical. It is characterised by a hot and dry summer from March to May, a south-west monsoon or rainy season from June to September, a pleasant post-monsoon or retreating monsoon from October to November and a cool winter from December to February. Therefore, climatologically, four seasons viz. summer (pre-monsoon), monsoon, post-monsoon and winter could be deciphered comprising the following months:

Summer	:	March, April, May
Monsoon	:	June, July, August, and September
Post-monsoon	:	October, November
Winter	:	December, January, and February

3.7.2 PAST RECORDS OF IMD, DURGAPUR

3.7.2.1 Data Collected

The meteorological data described in this section have been collected from the IMD Station located at Durgapur, which is around 12 km from the Project Site and deemed to be representative of the study area. The station is observed to be well manned and equipped. Available meteorological data for the past 15 years' period (1971-1985) have been collected and have been summarized. The climatic features of this station are presented in **Tables 3.7.1**.

3.7.2.2 Temperature

At Durgapur, the overall mean dry bulb temperature for the past 15 years' period (1971 – 1985) was recorded 26.3°C in day time and 28.1°C in night time while the overall mean wet bulb temperature for the past 15 years' period (1971 – 1985) was recorded 22.5°C in day time and 23.2°C in night time **(Table-3.7.1)**.

3.7.2.3 Relative Humidity

Humidity was fairly high through the major part of the year at Durgapur. In day time the overall mean relatively humidity was 70% while in night time it was 66% **(Table-3.7.1)**. The mean relative humidity of Monsoon and Post monsoon seasons was ranging between 68% - 84% in day time and 64% - 81% in night time. The mean relative humidity of summer and winter seasons was ranging between 53% - 67% in day time and 45% - 62% in night time. From these 15 years' IMD data it was found that the

relative humidity was fairly very high in Monsoon season (June, July, August, and September).

3.7.2.4 Rainfall and Rainy Days

The total annual mean rainfall received is about 1910.2 mm at Durgapur **(Table-3.7.1)**. Rainfall was peaked during the month of July (mean monthly rainfall in July was 600.4 mm). The lowest rainfall was occurred during the month of January (mean monthly rainfall in January was 7.7 mm). Total annual mean number of rainy days was about 68.1 in Durgapur.

3.7.2.5 Cloud Cover

The mean monthly data revealed that the cloud cover in day time ranged between 1.1 Oktas (at month of January) to 5.5 Oktas (at month of August) and in night time it ranged between 1.0 Oktas (at month of January) to 5.5 Oktas (at month of July and August). The overall annual mean cloud cover was found 2.7 Oktas in both day and night time **(Table-3.7.1)**.

3.7.2.6 Wind Speed and Direction

The annual mean wind speed is around 7.8 km/hr at Durgapur with the mean monthly wind speed was ranged between 5.1 km/hr (during November) and 10.1 km/hr (during May) at Durgapur **(Table-3.7.1)**. The predominant wind direction was observed South-West, followed by North and South.

3.7.3 ON-SITE METEOROLOGICAL OBSERVATIONS

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

For this purpose as also to corroborate and supplement the long term meteorological data availed from IMD, Durgapur, a sophisticated on-site meteorological observatory was established close to the project site and operated continuously for three months' monitoring period **(1st March, 2022 to 31st May, 2022)**.

The observatory was located about 10 m above the ground level and ensured to be free from any obstruction to wind. Besides, this location was found to be most suitable one being close to the project site. The summary of the on-site data generated in respect of the above parameters for the period mentioned above are presented in **Table-3.7.2**. The Wind rose diagram for the entire period is shown i **Figures-3.7.1.** Hourly Wind speed, Wind direction, Dry bulb and Wet bulb Temperature, Relative Humidity, Rainfall, Solar radiation, Cloud cover, Environmental Lapse Rate all the attributes are considered for Micro-Meteorological analysis.

3.7.4 RESULTS OF ON-SITE METEOROLOGICAL DATA

3.7.4.1 Temperature

The monthly maximum and minimum temperatures recorded on-site during the aforesaid monitoring period (**1st March, 2022 to 31st May, 2022**) varied between (39.5 – 42.5)°C and (18.0 – 22.0)°C respectively with overall maximum and minimum temperatures being 18.0°C and 42.5°C respectively **(Table-3.7.2)**.

3.7.4.2 Relative Humidity

The monthly minimum and maximum relative humidity recorded on-site during the said monitoring period varied between (45.0 - 59.0)% and (71.0 - 87.0)% respectively, the overall maximum and minimum being 87.0% and 45.0% respectively **(Table-3.7.2)**.

3.7.4.3 Atmospheric Pressure

The overall minimum and maximum atmospheric pressures recorded on-site during the said monitoring period were 745.7 mmHg and 755.7 mmHg respectively **(Table-3.7.2)**

3.7.4.4 Wind Speed and Direction

The maximum wind speed 7.45 Km/hr was recorded in the month of March, 2022 while the overall mean wind speed during the whole monitoring period was 6.9 Km/hr. **(Table-3.7.1)**. The predominant wind direction was observed as South, South-West, South-East.

TABLE-3.7.1

MEAN MONTHLY SUMMARY OF CLIMATOLOGICAL DATA COLLECTED FROM IMD, DURGAPUR (1971 - 1985)

जलवायवी सारणी

CLIMATOLOGICAL TABLE

BACK

स्टेशन : दुर्गापुर STATION : Durgapur — अक्षांश LAT. 23°29' — देशांतर LONG. 87°19' — समुद्री तल माप से ऊँचाई HEIGHT ABOVE M.S.L. 69 METRES — वर्षों पर आधारित BASED ON OBSERVATIONS 1971-1985

माह MONTH	स्टेशन का वायु दाब STATION LEVEL PRESSURE	वायु तापमान AIR TEMPERATURE										आर्द्रता HUMIDITY		मेघ छाने की मात्रा CLOUD AMOUNTS		वर्षा RAINFALL					
		माध्य MEAN						चरम EXTREMES													
		शुष्क बल्ब DRY BULB	नम बल्ब WET BULB	दैनिक अधिक मान DAILY MAX	दैनिक न्यून मान DAILY MIN	माह में उच्चतम HIGHEST IN THE MONTH	माह में निम्नतम LOWEST IN THE MONTH	उच्चतम HIGHEST	दिनांक और वर्ष DATE AND YEAR	निम्नतम LOWEST	दिनांक और वर्ष DATE AND YEAR	सापेक्ष आर्द्रता RELATIVE HUMIDITY	वाष्प दाब VAPOUR PRESSURE	सभी मेघ ALL CLOUDS	निम्न मेघ LOW CLOUDS	मासिक योग MONTHLY TOTAL	वर्षा के दिनों की संख्या NO. OF RAINY DAYS	सर्वाधिक वर्षा वाले माह का योग TOTAL IN WETTEST MONTH WITH YEAR	सर्वाधिक शुष्क माह का योग TOTAL IN DRIEST MONTH WITH YEAR	24 घंटों में सबसे भारी वर्षा HEAVIEST FALL IN 24 HOURS	दिनांक और वर्ष DATE AND YEAR	माध्य पवन गति MEAN WIND SPEED
		hPa	°C	°C	°C	°C	°C	°C		°C		%	hPa	Oktas of sky		mm		mm	mm	mm		Kmph
जनवरी JAN	I	18.4	14.5	24.2		28.3		32.2	13 1964	5.1	5 1978	64	13.5	1.1	1.0	7.7	1.0	64.4 1966	0.0	53.6	4 1966	6.9
	II	21.1	16.4									60	15.1	1.0	1.0							
फरवरी FEB	I	21.2	16.4	27.8		33.3		37.4	23 1964	7.2	12 1974	60	15.0	1.2	1.1	17.2	1.6	81.1 1961	0.0	63.5	13 1959	6.8
	II	24.6	18.4									53	16.3	1.3	1.1							
मार्च MAR	I	26.0	19.6	34.0		37.6		40.7	31 1970	9.6	2 1983	53	18.0	1.4	1.2	23.0	1.8	79.3 1980	0.0	42.5	27 1980	7.2
	II	29.4	21.0									45	18.5	1.4	1.1							
अप्रैल APR	I	30.2	24.3	38.1		42.3		46.0	22 1973	13.3	1 1985	61	26.0	1.5	1.3	35.3	2.2	122.8 1967	0.0	52.5	17 1977	9.0
	II	33.3	24.8									50	24.6	1.5	1.2							
मई MAY	I	30.6	25.8	37.8		42.9		46.1	14 1970	16.5	16 1968	67	29.6	2.1	1.6	63.5	4.6	210.0 1985	0.0	92.0	7 1977	10.1
	II	32.8	26.1									59	28.5	2.3	1.8							
जून JUN	I	30.3	26.8	36.1		41.5		46.4	5 1958	16.1	28 1961	76	32.5	3.8	2.7	241.3	9.3	794.6 1984	72.6 1976	211.0	28 1978	10.0
	II	31.7	27.0									70	31.9	4.0	2.6							
जुलाई JUL	I	28.8	26.7	32.6		35.8		38.5	5 1979	20.8	15 1984	84	33.5	5.4	3.6	600.4	16.1	556.3 1975	86.6 1969	115.5	30 1975	9.3
	II	29.3	26.8									81	33.4	5.5	3.4							
अगस्त AUG	I	28.7	26.6	32.2		34.9		37.2	19 1959	20.2	20 1981	84	33.2	5.5	3.6	364.9	14.5	481.8 1959	92.6 1963	133.5	27 1980	9.2
	II	29.2	26.7									81	33.1	5.5	3.4							
सितम्बर SEP	I	28.7	26.3	32.2		34.7		35.8	1 1968	19.8	28 1983	82	32.4	4.9	3.1	442.0	11.4	847.1 1978	78.8 1971	387.7	27 1978	8.2
	II	29.1	26.6									81	32.7	4.9	3.1							
अक्तूबर OCT	I	27.8	24.7	32.1		34.3		36.0	13 1979	14.8	31 1985	76	28.7	2.6	2.0	93.7	4.0	371.8 1959	0.0	139.0	1 1959	5.2
	II	28.6	25.2									75	29.4	2.6	1.9							
नवम्बर NOV	I	24.4	20.4	29.4		32.3		35.4	6 1965	8.3	29 1985	68	20.9	1.4	1.3	9.6	0.6	22.7 1977	0.0	20.4	1 1971	5.1
	II	26.2	21.5									64	22.1	1.3	1.2							
दिसम्बर DEC	I	19.8	16.1	25.2		29.3		31.1	4 1962	4.4	21 1966	66	15.4	1.4	1.3	11.7	1.1	60.0 1980	0.0	60.0	28 1980	6.2
	II	21.9	17.4									62	16.4	1.2	1.2							
वार्षिक योग या माध्य ANNUAL TOTAL OR MEAN	I	26.3	22.5	31.8		44.2		46.4	5	4.4	21	70	25.1	2.7	2.0	1910.2	68.1	1951.7	848.5	387.7	27	7.8
	II	28.1	23.2					6	1958	12	1966	66	25.3	2.7	1.9			1978	1966	9	1978	
संकेतों की संख्या NUMBER OF YEARS	I																					
	II	14	14	13		13		27		27		14	14	14	14	13	13	29	29	30		13

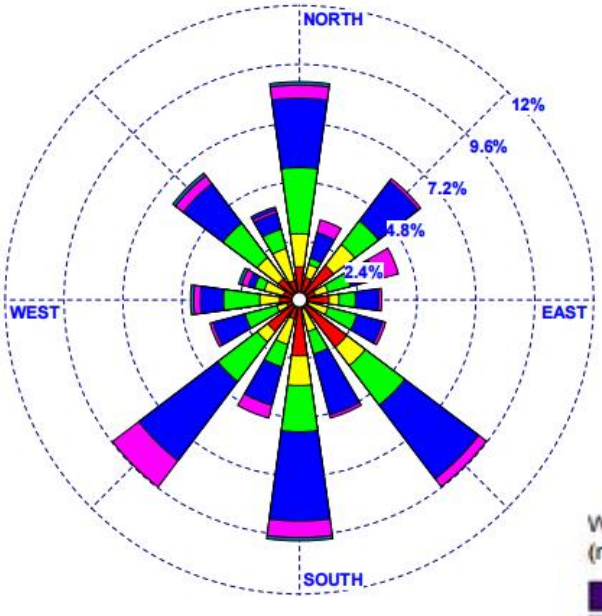
जलवायवी सारणी
CLIMATOLOGICAL TABLE

क्षेत्रम : दुर्गापुर
STAION : Durgapur

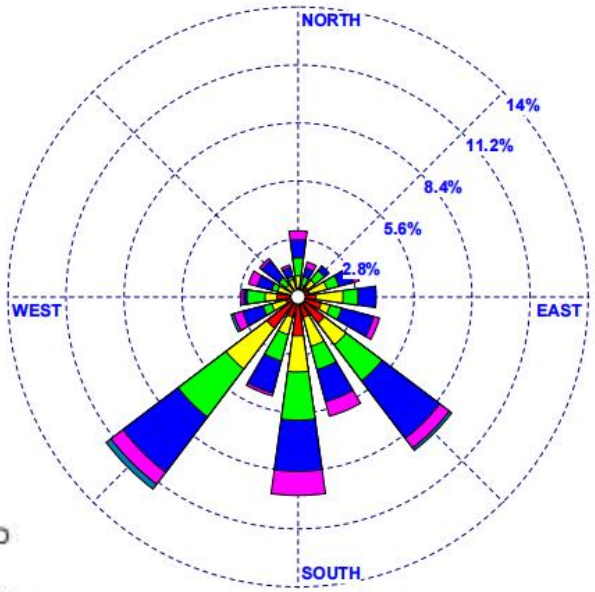
		मौसम परिघटनाएं						पवन														मेघ										दृश्यता				
		जो लक्षण दिनों की संख्या						पवन की गति के लक्षण दिनों की संख्या (कि. मी. प्र. घं.)				पवन की दिशा के दिनों की संख्या का प्रतिशत										मेघ लक्षण (सभी मेघ) सहित दिनों की संख्या - अष्टमांश					निम्न स्तरी मेघ लक्षण सहित दिनों की संख्या - अष्टमांश					दृश्यता सहित दिनों की संख्या				
माह		कोहरा 0.3 कि.मि.या अधिक	ओले	गर्ज	तूफान	धूल भरी आंधी	बर्फ पात	42 या अधिक	28-41	1-27	0	उ	उप	पू	दप	द	दप	प	पप	उप	शां	0	कि-2	3-5	6-7	8	0	कि-2	3-5	6-7	8	धूमा श	1 कि.मी. से कम	1-4 कि.मी.	4-10 कि.मी.	10-20 कि.मी.	20 कि.मी. से अधिक
		WEATHER PHENOMENA						WIND														CLOUD										VISIBILITY				
		No. OF DAYS WITH						No. OF DAYS WITH WIND SPEED (Km. p.h.)				PERCENTAGE No. OF DAYS WIND FROM										No. OF DAYS WITH CLOUD AMOUNT (ALL CLOUDS) OKTAS					No. OF DAYS WITH LOW CLOUD AMOUNT OKTAS					No. OF DAYS WITH VISIBILITY				
MONTH		FOG	HAIL	THUNDER	FOG	DUST STORM	SNOW FALL	42 or more	28-41	1-27	0	N	NE	E	SE	S	SW	W	NW	CALM	0	1-2	3-4	5-7	8	0	1-2	3-4	5-7	8	FOG	UPTO 1 Km.	1-4 Km.	4-10 Km.	10-20 Km.	OVER 20 Km.
जनवरी	I	1.3	0.0	0.0	0.0	0.0	0.0	0	1	30	0	39	12	0	4	2	2	1	39	1	16	14	0	0	1	17	14	0	0	0	0	0.0	1.5	22.0	7.3	0.2
JAN	II							0	0	31	0	34	18	0	3	2	2	0	40	1	18	14	0	0	1	17	14	0	0	0	0	0.0	2.8	23.7	4.8	0.1
फरवरी	I	2.1	0.0	0.0	0.0	0.0	0.0	0	0	28	0	41	15	1	3	4	8	1	27	0	15	12	0	0	1	15	12	0	1	0	0	0.0	0.3	18.9	9.9	0.8
FEB	II							0	0	27	1	42	10	0	5	4	7	1	29	2	15	12	0	0	1	15	12	0	1	0	0	0.0	1.3	18.2	7.2	1.3
मार्च	I	2.4	0.0	0.0	0.0	0.0	0.0	0	0	31	0	28	7	1	13	20	17	1	13	0	15	14	0	0	2	16	14	0	1	0	0	0.0	0.3	11.4	17.8	1.8
MAR	II							0	0	31	0	27	8	1	14	19	19	2	9	1	15	14	0	0	2	16	14	0	1	0	0	0.0	0.5	17.1	12.5	0.9
अप्रैल	I	2.8	0.0	0.0	0.0	0.0	0.0	0	2	28	0	2	1	1	29	30	30	2	5	0	16	12	0	0	2	16	12	0	2	0	0	0.0	0.5	11.5	15.5	2.5
APR	II							0	1	29	0	3	1	2	28	28	33	1	5	1	15	12	1	0	2	15	13	0	2	0	0	0.0	1.2	11.8	14.8	2.3
मई	I	5.3	0.0	0.0	0.0	0.0	0.0	0	1	30	0	0	1	1	28	27	40	0	3	0	16	11	0	0	4	16	11	1	3	0	0	0.0	0.2	11.5	17.0	2.3
MAY	II							0	2	29	0	0	1	2	32	20	42	0	3	0	12	12	1	1	5	14	12	1	4	0	0	0.0	0.9	14.7	13.3	2.1
जून	I	11.3	0.0	0.0	0.0	0.0	0.0	0	3	27	0	0	0	0	33	21	46	0	0	0	8	9	0	1	12	11	9	2	8	0	0	0.1	0.9	16.3	10.8	1.9
JUN	II							0	2	28	0	1	1	0	32	22	41	1	1	1	8	8	0	1	13	13	8	1	8	0	0	0.0	0.8	17.5	9.9	1.9
जुलाई	I	19.2	0.0	0.0	0.0	0.0	0.0	0	2	29	0	1	1	1	19	23	53	1	1	0	2	9	1	2	17	5	10	4	11	1	0	0.0	1.1	17.8	10.4	1.8
JUL	II							0	1	30	0	0	0	1	20	25	48	3	2	1	1	10	1	2	17	6	10	2	12	1	0	0.0	1.2	17.7	10.2	1.9
अगस्त	I	17.8	0.0	0.0	0.0	0.0	0.0	0	1	30	0	1	0	2	17	29	48	1	2	0	1	10	1	1	18	5	11	4	10	1	0	0.0	0.8	17.5	10.4	2.3
AUG	II							0	1	30	0	2	1	1	16	30	44	2	4	0	1	10	1	2	17	6	11	2	12	0	0	0.0	0.9	18.1	9.9	2.1
सितम्बर	I	14.2	0.0	0.0	0.0	0.0	0.0	0	1	29	0	5	2	1	14	25	42	5	6	0	2	12	1	2	13	6	12	4	8	0	0	0.0	1.0	15.3	11.3	2.4
SEP	II							0	1	29	0	8	1	1	15	27	36	8	5	1	2	12	1	2	13	6	12	3	8	1	0	0.0	0.8	18.0	9.2	2.0
अक्तूबर	I	5.2	0.0	0.0	0.0	0.0	0.0	0	0	30	1	20	4	0	11	27	22	2	12	2	8	17	0	0	6	9	18	1	3	0	0	0.0	0.4	14.8	13.2	2.9
OCT	II							0	0	30	1	19	7	0	9	25	24	2	10	4	8	16	0	1	6	9	18	1	3	0	0	0.0	3.2	17.3	7.9	2.6
नवम्बर	I	1.5	0.0	0.0	0.0	0.0	0.0	0	0	29	1	53	12	2	2	3	2	1	23	2	12	17	0	0	1	12	17	0	1	0	0	0.0	0.8	15.1	13.8	0.5
NOV	II							0	0	28	2	53	12	1	2	2	0	0	24	6	12	17	0	0	1	13	16	0	1	0	0	0.0	3.9	21.0	4.7	0.4
दिसम्बर	I	1.2	0.0	0.0	0.0	0.0	0.0	0	1	30	0	47	14	0	0	1	1	1	35	1	12	18	0	0	1	12	18	0	1	0	0	0.0	1.7	22.3	7.0	0.0
DEC	II							0	0	30	1	41	15	1	1	0	1	2	37	2	14	16	0	0	1	14	16	0	1	0	0	0.0	4.9	21.9	3.9	0.4
वार्षिक योग या माध्य	I	84.0	0.0	0.0	0.0	0.0	0.0	0	12	351	2	20	8	1	14	18	25	1	14	1	118	180	4	8	75	134	164	16	49	2	0	0.1	9.4	194.3	141.7	19.4
ANNUAL TOTAL OR MEAN	II							0	7	352	8	19	8	1	15	17	24	2	14	2	117	180	5	8	75	139	162	12	50	2	0	0.0	22.0	217.1	108.0	18.0
वर्षों की संख्या	I																																			
NUMBER OF YEARS	II	13						14				14									14					14						14				

Table 3.7.2
Onsite Meteorological Data in the study area
(March, 2022 - May, 2022)

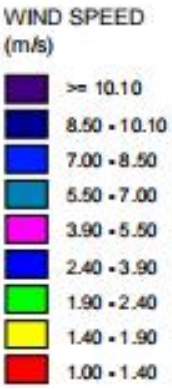
Month	Temperature		Relative Humidity		Barometric Pressure		Average Velocity (km/hr)
	Max.	Min.	08:30 hrs	17:30 hrs	08:30 hrs	17:30 hrs	
	(°C)		(%)		(mm Hg)		
March, 2022	39.5	18.0	87	45	755.7	750.6	7.45
April, 2022	42.5	22.0	73	59	754.1	750.1	6.2
May, 2022	42.5	22.0	71	47	752.2	745.7	7.05
OVERALL	**42.5**	**18.0**	**87**	**45**	**755.7**	**745.7**	**6.9**

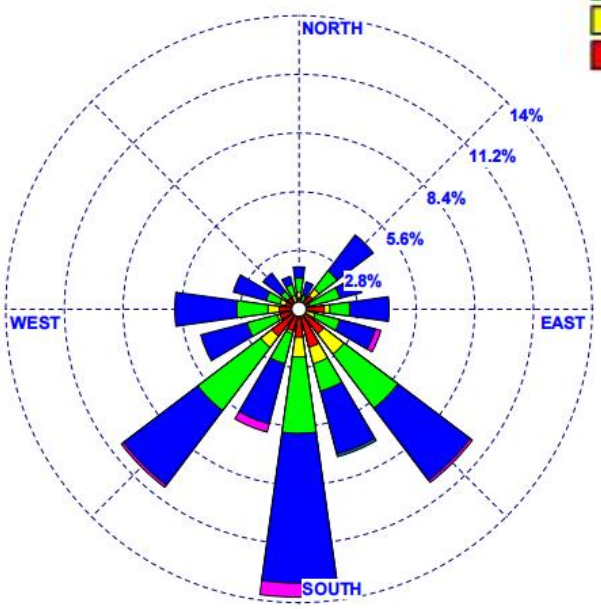


March, 2022
(Calm: 10.48%)



April, 2022
(Calm: 28.55%)





May, 2022
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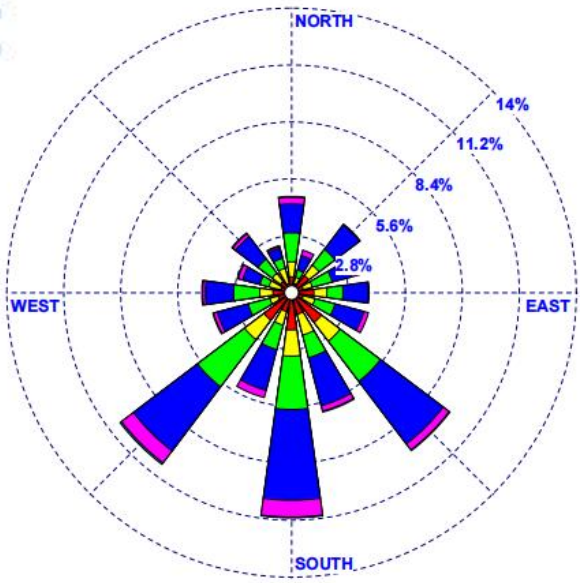


March, 2022 - May, 2022
(Calm: 17.77%)

FIGURE-3.7.1:
WIND ROSE DIAGRAMS OF 3 MONTHS STUDY PERIOD

3.8 AIR QUALITY

3.8.1 SELECTION OF MONITORING STATIONS

The sources of air pollution in the region are industrial emissions, vehicular traffic, dust arising from unpaved village roads and domestic fuel burning. The prime objective of the baseline air quality study was to establish the existing ambient air quality of the area. This will be useful for assessing the conformity to standards of the ambient air quality during the operation of the proposed project.

The monitoring locations for establishing the baseline status of ambient air quality has been identified on the basis of the following considerations:

1. Meteorological conditions
2. Topography of the study area
3. Category of the area like habitat, forest etc.
4. Representative of likely affected area

Further, due consideration was also given to the likely affected zones during construction and operation of the plant. The location of human habitation and other sensitive areas within the study area were also considered in selection of ambient air quality monitoring locations.

Eight (8) numbers of monitoring stations were set up to assess the existing air quality of the study area. One station was located near the proposed project site and the seven others, in the study area around the proposed project site. The locations of the monitoring stations were based on the frequent wind directions in order to site the stations as close as feasible to the anticipated maximum pollutant deposition areas, moreover, duly considering human habitation and proximity to sensitive zones within the study area. Logistic considerations as ready accessibility, security, availability of reliable power supply etc. were examined while finalizing the monitoring locations.

The Ambient Air Quality Monitoring locations have been presented in **Figure-3.8.1**. The relative direction and distance of these locations with respect to the project site have been tabulated in **Table-3.8.1**.

3.8.2 PARAMETERS & FREQUENCY OF MONITORING

Ambient Air Quality Monitoring has been conducted for the period (1st October, 2021 – 31st December, 2021) at a frequency of twice a week at each station adopting a continuous 24 hours schedule in respect of the following parameters:

- Particulate Matter-10 (PM_{10})
- Particulate Matter-2.5 ($PM_{2.5}$)
- Sulphur Dioxide (SO_2)
- Nitrogen Dioxide (NO_2)

Carbon Monoxide (CO) monitoring has been conducted for the same period at a frequency of twice in a week at each station, with each day comprising of three different shifts of 8 hours duration.

The equipment was placed at a height of 3.0 to 4.5 metres above ground level at each monitoring station, thus negating the effects of windblown ground dust. The equipment was placed at open space free from trees and other obstruction which otherwise act as a sink of pollutants resulting in lower levels in monitoring results. At locations close to highways, the equipment was placed at least 100 m away from such highways/roads to avoid influence of traffic exhaust emissions.

Description of Monitoring Stations

- **Near Project Site (Sahebdihi) (AQ1)**: The monitoring station (Latitude - 23°23'53.85"N & Longitude - 87°17'1.49"E is located at a distance of around 0.48 km in W direction from the project site. This station is located in the industrial and Rural area and the data collected represents the background air quality of the project site area. There are many industries located at Sahebdihi. Others Industries located within 2.0 km range from AQ1. All these factors maybe attributed to the higher level of PM10 and others pollutants concentration.

- **Near Purunia Prathamic School (AQ2)**: The monitoring station (Latitude - 23°22'21.89"N & Longitude - 87°17'3.37"E) is located at a distance of around 2.9 km in S direction from the project site. This location represents the most Pre-dominant upwind direction. Air quality monitoring instruments were placed on the roof top of a building in this village. There is human population around this monitoring station and electricity is available in this location.

- **Kanta Bandh (AQ3)**: Kanta Bandh is a Village and residential area . The monitoring station (Latitude - 23°22'43.11"N & Longitude -

87°18'20.43"E is located at a distance of 2.9 km in SE direction w.r.t. the project site. This location represents the 3rd most pre-dominant upwind direction. The station is located in settlement area. There are agriculture lands all around this Area. Air quality monitoring instruments were placed on the rooftop of a village building. All necessary infrastructures like accessible road, electricity etc. are available in the vicinity.

- **Hari Nagara (AQ4)**: Hari Nagara is a residential area, located at a distance of 3.2 km in NE direction w.r.t. the project site. The monitoring station (Latitude - 23°25'4.85"N & Longitude - 87°18'45.01"E) is located in the settlement area. This village is surrounded by agricultural and Residential area . Air quality monitoring instruments were placed on the rooftop of a residential building. Electricity & all other infrastructure facilities are available in the village.

- **Near Barjora Danpara Jr High School (AQ5)**: **Near Barjora Danpara Jr High School** is situated in a small settlement area. The monitoring station (Latitude - 23°25'48.34"N & Longitude - 87°17'33.48"E) in this settlement area is located at a distance of 3.5 km in N direction w.r.t. the project site. This village is surrounded by agricultural and Settlement area. Air quality monitoring instruments were placed on the rooftop of a building in the settlement area. All types of infrastructure are available in this area.

- **Ghutgoria (AQ6)**: Ghutgoria is a small village. The monitoring station (Latitude - 23°26'30.22"N & Longitude - 87°15'11.79"E is located at a distance of 5.9 km in NW direction w.r.t. the project site. Surrounded by agricultural and settlement area. Air quality monitoring instruments were placed on the rooftop of a village building. Electricity & all other infrastructures are available in this area.

- **Near Muktatore Primary School (AQ7)**: Muktatore Primary School is located in a small village. The monitoring station (Latitude - 23°24'33.51"N & Longitude - 87°13'32.64"E is located at a distance of 6.5 km in W direction w.r.t. the project site. Surrounded by agricultural and settlement area. Air quality monitoring instruments were placed on the rooftop of a village building. Electricity & all other infrastructures are available in this area.

- **Talanjuri (AQ8)**: Talanjuri is a large size village, located at a distance of 3.2 km in SW direction w.r.t. the project site. The monitoring station (Latitude - 23°22'52.74"N & Longitude - 87°15'49.28"E was set up on the rooftop of a building in this village. This location represents the 2nd most pre-dominant up-wind direction. This village is surrounded

by Industrial, agricultural and settlement area. Air quality monitoring instruments were placed on the rooftop of a village building. Electricity is available in this village.

TABLE-3.8.1
Ambient Air Quality Monitoring Locations in the study area

Sl. No.	Location Code	Location	Aerial Distance w.r.t. Project site (km)	Direction w.r.t. Project site	Criteria for Selection
1	AQ1	Near Project Site (Sahebdihi)	0.48	W	Representation of the Project Site.
2	AQ2	Near Purunia Prrathamic School	2.9	S	Located in the settlement area and most Pre-dominant up-wind direction
3	AQ3	Kanta Bandh	2.9	SE	Located in the settlement area and representing the 3rd predominant up-wind direction.
4	AQ4	Hari Nagara	3.2	NE	Located in the Settlement and agriculture & Industrial area
5	AQ5	Near Barjora Danpara Jr High School	3.5	N	Location in the Settlement and agriculture
6	AQ6	Ghutgoria	5.9	NW	Located in the settlement area represents the most pre-dominant down-wind direction
7	AQ7	Near Muktatore Primary School	6.5	W	Located in the settlement area
8	AQ8	Talanjuri	3.2	SW	Located in the village and Industrial & large Settlement area & 2nd pre-dominant up-wind direction

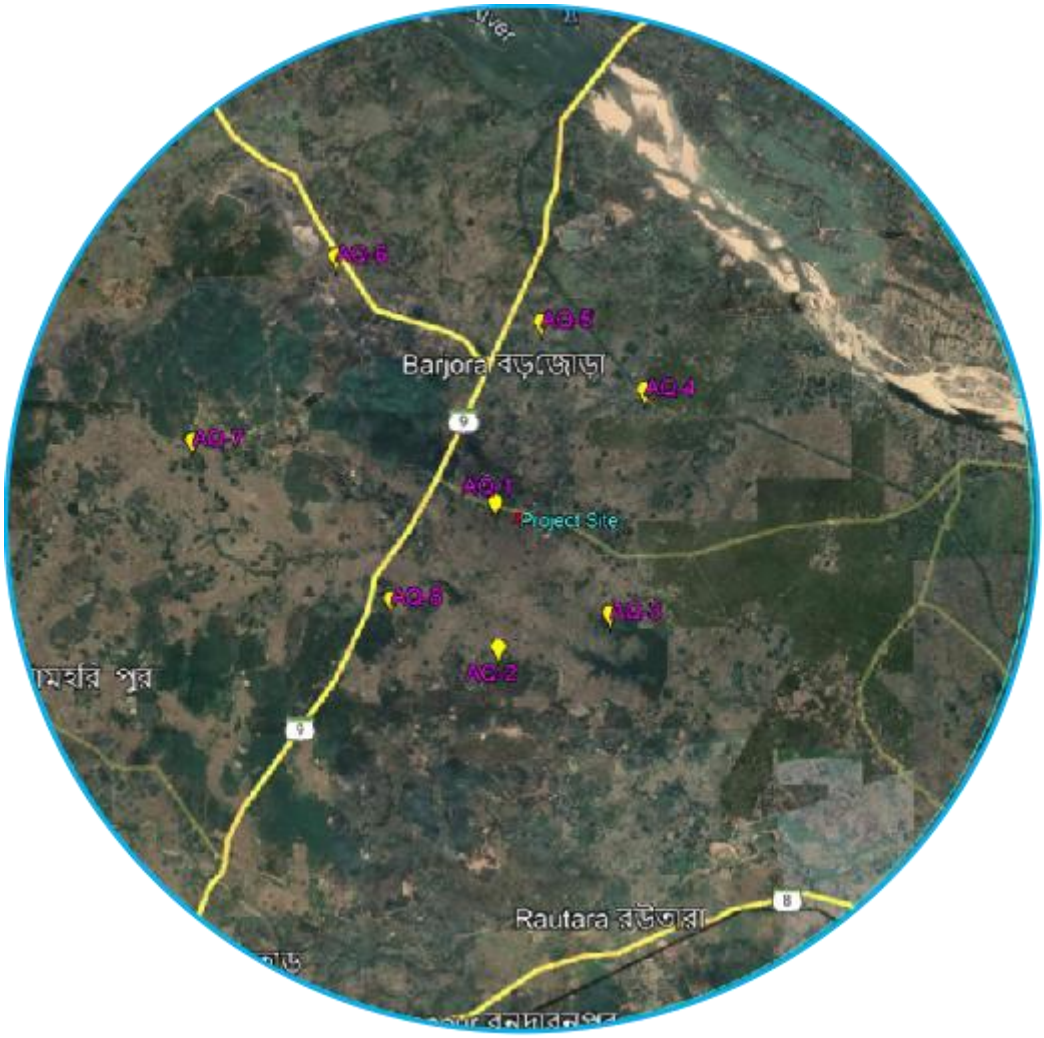


FIGURE-3.8.1: AIR QUALITY MONITORING LOCATIONS

Location Code	Location Name	Approx. aerial distance from Centre of the project site (in km)	Direction from Centre of the project site
AQ1	Near Project Site (Sahebdihi)	0.48	W
AQ2	Near Purunia Prrathamic School	2.9	S
AQ3	Kanta Bandh	2.9	SE
AQ4	Hari Nagara	3.2	NE
AQ5	Near Barjora Danpara Jr High School	3.5	N
AQ6	Ghutgoria	5.9	NW
AQ7	Near Muktatore Primary School	6.5	W
AQ8	Talanjuri	3.2	SW

Ambient Air Quality Monitoring Station

Co-ordinates

Location Code	Location	Latitude	Longitude
AQ1	Near Project Site (Sahebdihi)	23°23'53.85"N	87°17'1.49"E
AQ2	Near Purunia Prrathamic School	23°22'21.89"N	87°17'3.37"E
AQ3	Kanta Bandh	23°22'43.11"N	87°18'20.43"E
AQ4	Hari Nagara	23°25'4.85"N	87°18'45.01"E
AQ5	Near Barjora Danpara Jr High	23°25'48.34"N	87°17'33.48"E
AQ6	Ghutgoria	23°26'30.22"N	87°15'11.79"E
AQ7	Near Muktatore Primary School	23°24'33.51"N	87°13'32.64"E
AQ8	Talanjuri	23°22'52.74"N	87°15'49.28"E

TABLE-3.8.2

STATISTICAL ANALYSIS RESULTS OF AIR POLLUTANTS

(Period: March, 2022 - May, 2022)

POLLUTANTS	LOCATIONS	MES	MIN	MAX	A.M.	P - 98
PM_{10} ($\mu g/m^3$)	Near Project Site	25	65	87	74.0	84.6
	Near Purunia Prrathamic	25	58	78	66.4	77.0
	Kanta Bandh	25	60	82	71.4	81.0
	Hari Nagara	25	62	84	72.2	83.0
	Near Barjora Danpara Jr	25	56	86	70.8	85.0
	Ghutgoria	25	68	92	78.7	91.5
	Near Muktatore Primary	25	55	76	65.2	75.0
	Talanjuri	25	57	82	69.8	81.5
	Overall	**200**	**55**	**92**	**71.1**	**-**
$PM_{2.5}$ ($\mu g/m^3$)	Near Project Site	25	27	38	30.7	37.2
	Near Purunia Prrathamic	25	19	32	27.4	32.2
	Kanta Bandh	25	21	36	29.5	35.8
	Hari Nagara	25	22	38	30.2	37.2
	Near Barjora Danpara Jr	25	18	40	29.1	38.7
	Ghutgoria	25	28	45	35.6	44.4
	Near Muktatore Primary	25	17	33	26.8	33.0
	Talanjuri	25	20	38	30.6	37.9
	Overall	**200**	**17**	**45**	**30.0**	**-**
SO_2 ($\mu g/m^3$)	Near Project Site	25	7	15	9.8	14.5
	Near Purunia Prrathamic	25	6	12	9.0	12.0
	Kanta Bandh	25	5	14	8.5	13.5
	Hari Nagara	25	8	16	10.8	15.5
	Near Barjora Danpara Jr	25	7	15	9.8	14.0
	Ghutgoria	25	9	19	13.1	18.5
	Near Muktatore Primary	25	6	12	8.7	12.0
	Talanjuri	25	8	17	10.8	16.0
	Overall	**200**	**5**	**19**	**10.1**	**-**
NO_2 ($\mu g/m^3$)	Near Project Site	25	12	27	19.3	26.5
	Near Purunia Prrathamic	25	15	29	21.4	27.6
	Kanta Bandh	25	16	30	22.3	30.0
	Hari Nagara	25	20	33	25.6	32.0
	Near Barjora Danpara Jr	25	14	26	20.3	25.5
	Ghutgoria	25	18	36	25.5	35.5
	Near Muktatore Primary	25	13	27	18.7	26.0
	Talanjuri	25	17	32	23.8	31.5
	Overall	**200**	**12**	**36**	**22.1**	**-**
BaP (ng/m^3)	Near Project Site (Sahebdihi)	25	N.D.	N.D.	N.D.	-
	Near Purunia Prrathamic School	25	N.D.	N.D.	N.D.	-
	Kanta Bandh	25	N.D.	N.D.	N.D.	-

	LOCATIONS	MES	MIN	MAX	A.M.	P -98
	Hari Nagara	25	N.D.	N.D.	N.D.	-
	Near Barjora Danpara Jr High School	25	N.D.	N.D.	N.D.	-
	Ghutgoria	25	N.D.	N.D.	N.D.	-
	Near Muktatore Primary School	25	N.D.	N.D.	N.D.	-
	Talanjuri	25	N.D.	N.D.	N.D.	-
	Overall	**200**	**-**	**-**	**-**	**-**
CO (mg/m^3)	Near Project Site (Sahebdihi)	75	0.216	0.644	0.417	0.640
	Near Purunia Prrathamic School	75	0.153	0.643	0.383	0.595
	Kanta Bandh	75	0.184	0.684	0.393	0.646
	Hari Nagara	75	0.257	0.896	0.568	0.828
	Near Barjora Danpara Jr High School	75	0.178	0.596	0.353	0.584
	Ghutgoria	75	0.288	1.222	0.647	1.191
	Near Muktatore Primary School	75	0.172	0.623	0.376	0.600
	Talanjuri	75	0.263	0.874	0.477	0.726
	Overall	**600**	**0.153**	**1.222**	**0.452**	**-**

N.B.: **MES** - No. of measurements, **MIN** - Minimum, **MAX** - Maximum, **A.M.** - Arithmetic Mean, **P-98** - 98 Percentile. **N.D**. - Not Detected

3.8.3 RESULTS & DISCUSSIONS

Statistical analysis (minimum, maximum, arithmetic mean) of the ambient air quality in the study area for the entire three months monitoring period are shown in **Table-3.8.2**.

The following implications can be made on the basis of the obtained results:

3.8.3.1 Particulate Matter-10 (PM_{10})

Arithmetic Mean of the 24-hourly average values of PM_{10} varied station-wise between 65.2 $\mu g/m^3$ (at Muktapur Junior High School) to 78.7 $\mu g/m^3$ (at Ghutgoria) with overall mean of all 8 stations being 71.1 $\mu g/m^3$.

Arithmetic Mean of the 24-hourly average values of PM_{10} at all locations is under the limit of (100 $\mu g/m^3$) National Ambient Air Quality Standards, 2009.

3.8.3.2 Particulate Matter - 2.5 ($PM_{2.5}$)

Arithmetic Mean of the 24-hourly average values of $PM_{2.5}$ varied station-wise between 26.8 $\mu g/m^3$ (at Muktapur Junior High School) to 35.6 $\mu g/m^3$ (at Ghutgoria) with overall mean of all 8 stations being 30.0 $\mu g/m^3$.

Arithmetic Mean of the 24-hourly average values of $PM_{2.5}$ at all locations is under the limit of (60 $\mu g/m^3$) National Ambient Air Quality Standards, 2009.

3.8.3.3 Sulphur Dioxide (SO_2)

Arithmetic mean of 24-hourly average values of SO_2 varied station wise between 8.5 $\mu g/m^3$ (at Kanta Bandh) to 13.1 $\mu g/m^3$ (at Ghutgoria) with overall mean of all 8 stations being 10.1 $\mu g/m^3$.

Arithmetic Mean of the 24-hourly average values of SO_2 at all locations is under the limit of (80 $\mu g/m^3$) National Ambient Air Quality Standards, 2009.

3.8.3.4 Nitrogen Dioxide (NO_2)

The overall arithmetic mean of 24-hourly average values of NO_2 over the entire study area was 22.1 $\mu g/m^3$ while individual arithmetic mean levels computed at 8 stations ranged between 18.7 $\mu g/m^3$ (Muktapur Junior High School) to 25.6 $\mu g/m^3$ (at Hari Nagara).

Arithmetic Mean of the 24-hourly average values of NO_2 at all locations is under the limit of (80 $\mu g/m^3$) National Ambient Air Quality Standards, 2009.

3.8.3.5 Benzo(a)Pyrene (BaP)

Benzo(a)Pyrene was monitored and analyzed by extracting EPM 2000 filter paper and was not detected i.e. below detectable range.

As per NAAQM Standard of CPCB, Annual Average of Benzo(a)Pyrene should be less than 1 ng/m^3 .

3.8.3.6 Carbon Monoxide (CO)

The overall arithmetic mean of 8-hourly average values of CO over the entire study area was 0.452 mg/m^3 while individual arithmetic mean levels computed at 8 stations ranged between 0.353 mg/m^3 Shyampur) to 0.647 mg/m^3 (at Ghutgoria).

Arithmetic Mean of the 24-hourly average values of CO at all locations is under the limit of (2 mg/m^3) National Ambient Air Quality Standards, 2009.

The graphical analyses of the concentrations of all pollutants have been shown in **Figure-3.8.2** to **Figure-3.8.6**.

National Ambient Air Quality Standards

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual*	50	20	- Improved West and Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2), $\mu g/m^3$	Annual*	40	30	- Modified Jacob & Hochheiser (Na-Arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM_{10} $\mu g/m^3$	Annual*	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ $\mu g/m^3$	Annual*	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) $\mu g/m^3$	8 hours**	100	100	- UV photometric - Chemilminescence
		1 hour**	180	180	- Chemical Method
6	Lead (Pb) $\mu g/m^3$	Annual*	0.50	0.50	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO) mg/m^3	8 hours**	02	02	- Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) $\mu g/m^3$	Annual*	100	100	-Chemiluminescence
		24 hours**	400	400	-Indophenol blue method

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m^3	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m^3	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/184/09/Exty.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.

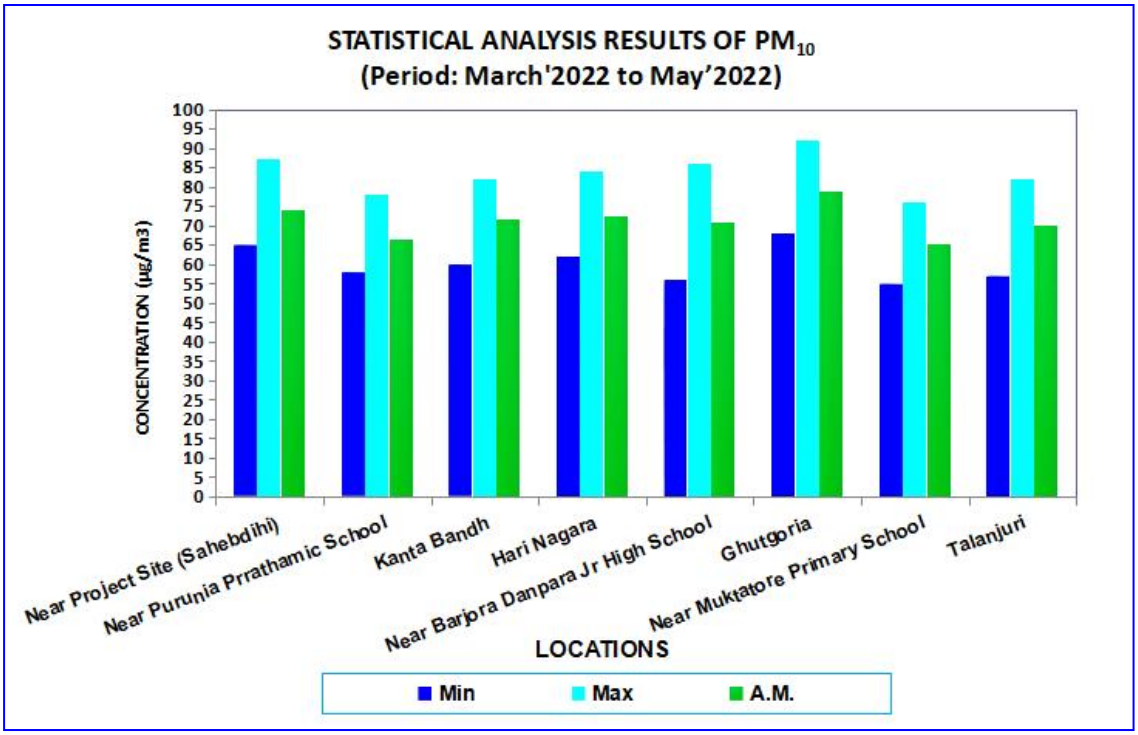


FIGURE-3.8.2: DIAGRAM OF PM_{10} OF ALL AAQM STATIONS

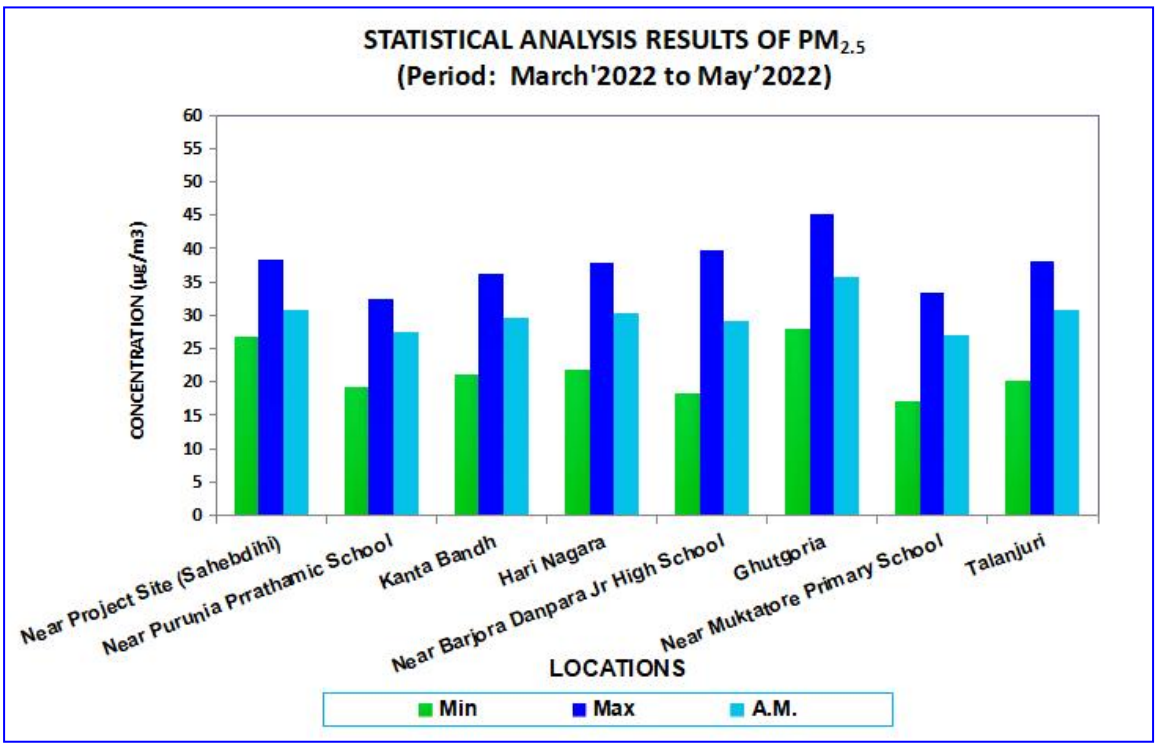


FIGURE-3.8.3: DIAGRAM OF $PM_{2.5}$ OF ALL AAQM STATIONS

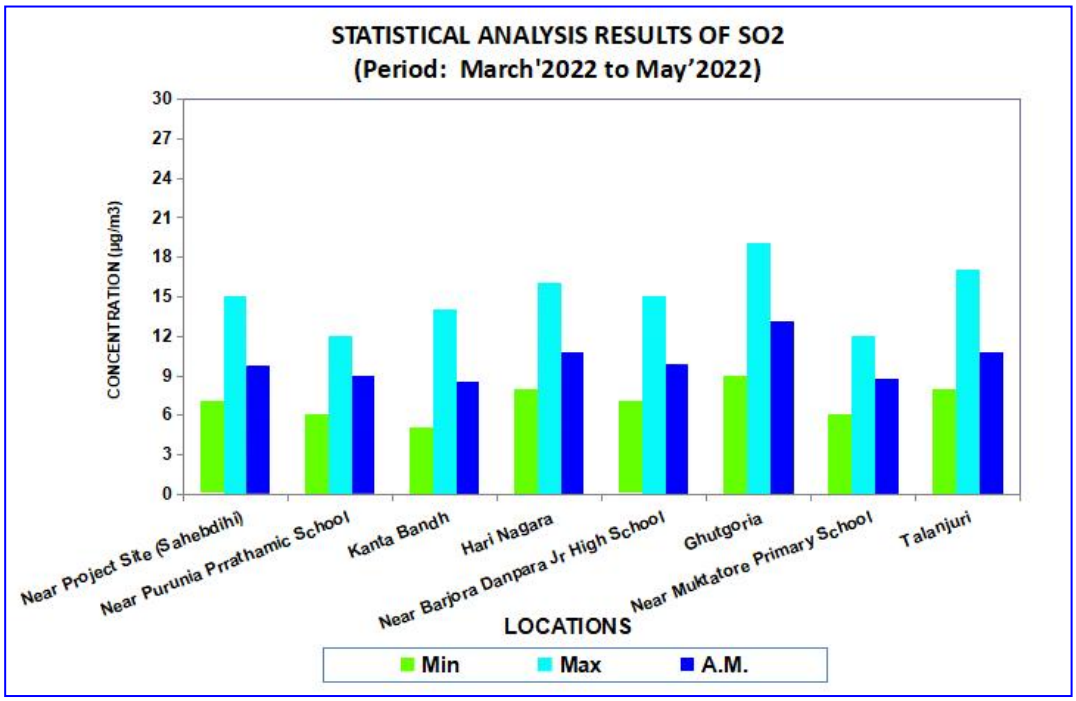


FIGURE-3.8.4: DIAGRAM OF SO_2 OF ALL AAQM STATIONS

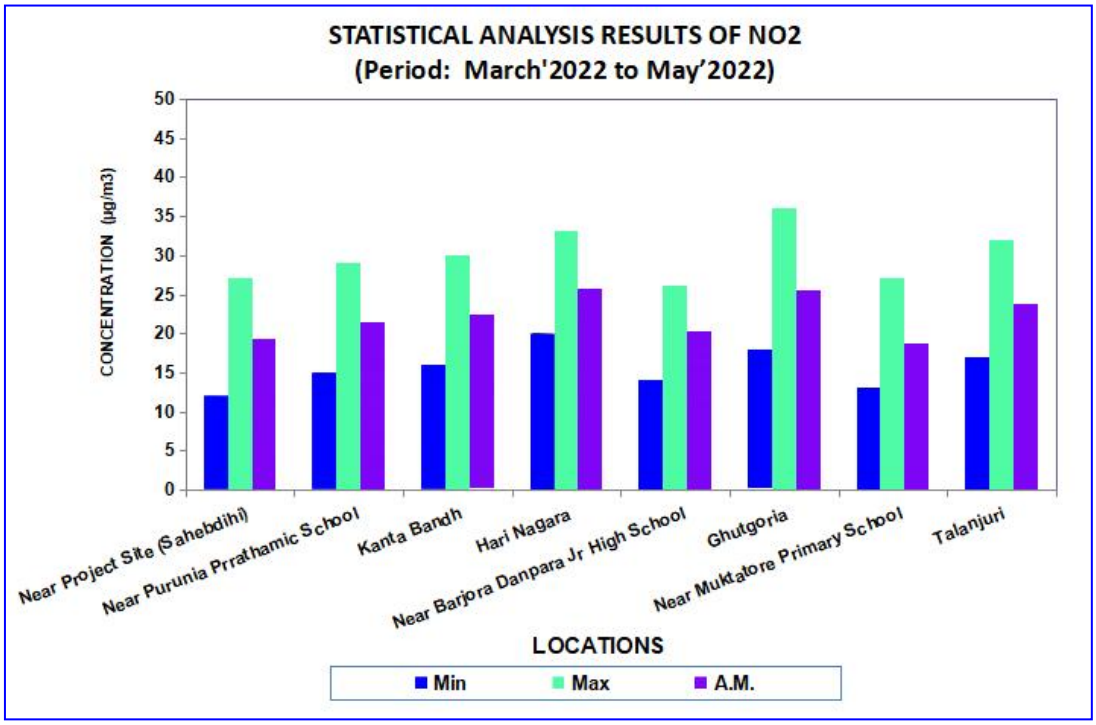


FIGURE-3.8.5: DIAGRAM OF NO_2 OF ALL AAQM STATIONS

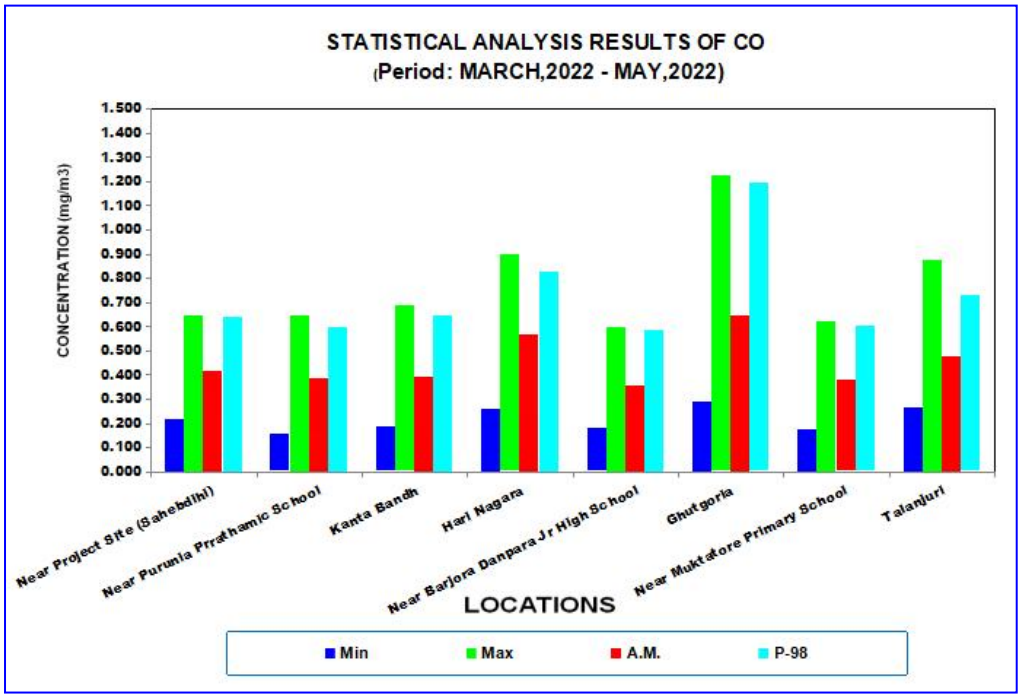


FIGURE-3.8.6: DIAGRAM OF CO OF ALL AAQM STATIONS

3.8.4 Conclusion

The values of all the ambient air parameters i.e., PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO at the respective 8 monitoring locations are within the stipulated limits on all the occasions as per NAAQ Standard. The maximum value of PM_{10} was observed near project site and at Ghutgaria (AQ-6) i.e., 89 $\mu g/m^3$, which is considerably on higher side, but is still within the standard. This may be attributed to the presence of few existing steel plants operating in the close vicinity of the proposed project site as well as due to the vehicular emissions in the area.

3.8.5 TRAFFIC STUDY ASSESSMENT

Traffic density was monitored under three different vehicle categories i.e., Heavy, Medium and Light. The heavy vehicles included trucks, buses, cranes etc. The medium vehicles included mini buses, matadors etc. while cars, jeeps, two wheelers and auto rickshaws were considered under the light vehicles category.

The data were recorded once for a day in the month of May, 2022 for continuous 24 hours in a day. The relevant account has been gathered in **Tables-3.8.1 and 3.8.2** .

TABLE-3.8.1

NAME OF THE LOCATION : At Hat Asuria More on Durgapur-Bankura State Highway - 9 (Date of Sampling : 24.05.2022)

HOUR	HEAVY	MEDIUM	LIGHT	TWO WHEELERS	TOTAL
0700 - 0800	31	24	33	63	**151**
0800 - 0900	48	35	49	68	**200**
0900 - 1000	59	33	60	46	**198**
1000 - 1100	64	21	39	30	**154**
1100 - 1200	50	38	20	74	**182**
1200 - 1300	59	20	44	46	**169**
1300 - 1400	86	52	35	25	**198**
1400 - 1500	79	22	27	50	**178**
1500 - 1600	68	45	42	31	**186**
1600 - 1700	92	30	46	59	**227**
1700 - 1800	32	42	55	70	**199**
1800 - 1900	84	26	38	62	**210**
1900 - 2000	59	14	27	55	**155**
2000 - 2100	36	22	14	49	**121**
2100 - 2200	62	10	8	37	**117**
2200 - 2300	50	5	5	29	**89**
2300 - 0000	66	8	2	11	**87**
0000 - 0100	24	2	1	12	**39**
0100 - 0200	10	0	0	3	**13**
0200 - 0300	5	0	0	0	**5**
0300 - 0400	12	0	0	0	**12**
0400 - 0500	6	4	2	3	**15**
0500 - 0600	15	16	12	25	**68**
0600 - 0700	27	20	23	44	**114**
Total	**1124**	**489**	**549**	**892**	**3087**

TABLE-3.8.2

NAME OF THE LOCATION : At Metsil More on Hat Asuria - Pakhanna Road

(Date of Sampling : 25.05.2022)

HOUR	HEAVY	MEDIUM	LIGHT	TWO WHEELERS	TOTAL
0700 - 0800	21	17	42	30	**110**
0800 - 0900	46	12	34	58	**150**
0900 - 1000	27	25	23	34	**109**
1000 - 1100	30	33	29	46	**138**
1100 - 1200	37	14	20	55	**126**
1200 - 1300	18	27	16	41	**102**
1300 - 1400	13	17	24	24	**78**
1400 - 1500	37	36	11	38	**122**
1500 - 1600	20	32	18	49	**119**
1600 - 1700	6	11	25	57	**99**
1700 - 1800	9	30	28	19	**86**
1800 - 1900	8	18	30	37	**93**
1900 - 2000	5	11	16	20	**52**
2000 - 2100	9	15	22	21	**67**
2100 - 2200	4	24	14	8	**50**
2200 - 2300	12	11	8	17	**48**
2300 - 0000	7	7	13	10	**37**
0000 - 0100	2	10	11	3	**26**
0100 - 0200	-1	5	5	0	**9**
0200 - 0300	2	6	4	0	**12**
0300 - 0400	4	3	0	0	**7**
0400 - 0500	0	2	3	3	**8**
0500 - 0600	5	15	5	9	**34**
0600 - 0700	14	18	11	37	**80**
Total	**335**	**399**	**412**	**616**	**1762**

3.9 WATER ENVIRONMENT

3.9.1 WATER BODIES IN THE STUDY AREA

The main surface water body in the study area is river Damodar. In the study area, there are two important canals which were made by the DVC from the Durgapur Barrage. Besides, a number of confined water bodies, viz. tanks, ponds, roadside burrows etc. which form a part of surface hydrological system, exist within the study area. As the River Damodar is the main drainage channel of the region, this river receives pollution loads of industrial and domestic waste water and also agricultural run-off. Ground water sources are mainly bore wells, tube wells and dug wells which are scattered in the whole study area.

PRESENT WATER USE

The water demand of the area can be broadly classified into domestic, agricultural and industrial. All these demands are met from both surface and ground water sources.

3.9.2 WATER SAMPLING

As surface water, water samples were collected and analyzed from total ten (10) locations, including two (2) different locations from the Damodar River water and eight (8) from different ponds of different locations , Ground water samples were collected and analyzed from total nine (9) different locations from tube wells /bore wells to assess the baseline status of the whole water quality in the study area.

Out of two water (Damodar River) samples, one was collected near Gourabera Village and the other near (Near Shitalpur) village.

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 for both surface and ground water are tabulated in **Table-3.9.1**. Surface water and Ground water sampling locations have been presented in **Figure-3.9.1** and **Figure-3.9.2** respectively.

3.9.3 SURFACE WATER QUALITY

All the samples were analyzed with respect to physical, chemical and biological parameters including toxic organics and metals, adopting Standard methods. Sampling and analysis of surface water were carried out following the analysis techniques and methodology described in

relevant Indian Standards and as per 23rd edition of "Standard Methods for the Examination of Water and Waste Water" published by American Public Health Association (APHA), 2017. Analysis results of all surface water samples were compared with CPCB Water Quality Criteria for Surface Water.

3.9.3.1 RESULTS OF SURFACE WATER QUALITY MONITORING:

Results of Water Quality from the River Water:

The water quality monitoring results of river water samples (**SW1, SW-2)** have been compiled in **Table-3.9.3**.

The pH values of the collected two water samples (**SW1 and SW2**) from the river water were found pH 7.2 - 7.3. Conductivity was found in the range of (251-292) µS/cm. Value of Dissolved Oxygen were observed (6.8-7.1) mg/lit. Value of BOD were found (2 - 3) mg/lit respectively. Boron and Ammonia (as NH_3-N) was below detection limit (<0.02 and <0.05 mg/lit) in these sample. Sodium Absorbance Ratio Iron were found (0.7 - 0.9) mg/lit respectively.

Results of Pond Water Quality:

The water quality monitoring results of eight (8) pond water samples (**SW3** to **SW12**) have been compiled in **Table-3.9.2**.

The pH values of the collected pond water samples were found in the range of (7.1 – 7.6). Conductivity was found in the range of (389-636) µS/cm. Value of Dissolved Oxygen were observed (5.8- 6.6) mg/lit. Value of BOD were found (2 - 7) mg/lit respectively. Boron and Ammonia (as NH_3-N) was below detection limit (<0.02 and <0.05 mg/lit) in these sample. Sodium Absorbance Ratio Iron were found (2.0 - 0.9) mg/lit respectively.

3.9.4 GROUND WATER QUALITY

Ground Water samples (from bore-well and Tube well) were collected from 9 locations (GW1 to GW9). Locations of ground water sampling have been shown in **Table-3.9.1**. The ground water quality monitoring results have been presented in **Table-3.9.2**.

Sampling and analysis of ground water were carried out following the analysis techniques and methodology described in relevant Indian Standards. The ground water quality monitoring results have been tabulated in **Table-3.9.2**.

3.9.4.1 RESULTS OF GROUND WATER QUALITY MONITORING:

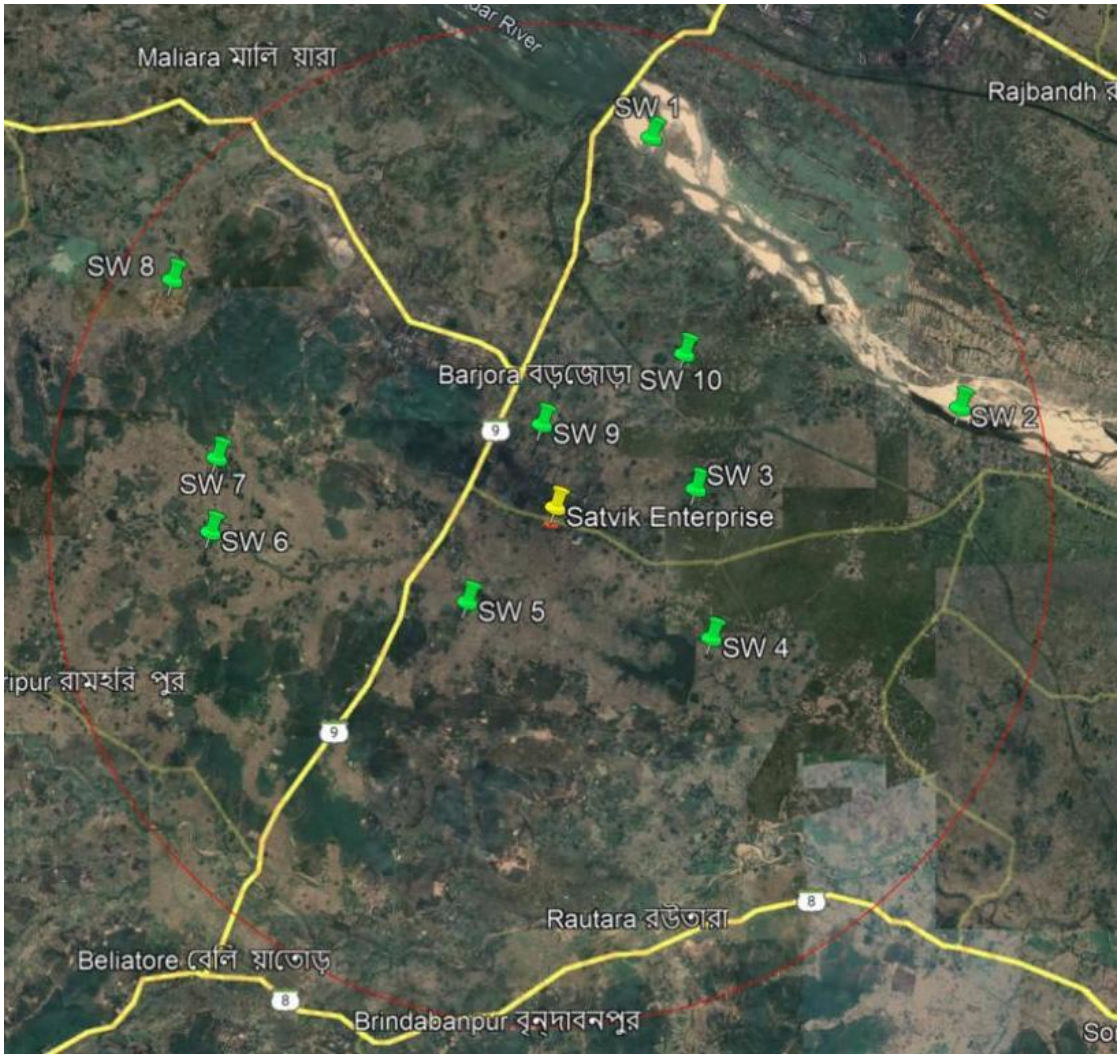
The pH values of collected ground water samples were found in the range of (7.15 – 7.78). Total Dissolved Solids (TDS) was found in the range of (314 – 583) mg/lit, while Total Hardness (as $CaCO_3$) was found in the ranges of (146 – 238) mg/lit. Alkalinity (as $CaCO_3$) was found in the ranges of (138 – 278) mg/lit. Calcium (as Ca) and Magnesium (as Mg) were found varying in the ranges of (34 – 71) mg/lit and (5 – 15) mg/lit respectively. Sulphate (as SO_4), Nitrate (as NO_3) and Chloride (as Cl) were observed in the ranges of (25 – 74) mg/lit, (1.2 – 3.5) mg/lit and (75 – 126) mg/lit respectively. Iron (as Fe) content was found in the range of (0.21 – 0.42) mg/lit and Zinc (as Zn) content was found <0.05 mg/lit.

Other heavy metals like Copper (as Cu), Lead (as Pb), Cadmium (as Cd), Chromium (as Cr), Manganese (as Mn), Arsenic (as As) and Mercury (as Hg) were below their respective detection limits.

TABLE-3.9.1
WATER QUALITY MONITORING LOCATIONS IN THE STUDY AREA

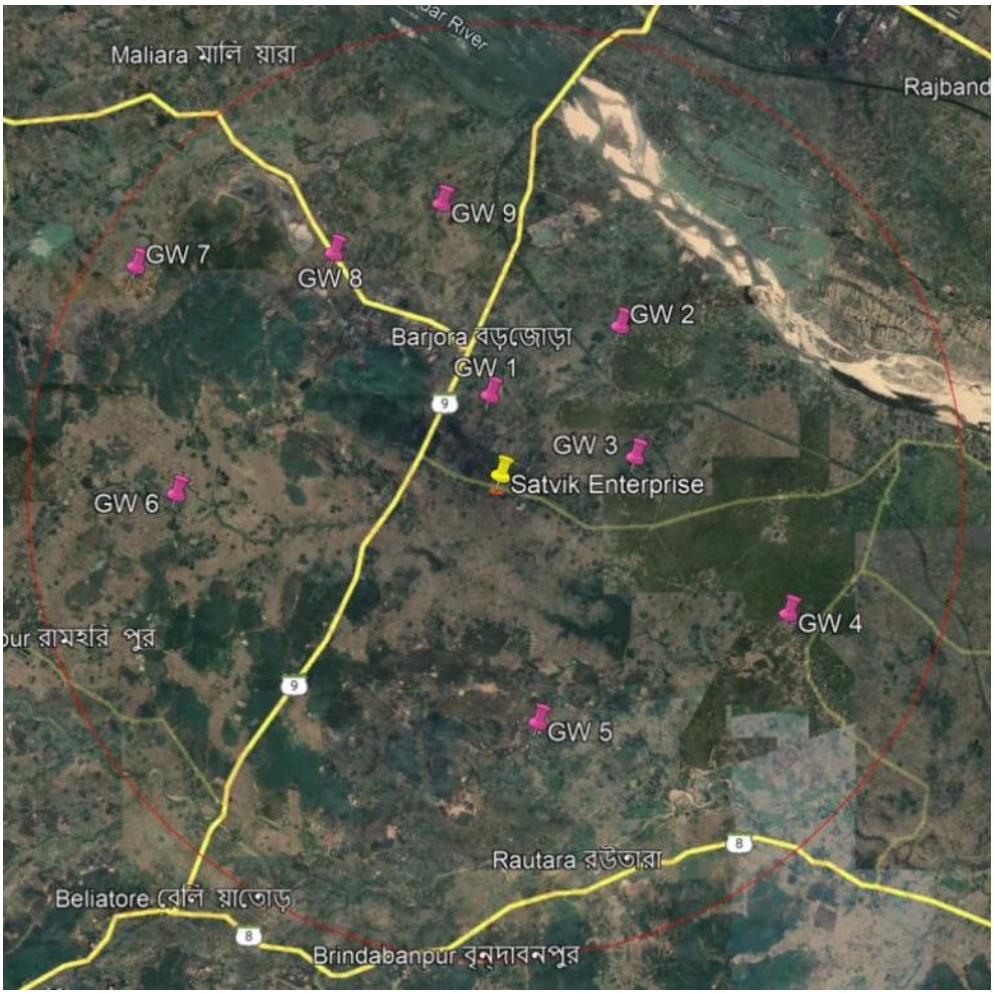
Sample Code	Locations	Latitude	Longitude
SURFACE WATER:			
SW1	Damoar River (Near Gourabera)	23°27'55.84"N	87°18'26.12"E
SW2	Damoar River (Near Shitalpur)	23°25'0.91"N	87°22'3.25"E
SW3	Pond Water (Mandarbani)	23°24'8.40"N	87°18'57.17"E
SW4	Pond Water (Mahidhara)	23°22'31.87"N	87°19'8.25"E
SW5	Pond Water (Bhustora)	23°22'55.29"N	87°16'16.35"E
SW6	Pond Water (Shitla)	23°23'40.49"N	87°13'15.71"E
SW7	Pond Water (Muktatore)	23°24'28.39"N	87°13'20.10"E
SW8	Pond Water (Anandapur)	23°26'23.56"N	87°12'48.81"E
SW9	Pond Water (Sonergram)	23°24'50.15"N	87°17'8.91"E
SW10	Pond Water (Bhirabpur)	23°25'35.66"N	87°18'49.14"E
GROUND WATER:			
GW1	Sonergram (Tubewell water)	23°24'51.60"N	87°17'10.10"E
GW2	Bhairabpur (Tubewell water)	23°25'39.36"N	87°18'48.38"E
GW3	Mandarbani (Tubewell water)	23°24'8.76"N	87°18'59.71"E
GW4	Pear Bera (Tubewell water)	23°22'20.25"N	87°20'55.44"E
GW5	Birshingpur (Tubewell water)	23°21'5.09"N	87°17'46.29"E

GW6	Shitla (Tubewell water)	23°23'43.22"N	87°13'13.38"E
GW7	Anandapur (Tubewell water)	23°26'20.50"N	87°12'42.96"E
GW8	Ghutgoria (Tubewell water)	23°26'29.74"N	87°15'12.36"E
GW9	Kishoripur (Tubewell water)	23°27'4.07"N	87°16'33.57"E



Sample Code	Location	Direction & Distance from centre of project site (km)		Date of Sampling
SW1	Sonergram (Tubewell water)	7.61	NNE	04.04.2022
SW2	Bhairabpur (Tubewell water)	8.33	ENE	04.04.2022
SW3	Mandarbani (Tubewell water)	2.83	E	04.04.2022
SW4	Gour Mohanpur (Tubewell water)	4.07	SE	04.04.2022
SW5	Sangrampur (Tubewell water)	2.58	SW	04.04.2022
SW6	Shitla (Tubewell water)	6.91	W	04.04.2022
SW7	Anandapur (Tubewell water)	6.83	W	04.04.2022
SW8	Ghutgoria (Tubewell water)	8.89	WNW	04.04.2022
SW9	Kishoripur (Tubewell water)	1.67	N	04.04.2022
SW10	Sonergram (Tubewell water)	3.99	NE	04.04.2022
SW11	Bhairabpur (Tubewell water)	7.61	NNE	04.04.2022
SW12	Mandarbani (Tubewell water)	8.33	ENE	04.04.2022

FIGURE-3.9.1
SURFACE WATER SAMPLING LOCATIONS



Sample Code	Location	Direction & Distance from centre of project site (km)		Date of Sampling
GW1	Sonergram (Tubewell water)	1.7	N	05.04.2022
GW2	Bhairabpur (Tubewell water)	4.1	NE	05.04.2022
GW3	Mandarbani (Tubewell water)	2.9	E	05.04.2022
GW4	Pear Bera (Tubewell water)	6.8	ESE	05.04.2022
GW5	Birshingpur (Tubewell water)	5.3	S	05.04.2022
GW6	Shitla (Tubewell water)	7.0	W	05.04.2022
GW7	Anandapur (Tubewell water)	9.0	WNW	05.04.2022
GW8	Ghutgoria (Tubewell water)	5.9	NW	05.04.2022
GW9	Kishoripur (Tubewell water)	5.9	NNW	05.04.2022

FIGURE-3.9.2
SURFACE WATER SAMPLING LOCATIONS

TABLE-3.9.2
GROUND WATER QUALITY

Sl.NO	Parameter	Unit	Concentrations (Code : GW_1 to GW_5)				
			GW_1	GW_2	GW_3	GW_4	GW_5
1	Colour	Hazen	<5	<5	<5	<5	<5
2	Odour		Unobj.	Unobj.	Unobj.	Unobj.	Unobj.
3	Taste		Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	<1	<1	<1	<1	<1
5	pH	-	7.38	7.41	7.15	7.23	7.54
6	Conductivity	µS/cm	616	673	535	553	884
7	Free Residual Chlorine (mg/L)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
8	Total Dissolved Solids	mg/L	377	397	314	325	527
9	Phenol (as C6H5OH)	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
10	Total Hardness (as CaCO3)	mg/L	179	163	152	146	225
11	Total Alkalinity (as CaCO3)	mg/L	179	171	145	138	237
12	Chloride (as Cl)	mg/L	93	102	75	81	126
13	Sulphate (as SO4)	mg/L	26	37	29	32	45
14	Nitrate (as NO3)	mg/L	1.2	1.5	1.4	1.8	2.4
15	Fluoride (as F)	mg/L	0.16	0.19	0.15	0.34	0.28
16	Calcium (as Ca)	mg/L	51	46	42	34	66
17	Magnesium (as Mg)	mg/L	13	12	11	15	15
18	Ammonia (as Total NH3-N)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
19	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02
20	Chromium (as Cr)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
21	Copper (as Cu)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
22	Manganese (as Mn)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
23	Zinc (as Zn)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
24	Cadmium (as Cd)	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003
25	Iron (as Fe)	mg/L	0.25	0.36	0.22	0.24	0.39
26	Lead (as Pb)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
27	Silver (as Ag)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
28	Nickel (as Ni)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
29	Arsenic (as As)	ppb	<2	<2	<2	<2	<2
30	Mercury (as Hg)	ppb	<1	<1	<1	<1	<1
31	Total Coliforms	MPN/100	N.D.	N.D.	N.D.	N.D.	N.D.

Unobj. – Unobjectional

CODE	LOCATION NAME
GW1	Sonergram (Tubewell water)
GW2	Bhairabpur (Tubewell water)
GW3	Mandarbani (Tubewell water)
GW4	Pear Bera (Tubewell water)
GW5	Birshingpur (Tubewell water)

TABLE-3.9.2 (Continued)
GROUND WATER QUALITY

Sl.NO	Parameter	Unit	Concentrations (Code : GW_6 to GW_9)			
			GW_6	GW_7	GW_8	GW_9
1	Colour	Hazen	<5	<5	<5	<5
2	Odour		Unobj.	Unobj.	Unobj.	Unobj.
3	Taste		Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	<1	<1	<1	<1
5	pH	-	7.78	7.62	7.33	7.15
6	Conductivity	µS/cm	989	727	665	591
7	Free Residual Chlorine (mg/L)	mg/L	<0.1	<0.1	<0.1	<0.1
8	Total Dissolved Solids	mg/L	583	430	392	345
9	Phenol (as C6H5OH)	mg/L	<0.001	<0.001	<0.001	<0.001
10	Total Hardness (as CaCO3)	mg/L	238	192	180	161
11	Total Alkalinity (as CaCO3)	mg/L	278	220	184	181
12	Chloride (as Cl)	mg/L	116	89	95	79
13	Sulphate (as SO4)	mg/L	74	39	36	25
14	Nitrate (as NO3)	mg/L	2.9	2.6	3.5	1.8
15	Fluoride (as F)	mg/L	0.28	0.22	0.16	0.27
16	Calcium (as Ca)	mg/L	71	62	63	51
17	Magnesium (as Mg)	mg/L	15	9	5	8
18	Ammonia (as Total NH3-N)	mg/L	<0.05	<0.05	<0.05	<0.05
19	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02
20	Chromium (as Cr)	mg/L	<0.05	<0.05	<0.05	<0.05
21	Copper (as Cu)	mg/L	<0.05	<0.05	<0.05	<0.05
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	Cadmium (as Cd)	mg/L	<0.003	<0.003	<0.003	<0.003
25	Iron (as Fe)	mg/L	0.21	0.36	0.42	0.32
26	Lead (as Pb)	mg/L	<0.01	<0.01	<0.01	<0.01
27	Silver (as Ag)	mg/L	<0.05	<0.05	<0.05	<0.05
28	Nickel (as Ni)	mg/L	<0.01	<0.01	<0.01	<0.01
29	Arsenic (as As)	ppb	<2	<2	<2	<2
30	Mercury (as Hg)	ppb	<1	<1	<1	<1
31	Total Coliforms	MPN/100 ml	N.D.	N.D.	N.D.	N.D.

Unobj. – Unobjectional

CODE	LOCATION NAME
GW6	Shitla (Tubewell water)
GW7	Anandapur (Tubewell water)
GW8	Ghutgoria (Tubewell water)
GW9	Kishoripur (Tubewell water)

TABLE-3.9.3
SURFACE WATER QUALITY

Sl.No.	Parameter	Unit	Concentrations (Code : SW_1 to SW_6)					
			SW_1	SW_2	SW_3	SW_4	SW_5	SW_6
1	pH		7.26	7.15	7.41	7.23	7.39	7.28
2	Conductivity	µS/cm	292	251	389	473	436	569
3	Dissolved Oxygen	mg/L	6.8	7.1	6.5	5.8	6.4	6.1
4	Biochemical Oxygen Demand (3 days at 27^0C)	mg/L	3	2	2	7	4	5
5	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
6	Ammonia (as NH_3-N)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
7	Sodium Absorbance Ratio	-	0.9	0.7	0.9	1.4	1.1	1.7

Unobj. – Unobjectionable

CODE	LOCATION NAME
SW1	Damoar River (Near Gourabera)
SW2	Damoar River (Near Shitalpur)
SW3	Pond Water (Mandarbani)
SW4	Pond Water (Mahidhara)
SW5	Pond Water (Bhustora)
SW6	Pond Water (Shitla)

TABLE-3.9.3 (Continued)
SURFACE WATER QUALITY

Sl.No.	Parameter	Unit	Concentrations (Code : SW_7 to SW_10)			
			SW_7	SW_8	SW_9	SW_10
1	pH		7.34	7.56	7.14	7.43
2	Conductivity	µS/cm	433	636	471	593
3	Dissolved Oxygen	mg/L	6.6	6.3	6.1	6.4
4	Biochemical Oxygen Demand (3 days at 27^0C)	mg/L	4	5	6	4
5	Boron (as B)	mg/L	<0.02	<0.02	<0.02	<0.02
6	Ammonia (as NH_3-N)	mg/L	<0.05	<0.05	<0.05	<0.05
7	Sodium Absorbance Ratio	-	1.3	2.0	1.3	1.9

Unobj. – Unobjectionable

CODE	LOCATION NAME
SW7	Pond Water (Muktatore)
SW8	Pond Water (Anandapur)
SW9	Pond Water (Sonergram)
SW10	Pond Water (Bhirabpur)

TABLE-3.9.4
SURFACE WATER QUALITY CRITERIA AS PER CPCB

Sl. No.	Parameters	Class A	Class B	Class C	Class D	Class E
1	pH	6.5–8.5	6.5–8.5	6.0–9.0	6.5–8.5	6.0–8.5
2	Dissolved Oxygen (as O_2), mg/l, min	6	5	4	4	-
3	BOD, 5 days at 20°C, max	2	3	3	-	-
4	Total Coliform organism, MPN/100 ml, max	50	500	5000	-	-
5	Free ammonia (as N), mg/l, max	-	-	-	1.2	-
6	Electrical Conductivity, µmhos/cm, max	-	-	-	-	2250
7	Sodium Absorption Ratio, max	-	-	-	-	26
8	Boron (as B), mg/l, max	-	-	-	-	2

Class A: Drinking water source without conventional treatment but after disinfection.
Class B: Outdoor bathing (organized).
Class C: Drinking water source after conventional treatment and after disinfection.
Class D: Propagation of Wild life and Fisheries.
Class E: Irrigation, Industrial Cooling, and Controlled Waste Disposal.
Below E: Not meeting A, B, C, D & E Criteria.

Designated Best Use Water Quality Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH betwwn 6.0 to 8.5 Electrical Conductivity at 25C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

[Source: https://cpcb.nic.in/wqm/Designated_Best_Use_Water_Quality_Criteria.pdf]

CONCLUSION FROM SURFACE WATER ANALYSIS

As per CPCB norms of classification of surface water,

- Damodar river water quality (**SW1** & **SW2**) parameters are within the standard for Class C i.e., Drinking water source after conventional treatment and after disinfection.
- The Pond water quality (**SW3** and **SW7**) parameters are within the standard for Class C except for BOD levels in case of SW4, SW5, SW6, SW7, SW8, SW9 and SW10 where the values are 7 mg/l, 4 mg/l, 5 mg/l, 4 mg/l, 5 mg/l, 6 mg/l and 4 mg/l respectively, which is more than the standard (3 mg/l). Hence, this water is suitable for "Propagation of Wildlife & Fisheries" (i.e., Class D).

IS 10500:2012 LIMITS

Sl. No.	Parameter	Unit	Acceptable Limit of IS:10500:2012	Permissible limit of IS:10500:2012
1	Colour	Hazen unit	5	15
2	Odour		Agreeable	Agreeable
3	Taste		Agreeable	Agreeable
4	Turbidity	NTU	1	5
5	pH	-	6.5 – 8.5	No relaxation
6	Temperature	^{0} C	-	-
7	Conductivity	µS/cm	-	-
8	Free Residual Chlorine	mg/L	0.2	1
9	Total Dissolved Solids	mg/L	500	2000
10	Phenol (as C_6H_5OH)	mg/L	0.001	No relaxation
11	Total Hardness (as $CaCO_3$)	mg/L	200	600
12	Total Alkalinity (as $CaCO_3$)	mg/L	200	600
13	Chloride (as Cl)	mg/L	250	1000
14	Sulphate (as SO_4)	mg/L	200	400
15	Nitrate (as NO_3)	mg/L	45	No relaxation
16	Fluoride (as F)	mg/L	1	1.5
17	Calcium (as Ca)	mg/L	75	200
18	Magnesium (as Mg)	mg/L	30	100
19	Ammonia (as Total NH_3-N)	mg/L	0.5	No relaxation
20	Boron (as B)	mg/L	0.5	2.4
21	Chromium (as Cr)	mg/L	0.05	No relaxation
22	Copper (as Cu)	mg/L	0.05	1.5
23	Manganese (as Mn)	mg/L	0.1	0.3
24	Zinc (as Zn)	mg/L	5	15
25	Cadmium (as Cd)	mg/L	0.003	No relaxation
26	Iron (as Fe)	mg/L	1	No relaxation
27	Lead (as Pb)	mg/L	0.01	No relaxation
28	Silver (as Ag)	mg/L	0.1	No relaxation
29	Nickel (as Ni)	mg/L	0.02	No relaxation
30	Arsenic (as As)	ppb	10	No relaxation
31	Mercury (as Hg)	ppb	1	No relaxation
32	Total Coliforms	MPN/ 100 ml	Shall not be detectable in any 100 ml sample	Shall not be detectable in any 100 ml sample

CONCLUSION FROM GROUND WATER SAMPLE ANALYSIS

Ground water physico-chemical properties in the study area showed that the water strata mainly from Bicarbonate buffer system has appreciable amount of alkalinity & Hardness. Calcium & Magnesium which are beneficial for human health are found satisfactory. The other parameters (i.e. Sulphate, Chloride etc.) fall within satisfactory level. While comparing with IS 10500:2012, it can be concluded that all ground water samples are within permissible limit & can be used as drinking water source.

The plant will be based on Zero Liquid Discharge (ZLD) Concept. Therefore, the sources of water including ground water will not be affected during the operational phase.

3.10 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. These locations have been displayed in **Table-3.10.1**.

3.10.1 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.

3.10.2 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.

A preliminary reconnaissance survey was undertaken to identify the major noise sources in the area. The sampling location in the area was identified considering location of industry, commercial shopping complex activities, residential areas with various traffic activity and sensitive areas like hospital, court, temple, schools etc.

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.

3.10.3 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 Night times have been presented in **Table-3.10.2**.

During the day time, the equivalent noise levels were found to vary in the range of (51.8 - 67.3) dB (A) while in the night time, the equivalent noise levels were observed to be varying in the range of (41.0 - 54.6) dB (A). The variation of noise level in day & night time is presented in **Figure-3.10.2**.

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

TABLE-3.10.1
NOISE LEVEL MONITORING LOCATIONS

SL. NO.	CODE	LOCATIONS	LATITUDE	LONGITUDE	DISTANCE & DIRECTION FROM THE PROJECT SITE
1.	N-1	Near Project Site	23°23'55.71"N	87°17'25.31"E	0.2 km, E
2.	N-2	Near Kalimata Ispat Industries	23°24'9.70"N	87°17'1.86"E	0.62 km, NW
3.	N-3	Near Metsil Limited	23°24'22.05"N	87°17'42.44"E	1.1 km, NE
4.	N-4	Hat Ashuria High School (H.S.)	23°23'53.57"N	87°17'54.66"E	1.0 km, E
5.	N-5	Harirampur (Talanjuri Prathomik School)	23°23'16.92"N	87°16'45.84"E	1.5 km, SW
6.	N-6	Near Barjora Hospital	23°25'29.98"N	87°16'54.53"E	2.95 km, NNW
7.	N-7	Dejuri Village	23°24'5.01"N	87°15'51.44"E	2.5 km, W
8.	N-8	Purunia Village	23°22'22.40"N	87°17'2.78"E	2.93 km, S
9.	N-9	Kotgram Village	23°25'2.88"N	87°18'10.14"E	2.0 km, ESE
10.	N-10	Sarali Market	23°23'35.93"N	87°18'24.92"E	2.5 km, NE

FIGURE-3.10.1
NOISE LEVEL MONITORING LOCATIONS IN THE STUDY AREA

CODE	LOCATIONS
N-1	Near Project Site
N-2	Near Kalimata Ispat Industries
N-3	Near Metsil Limited
N-4	Hat Ashuria High School (H.S.)
N-5	Harirampur (Talanjuri Prathomik School)
N-6	Near Barjora Hospital
N-7	Dejuri Village
N-8	Purunia Village
N-9	Kotgram Village
N-10	Sarali Market

TABLE-3.10.2
EQUIVALENT NOISE LEVEL IN THE STUDY AREA, Leq in dB(A)

SL. NO.	LOCATIONS	EQUIVALENT NOISE LEVEL, L_{eq} in dB(A)		SECTOR
		DAY	NIGHT	
1.	Near Project Site	58.1	51.6	Industrial
2.	Near Kalimata Ispat Industries	65.7	54.6	Industrial
3.	Near Metsil Limited	67.3	53.9	Industrial
4.	Hat Ashuria High School (H.S.)	55.8	44.3	Silence
5.	Harirampur (Talanjuri Prathomik School)	54.9	43.4	Silence
6.	Near Barjora Hospital	51.8	41.0	Silence
7.	Dejuri Village	57.1	44.3	Residential
8.	Purunia Village	59.3	45.1	Residential
9.	Kotgram Village	57.8	43.1	Residential
10.	Sarali Market	64.7	46.6	Commercial

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

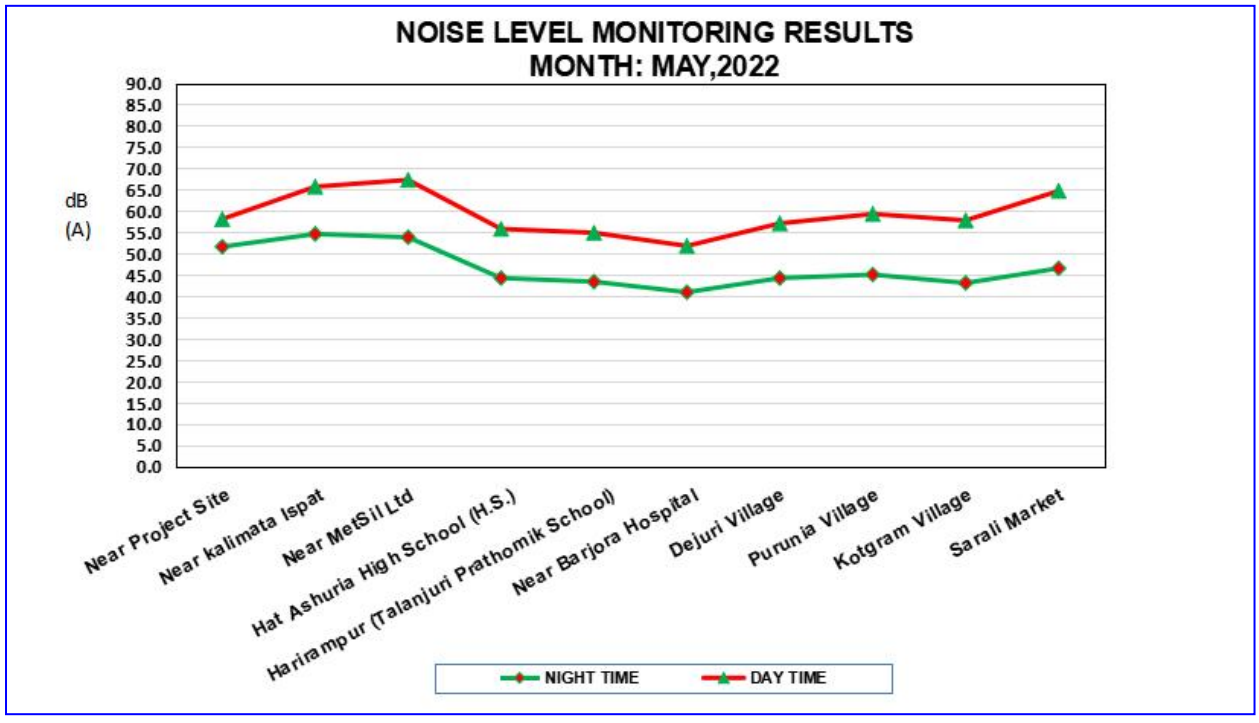


FIGURE: 3.10.2
GRAPHICAL REPRESENTATION OF THE NOISE LEVEL MONITORING RESULTS IN THE STUDY AREA

CONCLUSION OF NOISE LEVEL MONITORING:

The Equivalent Noise Levels in the Industrial locations are within permissible limits. However, the noise level has exceeded the permissible limits for Residential, Commercial and Sensitive locations in the study area. Such high noise levels may be attributed mainly to the noise, generated due to the vehicular traffic.

Trees and herbs can make a contribution to noise reduction. The attenuation of sound by vegetation is commonly attributed to the processes of reflection, scattering and absorption. Reflection and scattering from the surfaces of leaves, branches, trunks and the ground can alter the phase of sound, which can cause interference in the sound waves and a reduction in noise level. The study area is rich in floral composition with much concentration of large and medium size trees which can effectively reduce noise level in the study area.

3.11 ECOLOGY

3.11.1 INTRODUCTION

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. Natural flora and fauna is an integral component of Eco-system and is a good indicator of Environmental quality of the habitat. Different communities present in it show different degree of responses and sensitiveness to physical (biotic) influences. Therefore, any environmental analysis where integration of ecological thoughts into planning process is required, the analysis of biological status of the area is very important to project possible deterioration in natural environment on account of Industrial development in the area and designing suitable management corrective action plan.

In addition to the field study, literature review/desk research was carried out to determine the existing conditions within the study area and to identify habitats and species of potential importance that may be affected by the Project.

The following parameters were primarily considered in the study:

1) To assess the nature and distribution of vegetation in and around the project site within the 10 km radius study area;
2) To assess the biodiversity of natural system present in the study area;
3) Identification of important plants/animal species having diverse economic values;
4) Identification of rare endangered plants and animal species (if any);
5) Collection of data from literature about the floral and faunal accounts.

3.11.2 BIOLOGICAL ASPECT

The study on biological aspect is important for Environmental Impact Assessment in view of conservation of environmental quality and safety of natural flora and fauna. A biological community being dependant on the condition and resources of its location may change if there is a little change in the ecosystem. Such a community change is a reflection of changes in the plant and animal population that comprises of the community because of the complex interrelationships of a changing condition of resources that causes one or more of the population to change may cause many populations to change and be replaced by others. Since the environment of organisms are able to inhabit that

location, the inhabitants should be biological induces of environmental changes.

3.11.3 GENERAL VEGETATION OF THE DISTRICT

According to the State Forest Report of 2010-2011, the total geographical area of the Bankura District is about 6882 sq. km. The total forest area of Bankura District, which comprises three divisions, Bankura (North) Division, Bankura (South) Division and Panchet Division, is about 1482 sq. km., covering 21.53% percent of the total geographical land area of the district. The total forest area of this district comprises 80 sq. km. of Reserved Forest, 1311 sq. km. of Protected Forest, and 91 sq. km. of Unclassified State Forest, whereas, the total recorded forest land in the West Bengal state is about 11,879 sq. km., of which 7,054 sq. km. is Reserved Forest, 3,772 sq. km. is Protected Forest and 1,053 sq. km. is Unclassified State Forest. The division of forest area of the Bankura district with comparing of the state West Bengal is tabulated in **Table-3.11.1.**

Classification of Recorded Forest Land

Reserved Forest : An area notified under the provisions of Indian Forest Act, 1927 having full degree of protection. In Reserved Forests all activities are prohibited unless specifically permitted (Sec.20 of IFA, 1927).

Protected Forest : An area notified under the provisions of the Indian Forest Act having limited degree of protection. In Protected Forest all activities are permitted unless prohibited (Sec. 29 of IFA, 1927).

Unclassified State Forest : An area recorded as forest but not included in Reserved or Protected forest category. Ownership status of such forests varies from state to state.

TABLE-3.11.1
Division of forest Land of the Bankura District with comparing of the state of West Bengal

Total Geographical Area (Km^2)	Total Forest Area (Km^2)	Reserved Forest (Km^2)	Protected Forest (Km^2)	Unclassified State Forest (Km^2)
DISTRICT – BANKURA				
6,882	1,482	80	1,311	91
STATE – WEST BENGAL				
88,752	11,879	7,054	3,772	1,053

(Source: State Forest Report, 2010 - 2011)

3.11.4 DESCRIPTION OF THE STUDY AREA

In the present survey, the 10 km radius study area is an alluvial land. The project site and its surrounding area in 10 km radius are located in the Bankura District of West Bengal. The periphery of the study area is mainly rural in nature with some portion of the area is semi-urban. There are various industries found within the study area. The only and major River in the study area is River Damodar. A substantial part of the study area is occupied by this major river.

The soil in the study area is rich and mostly clay-loams with high amount of nutrients having high water retention capacity. The ground water table is moderate in this region. All these factors help in prolific growth of a variety of plants and vegetation in the area.

Assessment of flora and fauna of both terrestrial and aquatic ecology was undertaken in the study area. Sampling of flora and fauna was done on random basis and were considered separately and their distribution in the above mentioned study area was represented separately.

Barjora Forest is located near the project site and extends from north-west and south-east direction. Few wild animals are rarely found within this forest.

3.11.5 RECONNAISSANCE SURVEY

A reconnaissance survey was undertaken in 10 km radius study area around the proposed project site. Through initial rapid extensive field survey at the selected sampling locations, flora-fauna checklists were prepared by the survey team members. The field study was undertaken once during the study period (1st October, 2021 to 31st December, 2021).

3.11.6 METHODOLOGY OF ECOLOGICAL STUDY

Different methods which have been adopted for ecological study in the study area are as follows:

1. Inventorisation of flora/fauna: The list of flora and fauna found in the region was prepared by conducting field survey and by discussions with concerned Forest Department personnel using the list available in the Working Plan as a base.

2. Generation of primary data through systematic ecological studies: The phyto-sociology of the vegetation (covering frequency, density, abundance and species diversity) in the forest areas falling in

the study area was determined by conducting field studies in selected areas (by laying suitable sizes of Quadrat).

3. Discussion with local people so as to elicit information about local plant and animals.

The ecological status of the study area has been divided into mainly two categories: Terrestrial Ecology and Aquatic Ecology.

3.11.7 TERRESTRIAL ECOLOGY

Terrestrial Ecology covers all the land based ecosystem component analysis viz. Forest and other vegetation covers, Flora and fauna resources, agriculture and livestock status etc. 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 of distinctive community having mutual dependences among their 3 types of bio-diversity, i.e., genetic diversity, species diversity and ecological diversity and so diverse degree of respond and sensitivities to physical influences.

TERRESTRIAL FLORA

The study area is rural and semi-urban mixed in nature. There have sufficient number of natural vegetations all around the study area.

Vegetation of a particular area depends upon the interaction of various natural factors including plants, animals, micro-organisms of that particular area in which they grown, live and influence one another.
The most common natural tree species found within the study area are Eucalyptus (*Eucalyptus globules*), Date palm/Khejur (*Phoenix sylvestris*), Sal (*Shorea robusta*), Radhachura (*Peltophorum pterocarpum*), Mahua (*Madhuca indica*), Devdaru (*Polyalthia longifolia*), Segun (*Tectona grandis*), Arjun (*Terminalia arjuna*), Guava/Peara (*Psidium guajava*), Babool (*Acacia nilotica*), Palm Tree/Taal (*Borassus flabellifer*) etc. Natural tree species was analyzed and calculated by Quadrat method at different places in the study area like inside and outside of the Borjora Forest, just beside of the project site, roadside land, domestic land, small patchy area etc.

A checklist of natural tree species has been given in **Table-3.11.2(A)** and composite Quadrat analysis & Biodiversity Index of those species have been calculated and tabulated in **Table-3.11.2(B)** and **Table-3.11.2(C).**

There are also several natural species of shrubs, herbs and climbers observed within the study area and a checklist of these species of shrubs, herbs and climbers has been shown in **Table-3.11.3.** Some common medicinal plant species of all types (trees, shrubs, herbs and climbers) which were identified in the study area have been tabulated in **Table-3.11.4** with their medicinal importance. There are various agricultural species in the study area grow in all over the year. Some agricultural species in the study area were identified in the current study period by survey team members and rests of agricultural species which grow in rest of the year have been known from local people. A checklist of agricultural species in all over year in the study area has been shown in **Table-3.11.5.**

The following survey was undertaken in the study area during field trips:

- **Forest/Vegetation composition analysis:** Recording and its detail phyco-sociological analysis was done by the following quadrat (10m x 10m) method.

The following parameters were primarily considered in the study and computed in the following way:

(i) Frequency: The degree of dispersion of individual species in an area is called frequency. It is express as percentage occurrence.

$$\text{Frequency (f)} = \frac{\text{Number of quadrates in which a species occurs}}{\text{Total number of quadrates sampled}} \times 100$$

(ii) Abundance: This is the study of number of individual of different species in community per unit area.

$$\text{Abundance (A)} = \frac{\text{Total No. of individuals of a species in all quadrate}}{\text{Total number of quadrates in which the species occurs}}$$

(iv) **Relative Abundance:** It is the determination of the percentage of individual of one genera in composition to the total of all individual as a given area.

$$\text{Relative Abundance (A)} = \frac{\text{Total No. of individuals species in the sample}}{\text{Number of quadrat in which a species occurs}}$$

(iv) Density: It is the numerical strength of a species.

$$\text{Density (D)} = \frac{\text{Total No. of individuals of a species in all quadrates}}{\text{Total No. of quadrat sampled}}$$

➢ **Species Diversity Index:** species diversity in a biological community is based on presence of a wide variety of species. It is in expressed by **Shannon-Weiner Index** (1948) in the following way:

$$H = \sum_{i=1}^{s} -(Pi \times \ln Pi)$$

Where,
H = Species diversity index
S = the number of species in a sample
Pi = (ni/N)
N = the total number of individuals of all the species in a sample
ni = the number of individuals of a species.

FIGURE-3.11.2 (A)
CHECKLIST OF NATURAL TREE SPECIES IDENTIFIED IN THE STUDY AREA

Sl. No.	Scientific Name	Common Name	Family
1	*Acacia auriculiformis*	Akashmoni	Mimosaceae
2	*Acacia nilotica*	Babool	Mimosaceae
3	*Aegle marmelos*	Bel	Rutaceae
4	*Albizia lebbeck*	Siris	Mimosaceae
5	*Alstonia scholaris*	Chhatim	Apocynaceae
6	*Anthocephalus cadamba*	Kadam	Rubiaceae
7	*Annona reticulata*	Ramphal	Annonaceae
8	*Artocarpus heterophyllus*	Kathal	Moraceae
9	*Azadirachta indica*	Neem	Meliaceae
10	*Bomax ceiba*	Simul	Bombacaceae
11	*Borassus flabellifer*	Palm Tree/ Taal	Arecaceae
12	*Butea monosperma*	Palash	Fabaceae
13	*Carica papaya*	Pepe	Caricaceae
14	*Cassia fistula*	Amaltas	Caesalpiniaceae
15	*Citrus grandis*	Batabi Lebu	Rutaceae
16	*Cocos nucifera*	Coconut	Arecaceae
17	*Dalbergia sissoo*	Sissu	Fabaceae
18	*Delonix regia*	Gulmohar/ Krishnachura	Fabaceae
19	*Dillenia indica*	Chalta	Dilleniaceae
20	*Erythrina stricta var. suberosa*	Raktamandar	Fabaceae
21	*Eucalyptus globulus*	Eucalyptus	Myrtaceae
22	*Eugenia jambolana*	Kalajam	Myrtaceae
23	*Feronia elephantum*	Kathbel	Rutaceae
24	*Ficus benghalensis*	Banyan/ Bat	Moraceae
25	*Ficus hispida*	Fig/ Dumur	Moraceae

26	*Ficus religiosa*	Aswatha	Moraceae
27	*Lagerstroemia parviflora*	Jarul	Lythraceae
28	*Lannea coromandelica*	Jiol	Anacardiaceae
29	*Madhuca indica*	Mahua	Sapotaceae
30	*Mangifera indica*	Mango/Aam	Anacardiaceae
31	*Mimusops elengi*	Bakul	Sapotaceae
32	*Moringa pterygosperma*	Sajina	Moringaceae
33	*Peltophorum pterocarpum*	Radhachura	Fabaceae
34	*Phoenix sylvestris*	Date Palm/ Khejur	Arecaceae
35	*Polyalthia longifolia*	Devdaru	Annonaceae
36	*Psidium guajava*	Guava/ Peara	Myrtaceae
37	*Shorea robusta*	Sal	Dipterocarpaceae
38	*Spondias pinnata*	Amra	Anacardiaceae
39	*Swietenia mahagoni*	Indian Mahogany	Meliaceae
40	*Streblus asper*	Sheora	Moraceae
41	*Tamarindus indica*	Tamarind/ Tentul	Fabaceae
42	*Tectona grandis*	Segun	Verbenaceae
43	*Terminalia arjuna*	Arjun	Combretaceae
44	*Terminalia bellirica*	Baheda	Combretaceae
45	*Trewia nudiflora*	Pitali	Euphorbiaceae
46	*Ziziphus mauritiana*	Jujube/ Kul	Rhamnaceae

TABLE - 3.11.2 (B)
QUANTITATIVE ASSESSMENT (BY QUADRAT METHOD) OF NATURAL TREE SPECIES IN THE STUDY AREA
(Note: Each column of Quadrat Number represents 1 Quadrat of 50m × 50m Size)

Sl. No.	Name of Natural Trees	Quadrat Number										Total	Freq-uency	Density	Abun-dance
		1	2	3	4	5	6	7	8	9	10				
1	*Acacia auriculiformis*	1	2			1	1					5	40	0.5	125
2	*Acacia nilotica*	2	2	1			1					6	40	0.6	150
3	*Aegle marmelos*	1	3		1							5	30	0.5	167
4	*Albizia lebbeck*		1	1		1			1			4	40	0.4	100
5	*Alstonia scholaris*	1		2				1				4	30	0.4	133
6	*Anthocephalus cadamba*	2			1							3	20	0.3	150
7	*Annona reticulata*					2						2	10	0.2	200
8	*Artocarpus heterophyllus*							1	1	1	2	5	40	0.5	125
9	*Azadirachta indica*	1			1		1				1	4	40	0.4	100
10	*Bomax ceiba*		1	1	1				1			4	40	0.4	100
11	*Borassus flabellifer*			2	3		5		1			11	40	1.1	275
12	*Butea monosperma*	1		1		1		1				4	40	0.4	100
13	*Carica papaya*					1			1	3	2	7	40	0.7	175
14	*Cassia fistula*	2	1	1								4	30	0.4	133
15	*Citrus grandis*								1	1	2	4	30	0.4	133
16	*Cocos nucifera*						1		2	2	1	6	40	0.6	150
17	*Dalbergia sissoo*		1	2				1				4	30	0.4	133
18	*Delonix regia*		3	2								5	20	0.5	250
19	*Dillenia indica*	1			1			1				3	30	0.3	100
20	*Erythrina stricta var. suberosa*		1	2	1							4	30	0.4	133
21	*Eucalyptus globulus*	3	4			1		6				14	40	1.4	350
22	*Eugenia jambolana*										2	2	10	0.2	200
23	*Feronia elephantum*	2							4			6	20	0.6	300
24	*Ficus benghalensis*			1	1							2	20	0.2	100
25	*Ficus hispida*		1			1				1		3	30	0.3	100

26	*Ficus religiosa*	1		1	1							3	30	0.3	100
27	*Lagerstroemia parviflora*		2	1		1				1		5	40	0.5	125
28	*Lannea coromandelica*	2			1	1						4	30	0.4	133
29	*Madhuca indica*	1	3			2	1					7	40	0.7	175
30	*Mangifera indica*			1	1	1				2	3	8	50	0.8	160
31	*Mimusops elengi*		2									2	10	0.2	200
32	*Moringa pterygosperma*								1	3	2	6	30	0.6	200
33	*Peltophorum pterocarpum*	2	3		1		2		2			10	50	1	200
34	*Phoenix sylvestris*			2			2	1	3	3		11	50	1.1	220
35	*Polyalthia longifolia*					2	1	4		2		9	40	0.9	225
36	*Psidium guajava*	2			1			1	2	2	3	11	60	1.1	183
37	*Shorea robusta*	4	3	2			1	2				12	50	1.2	240
38	*Spondias pinnata*					1			1		1	3	30	0.3	100
39	*Swietenia mahagoni*	1	1	3	2							7	40	0.7	175
40	*Streblus asper*						1		1			2	20	0.2	100
41	*Tamarindus indica*			1	2	1				1	2	7	50	0.7	140
42	*Tectona grandis*	2	2	1	1		2		1			9	60	0.9	150
43	*Terminalia arjuna*		1		3	2		2		1		9	50	0.9	180
44	*Terminalia bellirica*	1		1								2	20	0.2	100
45	*Trewia nudiflora*			1				1			1	3	30	0.3	100
46	*Ziziphus mauritiana*				2	1				2	2	7	40	0.7	175
Total		**33**	**37**	**30**	**25**	**20**	**19**	**22**	**23**	**25**	**24**	**258**	**1600**	**25.8**	**7365.0**

TABLE-3.11.2 (C)
BIODIVERSITY INDEX OF NATURAL TREE SPECIES IN THE STUDY AREA

Sl. No.	Name of Species	Total No. (ni)	Pi = (ni/N)	Shannon Index (Pi×lnPi)
1	*Acacia auriculiformis*	5	0.02	0.07
2	*Acacia nilotica*	6	0.02	0.08
3	*Aegle marmelos*	5	0.02	0.07
4	*Albizia lebbeck*	4	0.01	0.06
5	*Alstonia scholaris*	4	0.01	0.06
6	*Anthocephalus cadamba*	3	0.01	0.05
7	*Annona reticulata*	2	0.01	0.04
8	*Artocarpus heterophyllus*	5	0.02	0.07
9	*Azadirachta indica*	4	0.01	0.06
10	*Bomax ceiba*	4	0.01	0.06
11	*Borassus flabellifer*	11	0.04	0.13
12	*Butea monosperma*	4	0.01	0.06
13	*Carica papaya*	7	0.03	0.09
14	*Cassia fistula*	4	0.01	0.06
15	*Citrus grandis*	4	0.01	0.06
16	*Cocos nucifera*	6	0.02	0.08
17	*Delonix regia*	5	0.01	0.06
18	*Dalbergia sissoo*	4	0.02	0.07
19	*Dillenia indica*	3	0.01	0.05
20	*Erythrina stricta var. suberosa*	4	0.01	0.06
21	*Eucalyptus globulus*	14	0.05	0.15
22	*Eugenia jambolana*	2	0.01	0.04
23	*Feronia elephantum*	6	0.02	0.08
24	*Ficus benghalensis*	2	0.01	0.04
25	*Ficus hispida*	3	0.01	0.05
26	*Ficus religiosa*	3	0.01	0.05

27	*Lagerstroemia parviflora*	5	0.02	0.07
28	*Lannea coromandelica*	4	0.01	0.06
29	*Madhuca indica*	7	0.03	0.09
30	*Mangifera indica*	8	0.03	0.10
31	*Mimusops elengi*	2	0.01	0.04
32	*Moringa pterygosperma*	6	0.02	0.08
33	*Peltophorum pterocarpum*	10	0.04	0.12
34	*Phoenix sylvestris*	11	0.04	0.13
35	*Polyalthia longifolia*	9	0.03	0.11
36	*Psidium guajava*	11	0.04	0.13
37	*Shorea robusta*	12	0.04	0.14
38	*Spondias pinnata*	3	0.01	0.05
39	*Swietenia mahagoni*	7	0.03	0.09
40	*Streblus asper*	2	0.01	0.04
41	*Tamarindus indica*	7	0.03	0.09
42	*Tectona grandis*	9	0.03	0.11
43	*Terminalia arjuna*	9	0.03	0.11
44	*Terminalia bellirica*	2	0.01	0.04
45	*Trewia nudiflora*	3	0.01	0.05
46	*Ziziphus mauritiana*	7	0.03	0.09
Total (N)		**258**	**1.00**	**3.52**
BIODIVERSITY INDEX: Shannon-Weiner Index = 3.52				

TABLE-3.11.3
CHECKLIST OF NATURAL SHURBS, HERBS & CLIMBERS IN THE STUDY AREA

Sl. No.	Scientific Name	Common Name	Family
SHRUBS & HERBS			
1	*Achyranthes aspera*	Latjira	Amaranthaceae
2	*Adhatoda vasica*	Basak	Acanthaceae
3	*Ageratum conyzoides*	Uchunti	Asteraceae
4	*Amaranthus viridis*	Kata Note	Amaranthaceae
5	*Amorphophallus paeoniifolius*	Oal/Gandira	Araceae
6	*Andrographis paniculata*	Kalmegh	Acanthaceae
7	*Bambusa bambos*	Bamboo/ Baans	Poaceae
8	*Blumea lacera*	Kukurmuta/ Kakronda	Asteraceae
9	*Bryophyllum pinnatum*	Patharkuchi	Crassulaceae
10	*Calotropis gigantea*	Akanda	Apocynaceae
11	*Carissa carandas*	Koromcha	Apocynaceae
12	*Cassia tora*	Chakunda	Caesalpiniaceae
13	*Catharanthus roseus*	Nayantara	Apocynaceae
14	*Centella asiatica*	Thankuni	Apiaceae
15	*Cleistanthus collinus*	Garari/ Parashi	Euphorbiaceae
16	*Clerodendrum infortunatum*	Ghentu	Verbenaceae
17	*Clitoria ternatea*	Aparajita	Fabaceae
18	*Coccinia grandis*	Telakucha	Cucurbitaceae
19	*Commelina benghalensis*	Bengal Dayflower/ Kanchira	Commelinaceae
20	*Cynodon dactylon*	Doobghas	Poaceae

21	*Datura metel*	Dhutura	Solanaceae
22	*Dryopteris filixmas*	Fern	Dryopteridaceae
23	*Enhydra fluctuans Lour*	Helencha/ Hingcha	Asteraceae
24	*Eupatorium odoratum*	Asamlata	Asteraceae
25	*Euphorbia hirta*	Dudhi	Euphorbiaceae
26	*Euphorbia neriifolia*	Mansa	Euphorbiaceae
27	*Grewia hirsuta*	Kukurbicha	Tiliaceae
28	*Gymnema sylvestre*	Gurmar/ Chhota-dudhilata	Asclepiadaceae
29	*Hibiscus rosa sinensis*	Joba	Malvaceae
30	*Holarrhena Antidysenterica*	Kurchi	Apocynaceae
31	*Hygrophila spinosa*	Kulekhara	Acanthaceae
32	*Ipomoea aquatica*	Kalmi	Convolvulaceae
33	*Leucas aspera*	Swet Dron/ Ghal ghase	Lamiaceae
34	*Marsilea quadrifolia*	Susni	Marsileaceae
35	*Mimosa pudica*	Lajjabati	Fabaceae
36	*Musa paradisiaca*	Kachkola	Musaceae
37	*Nerium oleander*	Raktakarabi	Apocynaceae
38	*Ocimum basilicum*	Bantulsi	Lamiaceae
39	*Ocimum sanctum*	Tulshi	Lamiaceae
40	*Opuntia dillenii*	Nagphana	Cactaceae
41	*Oxalis corniculata*	Amrulshak	Oxalidaceae
42	*Parthenium hysterophorus*	Parthenium	Asteraceae
43	*Sida cordifolia*	Berela	Malvaceae
44	*Solanum surattense*	Kanta Begun	Solanaceae
45	*Strychnos nux-vomica*	Kuchila	Loganiaceae
46	*Tinospora cordifolia*	Nimgilo/ Gulancha	Menispermaceae
47	*Tragia involucrata*	Bichuti	Euphorbiaceae
48	*Vitex negundo*	Nishinda	Verbenaceae
CLIMBERS			
1	*Abrus precatorius*	Gunch	Fabaceae
2	*Asparagus racemosus*	Shatamuli	Asparagaceae
3	*Hemidesmus indicus*	Anantamul	Asclepiadaceae
4	*Ichnocarpus frutescens*	Kalidudhi	Apocynaceae
5	*Luffa aegyptiaca*	Purul gach	Cucurbitaceae
6	*Paederia scandens*	Gandal	Rubiaceae
7	*Stephania hernandifolia*	Malabuta/Tape vine	Menispermaceae

TABLE-3.11.4
CHECKLIST OF SOME MEDICINAL SPECIES IN THE STUDY AREA

Sl. No.	Scientific Name	Common Name	Parts used	Ethno botanical / Medicinal uses
1	*Abrus precatorius*	Gunch	Seed	Snake bite, fiver
2	*Areca catechu*	Supari	Bark, hard wood, juice, leaf, flower	Toothache, cough and cold, stomach, pain, coloring, betel nut
3	*Acacia nilotica*	Babool	Whole plants,	Jaundice, itching, worms, tooth

			flower	ache, eye elements, cough, facial paralysis, easy delivery, asthma, fever, carpentry work
4	*Achyranthes aspera*	Latjira	Root, seed, whole plant	Snake bite, stomach pain, fever, hydrophobia, skin problem, cough
5	*Adhatoda vasica*	Basak	Leaves, root, whole plant	Asthma, urinary problem, piles, cough
6	*Aegle marmelos*	Bel	Leaf, root, fruit, stem, juice,	Mouth ulcer, Piles, Headache, headache, fever, weakness, dysentery, cataract, chest seed pain, as gum
7	*Albizia lebbeck*	Siris	Root, flower, bark, stem, root,seed, flower	Scorpion bite, migraine, piles, hydrocele, toothache, wound and cut, carpentry
8	*Amaranthus viridis*	Kata Note	Leaves	Eye elements, blood purification, fodder
9	*Amorphophallus paeoniifolius*	Oal /Gandira	corm	Bronchitis, asthma, abdominal pain, emesis, dysentery, enlargement of spleen, piles, elephantiasis, diseases due to vitiated blood, and rheumatic swellings.
10	*Andrographis paniculata*	Chirayata / Kalmegh	Whole plant	Malarial fever, Stomach diseases, increase of fever related disease resistance capacity.
11	*Annona reticulata*	Ramphal	Fruit, leaf, seeds, stem	Digestion, tumor, cancer, diabetes
12	*Asparagus racemosus*	Shatamuli	Root	Use for upset stomach (dyspepsia), constipation, stomach spasms, and stomach ulcers. It is also used for fluid retention, pain, anxiety, cancer, diarrhea, bronchitis, tuberculosis, dementia, and diabetes.
13	*Azadirachta indica*	Neem	Seed oil, bark, leaf, wood, fruit	Heart problems, eczema, arthritis, white discharge, ear and tooth ache, malaria, anti-toxic and anti-microbial, tooth washing, furniture making, chicken pox, blood purification, cosmetics
14	*Bambusa bambos*	Bamboo/ Baans	Whole plant	Wound healing, tuberculosis, bronchitis, Leprosy, food and fodder, feeding of cow after delivery, musical instruments
15	*Bomax ceiba*	Simul	Bark, fruit, leaves	Piles, leprosy, anti-dote, medicinal cotton, anemia, liver and spleen disease
16	*Blumea lacera*	Kukurmuta / Kakronda	Whole plant	Bronchitis, diseases of the blood, fevers, thirst and burning sensations. In Homoeopathic system, it is given in enuresis, neuralgia, headache and cold borne cough.
17	*Bryophyllum pinnatum*	Patharkuchi	Leaf, stem	Antiseptic, cures kidney stone, skin disease, head ache
18	*Butea monosperma*	Palash	Gum, root, seed, flower	Night blindness, eye disorder, epilepsy, diarrhea, eczema, arthritis, abdominal worm,

				cataract, worship, dyes
19	*Calotropis gigantea*	Akanda	Fruit, whole plant	Cut and wound, leprosy, dropsy, rheumatic pain, asthma, bronchitis
20	*Carica papaya*	Pepe	Leaf, fruit, seed, latex	Liver enlargement, heart problem, piles, skin problem, cosmetics
21	*Cassia fistula*	Amaltas	Leaf, root, seed, wood	Ring worm, wound, fever, leprosy, cough
22	*Centella asiatica*	Thankuni	Leaf, whole plant	Insomnia, abdominal problem, enhance memory, hair anxiety, b.p. problem, chicken pox
23	*Clerodendrum infortunatum*	Ghetu	Leaves, root, whole plant	Used externally for tumors and certain skin diseases. The fresh juice is given internally as a vermifuge and febrifuge in malarial fevers, especially in children.
24	*Cynodon dactylon*	Doobghas	Leaves, whole plants	Leucorrhoea, excessive pus formation, piles, epilepsy, nasal bleeding, cancer, eczema, eye and mouth problem ,headache, urinary problem , paper making, fodder
25	*Dalbergia sissoo*	Sissu	Oil, leave, whole plant	Skin disorder, toothache, eye aliments, burning sensation, carpentry work
26	*Datura metel*	Dhutura	Leaves whole plant	Eye problem, asthma, arthritis, headache, male impotency, cultural use
27	*Delonix regia*	Gulmohar	Leaf, flower, wood	Skin trouble, coloring
28	*Diospyros melanoxylon*	Kendu	Pulp, fruit,leaf	Healing of crack feet, edible, bad breath, dysentery
29	*Dryopteris filixmas*	Fern	Rhizome	Anthelmintic
30	*Eugenia jambolana*	Kalajam	Fruit,bark,seed, leaf	Piles, diabetes, loose motion, eye and ear problem, Syphilis, vomiting, lever swelling, furniture
31	*Euphorbia hirta*	Dudhi	Root, leaf	Cough, dysentery, Anti -asthmatic, milk secretion, fodder
32	*Ficus benghalensis*	Banyan Tree/ Bat	Latex, Leaf, bark, root	Prevent loss of hair, pain killer in joint pain, diabetes
33	*Ficus hispida*	Fig/ Dumur	Fruit	Useful in ulcer, leucoderma, psoriasis, anemia, hemorrhoids, jaundice, epistaxis, stomatorrhagia, inflammations, intermittent fever
34	*Ficus religiosa*	Peepal	Whole plants, letex	Eczema, toothache, leucorrhoea, cut and wound, earache, cough and cold, jaundice, stomach pain, fodder, worship
35	*Hibiscus rosa sinensis*	Joba	Flower, seed, leaves, root	Hair fall, cough and cold, male impotency, stomach pain, worship
36	*Madhuca indica*	Mahua	Flower, whole plant	Anti-bacterial, carpentry work, pain killer, wine/liquor, worship
37	*Marsilea quadrifolia*	Susni	Leaf	Used for cough, bronchitis, diabetes, psychiatric diseases, eye diseases, diarrhea and skin diseases
38	*Mimosa pudica*	Lajjabati	Leaves, root	Piles, diarrhea, swelling, jaundice,

				excessive urination, indigestion
39	*Moringa pterygosperma*	Sajina	Fruit, bark, leaves, root	Piles, cough, intestinal worm, Bp., gum problem, headache
40	*Ocimum basilicum*	Bantulsi	Leaves, seed, root	Cough and cold, green tea, giddiness
41	*Ocimum sanctum*	Tulshi	leaves, stem, flower, root, seeds and even whole plant	recommended for the treatment of bronchitis, bronchial asthma, malaria, diarrhea, dysentery, skin diseases, arthritis, painful eye diseases, chronic fever, insect bite etc.
42	*Oxalis corniculata*	Amrulshak	Whole plant	Used in the treatment of influenza, fever, urinary tract infections, enteritis, diarrhea, traumatic injuries, sprains and poisonous snake bites.
43	*Paederia scandens*	Gandal	Leaves, whole plants	The leaves are antirheumatic. They are used to increase infertility and treat paralysis. The whole plant is used in the treatment of abdominal pain, abscesses, arthritis, overeating etc.
44	*Psidium guajava*	Guava/ Peara	Fruit, whole plant	Joint pain, cough, heart ailment, toothache, dysentery, ulcer
45	*Shorea robusta*	Sal	Fruit, seed, whole plant	Dysentery, anti-dote, Furniture
46	*Stephania hernandifolia*	Malabuta/ Tape vine	Leaves & Roots	Used in fever, diarrhoea, dyspepsia and urinary complaints.
47	*Tamarindus indica*	Tentul	Leaves, bark, seeds, wood	Scorpion bite, scabies, stomach pain, furniture
48	*Tectona grandis*	Sagun	Whole plant	Burning sensation, arthritis, kidney and skin disease, furniture, diabetes, ulcer
49	*Terminalia arjuna*	Arjun	Bark leaf	Heart and liver disease
50	*Ziziphus jujuba*	Ber	Fruit, leaf, bark, stem	Ulcer, fever, wound, abdominal pain, asthma, vegetable

TABLE-3.11.5
LIST OF AGRICULTURAL SPECIES IN THE STUDY AREA

Sl. No.	Common Name	scientific Name
CEREALS		
1	Rice	*Oryza sativa*
2	Wheat	*Triticum* aestivum
3	Maize	*Zea mays*
PULSES		
1	Pea	*Pisum sativum*
2	Mung bean/ Greengram	*Vigna radiata*
3	Groundnut	*Arachis hypogaea*
4	Cowpea/ Badbati	*Vigna unguiculata*
5	Pigeon pea	*Cajanus cajan*
OILSEEDS		
1	Mustard Seed	*Brassica nigra*
2	Sesame/ Til	*Sesamum indicum*
VEGETABLES		

1	Potato	*Solanum tuberosum*
2	Brinjal	*Solanum melongena*
3	Cucurbits	*Cucurbita maxima*
4	Cucumber	*Cucumis melo*
5	Ladies finger	*Abelmoschus esculentus*
7	Cabbage	*Brassica oleracea var. capitata*
8	Cauliflower	*Brassica oleracea var. botrytis*
9	Tomato	*Solanum lycopersicum*
10	Radish	*Raphanus sativus*
11	Carrot	*Daucus carota sativus*
12	Chilli	*Capsicum frutescens*
13	Beans	*Phaseolus vulgaris*
14	Onion	*Allium cepa*
15	Spinach	*Spinacia oleracea*
16	Bitter Gourd	*Momordica charantia*
FRUITS		
1	Mango	*Mangifera indica*
4	Banana	*Musa sapientum*
5	Papaya	*Carica papaya*
6	Guava	*Psidium guajava*
8	Jack fruit	*Artocarpus heterophyllus*
OTHER CROPS		
1	Jute	*Corchorus capsularis*

TERRESTRIAL FAUNA

Since there is no eco-sensitive zone like National Park, Wildlife Sanctuary, Reserve Forest etc. in the study area, wild animals in the study area are rare. Only a few wild animals like Fox, Jackal, monkey, Wild cat etc could be seen in the study area occasionally.

Survey of terrestrial fauna reveals that in general there has been no impact of pollution on fauna. Destructive habits of human population are the only reason for the declining numbers of animals.

During the present investigation, species were examined include mammals, birds, reptiles and amphibians. A total of 12 species of mammals, 15 species of birds, 11 species of reptiles and 4 species of amphibians were observed during the study and have been presented in **Table-3.11.6** according to their schedule number of The Wildlife (Protection) Act, 1972.

TABLE-3.11.6
CHECKLIST OF FAUNAL SPECIES IN THE STUDY AREA

Sl. No.	Common Name	Scientific Name	Family	Schedule of Wildlife (Protection) Act,1972
Mammals				
1	Wild jackal	*Vulpes bengalensis*	Canidae	II
2	Fox	*Canis aureus*	Canidae	II
3	Common Langur	*Presbytis entellus*	Cercopithecidae	II
4	House rat	*Rattus rattus*	Muridae	V
5	Indian mole rat	*Bandicota bengalensis*	Muridae	V
6	Indian Shrew	*Suncus murinus*	Soricidae	V
7	Wild cat	*Felis silvestris*	Felidae	II
8	Cat	*Felis domesticus*	Felidae	II
9	Fruit bat	*Cynopterus sphinx*	Pteropodidae	V
10	Indian Street Dog	*Canis lupus familiaris*	Canidae	II
11	Three stripped squirrel	*Funambulus palmarum*	Sciuridae	IV
12	Five-striped palm squirrel	*Funambulus pennantii*	Sciuridae	IV
Birds				
1	Jungle fowl	*Gallus sonneratii*	Phasianidae	IV
2	House Crow	*Corvus splendens*	Corvidae	V
3	Jungle crow	*Corvus macrorhynchos*	Corvidae	IV
4	Koel	*Eudynamys scolopacea*	Cuculidae	IV
5	Pigeon	*Columba livia*	Columbidae	IV
6	Sparrow	*Passer domesticus indicus*	Passeridae	IV
7	Parrot	*Psittacula krameri*	Psittaculidae	IV
8	Myna	*Acridotheres tristis*	Sturnidae	IV
9	Spotted owl	*Athene brama*	Strigidae	IV
10	Grey partridge	*Francolinus pondicerianus*	Phasianidae	IV
11	Common Kingfisher	*Alcedo atthis*	Alcedinidae	IV
12	Cattle Egret	*Bubulcus ibis*	Ardeidae	IV
13	Pond Heron	*Ardeola grayii*	Ardeidae	IV
14	Oriental turtle dove	*Streptopelia orientalis*	Corvidae	IV
15	Spotted Dove	*Spilopelia chinensis*	Corvidae	IV
Reptiles				
1	House gecko	*Hemidactylus flaviviridis*	Gekkonidae	II
2	Brook's gecko	*Hemidactylus brookii*	Gekkonidae	II
3	Common Garden lizard	*Calotes versicolor* (Daudin)	Agamidae	II
4	Common Bengal monitor	*Varanus bengalensis*	Varanidae	II

5	Yellow monitor	*Varanus flavescens*	Varanidae	II
6	Common or Brahminy skink	*Mabuya carinata*	Scincidae	II
7	Blind Snake	*Typhlops acutus*	Typhlopidae	IV
8	Checkered keelback	*Xenochrophis piscator*	Colubridae	II
9	Indian Krait	*Bungarus caeruleus*	Elapidae	IV
10	Russell's viper	*Vipera russelii*	Viperidae	II
11	Indian Rat Snake	*Ptyas mucosa*	Colubridae	II
Amphibians				
1	Indian bull frog	*Rana tigrina*	Dicroglossidae	IV
2	Common Indian toad	*Bufo melanostictus*	Bufonidae	IV
3	Marbled Toad	*Bufo stomaticus*	Bufonidae	IV
4	Paddy field frog	*Rana limnocharis*	Dicroglossidae	IV

3.11.8 AQUATIC ECOLOGY

The study area has a major river, i.e., Damodar River; several big and small ponds, jheels, beels, tanks, ditches etc which form the ecology of aquatic environment. So, the richness and diversity of aquatic flora and fauna is enough in the study area. The major forms of aquatic biota as recorded during the survey are as follows:

4. Macro-phytic flora,
5. Planktons, and
6. Fishes.

MACRO-PHYTIC FLORA:

There are a number of vegetations found in various water bodies like ponds, beels, Jheels, ditches etc in the study area. All such water bodies are more or less vegetated by different aquatic macrophytic flora and marshy plants in the study area. The details of aquatic macrophytic flora and marshy plants have been summarized in **Table-3.11.7.**

TABLE-3.11.7
CHECKLIST OF AQUATIC MACROPHYTES & MARSHY PLANTS

Sl. No.	Scientific Name	Family
1	*Alternanthera philoxeroides*	Amaranthaceae
2	*Colocasia esculenta*	Araceae
3	*Hygrophila spinosa*	Acanthaceae
4	*Ludwigia adscendens*	Onagraceae
5	*Nymphaea nouchali*	Nympheaceae
6	*Spirodela polyrhiza*	Lemnaceae
7	*Lemna perpusilla*	Lemnaceae
8	*Eichornia crassipes*	Hydrocharitaceae
9	*Pistia stratiotes*	Hydrocharitaceae
10	*Monochoria hastata*	Hydrocharitaceae

11	*Utricularia sp.*	Lentibulariaceae
12	*Enhydra fluctuan*	Compositae
13	*Ipomea aquatica*	Convolvulaceae
14	*Scirpus articulatus*	Cypheraceae
15	*Salvinia natans*	Salviniaceae
16	*Azolla pinnata*	Salviniaceae
17	*Marsilea minuta*	Marseliaceae
18	*Trapa bispinosa*	Trapaceae

PLANKTONS

The phytoplanktons are the primary producers and form the base of the food chain. The zooplanktons are the secondary producers and they feed on phytoplanktons. A study of the density, composition, and species diversity of these two organisms gives an idea about the nutrient content, trophic condition of the total aquatic ecosystem and the quality of the water.

Phytoplanktons:

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. Some major phytoplanktons which are found in aquatic ecosystem of the study area are *Euglena sp.*, *Microcystis sp.*, *Diatoma sp.*, *Spirogyra sp.*, *Oedogonium sp.*, *Zygnema sp.*, *Closterium sp.* etc. **(Table-3.11.8).**

Zooplanktons:

Zooplanktons are animals that occur in the water column of either marine or freshwater ecosystems. Zooplanktons are an important link in the transfer of energy from the algae (the primary producers) to the ecologically and economically important fish community (the consumers).

In the aquatic ecosystem of the study area most species in the small zooplankton community fall into three major groups - Crustacea, Rotifers, and Protozoans. Crustaceans are generally the most abundant, especially those in the order Cladocera (waterfleas), and the class Copepoda (the copepods), particularly the orders Calanoida and Cyclopoida. Cladocerans are typically most abundant in freshwater, with common genera including *Daphnia* sp. and *Bosmina sp*. The pollution indicator species like *Brachinous calciflores*, *Filinia terminalis* and *Keratella toopica* etc. **(Table-3.11.8)**.

TABLE-3.11.8
CHECKLIST OF PLANKTON SPECIES IN THE STUDY AREA

Sl. No.	PHYTOPLANKTON	ZOOPLANKTON
1	*Microcystis sp.*	*Brachionus sp.*
2	*Euglena sp.*	*Daphnia sp.*
3	*Diatoma sp.*	*Cyclops sp.*
4	*Achnanthes sp.*	*Diaptomus sp.*
5	*Zygnema sp.*	*Moina sp.*
6	*Spirogyra sp.*	*Cypris sp.*
7	*Oscillatoria sp.*	*Keratella sp.*
8	*Scenedesmus sp.*	*Mysis sp.*
9	*Cymbella sp.*	*Diaptomus sp.*
10	*Closterium sp.*	*Filinia terminalis*
11	*Oedogonium sp.*	-

FISH:

Fishes are at the tertiary level of the food chain of aquatic ecology. As the study area having many inland water bodies like several ponds, jheels, beels, ditches and the important river Damodar, so the biodiversity of fishes is rich. Types of freshwater fishes of both confined and unconfined (flowing) surface water bodies in the study area were known by talking with local fishermen and local people and have been summarized in Table-3.11.9.

TABLE-3.11.9
CHECKLIST OF FISH SPECIES IN THE STUDY AREA

Sl. No.	Scientific Name	Common Name
1	*Salmostoma sardinella*	Chela
2	*Osteobrama cotio cotio*	Chanda
3	*Catla catla*	Katla
4	*Channa orientalis*	Chang
5	*Cyprinus carpio*	Common Carp
6	*Hypophthalmichthys molitrix*	Silver carp
7	*Cirrhinus mrigala*	Mrigal
8	*Cyprinus carpio*	American rui
9	*Labeo rohita*	Rohu
10	*Labeo bata*	Bata
11	*Labeo calbasu*	Kalbous
12	*Puntius safari*	Punthi
13	*Clarias batrachus*	Magur
14	*Heteropneustes fossilis*	Singi
15	*Channa striatus*	Shol

16	*Channa punctatus*	Lata
17	*Oreochromis mossambica*	Tilapia
18	*Anabas testudineus*	Koi
19	*Mystus singhala*	Tangra
20	*Lates calcarifer*	Bhetki
21	*Mastacembelus armatus*	Pakal
22	*Mastacembelus pancalus*	Pakal
23	*Notopterus notopterus*	Falui
24	*Labeo gonius*	Kurchi
25	*Wallago attu*	Boal

3.12 CONCLUSION

The biodiversity value of the studied ecosystem obtained was 3.52. Thus, the proposed project site has moderate biodiversity, which must be conserved. The terrestrial and aquatic ecological scenarios constitute various types of trees, sbrubs, herbs, climbers, amphibians, reptiles, birds, mammals, fish, etc. The proposed study area has river, canals, beels, ponds and several other categories of water bodies, so the richness and diversity of aquatic flora and fauna is also high. A good number of water birds were noticed in the study area. Thus, the study area is ecologically rich & diverse.

3.13 DEMOGRAPHY & SOCIO-ECONOMIC STATUS

3.13.1 GENERAL DESCRIPTION

The growth of industrial sectors and infrastructure developments in and around the agriculture dominant areas, village and towns is bound to create its impact on the socio-economic aspects of the local population of the area experiencing development. The impacts may be positive or negative depending upon the development activity. To assess the anticipated impacts of the project and industrial growth on the socio-economic aspects of people, it is necessary to study the existing socio-economic status of the local population, which will be helpful for making efforts to further improve the quality of life in the area under study.

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

The Baseline Demographic and Socio economic characteristics with regards to demography, literacy and occupational status have been described based on the Primary Census Abstract, 2011. The proposed project site is located at Mouza: Basudevpur (North), PO: Hat Asuria, PS: Barjora, District Bankura, West Bengal. A total of 181 villages of Bankura district fall under the 10 km radius study area. The 10 km radius study area around the proposed project also comprises of 7 Wards of Durgapur Municipal area under Paschim Burdwan District. Town Barjora is also in the 10 km radius study area.

The study area is mainly rural in nature and dense populated with the total population of 2,86,084 (as per 2011 Census). Scheduled Caste (SC) and Scheduled Tribe (ST) population in the study area is about 30.73% and 0.72% w.r.t. the total population respectively. The sex ratio in the study area is about 941 females per 1000 males. The overall literacy rate is about 67.1% w.r.t. total population. The principal language is Bengali and the principal staple food is rice. The primary sources of drinking water are tube wells, Hand pump water in rural areas and tube wells, Hand pump and Supply water in urban area.

3.13.2 DEMOGRAPHIC ASPECTS

3.13.2.1 Average Household Size:

The Study area has an average family size of around 4.47 persons per household. This is considered to be the average family size in West Bengal.

3.13.2.2 Overall population density and family size:

As per 2011 census, the total population in the study area is 2,86,084. According to this population in the study area Population Density is approximately 911 persons per square kilometer. Total population, population density & family size have been shown below in **Table-3.14.1**.

TABLE-3.14.1
OVERALL POPULATION DENSITY AND FAMILY SIZE

Sl. No.	Particulars	Number
1	No. of Household	64065
2	Population Density	911 Nos./sq.km
3	Family Size	4.47
4	Male Population	147409
5	Female Population	138675
6	**Total Population**	**286084**

Source: Census of India, 2011

3.13.2.3 Sex Ratio:

According to 2011 census, the sex ratio (female per 1000 male) in the rural segment of the study area is 941 sex ratio of the study area is tabulated in **Table-3.14.2**.

TABLE-3.14.2
SEX RATIO OF THE STUDY AREA

Sl. No.	Segment of the area	Females per 1000 males
1	Rural	944
2	Urban	936
3	**Whole**	**941**

Source: Census of India, 2011

3.13.2.4 Population structure:

As per 2011 census total rural population within the study area is 2,86,084 having 51.33% of male and 48.47% of female population. within the study area major part belongs to the rural area. Population structure of the study area is tabulated in **Table-3.14.3**.

TABLE-3.14.3
POPULATION STRUCTURE OF THE STUDY AREA

Sl. No.	Segment of the area	Male	Female	Total
1	Rural	94242	88936	183178
2	Urban	53167	49739	102906
	TOTAL	147409	138675	286084

Source: Census of India, 2011

3.13.2.5 Social Structure:

As per 2011 census, the Scheduled caste (SC) population in the study area is 37.35% of the total rural population,18.94% of the total urban population.

As per 2011 census, Scheduled Tribe (ST) population in the study area is 0.89% of the total rural population scheduled tribe population in rural area,0.41% of the total urban population scheduled tribe population in segment of the study area is shown in Table-3.14.4.

TABLE-3.14.4
SOCIAL STRUCTURE OF THE STUDY AREA

Segment of the Area	Number of population								
	Total Population			Scheduled Caste			Scheduled Tribe		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Rural	94242	88936	183178	34825	33589	68414	838	793	1631
Urban	53167	49739	102906	10073	9413	19486	222	201	423
Total	**147409**	**138675**	**286084**	**44898**	**43002**	**87900**	**1060**	**994**	**2054**

3.13.2.6 Literacy Level:

Total literacy rate in study area is 61.1% of the total rural population whereas male literacy rate is 69.6% of the total rural male population and female literacy rate is 52.1% of total rural female population. the total female population). Population classification for literates in the study area is presented, Total literacy rate in study area is 77.7% of the total urban population whereas male literacy rate is 82.1% of the total urban male population and female literacy rate is 73.1% of total urban female population. the total female population). Population classification for literates in the study area is presented Table-3.14.5.

TABLE-3.14.5
LITERACY LEVEL IN THE STUDY AREA

Area	No. of Literates		
	Male	Female	Total
Rural	65556	46355	111911
Urban	43633	36337	79970
Total	**109189**	**82692**	**191881**

Source: Census of India, 2011

3.13.3 OCCUPATIONAL STRUCTURE

The occupational structure of population in the study area is studied with reference to main workers and marginal workers. As per Census of India, all persons engaged in 'work' defined as participation in any economically productive activity with or without compensation, wages or profit are workers. The Reference period for determining a person as worker and non-worker is one year preceding the date of enumeration The Census classifies Total Workers into two groups namely, (i) Main workers (ii) Marginal workers. Main Workers are those workers who had worked for the major part of the reference period i.e. 6 months or more. Marginal Workers are those workers who had not worked for the major part of the reference period i.e. less than 6 months.

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.

3.13.3.1 Workers and Non-workers:

i) Total Workers:

Total Worker in rural areas is 40.5% of the total rural population in the study area according to 2011 Census. The total workers are divided into main and marginal workers. Total Worker in urban areas is 36.8% of the total urban population in the study area according to 2011 Census. The total workers are divided into main and marginal workers.

ii) Main Workers:

Main Worker in rural and urban areas is 67.0% of the total rural population and 73.63% of the total urban population Main worker in the study area according to 2011 Census.

iii) Marginal Workers:

Marginal Worker in rural areas is 33.0% and 26.4% is urban area of the total population in the study area according to 2011 Census.

iv) Non-workers:

Non-Worker in rural areas is 59.5% of the total rural population in the study area and urban areas is 63.2 of the urban population in the study area, according to 2011 Census.

The occupational status of workers and non-workers has been shown in **Table – 3.14.6**.

TABLE – 3.14.6

OCCUPATIONAL STATUS OF THE STUDY AREA

Area	No. of workers						No. of non-workers			Total Population (3)+(6)+(9)
	Main Workers			Marginal Workers						
	Male (1)	Female (2)	Total (3)	Male (4)	Female (5)	Total (6)	Male (7)	Female (8)	Total (9)	
Rural	41965	7715	49680	13655	10781	24436	38622	70440	109062	183178
Urban	23818	4073	27891	6115	3874	9989	23234	41792	65026	102906
Total	**65783**	**11788**	**77571**	**19770**	**14655**	**34425**	**61856**	**112232**	**174088**	**286084**

3.13.3.2 Classified Occupational Status:

Cultivators and agricultural workers in rural areas are 7.3% and 9.7% respectively w.r.t. the total rural population in the study area.Cultivators and agricultural workers in urban areas are 0.39% and 0.69% respectively w.r.t. the total urban population in the study area. The classified occupational status in the study area has been tabulated in **Table-3.14.7**.

TABLE-3.14.7

CLASSIFIED OCCUPATIONAL STATUS

Area	Total Workers	Cultivators	Agricultural Workers	Others
Rural	74116	13422	17780	17126
Urban	37880	401	708	25940
Total	**111996**	**13823**	**18488**	**43066**

Graphical presentations of demographical and occupational status have been given below in **FIGURE-3.14.1.**

3.13.4 INFRASTRUCTURE FACILITIES:

Medical Facilities

Medical facility in some form or the other is available to the population residing within the rural segment of the study area. However, medical facilities i.e. Hospital with basic facilities only, is available within the urban segment of the study area.

Drinking Water Facilities

Tap water, ground water and surface water is being used in the different village located in the rural sector of concerned C.D Blocks. In the urban area tube well and tap water are the source of drinking water.

Electricity

Most of the villages have electricity in the Concerned C.D Blocks. Available for domestic purposes.

Communication Transport & Access Facilities

Most of the villages in the concerned C.D Block have Post Office available within study area. Almost all the villages have bus connectivity. Approach paved road is available in the all village areas. In the urban area surface rail, buses and rickshaw etc. are available for communication.

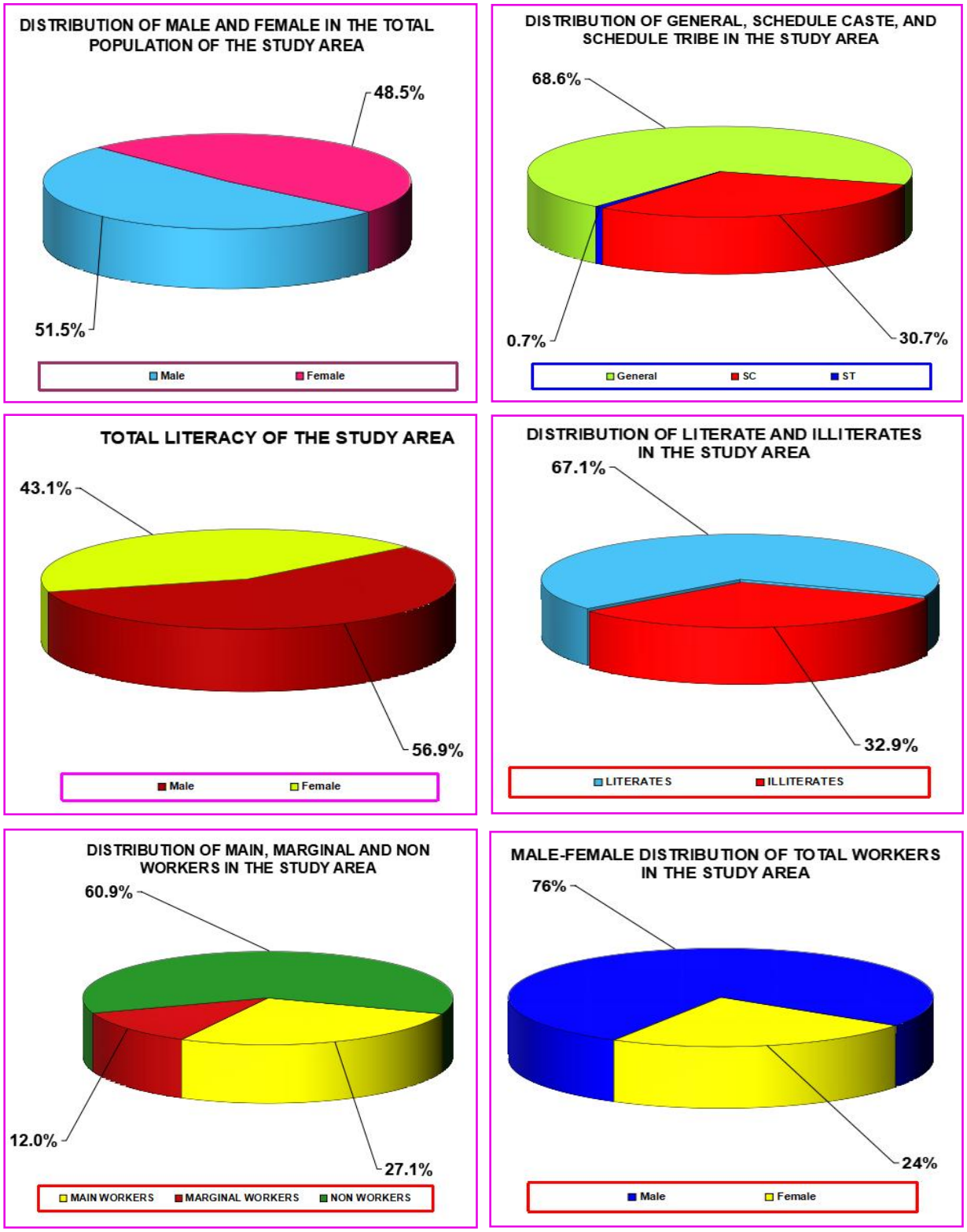


FIGURE-3.14.1
GRAPHICAL PRESENTATION OF DEMOGRAPHIC & SOCIAL STATUS (BASED ON 2011 CENSUS DATA)

3.14 SOCIO-ECONOMIC SURVEY

The 2011 census data have been supplemented and corroborated by a socio-economic sample survey, conducted in May, 2022, covering a sample population size of 10316 numbers covering 2301 number of Households, distributed over 13 villages and 2 Census Towns within the study area through structured questionnaires portraying demographic and socio-economic aspects of the study area population. The names of the villages, considered for the sample survey have been gathered in **Table-3.15.1**. The data of this socio-economic survey including demographic and socio-economic characteristics, income profiles, household amenities, educational status etc. have been presented in **Chapter-7.0**. The salient findings of this sample survey are presented below:

Total Population	10316 (Male: 5299, Female: 5017)
No. of Households	2301
Family Size	4.48
Sex ratio	947 females per 1000 males
Caste	SC & ST (31.77% w.r.t total Sampling population)
Literacy Level in Area	Total Literate 68.59%, Male Literate 73.52%, Female Literate 63.38%
Build of House of sample Households	Brick (64.84%), Multistoried Brick (22.16%), Thatched Roof Brick (11.78%)
Lighting source of sample Households	Electricity (100%)
Occupational Status of sample population	Workers (38.2%), Non-Workers (61.8%)
Source of Income	Agriculture (5.45%), Business / Trade (24.04%), Service (20.61%), Labour (32.28%), Forestry / Plantation (1.29%), Livestock/ Fishery (3.58%), Others (12.75%)

Comparison of the findings of the socio-economic sample survey with the 2011 census data are presented in **Table-3.15.2**.

Table-3.15.2
Comparison of the Findings of the Socio-Economic Sample Survey

Particulates	2011 Census	2022 Sample Survey
Family Size (persons per household)	4.47	4.48
Literacy Level in Area (% of total population)	67.1	68.59
Sex ratio in rural area	941 females per 1000 males	947 females per 1000 males
Occupational Status in area of the total worker population	Workers (40.5%), Non-Workers (59.5%)	Workers (38.2%), Non-Workers (61.8%)

It is evident from the above comparison that there has been slight increase in the family size, literacy rate has increased, sex ratio has increased and percentage of workers has slightly decreased in the villages under sample survey.

Table-3.15.3 : List of Villages & Census Towns for Sample Survey

S.N	Name of Village / town	No. of Households	Population		
			T	M	F
1	Deucha	45	194	98	96
2	Dejuri	72	346	181	165
3	Birsinghapur	51	257	138	119
4	Sonergram	28	113	60	53
5	Rajprasadpur	167	749	390	359
6	Hatashuria	280	1218	615	603
7	Mandarbani	119	509	264	245
8	Sarali	72	325	168	157
9	Madanhati	69	291	153	138
10	Bishanpur	48	259	136	123
11	Talanjuri	168	799	408	391
12	Saldanga	42	167	84	83
13	Basudebpur	35	148	74	74
14	Barjora (CT) WARD NO.-0001	797	3505	1802	1703
15	Ghutgarya (CT) WARD NO.-0001	308	1436	728	708
TOTAL		2301	10316	5299	5017

It is evident from the above comparison that there has been slight increase in the family size while literacy rate has marginally improved.

In addition to the above, the survey was conducted to find out whether the following facilities are available in the villages covering 10 kms study area.:

1. Drinking Water Facility
2. Medical & Educational Facility
3. Garbage Collection & Disposal Facility
4. Facility for Skill Development
5. Electrification including Solar Power
6. Sanitation
7. Rainwater Harvesting
8. Agricultural Practices
9. Roads
10. Sewerage System

1. Drinking Water Facility

It was observed that all most all villages fulfill their drinking water requirement mostly through tap water / hand pumps/ dug wells.

2. Medical & Educational Facility:

Among the 10 kms study area, 233 villages have Govt. Pre - primary and Primary schools, 5 villages have private Pre - primary schools, 55 villages have Middle Schools, 26 villages have Secondary Schools and 18 villages have Senior Seconary Schools. The villages also have the facility of 5 Primary Health Centres, 37 Primary Health Sub Centres, 2 Maternity and Child Welfare Centres, 4 TB Clinics and 4 Veterinary Hospitals.

3. Garbage Collection & Disposal Facility:

There is no proper garbage collection and disposal facility available at most of these villages. Villagers throw their garbage in the open area thereby creating an unhygienic condition in the surrounding areas.

4. Facility for Skill Development:

The educational system at all these villages is not based on the traditional pattern and is job-oriented. There are 3 vocational training centers in the villages for skill development in any village.

5. Electrification including Solar Power:

Electricity is available in all the surveyed villages. However, there is no facility for utilizing solar power.

6. Sanitation

In all the houses of the villages have own facility of the toilet.

7. Rainwater Harvesting

There is no concern of rain water harvesting in any of these villages.

8. Agricultural Practices

Agriculture is one of the occupations of the villagers in these villages. They have very limited knowledge about the modern agricultural practices for improving the yield of crop and fodder.

9. Roads

All the villages have black-topped roads. But, the quality of existing village roads is not good.

10. Sewerage System

There is no proper sewerage system in any of the villages in the study area.

Table - A.1

Total Population of Sample Survey

S.N	Name of Village / town	No. of House-holds	Population			Age Wise Distribution					SC / ST		
			T	M	F	0-6	07-15	16-25	26-60	>60	T	M	F
1	Deucha	45	194	98	96	16	17	45	81	35	97	49	48
2	Dejuri	72	346	181	165	28	31	80	145	62	131	70	61
3	Birsinghapur	51	257	138	119	21	23	59	108	46	104	55	49
4	Sonergram	28	113	60	53	9	10	26	46	22	49	25	24
5	Rajprasadpur	167	749	390	359	60	67	172	315	135	210	108	102
6	Hatashuria	280	1218	615	603	97	110	284	512	215	501	256	245
7	Mandarbani	119	509	264	245	41	46	117	213	92	104	54	50
8	Sarali	72	325	168	157	26	29	75	137	58	110	57	53
9	Madanhati	69	291	153	138	22	26	69	122	52	148	75	73
10	Bishanpur	48	259	136	123	21	23	60	109	46	90	46	44
11	Talanjuri	168	799	408	391	64	72	184	336	143	301	152	149
12	Saldanga	42	167	84	83	13	16	38	70	30	138	70	68
13	Basudebpur	35	148	74	74	12	13	34	62	27	112	56	56
14	Barjora (CT) WARD NO.-0001	797	3505	1802	1703	275	322	806	1472	630	894	456	438
15	Ghutgarya (CT) WARD NO.-0001	308	1436	728	708	110	130	330	610	256	288	146	142
TOTAL		2301	10316	5299	5017	815	935	2379	4338	1849	3277	1675	1602
% w.r.t Total Sampling Population		-	-	51.37	48.63	7.90	9.06	23.06	42.05	17.92	31.77	16.24	15.53
Sex Ratio (Female/ 1000 males)		-	947			-	-	-	-	-	-	-	-
Family Size		4.48				100.0							

Table - A.2

Educational Status and Literacy Level of Sample Population

S.N	Name of Village / town	Primary	Secondary	Higher Secondary	Graduate	Post Graduate	Literate		
							Total	Male	Female
1	Deucha	12	29	33	22	9	125	66	59
2	Dejuri	23	62	69	46	21	221	137	84
3	Birsinghapur	18	48	53	36	17	172	105	67
4	Sonergram	9	20	22	15	4	78	42	36
5	Rajprasadpur	43	124	137	93	46	480	268	212
6	Hatashuria	63	186	206	140	71	790	412	378
7	Mandarbani	29	82	91	62	30	320	170	150
8	Sarali	22	58	64	43	20	207	116	91
9	Madanhati	17	44	49	33	15	182	93	89
10	Bishanpur	17	44	49	33	15	166	99	67
11	Talanjuri	52	152	169	114	57	544	314	230
12	Saldanga	10	22	24	16	6	105	54	51
13	Basudebpur	11	24	26	18	5	96	50	46
14	Barjora (CT) WARD	240	738	817	553	287	2635	1446	1189
15	Ghutgarya (CT) WARD	85	256	284	192	99	955	524	431
TOTAL		651	1889	2093	1416	702	7076	3896	3180
% of Total Population		9.20	26.70	29.58	20.01	9.92	68.59		
Male & Female Literacy (%) of Total Population								73.52	63.38

Table - A.3

Occupational Status of Sample Population

S.N	Name of Village / town	No. of Sample House Holds	Non-Workers	Workers							
				Agriculture	Forestry / Plantation	Livestock / Fishery	Business / Trade	Service	Labour	Others	Total
1	Deucha	45	121	6	1	3	17	15	24	8	74
2	Dejuri	72	204	11	2	5	33	29	45	17	142
3	Birsinghapur	51	175	6	1	3	19	17	26	10	82
4	Sonergram	28	66	4	1	2	11	8	15	6	47
5	Rajprasadpur	167	474	21	4	10	65	58	88	30	276
6	Hatashuria	280	728	37	7	17	115	99	156	58	489
7	Mandarbani	119	314	15	3	7	46	39	62	23	195
8	Sarali	72	224	8	2	4	24	21	33	10	102
9	Madanhati	69	159	10	2	5	31	27	42	15	132
10	Bishanpur	48	151	8	2	4	25	22	34	12	107
11	Talanjuri	168	433	27	5	13	84	74	117	46	366
12	Saldanga	42	88	6	1	3	19	16	26	9	80
13	Basudebpur	35	76	5	1	3	17	14	23	10	73
14	Barjora (CT) WARD NO.-0001	797	2223	28	12	45	325	273	420	180	1283
15	Ghutgarya (CT) WARD NO.-0001	308	940	23	7	17	117	101	162	69	496
Total		**2301**	**6376**	**215**	**51**	**141**	**948**	**813**	**1273**	**503**	**3944**
% w.r.t Total Sampling Population		-	61.8	5.45	1.29	3.58	24.04	20.61	32.28	12.75	38.2

Table - A.4

Amenities Available in Sample Households

S.N	Name of Village/Town	No. of Sample Households	Built of House				Lighting Source			
			Brick	Multistoried Brick	Thatched Roof Brick	Mud	Electricity	Kerosene	Bio-Gas	Others
1	Deucha	45	29	9	6	1	45	0	0	0
2	Dejuri	72	47	14	9	2	72	0	0	0
3	Birsinghapur	51	33	11	6	1	51	0	0	0
4	Sonergram	28	18	5	4	1	28	0	0	0
5	Rajprasadpur	167	109	34	21	3	167	0	0	0
6	Hatashuria	280	185	54	35	6	280	0	0	0
7	Mandarbani	119	77	25	15	2	119	0	0	0
8	Sarali	72	47	15	9	1	72	0	0	0
9	Madanhati	69	45	11	9	4	69	0	0	0
10	Bishanpur	48	31	10	6	1	48	0	0	0
11	Talanjuri	168	112	32	21	3	168	0	0	0
12	Saldanga	42	27	8	5	2	42	0	0	0
13	Basudebpur	35	23	7	4	1	35	0	0	0
14	Barjora (CT) WARD NO.-0001	797	510	201	86	0	797	0	0	0
15	Ghutgarya (CT) WARD NO.-0001	308	199	74	35	0	308	0	0	0
Total		**2301**	**1492**	**510**	**271**	**28**	**2301**	**0**	**0**	**0**
% w.r.t Total Sample Households		**-**	**64.84**	**22.16**	**11.78**	**1.22**	**100.00**	**0.00**	**0.00**	**0.00**

Table - A.5

Amenities Available in Sample Households

S.N	Name of Village/Town	Fuel Used for Cooking						Own Transport				
		Coal	LPG	Bio-gas	Kerosene	Electricity	Wood	Car	Motor Cycle / Scooter	Bicycle	Others	Nothing
1	Deucha	6	36	0	0	-	3	1	21	26	3	5
2	Dejuri	9	57	0	0	-	6	2	33	42	4	7
3	Birsinghapur	7	42	0	0	-	2	2	23	30	3	4
4	Sonergram	4	23	0	0	-	1	1	13	16	1	2
5	Rajprasadpur	23	139	0	0	-	5	5	77	97	2	5
6	Hatashuria	27	245	0	0	-	8	8	129	162	0	7
7	Mandarbani	16	99	0	0	-	4	4	55	69	0	3
8	Sarali	13	57	0	0	-	2	2	33	42	2	8
9	Madanhati	10	54	0	0	-	5	2	32	40	0	6
10	Bishanpur	8	37	0	0	-	3	1	22	28	1	5
11	Talanjuri	33	130	0	0	-	5	5	77	97	2	2
12	Saldanga	7	33	0	0	-	2	6	19	24	0	5
13	Basudebpur	5	26	0	0	-	4	0	16	20	2	4
14	Barjora (CT)	24	773	0	0	-	0	143	438	462	0	2
15	Ghutgarya	13	295	0	0	-	0	55	169	179	0	5
Total		205	2046	0	0	0	50	237	1157	1334	20	70
% w.r.t Total Sample		8.91	88.92	0.00	0.00	0.00	2.17	10.30	50.28	57.97	0.87	3.04

Table - A.6 (Contd...)

Amenities Available in Sample Households														
S.N	Name of Village / Town	No. of Sample House holds	Drinking Water Source							Sewer System				
			Tap	Well	Tank/Pond/Lake	Tube Well	River	Canal	Others	Sewer	Open Surface Drain	Box Surface Drain	Cess-pool Method	Pit System
1	Banpatna	114	42	0	-	72	-	-	-	-	-	-	-	-
2	Khelar	158	64	4	-	90	-	-	-	-	-	-	-	-
3	Kuchiabhuluk	37	15	0	-	22	-	-	-	-	-	-	-	-
4	Kantagerya	56	21	3	-	32	-	-	-	-	-	-	-	-
5	Tentulmuri	40	15	1	-	24	-	-	-	-	-	-	-	-
6	Kharigerya	18	8	0	-	10	-	-	-	-	-	-	-	-
7	Banspukhuria	28	12	0	-	16	-	-	-	-	-	-	-	-
8	Mantageria	18	7	2	-	9	-	-	-	-	-	-	-	-
9	Dharimba	122	46	6	-	70	-	-	-	-	-	-	-	-
10	Chak Makrampur	34	15	0	-	19	-	-	-	-	-	-	-	-
11	Ranbania	30	13	0	-	17	-	-	-	-	-	-	-	-
12	Malka	29	11	2	-	16	-	-	-	-	-	-	-	-
13	Rampura	34	14	1	-	19	-	-	-	-	-	-	-	-
14	Dauka	32	12	2	-	18	-	-	-	-	-	-	-	-
15	Chirkunya	40	18	0	-	22	-	-	-	-	-	-	-	-
Total		2301	2017	37	0	247	-	-	0	0	0	0	0	0
% w.r.t Total Sample Households		-	87.66	1.61	0.00	10.73	57.72	-	-	0.00	0.00	0.00	0.00	0.00

Table A.7

Monthly Income & Source of Income in Sample Households

S. N	Name of Village / Town	No. of Sample Households	5,000 to 9,999	10,000 to 14,999	15,000 to 19,999	20,000 and above	Agricul-ture	Forestry / Plantation	Livestock / Fishery	Business / Trade	Service	Labour	Others
			Monthly Income				Source of Income						
1	Deucha	45	18	13	9	5	6	1	3	17	15	24	8
2	Dejuri	72	19	24	14	15	11	2	5	33	29	45	17
3	Birsinghapur	51	14	20	10	7	6	1	3	19	17	26	10
4	Sonergram	28	11	8	6	3	4	1	2	11	8	15	6
5	Rajprasadpur	167	59	48	33	27	21	4	10	65	58	88	30
6	Hatashuria	280	97	76	58	49	37	7	17	115	99	156	58
7	Mandarbani	119	35	37	27	20	15	3	7	46	39	62	23
8	Sarali	72	25	21	13	13	8	2	4	24	21	33	10
9	Madanhati	69	27	18	15	9	10	2	5	31	27	42	15
10	Bishanpur	48	20	13	9	6	8	2	4	25	22	34	12
11	Talanjuri	168	54	46	38	30	27	5	13	84	74	117	46
12	Saldanga	42	15	14	8	5	6	1	3	19	16	26	9
13	Basudebpur	35	13	11	7	4	5	1	3	17	14	23	10
14	Barjora (CT) WARD NO.-0001	797	211	219	199	168	28	12	45	325	273	420	180
15	Ghutgarya (CT) WARD NO.-0001	308	82	88	72	66	23	7	17	117	101	162	69
Total		**2301**	**700**	**656**	**518**	**427**	**215**	**51**	**141**	**948**	**813**	**1273**	**503**
% w.r.t Total Sample Households		-	**30.42**	**28.51**	**22.51**	**18.56**	**5.5**	**1.3**	**3.6**	**24.0**	**20.6**	**32.3**	**12.8**

3.15 OVERALL CONCLUSION

The field data were generated for soil, meteorology, air quality, water quality, noise & ecology during three months' period **(1st March, 2022 - 31st May, 2022)** of Summer season along with the relevant secondary data, collected from various agencies on the relevant disciplines like Geology and Geo-hydrology, Land Use, Meteorology and Demography & Socio-Economy.

While analyzing the Landuse Pattern of the 10 km radius study area, it is observed that single cropped land covers 54.9% of the total study area. It is the predominant feature of land use of the study area. The second most predominant feature is forest / vegetation which is 12.9% of the total study area. Built-up land covers about 6.1% of the total study area.

Loamy texture of the soil of this area along with sufficient level of organic matter renders moderate productivity of agricultural crops. As per FAO-UNESCO soil classification, this soil is of Ultisols and is suitable for rice, pulses, vegetables, etc. It is also home for beneficial organisms, worms etc. which, in turn, help in plant growth. No impact from the local industries have been observed.

Overall maximum and minimum temperatures were observed to be 29.5°C and 9.5°C. The overall maximum and minimum relative humidity recorded on-site was 74.0% and 44.0% respectively. The overall mean wind speed during the monitoring period was 2.7 Km/hr. The predominant wind direction is North.

The values of all the ambient air parameters i.e., PM_{10}, $PM_{2.5}$, SO_2, NOx and CO at the respective 8 monitoring locations are within the limits on all the occasions as per NAAQ Standard. The maximum value of PM_{10} was observed near project site and at Ghutgaria (AQ-6) i.e., 85.3 $\mu g/m^3$, which is considerably on higher side, but is still within the standard. This may be attributed to the presence of few existing steel plants operating in the close vicinity of the proposed project site as well as due to the vehicular emissions in the area.

Ground water physico-chemical properties in the study area showed that the water strata mainly from Bicarbonate buffer system has appreciable amount of alkalinity & Hardness. Calcium & Magnesium which are beneficial for human health are found satisfactory. The other parameters (i.e. Sulphate, Chloride etc.) fall within satisfactory level. While comparing

with IS 10500:2012, it can be concluded that all ground water samples are within permissible limit & can be used as drinking water source.

The Equivalent Noise Levels in the Industrial locations are within permissible limits. However, the noise level has exceeded the permissible limits for Residential and Silence locations in the study area. Such high noise levels may be attributed mainly to the noise, generated due to the vehicular traffic.

The biodiversity value of the studied ecosystem obtained was 3.52. Thus, the proposed project site has moderate biodiversity, which must be conserved. The terrestrial and aquatic ecological scenarios constitute various types of trees, sbrubs, herbs, climbers, amphibians, reptiles, birds, mammals, fish, etc. The proposed study area has river, canals, beels, ponds and several other categories of water bodies, so the richness and diversity of aquatic flora and fauna is also high. A good number of water birds were noticed in the study area. Thus, the study area is ecologically rich & diverse.

Majority of the study area is rural and semi-urban in nature and moderately populated with the total population of 2,86,084 (as per 2011 Census). Scheduled Caste (SC) and Scheduled Tribe (ST) population is about 30.73% and 0.72% of the total population respectively. The sex ratio in the study area is about 941 females per 1000 males. The overall literacy rate is about 67.1%. Total worker is 40.5% of the total population. Medical facilities are available in the study area. Ground water is the primary sources of drinking water in the study area. Such water is drawn either through tube-wells or bore wells or hand pumps. All the villages have electricity.

CHAPTER-4.0
ENVIRONMENTAL IMPACT

4.1 PROJECT ACTIVITIES

4.1.1 Phases of Impacts

The proposed project will have impacts on the environment in two phases. During the construction phase, which is temporary and short-term, the other during the operation stage, which will have long term effects. The environmental impacts in this study have been discussed separately for the construction phase and the operation stage.

The impacts have been assessed over the study area of 10 km radius of the project site. Overall impacts in the regional context are negligible.

4.2 IMPACTS DURING CONSTRUCTION PHASE

4.2.1 Activities during Construction Phase

During the construction phase, the following activities are considered to be important towards development of impacts:

a) Site preparation
b) Excavation and backfilling
c) Hauling of earth materials
d) Piling, cutting and drilling
e) Erection of concrete and steel structures
f) Road construction
g) Painting and finishing
h) Clean up operations
i) Landscaping and Afforestation

Construction phase activities will have moderate impacts on land use, demography and socio-economics, on-site soils and on-site noise. It could also develop minor impacts on water use, air and water quality and ecology.

The activities can be divided into two categories, viz. sub-structural and super-structural work. Certain foundation would require pile driving and the machineries would pose noise and gaseous pollution.

Moreover, construction work will involve cutting of trenches, excavation, concreting etc. There may be dust, gaseous and noise pollution from these activities.

Mechanical erection work involves use of mechanical equipment for storage, transportation, erection and on-site fabrication work. These

activities generally produce some air contaminants and noise pollution which will be contained by using water sprinkling and noise abatement measures.

4.2.2 Impacts on Air Quality

Particulate matter would be the predominant pollutant affecting the air quality during the construction phase. Dust will be generated mainly during excavation, back filling and hauling operations along with transportation activities.

Sprinkling of water from tankers or other suitable means would be undertaken at the construction sites for the suppression of fugitive dust.

Undesirable gaseous pollutants will be generated mostly by the traffic and use of machineries. However, this would not lead to any tangible effect, as the expected emission volume is low.

It would be ensured that all the vehicles plying during construction are properly tuned and maintained to keep emissions within the permissible limits.

4.2.3 Impacts on Hydrology and Water Use

The construction activities will take place inside the existing plant premises. The plant layout has been prepared in such a manner to follow the general ground profile and not to disturb the general drainage pattern of the area. There will be increased storm water run-off due to increase in the paved area, but proper/suitable arrangements will be made to channelize such excess storm water run-off efficiently that no area in the downstream gets affected by such excess storm water run-off.

4.2.4 Impacts on Water Quality

Wastewater from construction activities would mostly contain suspended impurities. Other pollutants which may find their way into it will be in insignificant concentrations and may be safely disregarded. Drains from different construction sites will be led to sedimentation pits where excess suspended solids will be settled out and relatively clear supernatant will be discharged into the outside surface drains. Domestic waste water from the construction site would be subjected to on-site treatment prior to reuse/ disposal. As such, there will be no adverse impact on the surface water quality of the area.

4.2.5 Impacts on Noise

During the construction phase, noise will be generated due to movement of vehicles and operation of light and heavy construction machineries including pneumatic tools and compressors, which are expected to emit sounds with moderate to high decibel value. Careful planning of their operation is required during this period so that minimum disturbances are caused. Moreover, residential areas not being close to the project site, no significant impact is apprehended.

4.2.6 Impacts on Soil and Land Use

All major construction activities tend to create certain changes in the soils of the area. However, this will take place inside the plant premises and as such; there will be no impact on the soil condition outside the plant boundary in terms of fertility.

During storms, some of the excavated soil and construction materials such as sand etc. would be blown up in the air and dispersed around the project site; some would also tend to be driven into the soil and clog inter granular spaces.

However, in order to minimise such impacts, sprinkling of water shall be done.

Preparatory activities like construction of access roads, temporary offices, quarters and godowns, piling, storage of construction materials etc. will be confined within the project area. These will not generally exercise any significant impact except altering the land use pattern of the proposed site. There will be no impact on the adjoining land.

As a result, the impact on land use would be very insignificant and any impact due to construction will be confined within the project area and will not hamper the land use aspects outside.

Overall, it could be easily inferred that there will be no adverse impact on soil quality & land use in the study area.

4.2.7 Impacts on Demography & Socioeconomics

It is estimated that a large number of workers, comprising of skilled, semi-skilled and unskilled labourers, shall be employed by various contractors at site during the construction phase. Significant number of semiskilled and unskilled labourers would be recruited from the

nearby areas. This would create some employment opportunities in the area.

Since most of sizeable labour force will be drawn from neighbourhood, no change in demographic profile is anticipated. However, there will be increased economic opportunities for the local people.

Most of the construction work is labour intensive. As most of the job will be done by the contractors, it will be ensured that the contractor's workers are provided with proper facilities including sanitation and drinking water supply.

4.3 IMPACTS DURING OPERATIONAL PHASE

The process description including quantum of pollution loads from liquid and gaseous effluents considering their proposed environmental control measures has been discussed in **Chapter 2 - Project Profile.**

The operational impacts in this study have accordingly been evaluated for this project.

4.3.1 Impacts on Air Quality

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.

TABLE-4.1
PROPOSED STACKS & EMISSION CHARACTERISTICS

Description	Submerged Arc Furnaces (2x9 MVA)
No. of Stacks	2
Stack height (m)	30
Internal diameter at Stack Top (m)	1.8
Exit velocity of flue gas (m/s)	10.0
Temp. of flue gas degree (^oC)	79
Temp. of flue gas degree (K)	352
Flue gas flow rate (Nm^3/Hr)	71894
PM emission rate (mg/Nm^3)	30
PM emission rate (gm/Sec)	0.60

4.3.1.2 Air Quality Dispersion Modelling

Selection of Model

The plant operation will emit gaseous pollutants through stacks, 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

Various 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 **(1st March, 2022 to 31st May, 2022)** representing the study period.

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 the region. The mixing heights considered for modelling are given in **Table 4.2**.

TABLE 4.2
MIXING HEIGHT

Hour of the day	Mixing Height (m)
1	0
2	0
3	0
4	0
5	50
6	50
7	100
8	100
9	500
10	700
11	1000
12	1500
13	1500
14	1500
15	1500
16	1500
17	1500
18	1000
19	1000
20	700
21	500
22	100
23	50
24	0

4.3.1.4 Modelling Procedure

Modelling exercise has been performed for **two (2) new stacks attached with Proposed Units only.**

The actual locations of the emission sources have been defined in a Cartesian co-ordinate (x, y) system, with Absolute Reference Point, being the proposed raw material yard.

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.

For multiple stacks computation, inter-stack distances have been considered. Since the contributions from different pollution sources are additive, the contributions of all sources at a given receptor have been computed separately and then added to give the total concentration.

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 study period.

4.3.1.5 Discussion on Modelling Results

The predicted maximum GLC of PM is presented in **Table – 4.3**. The isopleth of PM has been depicted in **Figure – 4.1** .

TABLE – 4.3
PREDICTED MAXIMUM GLC OF SPM

Pollutants	Max. GLCs ($\mu g/m^3$)	Direction	Distance (km)
Proposed Ferro Alloy Plant			
PM	0.29	NW	0.5

Hence, the maximum incremental value of PM would be about 0.29 which will occur at a distance of 0.5 km. in 'South' direction w.r.t. the ARP. However, it may be observed that this value has been attained only on one day in the study period.

The predicted GLC of the pollutants at the respective eight (8) ambient air quality monitoring locations have been further

superimposed on the corresponding background concentrations to get the resultant concentrations at those locations and have been presented in **Table-4.4**.

Table-4.4 : Prediction of GLC
(All values in μg/m³)

Location Code	AAQM location	PM_{10}		
		Back Ground Maximum value	Predicted GLC(Max)	Over all scenario/ Net Impact
A1	Near Project Site (Sahebdihi)	87	0.28	87.28
A2	Near Purunia Prrathamic School	78	0.22	78.22
A3	Kanta Bandh	82	0.19	82.19
A4	Hari Nagara	84	0.18	84.18
A5	Near Barjora Danpara Jr High School	86	0.23	86.23
A6	Ghutgoria	92	0.21	92.21
A7	Near Muktatore Primary School	76	0.20	76.20
A8	Talanjuri	82	0.28	82.28
Norm		100.0		

The above table reveals that the resultant GLC are within the prescribed Norms for PM.

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 reality, the pollutant concentrations are expected to be relatively lower than the predicted value.

4.3.1.6 Impacts on Air Quality due to transportation of materials (Raw Materials, Products and Solid Wastes) and Manpower movement

Presently, the background emissions in the project area are primarily due to emissions from traffic plying on the State Highway-9 in the vicinity of the site (about 1.7 km from the project site). During the operation phase of the entire project, movement of goods' vehicles and loading and unloading operations may contribute to air emission. Control measures like dust suppression system and water sprinklers will be installed to mitigate/suppress such fugitive emissions. With stringent traffic management system within the project site, scope for

air pollution due to movement of goods transports will be minimized. This will act as effective media for arresting the emissions within the project site. The layout of the project has generous area earmarked for parking, roads and greenery. This will act as effective media for arresting the emissions.

The vehicular traffic plying in and out of the project site will be one of the significant sources of air pollution. If the site is not properly regulated, it can create disruption in free traffic movement leading to air pollution problems. This difficulty can be tackled to a great extent by properly regulating the traffic and by following strict and disciplined vehicular movement and operation in the project site. By imposing vehicular emission standards, this problem can be further curbed to a large extent. Adequate and planned road network will be set up in the proposed project for smooth movement of the goods vehicles.

The major raw materials, which will be handled, consist of Manganese Ore, Chrome Ore, Coke, Coal, Dolomite, Lime, Quartz etc.

The details like source and transportation of the products, raw materials and solid wastes for the proposed project are mentioned in Chapter-2 of this EIA Report.

For the impact assessment on air quality due to vehicular emissions, the material transportation by road has been considered. The estimated quantity of raw materials, solid waste & products of proposed project is as follows:

TABLE-4.5
LIST OF RAW MATERIALS TO BE TRANSPORTED

Sl No.	Items	Source	Raw Material Requirement
			MT
A	FOR PRODUCTION OF SILICO MANGANESE		
1	Manganese Ore	Imp: Australia / South Africa	55,760
2	Fe - Mn Slag	Dom: Balaghat / Barbil / Bellary	22,960
3	Coal	Own Generation / West Bengal	13,120
4	Coke	West Bengal / Jharkhand	13,120
5	Quartz	West Bengal / Jharkhand	6,560
B	FOR PRODUCTION OF FERRO MANGANESE		
1	Manganese Ore	Imp: Australia / South Africa	1,15,440
2	Coal	Dom: Balaghat / Barbil / Bellary	17,760
3	Coke	Imp: China Dom: West Bengal / Jharkhand / Assam	17,760
4	Dolomite	Orissa / Chhatisgarh	1,332
C	FOR PRODUCTION OF FERRO SILICON		
1	Quartz	West Bengal / Andhra Pradesh	25,840
2	Mill Scrap	West Bengal / Jharkhand	6,536
3	M S Scrap	West Bengal / Jharkhand	304
4	Charcoal	Andhra Pradesh / Tamilnadu	13,680
5	Lam Coke	Imp: China Dom: West Bengal / Jharkhand / Assam	8,360
D	FOR PRODUCTION OF FERRO CHROME		
1	Chrome Ore	Orissa	87,360
2	Coke	Imp: China	13,440

		Dom: West Bengal / Jharkhand / Assam	
3	Coal	West Bengal / Jharkhand	6,048
4	Quartz	West Bengal / Andhra Pradesh	672
5	Dolomite	Orissa / Chhatisgarh	672
6	Lime	Orissa / Chhatisgarh	840
7	Molasses	Uttar Pradesh	2,016

The details of the products, to be manufactured after the proposed project are presented in **Table-4.6**.

TABLE-4.6
LIST OF PRODUCTS TO BE TRANSPORTED

PRODUCTS	Quantity (IN TPA)	Mode of transport (TPA)
	Proposed	
Ferro Manganese	44,400	Road
Silico Manganese	32,800	Road
Ferro Chrome	33,600	Road
Ferro Silicon	15,200	Road
Total Product to be transported from Plant (Outward) in a year (Maximum Quantity for Ferro Manganese)	**44,400**	

The Solid Wastes which will be transported to the outward, consist of Silico Manganese Slag, Ferro Chrome Slag and Ferro Silicon Slag etc.

The annual requirement of major solid wastes after the project is presented in **Table-4.7**.

TABLE-4.7
LIST OF SOLID WASTES TO BE TRANSPORTED

Sl. No.	Solid Waste	Proposed Quantity (TPA)	Utilization or Management
1	Ferro Manganese Slag	44,400	Used as a raw material for Silico Manganese Production
2	Silico Manganese Slag	29,520	Used for road construction or land filling purposes
3	Ferro Silicon Slag	1,217	Used for cement industries as a raw material & used for medium carbon silico manganese production purpose.
4	Ferro Chrome Slag	26,880	Used for road construction or land filling purposes after chrome recovery through Jigging Process and after TCLP test.
Maximum Quantity for Ferro Manganese		**44,400**	

Out of the total products, raw materials & solid wastes, the impact of transportation for the existing quantities is already reflected in the existing ambient air quality scenario. Therefore, only transportation of proposed quantities of the products, raw materials & solid wastes has been considered for the impact prediction on the ambient air quality of the area, which has been presented in the **Table-4.9**.

TABLE-4.9
QUANTITY OF MATERIALS TO BE TRANSPORTATED BY ROAD FOR PROPOSED PROJECT

Raw material	Product	Solid Waste	Total Quantity
1,52,292 TPA	44,400 TPA	44,400 TPA	2,41,092 TPA
Total No. of Trucks per year (@20 tonne per Truck)			12,055
Total No. of Trucks per day			37
Total No. of Trucks per hour			2

These additional raw materials, products and solid wastes will be transported by trucks.

Thus, additional 2,41,092 TPA materials will be transported through road (considering 330 working days) for the proposed project. Thus, around 37 trucks per day (1.52 trucks, say maximum 2 trucks per hour) will be required to transport the materials by road with the capacity of each truck being 20 Tons.

Impact due to transportation of plant workers during operation

There will be additional traffic load due to manpower movement during operation for proposed project of **M/s. Satvik Enterprises Limited**. There will be around 80 persons to operate and maintain the proposed project. It is estimated that around 5 persons will come to the plant by car & around 20 persons will come on two wheelers. Out of the rest 55 persons, 35 persons will come to the plant by bicycle and for the remaining 20 persons, the company will provide one bus service.

Combining together all the traffic load during plant operation, around 37 trucks per day will be required during material transportation. Besides, 1 no. Bus, 5 no. Cars and 20 no. two wheelers will be required for the transportation of the workers and the executives of the company during plant operation in a day. Considering to & fro movement, there will be total 74 trips of trucks, 2 trips of buses, 10 trips of cars and 40 trips of two wheelers for the proposed project in a day. Hence, per hour movement for the respective conveyance will be around 3.16 trips, say 3 trips of trucks & buses, 0.2 trips, say 1 trips of Cars, 1.6 trips, say 2 trips of two-wheelers. Such additional traffic load due to the man power movement & material transportation will be added to the present traffic load of the area, which is presented in the following section.

PRESENT TRAFFIC LOAD:

Presently, the background emissions in the project area are primarily confined to emissions from traffic plying on the nearby Hat Asuria - Pakhanna road and State Highway - 9 in the vicinity of the project site. During the operation phase of the proposed project, movement of goods' vehicles and loading and unloading operations may contribute to air emission. Control measures like Bag Filters and other dust suppression system will be installed to mitigate/suppress such fugitive emissions. With stringent traffic management system within the project site, scope for air pollution due to movement of goods transports will be minimized. The layout of the proposed project has

generous area earmarked for greenery development. This will act as effective media for arresting the emissions within the project site.

The vehicular traffic plying in and out of the project site will be one of the significant sources of air pollution. If the site is not properly regulated, it can create disruption in free traffic movement leading to air pollution problems. This difficulty can be tackled to a great extent by properly regulating the traffic and by following strict and disciplined vehicular movement and operation at the project site. By imposing vehicular emission standards, this problem can be further curbed to a large extent. Adequate and planned road network will be set up at the project site for smooth movement of the goods vehicles.

The project site of **M/s Satvik Enterprises Limited.** is surrounded by two roads i.e.,

a) **Durgapur-Bankura State Highway - 9 (SH-9)** is passing at a distance of about 2.1 Kms from the Project site in West-north-west direction. This road originates at Durgapur from Durgapur Expressway and meets to National Highway - 60 at Bankura.

b) **Hat Asuria - Pakhanna Road** is passing through south-west direction w.r.t. the project site. This road connects SH-9 with Sonamukhi-Pakhana road at Kuldanga More near Rangamati.

Traffic density was monitored on following two locations

Location No. - 1 :
At Hat Asuria More on Durgapur-Bankura State Highway - 9 (SH-9).

Location No. - 2 :
On Hat Asuria - Pakhanna Road.

The Location Map on Google for the Traffic Survey Assessment has been shown in **Figure-4.3**.

Traffic density was monitored under four different vehicle categories i.e., Heavy, Medium, Light and two wheelers. The heavy vehicles included trucks, buses, cranes etc. The medium vehicles included mini buses, matadors etc. while cars, jeeps, auto rickshaws and trekkers were considered under the light vehicles category.

The data were recorded once for a day in the month of April, 2019, for continuous 24 hours in a day. The relevant account has been gathered in **Tables-4.10 & 4.11** respectively.

Future Traffic Load due to Project

The additional traffic load due to material as well as manpower movement during the operation of overall project for **M/s Satvik Enterprises Limited** hasn added to the existing traffic load at both the above mentioned points in **Tables-4.10 & 4.11** respectively.

Comparison of overall Traffic load with IRC: 64 – 1990

The same has been compared with Indian Roads Congress code for Guidelines for Capacity of Roads in Rural Areas (IRC: 64 – 1990). Relevant abstract of the same is presented in **Table-4.12.**

Thus, additional 2,41,092 TPA materials will be transported through road (considering 330 working days) for the proposed project. Thus, around 37 trucks per day (1.54 trucks, say maximum 2 trucks per hour) will be required to transport the materials by road with the capacity of each truck being 20 Tons.

However, their movement will be well spread on the different road stretches in the area, the impact prediction has been done, considering the entire vehicular movement on these two main stretches i.e., Hat Asuria - Pakhanna road and State Highway - 9 for the projection of the worst case scenario.

TABLE-4.10
NAME OF THE LOCATION : At Hat Asuria More on Durgapur-Bankura State Highway - 9 (Date of Sampling : 24.05.2022)

HOUR	HEAVY	MEDIUM	LIGHT	TWO WHEELERS	TOTAL
0700 - 0800	31	24	33	63	**151**
0800 - 0900	48	35	49	68	**200**
0900 - 1000	59	33	60	46	**198**
1000 - 1100	64	21	39	30	**154**
1100 - 1200	50	38	20	74	**182**
1200 - 1300	59	20	44	46	**169**
1300 - 1400	86	52	35	25	**198**
1400 - 1500	79	22	27	50	**178**
1500 - 1600	68	45	42	31	**186**
1600 - 1700	92	30	46	59	**227**
1700 - 1800	32	42	55	70	**199**
1800 - 1900	84	26	38	62	**210**
1900 - 2000	59	14	27	55	**155**
2000 - 2100	36	22	14	49	**121**
2100 - 2200	62	10	8	37	**117**
2200 - 2300	50	5	5	29	**89**
2300 - 0000	66	8	2	11	**87**
0000 - 0100	24	2	1	12	**39**
0100 - 0200	10	0	0	3	**13**
0200 - 0300	5	0	0	0	**5**
0300 - 0400	12	0	0	0	**12**
0400 - 0500	6	4	2	3	**15**
0500 - 0600	15	16	12	25	**68**
0600 - 0700	27	20	23	44	**114**
Total	**1124**	**489**	**549**	**892**	**3087**
Addition for material movement due to Project.	37	-	-	-	37
Addition for staff movement due to project	1	0	5	20	26
Grand Total	1162	489	549	912	3112
PCU Factor	3	1.5	1	0.5	-
PCU per day	3486	734	549	456	5225
As per IRC: 64-1990 code, Table 4, a Two Lane road in Plain terrain can accommodate vehicular traffic load of 15000 PCU per day.					
Durgapur-Bankura State Highway - 9 is a two lane road with approx. 12 m width and can well accommodate existing traffic load along with the additional load due to M/s. satvik Enterprises Limited					
Note : **HEAVY :** Truck, Bus, Cranes **MEDIUM :** Minibus, Matador **LIGHT ;** Car, Jeep, Auto Rickshaw, Trekker					

TABLE-4.11

NAME OF THE LOCATION : At Metsil More on Hat Asuria - Pakhanna Road

(Date of Sampling : 25.05.2022)

HOUR	HEAVY	MEDIUM	LIGHT	TWO WHEELERS	TOTAL
0700 - 0800	21	17	42	30	**110**
0800 - 0900	46	12	34	58	**150**
0900 - 1000	27	25	23	34	**109**
1000 - 1100	30	33	29	46	**138**
1100 - 1200	37	14	20	55	**126**
1200 - 1300	18	27	16	41	**102**
1300 - 1400	13	17	24	24	**78**
1400 - 1500	37	36	11	38	**122**
1500 - 1600	20	32	18	49	**119**
1600 - 1700	6	11	25	57	**99**
1700 - 1800	9	30	28	19	**86**
1800 - 1900	8	18	30	37	**93**
1900 - 2000	5	11	16	20	**52**
2000 - 2100	9	15	22	21	**67**
2100 - 2200	4	24	14	8	**50**
2200 - 2300	12	11	8	17	**48**
2300 - 0000	7	7	13	10	**37**
0000 - 0100	2	10	11	3	**26**
0100 - 0200	-1	5	5	0	**9**
0200 - 0300	2	6	4	0	**12**
0300 - 0400	4	3	0	0	**7**
0400 - 0500	0	2	3	3	**8**
0500 - 0600	5	15	5	9	**34**
0600 - 0700	14	18	11	37	**80**
Total	**335**	**399**	**412**	**616**	**1762**
Addition for material movement due to Project.	37	-	-	-	37
Addition for staff movement due to project	1	0	5	20	26
Grand Total	373	399	412	636	1820
PCU Factor	3	1.5	1	0.5	
PCU per day	1119	599	412	318	2448
As per IRC: 64-1990 code, Table 4, a Two Lane road in Plain terrain can accommodate vehicular traffic load of 15000 PCU per day.					
Hat Asuria - Pakhanna Road is a two lane road with approx. 7 m width and can well accommodate existing traffic load along with the additional load due to M/s. Satvik Enterprises Limited					
Note : **HEAVY :** Truck, Bus, Cranes **MEDIUM :** Minibus, Matador **LIGHT ;** Car, Jeep, Auto Rickshaw, Trekker					

Table no.-4.12
Abstract from Indian Roads Congress (IRC:64 – 1990 code)
Guidelines for Capacity of Roads in Rural Areas

TABLE 1 RECOMMENDED PCU FACTORS FOR VARIOUS TYPES OF VEHICLES ON RURAL ROADS

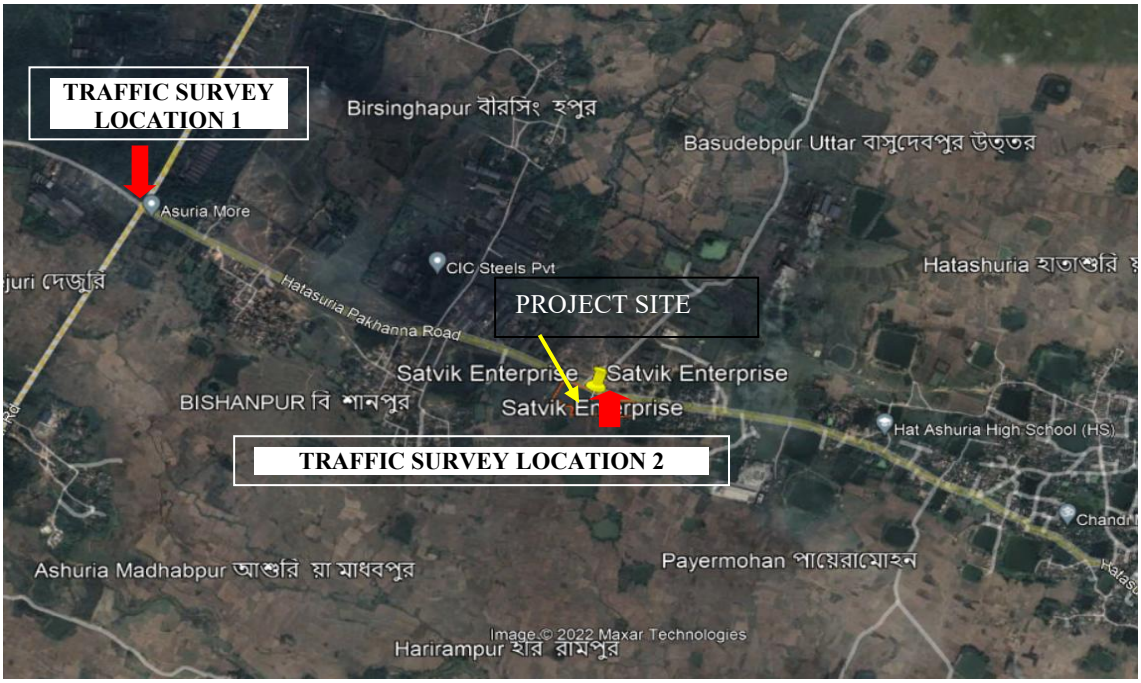
S. No.	Vehicle Type	Equivalency Factor
	Fast Vehicles	
1.	Motor Cycle or Scooter	0.50
2.	Passenger Car, Pick-up Van or Auto-rickshaw	1.00
3.	Agricultural Tractor, Light Commercial Vehicle	1.50
4.	Truck or Bus	3.00
5.	Truck-trailer, Agricultural Tractor-trailer	4.50
	Slow Vehicles	
6.	Cycle	0.50
7.	Cycle-rickshaw	2.00
8.	Hand Cart	3.00
9.	Horse-drawn vehicle	4.00
10.	Bullock Cart*	8.00

* For smaller bullock-carts, a value of 6 will be appropriate.

TABLE 4. RECOMMENDED DESIGN SERVICE VOLUMES FOR TWO LANE ROADS

S.N.	Terrain	Curvature (Degrees per Kilometre)	Design Service Volume in PCU/day
1.	*Plain*	Low (0-50)	15,000
		High (above 51)	12,500
2.	*Rolling*	Low (0-100)	11,000
		High (above 101)	10,000
3.	*Hilly*	Low (0-200)	7,000
		High (above 201)	5,000

12



However, their movement will be mainly on Hat Asuria - Pakhanna Road in the area, the impact prediction has been done, considering the entire vehicular movement on this Road for the projection of the worst case scenario.

4.3.2 Impacts on Water Quality

The Company will follow "the zero wastewater discharge concept" and the entire wastewater will be recycled to the plant for various uses. As no wastewater will be discharged outside the plant premises, there will be no impact on the water quality of any surface water bodies of the area.

4.3.3 Impacts on Hydrology and Water Use

The requirement of water for the proposed project will be around 70 m^3/day. The raw water will be sourced from Barjora Panchayat Samity water supply system. The water availability is well ascertained by the relevant Authority before approval for the same. Hence, it is expected that it will have no significant impact on the hydrological system.

The Company will follow "the zero wastewater discharge concept" and the entire wastewater will be recycled to the plant for various uses. As no wastewater will be discharged outside the plant premises, there will be no impact on any surface water hydrology of the area.

4.3.4 Impacts on Noise during Operation

Sources of Plant Noise

The operation of the new units is expected to generate relatively high and continuous noise levels. However, all the machineries will be within the permissible noise limit as per Environment Protection Act.

Impacts of Plant Noise

Operational activities are not expected to cause any undue disturbances to the people living in the proximate areas outside the plant boundary.

Impacts of noise on workers could be minimised through the adoption of adequate protective measures in the form of (a) use of personal protective equipment (ear plugs, ear muffs etc.), (b) education and public awareness, and (c) exposure control through the rotation of work assignments in the intense noise areas.

As such, due to protection, there will not be any appreciable impact from noise due to the operation of the new project.

4.3.5 Impacts on Soil

There will be solid waste generation, but will be managed in the proper manner, which has been discussed in **Chapter-2.0** of the report. This will ensure that there will not be any impact on soil quality due to the disposal or deposition of solid wastes.

4.3.6 Impacts on Land Use

The proposed development will take place inside the already acquired land area, so there will not be any impact on the land use pattern outside the plant area.

4.3.7 Impacts on Demography and Socioeconomics

The employment opportunities, both direct and indirect, that will arise from the proposed project are 180 persons, who will get employment on daily average basis during the construction period. Around 80 persons will get direct employment in the project during the operation stage.

The labour force involved during construction phase will be replaced by more skilled manpower to operate and maintain the plant.

As the area is close to Barjora & Durgapur Town, the skilled people from the town will be available to work here. So, there will be no major change of local occupational scenario, though the establishment of the new projects will increase the direct and indirect jobs and other economic opportunities. There will be some development of secondary service market, which will be beneficial to the local economy.

FIGURE-4.1
ISOPLETHS OF PM

CHAPTER-5.0
ANALYSIS OF ALTERNATIVES

5.1 ANALYSIS OF ALTERNATIVES

M/s Satvik Enterprises Limited has proposed to ferro-alloy plant by installation of 2x9 MVA Submerged Arc Furnaces along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal. The proposed project will be installed on total 2.18 hectares (5.38 acres) of land, which has been acquired and is in possession of the Company.

The following alternative locations/sites were considered and analyzed to select the most suitable location for development of proposed project on the basis of raw material, power & water availability, area requirement and accessibility via road or port.

- **Alternative Site 1**: Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Pin: 722204, District: Bankura in West Bengal. (Geographical Co-ordinates: Latitude 23°23'56.57"N & Longitude 87° 17'18.31"E)

- **Alternative Site 2**: Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura in West Bengal. . (Geographical Co-ordinates: Latitude 23°24'8.74"N & Longitude 87° 17'25.39"E)

- **Alternative Site 3**: Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura in West Bengal. (Geographical Co-ordinates: Latitude 23°23'50.97"N & Longitude 87°17'40.64"E)

CIC Steels Pvt
ALTERNATIVE SITE 2
Kalimata Vyapaar Pvt. Ltd
Shree Ambey Ispat Pvt. Ltd. Factory
Hatasuria Pakhanna Road
Susunia vivekananda club
SAHEBDIHI MAQSOOD ORPHAN
ALTERNATIVE SITE 1
Hatasuria Pakhanna Road
Hatasuria Pakhanna Road
Susunia Ground
ALTERNATIVE SITE 3
Durga Temple

SITE-I
Hatasuria Pakhanna Road
ALTERNATIVE SITE 1
Hatasuria Pak
N

N
SITE-II
ALTERNATIVE SITE 2
Shree Ambey Ispat Pvt.

N
SITE-III
Susunia vivekananda club
SAHEBDIHI MAQSOOD ORPHA
Hatasuria Pakhanna Ro
Susunia Ground
ALTERNATIVE SITE 3

5.2 Criteria for Site Evaluation

The following factors will be considered for site evaluation:

- Away from environmentally sensitive areas
- Availability of adequate land with favourable terrain and soil condition
- Availability of infrastructural facilities viz. power, water, road and port facilities.
- Proximity to the port for transportation of feedstock as well as dispatch of final products.
- Site slope and drainage pattern

Keeping the above facilities in view, an attempt is made to select a suitable site which meets the above requirements and also results in optimization of not only the initial investment cost but also the operating costs.

5.3 Description of all the considered sites

A. Site – I (at Sahebdihi)

i. Location

The proposed project site is located as Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura in West Bengal and at a distance of 3.0 Km from Barjora.

ii. Land & Terrain

Approx. 5.38 acres of land is available for the proposed project. The terrain is flat.

iii. Road & Rail

National Highway no. 9 passing in the SW direction of the identified site. Durgapur Railway station is located at a distance of 11.0 kms (approx.) from the project site.

iv. Water

The total water requirement will be about 70 KLD. The Requirement Water for the plant Available from Barjora Panchayat Samity.

v. Power

The net power requirement will be about 16 MVA. To meet the above requirement the power will be made available from DVC.

B. Site – II (at Sahebdihi)

i. Location

The proposed site is located at Mouza: Sahebdihi, P.O. Hat-Asuria, P.S. Barjora, District Bankura in West Bengal and at a distance of 2.64 Km from Barjora.

ii. Land & Terrain

Approx. 4.81 acres of land is available for the proposed project. The terrain is flat.

iii. Road & Rail

National Highway no. 9 passing in the SW direction of the identified site. Durgapur Railway station is located at a distance of 10.60 kms (approx.) from the project site.

iv. Water

The total water requirement will be about 70 KLD. The Requirement Water for the plant Available from Barjora Panchayat Samity.

v. Power

The net power requirement will be about 16 MVA. To meet the above requirement the power will be made available from DVC.

C. Site – III (at Sahebdihi)

i. Location

The proposed site is located at Mouza: Sahebdihi, P.O. Hat-Asuria, P.S. Barjora, District Bankura in West Bengal and at a distance of 3.3 Km from Barjora.

ii. Land & Terrain

Approx. 4.39 acres of land is available for the proposed project. The terrain is flat.

iii. Road

National Highway no. 9 passing in the SW direction of the identified site. Durgapur Railway station is located at a distance of 10.60 kms (approx.) from the project site.

iv. Water

The total water requirement will be about 70 KLD. The Requirement Water for the plant Available from Barjora Panchayat Samity.

v. Power

The net power requirement will be about 16 MVA. To meet the above requirement the power will be made available from DVC.

5.4 Conclusion/Recommendation

The facts presented in preceding paragraphs mandate that **Site-I** at Barjora emerges as technically best suitable site w.r.t. land availability. It is substantially advantageous in terms of environmental and technical criteria.

CHAPTER-6.0
ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

Environmental monitoring is the repetitive and systematic measurement of the characteristics of environmental components. The post project environmental monitoring program serves as the key tool to check the performance of mitigation measures implemented / adequacy of pollution control technologies installed.

6.2 ENVIRONMENTAL MONITORING PROGRAMME

Monitoring of the following aspects is important to keep a constant check on the environmental performance of the project and also the environmental quality of the area.

- Ambient Air Quality
- Stack Emission
- Work zone Air quality,
- Water Quality
- Waste water Quality
- Drinking Water Quality
- Noise Level
- Plantation Condition
- Periodic Preventive Maintenance
- Occupational Health & Safety Monitoring
- Fire Safety Monitoring

<u>Ambient Air Quality</u>

Ambient air quality monitoring will be conducted at 3 locations (120 degree to each other) around the project site for relevant parameters as per frequency stipulated in NAAQS 2009. The parameters, to be monitored include PM_{10}, $PM_{2.5}$, SO_2 and NO_2.

Fugitive emissions of PM_{10} will be monitored quarterly inside the project area where fugitive dust emissions are anticipated like the raw material

handling area (unloading and storage), truck movement and parking areas, solid wastes storage area, to ensure that air pollution control measures are working properly.

Table 6.1: Air Pollutant Measurement Technique

Sl. No.	Parameter	Technique	Technical Protocol Minimum Detectable
1	Respirable Particulate Matter (PM_{10})	Respirable Dust Sampler (Gravimetric Method)	IS 5182 (Part 23) : 2006 Reaffirmed 2012
2	$PM_{2.5}$	Fine Respirable Dust Sampler (Gravimetric Method)	CPCB method -
3	Sulphur Dioxide	Modified West & Gaeke method	IS 5182 (Part 2) : 2001 Reaffirmed 2012
4	Oxides of Nitrogen	Jacob & Hochheiser method	IS 5182 (Part-6): 2006 Reaffirmed 2012

Stack Emissions

In the proposed project, there will be 2 nos. stacks, attached to 2x9 MVA SAFs. The flue gas from all these stacks shall be monitored in line with the existing practice.

Table 6.2: Stack Measurement Technique

Sl. No.	Parameter	Technique	Technical Protocol Minimum Detectable
1	Particulate Matter	Gravimetric Method	IS 11255 (Part 1) : 1985 Reaff. 2014

Ground Water Quality

Ground water will be monitored inside the project site, near solid wastes storage area by installing a piezometer. Groundwater quality monitoring will be also done at nearby villages (3 villages located along the boundary of plant). The monitoring will be carried out with a frequency of four times in a year.

Wastewater Quality

Zero wastewater discharge has been planned for the project. There will be wastewater treatment plant and final treated wastewater after treatment will be reused. Yet the wastewater quality before use will be regularly monitored on monthly basis.

Meteorology

A meteorological station will be set-up at the project site for the record of meteorological parameters such as wind velocity and direction, ambient temperature, relative humidity, atmospheric pressure, rainfall etc.

Noise

Noise monitoring will be carried out inside the work area of each plant and near the high noise generating areas, at plant boundary and outside the project site at nearby villages twice in a year.

Plantation

The project proponent have trained people to look after and record the conditions of tree plantation and greening of the project area.

Periodic Preventive Maintenance

All instruments installed or used for monitoring and recording of working environment parameters will be regularly tested and calibrated, and the respective records maintained.

Occupational Health & Safety Monitoring

The occupational health and safety monitoring program shall include safety inspection, testing and calibration. Project proponent shall carry out inspection and testing of all safety features and hazard control measures for plant operation. This shall include regular inspection and testing of all safety features and hazard control measures focusing on engineering and personal protective features, work procedures, places of work, installations, equipment, and tools used. The inspection shall verify that issued personal protective equipment (PPE) continues to provide adequate protection and is being worn as required.

Conclusion

The relevant details of the Environmental Monitoring programme of M/s Satvik Enterprises limited are mentioned in **Table-6.3**.

TABLE-6.3
POST PROJECT MONITORING PROGRAMME

Discipline	Locations	Parameters	Frequency	Fund Provision (Annual Cost in Lakhs)
Meteorology (Met Station)	One	Temperature, Rainfall, Relative Humidity, Atmospheric Pressure, Wind Speed and Direction	Hourly	2 lakhs
Ambient Air Quality	3-4 relevant locations	PM_{10}, $PM_{2.5}$, SO_2, NO_2 & Benzopyrene	Twice in a week	25 lakhs
Stack Emission	Each Unit	PM	Quarterly	5 lakh
Fugitive Emission	3-4 relevant locations	PM_{10}, $PM_{2.5}$, SO_2, NO_X	Twice in a year	2 lakh
Performance Monitoring of APC devices	Each Unit	Pressure Drop & Pollutants' Emission	Once in a year	2 lakh
Effluent	Cooling Tower blow down	pH, Total Suspended Solid, BOD, COD, Fe, Zn, Ammonical Nitrogen, Oil & Grease	Every 2 months	2 lakh
Ground Water Quality	3-4 Locations	pH, Temperature, Conductivity, Turbidity, Alkalinity, Chlorine, Total Suspended Solid, Total Dissolved Solids, Total Hardness, Ca-hardness, Mg-hardness, Coliform, Fe, Cu, Cd, Cr^{6+}, Pb, As, Hg, Zn	Twice in a year	2 lakh
Noise	Plant Area and Nearby villages	Day and Night Time Noise Levels	Half-yearly	1 lakh
TOTAL				41 lakhs

After implementation of the proposed project, the existing monitoring program shall be further strengthened to accommodate the future requirement.

6.3 TECHNICAL SPECIFICATION OF AIR POLLUTION CONTROL DEVICES

Technical specification of air pollution control devices in the proposed plant:

Bag Filter / Bag House Technical Data Details								
Sl. No.	Division	Area	Gas Flow Rate / Capacity	Unit	ID Fan Capacity	Unit	Motor Capacity	Unit
1	Ferro Alloys	9 MVA (proposed)	90000	m^3/hr	90000	m^3/hr	160	KW
		9 MVA (proposed)	90000	m^3/hr	90000	m^3/hr	160	KW

6.4 PERFORMANCE MONITORING OF POLLUTION CONTROL DEVICES

M/s. Satvik Enterprises Limited will continuously monitor performance of pollution control devices through its process, experienced engineers & good preventive maintenance system. Performance of pollution control system will be mainly monitored by operator & maintenance staff through pressure drop measurement system. Bag filters are equipped with U-tube manometer & electronically operated differential pressure switches. If it crosses its acceptable limit then operator will get alarm of failure. In case of failure, Operator will take immediate action by stopping the particular machine & inform maintenance dept. for necessary corrections.

PERFORMANCE MONITORING OF BAG FILTERS

Commonly known as bag houses, bag filters are one of the most efficient and cost effective types of dust collectors available and can achieve a collection efficiency of more than 99% for very fine particulates.

Table 6.4
Typical preventive maintenance procedure and performance monitoring for bag filters

Frequency	Procedure
Daily	Check pressure drop
	Observe stack (visually)
	Walk through system.
	Check for unusual occurrences in process
	Observe control panel indicators
	Check compressed-air pressure
	Assure that dust is being removed from system
Weekly	Operate damper valves
	Check compressed-air lines.
	Check that valves are opening and closing properly in bag-cleaning sequence.
	Verify accuracy of temperature-indicating equipment

	Check pressure-drop-indicating equipment
Monthly	Check all moving parts in shaker mechanism
	Inspect fans for corrosion and material build up
	Check drive belts for wear and tension
	Inspect and lubricate appropriate items
	Spot-check bag tension
	Spot check for bag leaks
	Check hoses and clamps
	Check accuracy of indicating equipment
	Inspect housing for corrosion
Quarterly	Inspect baffle plate for wear
	Inspect bags thoroughly
	Check duct for dust build up
	Observe damper valves for proper seating
	Check gaskets on doors
	Inspect paint, insulation, etc.
	Check RAV for wear or abrasion
	Check fan belts
Annually	Check welds
	Inspect hopper for wear

Maintenance team of the company will continuously work for better performance of APC devices by maintaining proper schedule for maintenance to achieve pollution free working environment.

CHAPTER-7.0
ADDITIONAL STUDIES
(HAZARD IDENTIFICATION & RISK ASSESSMENT, DISASTER MANAGEMENT PLAN & PUBLIC CONSULTATION

7.1 INTRODUCTION

Considering the generic structure of the EIA/EMP report prescribed in EIA Notification dated 14.09.2006, this chapter comprises of public consultation, Risk Assessment, social impact assessment and R&R Action plan.

This chapter deals with identification of the potential hazards and disaster and preventive measures for disaster. The proposed project may encounter with certain types of hazards which can disrupt normal activities suddenly and lead to disaster like fires, inundation, failure of machinery, hot metal spill, electrocution, to name a few. Disaster management plan has been formulated with an aim of taking precautionary step to control the hazard propagation and ward off disaster and also to take such action after the disaster which minimize the damage.

Industrial activities, involved in producing, treating, storing and handling of hazardous substances, have a high hazard potential to safety of man and environment at work place and outside. Recognising the need to control and minimize the risks posed by such activities, the Ministry of Environment, Forest and Climate Change (MoEF&CC) has notified the “Hazardous and other wastes (Management and Transboundary Movement) Rules in the year 2016 (In super session of the Manufacture, Storage, Handling and Transboundary Movement and Hazardous Waste Rules, 2008). For effective implementation of the rule, Ministry of Environment, Forest and Climate Change has provided a set of guidelines. The guidelines, in addition to other aspects, set out the responsibilities/duties needed to be performed by the occupier along with the procedure. The rule also lists out the industrial activities and chemicals, which are needed to be considered as hazardous.

The proposed activities are scrutinized in line with the above referred "Manufacture, storage and import of hazardous chemicals rules" and observations/findings are presented in this document.

Ferro Alloy plant involves hazardous processes, which can result in significant risk to the work environment and hence needs proper assessment.

During the manufacturing process of the proposed project, the major substances to be handled/stored include Manganese Ore, Chrome Ore, Coal, Coke etc. and fluxes such as dolomite etc. The major chemicals to be handled/stored include HSD, FO etc.

7.2 HAZARD IDENTIFICATION AND RISK ASSESSMENT

Hazard is a source or situation that has the potential for harm in terms of ill health, human injury, damage to property or the environment, or a combination of these factors. It has got both short and or long term effect on the work environment with considerable human and economic costs. A hazard may have a potential to create an emergency like situation at the work place. Hazard is a potential cause to lead to a disaster.

Hazards exist almost in every workplace in different forms and required to be identified, analyzed / assessed and controlled regarding the work processes, plant or substances. They arise from (i) workplace environment, (ii) use of plant and equipment (iii) use of substances & materials, (iv) poor work or plant design, (v) improper management systems and work procedures, and (vi) human behaviour.

Ferro Alloy plant have several hazardous processes and operations which can cause considerable environmental, health and safety risk to the workforce. All the hazards cause potential risk to the work environment which include work force and work place and hence need proper assessment.

M/s Satvik Enterprises Limited has proposed to set up a Ferro-Alloy plant by installation of 2x9 MVA SAFs for production of 32,800 TPA Silico Manganese (Si-Mn) or 44,400 TPA Ferro Manganese (Fe-Mn) or 15,200 TPA Ferro Silicon (Fe-Si) or 33,600 TPA Ferro Chrome (Fe-Cr) along with 10 TPH Briquetting Plant at

Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal.

The proposed plant has lower risk potential than those industries which deal with toxic and flammable chemicals. Off-site people are not exposed to any threat, hence the societal risk is insignificant.

This is an early check of major hazards, which are of risk potential - including the potential for disastrous interactions of the various plant operational activities. This checklist, though not strictly speaking a Hazard and Operability Study (HAZOP) would considerably facilitate a full scale HAZOP Study for final drawing up of risk management measures when the 'design-freeze' stage commences. The identification of hazards anticipation for the proposed project activities are presented below in **Table-7.1**.

TABLE 7.1
HAZARD IDENTIFICATION OF THE PROPOSED PROJECT

Item	Nature of Hazard	Hazard Potential
Raw Material Handling:		
Chrome & Manganese Ore, Quartz, Dolomite etc.	Dust	Minor
Coal (Non-coking)	Heat, Fire & Dust	Moderate
HSD/ Lube Oils / Greases	Heat & Fire	Major
Production Units:		
Ferro Alloy Plant	Fire, Heat & Dust	Moderate
Ferro Alloys Making Facilities : Submerged Arc Furnaces	Heat & Fire by Hot Metal & Slag Handling	Major
Briquette Plant	Fire, Heat & Dust	Moderate
Utilities :		
Fuel (Gas / Liquid)	Heat & Fire	Major
Electric Power Supply	Heat & Fire	Minor

The Brief about nature of various Hazards in **M/s Satvik Enterprises Limited** is given below,

Brief of Nature of Hazard in the Project

NATURE OF HAZARD	SOURCES
Fire Hazard	➢ Hot Liquid metal ➢ Fire in HSD storage
Fire / Explosions due to Spillage of Liquid Metal	Spillage / Transfer of liquid Metal and hot slag.

Heat Radiations due to Hot Metal Handling	Spillage of liquid Metal and hot slag
Accidents due to Material Handling Equipment	Connected with all Material Handling Equipment

Splashing of molten metal & solid waste : Sudden break out of molten metal and slag have been known to take place during furnace operation. The break out may take place from weak portions of the hearth. The spillage of hot metal or slag can lead to severe burn injuries and fires. Explosions may also happen as a result of hot metal or slag falling in a pool of water resulting in human injuries and fire due to flying hot splinters and splashing of hot metal or slag. The spillage of hot metal can also take place be due to hearth breakage, mould breakage and during transportation. The accidents can also occur due to failure of water-cooled panels, puncture in water-cooled lances, leakage of water from the walls of mould. Through checks in regular intervals and proper upkeep of furnace refractory and cooling panels, such incidents can be avoided.

The consequences may result in death (in extreme case), severe burn and mechanical injury and will be limited to working personnel near the site of incident.

7.2.1 APPROACH TO THE STUDY

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

1. Identification of potential hazard areas;
2. Identification of representative failure cases;
3. Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
4. Assess overall suitability of the site from hazard minimization and disaster mitigation point of views;
5. Provide specific recommendations on the minimization of the worst accident possibilities; and

6. Preparation of elaborated Disaster Management Plan (DMP), on-site & off-site emergency plan, which includes occupational and health safety plan.

7.3 HAZARD ASSESSMENT AND EVALUATION

7.3.1 METHODOLOGY

The hazards expected from this plant include the pool fire situation due to the leakage of HSD storage tanks. There will be total 2 nos. of storage tanks, 2X20 KL for HSD. The tanks (made of mild steel), will be provided with dyke. The worst case can be assumed when the entire content leak out into the dyke forming a pool, which may catch fire after getting source of ignition.

HSD STORAGE TANKS - POOL FIRE SCENARIO:

The maximum quantity of HSD stored at site are 40 KL capacity. In the event of oil spillage through a small leakage, fire will occur after getting ignition source. As the tanks will be provided with dyke, the fire will be limited within the dyke. The threshold limit for first degree burns is 4.5 kw/m^2. Based on these results it can be concluded that the vulnerable zone in which the thermal fluxes higher than the threshold limit for first degree burns (4.5 kw/m^2) is restricted to to 2.18 m.

The hazard distances for various radiation intensities are shown in **Table 7.2.**

TABLE-7.2
HAZARD DISTANCES DUE TO HSD TANK ON FIRE
(HSD Tank: 2x20 KL)

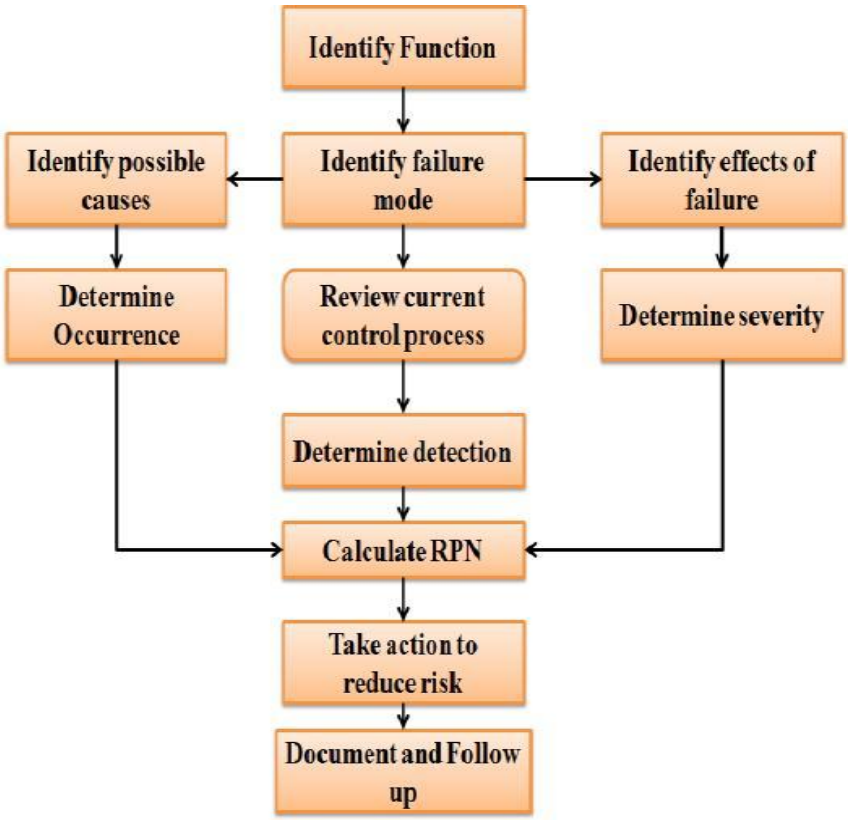
Thermal Radiation Intensity (in kW/m^2)	Damage to People	Hazard Distances (in m)
37.5	100% lethality	0.66
25.0	50% lethality	0.87
12.5	1% lethality	1.49
4.5	1st degree burns	2.18

The hazard distances for Thermal radiation are confined only to the plant premises. Hence, there will not be any thermal radiation impact on outside population due to the pool fire scenario.

7.4 FAILURE MODE EFFECT ANALYSIS FOR PROCESS UNITS

Failure mode effects analysis (FMEA) is one of the most important and widely used tools for reliability analysis. FMEA identifies corrective actions, which are required to reduce failures to assure the highest possible yield safety and reliability. Even though it is a widely used reliability technique, it has some limitations in prioritizing the failure modes and output may be large for even simple systems, which may not deal easily with time sequence, environmental and maintenance components.

Figure – 7.1: Steps in FMEA



7.4.1 RISK PRIORITY NUMBER

Risk priority number (RPN) methodology is a technique for analysing the risk associated with potential failures during a FMEA analysis. To calculate risk priority number, severity, occurrence and detection are the three factors, which need to be determined.

RPN = (Severity × Occurrence × Detection)

7.4.2 SEVERITY (S)

Severity is the seriousness of the effect of potential failure modes. Severity rating with the higher number represents the higher seriousness or risk which could cause death.

Table-7.3: Example Table of Severity

Rating	Detection	Detection by design control
10	Absolute uncertainty	Design control cannot detect failure mode
9	Very remote	Very remote chance the design control detect failure mode
8	Remote	Remote chance the design control detect failure mode
7	Very low	Very low chance the design control detect failure mode
6	Low	Low chance the design control detect failure mode
5	Moderate	Moderate chance the design control detect failure mode
4	Moderately high	Moderately high chance the design control detect failure mode
3	High	High chance the design control detect failure mode
2	Very high	Very high chance the design control detect failure mode
1	Almost certain	Design will control detect failure mode

7.4.3 OCCURRENCE (O)

Occurrence ratings for FMEA are based on the likelihood that a cause may occur based on past failures and performances of the similar system in the similar activity. Occurrence values should contain data to provide justification.

Table – 7.4 : Example table of Occurrence

Rating	Classification	Example
10 9	Very High	Inevitable failures
8 7	High	Repeated failures
6 5	Moderate	Occasional failures
4 3	Low remote	Few failures
2 1	Remote	Failures unlikely

7.4.4 DETECTION (D)

Detection is an assessment of the likelihood that the current controls will detect the cause of failure mode.

Table – 7.5: Example Table of Detection

Ranking	Effect	Severity effect
10	Hazardous without warning	Very high severity without warning
9	Hazardous with warning	Very high severity with warning
8	Very high	Destructive failure without safety
7	High	System inoperable equipment damage
6	Moderate	System inoperable with minor damage
5	Low	System inoperable without damage
4	Very low	Degradation of performance

3	Minor	System operable with some degradation in performance
2	Very minor	System operable with minimal interference
1	None	No effect

7.4.5 FMEA IMPLEMENTATION

Failure mode effect analysis is executed by a multidisciplinary team of experts with the help of process flow chart. Criteria of ranking of severity, occurrence and detection are selected based on the past failure records of the furnace. Risk priority number (RPN) is calculated using values of severity, occurrence and detection number.

TABLE - 7.6
RPN for RPN for Ferro Alloy Plan with Proposed Control Measures

Ferro Alloy Plant								
Components / Process	**Failure Mode**	**Failure Effect**	**Failure Cause**	**S**	**O**	**D**	**RPN**	**Control Measures**
Furnace	Recirculating cooling water coming in contact with the molten metal or slag	Spillage of Hot Spurting of metal/slag. Explosion under extreme cases.	Leakage of water from the refractory walls Operate	8	2	2	32	Regular inspection and Periodic maintenance
Furnace	Presence of Oil & Grease and other impurities	Sudden catching of fires and flames	Improper Maintenance	4	3	3	36	Regular inspection and Periodic maintenance
Chrome Briquette manufacturing plant								
Conveyor Belt	Friction	Fire	Improper Maintenance	8	2	2	32	Belt Sway Switch and Lubricating the rotating parts regularly

7.4.6 RISK REDUCTION OPPORTUNITIES

The following opportunities will be considered as a potential means of reducing identified risks during the detailed design phase:

- Safety organization is of prime importance in the ferro alloy plant, where safety depends so much on workers' reaction to potential hazards. The first responsibility for management is to provide the safest possible physical conditions, Accident-

prevention committees, workers' safety delegates, safety incentives, competitions, suggestion schemes, slogans and warning notices can all play an important part in safety programmes.

- Provision for adequate water capacity to supply fire protection systems and critical process water;
- Isolate people from load carrying/mechanical handling systems, vehicle traffic and storage and stacking locations;
- Installation of fit-for-purpose access ways and fall protection systems to facilitate safe access to fixed and mobile plant;
- Provision and integrity of process tanks, waste holding tanks and bunded areas as per relevant standards;
- Arrange display signs for material strictly prohibited inside any work premises like inflammable materials, firearms, weapons & ammunitions, etc.
- Developing 'Dos' & 'Don'ts' during various types of works like working at heights etc.
- Ensure that emergency control mechanisms like switch, valve and emergency lamp are covered with shield, water & shock resistance cover during rain etc. and peddle switch for bigger rotating machinery mixer etc. There should be no temporary cable joints and open air working switch yard at enriched level.
- In addition to the yard fire hydrant system, process area would be provided with fire and smoke detection alarm system. Fire detection system would be interlocked with automated water sprinklers.
- Security of facility to prevent unauthorized access to plant, introduction of prohibited items, and control of onsite traffic; and
- Development of emergency response management systems commensurate.

Overall, an integrated approach combining good engineering and maintenance practices, safe job procedures, worker training and use of personal protective equipment (PPE) is required to control hazards.

7.5 DISASTER MANAGEMENT PLAN

A disaster is an unforeseen combination of circumstances that causes serious body injuries loss of life or extensive damage to the plant facilities or total.

Disaster is an undesirable occurrence of events of such magnitude and nature that adversely affect production, cause loss of human lives and property as well as damage to the environment. Industrial installations are vulnerable to various kinds of natural and manmade disasters. Examples of natural disasters are flood, cyclone, earthquake, lightning etc. and manmade disasters are like major fire, explosion, sudden heavy leakage of toxic/poisonous gases, civil war, nuclear attacks, terrorist activities etc. It is impossible to forecast the time and nature of disaster which might strike an undertaking. However, an effective disaster management plan helps to minimize the losses in terms of human lives, plant assets and environmental damage and then resumes working condition as soon as possible. Risk analysis forms an integral part of disaster management plan and any realistic disaster management plan can only be made after proper risk analysis study of the activities and the facilities provided in the installation. Correct assessment and evaluation of the potential hazards, advance meticulous planning for prevention and control, training of personnel, mock drills and liaison with outside services available can minimize losses to the plant assets, rapidly contain the damage effects and effectively rehabilitate the damage areas.

Anyone or more of the following uncontrollable factors may cause disaster:

1. Reduction or failure of cooling water
2. Failure of Power
3. Rupture or damage of the line, vessel or tank
4. Excessive leakage of inflammable or corrosive or toxic material
5. Cyclone

6. Earthquake
7. Fine or explosion
8. Sabotage
9. Riot,
10. Air Raid

The Disaster Management Plan of the company is divided into two parts:

(i) Onsite Emergency Plan
In this plan, the company officers are given pre-designated responsibilities for dealing with the emergency.

(ii) Offsite Emergency Plan
In this, different Govt. agencies will be conformed about the emergency for necessary help from them.

7.5.1 OBJECTIVE OF DISASTER MANAGEMENT PLAN

The objective of Disaster Management Plan is to ensure safety of life, protection of environment, protection of installation and restoration of production.

For effective implementation of the disaster management plan, it will be widely circulated and personnel training given through rehearsals/drills. The disaster management plan would reflect the probable, consequential severities of the undesired event due to deteriorating conditions.

To tackle the consequences of a major emergency inside the factory or immediate vicinity of the factory, a disaster management plan has to be formulated and this planned emergency document is called “Disaster Management Plan”.

The objective of the industrial disaster management plan is to make use of the combined resources of the plant and the outside services to achieve the following:

- Proper training should be provided to ensure safe operation of the crane for hot metal transfer. There should be proper communication and use of standard hand signals between crane drivers and slingers to prevent injuries from unexpected crane movement / spillage of hot metal

- Ensuring proper safe guard by providing rail guards with inter locks in all those areas where hot metal transfer takes place.
- Inspection and maintenance programs for crane parts, ropes, lifting tackle, hooks to prevent dropped loads.
- Safe means of access to cranes to avoid falls and accidents on crane transverse ways.
- Regular maintenance shall be ensured for Mechanical parts of trolleys like Gearbox, Axial & Wheels to avoid any spillage of hot metal during transportation.
- Proper training should be imparted to the workers, which should include information about hazards, safe methods of work, avoidance of risks and the wearing of PPE.
- Furnace operators should be protected by enclosing the source of noise by providing sound proof shelters. Reducing exposure time may also prove effective. Hearing protectors (earmuffs or earplugs) are often required in high-noise areas.
- All dangerous parts of machinery and equipment, including lifts, conveyors, long travel shafts and gearing on overhead cranes, should be securely guarded.
- Proper ventilation should be provided throughout the plant wherever substantial quantity of dust, fumes and gas are generated, together with the highest standards of cleanliness and housekeeping.

- Gas equipment must be regularly inspected to prevent any gas leakage. Whenever any work is to be done in an environment likely to contain gas, carbon monoxide gas detectors should be used to ensure safety. When work in a dangerous area is unavoidable, self-contained or supplied-air respirators should be worn. Breathing-air cylinders should always be kept in readiness.

- Heat protection should be provided between workers and radiant heat sources, such as furnaces or hot metal.

7.5.2 ON-SITE EMERGENCY PLAN

A) The disaster control procedure lays down the efforts to be made to prevent fatal accidents, physical harm or injury to personnel and damage to equipment facilities materials. It requires coordinated efforts of all employees to control and eliminate a disastrous situation.

B) All efforts to control a disaster will be coordinated among the various co-ordinators and all actions, taken will be as directed by the chief co-ordinator. The co-ordinating members will be responsible to keep him posted on the development and course of action will be followed by them [refer **Annexure-7-II**].

7.5.3 FACILITIES TO BE AVAILABLE WITHIN THE FACTORY

a) **Fire Fighting Facility**
The entire factory will be protected with fire extinguishing system from outside and inside the shop floor.

b) **Material Handling**
Heavy duty cranes including mobile cranes, fork lifts, trucks, trolleys will be used in the plant. The same could be used at time of emergency for handling the material.

c) **Personnel Protective Equipment**
Safety shoe, safety helmets, safety goggles, asbestos hand gloves, rubber hand gloves, acid proof aprons, earplugs, aprons, leg guards etc. will be made available in the Central store of the plant. At the time of emergency, the same can be made easily available by safety coordinator.

d) **Medical Facility**
The Plant will have the required emergency medical facilities and health check-up for the workers will be done regularly by the visiting Doctors. In case of major accident, persons will be referred to nearest Hospital/Primary Health Centre.

7.5.4 OBJECTIVES

The objective of the On-site Emergency Plan will be to make maximum use of both the internal as well as the external resources:

- For rescue and treatment of casualties and safeguard personnel in the premises.
- To minimize damage to property and environment.
- To initially contain and ultimately bring the incident under control.
- To ensure safe rehabilitation of affected areas.
- To provide authoritative information to the news media.

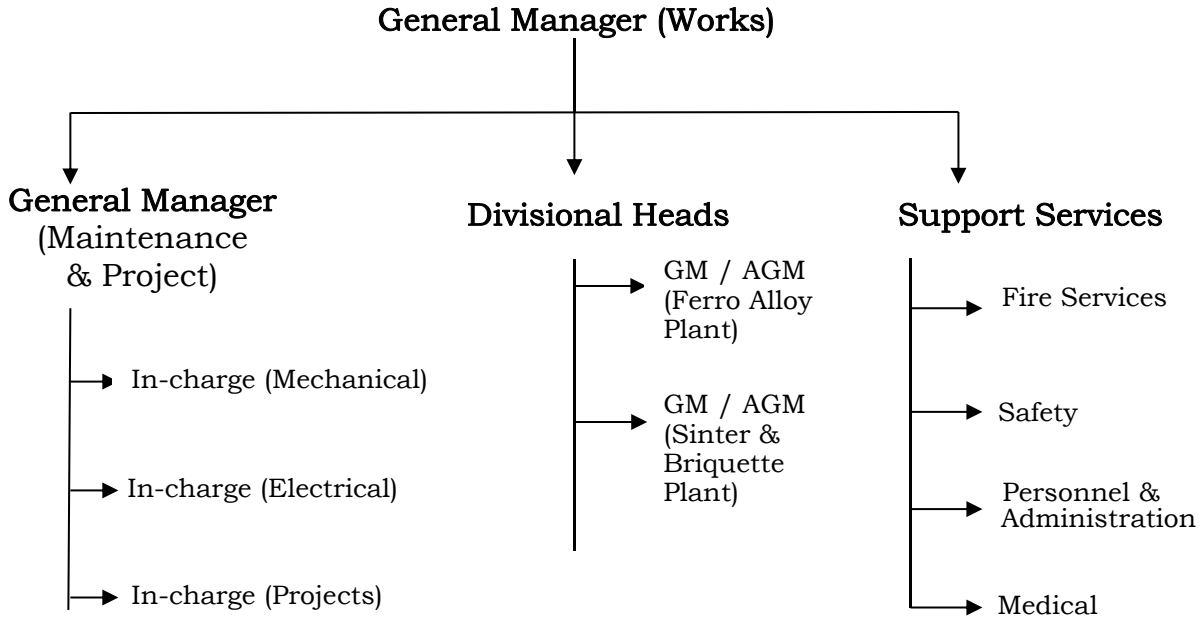
- To preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of emergency.

7.5.5 KEY PERSONNEL AND RESPONSIBILITIES

The actions necessary in an emergency will clearly depend upon the surrounding circumstances. Nevertheless, it is imperative that the required actions will be initiated and directed by nominated people, each having specified responsibilities as part of coordinated plan. Such nominated personnel will be known as Key Personnel.

7.5.6 ORGANIZATION

The Central Disaster Management Cell (DMC) will be set up under the direct charge of General Manager (Works). Organizational structure is as below:



General Manager (Works) will be empowered to declare emergency and he would be in charge of all operations in such situations. He will be supported by GM (Maintenance & Projects), Divisional Heads of respective all Plants, Security and Fire Fighting, Administration, Medical Officer, In-charge Safety and In-charge Environment in handling such a situation.

Disaster Control Cell will operate from the Administrative block during emergency.

7.5.7 OFF SITE EMERGENCY PLAN

Type of emergency facilities/actions required from outside bodies:

a) Fire-fighting facilities required: Factory will have its own fire-fighting facilities but during emergency, fire brigade can also be called.

b) During emergency help of Police will be required for evacuation of the people. Moreover, traffic control, security arrangements etc. shall be made available.

c) Medical help required: seriously injured personnel may be referred to the Hospital/Primary Health Centre depending upon the gravity and type of injuries.

List of Key persons of Off- Site Emergency Plan has been given in **Annexure – 7-III**.

7.6 EDUCATION OF PUBLIC

In the emergency People living within the influence zone will be educated in a suitable manner. This can be achieved only through the Local and District Authorities. However, necessary information can be extended to the Authorities.

7.7 REHABILITATION AND RESETTLEMENT (R&R)

Proposed project will be installed on 2.18 hectares (5.38 acres) of land, which is under the possession of the company. There is no human settlement in the proposed project site. So, R&R plan will not be applicable for this Project.

7.8 PUBLIC CONSULTATION

The Public Hearing shall be conducted by West Bengal Pollution Control Board. The point-wise compliance to the issues, raised during this meeting shall be kept in mind. An action plan shall be formulated along with budgetary provision and this shall be included in the Final EIA Report.

7.12 CONCLUSION

It can be concluded that there will be no major risk involved in the proposed expansion-cum-modification project. Suitable risk

control measures and management with respect to Risk Assessment will be implemented to minimize any risk. Regular training, implementation of SOPs and use of relevant Personal Protective Equipment (PPE) shall help to minimize the health hazards and incidental casualties. The company will continue to work for development of the society in future. Thus, the expansion-cum-modification project will have a positive impact on society. It also does not involve discharge of any effluent and shall follow zero discharge concept; thus, the society will not be impacted. Therefore, it is safe to say that any risk involved due to the activities within the premises of proposed project will be controlled and managed by plant personnel.

ANNEXURE - 7 - I

List of Key persons of on Site Emergency Plan

Sl. No.	Emergency Co-ordinator
1	Executive Director
2	General Manager (Works)
3	General Manager (Maintenance & Projects)
4	General Manager/ Asstt. General Manager (All individual Units)

ANNEXURE – 7 - II

CHEMICAL DATA SHEET

The factory will have only fire hazardous chemicals as shown below:

Fire Hazardous Chemicals	Handling	Storage Facility	Nature of Hazardous
HSD	Storage Tanks	Drums / Tank segregated	Fire hazard

Likely occurrence of major accidents from:

a) Storage – Likely occurrence of major accidents could only be a fire and explosion.
b) Process – From Processes also likely occurrence of major accident could be fire. Since processes does not involve any toxic chemicals and hence no chance of leakage of toxic gases.
c) Leakage / Splashing of liquid metal.

Physical range of consequences propagating:

a) From storage – Entire process plant
b) From process – Localize to affected area

ANNEXURE - 7 - III

List of Key persons of Off Site Emergency Plan

1.	Collector of District
2.	Asst. Director I & II
3.	Fire Office
4.	Controller of Explosive
5.	District Informatics Officer
6.	Superintendent of Police
7.	District Health Officer
8.	Assistant Labour Commissioner
9.	SDO

CHAPTER-8.0
PROJECT BENEFITS

Implementation of the proposed project of **M/s Satvik Enterproses Limited,** having its project cost around Rs. 36.53 Crores located at Mouza: Sahendihi, P.O.: Hat-Asuria, P.S.: Barjora, Dist.: Bankura in West Bengal. The proposed project will be a boon to the region and will give various benefits to society of the region.

BENEFITS FROM THE PROPOSED PROJECT:

1) **Improvement of living conditions to the local people:**
   Such project is expected to improve living conditions by providing better employment opportunities and thereby, result in further reduction of population below poverty line, which is one of the prime policy objectives of the Government.

2) **Improvement of the Society:**
   It is expected that by creation of good employment potential and industrialization of this area, poor/weaker section of the society will enjoy higher earning power and quality of life.

3) **Infrastructure Development:**
   The project is expected accelerate the infrastructure development in and around the area, such as rail, road, transports and communication facilities.

4) **Improvement of Hospitality Services:**
   Through the proposed project it is expected to improve hospitality services such as hotels/lodgings houses, restaurants, fast food joints, transport services, couriers, travel, shopping, amusement park, communication facilities, hospitals/nursing homes as well as education facilities such as schools, colleges and other professional institutes/training centers/coaching centers in the region.

5) **Employment Opportunities:**
   The employment opportunities, both direct and indirect, that will arise from the proposed project are described below:

Direct employment : Around 80 persons will get direct employment in the project during the operation stage. Preference shall be given to local people depending upon their skill and qualification.

Indirect employment : The project will create opportunities for indirect employment to persons who shall be employed for the greenery development work in and around the plant site.

The project is expected to create opportunities for indirect employment to about 100 persons (as drivers, conductors and attendants of new trucks, passenger carrying vehicles, technicians in workshops and garages besides the plumbers, electricians and masons). The project will create opportunities for indirect employment due to increase in trade opportunities like stockiest/ retailers of building materials, groceries, provision shops, medical stores, garment shops, furniture shops, etc.

Trading of equipment and materials such as plates, pipe fittings, valves, pumps, compressors, electrical machinery and construction materials provide employment and income to a large number of people.

Through the proposed project it is expected to improve hospitality services such as hotels/lodgings houses, restaurants, fast food joints, transport services, travel, shopping, communication facilities, hospitals/nursing homes as well as education facilities in the region.

The project will create opportunities for indirect employment to persons who shall be employed for the greenery development work in and around the plant site.

The project is expected to create large opportunities for indirect employment as drivers, conductors and attendants of new trucks, passenger carrying vehicles, technicians in workshops and garages besides the plumbers, electricians and masons. The project will create opportunities for indirect employment due to increase in trade opportunities like stockiest/ retailers of building materials, groceries, provision shops, medical stores, garment shops, furniture shops, etc.

CHAPTER-9.0
ENVIRONMENTAL COST BENEFIT ANALYSIS

The scope of the EIA/EMP has been prescribed vide the Terms of References (TOR) issued by MoEF&CC, New Delhi vide letter no. J-11011/154/2022-IA.II(IND-I)] dated 18th August, 2022 (Refer **Annexure-I**).

As per S.O. 1533 dated 14th September 2006, this chapter is to be prepared if prescribed at scoping stage.

The prescribed scope does not require environmental cost benefit analysis.

CHAPTER-10.0 ENVIRONMENTAL MANAGEMENT PLAN

10.1 BASIC CONTENTS

Environmental Management Plan is the key to ensure a safe and clean environment. A plant may have taken proper pollution control measures but without a management plan to assure its proper function, the desired results may not be obtained.

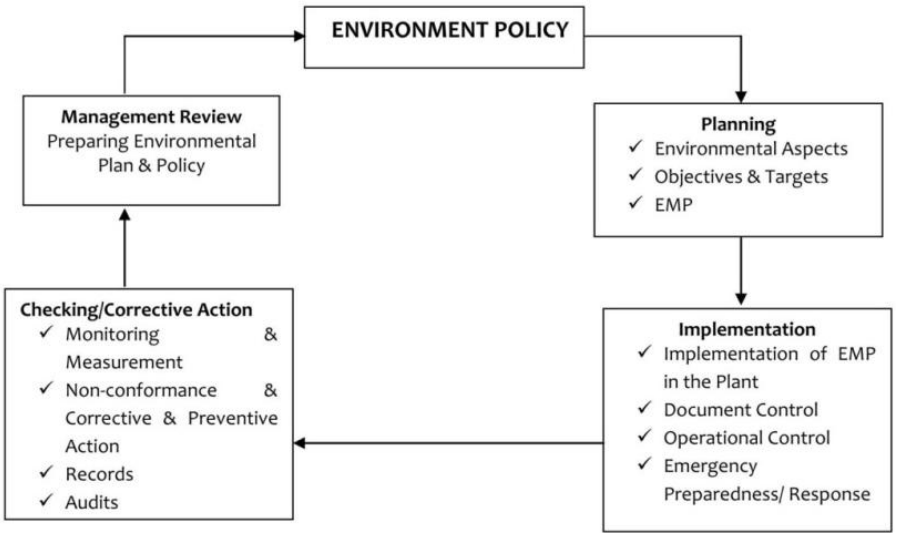
Various pollutants' generation, their control & disposal for the proposed expansion projects have been discussed in **Chapter-2**. In this chapter, various mitigatory measures, to be taken by the company to ensure the overall Environmental Management System of the plant are discussed.

10.2 ADMINISTRATIVE MANAGEMENT AND POLICIES

Environmental management plan can be implemented effectively if the company has certain employees dedicated towards environment and certain policies depicting the various goals towards sustainable environment.

The working concept of environment management of the Company is given below:

Working of Environment Management Plan



10.2.1 ENVIRONMENTAL MANAGEMENT CELL

Establishment of an environmental management cell will be a positive step towards protection of environment. For effective pollution control and environmental protection measures, following functions of environmental management cell are recommended:

Functions of Environmental Management Cell

1. Responsible for collection, treatment and disposal facilities for air emissions, waste water and solid wastes.
2. Routine monitoring of relevant parameters to determine pollution levels.
3. Green belt maintenance.
4. Implementation of environmental management plan.
5. Data handling, reporting, liaison with statutory bodies and future planning regarding environment management.

10.3 CORPORATE ENVIRONMENT POLICY

The Company has set goals and objectives laid by its board of Directors. Corporate Environment Policy (CEP) prescribes for standard operating process/ procedures to bring into focus any infringement/ deviation/ violation of the environmental or forest norms/ conditions. It also constitutes the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions. The company has system of reporting of non-compliances/ violations of environmental norms of the Board of Directors of the company and/ or shareholders or stakeholders at large. All the above statements are mentioned in CEP and company has its working based on its concern towards Environment.

For point wise Compliance to "General condition 9" of ToR F. No- J-11011/378/2009-IA. II (I)) dated 26th February, 2022 issued by MoEF&CC, New Delhi please refer **the Addendum below.**

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ANNEXURE-V

CORPORATE ENVIRONMENT POLICY

i. **Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.**

Yes. The Company has a well laid down Environment Policy approved by the Board of Directors and the same ***is enclosed as APPENDIX—1.***

ii. **Does the Environment Policy prescribe for standard operating process/ procedures to bring into focus any infringement/ deviation/ violation of the environmental or forest norms/ conditions? If so, it may be detailed in the EIA.**

Yes. Environment Policy clearly mentions that, in case of emergency (non-compliance/deviation/violation/ major accident) immediate reporting to be done to the Directors/ Chairman of the Company and the same ***is enclosed as APPENDIX—1.***

iii. **What is the hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.**

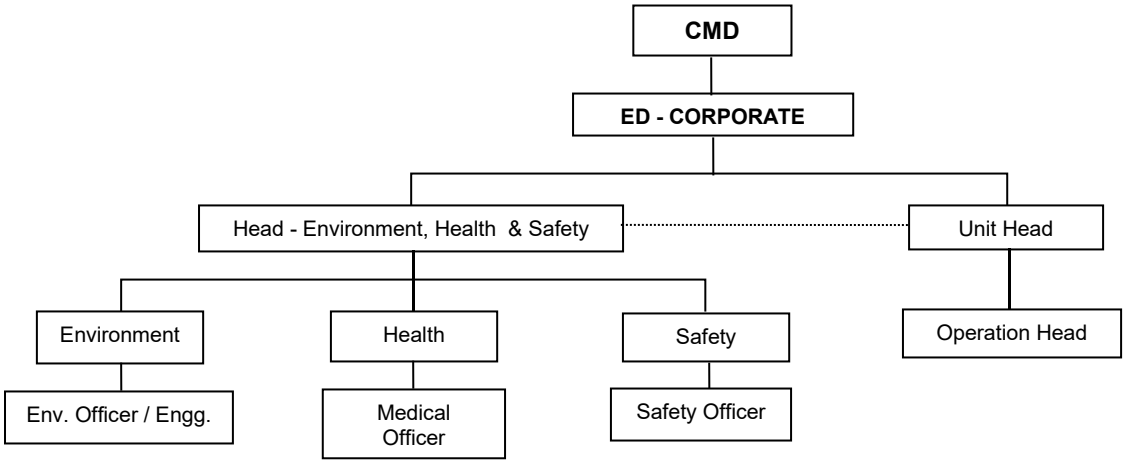
The Board of Directors shall duly constitute a Cell called the Corporate Environment Cell (CEC). The CEC & Head of Environment Department of plant shall be committed to conduct the company operations in an environmentally sound manner. The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions is as under. The detailed hierarchical system *is found in* ***APPENDIX—1.***

iv. **Does the company have a system of reporting non-compliances/ violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report.**

Yes. To have proper checks and balances, the company has a well laid down system of reporting non-compliances/violations of environmental norms to the Board of Directors of the company. The Corporate Environment Cell (CEC) will formally review environment performance of the company and report environmental performance to the Board of Directors/ Chairman of the company directly once every quarter. In case of emergency (non-compliance/deviation/violation/ major accident) immediate reporting to be done to the Directors/ Chairman of the Company.

Also, the Head of Environment Department will Ensure implementation of Policy on environment at plant level and review, report environment performance of the plant to the Board of Directors/ Chairman of the company through CEC Cell once every quarter. In case of emergency (non-compliance/deviation/violation/ major accident) Head of Environment Department will do immediate reporting to the Directors/ Chairman of the Company.

Authorized Signature



Addendum 10.1
Environment Policy approved by the Board of Directors

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SATVIK ENTERPRISES LIMITED

CORPORATE ENVIRONMENT POLICY

Satvik Enterprises Limited (hereinafter referred to as 'SEL'), a Private Limited company, was incorporated on 6th day of May 1997, having its registered office at 1, Park Lane, 3rd floor, Kolkata-700 016 in West Bengal. The company has developed core competence in the iron & steel industry with particular specialization in import (Manganese Ore) and export (Ferro-Alloys) of critical products in the steel supply chain. The growth of the group during last few years has been phenomenal and fast catching the attention of bankers, professionals and the industry as a whole. With verticals that are exploring innovative and sustainable avenues across base metals, alloys and steel, SEL is paving the way for India's emergence as a global superpower.

- The company, Satvik Enteprises Limited recognizes its joint responsibility with the Government and the Public to protect environment and is committed to regulate all its activities so as to follow best practicable means for minimizing adverse environmental impact arising out of its operations.
- The aim of the Policy is to do all that is reasonably practicable to prevent or minimize, encompassing all available knowledge and information, the risk of an adverse environmental impact arising from manufacturing and supply of our products.
- This Policy document reflects the continuing commitment of the Board for sound Environment Management of its operations. The Policy is applicable to all company operations covering manufacturing, sales and distribution and other offices. This document defines the aims and scope of the Policy as well as responsibilities for the achievement of the objectives laid down.

THE VISION

Our business approach not only seeks to minimize our environmental footprint but also contribute in enhancing the environmental quality in and around our work area. We are an ISO 9001:2015 certified company and are integrated trading systems consolidate our belief in quality assurance keeping sustainability in mind.

ENVIRONMENTAL POLICY

Satvik Enterprises Limited is committed to meeting the needs of customers in an environmentally sound manner, through continuous improvement in environmental performance in all our activities. Management at all levels, jointly with employees, is responsible and will be held accountable for company's environmental performance. Accordingly, SEL aims to:

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- Continuously assess our environmental impacts and measure and improve our environmental performance by adopting best practices for prevention and control of pollution.
- Ensure safety of its products and operations for the environment by using standards of environmental safety, which are scientifically sustainable and commonly acceptable.
- Develop, introduce and maintain environmental management systems across the company to meet the company standards as well as statutory requirements for environment. Verify compliance with these standards through regular auditing.
- Make continuous efforts to reduce water intensity and fresh water usage by increased use of harvested and recycled water in our operation.
- Reduce waste, conserve energy and explore opportunities for reuse and recycle.
- Conduct all our operations in an environmentally responsible manner that is better than statutory environment compliances and applicable standards.
- Involve all employees in the implementation of this Policy and provide appropriate training.
- Work in partnership with external bodies and Government agencies to promote environmental care, increase understanding of environmental issues and disseminate good practices.

CORPORATE RESPONSIBILITY

The Directors/ Chairman of the Company is responsible for the Compliance of the Policy. The Directors/ Chairman shall constitute a Cell called as Corporate Environment Cell (CEC) consisting of MD (Mr. Vikash Agarwal), CEO (Mr. Debashish Chatterjee), Lead Chemist (Mr. Vipin Singh) and Plant Production & Safety (Mr. Asim Roy) & Environmental Hazard Manager (Mr. Gopal Darbar). The CEC is committed to conduct the company operations in an environmentally sound manner. The CEC will:

- Set standards and establish environmental improvement objectives and targets for OMPL as a whole and for individual units, and ensure these are included in the annual operating plans.
- Formally review environment performance of the company and report environmental performance to the Board of Directors/ Chairman of the company directly once every quarter.
- In case of emergency (non-compliance/deviation/violation/ major accident) immediate reporting to be done to the Directors/ Chairman of the Company.
- Review environment performance on monthly basis and recognise exemplary performance.
- Ensure implementation of Policy on environment at plant level and review, report environment performance of the plant to the Board of Directors/ Chairman of the company through CEC Cell once every quarter.
- In case of emergency (non-compliance/deviation/violation/ major accident) Head of Environment Department will do immediate reporting to the Directors/ Chairman of the Company.

The Corporate Environment Cell in coordination with Head of Environment Department will:

- Ensure implementation of Policy on environment and compliance with the Company's environmental standards and the standards stipulated as per law.

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- Prevention of incidents or accidents that might result from abnormal operating conditions and
- Reduction of adverse effects that result from normal operating conditions.
- Establish appropriate management systems for environment management and ensure regular auditing to verify compliance.
- Establish systems for appropriate training in implementation of Environment Management Systems at work.
- Ensure periodic 3rd party environment audits through certification bodies to check efficacy of the Environment Management Systems
- Participate, wherever possible, with appropriate industry and Government bodies advising on environmental legislation and interact with national and local authorities concerned with protection of environment

The Hierarchy of our Corporate Environment management Cell that is being strictly followed is attached in next page:

SATVIK ENTERPRISES LTD. KOL-16

Signature

Date: 13/09/22

SATVIK ENTERPRISES LIMITED
1, PARK LANE, KOLKATA-700 016, INDIA
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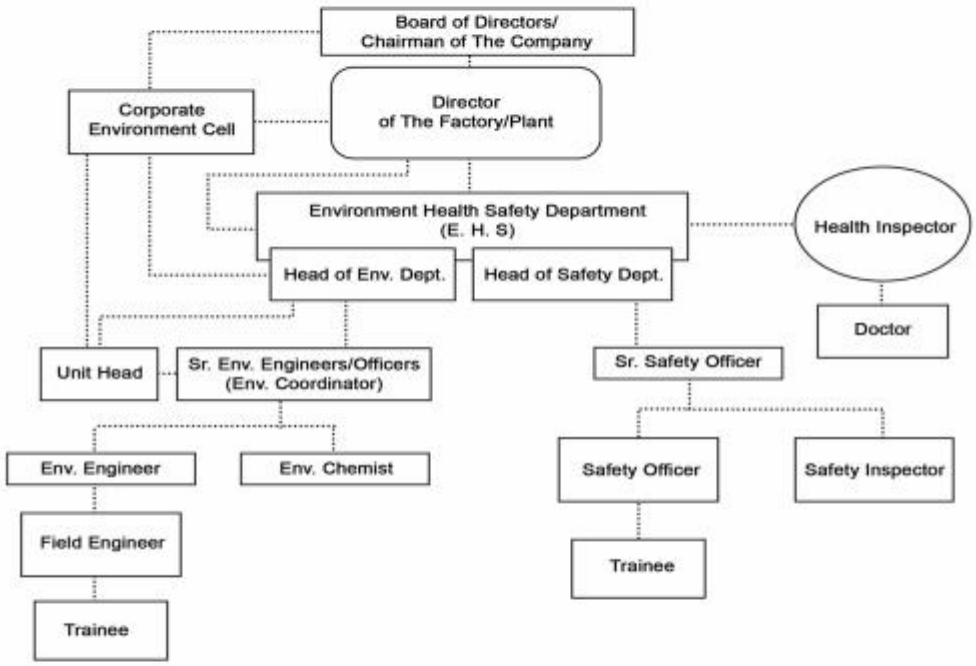
SATVIK ENTERPRISES LIMITED

KOLKATA



10.4 GREEN BELT DEVELOPMENT PLAN

The potential value of vegetation in controlling air pollution has been well recognized. Trees can filter particulates and are effective pollutant sink. Vegetation also reduces noise level and regulates the oxygen balance in the area by consuming released carbon dioxide. In order to improve the aesthetic look of the area and enhance the land use as well as to compensate for any loss in ecology during construction, adequate plantation programmes all around the project site have been planned and will be adopted. Development of green belt will include plantation of trees along boundary of the factory, roads, raw material yard and other available spaces. The plant species will be selected on the basis of their growth and morphological characteristics (height, crown and ornamental values) and factors like availability of local species, resistance to pollutants, location of sources, plant layout, meteorological conditions, water availability etc.

M/s Satvik Enterprises Limited has earmarked 0.72 Hectares (1.78 acres) of land (33% of 2.18 hactares/5.38 acres) for Green Belt Development within its proposed plant site at Mouza: Basudevpur (North), PO: Hat Asuria, PS: Barjora, District Bankura in West Bengal. Around 1800 number of trees (@2500 nos. of tree per hectares) has been considered under plantation programme in greenbelt development and the greenbelt development is already completed for the overall project.

The plant species selected for greenbelt is including the native species. These saplings will be planted with 10 m to 15 m width with a tree density of about 2500 trees/hectare. The tree species selected for green belt is presented in **Table-10.1**.

TABLE-10.1
LIST OF SELECTED TREES FOR PLANTATION

TREE SPECIES	COMMON NAME
Pongamia pinnata	Karanja
Mimusops elengi	Bakul
Butea monosperma	Palash
Cassia fistula	Amaltas
Dalbergia sissoo	Sissoo
Ficus benghalensis	Banyan

Ficus religiosa	Peepal
Alstinia scholaris	Saptaparni
Cassia fistula	Sonajhuri
Peltophorum pterocarpum	Radhachura
Terminalia arjuna	Arjun
Azadirachta indica	Neem
Madhuca latifolia	Mahua
Mangifera indica	Mango
Albizia lebbeck	Siris
Artocarpus heterophyllus	Jackfruit
Polyalthia longifolia	Ashoka
Dendrocalamus strictus	Bamboo

Criteria for Selection of Species:

- Large crown volume
- Rapid growth
- Capacity to endure water stress and climatic conditions
- Difference in height and growth habits
- Mixed plantation will be carried out keeping optimum spacing between saplings
- Native Species will be preferred for plantation in consultation with local Horticulturists and Forest Officials.

Phase Wise Green Belt Development Plan

Green belt will be developed in a phase wise manner right from the construction phase of the project. In the first phase of construction with the start of the construction activity, the plant boundary, around the proposed temporary solid waste storage areas and the major roads will be planted. In the second phase of the construction, the office building area will be planted. And, in the third phase of the construction, when all the construction activity will be complete, plantation will be taken up in the plant area, in stretches of the open land and along other roads.

The trees may be watered using the treated effluent. Kitchen waste from the plant canteen can be used as manure either after composting or by directly putting the manure at the base of the plants. The data on area of green cover, survival rate etc. will be compiled for periodic review. However, following plan shall be made for green belt development:

- Annual plans for tree plantation with specific number of trees to be planted shall be made. The fulfillment of the plan shall be monitored by the Horticulture department every six months.
- A plan for post plantation care will be reviewed in the monthly meetings. 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.

TIME SCHEDULE, COST AND TECHNIQUES FOR PLANTATION

Time Schedule :

Formation of greenbelt will be completed in a phased manner within a span of three (3) years with continuous and intensive maintenance for 0.72 hectares of proposed land for greenbelt development. The proposed greenbelt area is to be demarcated properly with RCC pillars and wire mesh fencing to avoid intrusion and damages.

TECHNIQUES FOR PLANTATION

Choice of Species and Quality planting materials :

Quality Planting Materials of Indigenous and natural species as mentioned above is planted in 2-3 rows in the greenbelt. Planting materials will have following quality parameters:

- Seedlings are raised from very good quality seeds from good and proven provenance. Seeds are to be under professional certification.
- Multiple seed germination in the poly pot is undertaken to select the best germinant to grow as a seedling. The fittest and ablest germinant is retained to grow as a seedling in the poly pot.
- No root coiling is allowed for the seedlings by adopting continuous shifting and grading procedures in the nursery.
- Only the seedlings having height 900-1000 mm. or more is used. (Height is measured from collar to tip)
- Only the seedlings having collar diameter more than 20-25 mm is used.
- Age of the seedlings is 12 month or more.
- Non-succulent, Hardened, vigorous, healthy and morbidity free seedlings are used.
- Seedlings which must not have grown under the influence of Nitrogenous fertilizers are used.
- Average height of the seedlings of a given species are 90% of the Maximum height of that species.

- Native Species/seeds are considered for plantation in consultation with local Horticulturists and Forest department.

Planting techniques and methods (Technical standards):

- Dimension of the pits is 1000mm x 1000mm x 1000mm to promote immediate and appropriate roots establishment. This dimension of the pits is chosen to avoid heat shocks to the roots due to refractory nature of the soil and extreme climatic condition. Better pit dimension makes aeration better and it improve edaphic factors.
- Pit should be filled with dug out soil mixed with sand and manure with a ratio of soil: sand: manure = 2:1:1. This mixture is to be treated with appropriate fungicides and
- Insecticides as per the site condition to enhance the conducive edaphic factors in order to promote faster growth and better survival of the plants.
- Staggered trenched are to be provided within the rows for better moisture conservation.
- Major plantation will be done in the Monsoon season.

Post Planting Maintenance Operations:

- Regular watering as and when required. In summer season, watering twice daily (morning and evening) will be mandatory.
- Without prejudice to any other definition of summer; for the present work, summer is defined as the climatic condition in which maximum diurnal temperature exceeds 35 degree Celsius.
- Regular watch & ward through out the year.
- In a year, minimum 3-nos. of weeding, soil working backed by nutrient, fertilizer and pesticides application is to be carried out without fail.
- Every year there should be 100% casualty replacement as per field requirements.
- Plant hygiene will be maintained round the year without fail
- Morbid plants will be treated as casualty and will be replaced every year along with casualty replacement.
- Officer in charge of environmental management will evaluate every month all Planting and other Afforestation work.
- Appropriate textual and visual documentation will be maintained. Chronological log of the afforestation work is to be thoroughly maintained and preserved.
- Planting density is 1000 Plants per acre.
- Average initial cost of Greenbelt Establishment is @ Rs. 120.00 per Plant i.e Rs. 3,00,000 per hectares at current Price.

- Annual recurring maintenance operation cost of the entire greenbelt beyond the span of establishment period is approximately @ 10% of initial cost of Establishment of Greenbelt.
- Approximate proposed minimum area of Greenbelt is 0.72 Hectares.

Time Schedule and Approximate Capital Cost of the Proposed Green Belt

Year of establishment / formation	Area to be planted (in Hectare)	Expenditure on Formation/ Establishment @Rs. 3,00,000/- per Hectare
1st Year	0.72	Rs. 2,16,000 (For 0.72 Hectares)
Total Initial Cost	0.72	**Rs. 2,16,000**

Time Schedule and Approximate Maintenance Cost of the Green Belt

Year of establishment / formation	Area to be planted (in Hectare)	Year wise Expenditure on Maintenance per Hectare	Total Year wise Expenditure on Maintenance
1st Year	0.72	Maintenance @Rs. 30,000/- per Hectare	Rs. 21,600 (For 0.72 Hectares)
Approximate Annual cost of maintenance beyond initial establishment phase			Rs. 21,600/Year

10.5 HAZARDOUS WASTE MANAGEMENT

The hazardous waste generation from the factory will be Used/Spent Oil. Used oils removed from machineries, gear boxes, compressors etc. and sludge will be collected in drums and temporarily stored in specifically earmarked areas. They will be disposed through the approved agencies.

10.6 MITIGATORY MEASURES DURING CONSTRUCTION

The impacts of the proposed construction phase on the environment would be basically of transient nature and are expected to wear out gradually on completion of the construction programme. However, once the construction of the units will be completed and its operations started, these operation stage impacts would overlap the impacts due to the construction activities.

The impacts in different aspects of environment due to the construction programmes have been elucidated in **Chapter-4**. In order to mitigate such impacts and restrict them within tolerable levels, the Authorities would adopt the following measures:

Traffic Safety

- Vehicle shall not exceed the speed limit of 10 km/hr inside the plant premises.
- All vehicles shall be maintained.
- The contractor shall avoid traffic congestion and abide by the traffic rules by deploying trained and licensed drivers.
- All vehicles shall have valid PUC

Fuel and Sanitation

- The project management shall take adequate steps to ensure suitable sanitary facilities for the workers. These facilities include water supply, sanitary toilets and waste treatment etc.
- Contractors shall arrange for the supply of fuel to the construction workers so that the local trees are not felled to meet the fuel requirement.

Handling & Storage of Hazardous Chemicals

- Hazardous chemicals/materials like oils, paints, and other chemicals etc., which are hazardous in nature shall be stored as per stipulated "Manufacture, Storage & Import of Hazardous Chemicals Rules, 2008".

Emission & Noise Control

- During construction, M/s Satvik Enterprises Limited shall take adequate measures (e.g. water spraying) to avoid dust emissions.
- M/s Satvik Enterprises Limited shall ensure proper maintenance of the construction equipment.
- Construction material/ the debris shall be transported with proper cover to avoid the fugitive emissions of dust.
- The equipment shall comply with the Statutory limit of 85 dB(A) (at 1 m. from the source) for noise.

Waste Collection & Disposal

- Waste has been categorized as: wood, metal, chemicals, paper, plastic etc.
- The impact of waste shall be reduced through segregated collection.

- ❖ Besides, during mobilization, construction, demobilization and commissioning of the project, the contractor shall minimize the waste burden through proper material selection.
- ❖ M/s Satvik Enterprises Limited shall provide sufficient number of metal containers on-site to store trash and debris resulting from their operations.
- ❖ No waste, regardless of composition, shall be drained to sewers, trenches, ditches or channels.
- ❖ Hazardous waste disposed off during the construction activities shall be registered in a Waste Log by the contractor. Waste shall be stored in such a way that it is not accessible to unauthorized persons.
- ❖ Waste handling shall be in compliance with applicable Legislation.

Personal Safety

- ❖ M/s. Satvik Enterprises Limited shall provide his workers with Personal Protective Equipment (PPE) (e.g. Helmet, Goggles, Dust Mask, Ear Plug/ Muff, Hand Gloves etc.).

- ❖ The company shall maintain First-aid Facility at the site & also an ambulance for proper medical care of his workers.

Review of Contractor's HSE performance

- ❖ M/s Satvik Enterprises Limited shall submit the HSE performance periodically.
- ❖ Based on the review by M.s Satvik Enterprises Limited the contractor shall make suitable changes in the plan and take corrective & preventive actions.

10.7 FIRE AND SAFETY MANAGEMENT

Full-fledged fire fighting facilities will be provided in the plant to tackle any fire contingency. Regular safety audits will be carried out for improving safety performance. Onsite and Offsite Disaster Management Plans shall be developed and mock drills will be conducted at regular intervals to keep the disaster management team in a state of full preparedness.

10.8 ENVIRONMENTAL AWARENESS CAMPAIGN

In addition to training of employees in various aspects of pollution control activities of the plant, programmes like celebration of World Environment Day, World Safety Day, screening of films on environment, tree plantation etc. will be regularly carried out in order to create greater

awareness towards environment protection amongst employees and the people in the neighbouring areas.

10.9 LEGAL AND STATUTORY COMPLIANCE

All the environmental standards/ stipulations will be fully maintained by the Company.

The plant will obtain yearly clearance from the State Pollution Control Board for liquid, gases & solid wastes disposal. Specific information in prescribed forms will be submitted as per Water (Prevention & Control of Pollution) Act, Air (Prevention & Control of Pollution) Act etc. It will be supervised that all requirements under these Acts and Rules shall meet.

The engineer-in-charge for the Environmental Cell will prepare these reports with the help of the production engineers.

10.10 DOCUMENTATION

All the monitoring data, environmental and health related should be stored in systematic manner so that the specific records will be easily available as required.

10.11 INFORMATION DISSEMINATION AND PUBLIC RELATIONS

Everybody now a day is concerned about environmental pollution. A ferro alloy plant is, therefore, susceptible to people as a source of local pollution. It is, therefore, needed that people should be provided with environmental data related to the plant so that wrong apprehensions can be removed. This requires a well-planned public relation and information dissemination process so that unnecessary public intervention is avoided. In this connection, The Company will organize different programmes with participation from local bodies, encouraging local community in environmental projects (like tree plantation) etc.

10.12 ENVIRONMENT MANAGEMENT PLAN

A detailed study for the identification & prediction of anticipated environmental impacts of the project was carried out and the outcomes of the study are described in Chapter-4.0. The major impacts which require proper administrative management to protect the environment are further considered for formulation of Environmental Management Plan (EMP). The company will formulate Standard Operating Procedures for the environment management plan and execute all work accordingly. The company has allocated a budget of Rs. 2.6 Crores to be spent for

environment management plan with recurring cost of Rs. 0.26 Crores/annum and will ensure the company remains environmentally complaint at all times.

10.12.1 Air Environment Management

Following is the preliminary list of the air pollution abutment equipment has been envisaged and environmental mitigation for the proposed project,

SL. NO.	UNIT NAME	DESCRIPTION OF EQUIPMENT	NUMBERS	%EFFICIENCY
1.	Submerged Arc Furnaces (2×9 MVA)	Bag Filter	2 Nos.	>95%
Fund Allotted : For air environment management company has allocated a budget of Rs. 2.6 Crores with recurring cost of Rs. 0.26 Crores/ annum.				

10.12.2 Waste Water Management

The prevention and control of water pollution aim at conserving make-up water by recycling the waste water after treatment. The waste water, likely to be generated from the proposed plant is:

- Backwash Waste from Filtration Plant
- Run-off water from Raw Material Storage Yards
- Cooling Tower Blow-down
- Sewage & Canteen Effluents

Backwash from Filtration Plant will be led to a clarifier for removing suspended solids. The overflow from the clarifier will be reused in the plant water system. The Sludge from the clarifier will be dried and disposed through local agency.

Cooling Tower Blow-down from various recirculation systems will be cascaded for reuse in the process.

The plant will be designed as a “Zero Liquid Discharge (ZLD)” plant as far as the process effluents are concerned. The water will be recirculated through cooling and treatment. No plant effluent will be discharged outside the plant premises. The entire waste water will be recycled for various purposes inside the plant.

Domestic effluent from the various buildings/sheds of the plant will be treated in STP System.

Fund Allotted : For waste water management company has allocated a budget of Rs.0.12 Crores with recurring cost of Rs. 12 Lakhs/ annum.

10.12.3 Solid Waste Management

Solid waste generation and its disposal from the proposed units are presented below,

Sl. No.	Solid Waste	Proposed Quantity (TPA)	Utilization or Management
1	Ferro Manganese Slag	44,400	Used as a raw material for Silico Manganese Production
2	Silico Manganese Slag	29,520	Used for road construction or land filling purposes
3	Ferro Silicon Slag	1,217	Used for cement industries as a raw material & used for medium carbon silico manganese production purpose.
4	Ferro Chrome Slag	26,880	Used for road construction or land filling purposes after chrome recovery through Jigging Process and after TCLP test.

Fund Allotted : For solid waste management company has allocated a budget of Rs. 0.1 Crores with recurring cost of Rs. 10 Lakhs/ annum.

10.12.4 Noise Management

For noise management the company will take following measures: -

- Noise level survey will be carried out as per the prescribed guidelines and report will be submitted to concerned authorities as part of compliance report.
- Strict implementation of usage of PPEs like Ear plugs or muffs will be ensured during construction and operation phase.
- Proper training will be provided to workers exposed to high noise level areas.

- Alternation of duties and regular check-ups will be conducted to find any anomaly due to the noise pollution in the project.

Fund Allotted : For noise management company has allocated a budget of Rs. 0.06 Crores with recurring cost of Rs. 6 Lakhs/ annum.

10.13 OCCUPATIONAL HEALTH ACTIVITIES

10.13.1 Introduction

Occupational Health and Safety Management System exists in SSPL. In this, Management of Health and Safety are taken into consideration. The purpose of the Occupational Health and Safety Management System is as follows:

- Minimize risk to employees and others
- Improve business performance
- Assist the organization to establish a responsible image for health and safety.

10.13.2 Approach

The basic approach of the occupational health and safety management system involves the following steps:

- Identify the hazards involved in the activities of the organization.
- Evaluate the risks which are involved in the performance of these activities.
- Control these risks to an acceptable level.

All contractor personnel and temporary staff will be compelled to use safety equipment. Even the visitors will be advised to use helmet and safety shoes during plant visit. The list of PPE is given in **Table 10.3**.

TABLE: 10.3
PERSONAL PROTECTIVE EQUIPMENTS

Protection for	Equipment	Protection Against
Head	Safety helmet	Fall of objects/hitting against objects during construction, maintenance, etc.
	Electrical resistance helmet	Electrical shock.
	Welder's leather cap	Splashing of liquid etc.
Eye	Panorama goggles with clear plastic vision	Oil and paint splashes, dust and chips.
	Spectacle-type goggles with blue lens	High temperature flame during furnace work.
Ear	Ear plugs or muffs	High noise level.

Nose	Dust, fume mask Oxygen musk & Air musk	Fine dust particles, fumes & gas
Face	Welding helmet and shield	Welding fumes, sparks and UV rays.
Body	Apron	Falling of hot chips, slag's, etc.
	Safety belt	Falling of persons from height.
	Hand gloves	Heat radiation.
	Electrical resistance gloves	Electric shock.
	Canvas gloves	Contact with oil, grease, etc.
Leg	Safety Shoe	Striking by objects, fall of objects and stepping on sharp or hot objects.

10.13.3 STANDARDS FOR THE OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM

As per OHSAS 18001, the following specification is applicable to the organization as given below:

- The establishment of an Occupational Health and Safety Management System to eliminate risk to employees and other interested parties.
- Implement, Maintain and continually improve the occupational health and safety management system.
- Assign itself of its conformance with its stated occupational health and safety policy.

10.13.4 CORE ELEMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT

The basic core elements are:

- Occupational Health and Safety Policy
- Planning
- Implementation and operation
- Checking and corrective action
- Management review

10.13.5 OCCUPATIONAL HEALTH AND SAFETY POLICY

It sets an overall direction of the system. It lays down the principles involved as responsibilities, performance requirement, commitments, framework for setting objective and targets.

- In SEL, the hazards' places shall be identified and the nameplates will also be placed for the safety precaution to the relevant equipment.
- All the operational parts of the various departments will be identified and assessed.

- In the operational area, the broad categories of hazards could be mechanical, electrical, substance fire and explosions, which will be carefully monitored.

10.13.6 STRUCTURE AND RESPONSIBILITIES

In SEL, the following structure and responsibilities will form occupational health and safety management system.

- All HOD of respective departments will lay down the safety rules and safety status of their work places and they will have the authority to place the manpower accordingly.
- The communication between the worker and management will be clear about the position of hazards situation.
- The top management of the company provides resources such as human resources, technological resources and financial resources for the implementation and control of the situation.
- There is a quarterly evaluation of the improvement of the safety and occupational health of the employees.
- Safety officer monitors the compliance of safety rules.

10.13.7 TRAINING AWARENESS

In SEL, the workers, selected by their departmental head, training will be given. During training, the following topics will be discussed

- The occupational health and safety consequences of their activities.
- The emergency preparedness and response
- Importance of the occupational health and safety management system.
- Training to be taken into account the responsibility, ability and literacy of the person concerned and the nature and the extent of risk involved.

10.13.8 AUDIT OF OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT

In SEL, there will be a periodic internal audit, the main elements of which are given below:

- The planned arrangement and implemented system conforms to the specification.
- The Occupational Health and Safety Management system has been properly implemented and maintained.
- The audit status is provided to top management.
- There must be external auditor to evaluate the present status of monitoring.

10.13.9 MANAGEMENT REVIEW

In SEL, there will be continuing suitability adequacy and effectiveness of the established Occupational Health and Safety Management System. The necessary information about the system will be collected and reviewed.

During First-Aid training programme, classes on occupational health & hygiene will be held for the officers & staff. All employees will be exposed to this training.

10.13.10 PROPOSED HEALTH CHECK-UP PLAN

For the proposed Project pre-employment health check-up will be followed by periodical health check up with special attention to occupational health. The periodicity of occupational health check-up will be followed as per the following schedule:

Sl. No.	Age Limit (years)	Frequency of Health Check-up
1.	Below 31	Once in 5 years
2.	31 – 40	Once in 4 years
3.	41 – 50	Once in 2 years
4.	Above 50	Once a year

The health check-up will be conducted as per the pre-designed format which will include Chest X-rays, Audiometry, Spirometry, Vision Testing, ECG, Blood and Urine test etc.

Under Pre-employment check-up the following test will be conducted:

- Chest x-rays
- Audiometry
- Spirometry
- Vision testing (Far & Near vision, color vision and any other ocular defect)
- ECG
- Haemogram (examination of the blood)
- Urine (Routine and Microscopic)
- Complete physical examination

  - Musculo-skeletal disorders (MSD)
  - Backache
  - Pain in minor and major joints
  - Fatigue, etc.

Medical records of each employee will be maintained separately and will be updated as per finding during monitoring. Medical records of the employee at the end of his / her term will be updated.

Fund Allotted : For Occupational Health Management company has allocated a budget of Rs. 0.08 Crores with recurring cost of Rs. 8 Lakhs/ annum.

10.14 ENERGY CONSERVATION

The following measures are will be adopted for reduction in specific energy consumption:

- Satvik Enterprises Limited shall provide solar generation on roof tops of buildings, for solar lighting system for all common areas, street lights, parking around project area and maintain the same regularly.
- LED lighting system shall be installed throughout the office buildings and plant area.
- Use of energy efficient electric motors complying IEE3 Standards.
- Use of highly efficient VFD, minimizing idle running of machines.
- Optimizing loads and periodic preventive maintenance & lubrication
- Prevention of leakages of compressed air
- Optimized compressed air pressure.
- Periodic energy audits.
- Training, awareness and motivational programmes.
- Maximum utilization of renewable energy resources. Installation of energy efficient lightings. Use of energy saving light fittings.

10.15 ENVIRONMENTAL COST

Environmental Cost Component

The total project cost for the proposed expansion project has been estimated to be Rs. 36.53 Crores. The capital cost of environmental mitigation measures is estimated to be Rs. 2.6 Crores, which includes:

Item	Cost (in Crores)
Cost of Air Pollution Control Systems	2.1
Cost of Water conservation & Pollution Control	0.12
Cost of Solid /Hazardous Waste Management System	0.1
Green belt development	0.0216
Noise Reduction Systems	0.06
Occupational Health Management	0.08
Risk Mitigation & Safety Plan	0.05
Environmental Management Department	0.09
GRAND TOTAL	**2.60**

Calculated annual cost of environmental mitigation measures for the proposed project has been estimated to be Rs. 260 Lakhs. The annual estimated environmental mitigation costs include:

Item	Cost (in Lakhs)
Air Pollution Control Systems	210
Water conservation & Pollution Control	12
Solid /Hazardous Waste Management System	10
Green belt development	0.216
Noise Reduction Systems	6
Occupational Health Management	8
Risk Mitigation & Safety Plan	5
Environmental Management Department	9
GRAND TOTAL	**260**

CHAPTER-11.0
SUMMARY & CONCLUSION

11.1 INTRODUCTION

M/s Satvik Enterprises Limited, a Private Limited Company, was incorporated on 6th May, 1997, having its registered office at 1, Park lane, Kolkata - 700 016 in West Bengal. The Company emerged as one of the players in Ferro Alloy Industry in West Bengal after successful implementation and operation of their plant at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Dist.: Bankura, West Bengal. The company has earned an appreciative clientele in the Indian market as well as overseas markets. The quality and performance of company's product in the global market are well recognized.

M/s Satvik Enterprises Limited, proposes to set up a ferro-alloy plant by installation of 2x9 MVA Submerged Arc Furnaces along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal.

The overall project scenario with rated capacity per annum are presented in **Table-11.1**.

TABLE-11.1
OVERALL PROJECT SCENARIO

	Units	Capacity
Proposed	Submerged Arc Furnaces (2x9 MVA)	32,800 TPA Si-Mn or 44,400 TPA Fe-Mn or 15,200 TPA Fe-Si or 33,600 TPA Fe-Cr
	Ferro-Chrome Briquetting Plant	10 TPH

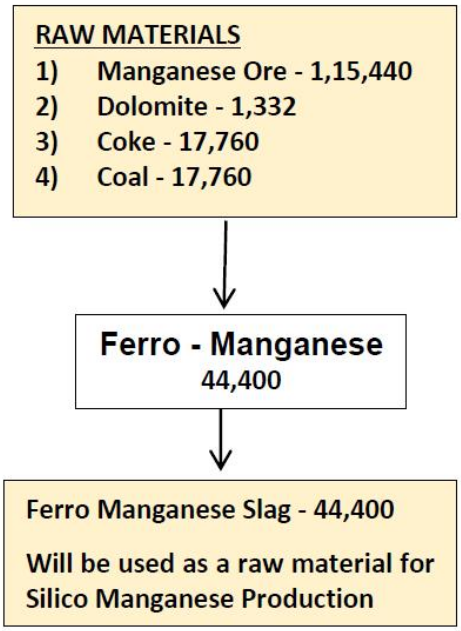
The major raw material, which will be handled, consists of Manganese Ore, Chrome Ore, Coke, Coal, Dolomite, Quartzite etc. The Manganese Ore can be imported from Australia / South Africa and also can be sourced from Barbil / Nagpur / Bellary region in the Country. Chrome Ore can be sourced from Orissa. Coal and Coke can be sourced from West Bengal and Jharkhand and can also be imported from China / Ukrain, Charcoal can be sourced from Andhra / Tamil Nadu, Lam Coke can be imported from China, Dolomite can be sourced from Orissa / Chhatisgarh and Quartzite can be sourced from West Bengal and Andhra Pradesh. etc. The annual requirement of major raw materials, which will be required for the proposed project is presented in the material balance diagram as presented below in Table-112.

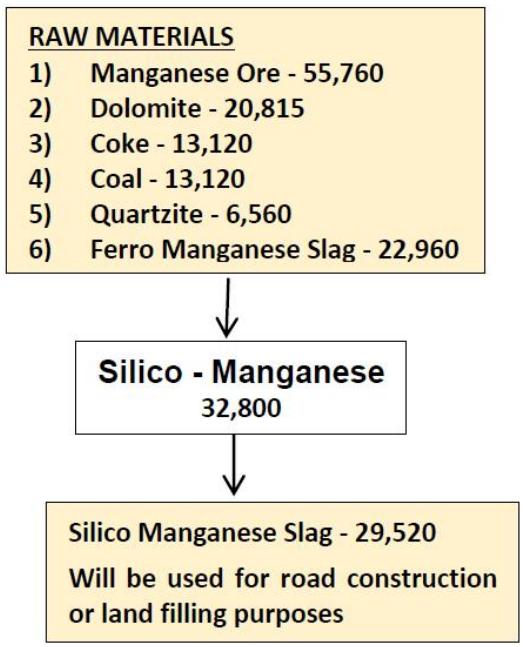
Raw materials will be received at plant site by road. All the trucks for raw material and finished product transportation shall comply with the applicable environmental norms. The Material Balance diagram for the proposed expansion project is depicted in Figure-11.1.

Table – 11.2
LIST OF RAW MATERIALS

Sl No.	Items	Source	Raw Material Requirement
			MT
A	FOR PRODUCTION OF SILICO MANGANESE		
1	Manganese Ore	Imp: Australia / South Africa	55,760
2	Fe - Mn Slag	Dom: Balaghat / Barbil / Bellary	22,960
3	Coal	Own Generation / West Bengal	13,120
4	Coke	West Bengal / Jharkhand	13,120
5	Quartz	West Bengal / Jharkhand	6,560
B	FOR PRODUCTION OF FERRO MANGANESE		
1	Manganese Ore	Imp: Australia / South Africa	1,15,440
2	Coal	Dom: Balaghat / Barbil / Bellary	17,760
3	Coke	Imp: China Dom: West Bengal / Jharkhand / Assam	17,760
4	Dolomite	Orissa / Chhatisgarh	1,332
C	FOR PRODUCTION OF FERRO SILICON		
1	Quartz	West Bengal / Andhra Pradesh	25,840
2	Mill Scrap	West Bengal / Jharkhand	6,536
3	M S Scrap	West Bengal / Jharkhand	304
4	Charcoal	Andhra Pradesh / Tamilnadu	13,680
5	Lam Coke	Imp: China Dom: West Bengal / Jharkhand / Assam	8,360
D	FOR PRODUCTION OF FERRO CHROME		
1	Chrome Ore	Orissa	87,360

2	Coke	Imp: China Dom: West Bengal / Jharkhand / Assam	13,440
3	Coal	West Bengal / Jharkhand	6,048
4	Quartz	West Bengal / Andhra Pradesh	672
5	Dolomite	Orissa / Chhatisgarh	672
6	Lime	Orissa / Chhatisgarh	840
7	Molasses	Uttar Pradesh	2,016





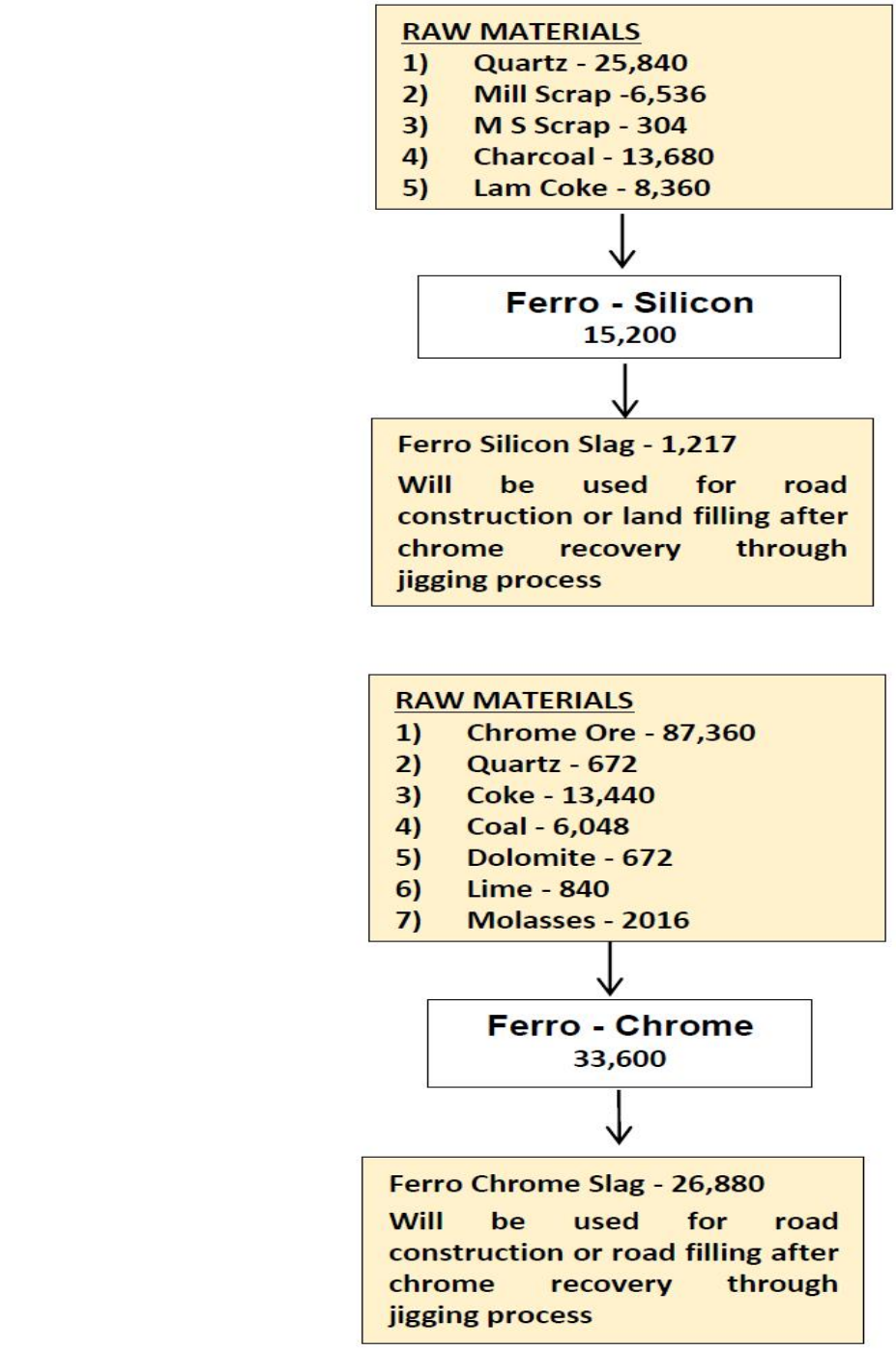


FIGURE - 11.1 : MATERIAL BALANCE DIAGRAM

11.2 SITE LOCATION

The project site is located at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Dist.: Bankura, West Bengal. The geographical co-ordinates of the project site are varying between Latitude: 23°23'54.60"N to 23°24'59.32"N and Longitude 87°17'15.69"E to 87°17'24.19"E with Above Mean Sea Level 272 ft (83m).

State Highway-9 (Durgapur-Bankura connecting State Highway) is passing at a distance of about 1.7 Km from the Project site in West-north-west direction and National Highway-2 is passing at about 13.5 Km from the Project site in North North-east direction.

The nearest Airport is Kaji Nazrul Islam Airport, Andal which is located at about 23.0 Km away in NNW direction from the project site. The important Airport - Netaji Subhas Chandra Bose International (NSCBI) Airport, Kolkata, is situated at about 144 Km distance in South-east direction w.r.t. project site. The project site has good connectivity with sea port of Kolkata, Haldia, Paradip and Vishakhapatnam.

The important river near the Project site is the River Damodar flowing at a distance of 6.7 Km from the Project site in North-east direction. The nearest important town - Barjora is located at about 3.0 Km away in NNW direction from the Project site. Bankura, the District Head Quarter is located at around 30.0 Km distance in South-west direction from the project site.

The location of project site on Google view map is presented in **Figures-11.2**.

Fig 11.2

Project Site:
Mouza:Sahebdihi, PO: Hat Asuria, PS: Barjora, Pin: 722204, District: Bankura, West Bengal

Site Co-ordinate:
Latitude 23°23’54.60"N to 23°24’59.32"N and
Longitude 87°17’15.69"E to 87°17’24.19"E

Mean Sea Level : 272 ft (83m)

11.3 PROJECT HIGHLIGHTS

The principal features or highlights of the proposed expansion project of **M/s Satvik Enterprises Limited,** under study are as follows:

Location	Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Pin: 722204, District: Bankura in West Bengal Its geographical co-ordinates of the project site are Latitude: 23°23’54.60"N to 23°24’59.32"N and Longitude 87°17’15.69"E to 87°17’24.19"E with Above Mean Sea Level 272 ft (83m).
Land requirement	The proposed project will be installed on total 2.18 hectares (5.38 acres) of land, which has been acquired and is in possession of the Company.
Raw water requirement	Water to the tune of 70 KLD will be needed for the proposed project.

& source	Source: Barjora Panchayat Samity
Power requirement	Proposed power requirement will be about 16 MVA. Source: DVC (Damodar Valley Corporation)
Effluent generation & disposal	The plant will be designed as a zero liquid discharge plant. The water will be recirculated through cooling and treatment. The entire wastewater will be recycled for various purposes inside the plant. Domestic wastewater will be treated in Sewage Treatment Plant (STP). Treated wastewater will be used for greenbelt purpose inside the plant premises.
Air pollution control	Adequate control measures like bag filters, dust suppression system & Stacks of adequate height at relevant points will be installed.
Solid Waste Management	Slag generated during Ferro Manganese production will be used as a raw material for Silico Manganese production. Slag generated during Silico Manganese will be used for road construction / land filling. Ferro Chrome slag after chrome recovery through the Jigging process will be used in land filling / road construction purpose after TCLP test. Ferro Silicon Slag will be used in cement industries as a raw material & used for medium carbon silico manganese production purpose. Domestic solid waste from the plant and staff quarters will be disposed of suitably in consultation with the concerned Authority.
Manpower	180 persons (both regular and contractual)
Project cost	Rs. 36.53 Crores

11.4 BASELINE ENVIRONMNETAL SCENARIO

The area falling within the radius of 10 km around the project site at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal has been considered as study area. On-site environmental quality monitoring was carried out from **1st March, 2022 to 31st May, 2022**.

11.4.1 Meteorology

The monthly maximum and minimum temperatures recorded on-site during the aforesaid monitoring period varied between (39.5 – 42.5)°C and (18.0 – 22.0)°C respectively with overall maximum and minimum temperatures being 42.5°C and 18.0°C respectively.

The monthly minimum and maximum relative humidity recorded on-site during the said monitoring period varied between (45.0 - 59.0)% and (71.0 - 87.0)% respectively, the overall maximum and minimum being 87.0% and 45.0% respectively.

The maximum wind speed 7.45 Km/hr was recorded in the month of March, 2022 while the overall mean wind speed during the whole monitoring period was 6.9 Km/hr.

11.4.2 Ambient Air Quality

Ambient air quality was monitored at eight (8) locations around the project site.

The overall mean values of PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO in the area (mean of all the 8 locations) were 71.1 $\mu g/m^3$, 30.0 $\mu g/m^3$, 10.1 $\mu g/m^3$, 22.1 $\mu g/m^3$ and 0.452 mg/m^3 respectively.

11.4.3 Water Quality

Water samples were collected and analyzed at ten (10) locations to assess the surface water quality in the study area. Water samples were collected from nine (9) locations to assess the baseline status of the ground water quality of the study area.

The pH values of the collected two water samples from the river water were found pH 7.2 - 7.3. Conductivity was found in the range of (251-292) µS/cm. Value of Dissolved Oxygen were observed (6.8- 7.1) mg/lit. Value of BOD were found (2 - 3) mg/lit respectively. Boron and Ammonia (as NH_3-N) was below detection limit (<0.02 and <0.05 mg/lit) in these sample. Sodium Absorbance Ratio Iron were found (0.7 - 0.9) mg/lit respectively.

The pH values of the collected pond water samples were found in the range of (7.1 – 7.6). Conductivity was found in the range of (389-636) µS/cm. Value of Dissolved Oxygen were observed (5.8- 6.6) mg/lit. Value of BOD were found (2 - 7) mg/lit respectively. Boron and Ammonia (as NH_3-N) was below detection limit (<0.02 and <0.05

mg/lit) in these sample. Sodium Absorbance Ratio Iron were found (2.0 - 0.9) mg/lit respectively.

The pH values of collected ground water samples were found in the range of (7.15 – 7.78). Total Dissolved Solids (TDS) was found in the range of (314 – 583) mg/lit, while Total Hardness (as $CaCO_3$) was found in the ranges of (146 – 238) mg/lit. Alkalinity (as $CaCO_3$) was found in the ranges of (138 – 278) mg/lit. Calcium (as Ca) and Magnesium (as Mg) were found varying in the ranges of (34 – 71) mg/lit and (5 – 15) mg/lit respectively. Sulphate (as SO_4), Nitrate (as NO_3) and Chloride (as Cl) were observed in the ranges of (25 – 74) mg/lit, (1.2 – 3.5) mg/lit and (75 – 126) mg/lit respectively. Iron (as Fe) content was found in the range of (0.21 – 0.42) mg/lit and Zinc (as Zn) content was found <0.05 mg/lit.

11.4.4 Noise

A total of 10 locations around the proposed project were selected for the measurement of ambient noise levels.

During the day time, the equivalent noise levels were found to vary in the range of (51.8 - 67.3) dB (A) while in the night time, the equivalent noise levels were observed to be varying in the range of (41.0 - 54.6) dB (A).

11.4.5 Ecology

The study area is found to have a good vegetation cover due to helpful climatic conditions and good soil quality in the area. There are good number of plantation patches in the study area and dense vegetation cover around settlement areas. The overall floral composition in the whole study area is quite rich.

Identically the terrestrial fauna of the area are also fairly rich. The richness and bio-diversity of aquatic flora and fauna is also very high in the study area.

11.4.6 Demography and Socio-economy

The major portion of the study area is basically rural in nature and some portion is urban with moderately populated with the total population of 2,86,084 (as per 2011 Census). Scheduled Caste (SC) and Scheduled Tribe (ST) population in the study area is about 30.73% and 0.72% w.r.t. the total population respectively. The sex ratio in the study area is about 941 females per 1000 males. The

overall literacy rate is about 67.1% of the total population. The principal language is Bengali and the principal staple food is rice.

11.5 ENVIRONMENTAL IMPACTS OF PROPOSED PROJECTS

11.5.1 Impacts on Air Quality

The Stack emissions from the plant are mostly Particulate matters (PM). The major source of continuous emission from the proposed project will be total 2 stacks.

As recommended by CPCB, GLCs at various receptor locations within 10 km radius have been computed for the three months' period (**1st March, 2022 to 31st May, 2022**) representing the summer season, based on the hourly meteorological data of this period. The computation has been made applying Industrial Source Complex (ISC3) model, developed by United States Environmental Protection Agency (USEPA), which is most widely used and also recommended by CPCB (PROBES/70/1997-98).

Hence, the maximum incremental value of PM would be about 0.29 which will occur at a distance of 0.5 km. in 'NW' direction w.r.t. the ARP.

The predicted maximum GLCs of SO_2, NOx & PM due to the operation of the proposed expansion project is well within the prescribed limits. Therefore, there will not be any significant impact on the Air Quality of the area due to the operation of the project.

11.5.2 Impacts on Water Quality

Company will follow "the zero waste water discharge concept" and the entire waste water will be recycled to the plant for various uses. As no waste water will be discharged into any outside water body, there will be no impact on the water quality of the area.

11.5.3 Impacts on Soil

Solid waste generated from the plant will be managed in proper manner. This will ensure that there is no impact on soil quality due to the disposal or deposition of solid waste.

TABLE-11.3
SOLID WASTES AND THEIR UTILIZATION

Sl. No.	Solid Waste	Proposed Quantity (TPA)	Utilization or Management
1	Ferro Manganese Slag	44,400	Used as a raw material for Silico Manganese Production
2	Silico Manganese Slag	29,520	Used for road construction or land filling purposes
3	Ferro Silicon Slag	1,217	Used for cement industries as a raw material & used for medium carbon silico manganese production purpose.
4	Ferro Chrome Slag	26,880	Used for road construction or land filling purposes after chrome recovery through Jigging Process and after TCLP test.

11.5.4 Impacts on Land Use

The proposed development will be confined within the boundary of the allocated land only, earmarked for the industrial purpose. So, there will not be any significant impact on the land use pattern of the area.

11.5.5 Impacts on Biological Environment

The surrounding area has substantial vegetation in the form of village orchards, roadside trees and agriculture. If the gaseous emission is controlled properly, there will not be any significant impact. There will be sufficient plantation of trees at the plant site in addition to the existing plantation. All these measures, if implemented properly will ensure that no significant impact is there on the local vegetation from the proposed project and may improve the vegetation scenario of the area.

No waste water will be discharged outside the plant premises. Therefore, no impact on the aquatic ecology of the water bodies.

11.5.6 Impacts on Socio-Economic Environment

The project will offer considerable direct and indirect employment potential during construction phase and operation phase, which will have beneficial impact.

11.6 ENVIRONMENTAL MONITORING PROGRAMME:

Details of the environmental monitoring schedule/frequency, which will be undertaken for various environmental components, as per are given in **Table-11.4.**

Table-11.4

POST PROJECT MONITORING PROGRAMME

Discipline	Locations	Parameters	Frequency	Fund Provision (Annual Cost in Lakhs)
Meteorology (Met Station)	One	Temperature, Rainfall, Relative Humidity, Atmospheric Pressure, Wind Speed and Direction	Hourly	2 lakhs
Ambient Air Quality	3-4 relevant locations	PM_{10}, $PM_{2.5}$, SO_2, NO_2 & Benzopyrene	Twice in a week	25 lakhs
Stack Emission	Each Unit	PM	Quarterly	5 lakh
Fugitive Emission	3-4 relevant locations	PM_{10}, $PM_{2.5}$, SO_2, NO_X	Twice in a year	2 lakh
Performance Monitoring of APC devices	Each Unit	Pressure Drop & Pollutants' Emission	Once in a year	2 lakh
Effluent	Cooling Tower blow down	pH, Total Suspended Solid, BOD, COD, Fe, Zn, Ammonical Nitrogen, Oil & Grease	Every 2 months	2 lakh
Ground Water Quality	3-4 Locations	pH, Temperature, Conductivity, Turbidity, Alkalinity, Chlorine, Total Suspended Solid, Total Dissolved Solids, Total Hardness, Ca-	Twice in a year	2 lakh

		hardness, Mg-hardness, Coliform, Fe, Cu, Cd, Cr^{6+}, Pb, As, Hg, Zn		
Noise	Plant Area and Nearby villages	Day and Night Time Noise Levels	Half-yearly	1 lakh
TOTAL				**41 lakhs**

11.7 PROJECT BENEFITS

Implementation of the proposed expansion project will be a boon to the region and will give various benefits to the society of the region.

Benefits from the proposed project:

- Improvement of living conditions to the local people
- Improvement of the Society
- Infrastructure Development
- Improvement of Hospitality Services
- Employment Opportunities, both direct and indirect

11.8 ENVIRONMENTAL MANAGEMENT PLAN

M/s Satvik Enterprises Limited, will develop various management activities for the Environmental Management Programme which will meet all statutory requirements and also help to improve environmental quality.

In order to improve the aesthetic look of the area and enhance the land use as well as to compensate for any loss in ecology during construction, adequate plantation programmes in and around the project site have been planned and will be implemented. Development of green belt will include plantation of trees along boundary of the factory, roads, raw material yard and in other available spaces in and around the plant. 33% of factory area will be covered under green cover.

A detailed monitoring for different environmental parameters will be carried out as per direction of State Pollution Control Board and statutory requirements. An environmental management group will be established to implement and monitor the management plan.

M/s Satvik Enterprises Limited has earmarked 0.72 Hectares (1.78 acres) of land (33% of 2.18 hactares/5.38 acres) for Green Belt

Development within its proposed plant site at Mouza: Basudevpur (North), PO: Hat Asuria, PS: Barjora, District Bankura in West Bengal. Around 1800 number of trees (@2500 nos. of tree per hectares) has been considered under plantation programme in greenbelt development and the greenbelt development is already completed for the overall project.

The total project cost for the proposed expansion project has been estimated to be Rs. 36.53 Crores. The capital cost of environmental mitigation measures is estimated to be Rs. 2.6 Crores, which includes:

Item	Cost (in Crores)
Cost of Air Pollution Control Systems	2.1
Cost of Water conservation & Pollution Control	0.12
Cost of Solid /Hazardous Waste Management System	0.1
Green belt development*	0.0216
Noise Reduction Systems	0.06
Occupational Health Management	0.08
Risk Mitigation & Safety Plan	0.05
Environmental Management Department	0.09
GRAND TOTAL	**2.60**

Calculated annual cost of environmental mitigation measures for the proposed project has been estimated to be Rs. 260 Lakhs. The annual estimated environmental mitigation costs include:

Item	Cost (in Lakhs)
Air Pollution Control Systems	210
Water conservation & Pollution Control	12
Solid /Hazardous Waste Management System	10
Green belt development*	0.216
Noise Reduction Systems	6
Occupational Health Management	8
Risk Mitigation & Safety Plan	5
Environmental Management Department	9
GRAND TOTAL	**260**

11.9 OVERALL CONCLUSION OF THE PROJECT

All the impacts likely to have an effect on the environment have been identified and efficient / adequate mitigation measures have been proposed for Sustainable Environment.

Considering the probability of likely impacts, the proponent has planned adequate mitigation measures and Environmental Management Plan. Further, the proponent has been undertaking various activities which have beneficial impacts on the socioeconomic environment. Measures like 100% rainwater harvesting, energy conservation and greenbelt development are also commendable for mention. Looking to the overall project scenario, employment potential and allied development plans will be a great impetus to the development of the society and the economy.

The best environment savvy technology including all safety aspects shall be adopted in the proposed project. All the above safe guards and the respective mitigation measures shall ensure sustainable environment.

CHAPTER-12.0 DISCLOSURE OF CONSULTANT ENGAGED

Brief Profile of M/s. Envirotech East Pvt. Ltd.

M/s. Envirotech East Pvt. Ltd., Kolkata has acquired the status of one of the Prime organizations of the country in undertaking various assignments in the areas like Environmental Impact Assessment, Environment Management Plan, Risk Analysis, Detailed Project Report, Environmental Audit / Statement, Geo-Technical Statement etc., since it was formed in 1988 by Prof. G. D. Agrawal, former Dean, IIT Kanpur and Member Secretary, Central Pollution Control Board.

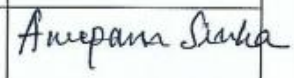
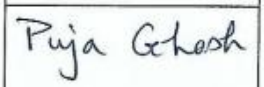
M/s Satvik Enterprises Limited, a Private Limited Company, was incorporated on 6th May, 1997, having its registered office at 1, Park lane, Kolkata - 700 016 in West Bengal. The Company emerged as one of the players in Ferro Alloy Industry in West Bengal after successful implementation and operation of their plant at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, Dist.: Bankura, West Bengal.

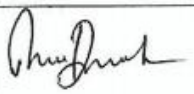
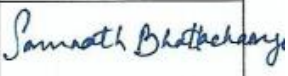
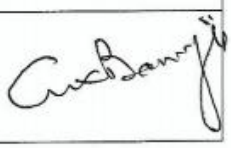
M/s Satvik Enterprises Limited, proposes to set up a ferro-alloy plant by installation of 2x9 MVA Submerged Arc Furnaces along with Briquetting Plant (10 TPH) at Mouza: Sahebdihi, PO: Hat Asuria, PS: Barjora, District: Bankura, West Bengal.

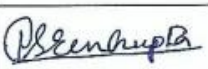
The company has a well-equipped laboratory, which is recognized by Ministry of Environment, Forest & Climate Change (MoEF&CC), Govt. of India and West Bengal Pollution Control Board (WBPCB).

TABLE-12.1
MANPOWER ENGAGED FOR EIA STUDY FOR PROPOSED FERRO ALLOY PLANT AT MOUZA: SAHEBDIHI, PO: HAT ASURIA, PS: BARJORA, DISTRICT BANKURA, WEST BENGAL

Discipline	Name of Expert	Key Qualifications indicating area of specialization relevant to the respective discipline	Involvement (Period & Task)	Signature
EIA Coordinator : Mr. T. Kundu		Bachelor of Technology (Chemical Engineering)	July, 2022 to till date Assessment & identification of the overall project, co-ordination with respective functional area experts, finalisation of action plans for the overall preparation of EIA report	
Functional Area Experts involved:				
Air Pollution	Mr. T. Kundu	Bachelor of Technology (Chemical Engineering)	July, 2022 to till date Finalization of monitoring locations for Ambient Air Quality Monitoring, evaluation of Ambient Air Quality results, suggestions & finalization of air pollution control measures, with client and contribution to overall EIA report preparation.	
Meteorology	Mr. A. K. Sinha	P.G. Diploma in Environmental Science and Technology	July, 2022 to till date Identification of air emission sources and their inventorisation, prediction of cumulative impacts on ambient air quality due to all identified point & mobile sources, suggestions & finalization of mitigation measures with project proponent and	

			contribution to overall EIA report preparation.	
Water Pollution Control	Mr. Asoke Kumar Banerjee	M.Sc. (Chem.)	July, 2022 to till date Finalization of sampling locations for surface water and ground water quality monitoring, evaluation of water quality results, analysis of water balance, identification of sources for wastewater generation and give suggestions on suitable water pollution control, exploring the ways for conservation of water, identification & assessment of impacts, finalization of mitigation measures with project proponent and contribution to overall EIA report preparation.	
Hydrology	Dr. Somenath Bhattacharya	Ph.D in Geology	July, 2022 to till date Assessment of existing Geology and hydrology of the area, Understanding and representing groundwater conditions, finalization of groundwater sampling locations, finalization of survey findings, identification of probable impact due to proposed industrial activity, suggestion of mitigation measures and contribution to overall EIA report preparation.	
Ecology & Bio-diversity	Dr. (Mrs.) Anupam Sinha	Ph.D in Botany	July, 2022 to till date Assessment of the existing Ecology & Bio-diversity with proper emphasis on eco-sensitive locations, assessment of possible impacts to the biological and	
	Ms. Puja Ghosh (TM)	M.Sc in Environmental Science		

			ecological environment of the area due to the proposed industrial activity and EIA report preparation.	
Noise & Vibration	Mr. R.K. Dasgupta	Bachelor of Engineering (Mechanical)	July, 2022 to till date Finalization of noise sampling location and analysis of data, identification of impacts, suggestions & finalization of suitable mitigation measures with client and contribution to overall EIA report preparation.	
Land Use	Dr. Somenath Bhattacharya	Ph.D in Geology	July, 2022 to till date Site visit, supervising development of land use maps of study area using GIS tools, finalization of landuse maps, based on ground truth verification, identification of any probable changes due to the proposed industrial activity and contribution to EIA report preparation.	
Solid & Hazardous Waste	Mr. Asoke Kumar Banerjee	M.Sc. (Chem.)	July, 2022 to till date Identification of potential solid & hazardous waste generating sources and their inventorisation, finalization of waste management strategies, identification of impacts, finalization of mitigation measures with project proponent and contribution to overall EIA report preparation.	
Soil Conservation	Mr. Asoke Kumar Banerjee	M.Sc. (Chem.)	July, 2022 to till date Finalization of soil sampling	

			locations, identification of potential sources of impacts due to project, finalization of suitable mitigation measures with project proponent and contribution to overall EIA report preparation.	
Risk & Hazard	Mr. T. Kundu	Bachelor of Technology (Chemical Engineering)	July, 2022 to till date Identification of major hazards, assessment of risks associated with the proposed project, quantification of the identified risks with the help of the standard software. preparation of on-site and off-site emergency plan and contribution to overall EIA report preparation.	
Socio-economics	Prof. Pabitra Sengupta	M.Sc. (Economics)	July, 2022 to till date Field survey, assessment of the existing socio-economic scenario of the area, assessment of possible changes to socio-economics of the area due to the proposed project and contribution to overall EIA report preparation.	

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Envirotech East Private Limited
UN F13, 1050/1 Survey Park, Kolkata - 700 075

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Thermal power plants	4	1 (d)	A
2	Metallurgical industries (ferrous & nonferrous) - both primary & secondary	8	3(a)	A
3	Cement plants	9	3 (b)	A
4	Petroleum refining industry	10	4 (a)	A
5	Coke oven plants	11	4 (b)	A
6	Petrochemical based processing	20	5 (e)	A
7	Synthetic organic chemicals industry	21	5 (f)	A
8	Distilleries	22	5 (g)	A
9	Pulp & paper industry excluding manufacturing of paper from waste paper and manufacture of paper from ready pulp without bleaching	24	5 (i)	A
10	Ports, harbours, break waters and dredging	33	7 (e)	A
11	Building and construction projects	38	8 (a)	B
12	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated Feb. 16, 2021 and supplementary minutes dated Aug. 13 and Oct.19, 2021 posted on QCI-NABET website

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/21/2192 dated Dec. 29, 2021. The accreditation needs to be renewed before the expiry date by Envirotech East Private Limited, Kolkata following due process of assessment.

Sr. Director, NABET
Dated: Dec. 29, 2021

Certificate No.
NABET/EIA/2124/SA 0145

Valid up to
Sep. 12, 2022

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

WEST BENGAL POLLUTION CONTROL BOARD

(Department of Environment, Government of West Bengal)
Paribesh Bhawan
Bldg. No. 10A, Block – LA, Sector – III, Bidhannagar, Kolkata – 700 106
Tel: 2335-9088 / 5076 / 5079 / 8861 / 7428 / 8211
Fax: (0091) (033) 2335-2813 / 8073 / 5272
Website: www.wbpcb.gov.in

Memo No: 0920 -5/WPB-S/99 (Part-VI) Date: 29 .03.2022
[E-File: WBPCB-15012(14)/1/2021-SEC(WBPCB)-WBPCB]

ORDER

In exercise of the power conferred under section 17(2) of the Water (Prevention and Control of Pollution) Act 1974 and under section 17(2) of the Air (Prevention and Control of Pollution) Act 1981, the West Bengal Pollution Control Board (hereinafter referred as the "State Board") recognizes Private/Government Laboratories for the purposes of environmental monitoring within the State of West Bengal.

The validity of recognition of the Private/Government Laboratories would expire on 31.03.2022. The State Board has decided to **extend the validity of recognition up to 30.06.2022** i.e. for another three (3) months.

Sl. No.	Name & address of the Laboratory	Reference order(s) of WBPCB	Processing fees payable
1.	M/s. Asansol Mines Board of Health, Court Compound, Katchari Road, P.O.- Asansol Court, Dist- Paschim Bardhaman	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 2000/-
2.	M/s. Bharat Foundation 25/11A, K. P. Roy Lane, Kolkata- 700031	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
3.	CSIR- Central Mechanical Engineering Research Institute Mahatma Gandhi Avenue, Durapur-713209, Paschim Bardhaman	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 2000/-
4.	M/s. Eco Care Manoj Talkies Basement, Asansol, Burdwan	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
5.	M/s. Edward Food Research and Analysis Centre Limited Subhash Nagar, PO-Nilgunj Bazar, Barasat, Kolkata -700121	147-5/WPB-S/99 (Part-V) dated 31.12.2019 0989-5/WPB-S/99 (Part-V) dated 27.05.2020 2342-5/WPB-S/99 (Part-V) dated 28.12.2020 0922-5/WPB-S/99 (Part-VI) dated 13.04.2021 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
6.	M/s. Envirocheck 189 & 190, 192 &63B, Rastraguru Avenue, Kolkata- 700028	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
7.	M/s. Envirotech East (P) Ltd. 100, Kalikapur, Madurdaha, Kolkata- 700107	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
8.	M/s. Fresh Environment Consultancy 123, R. N. Tagore Road, Berhampore, Murshidabad Pin-742101	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 2000/-
9.	M/s. Good Earth Enviro Care S. D. Park, Kusumba, P.O.- Narendrapur, Kolkata-700103	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
10.	M/s. Green Vision Urvashi Malhar, Phase II, MEAV-25, Bengal Ambuja Housing Complex, City Centre, Durgapur-713216	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
11.	M/s. Indicative Consultant India HPL Link Road, Basudevpur, Khanjanchak, Haldia, Dist- Purba Medinipur, Pin-721602	147-5/WPB-S/99 (Part-V) dated 31.12.2019 0868-5/WPB-S/99 (Part-V) dated 13.03.2020 1220-5/WPB-S/99 (Part-V) dated 21.09.2020 0697-5/WPB-S/99 (Part-VI) dated 08.03.2021 1680-5/WPB-S/99 (Part-VI) dated 01.09.2021 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-

Sl. No.	Name & address of the Laboratory	Reference order(s) of WBPCB	Processing fees payable
12.	M/s. J. M. Biotech (Pvt) Ltd. Sipta, P.O.- Amila, PS. Raina, Purba Bardhaman-713423	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
13.	M/s. Mitra S. K. Pvt. Ltd. Udyan Industrial Estate, P-48, 3- Pagla Danga Road, Kolkata- 700015	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
14.	M/s. N. D. International 107B, Block-F, New Alipore Kolkata- 700053	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
15.	M/s. Pollution Analizer Consultant 10, Sourin Roy Road, (2nd & 3rd Floor) Behala Kolkata-700034	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
16.	M/s. Pollution and Project Consultants P- 145, Bangur Avenue Block A, Kolkata-700055	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
17.	M/s. Qualissure Laboratory Services 361, Prantik Pally, 45/361, Bose Pukur Road, Kolkata- 700107	147-5/WPB-S/99 (Part-V) dated 31.12.2019 0623-5/WPB-S/99 (Part-VI) dated 26.02.2021 1021-5/WPB-S/99 (Part-VI) dated 04.05.2021 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
18.	M/s. Quality Control Laboratory, PO: Haldia Oil Refinery, Dist: Purba Medinipur, Pin-721606	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 2000/-
19.	M/s. R.V. Briggs & Co. Pvt Ltd. 9, Bentinck Street, 1st Floor, Taher Mansion, Kolkata- 700001	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
20.	M/s. S. M. Scientific Service 486, Dumdum Park, Kolkata-700055	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
21.	M/s. Scientific Research Laboratory 90, Lake East (4th Road), Santoshpur, Jadavpur, Kolkata - 700075	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
22.	M/s. SGS India Pvt. Ltd. CS Plot No.- 512(P), Mauza - Hanspukuria, Diamond Harbour Road, P.O. - Joka, Dist.- South 24 Paraganas, Kolkata- 700104	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
23.	M/s. Superintendence Co. of India Pvt Ltd Plot- y-23, Block-EP, Sector-V, Salt Lake City, Kolkata- 700091	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-
24.	M/s. Unitech Environmental Services Pvt. Ltd. 52D/12/1A, Babu Bagan Lane, Kolkata-700031	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 2000/-
25.	M/s West Bengal Waste Management Limited (A division of Ramky Enviro Engineers Ltd) J. L. No. -103, Mouza - Purba Srikrishnapur, P.S.- Sutahata, Haldia, Dist. -Purba Midnapur, Pin- 721635	147-5/WPB-S/99 (Part-V) dated 31.12.2019 2600-5/WPB-S/99 (Part-VI) dated 15.12.2021	Rs. 3000/-

The terms and conditions and the recommended parameters as mentioned in the above referred respective order(s) of the State Board will remain same and unaltered.

The Laboratories are requested to deposit the requisite processing fees mentioned against respective laboratory, to the State Board, within 30.04.2022.

Roshni Sen
Member Secretary, WBPCB

रजिस्ट्री सं० डी० एल०-33004/99 REGD. NO. D. L.-33004/99

भारत का राजपत्र
The Gazette of India

असाधारण
EXTRAORDINARY
भाग II—खण्ड 3—उप-खण्ड (ii)
PART II—Section 3—Sub-section (ii)
प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 4549] नई दिल्ली, शुक्रवार, नवम्बर 16, 2018/कार्तिक 25, 1940
No. 4549] NEW DELHI, FRIDAY, NOVEMBER 16, 2018/KARTIKA 25, 1940

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 15 नवम्बर, 2018

का.आ. 5768(अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) नियम, 1986 के नियम 10 के साथ पठित, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 12 की उपधारा (1) के खंड (ख) और धारा 13 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए भारत सरकार के तत्कालीन पर्यावरण और वन मंत्रालय की अधिसूचना सं. का.आ. 1174 (अ), तारीख 18 जुलाई, 2007 में निम्नलिखित और संशोधन करती है, अर्थात् :-

2. उक्त अधिसूचना से संलग्न सारणी में,

(i) क्रम संख्यांक 29, 31, 38, 54 और 73 तथा उससे संबंधित प्रविष्टयों के स्थान पर, निम्नलिखित क्रम संख्यांक और प्रविष्टियां रखी जाएंगी, अर्थात् :-

(1)	(2)	(3)	(4)
"29	मैसर्स महाबल ईनवायरो इंजीनीयरस प्राइवेट लिमिटेड, प्लाट नं. 13,17, 18, ग्रामपंचायत बोखारा, नागपुर शहर से 8 कि.मी. की दूरी पर, पटेल पैट्रोल पंप के सामने छिंदवाड़ा रोड, पोस्ट कोराडी, जिला नागपुर-441111, महाराष्ट्र	(i) श्री हरीश प्रभाकर मेंधी (ii) श्री किशोर चंद्रभान जी येओल (iii) श्री सचिन सुभाष गोरे	15 नवंबर, 2018 से 14 नवंबर, 2023
31	मैसर्स ईनवायरो ईस्ट प्राइवेट लिमिटेड, बंगाल अंबूजा कमर्शल कम्पलेक्स, यू एन-एफ-13, 1050/1, सर्वे पार्क, कोलकाता-700075	(i) श्री असोक कुमार बंदोपाध्याय (ii) श्री तापस कुंडु (iii) डा.शिबम मित्रा	15 नवंबर, 2018 से 14 नवंबर, 2023
38	मैसर्स ईनवायरोकेयर लैबस प्राइवेट लिमिटेड, ईनवायरो हाउस, ए-7, एम आई डी सी, वागले	(i) डा.प्रीती एन अमृतकर (ii) कुमारी स्नेहा औंकार मेथर	15 नवंबर, 2018 से 14 नवंबर, 2023

	इडस्ट्रीयल ईस्टेट, मेन रोड, थाने -400604, महाराष्ट्र	(iii) कुमारी मनीषा खराडे	
54	मैसर्स इको प्रो ईंजीनीयर्स प्राइवेट लिमिटेड, 32/41, जी टी रोड से पश्चिम की ओर, यू पीएस आई डी सी इंडस्ट्रीयल एरिया, गाजियाबाद-201009, उत्तर प्रदेश	(i) श्री अमित सक्सेना (ii) सुश्री दिव्या सक्सेना (iii) सुश्री पूर्णिमा चौहान	15 नवंबर, 2018 से 14 नवंबर, 2023
73	मैसर्स के के बी माइक्रो टेस्टींग लैबस प्राइवेट लिमिटेड, तरूण प्लाजा, 3-5-244, दूसरा तल, एन एफ सी मेन रोड, कृष्णा नगर कालोनी, मौला अली, हैदराबाद-500040	(i) श्री चौ रामाकृष्णा (ii) श्रीमती पी. राजेश्वरी (iii) श्रीमती अमृता नलिनी	15 नवंबर, 2018 से 14 नवंबर, 2023"

(ii) क्रम सं. 168 उससे संबंधित प्रविष्टयों के पश्चात्, निम्नलिखित क्रम सं. और प्रविष्टियां रखी जाएंगी, अर्थात् :-

"169	मैसर्स ईकोसिस्टम रिसोर्स मैनेजमैंट प्राइवेट लिमिटेड, ए-अशोका पैविलियन, कपाड़िया हैल्थ क्लब के सामने न्यू सिविल रोड, सूरत-295001, गुजरात	(i) श्री सुनील कुमार पांडे (ii) श्री पटेल नीरव कुमार भागवत प्रसाद (iii) श्री पटेल शिरीश धीरुभाई	15 नवंबर, 2018 से 14 नवंबर, 2023
170	मैसर्स एस सी एसईनवायरो सविर्स प्राइवेट लिमिटेड. 7 केसरविहार, खाटू श्यामजी मंदिर के सामने रामन्नागरिया रोड, जगतपुरा, जयपुर-302017, राजस्थान	(i) डा. डी एस परीहार (ii) श्री जितेन्द्र दीक्षित (iii) श्री अभिषेक गौतम	15 नवंबर, 2018 से 14 नवंबर, 2023
171	मैसर्स एपेक्स इनवायरो लेबोरटरी, 3-डेबर कालोनी, आई टी आई के पास, प्रताप नगर, उदयपुर, राजस्थान	(i) डा. वाई एल मेहता (ii) श्री अमित सक्सेना (iii) श्री किशनलाल अग्रवाल	15 नवंबर, 2018 से 14 नवंबर, 2023
172	मैसर्स पोलीटेस्ट लेबोरटरीज, 22 सोनी इंडस्ट्रीयल ईस्टेट, पीरांनगुट, पुणे-412115, महाराष्ट्र	(i) श्रीमती स्मिता अजय कपाडने (ii) श्री सचिन हरि कापडे (iii) श्रीमती स्वाती महेन्द्र उमारानी	15 नवंबर, 2018 से 14 नवंबर, 2023
173	मैसर्स इंडस्ट्रीयल रिसर्च एंड डवेलपमैंट हाउस प्राइवेट लिमिटेड, सी-10,सेक्टर-6, नौएडा-201306, उत्तर प्रदेश	(i) डा. एस एन ए रिजवी (ii) सुश्री वंदना गुप्ता (iii) सुश्री कविता शर्मा	15 नवंबर, 2018 से 14 नवंबर, 2023
174	मैसर्स विनमैट टैकनोलोजीस प्राइवेट लिमिटेड, प्लाट नं. आ-65, साईट- यूपी एस आई डी सी, ग्रेटर नौएडा-201306, उत्तर प्रदेश	(i) श्री कुलदीप सिंह तेवतिया (ii) श्रीमती उपासना (iii) श्री सुनील कुमार बंसल	15 नवंबर, 2018 से 14 नवंबर, 2023
175	मैसर्स नेक्सस टेस्ट लैबस प्राइवेट लिमिटेड 29, दूसरा तल, तीसरा मेन सींगेहनापलाया, महादेवपुरा, बैंगलोर-560048	(i) श्रीविजया सिंहा रेड्डी पीआर (ii) श्रीमती के कृष्णावेनी (iii) श्रीमती एस मल्लेस्वरी	15 नवंबर, 2018 से 14 नवंबर, 2023
176	मैसर्स इको टैक लैबस प्राइवेट लिमिटेड, 48 ए, दूसरी मेन रोड, रामनगर, साउथ एक्सटेंशन, पालीकरनई, चेन्नई-600100	(i) श्री ए. दामोधरन (ii) सुश्री एस कोकिला (iii) डा. आर रेणुका	15 नवंबर, 2018 से 14 नवंबर, 2023
177	मैसर्स एलकेटी रिसर्च लेबोट्रीज इंडिया प्राइवेट लिमिटेड, प्लाट नं. 1652, एम आई ई, पार्ट-बी, बहादुरगढ़-124507, हरियाणा	(i) डा. राजेश कुमार शर्मा (ii) श्री संजय कुमार पांडे	15 नवंबर, 2018 से 14 नवंबर, 2023

178	मैसर्स रोबस्ट मैटीरियल टेकनोलोजी प्राइवेट लिमिटेड, सं. 94, दूसरा तल, थिरूमाला कमपलेक्स, एन जी ई एफ लेआउट, नागराभावी, बैंगलौर-560072	(i) डा. के. आर रवीकुमार (ii) डा. ममता एस एन (iii) श्री संदेशा के एस	15 नवंबर, 2018 से 14 नवंबर, 2023"

[फा. सं. क्यू 15018/21/2017-सीपीडब्ल्यू]

बृजेश सिक्का, सलाहकार

टिप्पण : मूल अधिसूचना भारत के राजपत्र, असाधारण, में अधिसूचना संख्यांक का. आ. 1174(अ), तारीख 18 जुलाई, 2007 द्वारा प्रकाशित की गई थी और अधिसूचना संख्यांक का.आ.1539(अ), तारीख 13 सितम्बर, 2007, का.आ. 1811(अ), तारीख 24 अक्तूबर, 2007, का.आ. 55(अ), तारीख 9 जनवरी, 2008, का.आ. 428(अ) तारीख 4 मार्च, 2008, का.आ. 865(अ), तारीख 11 अप्रैल, 2008. का.आ. 1894 (अ) तारीख 31 जुलाई, 2008, का.आ. 2728(अ) 25 नवम्बर, 2008, का.आ. 1356 (अ) तारीख 27 मई, 2009, का.आ.1802(अ) तारीख 22 जुलाई, 2009, का.आ.2399 (अ) तारीख 18 सितम्बर, 2009, का.आ.3122(अ) तारीख 7 दिसम्बर, 2009, का.आ. 3123(अ), 7 दिसम्बर, 2009, का.आ. 142(अ) तारीख 21 जनवरी, 2010, का.आ.619(अ) तारीख 19 मार्च, 2010, का.आ. 1662(अ) तारीख 13 जुलाई, 2010, का.आ. 2390(अ) तारीख 30 सितम्बर, 2010, का.आ. 2904(अ) तारीख 8 दिसम्बर, 2010, का.आ.181(अ) तारीख 28 जनवरी, 2011, का.आ. 692(अ) तारीख 5 अप्रैल, 2011, का.आ. 1537(अ) तारीख 6 जुलाई, 2011, का.आ.1754(अ) तारीख 28 जुलाई, 2011, का.आ. 2609(अ) तारीख 22 नवम्बर, 2011, का.आ. 264(अ) तारीख 13 फरवरी, 2012, का.आ. 1150(अ) तारीख 22 मई, 2012, का.आ. 1295(अ), 6 जून, 2012 का.आ.2039(अ) तारीख 5 सितम्बर, 2012, का.आ. 2850(अ) तारीख 7 दिसम्बर, 2012, का.आ.592(अ) तारीख 8 मार्च, 2013, का.आ. 945(अ) तारीख 8 अप्रैल, 2013, का.आ. 2287(अ) तारीख 27 जुलाई, 2013, का.आ. 3489(अ) तारीख 26 नवम्बर, 2013, का.आ.21(अ) तारीख 3 जनवरी, 2014, का.आ. 561(अ) तारीख 26 फरवरी, 2014, का.आ. 1190(अ) तारीख 2 जून, 2014, का.आ. 2003(अ) तारीख 9 अगस्त, 2014, का.आ.137 (अ) तारीख 12 जनवरी, 2015, का.आ. 1783(अ) तारीख 30 जून, 2015, का.आ. 2453(अ) तारीख 7 सितम्बर, 2015 का.आ. 1953(अ), तारीख 2 जून, 2016 और का.आ.388(अ) तारीख 10 फरवरी, 2017 और का.आ.सं. 857(अ) तारीख 26 फरवरी, 2018 द्वारा उनका अन्तिम संशोधन किया गया।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, 15th November, 2018

S.O. 5768 (E).— In exercise of the powers conferred by clause (b) of sub-section (1) of section 12 and section 13 of the Environment (Protection) Act, 1986 (29 of 1986), read with rule 10 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following further amendments in the notification of the Government of India in the erstwhile Ministry of Environment and Forests, vide number S.O. 1174(E), dated the 18th July, 2007, namely: -

in the said notification, in the table, -

(i) for serial numbers 29, 31, 38, 54 and 73 the entries relating thereto, the following serial numbers and entries shall be substituted, namely: -

(1)	(2)	(3)	(4)
"29	M/s. Mahabal Enviro Engineers Pvt. Ltd. Plot No. 13,17,18, Grampanchayat Bokhara, 8 KM from Nagpur City, Opp. Patel Petrol Pump, Chhindwara Road, Post Koradi, Distt. Nagpur-441111, Maharashtra	(i) Mr. Harish Prabhakar Mendhi (ii) Mr. Kishor Chandrabhanji Yeole (iii) Mr. Sachin Subhash Gore	15th November, 2018 to 14th November, 2023
31	M/s. Envirotech East Pvt. Ltd. Bengal Ambuja Commercial Complex, UN-F-13, 1050/1, Survey Park, Kolkata-700075	(i) Mr. Asoke Kumar Bandyopadhyay (ii) Mr. Tapas Kundu (iii) Dr. Shibam Mitra	15th November, 2018 to 14th November, 2023
38	M/s. Envirocare Labs Pvt. Ltd. Enviro House, A-7, MIDC, Wagle Industrial Estate, Main Road, Thane-400604, Maharashtra	(i) Dr. Priti N. Amritkar (ii) Ms. Sneha Omkar Methar (iii) Ms. Manisha Kharade	15th November, 2018 to 14th November, 2023
54	M/s. Eko Pro Engineers Pvt. Ltd., 32/41, South Side of G.T. Road, UPSIDC Industrial Area, Ghaziabad-201009, Uttar Pradesh	(i) Mr. Amit Saxena (ii) Ms. Divya Saxena (iii) Ms. Purnima Chauhan	15th November, 2018 to 14th November, 2023
73	M/s. KKB Micro Testing Labs Pvt. Ltd. Tarun plaza, #3-5-244, 2nd Floor, NFC Main Road, Krishna Nagar Colony, Moula Ali, Hyderabad-500040	(i) Mr. Ch. Ramakrishna (ii) Mrs. P. Rajeswari (iii) Mrs. Amrutha Nalini	15th November, 2018 to 14th November, 2023

(ii) after serial number 168 and the entries relating thereto, the following serial numbers and entries shall be inserted, namely: -

(1)	(2)	(3)	(4)
"169	M/s. Ecosystem Resource Management Pvt. Ltd. A`-Ashoka Pavillion, Opp. Kapadia Health Club, New-Civil Road, Surat-395001, Gujarat	(i) Mr. Sunil Kumar Pandey (ii) Mr. Patel Niravkumar BhagvatPrasad (iii) Mr. Patel Shirish Dhirubhai	15th November, 2018 to 14th November, 2023
170	M/s. SCS Enviro Services Pvt. Ltd. 7 Kesar Vihar, Opposite Khatu Shyamji Temple, Ramnagariya Road, Jagatpura, Jaipur-302017, Rajasthan	(i) Dr. D.S Parihar (ii) Mr. Jitendra Dixit (iii) Mr. Abhishek Gautam	15th November, 2018 to 14th November, 2023
171	M/s. Apex Enviro Laboratory 3-Dhebar Colony, Near I.T.I Pratapnagar, Udaipur, Rajasthan	(i) Dr. Y.L. Mehta (ii) Mr. Amit Saxena (iii) Mr. Kishan Lal Agrawal	15th November, 2018 to 14th November, 2023
172	M/s. Polytest Laboratories 22 Sonaee Industrial Estates, Pirangut, Pune-412115, Maharashtra	(i) Mrs. Smita Ajay Kapadne (ii) Mr. Sachin Hari Kapade (iii) Mrs. Swati Mahendra Umarani	15th November, 2018 to 14th November, 2023
173	M/s. Ind Research & Development House Pvt. Ltd. C-10, Sector-6, Noida-201301, Uttar Pradesh	(i) Dr. SNA Rizvi (ii) Ms. Vandana Gupta (iii) Ms. Kavita Sharma	15th November, 2018 to 14th November, 2023
174	M/s. Winmet Technologies Private Ltd. Plot No. E-65, Site-IV, UPSIDC, Greater Noida-201306, Uttar Pradesh	(i) Mr. Kuldeep Singh Teotia (ii) Mrs. Upasna (iii) Mr. Sunil Kumar Bansal	15th November, 2018 to 14th November, 2023
175	M/s. Nexus Test Labs Pvt. Ltd. #29, Second Floor, 3rd Main,	(i) Mr. Vijaya Simha Reddy P.R (ii) Mrs. K. Krishnaveni	15th November, 2018 to

	Singaiahnaplaya, Mahadevapura, Bangalore-560048	(iii) Mrs. S. Malleswari	14th November, 2023
176	M/s. Eco Tech Labs Pvt. Ltd. 48A, 2nd Main Road, Ram Nagar , South Extension, Pallikaranai, Chennai-600100	(i) Mr. A. Dhamodharan (ii) Ms. S. Kokila (iii) Dr. R. Renuka	15th November, 2018 to 14th November, 2023
177	M/s. Alcatec Research Laboratories India Pvt. Ltd. Plot No. 1652, M.I.E , Part-B, Bahadurgarh-124507, Haryana	(i) Dr. Rajesh Kumar Sharma (ii) Sh. Sanjay Kumar Pandey	15th November, 2018 to 14th November, 2023
178	M/s. Robust Materials Technology Pvt. Ltd. No. 94, 2nd Floor, Thirumala Complex, NGEF Layout, Nagarabhavi, Bangalore-560072	(i) Dr. K.R. Ravikumar (ii) Dr. Mamatha S.N. (iii) Mr. Sandesha K.S	15th November, 2018 to 14th November, 2023"

[F. No. Q. 15018/21/2017-CPW]

BRIJESH SIKKA, Advisor

Note.- The principal notification was published in the Gazette of India, Extraordinary vide number S.O. 1174 (E), dated the 18th July, 2007 and subsequently amended vide notification numbers S.O. 1539 (E), dated the 13th September, 2007, S.O.1811(E), dated the 24th October, 2007, S.O.55(E), dated the 9th January, 2008, S.O. 428(E), dated the 4th March, 2008, S.O. No. 865(E), dated the 11th April, 2008, S.O.No.1894(E), dated the 31st July,2008, S.O. No. 2728(E), dated the 25th November, 2008, S.O.1356(E), dated the 27th May, 2009, S.O.No.1802(E), dated the 22nd July, 2009, S.O.No. 2399(E), dated the 18th September, 2009, S.O.No. 3122(E), dated the 7th December, 2009, S.O.No. 3123(E), dated the 7th December, 2009, S.O.No. 142(E), dated the 21st January, 2010, S.O. 619 (E), dated the 19th March, 2010, S.O.No. 1662(E), dated the 13th July, 2010, S.O.No. 2390(E), dated the 30th September, 2010, S.O.No. 2904 (E), dated the 8th December, 2010 , S.O.No. 181(E), dated the 28th January, 2011, S.O.No. 692(E) dated the 5th April, 2011, S.O No. 1754 (E), dated the 28th July, 2011, S.O. No. 2609, dated the 22nd November, 2011, S.O No. 264(E) , dated the 13th February, 2012, S.O No. 1150 (E) dated the 22nd May, 2012, S.O No. 1295(E), dated the 6th June, 2012, S.O. No. 2039 (E), dated the 5th September, 2012, S.O No. 2850 (E), dated the 7th December, 2012, S.O. No. 592 (E), dated the 8th March, 2013, S.O. No. 945(E), dated the 8th April, 2013, S.O. No. 2287 (E), dated the 26th July, 2013, S.O No. 3489(E) dated the 26th November, 2013, S.O No. 21(E), dated the 3rd January, 2014, S.O No. 561 (E), dated the 26th February, 2014, S.O. No. 1190(E), dated the 1st June, 2014, S.O. No. 2003(E), dated the 9th August, 2014, S.O. No. 137 (E), dated the 12th January, 2015, S.O. No. 1783(E), dated the 30th June, 2015, S.O. No. 2453(E), dated the 7th September, 2015 , S.O. No. 1953(E), dated the 2nd June, 2016, S.O. No. 388(E), dated the 10th February, 2017, S.O No. 2836 (E), dated the 30th August, 2017 and S.O. 857(E) dated the 26th February, 2018

Uploaded by Dte. of Printing at Government of India Press, Ring Road, Mayapuri, New Delhi-110064
and Published by the Controller of Publications, Delhi-110054.

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ANNEXURE I

No.IA-J-11011/154/2022-IA-II(IND-I)

Goverment of India

Minister of Enviroment,Forest and Climate Change

Impact Assessment Division

***

Indira Paryavaran Bhavan,
Vayu Wing,3rd Floor,Aliganj,
Jor Bagh Road,New Delhi-110003
18 Aug 2022

To,

M/s SATVIK ENTERPRISES LIMITED
1, Park Lane,
Kolkata-700016
West Bengal

Tel.No.--1; Email:vikash@satvikindia.com

Sir/Madam,

This has reference to the proposal submitted in the Ministry of Environment, Forest and Climate Change to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format (Form-1) along with a Pre-feasibility Report. The details of the proposal are given below:

1. Proposal No.:	IA/WB/IND/286081/2022
2. Name of the Proposal:	Installation of Ferro-Alloy Plant (SAF 2x9 MVA) and Ferro-Chrome Briquetting Plant (10 TPH)
3. Category of the Proposal:	Industrial Projects - 1
4. Project/Activity applied for:	3(a) Metallurgical industries (ferrous & non ferrous)
5. Date of submission for TOR:	05 Aug 2022

In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation as follows:

ACTIVITY 3 (a)- METALLURGICAL INDUSTRY (Ferrous and Non-ferrous)

STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR METALLURGICAL INDUSTRY (Ferrous and Non-ferrous) AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

GENERAL CONDITIONS-

1. Introduction

i. Background about the project
ii. Need of the project
iii. Purpose of the EIA study
iv. Scope of the EIA study

2. Project description

A. Site Details

i. Location of the project site covering village, Taluka/Tehsil, District and State.
ii. Site accessibility
iii. Adigital toposheet in pdf or shape file compatible to google earth of the study area of radius of 10km and site location preferably on 1:50,000 scale. (including all eco-sensitive areas and environmentally sensitive places).
iv. Latest High-resolution satellite image data having 1m-5m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc., along with delineation of plant boundary co-ordinates. Area must include at least 100m all around the project location.
v. Environment settings of the site and its surrounding along with map.
vi. A list of major industries with name, products and distance from plant site within study area (10km radius) and the location of the industries shall be depicted in the study area map.
vii. In case if the project site is in vicinity of the water body, 50 meters from the edge of the water body towards the site shall be treated as no development/construction zone. If it's near the wetland, Guidelines for implementing Wetlands (Conservation and Management) Rules, 2017 may be followed.
viii. In case if the project site is in vicinity of the river, the industry shall not be located within the river flood plain corresponding to one in 25 years flood, as certified by concerned District Magistrate/Executive Engineer from State Water Resources Department (or) any other officer authorized by the State Government for this purpose as per the provisions contained in the MoEF&CC Office Memorandum dated 14/02/2022.
ix. Type of land, land use of the project site.
x. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process as per the MoEF&CC O.M. dated 7/10/2014 shall be furnished.
xi. Engineering layout of the area with dimensions depicting existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.

B. Forest and wildlife related issues (if applicable):

i. Status of Forest Clearance for the use of forest land shall be submitted.
ii. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife if the project site located within notified Eco-Sensitive Zone, 10km radius of national park/sanctuary wherein final ESZ notification is not in place as per MoEF&CC Office Memorandum dated 8/8/2019.
iii. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, Eco-sensitive Zone and Eco-sensitive areas, the project proponent shall submit the map duly authenticated by Divisional Forest Officer showing the distance between the project site and the said areas.
iv. Wildlife Conservation Plan duly authenticated by the Competent Authorityof the State Government for conservation of Schedule I fauna, if any exists in the study area.

C. Salient features of the project

i. Products with capacities in **Tons per Annum** for the proposed project.
ii. If expansion project, status of implementation of existing project, details of existing/proposed products with production capacities in Tons per Annum.
iii. Site preparatory activities.
iv. List of raw materials required and their source along with mode of transportation.
v. Other than raw materials, other chemicals and materials required with quantities and storage capacities.
vi. Manufacturing process details along with process flow diagram of proposed units.
vii. Consolidated materials and energy balance for the project.
viii. Total requirement of surface/ ground water and powerwith their respective sources, status of approval.
ix. Water balance diagram
x. Details of Emission, effluents, hazardous waste generation and mode of disposal during construction as well as operation phase.
xi. Man-power requirement.
xii. Cost of project and scheduled time of completion.
xiii. Brief on present status of compliance (Expansion/modernization proposals)
a. Cumulative Environment Impact Assessment for the existing as well as the proposed expansion/modernization shall be carried out.
b. In case of ground water drawl for the existing unit, action plan for phasing out of ground water abstraction in next three years except for domestic purposes and shall switch over to 100 % use of surface water from nearby source.
c. Copy of all the Environment Clearance(s) including Amendments thereto obtained for the project from MoEF&CC/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environment clearances including amendments shall be provided.
d. In case the existing project has not obtained EnvironmentClearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the Regional Office of the SPCB shall be submitted.

3. Description of the Environment

i. Study period

ii. Approach and methodology for data collection as furnished below.

Attributes	Sampling		Remarks
	Network	Frequency	
A. Air Environment			
Micro-Meteorological • Wind speed (Hourly) • Wind direction • Dry bulb temperature • Wet bulb temperature • Relative humidity • Rainfall • Solar radiation • Cloud cover • Environmental Lapse Rate	Minimum 1 site in the project impact area	1 hourly continuous	• IS 5182 Part 1-20 • Site specific primary data is essential • Secondary data from IMD, New Delhi • CPCB guidelines to be considered.
Pollutants • $PM_{2.5}$ • PM_{10} • SO_2 • NOx • CO • HC • Other parameters relevant to the project and topography of the area	At least 8-12 locations	As per National Ambient Air Quality Standards, CPCB Notification.	• Sampling as per CPCB guidelines • Collection of AAQ data (except in monsoon season) • Locations of various stations for different parameters should be related to the characteristic properties of the parameters. • The monitoring stations shall be based on the NAAQM standards as per GSR 826(E) dated 16/11/2009 and take into account the predominant wind direction, population zone and sensitive receptors including reserved forests, • Raw data of all AAQ measurement for 12 weeks of all stations as

Attributes	Sampling		Remarks
	Network	Frequency	
			per frequency given in the NAAQM Notification of 16/11/2009 along with min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.
B. Noise			
• Hourly equivalent noise levels	At least 8-12 locations	As per CPCB norms	
C. **Water**			
Parameters for water quality • pH, temp, turbidity, magnesium hardness, total alkalinity, chloride, sulphate, nitrate, fluoride, sodium, potassium, salinity • Total nitrogen, total phosphorus, DO, BOD, COD, Phenol • Heavy metals • Total coliforms, faecal coliforms • Phyto plankton • Zoo plankton	Samples for water quality should be collected and analyzed as per: • IS: 2488 (Part 1-5) methods for sampling and testing of Industrial effluents • Standard methods for examination of water and wastewater analysis published by American Public Health Association.		
For River Bodies • Total Carbon • pH • Dissolved Oxygen • Biological Oxygen Demand • Free NH4 • Boron • Sodium Absorption Ratio • Electrical	• Surface water quality of the nearest River (60m upstream and downstream) and other surface water	• Yield of water sources to be measured during critical season • Standard methodology for collection of surface water (BIS standards)	

Attributes	Sampling		Remarks
	Network	Frequency	
Conductivity	bodies		
For Ground Water	• Ground water monitoring data should be collected at minimum of 8 locations (from existing wells /tube wells/existing current records) from the study area and shall be included.		
D. Traffic Study			
• Type of vehicles • Frequency of vehicles for transportation of materials • Additional traffic due to proposed project • Parking arrangement	-		
E. Land Environment			
Soil • Particle size distribution • Texture • pH • Electrical conductivity • Cation exchange capacity • Alkali metals • Sodium Absorption Ratio (SAR) • Permeability • Water holding capacity • Porosity	Soil samples be collected as per BIS specifications		
Land use/Landscape • Location code • Total project area • Topography • Drainage (natural) • Cultivated, forest, plantations, water bodies, roads and settlements	-		
E. Biological Environment			

Attributes	Sampling		Remarks
	Network	Frequency	
Aquatic • Primary productivity • Aquatic weeds • Enumeration of phyto plankton, zoo plankton and benthos • Fisheries • Diversity indices • Trophic levels • Rare and endangered species • Marine Parks/ Sanctuaries/ closed areas /coastal regulation zone (CRZ) **Terrestrial** • Vegetation-species list, economic importance, forest produce, medicinal value • Importance value index (IVI) of trees • Fauna • Avi fauna • Rare and endangered species • Sanctuaries / National park / Biosphere reserve • Migratory routes	• Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. Indicator species which indicate ecological and environment degradation should be identified and included to clearly state whether the proposed project would result in to any adverse effect on any species. • Samples to collect from upstream and downstream of discharge point, nearby tributaries at downstream, and also from dug wells close to activity site. • For forest studies, direction of wind should be considered while selecting forests. • Secondary data to collect from Government offices, NGOs, published literature.		
F. socio-economic			
• Demographic structure • Infrastructure resource base • Economic resource base • Health status: Morbidity pattern • Cultural and aesthetic attributes	• Socio-economic survey is based on proportionate, stratified and random sampling method. • Primary data collection through questionnaire • Secondary data from census records, statistical hard books, topo sheets, health records and relevant official records available with Govt. Agencies		

Attributes	Sampling		Remarks
	Network	Frequency	
• Education			

iii. Interpretation of each environment attribute shall be enumeratedand summarized as given below:

- Ambient air quality
- Ambient Noise quality
- Surface water quality
- Ground water quality
- Soil quality
- Biological Environment
- Land use
- Socio-economic environment

4. Anticipated Environment Impacts and mitigation measures (In case of expansion, cumulative impact assessment shall be carried out)

i. Identification of potential impacts in the form of a **matrix** for the construction and operation phase for all the environment components

Activity	Environment	Ecological	Socio-economic
Construction phase			
Operation phase			

ii. Impact on ambient air quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

- Details of stack emissions from the existing as well as proposed activity.
- Assessment of ground level concentration of pollutants from the stack emission based on AQIP Modelling The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any along with wind rose map for respective period
- Impact on ground level concentration, under normal, abnormal and emergency conditions. Measures to handle emergency situations in the event of uncontrolled release of emissions.

iii. Impact on ambient noise quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

iv. Impact on traffic (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

v. Impact on soil quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

vi. Impact on land use (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

vii. Impact on surface water resource and quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

viii. Impact on ground water resource and quality (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

ix. Impact on terrestrial and aquatic habitat (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

x. Impact on socio-economic environment (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

xi. Impact on occupational health and safety (Sources; Embedded control measures; Assessment; Mitigation measures; Residual impact)

a. Construction phase
b. Operation phase

5. Analysis of Alternatives (Technology & Site)

i. No project scenario
ii. Site alternative
iii. Technical and social concerns
iv. Conclusion

6. Environmental Monitoring Program

i. Details of the Environment Management Cell
ii. Performance monitoring schedule for all pollution control devices shall be furnished.
iii. Corporate Environment Policy

a. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.
b. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environment or forest norms / conditions? If so, it may be detailed in the EIA.
c. What is the hierarchical system or Administrative order of the company to deal with the environment issues and for ensuring compliance with the environment clearance conditions? Details of this system may be given.

d. Does the company have system of reporting of non compliances / violations of environment norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report

iv. Action plan for **post-project environment monitoring matrix**:

Activity	Aspect	Monitoring Parameter	Location	Frequency	Responsibility
Construction phase					
Operation phase					

7. Additional Studies

i. Public consultation details (Entire proceedings as separate annexurealong with authenticated English Translation of Public Consultation proceedings).

ii. Summary of issues raised during public consultation along with action plan to address the same as per MoEF&CC O.M. dated 30/09/2020

S	Physical activity and action plan		Year of implementation (Budget in INR)			Total Expenditure (Rs. in Crores)
	Name of the Activity	Physical Targets	1st	2nd	3rd	

iii. Risk assessment

- Methodology
- Hazard identification
- Frequency analysis
- Consequence analysis
- Risk assessment outcome

iv. Emergency response and preparedness plan

8. Project Benefits

i. Environment benefits
ii. Social infrastructure
iii. Employment and business opportunity
iv. Other tangible benefits

9. Environment Cost Benefit Analysis

i. Net present value
ii. Internal rate of return
iii. Benefit cost ratio
iv. Cost effectiveness analysis

10. Environment Management Plan (Construction and Operation phase)

i. Air quality management plan
ii. Noise quality management plan

iii. Solid and hazardous waste management plan
iv. Effluent management plan
v. Storm water management plan
vi. Rain water harvesting plan
vii. Occupational health and safety management plan
viii. Green belt development plan
ix. Socio-economic management plan
x. Wildlife conservation plan (In case of presence of schedule I species)
xi. Total capital cost and recurring cost/annum for environment pollution control measures shall be included.

11. Conclusion of the EIA study

12. In addition to the above, any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

SPECIAL CONDITIONS-

1. For Large ISPs, a 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site. MRL details of project site and RL of nearby sources of water shall be indicated.
2. Plan for the implementation of the recommendations made for the steel plants in the CREP guidelines.
3. Plan for solid wastes utilization
4. Plan for utilization of energy in off gases (coke oven, blast furnace)
5. System of coke quenching adopted with justification.
6. Details on environmentally sound technologies for recycling of hazardous materials, as per CPCB Guidelines, may be mentioned in case of handling scrap and other recycled materials.
7. Details on toxic metal content in the waste material and its composition and end use (particularly of slag).
8. Details on toxic content (TCLP), composition and end use of slag.
9. 100 % dolo char generated in the plant shall be used to generate power.
10. Fourth Hole fume extraction system shall be provided for SAF.WHR system shall be installed to recover sensible heat from flue gases of EAF. Provision for installation of jigging and briquetting plant to utilise the fines generated in the process.
11. No tailing pond is permitted for Iron ore slimes. Dewatering and filtration system shall be provided.
12. Emission/effluent norms as per G.S.R 894 (E) dated 4/12/2019.

SATVIK ENTERPRISES LIMITED

1, PARK LANE, KOLKATA-700 016, INDIA
PHONE : (033) 2265-8582, 2226-0779
FAX : (033) 4064-6480 ❐ E-MAIL : info@satvikindia.com
Website : www.satvikindia.com

Ref: SEL/BARJORA/2022-23/BDO/02
Date: May 12th, 2022

To,
The BDO,
Barjora, Distt: Bankura,
West Bengal

Sub: Application for conversion of land from Tora & Garlayekpati to Industry for setting-up 2 x 9 MVA sub-merged Electric Arc Furnace based Ferro Alloys project at Vill- Hatasuria, P.S.: Barjora, Distt: Bankura, West Bengal

Dear Sir,

We refer to the subject. We intend to set-up subject project at our land with following details:

Mouza: Sahebdihi
J.L. No.-98
Plot No.-Hall-51,53; Sabek-38,39
Khatian No.-105 L.R.
Total Land-5.38 Acre

We request you for conversion of Land from Tora & Garlayekpati to **Industry,** enabling us to proceed further.

Look forward to your approval and further necessary action in this regard.

Thanking you,

Yours faithfully,
For **SATVIK ENTERPRISES LIMITED**

SATVIK ENTERPRISES LTD. KOLKATA

VIKASH AGARWAL
MANAGING DIRECTOR AND APPLICANT

FORM-I

(See rule-5)

Application for Assessment of Development Charges

To
The Planning Authority / Development Authority/BDO Barjora

I intend to develop /institute/change the use of land / building as per details furnished in the statement below for which permission is required under this Act. I hereby request that you will be pleased to declare the liability of land and / or building for levy of development charge and to determine the development charges payable and communicate the same to me.

SATVIK ENTERPRISES LTD.
Director

Yours Faithfully

1.	(a) Name of the owner/occupier	: SATVIK ENTERPRISES LIMITED
	(b) Full Address	: 1 PARK LANE KOLKATA - 700016
	(c) Name of Applicant	: VIKASH AGARWAL
	(d) Date of application for permission	:
2.	Description of land or building for Which development has to be assessed	: NOT APPLICABLE. CURENTLY BARE LAND
3.	Land	
	(i) Total area of land square meter	:
	(ii) Present use	: Residential/Industrial/Commercial/ Agriculture
	(iii) Use proposed	: Residential/Industrial/Commercial/ Agriculture
	Building	
	(i) Total area of building and cubic meter of the content of such building of works	: .
	(ii) Present use	: Residential/Industrial/Commercial/ Agriculture
	(iii) Use proposed	: Residential/Industrial/Commercial/ Agriculture
4.	Any other particulars Supporting the application	: NOT APPLICABLE. CURENTLY BARE LAND

SATVIK ENTERPRISES LTD.
Director

Signature of the Applicant

Date:

Place: KOLKATA

Barjora Gangajalghati Planning Authority

Application for Assessment of Development Charges

The Planning Authority / Development Authority.

I intend to develop/institute/change the use of land/building as per details furnished in the statement below for which permission is required under this Act. I hereby request that you will be pleased to declare the liability of land and / or building for the levy of development charge and to determine the development charges payable and communicate the same to me.

Yours faithfully,

Application ID & Date	**:** ***2022/06/000035, 02/08/2022***
Registered Mobile No.	**:** *8145301026*
Development Permission For	**:** *Change Of Use Of Land*
Pertaining Offices	**:** *Barjora*

Applicant Details

Applicant	**Name :** *SATVIK ENTERPRISES LIMITED (DIRECTOR-VIKASH AGARWAL)* **Father's/Husband's Name :** *ROHITASH AGARWAL* **Address :** *1,PARK LANE* **P.S. :** *PARK STREET* **District :** *KOLKATA SOUTH* **Pin :** *700016* **State :** *WEST BENGAL* **Email :** *faizulmiddya@gmail.com* **Mobile :** *9434183135*

Land Owner Details

Owner	**Name :** *SATVIK ENTERPRISES LIMITED (DIRECTOR-VIKASH AGARWAL)* **Father's/Husband's Name :** *ROHITASH AGARWAL* **Address :** *1,PARK LANE* **P.S. :***PARK STREET* **District :** *KOLKATA SOUTH* **Pin :** *700016* **State :** *WEST BENGAL* **Email :** *faizulmiddya@gmail.com* **Mobile :** *9434183135*

Land Details

Total area of land in square metre	**:** *21772.11*
Is there any existence of building	**:** *No*
Use Proposed	**:** *Industrial*

Date : 17-Aug-2022

Place : *PARK STREET*

Signature of the Applicant

ANNEXURE IIC

Government of West Bengal
Block Land & Land Reforms Office
Barjora – Bankura

Memo No.....325(3).....Brj./2005 Dated..11/03/2005

Form – A
A Certificate for Mutation

To
Satvik Enterprises Ltd.
1 Park Lane
Kolkata – 16

(Name and address of the applicant)

Sub : U/550 Case No. 12/05,14/05, 15/05, 16/05
Ref : His prayer dated – 25/2/05

This is to inform him that his Name (s) has/ have been recorded U/S 50 of the B.L.R. Act in the L.O.R. (L.R) in respect of the land described in the schedule below vide U/550 case No. 12/05, 14/05, 15/05, 16/05

The Schedule

1.	District	:	Bankura
2.	Police Station	:	Borjora
3.	Mouza	:	Sahebdehi
4.	J.L. No.	:	98
5.	Khatian No.	:	105 L.R.
6.	Plot No.	:	Hall – 51, 53 Sabek 38, 39
7.	Area	:	2.26, 3.12 A. respectively

Classification – Tora, Garlayekpatit

11.3.05

Prescribed Authority U/S 50 of
The West Bengal Land Reforms Act, 1950
B.L. & LRO, BARJORA
Block Land & Dist.—Bankura
Barjora (Bankura)

ANNEXURE III

BARJORA PANCHAYAT SAMITI
BARJORA : BANKURA

Memo.No. 183/BPS/10 **Dated:** 22.12.10

To
M/S SATVIK ENTERPRISES LTD.
Vill:Asuria,P.O. Hatasuria,
P.S.Barjora.Dt:Bankura.

Sub: 120 KL per day water supply in the Plant.
Ref: His letter dt:23/07/10.

His prayer in connection with connection of Panchayat Samity Water Supply Scheme has been approved by Barjora Panchayat Samity.

We will supply water to the site of M/S SATVIK ENTERPRISES LTD. in pursuant to the 'MOU' we have with Damodar Valley Corporation and the source of water is Damodar River.

Water will be supplied to the site of M/S SATVIK ENTERPRISES LTD. through pipe line which exists for Industries nearby the project site of M/S SATVIK ENTERPRISES LTD.

This is for your information and taking necessary action.

BARJORA PANCHAYAT SAMITI OFFICE
BARJORA
BANKURA
(W.B.)

Sabhapati 22/12/10
Barjora Panchayat Samiti

Sabhapati
Barjora Panchayat Samity
Barjora, Bankura

ANNEXURE IV

DAMODAR VALLEY CORPORATION

Application Status

Agency Name : SATVIK ENTERPRISES LIMITED

GSTIN	:		DVC Substation	:	BARJORA
E-Mail Id	:	sa@satvikindia.com	Required Power Initial (in MVA)	:	15
Contact No	:	9903866492	Required Power Final (in MVA)	:	15
Application No	:	DVC/NEW-APPL-HT/2022-2023/2242	Required Voltage (in KV)	:	132

Sl No	Status By	Status	Status Remarks	Status Time
1	Applicant	Application Submitted	Application submitted succesfully by applicant	09/05/2022
2	Commercial	Sent to SPE for Feasibility Report	The applicant has deposited Rs. 47,200 (Application fee of Rs. 40,000 feasibility charge of Rs. 10,000 and GST of Rs.7200)	10/05/2022
3	SPE	Sent to TSC for Feasibility Report	Sent to TSC on 11.05.22	11/05/2022

TABLE: - I
Onsite Ambient Air Quality Monitoring Results
Location | Near Project Site (Sahebdihi)
(Period: March,2022 to May,2022)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	BaP (ng/m3)
04.03.2022	78	33	10	17	N.D.
07.03.2022	73	28	9	15	N.D.
11.03.2022	82	30	8	22	N.D.
14.03.2022	87	38	12	19	N.D.
18.03.2022	77	30	9	16	N.D.
21.03.2022	65	27	11	20	N.D.
25.03.2022	75	29	10	26	N.D.
28.03.2022	81	32	13	23	N.D.
01.04.2022	70	32	8	18	N.D.
04.04.2022	66	28	7	27	N.D.
08.04.2022	76	33	9	23	N.D.
11.04.2022	66	28	12	15	N.D.
15.04.2022	70	30	9	20	N.D.
18.04.2022	80	36	14	18	N.D.
22.04.2022	65	27	10	23	N.D.
25.04.2022	73	31	9	16	N.D.
29.04.2022	69	28	10	21	N.D.
02.05.2022	74	33	8	15	N.D.
06.05.2022	68	29	7	20	N.D.
09.05.2022	70	31	15	12	N.D.
13.05.2022	76	30	8	21	N.D.
16.05.2022	81	33	9	18	N.D.
20.05.2022	73	28	8	15	N.D.
23.05.2022	80	34	11	20	N.D.
27.05.2022	74	28	8	23	N.D.

N.D. : Not detected

TABLE: - 2
Onsite Ambient Air Quality Monitoring Results
Location Near Purunia Prrathamic School
(Period: March,2022 to May,2022)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	BaP (ng/m3)
04.03.2022	59	22	7	22	N.D.
07.03.2022	68	29	10	26	N.D.
11.03.2022	64	24	11	19	N.D.
14.03.2022	78	32	6	21	N.D.
18.03.2022	70	30	10	25	N.D.
21.03.2022	59	22	6	22	N.D.
25.03.2022	68	29	7	26	N.D.
28.03.2022	64	25	9	23	N.D.
01.04.2022	67	29	8	20	N.D.
04.04.2022	58	19	10	18	N.D.
08.04.2022	63	26	9	22	N.D.
11.04.2022	73	32	11	25	N.D.
15.04.2022	67	29	8	20	N.D.
18.04.2022	76	32	10	23	N.D.
22.04.2022	64	24	12	29	N.D.
25.04.2022	70	31	8	20	N.D.
29.04.2022	66	27	6	16	N.D.
02.05.2022	61	24	9	19	N.D.
06.05.2022	69	30	8	15	N.D.
09.05.2022	64	28	10	20	N.D.
13.05.2022	58	20	12	17	N.D.
16.05.2022	68	31	10	25	N.D.
20.05.2022	75	32	9	22	N.D.
23.05.2022	62	25	11	18	N.D.
27.05.2022	70	32	8	23	N.D.

N.D. : Not detected

TABLE: - 3
Onsite Ambient Air Quality Monitoring Results
Location │ Kanta Bandh
(Period: March,2022 to May,2022)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	BaP (ng/m3)
04.03.2022	72	29	7	16	N.D.
07.03.2022	68	27	9	19	N.D.
11.03.2022	73	30	6	21	N.D.
14.03.2022	62	28	5	30	N.D.
18.03.2022	71	27	9	23	N.D.
21.03.2022	82	36	7	16	N.D.
25.03.2022	70	29	5	29	N.D.
28.03.2022	75	32	10	24	N.D.
01.04.2022	60	21	7	28	N.D.
04.04.2022	68	27	12	17	N.D.
08.04.2022	72	30	8	20	N.D.
11.04.2022	63	22	6	26	N.D.
15.04.2022	74	32	10	19	N.D.
18.04.2022	79	34	13	17	N.D.
22.04.2022	68	27	7	30	N.D.
25.04.2022	70	29	9	23	N.D.
29.04.2022	77	35	6	19	N.D.
02.05.2022	66	26	10	24	N.D.
06.05.2022	74	30	14	27	N.D.
09.05.2022	80	34	7	16	N.D.
13.05.2022	70	27	11	26	N.D.
16.05.2022	80	34	8	21	N.D.
20.05.2022	70	30	6	30	N.D.
23.05.2022	75	34	9	20	N.D.
27.05.2022	66	26	12	16	N.D.

N.D. : Not detected

TABLE: - 4

Onsite Ambient Air Quality Monitoring Results

Location | **Hari Nagara**

(Period: March,2022 to May,2022)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	BaP (ng/m3)
04.03.2022	68	27	10	21	N.D.
07.03.2022	77	34	9	30	N.D.
11.03.2022	64	26	11	25	N.D.
14.03.2022	71	29	15	22	N.D.
18.03.2022	80	35	13	27	N.D.
21.03.2022	76	32	11	24	N.D.
25.03.2022	62	22	14	31	N.D.
28.03.2022	74	30	10	20	N.D.
01.04.2022	82	36	8	25	N.D.
04.04.2022	77	35	11	23	N.D.
08.04.2022	68	31	13	26	N.D.
11.04.2022	78	34	8	29	N.D.
15.04.2022	69	26	11	23	N.D.
18.04.2022	75	30	9	31	N.D.
22.04.2022	63	23	8	22	N.D.
25.04.2022	70	33	10	27	N.D.
29.04.2022	76	33	12	25	N.D.
02.05.2022	84	38	9	29	N.D.
06.05.2022	67	31	8	21	N.D.
09.05.2022	74	27	16	33	N.D.
13.05.2022	64	22	12	26	N.D.
16.05.2022	72	29	9	28	N.D.
20.05.2022	81	36	10	25	N.D.
23.05.2022	63	30	14	21	N.D.
27.05.2022	70	27	9	27	N.D.

N.D. : Not detected

TABLE: -5
Onsite Ambient Air Quality Monitoring Results
Location Near Barjora Danpara Jr High School
(Period: March,2022 to May,2022)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	BaP (ng/m3)
05.03.2022	65	28	11	19	N.D.
08.03.2022	76	33	13	25	N.D.
12.03.2022	72	30	9	21	N.D.
15.03.2022	56	18	8	17	N.D.
19.03.2022	76	32	7	20	N.D.
22.03.2022	70	27	8	24	N.D.
26.03.2022	57	19	10	26	N.D.
29.03.2022	70	30	7	23	N.D.
02.04.2022	83	32	15	18	N.D.
05.04.2022	71	28	11	22	N.D.
09.04.2022	76	34	8	15	N.D.
12.04.2022	58	20	13	20	N.D.
16.04.2022	68	28	11	23	N.D.
19.04.2022	86	40	9	19	N.D.
23.04.2022	74	32	11	14	N.D.
26.04.2022	67	27	8	18	N.D.
30.04.2022	65	25	10	23	N.D.
03.05.2022	57	18	9	21	N.D.
07.05.2022	76	33	7	15	N.D.
10.05.2022	65	24	11	20	N.D.
14.05.2022	84	38	8	22	N.D.
17.05.2022	74	33	12	23	N.D.
21.05.2022	81	37	9	19	N.D.
24.05.2022	68	27	13	24	N.D.
28.05.2022	76	34	8	17	N.D.

N.D. : Not detected

TABLE: - 6
Onsite Ambient Air Quality Monitoring Results
Location | Ghutgoria
(Period: March,2022 to May,2022)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	BaP (ng/m3)
05.03.2022	72	32	12	19	N.D.
08.03.2022	81	39	9	24	N.D.
12.03.2022	68	28	11	20	N.D.
15.03.2022	75	32	15	22	N.D.
19.03.2022	85	42	10	28	N.D.
22.03.2022	70	34	13	21	N.D.
26.03.2022	86	39	16	18	N.D.
29.03.2022	82	38	12	23	N.D.
02.04.2022	74	32	14	26	N.D.
05.04.2022	69	34	10	29	N.D.
09.04.2022	70	32	15	18	N.D.
12.04.2022	85	40	9	20	N.D.
16.04.2022	68	29	13	24	N.D.
19.04.2022	81	37	19	33	N.D.
23.04.2022	79	35	16	29	N.D.
26.04.2022	91	44	14	30	N.D.
30.04.2022	75	32	18	19	N.D.
03.05.2022	85	39	16	36	N.D.
07.05.2022	77	34	12	32	N.D.
10.05.2022	92	45	9	28	N.D.
14.05.2022	83	37	13	25	N.D.
17.05.2022	73	34	15	30	N.D.
21.05.2022	79	30	18	22	N.D.
24.05.2022	87	39	10	27	N.D.
28.05.2022	81	36	9	35	N.D.

N.D. : Not detected

TABLE: - 7
Onsite Ambient Air Quality Monitoring Results
Location | Near Muktatore Primary School
(Period: March,2022 to May,2022)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	BaP (ng/m3)
05.03.2022	67	27	6	20	N.D.
08.03.2022	62	24	9	17	N.D.
12.03.2022	70	31	8	22	N.D.
15.03.2022	63	25	7	15	N.D.
19.03.2022	76	33	10	13	N.D.
22.03.2022	70	29	8	16	N.D.
26.03.2022	65	26	10	14	N.D.
29.03.2022	55	17	9	21	N.D.
02.04.2022	69	30	7	18	N.D.
05.04.2022	62	27	6	25	N.D.
09.04.2022	56	18	10	15	N.D.
12.04.2022	66	28	10	13	N.D.
16.04.2022	61	24	8	19	N.D.
19.04.2022	71	31	6	17	N.D.
23.04.2022	64	26	11	15	N.D.
26.04.2022	62	23	7	23	N.D.
30.04.2022	65	29	12	20	N.D.
03.05.2022	74	33	6	17	N.D.
07.05.2022	60	21	11	24	N.D.
10.05.2022	72	32	8	22	N.D.
14.05.2022	68	30	9	16	N.D.
17.05.2022	70	31	11	25	N.D.
21.05.2022	62	28	12	18	N.D.
24.05.2022	55	18	10	15	N.D.
28.05.2022	66	29	7	27	N.D.

N.D. : Not detected

TABLE: - 8
Onsite Ambient Air Quality Monitoring Results
Location | Talanjuri
(Period: March,2022 to May,2022)

DATE	PM10 (µg/m3)	PM2.5 (µg/m3)	SO2 (µg/m3)	NO2 (µg/m3)	BaP (ng/m3)
05.03.2022	70	30	10	24	N.D.
08.03.2022	60	25	8	21	N.D.
12.03.2022	68	30	12	28	N.D.
15.03.2022	74	36	9	19	N.D.
19.03.2022	57	20	14	23	N.D.
22.03.2022	76	36	10	31	N.D.
26.03.2022	63	28	9	24	N.D.
29.03.2022	71	33	10	19	N.D.
02.04.2022	73	34	12	22	N.D.
05.04.2022	62	30	13	26	N.D.
09.04.2022	81	38	8	29	N.D.
12.04.2022	70	29	9	20	N.D.
16.04.2022	75	33	12	23	N.D.
19.04.2022	68	28	8	32	N.D.
23.04.2022	73	33	10	21	N.D.
26.04.2022	59	22	9	20	N.D.
30.04.2022	67	29	12	27	N.D.
03.05.2022	73	34	17	25	N.D.
07.05.2022	66	27	8	29	N.D.
10.05.2022	75	32	10	22	N.D.
14.05.2022	82	38	15	28	N.D.
17.05.2022	64	30	11	19	N.D.
21.05.2022	77	35	9	26	N.D.
24.05.2022	73	32	14	20	N.D.
28.05.2022	68	27	10	17	N.D.

N.D. : Not detected

TABLE: - I
Onsite Ambient Air Quality Monitoring Results
Location | Near Project Site (Sahebdihi)
(Period: March,2022 to May, 2022)

DATE	Shit - 1 (mg/m3)	Shit - 2 (mg/m3)	Shift-III (mg/m3)
04.03.2022	0.637	0.331	0.631
07.03.2022	0.279	0.276	0.219
11.03.2022	0.481	0.578	0.411
14.03.2022	0.223	0.533	0.378
18.03.2022	0.296	0.272	0.312
21.03.2022	0.637	0.431	0.231
25.03.2022	0.279	0.376	0.319
28.03.2022	0.336	0.440	0.428
01.04.2022	0.345	0.556	0.343
04.04.2022	0.459	0.374	0.402
08.04.2022	0.404	0.401	0.429
11.04.2022	0.630	0.472	0.500
15.04.2022	0.505	0.244	0.272
18.04.2022	0.420	0.534	0.562
22.04.2022	0.326	0.423	0.451
25.04.2022	0.642	0.339	0.367
29.04.2022	0.376	0.459	0.487
02.05.2022	0.480	0.319	0.347
06.05.2022	0.280	0.216	0.244
09.05.2022	0.540	0.637	0.565
13.05.2022	0.476	0.402	0.430
16.05.2022	0.418	0.457	0.485
20.05.2022	0.255	0.269	0.297
23.05.2022	0.531	0.493	0.521
27.03.2022	0.405	0.644	0.472

TABLE: - 2

Onsite Ambient Air Quality Monitoring Results

Location | Near Purunia Prrathamic School

(Period: March,2022 to May, 2022)

DATE	Shit - 1 (mg/m3)	Shit - 2 (mg/m3)	Shift-III (mg/m3)
04.03.2022	0.323	0.342	0.369
07.03.2022	0.458	0.325	0.383
11.03.2022	0.282	0.433	0.434
14.03.2022	0.327	0.353	0.324
18.03.2022	0.410	0.284	0.378
21.03.2022	0.458	0.295	0.283
25.03.2022	0.564	0.413	0.374
28.03.2022	0.327	0.174	0.224
01.04.2022	0.398	0.446	0.303
04.04.2022	0.285	0.491	0.318
08.04.2022	0.529	0.394	0.483
11.04.2022	0.153	0.204	0.505
15.04.2022	0.478	0.470	0.432
18.04.2022	0.292	0.343	0.311
22.04.2022	0.453	0.466	0.343
25.04.2022	0.442	0.365	0.434
29.04.2022	0.418	0.245	0.533
02.05.2022	0.441	0.350	0.177
06.05.2022	0.245	0.579	0.643
09.05.2022	0.417	0.368	0.369
13.05.2022	0.357	0.483	0.294
16.05.2022	0.477	0.386	0.523
20.05.2022	0.242	0.264	0.303
23.05.2022	0.163	0.594	0.595
27.03.2022	0.547	0.479	0.377

TABLE: - 3

Onsite Ambient Air Quality Monitoring Results

Location | Kanta Bandh

(Period: March,2022 to May, 2022)

DATE	Shit - 1 (mg/m3)	Shit - 2 (mg/m3)	Shift-III (mg/m3)
04.03.2022	0.382	0.353	0.552
07.03.2022	0.300	0.368	0.219
11.03.2022	0.505	0.448	0.408
14.03.2022	0.221	0.212	0.256
18.03.2022	0.280	0.385	0.469
21.03.2022	0.382	0.453	0.242
25.03.2022	0.300	0.368	0.219
28.03.2022	0.505	0.448	0.408
01.04.2022	0.346	0.548	0.637
04.04.2022	0.237	0.305	0.556
08.04.2022	0.450	0.559	0.371
11.04.2022	0.328	0.254	0.631
15.04.2022	0.276	0.406	0.233
18.04.2022	0.198	0.266	0.317
22.04.2022	0.302	0.646	0.184
25.04.2022	0.450	0.276	0.453
29.04.2022	0.374	0.345	0.634
02.05.2022	0.556	0.424	0.275
06.05.2022	0.477	0.420	0.380
09.05.2022	0.324	0.350	0.327
13.05.2022	0.253	0.392	0.281
16.05.2022	0.301	0.469	0.420
20.05.2022	0.425	0.368	0.328
23.05.2022	0.396	0.522	0.595
27.03.2022	0.585	0.645	0.684

TABLE: - 4
Onsite Ambient Air Quality Monitoring Results
Location | Hari Nagara
(Period: March,2022 to May, 2022)

DATE	Shit - 1 (mg/m3)	Shit - 2 (mg/m3)	Shift-III (mg/m3)
04.03.2022	0.835	0.531	0.384
07.03.2022	0.257	0.698	0.663
11.03.2022	0.602	0.540	0.467
14.03.2022	0.440	0.333	0.600
18.03.2022	0.505	0.501	0.454
21.03.2022	0.744	0.585	0.550
25.03.2022	0.585	0.523	0.450
28.03.2022	0.655	0.768	0.556
01.04.2022	0.693	0.378	0.642
04.04.2022	0.769	0.610	0.575
08.04.2022	0.564	0.443	0.529
11.04.2022	0.743	0.556	0.592
15.04.2022	0.600	0.896	0.749
18.04.2022	0.582	0.523	0.488
22.04.2022	0.467	0.405	0.336
25.04.2022	0.695	0.508	0.544
29.04.2022	0.672	0.668	0.821
02.05.2022	0.639	0.480	0.445
06.05.2022	0.404	0.642	0.669
09.05.2022	0.682	0.495	0.531
13.05.2022	0.463	0.435	0.588
16.05.2022	0.639	0.680	0.445
20.05.2022	0.504	0.642	0.669
23.05.2022	0.754	0.477	0.681
27.03.2022	0.464	0.543	0.329

TABLE: - 5

Onsite Ambient Air Quality Monitoring Results

Near Barjora Danpara

Location Jr High School

(Period: March,2022 to May, 2022)

DATE	Shit - 1 (mg/m3)	Shit - 2 (mg/m3)	Shift-III (mg/m3)
05.03.2022	0.554	0.519	0.547
08.03.2022	0.257	0.319	0.309
12.03.2022	0.468	0.405	0.504
15.03.2022	0.276	0.596	0.427
19.03.2022	0.237	0.261	0.351
22.03.2022	0.184	0.383	0.225
26.03.2022	0.458	0.482	0.372
29.03.2022	0.323	0.227	0.224
02.04.2022	0.276	0.282	0.398
05.04.2022	0.237	0.261	0.351
09.04.2022	0.185	0.596	0.225
12.04.2022	0.458	0.295	0.572
16.04.2022	0.221	0.227	0.264
19.04.2022	0.515	0.538	0.351
23.04.2022	0.554	0.422	0.178
26.04.2022	0.334	0.213	0.321
30.04.2022	0.237	0.261	0.403
03.05.2022	0.183	0.196	0.225
07.05.2022	0.458	0.482	0.474
10.05.2022	0.251	0.235	0.232
14.05.2022	0.515	0.538	0.553
17.05.2022	0.366	0.520	0.232
21.05.2022	0.423	0.284	0.455
24.05.2022	0.200	0.388	0.221
28.03.2022	0.312	0.299	0.361

TABLE: - 6
Onsite Ambient Air Quality Monitoring Results
Location | Ghutgoria
(Period: March,2022 to May, 2022)

DATE	Shit - 1 (mg/m3)	Shit - 2 (mg/m3)	Shift-III (mg/m3)
05.03.2022	0.388	0.667	0.552
08.03.2022	0.555	0.579	0.476
12.03.2022	1.201	1.222	0.781
15.03.2022	0.427	0.423	0.391
19.03.2022	0.917	0.396	0.681
22.03.2022	0.634	0.630	0.298
26.03.2022	0.288	0.667	0.552
29.03.2022	0.390	0.406	1.115
02.04.2022	0.506	0.685	0.677
05.04.2022	0.641	1.165	0.569
09.04.2022	0.707	0.525	0.694
12.04.2022	1.046	0.442	0.417
16.04.2022	0.534	0.583	0.605
19.04.2022	0.535	1.159	0.463
23.04.2022	0.694	0.681	1.181
26.04.2022	0.443	0.439	0.414
30.04.2022	0.552	0.731	0.923
03.05.2022	0.539	0.563	0.467
07.05.2022	0.418	1.139	1.005
10.05.2022	1.017	0.713	0.988
14.05.2022	0.461	0.640	0.532
17.05.2022	0.530	0.554	0.358
21.05.2022	0.480	0.601	0.467
24.05.2022	0.647	0.643	0.518
28.03.2022	0.890	0.706	1.015

TABLE: - 7

Onsite Ambient Air Quality Monitoring Results

Location | Near Muktatore Primary School

(Period: March,2022 to May, 2022)

DATE	Shit - 1 (mg/m3)	Shit - 2 (mg/m3)	Shift-III (mg/m3)
05.03.2022	0.185	0.443	0.543
08.03.2022	0.172	0.327	0.327
12.03.2022	0.187	0.517	0.517
15.03.2022	0.531	0.239	0.239
19.03.2022	0.221	0.213	0.213
22.03.2022	0.172	0.327	0.327
26.03.2022	0.187	0.517	0.517
29.03.2022	0.531	0.318	0.318
02.04.2022	0.325	0.452	0.256
05.04.2022	0.483	0.207	0.475
09.04.2022	0.422	0.412	0.380
12.04.2022	0.192	0.223	0.191
16.04.2022	0.589	0.437	0.405
19.04.2022	0.216	0.568	0.336
23.04.2022	0.422	0.384	0.352
26.04.2022	0.517	0.483	0.451
30.04.2022	0.409	0.357	0.325
03.05.2022	0.217	0.610	0.578
07.05.2022	0.382	0.372	0.340
10.05.2022	0.518	0.383	0.351
14.05.2022	0.196	0.344	0.212
17.05.2022	0.187	0.448	0.416
21.05.2022	0.549	0.539	0.507
24.05.2022	0.458	0.335	0.303
28.03.2022	0.575	0.623	0.391

TABLE: - 8
Onsite Ambient Air Quality Monitoring Results
Location | Talanjuri
(Period: March,2022 to May, 2022)

DATE	Shit - 1 (mg/m3)	Shit - 2 (mg/m3)	Shift-III (mg/m3)
05.03.2022	0.639	0.697	0.632
08.03.2022	0.342	0.497	0.394
12.03.2022	0.553	0.583	0.589
15.03.2022	0.361	0.874	0.712
19.03.2022	0.322	0.439	0.436
22.03.2022	0.265	0.561	0.310
26.03.2022	0.543	0.660	0.657
29.03.2022	0.408	0.405	0.309
02.04.2022	0.361	0.460	0.483
05.04.2022	0.322	0.439	0.436
09.04.2022	0.265	0.374	0.310
12.04.2022	0.543	0.473	0.657
16.04.2022	0.306	0.405	0.349
19.04.2022	0.600	0.716	0.736
23.04.2022	0.639	0.600	0.263
26.04.2022	0.419	0.391	0.406
30.04.2022	0.322	0.439	0.488
03.05.2022	0.265	0.374	0.310
07.05.2022	0.543	0.660	0.559
10.05.2022	0.336	0.413	0.317
14.05.2022	0.600	0.716	0.638
17.05.2022	0.451	0.698	0.317
21.05.2022	0.708	0.462	0.540
24.05.2022	0.285	0.566	0.306
28.03.2022	0.397	0.477	0.446

SATVIK ENTERPRISES LIMITED
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Website : www.satvikindia.com

SATVIK ENTERPRISES LIMITED

CORPORATE ENVIRONMENT POLICY

Satvik Enterprises Limited (hereinafter referred to as 'SEL'), a Private Limited company, was incorporated on 6th day of May 1997, having its registered office at 1, Park Lane, 3rd floor; Kolkata-700 016 in West Bengal. The company has developed core competence in the iron & steel industry with particular specialization in import (Manganese Ore) and export (Ferro-Alloys) of critical products in the steel supply chain. The growth of the group during last few years has been phenomenal and fast catching the attention of bankers, professionals and the industry as a whole. With verticals that are exploring innovative and sustainable avenues across base metals, alloys and steel, SEL is paving the way for India's emergence as a global superpower.

• The company, Satvik Enteprises Limited recognizes its joint responsibility with the Government and the Public to protect environment and is committed to regulate all its activities so as to follow best practicable means for minimizing adverse environmental impact arising out of its operations.

• The aim of the Policy is to do all that is reasonably practicable to prevent or minimize, encompassing all available knowledge and information, the risk of an adverse environmental impact arising from manufacturing and supply of our products.

• This Policy document reflects the continuing commitment of the Board for sound Environment Management of its operations. The Policy is applicable to all company operations covering manufacturing, sales and distribution and other offices. This document defines the aims and scope of the Policy as well as responsibilities for the achievement of the objectives laid down.

THE VISION

Our business approach not only seeks to minimize our environmental footprint but also contribute in enhancing the environmental quality in and around our work area. We are an ISO 9001:2015 certified company and are integrated trading systems consolidate our belief in quality assurance keeping sustainability in mind.

ENVIRONMENTAL POLICY

Satvik Enterprises Limited is committed to meeting the needs of customers in an environmentally sound manner, through continuous improvement in environmental performance in all our activities. Management at all levels, jointly with employees, is responsible and will be held accountable for company's environmental performance. Accordingly, SEL aims to:

SATVIK ENTERPRISES LTD. Kol-16

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- Continuously assess our environmental impacts and measure and improve our environmental performance by adopting best practices for prevention and control of pollution.
- Ensure safety of its products and operations for the environment by using standards of environmental safety, which are scientifically sustainable and commonly acceptable.
- Develop, introduce and maintain environmental management systems across the company to meet the company standards as well as statutory requirements for environment. Verify compliance with these standards through regular auditing.
- Make continuous efforts to reduce water intensity and fresh water usage by increased use of harvested and recycled water in our operation.
- Reduce waste, conserve energy and explore opportunities for reuse and recycle.
- Conduct all our operations in an environmentally responsible manner that is better than statutory environment compliances and applicable standards.
- Involve all employees in the implementation of this Policy and provide appropriate training.
- Work in partnership with external bodies and Government agencies to promote environmental care, increase understanding of environmental issues and disseminate good practices.

CORPORATE RESPONSIBILITY

The Directors/ Chairman of the Company is responsible for the Compliance of the Policy. The Directors/ Chairman shall constitute a Cell called as Corporate Environment Cell (CEC) consisting of MD (Mr. Vikash Agarwal), CEO (Mr. Debashish Chatterjee), Lead Chemist (Mr. Vipin Singh) and Plant Production & Safety (Mr. Asim Roy) & Environmental Hazard Manager (Mr. Gopal Darbar). The CEC is committed to conduct the company operations in an environmentally sound manner. The CEC will:

- Set standards and establish environmental improvement objectives and targets for OMPL as a whole and for individual units, and ensure these are included in the annual operating plans.
- Formally review environment performance of the company and report environmental performance to the Board of Directors/ Chairman of the company directly once every quarter.
- In case of emergency (non-compliance/deviation/violation/ major accident) immediate reporting to be done to the Directors/ Chairman of the Company.
- Review environment performance on monthly basis and recognise exemplary performance.
- Ensure implementation of Policy on environment at plant level and review, report environment performance of the plant to the Board of Directors/ Chairman of the company through CEC Cell once every quarter.
- In case of emergency (non-compliance/deviation/violation/ major accident) Head of Environment Department will do immediate reporting to the Directors/ Chairman of the Company.

The Corporate Environment Cell in coordination with Head of Environment Department will:

- Ensure implementation of Policy on environment and compliance with the Company's environmental standards and the standards stipulated as per law.

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- Prevention of incidents or accidents that might result from abnormal operating conditions and
- Reduction of adverse effects that result from normal operating conditions.
- Establish appropriate management systems for environment management and ensure regular auditing to verify compliance.
- Establish systems for appropriate training in implementation of Environment Management Systems at work.
- Ensure periodic 3rd party environment audits through certification bodies to check efficacy of the Environment Management Systems
- Participate, wherever possible, with appropriate industry and Government bodies advising on environmental legislation and interact with national and local authorities concerned with protection of environment

The Hierarchy of our Corporate Environment management Cell that is being strictly followed is attached in next page:

SATVIK ENTERPRISES LTD. Kol-16

Signature

Date: 13/09/22

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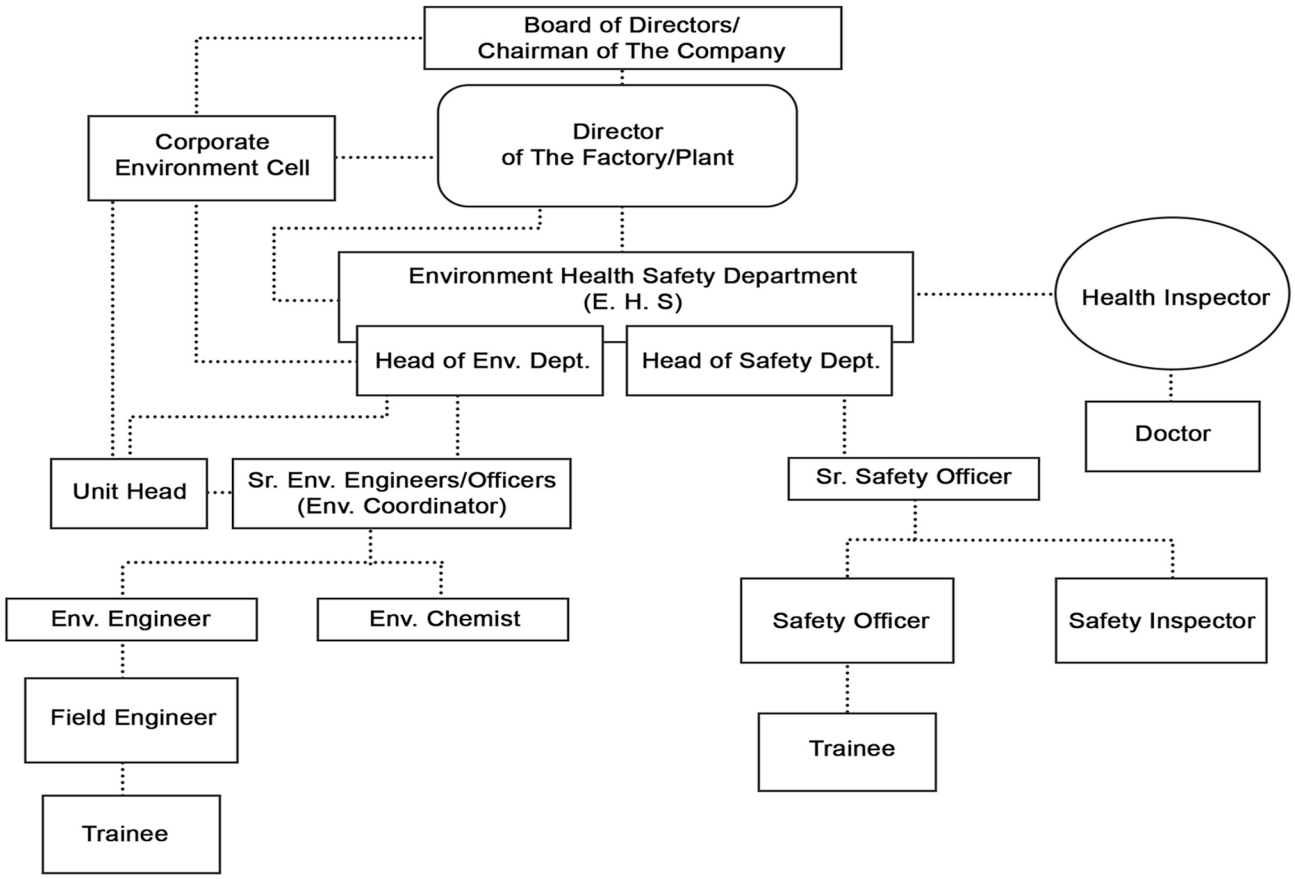
SATVIK ENTERPRISES LIMITED

KOLKATA



SATVIK ENTERPRISES LTD. Kol-16

Annexure – VII

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 ($10^{-6}\mu$c/mL)	nil	0.0001
37	Beta Emitters ($10^{-6}\mu$c/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 (^oC)	#	-	-	#
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^oC) (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 ($10^{-6}\mu c$/mL)	0.1	0.1	0.01	0.1
34	Beta Emitters ($10^{-6}\mu c$/mL)	1	1	0.1	1

Shall not exceed 5^oC 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

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual*	50	20	- Improved West and Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2), $\mu g/m^3$	Annual*	40	30	- Modified Jacob & Hochheiser (Na-Arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM_{10} $\mu g/m^3$	Annual*	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ $\mu g/m^3$	Annual*	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) $\mu g/m^3$	8 hours**	100	100	- UV photometric - Chemilminescence
		1 hour**	180	180	- Chemical Method
6	Lead (Pb) $\mu g/m^3$	Annual*	0.50	0.50	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO) mg/m^3	8 hours**	02	02	- Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) $\mu g/m^3$	Annual*	100	100	-Chemiluminescence
		24 hours**	400	400	-Indophenol blue method

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m^3	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m^3	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/184/09/Exty.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.

[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.

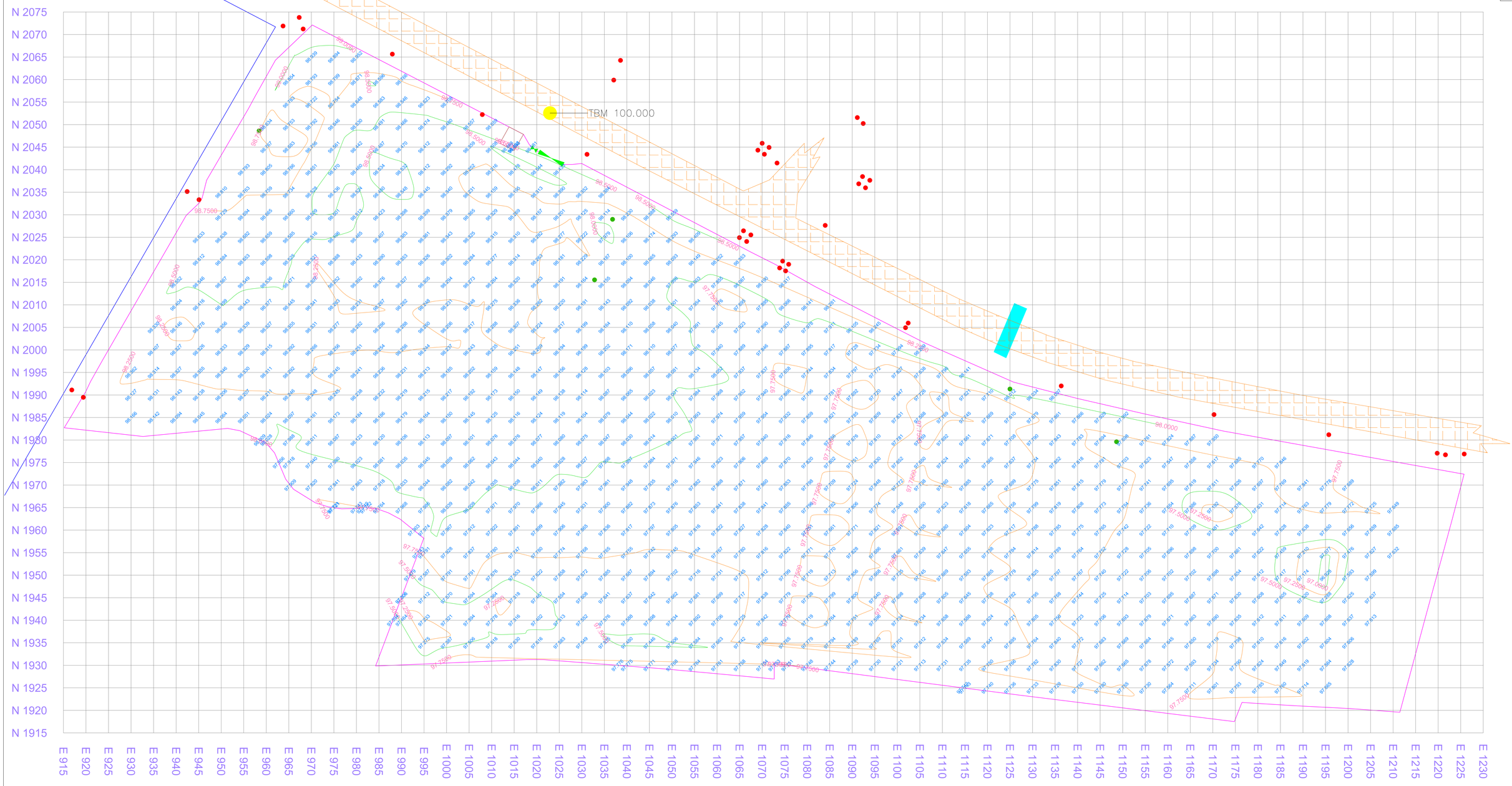
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.

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.

ANNEXURE I



Description	Area (in Acre)	Area (Sq. M)
TOTAL LAND (FACTORY BOUNDARY AREA)	5.38	21771.92

For ENVIROTECH EAST (PVT.) LTD.

TAPAS KUNDU
DY. GM (ENV. DIVISION)

NOTES
1). ALL DIMENSIONS ARE IN MM.
2). ALL GRID SPACING ARE @ 5.0 METERS BOTHWAYS.

Scale- 1:300

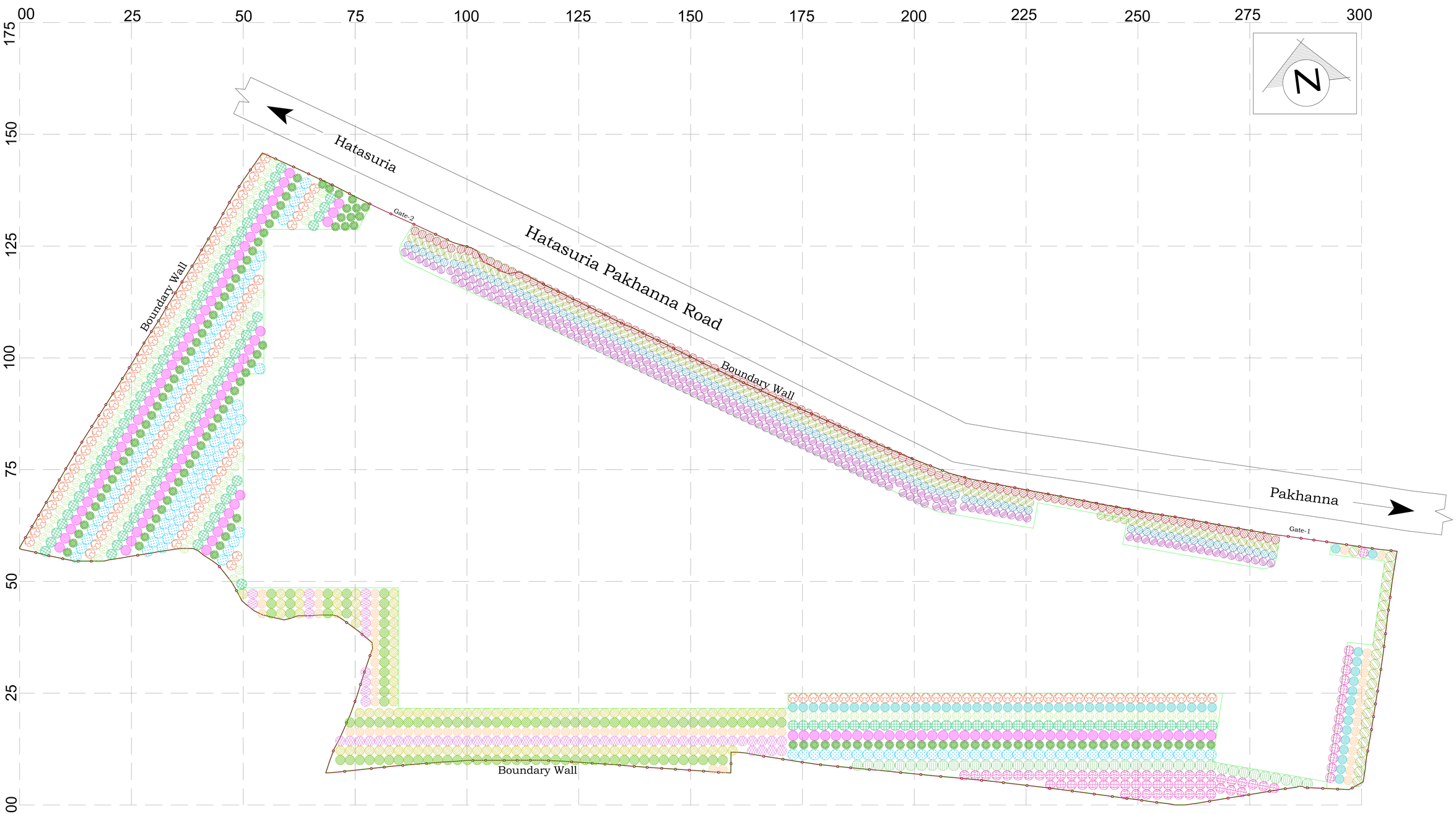
Quantity	Title/Name, designation, material, dimension etc			Article No./Reference	
Drawn by: Partha Bag	Checked by - date	Approved by - date	Filename	Date: 08.06.2022	Page: A0

Satvik Enterprises Limited

Mouza: Hat-Asuria & Basudebpur (North),
P.O. Hat Asuria
PS. : Barjora, Dist.: Bankura (WB)

CONTOUR MAP

SEL/PLANT LAYOUT/003 | REV. 0 | Sheet 1 OF 1



PROPOSED GREENBELT

DETAILS OF SELECTED TREES FOR PLANTATION

SR. NO.	TREE SPECIES	COMMON NAME	PLANT HEIGHT (M.)	SPACING (MM.)	QUANTITY (Nos.)	SYMBOL
1.	*Pongamia pinnate*	Karanja	15 - 30	2500	116	
2.	*Mimusops elengi*	Bakul	8-12	3000	133	
3.	*Butea monosperma*	Palash	10-15	3000	104	
4.	*Cassea fistula*	Amaltas	10-15	3000	160	
5.	*Dalbergia sissoo*	Sissoo	24 - 27	3000	111	
6.	*Ficus Bengalensis*	Banyan	18 - 20	3000	109	
7.	*Ficus Religiosa*	Peepal	16 - 18	2500	81	
8.	*Acacia auriculiformis*	Sonajhuri	35 - 40	3000	64	
9.	*Terminalia Arjuna*	Arjun	14 - 15	3000	135	
10.	*Azadirachta Indica*	Neem	15 - 30	3000	58	
11.	*Mangifera Indica*	Mango	30–40	2000	132	
12.	*Albizzia Lebbeck*	Siris	28 - 30	3000	125	
13.	*Artocarpus Heterophyllium*	Jackfruit	15 - 20	3000	117	
14.	*Polyathia longifolia*	Ashoka	24 - 30	3000	123	
15.	*Alstinia scholaris*	Saptaparni	16 - 20	3000	116	
16.	*Peltophorum pterocarpum*	Radhachura	10 - 12	2500	43	
17.	*Madhuca latifolia*	Mahua	16 - 20	2000	73	
				TOTAL	1800	

Description	Area (in Acre)	Area (Sq. M)	Percentage	NO. of Trees
Greenbelt	1.775	7183.12	33.00%	1800
TOTAL LAND (FACTORY BOUNDARY AREA)	5.38	21771.92	100.00%	

For ENVIROTECH EAST (PVT.) LTD.
TAPAS KUNDU
DY. GM (ENV. DIVISION)

NOTES
1). ALL DIMENSIONS ARE IN MM.
2). ALL GRID SPACING ARE @ 25.0 METERS BOTHWAYS.

Scale- 1:300

Quantity	Title/Name, designation, material, dimension etc		Article No./Reference		
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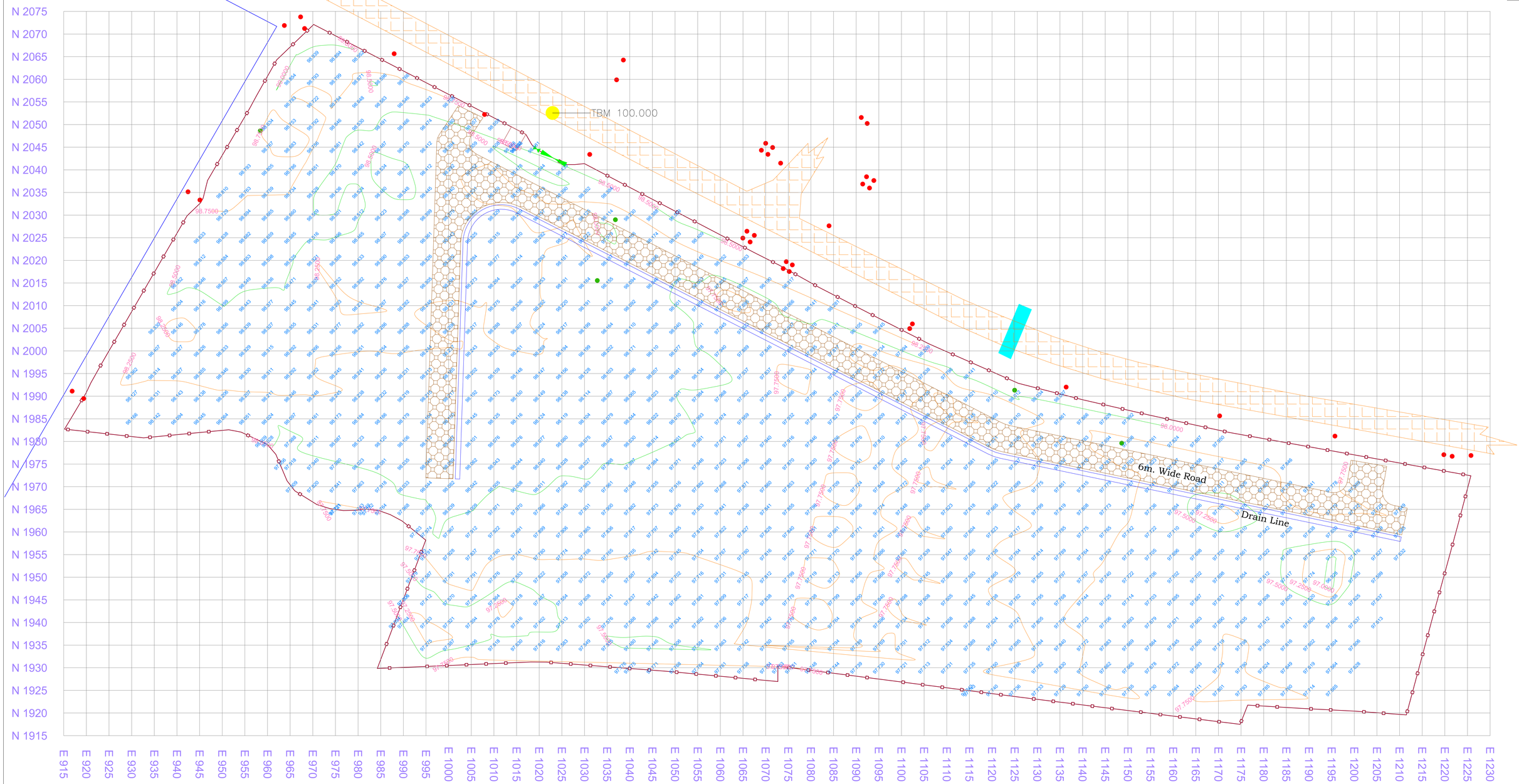
Mouza: Hat-Asuria & Basudebpur (North),
P.O. Hat Asuria
PS. : Barjora, Dist.: Bankura (WB)

TREES PLANTATION DRAWING

SEL/PLANT LAYOUT/002 | REV. 0 | Sheet 1 OF 1

ANNEXURE X



S. No.	Area Description	Area (in Acre)	Percentage	Symbol
01.	Road & Paved area	0.40	1618.73	
02.	Drainage System	--	278.31	
	TOTAL LAND (FACTORY BOUNDARY AREA)	5.38	21771.92	

For ENVIROTECH EAST (PVT.) LTD.
TAPAS KUNDU
DY. GM (ENV. DIVISION)

NOTES
1). ALL DIMENSIONS ARE IN MM.
2). ALL GRID SPACING ARE @ 5.0 METERS BOTHWAYS.

Scale- 1:300

Quantity	Title/Name, designation, material, dimension etc		Article No./Reference		
Drawn by: Partha Bag	Checked by - date	Approved by - date	Filename	Date: 08.06.2022	Page: A0

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P.O. Hat Asuria
PS. : Barjora, Dist.: Bankura (WB)

INTERNAL ROAD AND DRAINAGE SYSTEM

SEL/PLANT LAYOUT/004 | REV. 0 | Sheet 1 OF 1