DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Of

EXTRACTION OF RIVERBED SAND DEPOSITION

From

BARDHHAMAN-II SAND MINE (MIN_EBUR_25)

MOUZA – BECHARHAT

J.L. NO- 79, **Plot No**.: 1632(P),1620(P) & 1560(P); **Block-** Bardhhaman-II

P.S. – Bardhhaman, **District-** Purba Bardhhaman; **State –** West Bengal

Production Capacity: 5,34,405.60 Cu.M. of Sand

Lease Area: 6.65 Ha. (Non-Forest)

Screening Category: B1

LESSEE :

West Bengal Mineral Development & Trading Corporation Limited

WBIIDC Building, 3rd Floor, DJ-Block, DJ-10, Sector- II,
Bidhanagar (Salt Lake City),
Kolkata: 700091

TOR LETTER NO.: *2713/EN/T-II-1/519/2023*

SEIAA Proposal No.: *SIA/WB/MIN/440154/2023*

Prepared by:

INDIAN MINE PLANNERS AND CONSULTANTS

(A NABET Accredited 'A' Grade Consultants)

Room No. 409,4th Floor, DLF Galleria, New Town,
Action Area 1, Kolkata -700156, West Bengal

Laboratory Partner:

N.D. International

(A NABL Accredited Laboratory)

107B, Block-F, New Alipore, Kolkata-700053

(Baseline Data: March-May 2023)

January - 2024

Job No: - ENV-22/1 **Issue No: - 01**

DECLARATION BY THE APPLICANT

I do hereby declare that the EIA/EMP report in respect of **Bardhhaman-II Sand Mine (MIN_EBUR_25)** over an area of **6.65 Ha (16.432 Acres)** on **Damodar River** at JL No. – 79; Plot No. 1632(P), 1620(P) & 1560(P), Mouza – Becharhat; P.S. –Bardhhaman ; Block- Bardhhaman-II, District – Purba Bardhaman, West Bengal (Proposal No. **SIA/WB/MIN/440154/2023**) has been prepared by **M/S Indian Mine Planners & Consultants**, Kolkata as per the TOR prescribed by SEIAA West Bengal vide letter No. **2713/EN/T-II-1/519/2023 dated 1.12.2023**. The contents (information and Data) of the report about my project is correct and true to my knowledge & Belief.

WBMDTCL
WBIIDC Building, 3rd Floor, DJ-10,
DJ Block, Sector II, Salt Lake City
Kolkata – 700091, West Bengal

Samik Panigrahi, WBCS (Exe.)
General manager (Sand & Admin)
W.B. Mineral Dev. & Trading Corp. Ltd.

UNDERAKING BY THE CONSULTANT

This is to certify that we, M/s Indian Mine Planners & Consultants having NABET Accreditation no. **NABET/EIA/2023/SA-0182** [Sl. No. 1 (a) (i), Cat 'A'] dated December 20, 2022, have prepared in EIA/EMP report of "**Bardhhaman-II Sand Mine (MIN_EBUR_25)"** for extraction of **1.887** Cr. Cft. Of sand from the Damodar riverbed over an area 6.65 Ha. At Mouza: Becharhat; Plot No.:- 1632(P), 1620(P) & 1560(P), JL No. – 79; Block-Bardhhaman II, P.S.: Bardhhaman, District: Purba Bardhaman on behalf of West Bengal Mineral Development & Trading Corporation Ltd. (Project Proponent) as per TOR prescribed by SEAC West Bengal vide letter No. **2713/EN/T-II-1/519/2023 dated 1.12.2023**.

The information and data provided in the EIA/EMP report is true to its form and is verified by the respective EC & FAE's in due course of time.

Dr. N. B. Chanda
EIA Coordinator & Managing Partner
M/S Indian Mine Planners & Consultants
Date: 28.12.2023

DECLARATION BY THE APPLICANT

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA Coordinator:
Name: Dr. N.B. Chanda
Signature and Date: 26.07.2023
Period of involvement: March 2023 onwards

Functional area Experts:

S No 1.	Functional area	Functional Area Experts	Involvement (period and task**)	Signature & Date
	AP	Dr. N B Chanda	• Identification of baseline monitoring stations and study of the monitored data with respect to the applicable standards. • Identification of sources of air pollution comprising dust, gaseous emission due to mining & other activities • Identification of Impacts & suggestion of mitigation measures Period March 2023 onwards	
2.	AQ	Dr. A S Shannigrahi	• Quantification of emission particulars • Air quality modeling for prediction of post project impact on the air quality of the study area • Analysis of the Isopleth generated • Arriving at the post project cumulative concentration at the AAQ monitoring locations Period March 2023 onwards	
3.	WP	Dr. N B Chanda	• Identification of baseline monitoring stations and study of the monitored data with respect to the applicable standards. • Identification of Water requirement & Source • Preparation of water balance diagram • Identification of Water polluting sources • Impact of the project on the water	

			quality, both surface and groundwater • Suggestion of Mitigation measures to control water pollution Period March 2023 onwards	
4.	SW + HW	Sanjib Chattopadhyay	• Quantification of mineral & waste from mining operation • Waste disposal method evaluation • Providing dump management plan • Providing Surface Runoff Management Structure Requirements. • Identification of Hazardous waste and its details of disposal Period March 2023 onwards	
5.	SE	Mrs. Nidhi Singh Rathod	• Identification of villages in the study area and finalization of demographic profile of the villages within the study area. • Perusal of socio economic report done by client • Validation and incorporation of relevantportions in the report. Period March 2023 onwards	Nidhi Singh Rathod
6	EB	Prof. Tapan Mishra	• Perusal of existing data relevant to this project. • Studying the details of flora and fauna, separately for core, buffer zone and forest area based on primary field survey. • Identification of species • Indicating the Schedule of the fauna present in the study area • Assessment of impact on Biological environment and suggestion of mitigative measures • Collecting & providing details of existing and proposed Green belt development /plantation in the core zone Period March 2023 onwards	Tapan Kr. Mishra
7	HG	Debashish Ghosh	• Study of existing surface drainage arrangements in the core and buffer zone, impact due to mining on these drainage courses and suggestion of mitigative measures • Perusal of site specific ground water table details for the core zone and the study area. • Studied the hydrological aspects of surface and groundwater in study area	

			• Estimation of stage of ground water development as per CGWA norms • Study about impact on the hydrology due to mining operation • Suggesting mitigative measures like RWH for enhancement of ground water level Period March 2023 onwards	
8	GEO	Dr. N B Chanda	• Study of geology of the ML area and the surrounding areas. • Provide details about Mineralcomposition Period March 2023 onwards	
9	SC	G C Das	• Study of soil profile • Fixing of Soil sampling locations and perusal of analysis results. • Assessment of Impact on soil and suggesting plantation scheme. March 2023 onwards	
10	NV	Sanjib Chattopadhyay	• Identification of baseline monitoring stations and study of the monitored data with respect to the applicable standards. • Predict the noise level and vibration level due to proposed mining operation based on scientific evaluation. • Suggesting the Mitigation measures to control noise pollution • Suggesting the Mitigation measures to control ground vibration Period March 2023 onwards	
11	LU	G C Das	• Collection of Remote sensing satellite data to study the land use pattern. • Primary field survey and limited field verification for land categorization in thestudy area • Preparation of Land use map using Satellite data of the project area separately for the core zone. Period March 2023 onwards	
12	RH	Debasish Basu	• Identified Major risks involved in the project Mitigation measures suggested to avoid risk. • Preparation of onsite and offsite emergency management plan. Period March 2023 onwards	

MINE PLANNERS & CONSULTANTS
QCI-NABET Environment Consultant Organization
ISO 9001 : 2015

Executive Summary

The proposed project is the riverbed sand mining of Damodar River located under Mouza-Becharhat, J.L. No.- 79, Plot no.: 1632(P), 1620(P), & 1560(P), Block- Bardhaman II, P.S: Bardhhaman, District- Purba Bardhaman, West Bengal of "West Bengal Mineral Development & Trading Corporation Limited". The proposed project would have 6.65 hectares of land for five years. The area is in Survey of India Toposheet No. 73M/16; OSM No.: F45D16 and bounded by latitude 23°12'22.717" N to 23°12'17.726" N and longitude 87°51'22.412" E to 87°51'35.523" E. The area is non-forest land in nature. The area is predominantly flat with riverbed sand having elevation ranges from 86 m to 95m above mean sea level.

As per MoEF&CC, New Delhi Gazette dated 14thSeptember 2006 and amended thereafter, the proposed mining project is categorized as category 'B1' project.

The mining plan has been prepared by Qualified Person Dr. N.B.Chanda and approved for f five yearsby Chief Mining Officer, G.P. Branch, S.B. Unit, Asansol, Govt. of West Bengal.

The proposed activity is supposed to collect approximately 534405.60 Cu.M of sand for a total of fiveyears. The extraction of sand will be restricted within the central 3/4thwidth of the river and will be carried out through an open cast manual method. The proposed activity does not require any drillingand blasting in mining activities.

The lease area comes under 'waterbody LULC type as per Land use Landcover Classification of Birbhum district of West Bengal, and the surrounding land use type is a mixture of agricultural landwith settlement.

There is no permanent influx of the population anticipated, as the workers will be hired locally fromnearby villages. Unemployment is very pervasive in the study area. A total manpower of 90 nos will be involved with the project, with 4 nos. of technical personnel (manager/supervisor), 26 nos of skilled and 60 nos. of non-skilled labours. It is expected that a large part of the investment in this project will be direct/ indirect role on local population. Hence there will be an overall improvement of the socio-economic status of the people of surrounding areas.

A total water requirement of 6 KLD will be envisaged with the proposed project, with 1.5 KLD allocated for drinking purposes, 2 KLD allocated for maintenance of green belt, and 2.5 KLD for dust suppression. 2 nos. of excavator of capacity 1.5 cum, 20 nos. of tipper truck of capacity 10 cum and 2 nos. of watersprinkler truck of capacity 10 cum will be deployed for the proposed activity.

The total cost of the project is approx. 25.00275 crores, one year would be approx., 5.00055 crores andthere is a budgetary provision that 5% (0.2500275 crore per year) of the project cost will be allocatedfor the Environmental Management Plan (EMP) and 2% (0.1000110 crore per year) of the project cost will be allocated for Corporate Environmental Responsibility (CER) and health and hygiene (H&H) for causes of poor people of nearby villages. Health and Hygiene will be allocated for a healthcheck-up once in six-months. Extra budgetary provisions will be allocated to lady workers. The Totalexpenditure of welfare scheme i.e., EMP + CRP & H&H = 7% (0.3500385 crore per year).

Table of Contents

List of Figures

List of Tables

List of Abbreviations

Abbreviation	Definitions
AAQ	Ambient Air Quality
bgl	Below Ground Level
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
CPCB	Central Pollution Control Board
CSR	Corporate Social Responsibility
dB	Decibel
DO	Dissolved Oxygen
EAC	Expert Appraisal Committee
EIA	Environmental Impact Assessment
EMC	Environmental Management Cell
EMP	Environment Management Plan
EPA	The Environment Protection Act
GLC	Ground Level Concentration
Ha	Hectare
Ham	Hectare Meter
HFL	High Flood Level
KLD	Kilo litre Per Day
Km	Kilo Meter
Leq	Equivalent Noise Level
LFL	Low Flood Level
LOS	Level of Service
MoEF	Ministry of Environment and Forest & Climate Change
NABET	National Accreditation Board for Education and Training
NGO	Non Governmental Organisation
NH	National Highway
NOC	No Objection Certificate
OSHA	Occupational Safety and Health Administration
PCU	Passenger Car Unit
PM	Particulate Matter
PUC	Pollution Under Control
QCI	Quality Council of India
R & R	Rehabilitation & Resettlement
RBM	River Bed Material
RL	Reduced Level
SEAC	State Expert Appraisal Committee
SH	State Highway
SPCB	State Pollution Control Board
T/cum	Tons Per Cubic Meter
TKN	Total Kjeldahl Nitrogen

TOR	Term of Reference
TPA	Tonnes Per Annum
UNFC	United Nations Framework Classification
VWG	Village Working Group

List of Annexure:

Annexure no	Details
Annexure -I	Mining Plan Approval letter
Annexure -II	Terms of Reference (TOR) letter
Annexure -III	Letter of Intent
Annexure -IV	Approved Mining Plan
Annexure -V	Project site located on Toposheet
Annexure -VI	Baseline data (Lab Reports)
Annexure -VII	Non-cluster certificate
Annexure -VIII	CER undertaking
Annexure -IX	Transportation Route Map
Annexure - X	Comprehensive sand transport plan
Annexure -XI	NABET Accreditation Certificate of EIA Consultant
Annexure -XII	NABL Accreditation Certificate of lab

CHAPTER – 1

INTRODUCTION

The mining industry in India is a major economic activity which contributes significantly to the economy of India. The Mining and quarrying sector contributes around 2.5% of the Gross Domestic Product (GDP). The mining sector under index of Industrial Production (IIP) witnessed a growth of 1.7 percent Year on Year basis. Indian economy is on the aspirational path of becoming a $5 trillion GDP economy by 2024-25. The Mining Industry is going to have a sizable contribution to the envisaged GDP and wealth creation. India, being a developing economy, is dependent on the growth of energy sector to achieve the desired economic growth. The economic reforms in the past, has propelled Indian mining industry into a new and competitive environment.

Unless mining of the minerals is properly regulated, they can show adverse consequences on environment and socio-economic components of the society. It also disturbs the Air, soil, water and ecological parameters. On the other hand, it develops the economic standard of the region. Issues of Technology for zero waste or low waste mining, relief & rehabilitation, mine closure which otherwise leads to land degradation are important issues which require continuous attention. In order to mitigate the impact of mineral mining on the environment, a scientific assessment is very important for framing sustainable development strategies. Therefore, the implementation of scientific mining principles through EIA & EMP plays a vital role in sustainable economic growth of our country.

1.1. Purpose of the Report

The Environmental Impact Assessment has been prepared to access the present scenario of the study area for the proposed mining activity. Based on the assessment an environment management plan (EMP) has been prepared, which helps in minimizing the adverse effects of the mining on the surrounding environment.

The draft EIA report is being prepared to comply with the Term of reference (TOR) received from MoEF&CC under EIA notification of MoEF dated 1st December, 2023 and its amendments for seeking environmental clearance for sand mining in Damodar riverbed over an area of 6.65 Ha. in Mouza- Becharhat, J.L.No.: 79; Plot No.: 1632(P), 1620(P) & 1560(P), Block- Bardhhaman-II of Purba Barddhaman District of West Bengal. The project proponent has submitted application for prior Environmental Clearance (EC) and West Bengal State Expert Appraisal Committee has considered the same during the 73rd meeting held on 17.11.2023, subsequent to the discussions held on17.11.2023, State Environmental Impact Assessment Authority (SEIAA) has issued the Terms of

Reference (ToR) for conducting the Environmental Impacts Assessment (EIA) study and to prepare EIA report for conducting the Public hearing as part of Environment Clearances Process. This Environmental Impact Assessment (EIA) report is prepared to comply with the Terms of Reference (TOR) received from SEIAA under EIA notification of the MoEF dated 1-12-2023, and its amendments of MoEF&CC, Govt. of India, for seeking Environmental Clearance (EC) for sand mining in the applied mining lease area measuring 6.65 Ha falling under category "Bl".

1.2. Identification of the Project Proponent

The proposed mine lease was granted to **"West Bengal Mineral Development & Trading Corporation Limited"** on 10th July 2023. The mining plan for the Mine lease (ML) area has been approved by Chief Mining Officer, Dte of Mines & Minerals, G. P. Branch, S.B. Unit, Asansol, vide letter no 234/CMO/XVI/EBUR(553) dated 10th July, 2023. Attached as **Annexure-I**

- **Project proponent**

"West Bengal Mineral Development & Trading Corporation Limited"

WBIIDC Building, 3rd Floor, DJ-Block, DJ-10, Sector- II,

Bidhanagar (Salt Lake City),

Kolkata: 700091

Brief Description of Nature, Size, and Location of the project:

- **Nature of the project:**

Open Cast Mining method is proposed in the lease area.

- **Size of the project:**

As per the approved mining plan vide letter no 234/CMO/XVI/EBUR(553) dated 10th July, 2023, riverbed sand mining will be undertaken over an area of 6.65 Ha. for production of 5,34,405.60 Cu. M of sand for a contract period of Concession of 5 (five) years.

- **Anticipated Life of Project and Cost of the Project:**

The period of concession of the mine lease is 5 years based on the level of exploration and reserve established. The cost of mining lease, mining equipment, environmental protection, and socioeconomic development for the present mine lease area is about Rs 5.00055 Crores (For initial Year).

- **Location of the project:**

The proposed Becharhat sand mine unit comes under J.L. No.: 79, Plot No.: 1632(P),1620(P) & 1560(P); Mouza: Becharhat, Block- Bardhhaman-II in Purba Barddhaman district of West Bengal.

Geographically the ML area extends from latitude 23°12'22.717"N to 23°12'17.726"N and longitude 87°51'22.412"E to 87°51'35.523"E. The highest elevation of the river sand bed is 95 m AMSL, and the lowest elevation of the lease area is 86 m AMSL. The proposed area falls in SOI top sheet No.73M/16; OSM No.: F45D16. The study area map is shown in figure 1-1. The study area of the proposed project comprises 10 Km radius around the mining lease boundary. The map showing the core zone (Mine lease area) and Buffer zone (10 km radius from the lease boundary) is shown in Figure1-2.

The Mine Lease area is approx. 0.95 Km (N) of aerial distance from the district headquarters at Bardhaman City. The proposed ML area can be approached by its own conveyance from NH-19 which is 1.30 km away from the ML area on the Northern bank of Damodar River.

Table 1-1: Geographical Co-ordinates of the Mine lease area.

Pillar No.	Latitude	Longitude
1	23°12'22.717" N	87°51'22.412" E
2	23°12'26.454" N	87°51'23.479" E
3	23°12'25.380" N	87°51'31.197" E
4	23°12'22.328" N	87°51'38.578" E
5	23°12'18.791" N	87°51'36.231" E
6	23°12'17.726" N	87°51'35.523" E

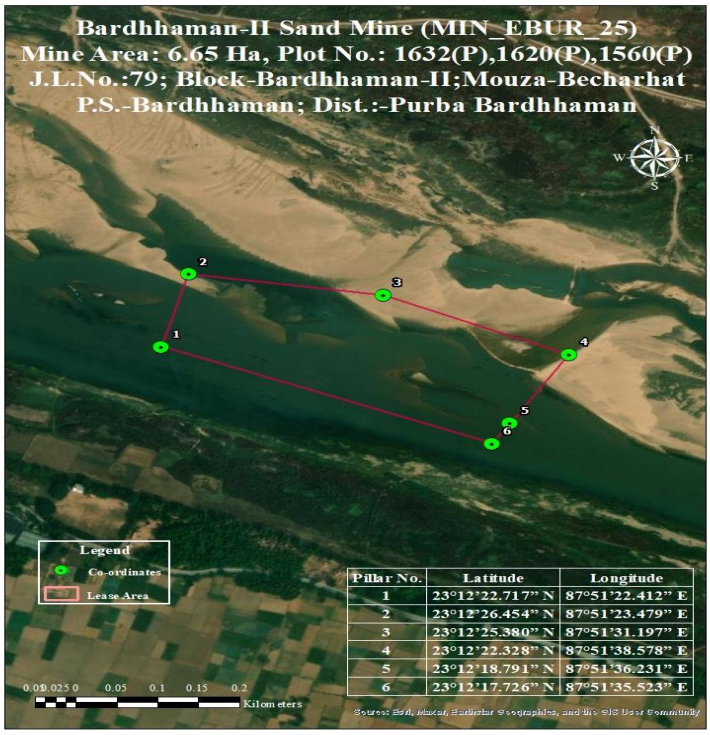

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Figure 1-1: Bardhhaman-II sand mining unit (MIN_EBUR_25)

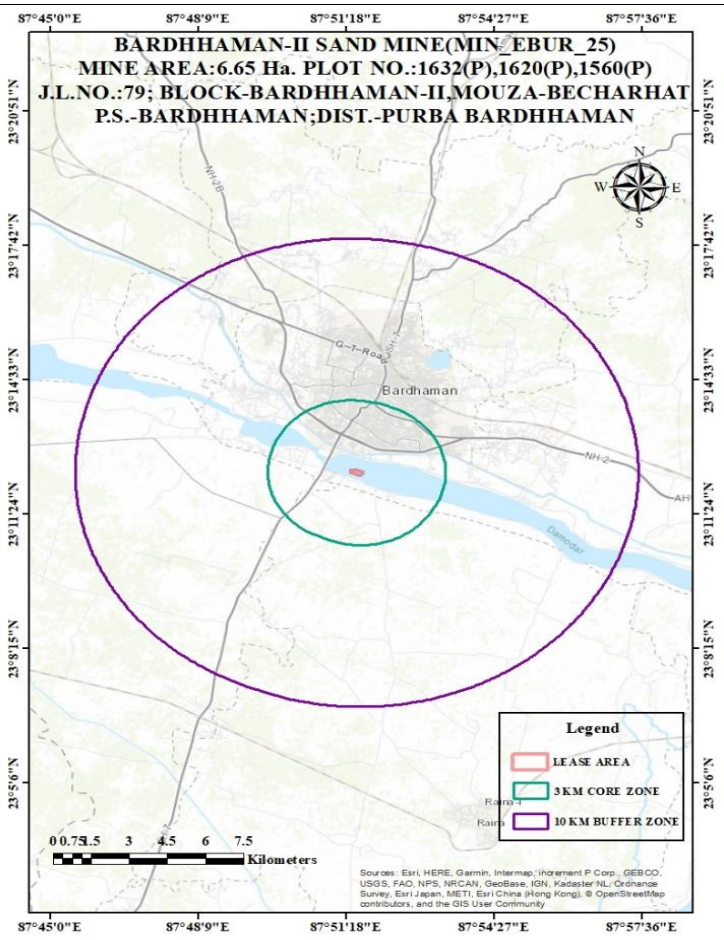

Fig no 1.2 –Map showing mine lease area and buffer zone

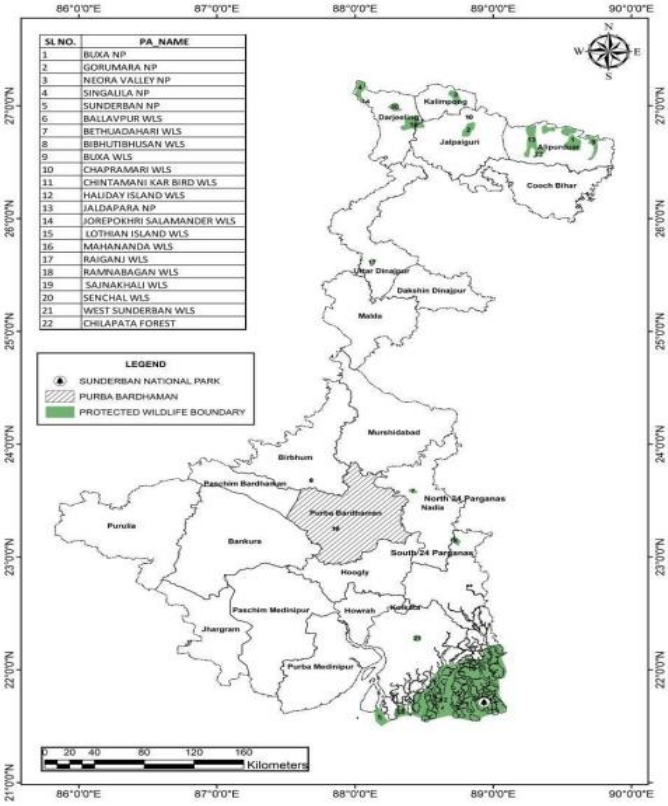

Fig no 1.3 –Map showing eco-sensitive zones

Table 1.2: **Salient Features of the Project Site**

<table>
<tr><td>1.</td><td>Project Name</td><td colspan="2">Bardhhaman-II Sand Mine</td></tr>
<tr><td>2</td><td>Location of the Project</td><td colspan="2">Mouza- Becharhat; J.L. No.- 79; Plot No.: 1632(P), 1620(P) & 1560(P), Block- Barddhaman-II, P.S.- Bardhhaman
District- Purba Barddhaman, West Bengal</td></tr>
<tr><td>3</td><td>Mine Lease Area</td><td colspan="2">6.65 Ha (16.432 acres)</td></tr>
<tr><td rowspan="7">4</td><td rowspan="7">Latitude & Longitude</td><td>Latitude</td><td>Longitude</td></tr>
<tr><td>23°12’22.717” N</td><td>87°51’22.412” E</td></tr>
<tr><td>23°12’26.454” N</td><td>87°51’23.479” E</td></tr>
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<tr><td>23°12’17.726” N</td><td>87°51’35.523” E</td></tr>
<tr><td>5</td><td>Toposheet Number</td><td colspan="2">(73M/16); OSM No. F45D16</td></tr>
<tr><td>6</td><td>Type of Land</td><td colspan="2">Riverbed</td></tr>
<tr><td>7</td><td>Elevation</td><td colspan="2">Highest Elevation: 95 m AMSL, Lowest Elevation: 86 m AMSL</td></tr>
<tr><td>8</td><td>Project Cost</td><td colspan="2">25.00275 Crore</td></tr>
<tr><td>9</td><td>Manpower & No. of Working days</td><td colspan="2">90 personnel for 200 Days/Year.</td></tr>
<tr><td>10</td><td>Water Demand & Source</td><td colspan="2">6.0 KLD, Source: Deep tube wells will be installed at site for drinking water with necessary treatment plant.</td></tr>
<tr><td>11</td><td>Mineable Reserves</td><td colspan="2">5,34,405.60 Cu M</td></tr>
<tr><td>12</td><td>Targeted Production</td><td colspan="2">1,06,881.12 Cu. M annually</td></tr>
<tr><td>13</td><td>Production Capacity</td><td colspan="2">
<table>
<tr><th>Year</th><th>Production Area (Ha)</th><th>Thickness (m)</th><th>Replenishment Rate (%)</th><th>Volume (m^3)</th></tr>
<tr><td>1st</td><td>4.9482</td><td>2.700</td><td>100</td><td>1,33,601.40</td></tr>
<tr><td>2nd</td><td>4.9482</td><td>2.025</td><td>75.0</td><td>1,00,201.05</td></tr>
<tr><td>3rd</td><td>4.9482</td><td>2.025</td><td>75.0</td><td>1,00,201.05</td></tr>
<tr><td>4th</td><td>4.9482</td><td>2.025</td><td>75.0</td><td>1,00,201.05</td></tr>
<tr><td>5th</td><td>4.9482</td><td>2.025</td><td>75.0</td><td>1,00,201.05</td></tr>
<tr><td colspan="4">Total Mineable Reserve (Cu.M)</td><td>5,34,405.60</td></tr>
<tr><td colspan="4">Total Mineable Reserve (C.Ft)</td><td>1.887 Cr</td></tr>
</table>
</td></tr>
<tr><td>14</td><td>Type of Mining</td><td colspan="2">Opencast manual Method</td></tr>
<tr><td>15</td><td>Seismic Zone</td><td colspan="2">Seismic Zone-III (As per 1893:2002)</td></tr>
<tr><td>16</td><td>End Use of Product</td><td colspan="2">For construction of Buildings and Roads</td></tr>
<tr><td>17</td><td>Nearest Town</td><td colspan="2">Bardhhaman city is situated 0.95 KM along the Northern Direction</td></tr>
<tr><td>18</td><td>Nearest Airport</td><td colspan="2">Durgapur is 90 KM, NW Direction</td></tr>
<tr><td>19</td><td>Nearest railway Station</td><td colspan="2">Bardhhaman railway Station is 4.95 km NNE direction</td></tr>
<tr><td>20</td><td>Nearest Highway</td><td colspan="2">NH-19 is 1.30 km (North),</td></tr>
<tr><td>21</td><td>Nearest Sanctuary /National Park /Eco-Sensitive Zone/Elephant Corridor /Conservation Reserve,</td><td colspan="2">None within 10 kms. Of the project area</td></tr>
<tr><td>22</td><td>Nearest reserve forest (with name and its distance from the</td><td colspan="2">Beliatore reserve forest 56.41 km. (SW)</td></tr>
</table>

	proposed project site)	
23	Local geology of the area	The applied lease is Riverbed sand deposition.

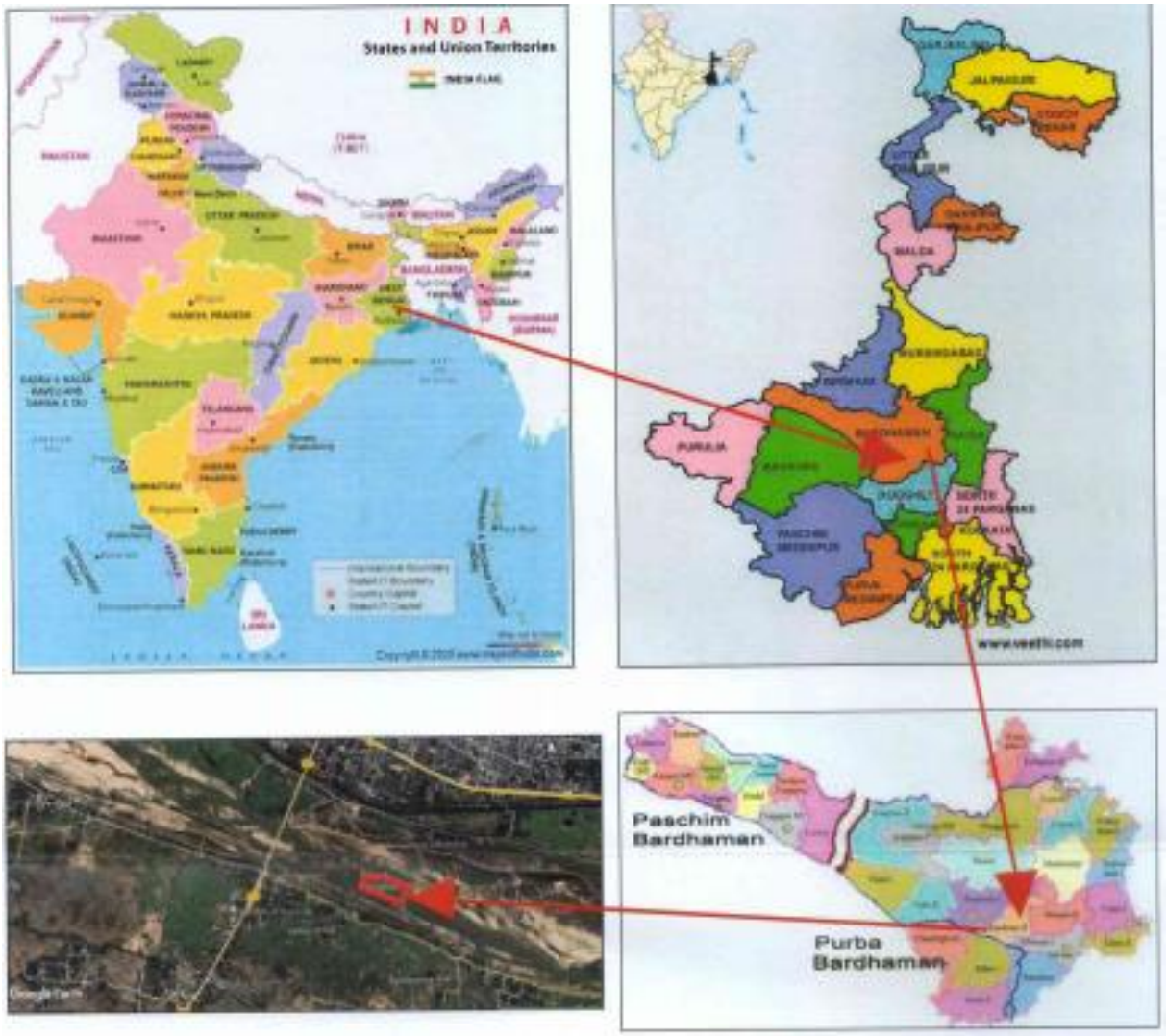


Figure No. 1.4: Location Map of the Damodar River Deposit

1.3. Scope of the Study

The scope of the study includes a detailed characterization of the environment in an area of 10 Km radius of the Mine Lease Area for various environmental parameters like Ambient Air, Water, Noise, and Land, Biological and Socio-economic aspects.

1.4. Compliance for Terms of References (ToR)

The project proposal was submitted to State Level Environment Impact Assessment Authority West Bengal for its appraisal. Based on which, SEAC meeting held on 17th November 2023 for Terms of Reference (TOR). Based on the data provided, ToR of proposed Sand mining project has been issued by SEIAA, West Bengal vide File no SEIAA. 2713/EN/T-II-1/519/2023 dated 1st December 2023 (**Refer Annexure - 4)**. The compliance of ToR is described below in Table 1.2.

Table 1.3: TOR Compliance

S. No	TOR	Compliance
1.	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	This is a new Mining Project.
2.	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Copy of document in support of the fact that the Proponent is the rightful lessee of the mine **(LOI)** is enclosed with draft EIA report as **Annexure-III.**
3.	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	All documents including mine plan, draft EIA are compatible with one another in terms of mine area, production levels, waste generation and its management if any, mining technology etc. All documents are in the name of the lessee and the sane for final EIA and Public Hearing
4.	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such	All corner coordinates of the mine lease area, are superimposed on a High-Resolution Imagery/ toposheet, topographic sheet, geomorphology

S. No	TOR	Compliance
	an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	and geology of the area are provided in figure no.1.1 and 1.2 The land use and other ecological features of the study area (core and buffer zone) are shown in figure 1.3.
5.	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of landforms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil	The topographic map of the study area is presented in Annexure –V (Original Toposheet with super impose project site).
6.	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	The Letter of Intent was issued by Government of West Bengal and is enclosed in **Annexure-III**
7.	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non- compliances / violations of environmental norms to the Board of Directors	Lessee is an individual owner of the mine lease however a well laid down Environment policy to take care of any infringement /deviation/ violation of the environmental or forest norms/ conditions applicable for the mine lease is proposed in the EIA report in Chapter 10

S. No	TOR	Compliance
	of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	
8.	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Method of mining for the sand mine is open cast semi-mechanized method (No drilling and blasting involved) discussed in Chapter 7, with this EIA report. (Refer Annexure IV: Approved Mining Plan).
9.	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	The study area of the proposed project comprises of a 10 km radius around the mining Lease boundary. Map showing study area (10km radius from the lease boundary) is given in chapter-3 of EIA Report. EIA contains the data regarding proposed production for the life of mine and the same has been incorporated in Chapter-2.
10.	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	The proposed mine lease area is riverbank land. The study area comprises of RF, agricultural land, waterbodies, human settlements and other ecological features involved. LU&LC Statistics presented.
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	Not applicable, as there is no overburden in the proposed Sand mining activity. No R&R involved.
12	A Certificate from the Competent Authority inthe	The proposed mine lease area is

S. No	TOR	Compliance
	State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	riverbank land. There is no forest/tree clearance involved in the proposed project.However, Letter of Intent for mining lease area was issued by Govt. of West Bengal, Dept. of Industry, Commerce & Tender Price, Mines Branch, vide letter no. 261-ICE-12011(99)/27/2022-MINES dated 20.04.2023 (**Annexure-III**)
13	Status of forestry clearance for the broken uparea and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	The proposed mine lease area is river bank land. There is no forest/tree clearance involved in the proposed project.However, Letter of Intent for mining lease area was issued by Govt. of West Bengal, Dept. of Industry, Commerce & Tender Price, Mines Branch, vide letter no. 261-ICE-12011(99)/27/2022-MINES dated 20.04.2023 (**Annexure-III**)
14.	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	Not applicable The area does not comes under tribal area, hence, "Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006" is not applicable.
15.	The vegetation in the RF / PF areas in the study	No Reserve Forest is falling within

S. No	TOR	Compliance
	area, with necessary details, should be given.	10 km radius of the proposed mining activity. Lalgarh forest is situated 3.6 km from project site in East direction. Please refer to figure 1.3.
16.	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted..	In this proposed mining activity there is no impact on wildlife. Biological Study for the project has been conducted. Impact and Mitigation measures are incorporated in Chapter - 4.
17.	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site, Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticatedby Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	There are no National parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger / Elephant Reserves (existing as well as proposed) in the core area. A map of west Bengal creating with existing NP (National Park) and (WLS) (Wildlife Life Sanctuaries) is provide in (Refer figure 1.3).
18.	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study	There is no schedule-I fauna present in the study area. A detailed biological study is discussed under Chapter-3

S. No	TOR	Compliance
	area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	
19.	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be	Not Applicable. The proposed project does not fall within 10 Km radius of any "**Critically Polluted**" area and Also The project area does not fall in "Aravali hill" ranges.
20.	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management authority)	Not Applicable, as the proposed project does not fall within CRZ area.
21.	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their	There will be no resettlement or rehabilitation involved in the project area, hence compensation details are not applicable.

S. No	TOR	Compliance
	requirements, and action programmer prepared and submitted accordingly, integrating the sectoral programmer of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspect should be discussed in the Report	
22.	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoonseason) ; December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	One season data of ambient air quality, water quality, noise level, meteorology, soil and flora and fauna has been collected from October' 2023 to December'2023 Details are given in Chapter 3
23.	Air quality modelling should be carried out for prediction of the impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for	The detailed Air Quality modelling will be incorporated in Final EIA report

S. No	TOR	Compliance
	transportation of minerals. The details of the model used, and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre- dominant wind direction may also be indicated on the map	
24.	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	The total water requirement will be 6 KLD which will be sourced from locality. The water required for domestic and drinking purpose will be 1.5 KLD which will be Ground water sourced from nearby localities whose permission would be taken from local governmental bodies at the time of CTO. Other 4.5 KLD's would be required for the purposes of dust suppression and plantation programmer Which would be sourced from near Damodar River.
25.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project would be obtained at the time of CTO.
26.	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Water requirements will be met from the deep tube wells installed at the site. But later on, when the mine sump will be developed and water will get accumulated in the sumps,

S. No	TOR	Compliance
		then ground water will be drawn only for drinking & sanitation purpose and rest of the requirement will be fulfilled from water accumulated in the mine sump, thereby conserving the natural water resources
27.	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Mining will be done as per the approved Mine Plan and applicable Rules &Regulation, so that there is no damage on ground water recharge potential due to sandmining. ➢ There will be no change in surface water quality as rivers are seasonal. ➢ Ground water quality will not be affected due to mining activities as it is restricted to 2.7 m depth. ➢ Mining will not be allowed below the water table. Regular monitoring of water samples will be done as precautionary measures.
28.	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken, and Report furnished. The Report inter-alia shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central	The proposed mining will be done well above the ground water table. Hence no adverse impact on ground water table. Please refer to Hydro Geological map and date furnished in chapter 2, Figure No.- 2.11

S. No	TOR	Compliance
	Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	
29.	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	The proposed mine lease areaitself is in the river bed. But there is no diversion of the any stream. Hence there is no impact on the water course.
30.	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.	The site is at an elevation of (highest 86 - lowest 95) m AMSL. The slicing of the sand will be done upto 2.7 mts only. No obstruction of the water table.
31.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and	Plantation programmer is given in Chapter- 10
32.	Impact on local transport infrastructure due tothe Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out,	There is no major impact on local transport as 67 trips per day will be required for transport of mined out material from proposed project. The LOS value from the proposed mine is excellent and very good for all

S. No	TOR	Compliance
	indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shallconduct Impact of Transportation study as perIndian Road Congress Guidelines.	villages. Traffic Management & Mitigation Measures includes. ➢ Haul roads will be sprinkled with water to keep the dust suppressed. ➢ Proper route management of the traffic will be done for smooth ingress and egress of traffic. ➢ Supervisors will be appointed to regulate the traffic at the project sites. ➢ Speed breakers will be constructed in accident prone areas to calm the traffic and its speed. ➢ Signposts will be erected at the sensitive and precarious places to caution or provide information to road users.
33.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report	Onsite shelter and facilities will be provided to the mine workers as per ApprovedMining Plan & as per Mines Rules. ➢ Following are the infrastructural facilities which will be provided to the workers: ➢ First aid facilities will be provided.
34.	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number ofsections) should be given in the EIA report	The proposed mine is in the riverbed, the reclamation of the mined out areas will be gradually filled up with sand carried out by water, during monsoon. Hence rehabilitation of the mined-out area are not applicable.
35.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Detailsof pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific	All safety measures prescribed under mining lawswill be followed strictly. All workers will be medically examined in pre placement phase. Periodical medical examination as per Mines Rule 1955- should be

S. No	TOR	Compliance
	occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	done. The persons working in dusty environment should be examined every year as per the DGMS circular No. 01 of 21.01.2010. Medical examination will be as per themedical fitness prescribed under Form P and PI of the Mines Rule 1955, amended by Mines (amendment) Rules, 1989. The details of Occupational health impact of project are described under Chapter 10.
36.	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	The workers' health check-up will be done in every six month. Medical camp will be organized in impact zone under CSR activity.
37.	Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Measures of socio-economic influence to the local community have been furnished and described under Chapter 10.
38.	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Environmental Management Plan is address in Chapter 10.

S. No	TOR	Compliance
39.	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Will incorporate after public hearing.
40.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	There is no litigation against the applicant and the lease area in any court of law to the best of our knowledge.
41.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly speltout.	Initial Project Cost- 5.00055 crores Cost for Environmental Protection Measures Capital Cost – Rs. 0.100011 crores per annum.
42.	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	Disaster management Plan have been furnished.
43.	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employmentpotential, etc.	The project proponent has proposed to provide financial assistance of 2% of project cost for the development of social infrastructure of the area. Following measure will be taken to improve the Social infrastructure of the study area: ➢ Preventive medical care and educational facilities for rural population shall bepromoted. ➢ Priority will be given to local people for employment. Indirect Employment through contractual services shall be provided. ➢ Extending general benefit by way of developmentwork in the villages

S. No	TOR	Compliance
		throughrespective Gram Panchayat. ➢ Supplementing Govt, efforts in health monitoring camps, social welfare andvarious awareness programmes among the rural population. Assisting social forestry programme.
41.	Besides the above, the below mentioned general points are also to be followed:- a) Executive Summary of the EIA/EMP Report b) All documents to be properly referenced with index and continuous page numbering. c) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated. d) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project. e) Where the documents provided are in a language other than English, an English translation should be provided. f) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted. g) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-l 1013/4l/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed. h) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission	a) Executive summary has been incorporated. b) Documents have been numbered in continuation and properly referenced w.r.t. Table of Contents (Index), c) The data presented in the report especially in table, along with the period in which the data was collected and the source has been incorporated. d) Analysis/testing reports of water, air, soil, noise has been incorporated. e) Compliance made. f) The relevant questionnaire will be incorporated in the final EIA. g) All instruction mentioned in O.M. No. J- 11013/ 41/ 2006- IA.II (I) dated 4th August, 2009 are being complied with. h) There is no change made in the basic scope and project parameter. i) This is new project. Hence, not applicable. j) All Surface plan, Geological cross section plan, conceptual plan has been incorporated EIA Report.

S. No	TOR	Compliance
	should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation i) As per the circular no. J-l 1011/618/2010-IA.II (I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, asmay be applicable. j) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) actions of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	
B. Additional Terms of Reference		
a)	Means of access and egress between the embankment and sand quarry may be clearly earmarked. The project proponent must commit that no hard toping or paving of any haulage route within the river bed will be attempted.	No hard toping or paving of any haulage route within the river bed will be attempted. Transportation route map is attached as Annexure IX.
b)	A plan on the management and handling of sand during the period of intermediate stockpiling should be submitted	The management and handling plan of sand has already been submitted in the mining plan.
c)	A progressive green belt plan may be prepared. The project area being entirely on the riverbed, afforestation/vegetation should be attempted alongside the village roads or other public land. This may be done with prior approval of the local self-governing bodies. If no public land is available for the purpose the project proponent	The Project area being entirely on the riverbed, afforestation/vegetation would be done alongside the village roads or other public land with prior Approval from the Local Self-Governing bodies.

S. No	TOR	Compliance
	shall arrange for land with his personal means. To enhance success/survival rate the plantation shall be attempted during the first two years of the project life, and the plantation so done shall be taken care of during the rest of the project life. Species of the plant selected should be self-sustaining in that particular region.	
d)	A need-based EMP may be prepared in accordance with the MoEF&CC Office Memorandum vide F.No.22-65/2017.14.lll dated 30.09.2020. Record of communications made in this regard with the identified/ intended beneficiaries (schools/ institutions etc) may also be uploaded.	CER undertaking is enclosed as Annexure VIII.
e)	A study report on base flow level measured at 5 points with date and supporting photographs may be submitted. lt should be committed that mining will be done at least 1m above the base flow level. Accordingly, if required, the excavation plan may also be revised.	Refer Chapter-3.
f)	Management plan of haul road to the public road.	Refer Annexure IX.

CHAPTER – 2:

2.1 PROJECT DESCRIPTION

This chapter gives a broad description of the project, location, type of ore deposits, quality of reserve, Mining Methodology, various site utilities and infrastructure, etc. The downstream use of minerals for value addition and its importance is also described.

2.2 Type of the Project:

The project is proposed for the excavation of river sand from Damodar River. The proposed project is a new minor mineral mining project. It is an opencast manual method mining project to excavate sand from the riverbed.

2.3 Need of the project:

River channels and their flood plains are important sources of construction grade aggregate materials like sand. The durability of river-borne coarser elastics and their sorting by fluvial action make them the most suitable raw materials/ingredients for building constructions. The market demand for the materials extracted from river is high throughout the country for construction of infrastructure projects.

Sand bars formed at various places hinder the flow of water and excess deposition can changed the shape of the riverbed. Because of this, during monsoon season, the water may rise above the high flood level causing heavy and devastating floods. Such disasters may damage large tracts ofland lying on both the banks of the river, especially agricultural lands. Hence, it is necessary to remove the materials so that the river gets channelized. Apart from this the project will also serve the following:

- ❖ Generate various employment opportunities especially to the local people hosting the mining project.
- ❖ Economic development of the state by contributing to state exchequer.

2.4 Description of Mining Lease Area:

The proposed activity of River sand mining is located at Mouza- Becharhat, Plot No.- 1632(P), 1620(P), & 1560(P), J.L. No.- 79, Block: Bardhhaman-II, P.S: Bardhhaman, District- Purba Bardhhaman, West Bengal, over an area of 6.65 Ha. The lease area falls in Survey of India Toposheet (SOI) No 73M/16; OSM No.: F45D16. The life of mine was estimated to be 5years.

2.5 Location Details and Connectivity:

Table 2-1: Location Details and Connectivity

<table>
<tr><th>Sl. No.</th><th>Permanent Features</th><th>Description of the Area &Distance from the Area (Aerial distance)</th></tr>
<tr><td>1.</td><td>Project site Location</td><td>Bardhhaman-II sand mine, Mouza– Becharhat, Plot No.-1632(P),1620(P),&1560(P); J.L.No.-79, Block-Bardhhaman II, P.S: Bardhhaman, District-Purba Bardhaman,,West Bengal.</td></tr>
<tr><td>2.</td><td>Site Coordinates (Middle Axis)</td><td>
<table>
<tr><th>Point ID</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>1</td><td>23°12’22.717” N</td><td>87°51’22.412” E</td></tr>
<tr><td>2</td><td>23°12’26.454” N</td><td>87°51’23.479” E</td></tr>
<tr><td>3</td><td>23°12’25.380” N</td><td>87°51’31.197” E</td></tr>
<tr><td>4</td><td>23°12’22.328” N</td><td>87°51’38.578” E</td></tr>
<tr><td>5</td><td>23°12’18.791” N</td><td>87°51’36.231” E</td></tr>
<tr><td>6</td><td>23°12’17.726” N</td><td>87°51’35.523” E</td></tr>
</table>
</td></tr>
<tr><td>3.</td><td>Village/District/State</td><td>Mouza: Becharhat,
District: Purba Bardhaman
State: West Bengal</td></tr>
<tr><td>4.</td><td>Maximum temperature</td><td>40ºC</td></tr>
<tr><td>5.</td><td>Minimum temperature</td><td>14ºC</td></tr>
<tr><td>6.</td><td>Annual rainfall (total)</td><td>>1400 mm</td></tr>
<tr><td>7.</td><td>Plant site elevation above MSL</td><td>Ground elevation level – 68 m AMSL</td></tr>
<tr><td>8.</td><td>Present land use at the site</td><td>Govt land of 6.65 Ha. (Riverbed)</td></tr>
<tr><td>9.</td><td>Nearest highway</td><td>NH-19 – 1.30 km (North)</td></tr>
<tr><td>10.</td><td>Nearest Railway Station</td><td>Bardhhaman Junction Railway Station Distance- 4.25 Km - NNE</td></tr>
<tr><td>11.</td><td>Nearest Airport</td><td>Airport- Durgapur Airport, Distance- 90 Km (NW)</td></tr>
<tr><td>12.</td><td>Nearest major water bodies</td><td>On the bank of Damodar River</td></tr>
<tr><td>13.</td><td>Nearest town/City</td><td>Bardhhaman City is 0.95 Km Northern direction</td></tr>
<tr><td>14.</td><td>Nearest village</td><td>Becharhat 0.5 km (N)</td></tr>
<tr><td>15.</td><td>Nearest Dispensary and Govt. Hospital, Educational facility</td><td>Hospital/Dispensary:
Kisholoy Childrens’ Hospital 2.94 km (NE); Burdwan Medical college 4.66 km (N), Teresa Memorial Hospital 5.02 km (NNE), Saranya multispeciality Hospital 5.05 km (NNE), Vivekananda Mahavidyalaya 1.89 km (N), Belsore Primary School 2.46 km (N); Salgachha Sibpur Free Primary School 2.89km (SSE); Bardhhaman Raj College 4.31 km (N), Bardhhaman University 4.85 km (NW),Udaypalli Siskha Niketan High Schlool 5.35 km (NNW);</td></tr>
<tr><td>16.</td><td>Nearest Religious/Worship Places</td><td>Kali mandir 0.80 km (SSE)
Durga mandir of Halder Family 2.25 km (SE)
Bardhhhamaneswar Temple 2.95 km (NNW)
Bantir Paschim Para Masjid 2.95 km (SSW)
Sarbamangala Temple 3.48 km (N)
Rastala Kali Mandir 6.78 km (NNE)</td></tr>
</table>

17.	Protected areas as per Wildlife Protection Act, 1972 (Tiger reserve, Elephant reserve, Biospheres, National parks, Wildlife sanctuaries, community reserves and conservation reserves)	None Within 10 km of Project Site
18.	Reserved / Protected Forests	Beliatore Reserve forest 56.41 Km (SW)
19.	Defence Installations	None Within 10 km of Project Site

2.6 Geological profile of the area:

2.6.1 Topography of the Area:

Purba Bardhaman district is a flat alluvial plain area that can be divided into four prominent topographical regions. On the north, the Kanksa Ketugram Plain lies along with the Ajay, which joins the Bhagirathi. The Bardhaman Plain occupies the central area of the district, with the Damodar on the south and the south-east. On the southern part is the Khandaghosh Plain. The Bhagirathi flows along the eastern boundary of the district, and the Bhagirathi Basin occupies the eastern part of the district. The undulating laterite topography of Purba Bardhaman district extends up to the Ausgram area of this district. The gradient is westerly to the west and to the east, it is northerly towards Ajay and southerly towards Damodar below the latitude. The Ajay- Damodar inter-stream tract is made up of several stows consisting of vales and low convex spurs which run in almost all directions except north-east and thus lends a very complicated character to local relief.

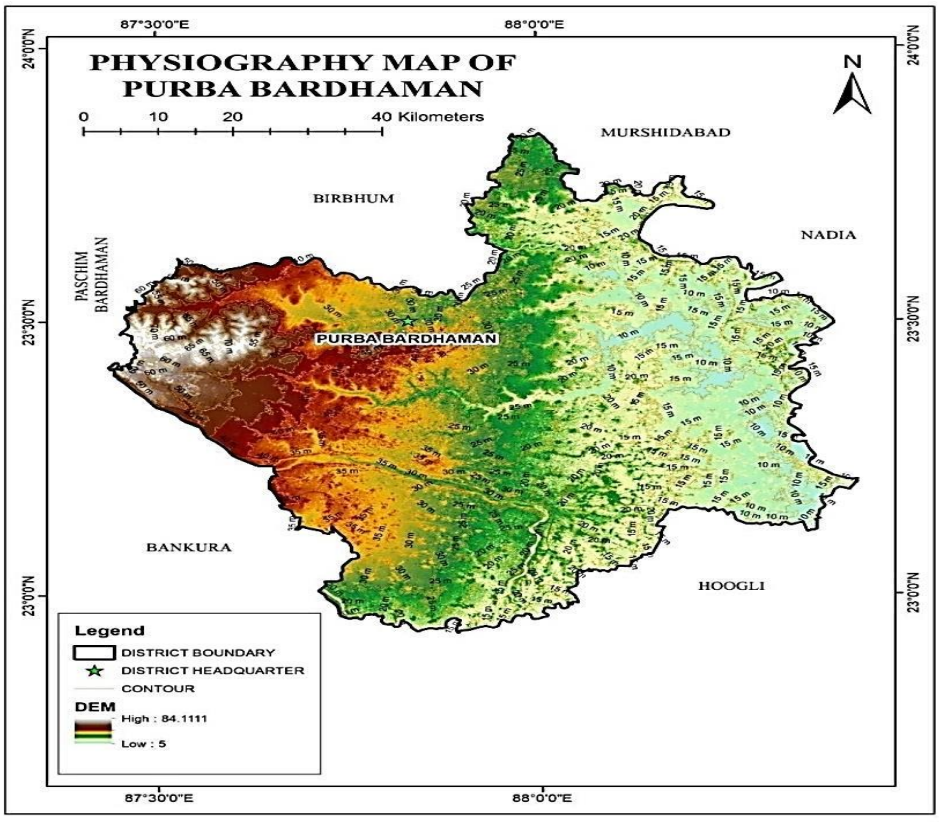


Fig 2-1: Physiographic map of Purba Bardhaman district

2.7 Geology:

Archaean granite gneisses and migmatites of the Chotanagpur Gneissic Complex are exposed in a narrow east-west belt fringing the north-western part and constitute the oldest basement rocks. Over these, in a faulted, subsided semi-graben type structural trough, deposited the thick bedded sedimentary sequence of Gondwana Super Group comprising sandstone, shale, siltstone with prolific commercial coal seams. All these rocks are cut across by a number of high angles, transverse, gravity faults. Mostly the Lower Gondwana sequence is developed in this district, comprising the Talchir, Barakar, Barren Measure, Raniganj and Panchet Formations. Durgapur beds constitute the youngest unit above the Panchet Formation which is considered equivalent to Mahadeva Formation of Upper Gondwana developed elsewhere. The Gondwana sequence rocks are exposed in the western part of the district area. In parts of the central and in the broad, oval area of eastern part, laterite cover with red soil and Quaternary sequence of riverine sediments grouped under Sijua, Panskura and Diara formations are exposed. The Sijua formation is mainly clay with caliche concretions; Panskura formation constitute clay alternations with silt and sand at the bottom and Diara formation comprise bedded interfingering sand, silt and clay in the present-day shifting river channel courses. Geological succession of Bardhaman district is furnished below-

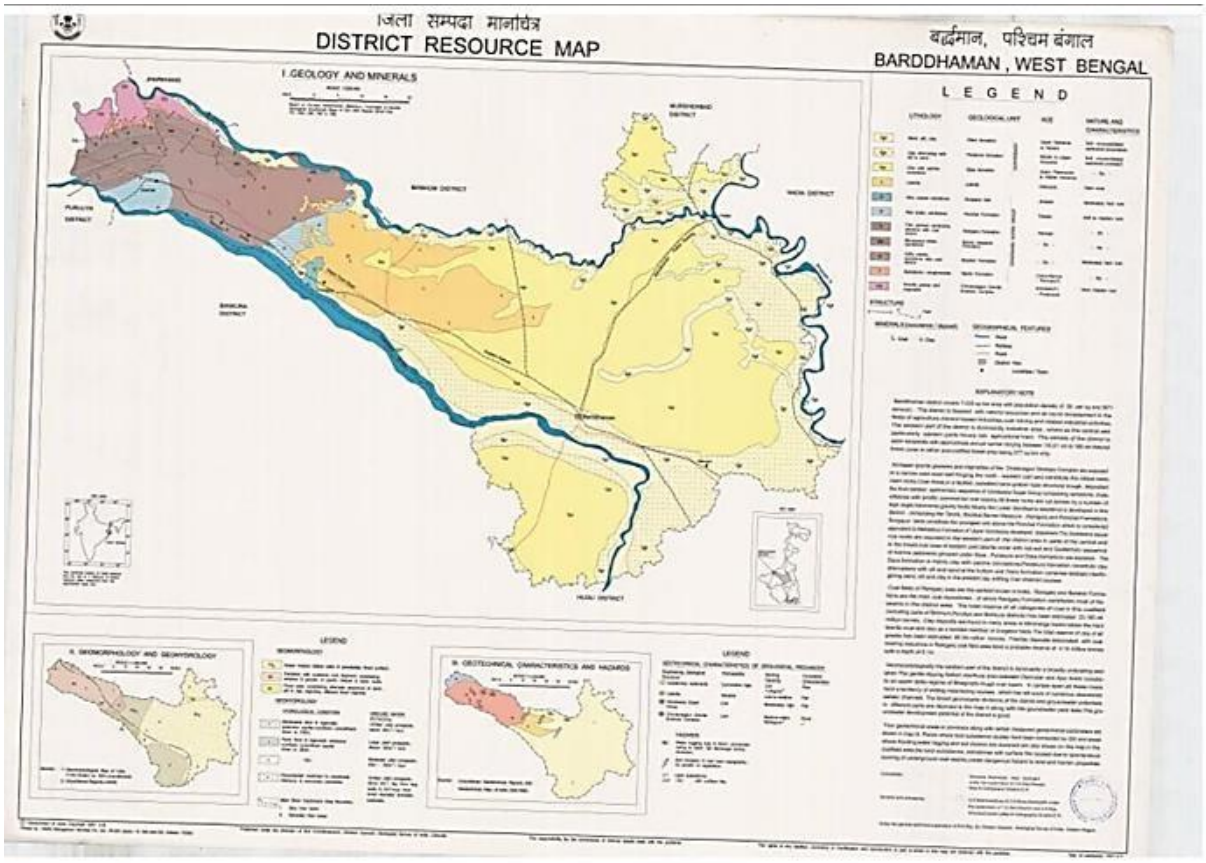


Figure 2-2: Geological map of Bardhaman district.

Table 2-2: Geological succession of Purba Bardhaman District

Lithology	Geologic Unit	Age	
Sand, Silt, Clay	Diara Formation	Quaternary	Upper Holocene to Recent
Clay Alternating with Silt and Sand	Paskura Formation		Middle to Upper Holocene
Clay with Caliche Aoncretion	Sijua Formation		Upper Pleistocene to Middle Holocene
Laterite	Laterite		Cainozoic
Very Coarse Sandstone	Durgapur Bed	Gondwana Super Group	Jurassic
Red Shale, Sandstone	Panchet Formation		Triassic
Fine Grained Sandstone, Siltstone with Coal Seams	Raniganj Formation		Permian
Micaceous Shale, Sandstone	Barren Measure Formation		Permian
Gritty Pebbly Sandstone with Coal Seams	Barakar Formation		Permian
Sandstone, Conglomerate	Talchir Formation		Carboniferous Permian
Granite Gneiss and Migmatite	Chhotanagpur Granite Gneissic Complex		Achaean-Proterozoic

2.8 Damodar River:

The city of Bardhaman is situated on the banks of the river Damodar and acts as an anchor for this town. The river is considered to be a holy and sacred river by the aborigines of the Chotanagpur Plateau. The river Damodar originates from the Sonajuria Falls of the Bijonsa Hill which is located in the district of Palampur in Bihar. The river joins Barakar at the town of Dishergarh in the Asansol subdivision of the Bardhaman district and then flows through the rest of the district of Bardhaman. It continues to flow through the districts of Hooghly and Howrah in West Bengal before finally joining the Bhagirathi River, which is the other name for the Ganges in Murshidabad. Bardhaman takes up the shape of a delta along with the branch rivers of the Damodar surrounding it, namely Balluka, Behula, Gangur, Banka and so on, some of which have almost become extinct at present. The civilization of 'Rarh-Bangla' has also developed with this river as its centre. A bridge has been constructed over the River Damodar at Sadarghat which is known as 'Krishok Setu' (as pronounced in Bangla).

Table 2.3: Drainage system with description of Damodar River

Sl.No.	Name of the River	Area drained (Sq.km)
1.	Damodar	100049200.5970

Table 2.4: **Salient Features of important river and stream**

Sl.No.	Name of the River or Stream	Total Length in District (inKm)	Place of origin	Altitude at Origin
1	Damodar	98,911.49	ChulhaPani, Lohardaga district, Chota Nagpur Plateau, Jharkhand	2000.49 ft

Geomorphological characteristic of a river is foremost factor for annual deposition of sedimentary load. The study includes following parameter:

i) Place of Origin

Details of origin of rivers of Purba Bardhaman District are furnished in Table 2.

Table 2-5: Place of Origin of important river and stream

Sl.No.	Name of the River or Stream	Place of origin
1	Damodar	Chulha Pani, Lohardaga district, Chota Nagpur Plateau, Jharkhand

ii) Catchment Area

The Purba Bardhaman district is mainly drained by the Damodar, Dwarakeswar, Hoogly and Ajay. These rivers and its tributary rivers are forming the main catchment area.

iii) General profile of river stream

River profile has been studied along the cross-section lines which was chosen based on the drastic variation of the river widths, proximity of the operating sand 'ghats' and the position of the sand bars. River profile section and cross section views are presented in Figures2-5 and 2-6 respectively.

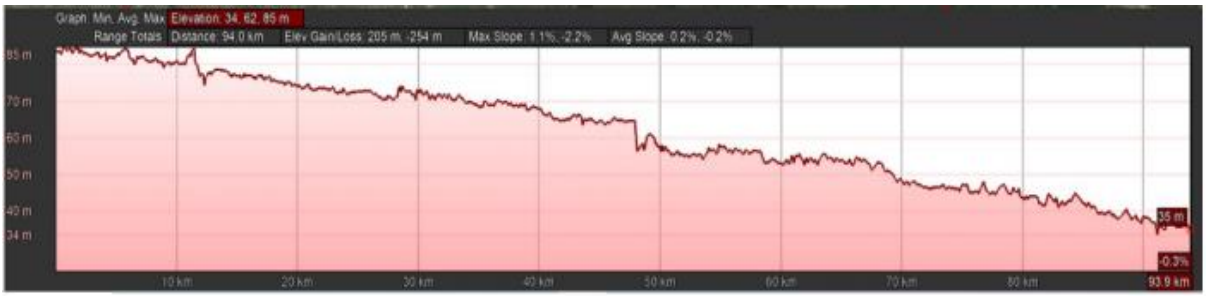


Figure 2-3: Profile section of Damodar River

Figure 2-4: Cross sectional view of Damodar River

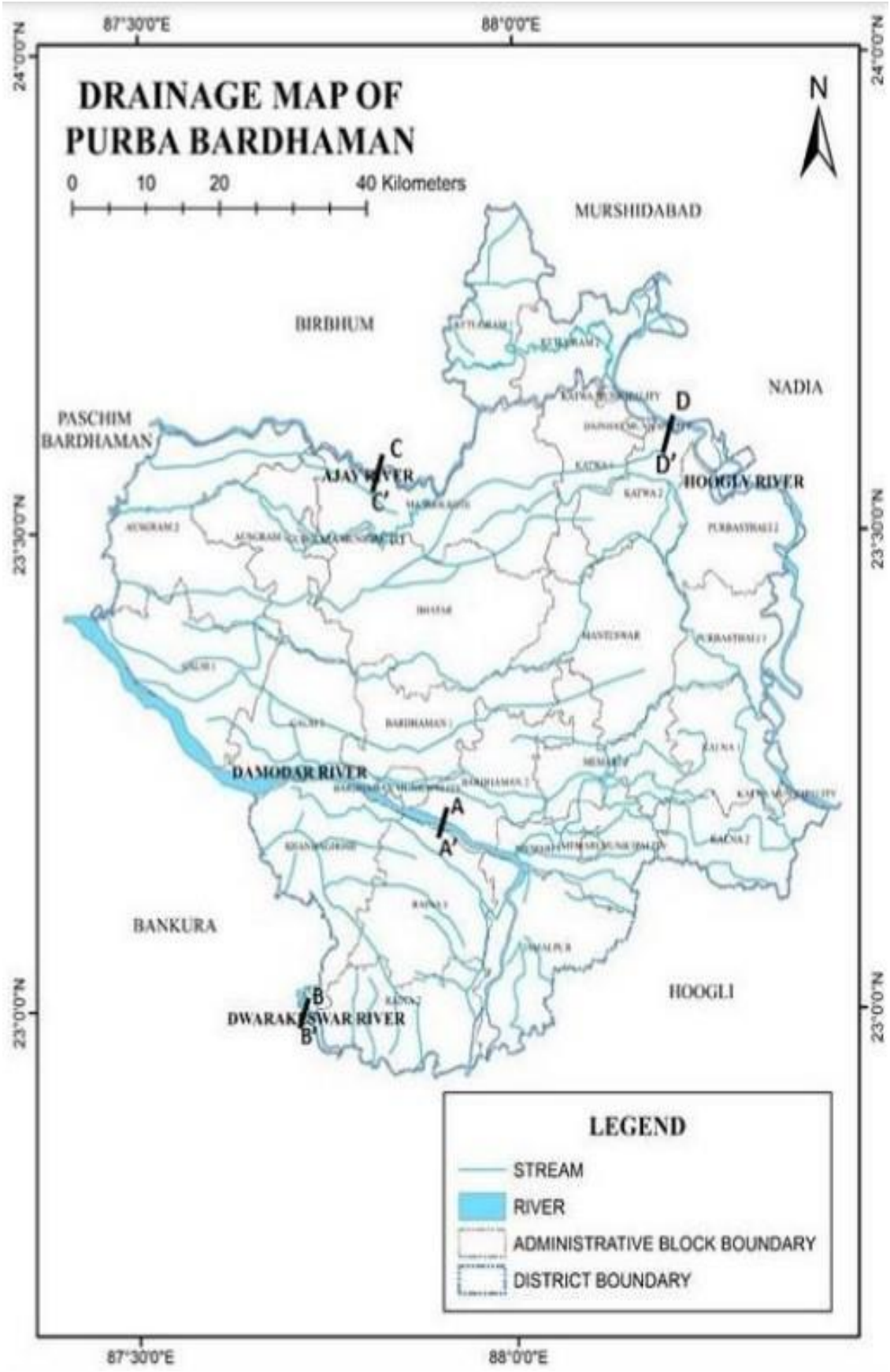


Figure 2-5: Drainage map of the district

Table 2-6: Sediment Load comparison between Pre- and Post-monsoon periods for Damodar River.

River Name	Pre-Monsoon Sediment Load (MCum)	Post Monsoon Sediment Load (MCum)	Difference (MCum)	Difference (%)
Damodar	74.80	76.15	1.35	1.81

Table 2.7: Replenishment rate of the Damodar River

River Name	Location (Mauza)	Area	Surface RL	Thickness	Volume	After mining floor RL	Surface RL after Replenishment	Thickness Replenished	Volume Replenished	Difference in RL	Replenishment Rate
		m^2	**m**	**m**	**cum**	**m**	**m**	**m**	**cum**	**m**	**%**
Damodar	Naricha	15100	34.00	2.88	43488.00	31.12	33.93	2.81	42357.31	0.07	97.40%
Damodar	Bangpur	27100	23.00	2.90	78590.00	20.10	22.94	2.84	77018.20	0.06	98.00%
Damodar	Jafrabad	20200	20.00	2.94	59388.00	17.06	19.96	2.90	58497.18	0.04	98.50%

2.9 Geomorphology:

Barddhaman district with its varied tectonic elements and riverine features, is a transitional zone between the Jharkhand plateau which constitutes a portion of peninsular shield in the west and Ganga-Brahamaputra alluvial plain in the north and east. In general, the Jharkhand plateau consists of the metasedimentary rocks of Precambrian age, Gondwana sedimentary rocks, Rajmahal basalts and upper tertiary sediments. Laterite has developed on these older rocks as well as on early Quaternary sediments. Towards south, the alluvial plain merges with Damodar-Kasain Subarnarekha deltaic plains.

The western half of the district resembles a promontory jutting out from the hill ranges of Chotonagpur plateau and consists of barren, rocky and rolling country with a laterite soil rising into rocky hillocks, the highest being 227 m. These diversify the otherwise monotonous landscape and lend a special charm to the skyline arround Asansol subdivision.

Ajay-barakar divide is a convex plateau, the avarage altitude being 150 m. The gradient is westerly to the west and to the east it is northerly towards Ajay and southerly towards Damodar below the latitude. The Ajay- Damodar inter-stream tract is made up of several stows consisting of vales and low convex spurs which run in almost all directions except north-east and thus lends a very complicated character to local relief.

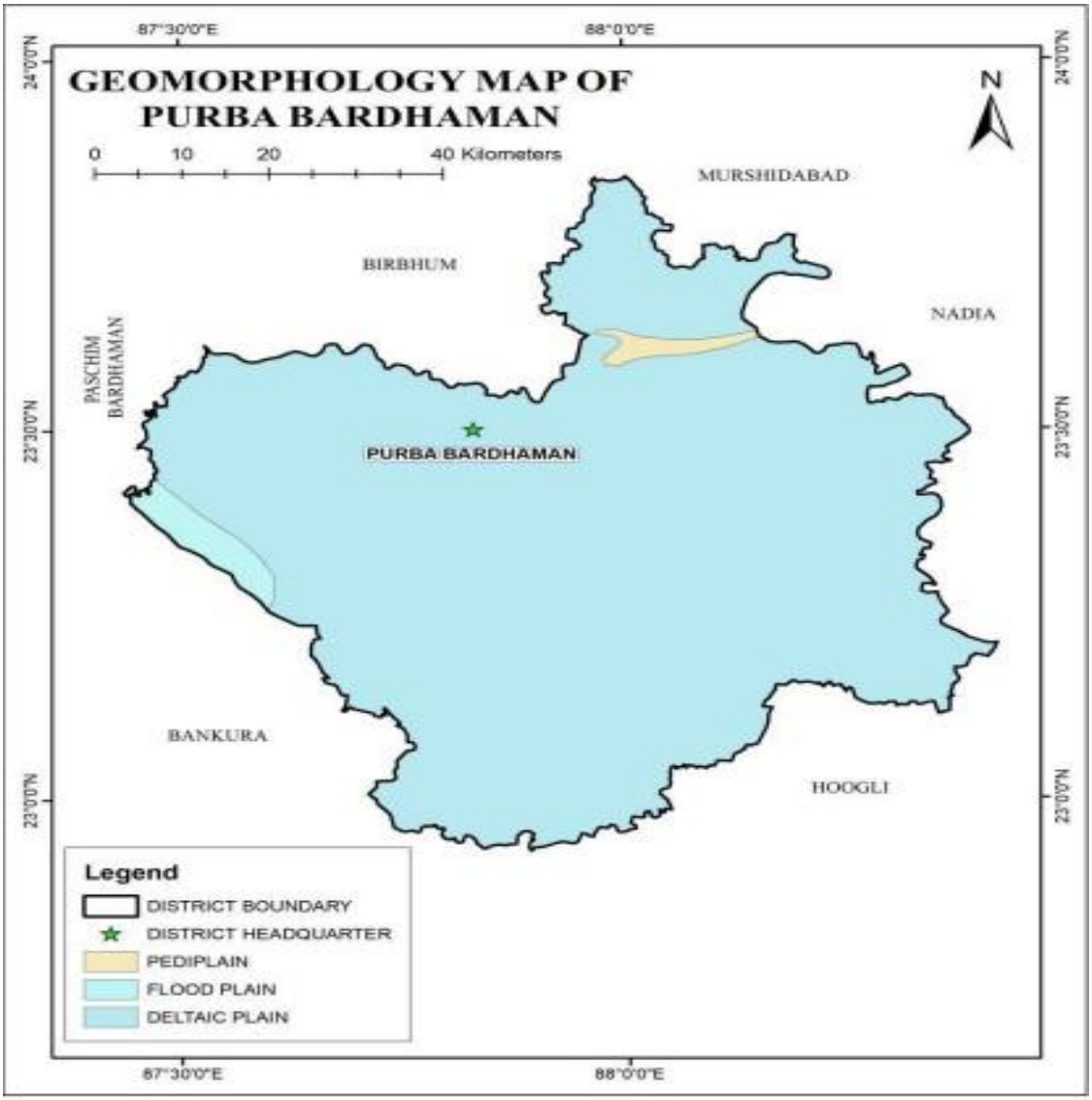


Figure 2.6: Geomorphological map of the Purba Bardhaman district

(Source: Resourcesat-1&2 – Liss-3, Bhuvan India)

2.10 Soil:

Different types of soil are encountered in different topographical biological and hydrological as well as geological condition within the Barddhaman district. In the west coarse gritty soil blended with rock fragments is formed from the weathering of pegmatites, quartz veins and conglomeratic sandstones, where as sandy soil characteristic of granitic rocks and sandstones. This soil is of reddish colour, medium to coarse in texture, acidic in reaction, low in nitrogen, calcium, phosphate and other plant nutrients. Water holding capacity of this soil increases with depth as well as with the increase of clay portions. Towards the east alluvial soil attains an enormous thickness in the low level plains to the east. This alluvial soil is formed of alluvium brought down by the Ajay, Damodar, Bhagirathi and numerous other rivers. These soils are sandy, well drained and slightly acidic in nature.

Depending upon the soil Bardhaman district is divided into three separated zones:-

i. Gangetic soil, which is found along the Ganga River.

ii. Vindhyan soil, between Ajay and Damodar Rivers in the central and eastern parts.

iii. Red soils, occurring in the undulgating and coal field areas in the western parts of the district.

Table 2.8: Soil characteristics of the Purba Bardhaman district

Soil Code	Description	Taxonomic Name
W036	Very deep, poorly drained, fine cracking soils occuring on level to nearly level low-lying alluvial plains with clayey surface associated with very deep, imperfectly drained, fine soils	Fine, Vertic Ochraqualfs
		Fine, Typic Ustochrepts
W037	Very deep, poorly drained,fine soils occuring on level to nearly level low lying alluvial plains with clayey surface associated with very deep, imperfectly drained, fine soils	Fine, Typic Haplaquepts
		Fine, Typic Haplaquepts
W038	Very deep, very poorly drained, fine cracking soils occuring on level to nearly level low lying alluvial plains with clayey surface associated with very deep, poorly drained, fine soils	Very Fine, Vertic Haplaquepts
		Fine, Typic Haplaquepts
W039	Very deep, imperfectly drained, fine soils occuring on level to nearly level low lying alluvial plains with clayey surface associated with very deep, moderately well drained, coarse loamy soils	Fine, Typic Ustochrepts
		Coarse loamy, Typic Ustifluvents
W040	Very deep, poorly drained, fine cracking soils occuring on level to nearly level low lying alluvial plains with loamy surface associated with very deep, poorly drained, fine soils	Fine, Vertic Ochraqualfs
		Fine, Aeric Haplaquepts
W041	Very deep, poorly drained, fine cracking soils occuring on level to nearly level low lying alluvial plain with loamy surface associated with very deep, poorly drained, fine soils	Fine, Vertic Haplaquepts
		Fine, Typic Haplaquepts
W042	Very deep, poorly drained, fine soils occuring on level to nearly level low lying alluvial plains with clayey surface associated with very deep, imperfectly drained, fine cracking soils	Fine, Aeric Haplaquepts
		Fine, Vertic Ochraqualfs
W043	Very deep, poorly drained, fine soils occuring on very gently sloping low lying alluvial plain with loamy surface	Fine, Typic Ochraqualfs

	associated with very deep, poorly drained, fine creacking soils	Fine, Vertic Ochraqualfs
W046	Very deep, poorly drained, fine soils occuring on very gently sloping low lying alluvial plain with clayey surface and moderately flooding associated with very deep, poorly drained, fine loamy soils	Fine, Typic Haplaquepts
		Fine, Typic Ustochrepts
W047	Very deep, poorly drained, fine soils occuring on level to nearly level low lying alluvial plain with clayey surface and severely flooding associated with very deep, moderately well drained, fine loamy soils	Very Fine, Aeric Haplaquepts
		Fine loamy, Typic Ustochrepts
W060	Very deep, moderately well drained, coarse loamy soils occuring on level to nearly level meander plain with loamy surface and moderate flooding associated with very deep, imperfectly drained, fine loamy soils	Coarse loamy, Typic Ustifluvents
		Fine loamy, Typic Ustochrepts
W061	Very deep, moderately well drained, coarse loamy soils occuring on level to nearly level meander plain with loamy surface and moderate flooding associated with very deep, poorly drained, fine soils	Coarse loamy, Typic Ustifluvents
		Fine, Aeric Haplaquepts
W064	Very deep, moderately well drained, coarse loamy soils occuring on very gently sloping flood plain with loamy surface,moderate erosion and moderate flooding associated with very deep, moderately well drained, fine loamy soils	Coarse loamy, Typic Ustifluvents
		Fine loamy, Typic Ustifluvents
W065	Very deep, moderately well drained, fine loamy soils occuring on very gently sloping flood plain with loamy surface,moderate erosion and moderate flooding associated with very deep, well drained, sandy soils	Fine loamy, Typic Ustifluvents
		Typic Ustifluvents
W067	Very deep, imperfectly drained, coarse loamy soils occuring on very gently sloping to undulating dissected upland with loamy surface and moderate erosion associated with very deep, moderately well drained, fine loamy soils	Coarse loamy, Typic Haplaquepts
		Fine loamy, Typic Haplaquepts
W068	Very deep, imperfectly drained, fine loamy soils occuring on very gently sloping to undulating dissected upland with loamy surface and moderate erosion associated with very deep, moderately well drained, fine loamy soils	Fine loamy, Ultic Paleaustalfs
		Fine loamy, Rhodic Paleaustalfs

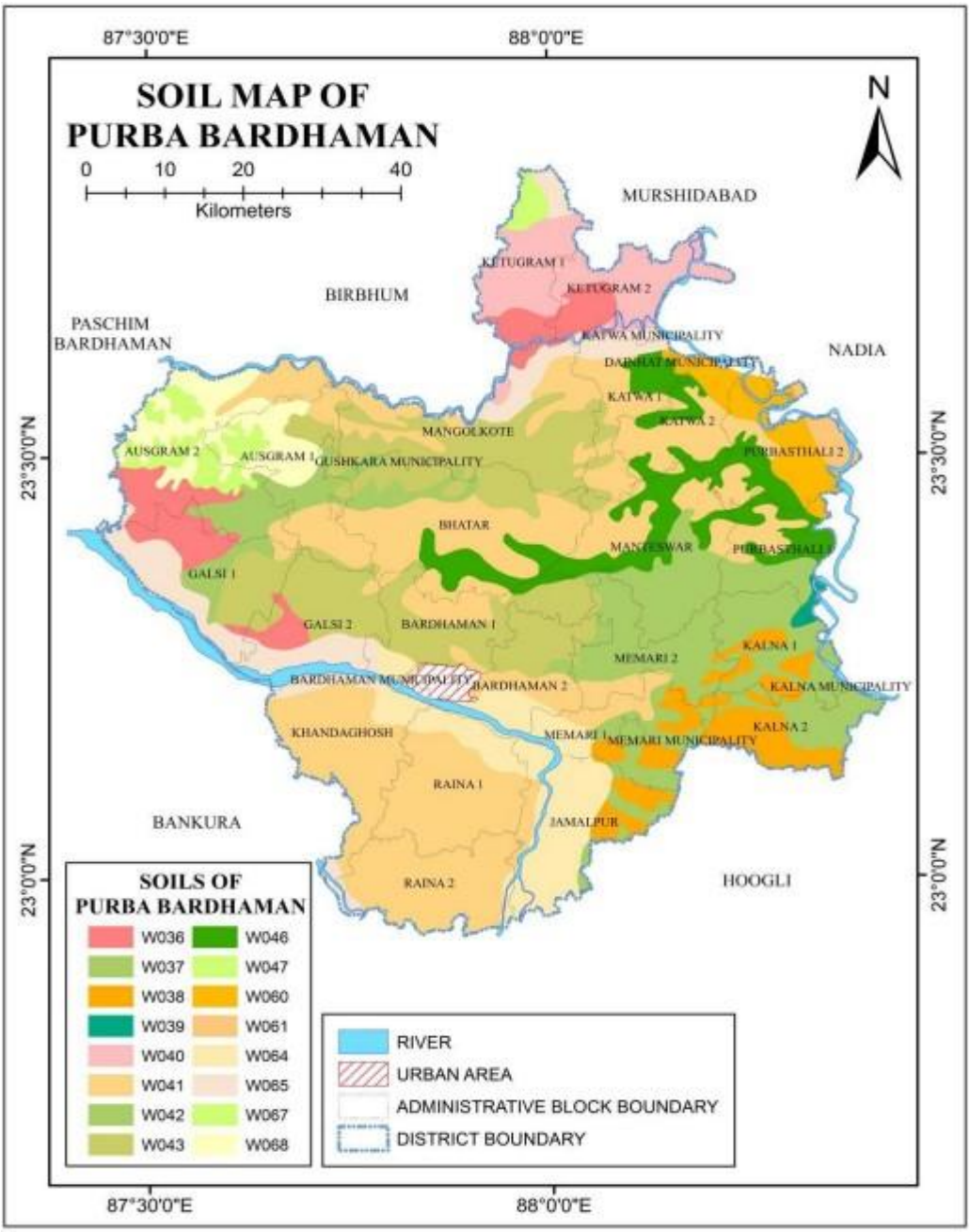


Figure 2-7: Soil pattern map of Purba Bardhaman district

(Source: https://esdac.jrc.ec.europa.eu/content/west-bengal-soils-sheet-2)

2.11 Drainage:

The river system in Bardhaman includes the Bhagirathi-Hooghly in the east, the Ajay and its tributaries in the north and the Dwarakeswar, the Damodar and its branches in the south-west. Besides, there are innumerable Khals and old river beds all over the area. On the north, the Kanksa Ketugram Plain lies along the Ajay, which joins the Bhagirathi. The Bardhaman Plain occupies the central area of the district, with the Damodar on the south and the south-east. The Bhagirathi flows along the eastern boundary of the district, and the Bhagirathi Basin occupies the eastern part of the district. The notable rivers and khals are Damodar, Bhagirathi, Barakar, Ajay, Dwarakeswar, Nonia, Singaram, Tamla, Kukua, Kunur, Tumuni,

Khari, Banka, Chanda-kanki nala, Behula, Gangur, Brahmani, Khandesvari, Karulia nala, Dwaraka or Babla, Koiya nala, Kandarkahal, Kanadamodar, Kananadi, Ghea, Kakinadi etc

Ajay River: Ajay River originates from Batpar from Chakai block of Jamui district in Bihar. It then enters Jharkhand near Devipur (a proposed industrial area of Deoghar) and flows through Jharkhand and enters West Bengal at Simjuri, near Chittaranjan. It first forms the border between Paschim Bardhaman district and Jharkhand and then between Paschim Bardhaman district and Birbhum district, and finally it enters Katwa subdivision of Purba Bardhaman district at Nareng village in Ketugram police station. It then joins the Bhagirathi River at Katwa Town. Total length of the Ajay is 288 kilometres (179 mi), out of which 152 kilometres (94 mi) are in West Bengal. The catchment area of Ajay River is 6,000 square kilometres (2,300 sq mi).

Damodar River: The city of Bardhaman is situated on the banks of the river Damodar and acts as an anchor for this town. The river is considered to be a holy and sacred river by the aborigines of the Chotanagpur Plateau. The river Damodar originates from the Sonajuria Falls of the Bijonsa Hill which is located in the district of Palampur in Bihar. The river joins Barakar at the town of Dishergarh in the Asansol subdivision of the Bardhaman district and then flows through the rest of the district of Bardhaman. It continues to flow through the districts of Hooghly and Howrah in West Bengal before finally joining the Bhagirathi River, which is the other name for the Ganges in Murshidabad. Bardhaman takes up the shape of a delta along with the branch rivers of the Damodar surrounding it, namely Balluka, Behula, Gangur, Banka and so on, some of which have almost become extinct at present. The civilization of 'Rarh-Bangla' has also developed with this river as its centre. A bridge has been constructed over the River Damodar at Sadarghat which is known as 'Krishok Setu' (as pronounced in Bangla).

Hoogly River: Bhagirathi River, river in West Bengal state, northeastern India, forming the western boundary of the Ganges-Brahmaputra delta. A distributary of the Ganges (Ganga) River, it leaves that river just northeast of Jangipur, flows south, and joins the Jalangi at Nabadwip to form the Hoogly River after a total course of 120 miles (190 km). Until the 16th century, when the Ganges shifted eastward to the Padma, the Bhagirathi formed the original bed of the Ganges. The Bhagirathi River originally flowed down the west of Nabadwip in the past, forming a natural boundary between the districts of Purba Bardhaman and Nadia. With time it has shifted its course to where it is at present, cutting the city off from the rest of the Nadia district.

Dwarakeswar River: Dwarakeswar River (also known as Dhalkisor) is a major river in the western part of the Indian state of West Bengal. The river originates near Madhabpur in Purulia district and enters Bankura district near Chhatna. It cuts across the district flowing past the district headquarters and enters the southeastern tip of East Bardhaman District. It then passes through Hooghly District. The Silai joins it near Ghatal and the two together are known as Rupnarayan River, which flows into the Hooghly River near Gadiara in Howrah District. Dwarakeswar River has much sedimentation from low water (any season). In rainy seasons it is filled up with water; then huge sedimentations are blocked the channel, even near Arambagh the channel basin reduced by garbage and anthropogenic (man made).

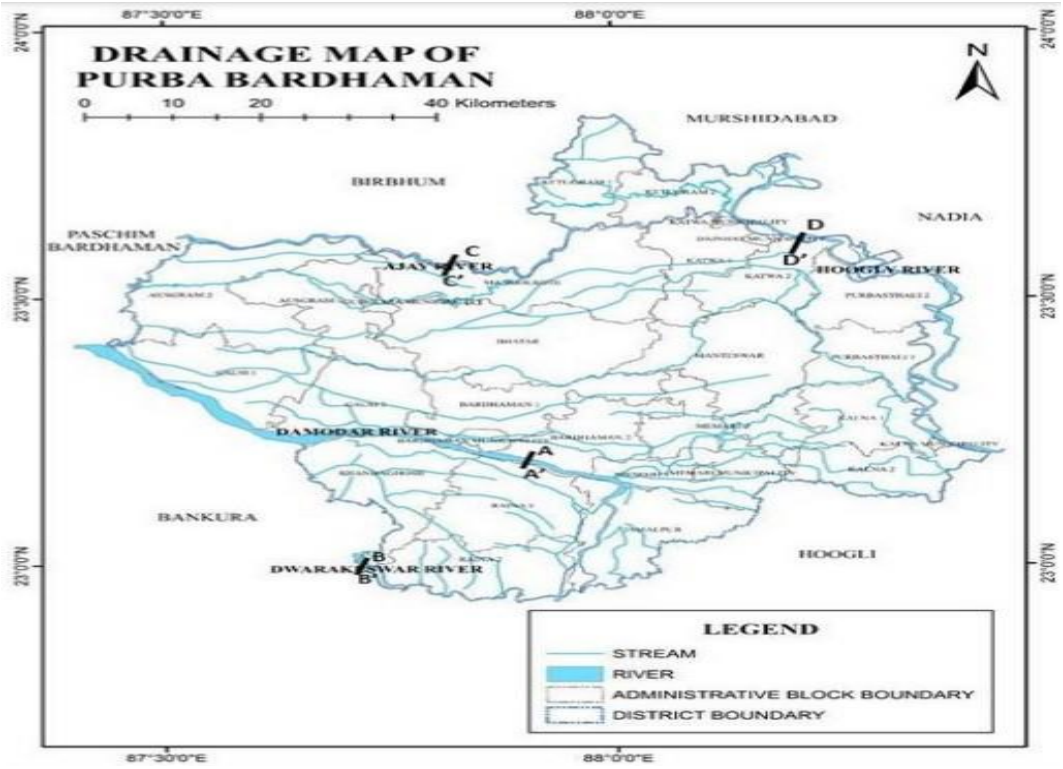


Figure 2-8: Drainage map of Bardhaman district

2.12 Climate and Rainfall:

Purba Bardhhaman district has a tropical climate – hot and humid. While the hottest month is May, the coldest is January. The monsoon season is from June to September, with an annual average rainfall of 1,400 mm, 75% of it falling in the monsoon months. Localized thunderstorms, called "Kal Baisakhi" in Bengali, are a special feature from March until the monsoon sets in. The cold season starts from about the middle of November and continues till the end of February. March to May is dry summer intervened by tropical cyclones and storms. June to September is wet summer while October and November are autumn. The average annual rainfall in the district is 1400mm. The variations in the annual rainfall within the district and from year to year are not large. The rainfall during the monsoon season – June

to September – constitutes 75 percent of the annual rainfall; July and August are the rainiest months)

Table 2-9: Monthly rainfall (in milimeter) recorded in Purba Bardhaman District

Month	2016	2017	2018	2019	2020	Average
Jan	13.5	1.2	0	0	26.6	8.26
Feb	29.3	0	0.1	64	1.1	18.9
Mar	15	32.6	15.1	16.3	64.6	28.72
Apr	0	28.3	82.6	47.8	65.8	44.9
May	120	171.2	43.5	129.9	212	135.32
Jun	182.5	255.8	158.1	90.9	298.4	197.14
Jul	263.0	464.1	329.7	195.8	338.2	318.16
Aug	463.5	252.9	174.7	233.1	262.2	277.28
Sept	247.5	178.2	154.3	215.8	128.2	190.2
Oct	44.3	260.1	16	191.7	81	118.62
Nov	1.9	14.5	0	16.8	1.7	6.98
Dec	0	9.1	26.7	11.1	0	9.38
Yearly Total	1380.5	1668	1000.8	1213.2	1479.8	1354.04

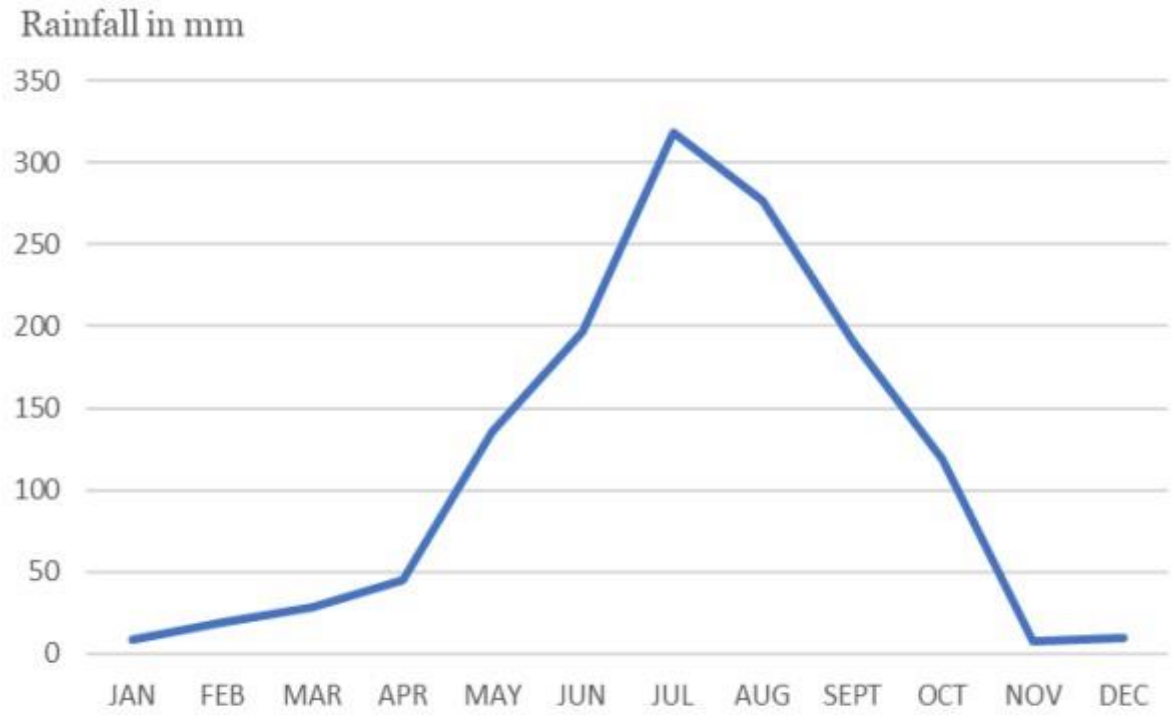


Figure 2-9: Graphical representation of the District rainfall

2.13 Temperature:

Summer: Purba Bardhaman district experiences dry and hot summer with maximum temperature of near about≈ 40°C during summer. The district shows a fierce dry heat in the warmer months. The summers in Purba Bardhaman usually start from month of March and last till the middle of June.

Monsoon: The arrival of the month of June marks the onset of monsoon in Purba Bardhaman. The district receives a high average rainfall. June to September has shown maximum average rainfall with moderate temperature. The district received average rainfall of 1400 mm.

Winter: Winters in Purba Bardhaman are pleasant and enjoyable, with mercury dropping to about 14°C or below. The winter starts from December and last till the month of February.

Table 2-10: Monthly mean temperature (in °C) distribution of the district

Parameter	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Average Temperature (° C)	17	20.5	25	30	29.5	29.5	28	28	27	25.5	21	18
Minimum Temperature (° C)	10	13	18	22	23	25	24	24	22	20	13	10
Maximun	24	28	32	38	36	34	32	32	32	31	29	26

2.14 Relative Humidity, Wind speed & Wind direction

The maximum and minimum relative humidity of the district during summer season varies from 75% to 85 % and 40% to 60% respectively. In winter time district's humidity varies from maximum 80% to 90 % and minimum 30% to 55% (District Disaster Management Plan, 2015-2016)

2.15 Hydrogeology:

Hydrological condition of the district is guided by topography, geology, and rainfall of the region. Central Ground Water Board (CGWB) has carried out detail hydrogeological investigation of the district. Figure 2.12 represents hydrogeological map showing the hydrogeological scenario of the district.

Ground water systems are the result of complex combination of different lithological and structural types within an area that together constitutes an aquifer within which ground water accumulates and moves. In the major part of the district, ground water in thick

unconsolidated Quaternaries and Tertiaries deposited under fluviatile environment, the sand and/or gravel in different proportions of this formation constitute the main aquifer and they occur down to 295 mbgl in the central and eastern part of the district. Deeper aquifers occur under semi-confined to confined condition. Groundwater in the western part of Upper-Palaeozoic- Mesozoic- Tertiary sequences of Gondwana Supergroup of sedimentaries occur under both unconfined and confined conditions down to 150.35 mbgl. Groundwater in the extreme north western small part of Salanpur Block occupied by the Archaean metamorphics occurs down to a depth of about 82 mbgl under both unconfined and confined conditions down to 150.35 mbgl. It mainly occurs under unconfined condition in the dug well zone and under semi confined to confined condition in the deeper horizons. In Bardhaman district, ground water occurs in semi-confined to confined aquifer conditions in the depth span of 12.00-38.00 mbgl, 31.00-55.00 mbgl and 70.00-88.00 mbgl.

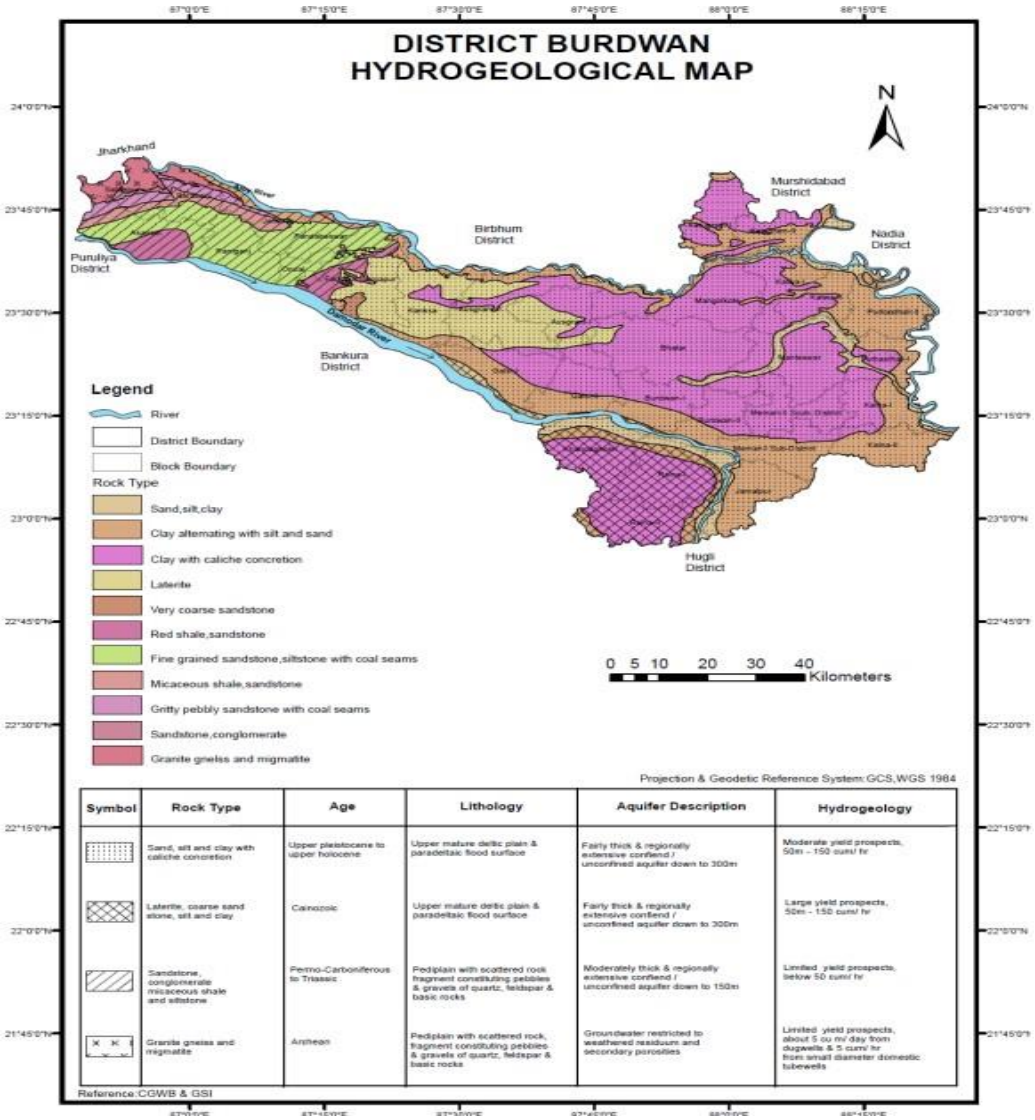


Figure 2-10: Hydrogeology map of undivided Burdwan district along with Purba Bardhaman.

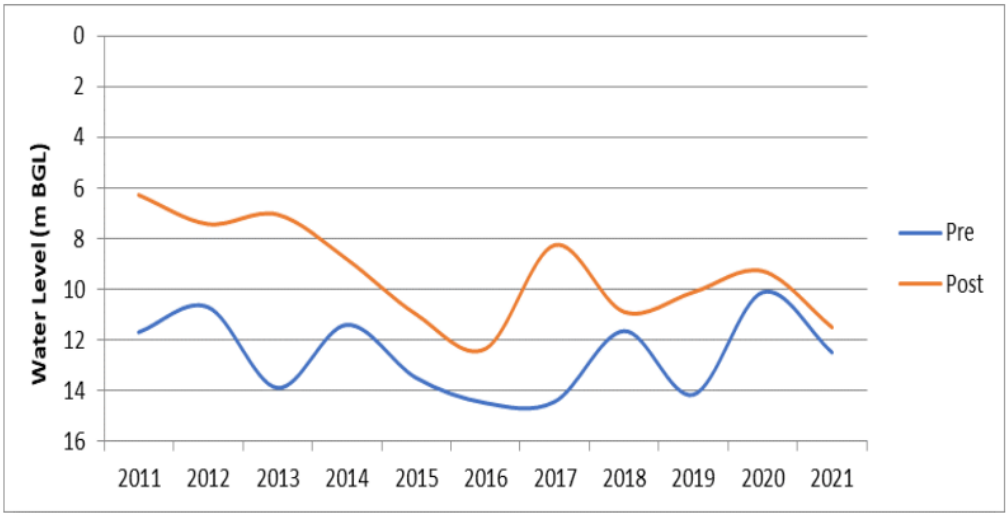


Figure 2-11: Graphical representation of pre-monsoon and post-monsoon water level data of district

2.16 Seismicity of the area:

Purba Bardhaman district is categorized under seismically active zone - III i.e., moderate seismic intensity zone. Bureau of Indian Standards, based on the past seismic history, grouped the country into four seismic zones, viz. Zone - II, Zone –III, Zone-IV and Zone-V. Of these, Zone V is the most seismically active region, while Zone II is the least.

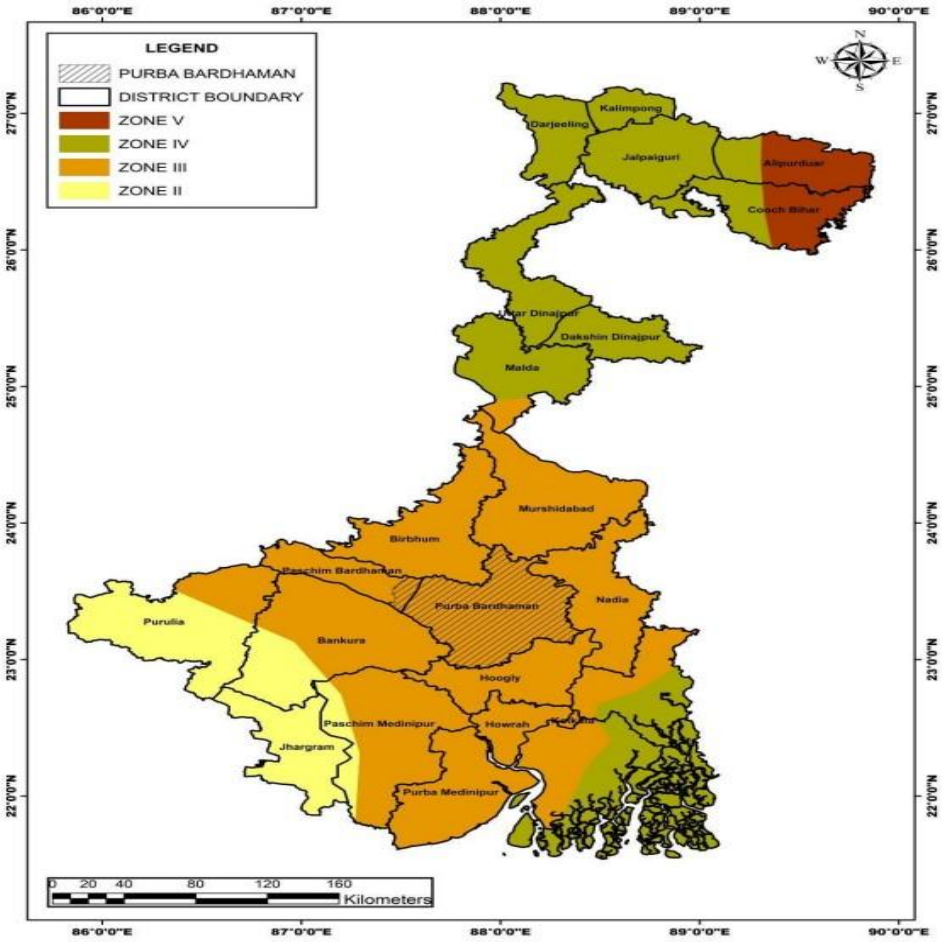


Figure 2-12: Earthquake zonation map of West Bengal highlighting the Purba Bardhaman district position.

2.17 Available reserves and production:

2.17.1 Geological Reserve:

The total area for lease is 6.65 Ha. Sand is available in the middle portion of the riverbed as well as near the riverbank. It is permitted to remove sand only up to 2.7 m depths or up to groundwater level, whichever is less. Now as per policy of the West Bengal state and West Bengal Minor Mineral and Concession Rules 2016 and approved DSR of Purba Bardhaman, the estimation of the reserves in term of volume has been drawn on the basis of the area under the lease multiplied by the average 2.7 m depths and the replenishment rate of the river is considered to be 75% annually.

Table 2-11: Considerations for Resource & Reserve Calculation of the Lease Area

Total Area (Ha)	Safety Zone (Ha)	Area of river entering the lease area	Production Area (Ha)	Thickness (m)
6.65	0.836	0.8658	4.9482	2.7

Table 2-12: Geological Reserve of the Lease Area

Year	Total Area (Ha)	Total area (m^2)	Thickness (m)	Replenishment Rate (%)	Geological Resource (m^3)
1st	6.65	66,500.00	2.700	100	1,79,550.0
2nd	6.65	66,500.00	2.025	75.0	1,34,662.5
3rd	6.65	66,500.00	2.025	75.0	1,34,662.5
4th	6.65	66,500.00	2.025	75.0	1,34,662.5
5th	6.65	66,500.00	2.025	75.0	1,34,662.5
Total Geological Reserve (Cu. M.)					**7,18,200.0**
Total Geological Reserved (C.Ft)					**2.536 Cr**

As per the MoEF&CC Guidelines we have to consider a Safety Zone in order to move forward with our mining activities in the allotted lease area, considering an annual replenishment rate of 75%.as per stated in Section 3,6 above.

So, considering 7.5 m of Safety Zone is = 17018 m^2 x 2.7m = 45,948.6 m^3

Now, After Deduction of safety zone and reserved blocked due to the interception of the Damodar river channel,

The Total Minable Reserve is = 1,33,601.40 m^3 (1,79,550m^3 – 45,948.6 m^3)

Table 2-13: Minable Reserve of the Sand Deposit

Year	Total Area (Ha)	Total Area (m^2)	Thickness (m)	Replenishment Rate (%)	Mineable Reserve (m^3)
1st	4.9482	49,482	2.700	100	1,33,601.40
2nd	4.9482	49,482	2.025	75.0	1,00,201.05
3rd	4.9482	49,482	2.025	75.0	1,00,201.05
4th	4.9482	49,482	2.025	75.0	1,00,201.05
5th	4.9482	49,482	2.025	75.0	1,00,201.05
Total Mineable Reserve (Cu. M.)					**5,34,405.60**
Total Mineable Reserve (C. Ft.)					**1.887 cr cft**

Figure 2-13: Mining location in lease area are marked as red colour polygon.

2.17.2 Mineable reserve of the minerals:

Assuming the riverbed of the Mining Contract Area to be a level area, the reserve of sand available for extraction can be estimated as stated below: -

The mineable area= 6.65 Hectares = 16.432 acres

Maximum depth allowed for riverbed mining = 2.70 m

The void occurring due to the removal of sand from the riverbed is gradually filled up with sand carried by the river current. This process is rapid during the rainy season and hence replenishes the reserve of the mineral (sand) every year as there will be an accumulation of sand to a considerable extent during the rainy season.

For extraction of the sand under the opencast mining method, three numbers of benches,each of 1m in depth and 1.5 m width, may be maintained as indicated in Figure 2-9 and Figure 2-10.

As per Issued LOI vide memo no. 261-ICE-12011(99)/27/2022-MINES, a total of **5,34,405.60** cum of sand may be excavated for 5 Years.

Extraction/ collection work of river sand is usually carried out for eight months in a year. The work remains suspended for the rest four months of the year due to seasonal monsoon rainfall and other related problems.

Therefore, considering the number of working days in a month tobe 25 days and 8 hours per day. So, the total working days in a year would be = (25 X 8) = 200 days

However, the Competent Authority may prescribe the quantity of sand to be extractedby the Mining Contract Holder as per the terms and conditions of the contract taking into account

the impact on the ecology and environment of the surrounding areas.

However, the quantity of sand allotted for extraction under the Mining Contract will bewithin the mineable reserve of sand available per year as depicted above.

2.18 Production of sand:

The Mining Contract proposed to be granted to the applicant **"West Bengal Mineral Development & Trading Corporation Limited"** in the riverbed of Damodar River is for extraction of sand manually. Damodar River is a seasonal river and hence, considerable amount of sand is transported by the flow of riverwater. The total quantity of the sand to be produced are **5,34,405.60** cum.

Sand will be lifted from the riverbed for all eight from June to September. Proposed production for (As per the DSR report of Purba Bardhaman):

Table 2-14: Year-wise Production details

Year	Total Area (Ha)	Thickness (m)	Replenishment Rate (%)	Mineable Reserve (m^3)
1st	4.9482	2.700	100	1,33,601.40
2nd	4.9482	2.025	75.0	1,00,201.05
3rd	4.9482	2.025	75.0	1,00,201.05
4th	4.9482	2.025	75.0	1,00,201.05
5th	4.9482	2.025	75.0	1,00,201.05
Total Mineable Reserve (Cu. M.)				**5,34,405.60**
Total Mineable Reserve (C. Ft.)				**1.887 cr cft**

2.18.1 Per Day Production

Total Estimated production of minable reserve during the full lease period will be

= **5,34,405.60m^3**.

[Yearly production details are provided under section 4.4]

The Maximum Production of Minor Mineral (Sand) during the full lease Period is:

= **1,33,601.40 m^3**

Considering the number of working days in a month to be 25 Since the Mining activities will be on halt during the time of Monsoon (Period of 4 months), therefore only 8 months of working on the Lease area will be possible.

So, the total working days in a year would be: (25 × 8) = 200 days.

So, the Maximum Extraction of Riverbed Sand deposits per day (i.e., 200 days) would be about: = **(1,33,601.40 / 200)**

= **668.007 m^3/ Day**.

Considering the carrying capacity of trucks/dumpers to be deployed is of average 10 m^3, the total no. of trips to be made **= (668.007/10) m^3 ≅ 67 trips/day**

Sand will be transported from the mine site to various government, semi-government, and private consumers mainly for civil construction and road construction purposes. The quantity of sand stated above is an estimated quantity that may be available for extraction considering the extent of the area of the Mining Contract Site. However, the competent authority shall decide and fix the quantity of sand to be lifted by the Mining Contract Holder as per terms and conditions of the Mining Contract with due emphasis on the impact on environment and ecology of the surrounding areas.

2.19 Working Depth

Taking into consideration the geological parameters of the sand deposit and the geotechnical field observations, it is advised to work in a semi mechanized mode and the method is opencast with a bench system which is adapted to work on the deposit. As per Updated 2022 District Survey Report- Purba Bardhaman, it is advised to keep the working depth of the Mining activities at 2.7 m. It is only a small-scale sand mining; The extraction of sand is being done using small-scale excavators (1.5 m^3) and manually with simple hand tools such as shovel pans and crowbars. This activity is followed by sorting pebbles manually or by a screening device.

The year wise projection of working is marked on the Production and Development plan which is enclosed in the section as **Plate No. – 4**.

Surface Plan of the proposed lease area is shown in **Plate No. – 5**.

Year-wise Production & Development Plan & Geological Cross-section showing the year-wise bench deposition is enclosed as **Plate No. – 6 & 7**.

2.20 Year Wise Development

No development work is required as the mining is for riverbed sand. Excavation of river sand will be done in combination of both manual method and transportation will be done by loading trucks of 20 Ton (10 m^3) capacity. It has been proposed to collect approximately 1,06,881.12 m^3/per year. The river bed material will be replenished during the monsoon season every year.

2.21 Life of mine:

Generally, the extraction/collection of river bed sand deposits can be carried out for eight months only in a year. The work remains suspended for four months during the monsoon season for allowing the river bed to replenish. During this period as the river bed remains full with seasonal flood water and other related problems like lack of approach road, heavy vehicles may get destroy connecting roads etc. The ultimate land use of the mine lease area

will not change. The life of mine will be up to lease period as stated in the Lease Grant Order (LGO). Based on the reserves with the maximum established rate of production of 1,33,601.40 m^3 per annum, the anticipated life of the sand mine will be about 5 years.

2.22 Mining Method:

2.22.1 Proposed Mining Method:

Presently the said mine is working with the conventional open cast with bench system method with the semi mechanized mode of operation. Based on the mode and method so adopted and taking into the consideration of geological parameters of the sand body, the mining pit is designed such that the height of the bench is kept at about 2.7 meters maximum and maintains 34˚ pit slope. However, only 2.7 m benches have been considered for present mining.

- Mode of operation (mining) is a manual opencast supplemented with the semi-mechanized operation.
- Extraction of sand will be done by both manual labour and small capacity machineries like Excavators and Tractors to excavate and transportation of the extracted sand.
- The extracted sand will be temporary stored in the Stacking Area which then further will be transported to the desired location as per MDO.
- The bench height will be 1m, at final stage the slope of the bench will be maintaining 34° slope.
- Loading of excavated/sorted sand material into the Tippers with the help of manual mode or by small capacity Excavator.

Source: ***Approved mine plan no. 234/CMO/XVI/EBUR (553) dated 10 July, 2023***

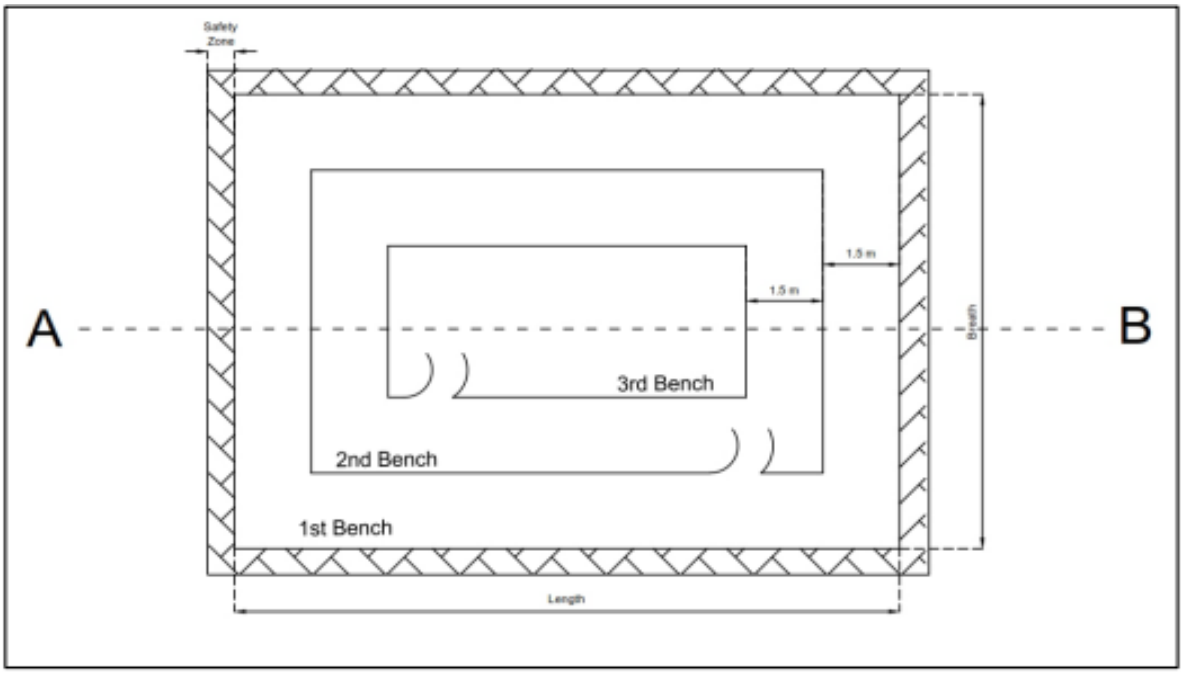


Figure 2-14: Model Scheme of Extraction of River Sand in Mining Contract Area.

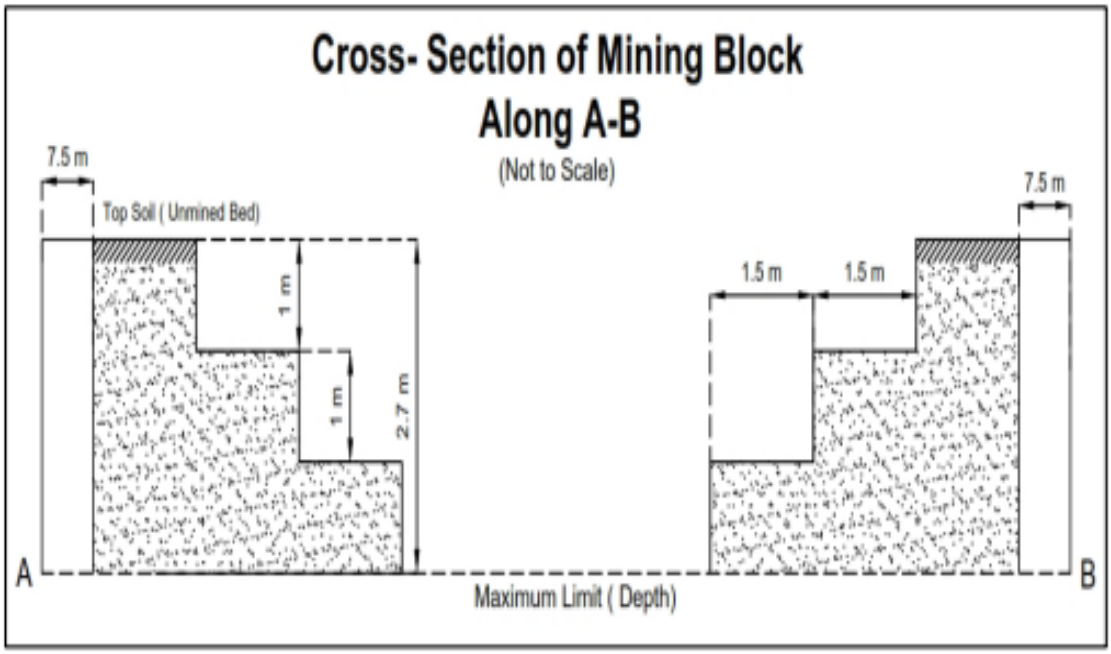


Figure 2-15: Cross sectional area of River Sand in Mining Contract Area.

2.23 Conceptual Plan of Mining:

Considering individual sand deposits and restricting the mining to top 2.7 m from the present groundsurface, shall be done. A pole (wooden or metal) shall be fixed in the sand deposit at a suitable location, with datum levels - 0m to 3m painted on it to work as a guide in depth restriction. The river channel is free of water and the ground water table lies about 6-8 m below the dry channel ofthe river exposed. In general, this condition prevails in almost all of the sand deposits on this riverstretch.

The mineralized zone or the sand zone in particular of the river does not follow any specific trend,somewhat it occurs as lensoid body. The relative occurrence of ground surface with the

sand zonethickness varies from place to place and depends upon factors such as stream/river flow characteristics, geometry of the river banks, sediment load, rate of water flow, rainfall and surfacerun off characteristics etc.

The longitudinal section of the river channel is explained in the Figure 2-18. The longitudinal section exhibits the generic upstream to downstream flow of river along with the sand deposits contained with it. As seen in the illustration, the top surface of the sand deposit is undulating and gently dipping and the contours of sand deposit vary with the factors as enumerated in above paragraph.

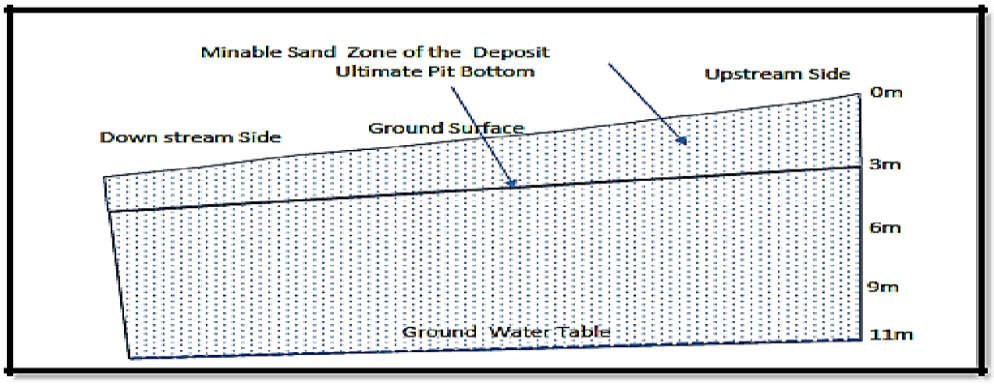


Figure 2-16: Conceptual Longitudinal Section of River Channel.

2.24 Machinery Requirement:

This is a new mining contract. Following equipment's are proposed to be deployed for the desiredproduction.

Table 2-15: List of Machinery.

Sl. No.	Name of Machinery	Capacity	Approximate Quantity (Nos./Day)
1.	Excavator	1.5 (Cu.M)	2
2.	Tipper Truck	10 (Cu.M)	20
3.	Water Sprinkler Truck	10 (Cu.M)	2

Table 2-16: Details of Manpower Deployed

Sl. No.	Manpower	Numbers
1.	Manager/ Supervisors/ Technical Professionals	04
2.	Skilled labour	26
3.	Non-skilled labour	60
Total		90

2.25 Transportation of Minerals:

As per the official Kolkata Gazette No. 48-ICE/O/MIN/GES-MIS/17/2021 dated 25th January 2022 and The West Bengal Sand Rule 2016, the following are the rules for transportation, storage & sale of sand:

1. No person shall transport sand without being duly authorized by the State Government and carrying a valid internal permit or e-challan generated on the centralized portal.
2. No person shall store and/or sell sand and or carry out any other allied activities without being duly authorized by the State Government.
3. A person engaged in the transportation of sand shall register itself and every carrier used by it for transporting sand on the centralized portal, in such manner, as may be specified by the State Government in a notification published in the Official Gazette.
4. A person engaged in the storage of sand shall register itself and every such stockyard/depot used for storage of sand on the centralized portal, in such manner, as may be specified by the State Government in a notification published in the Official Gazette.
5. A person engaged in sale of sand shall register itself on the centralized portal, in such manner as may be specified by the State Government in a notification published in the Official Gazette.
6. The persons specified in sub-rule (3), (4) and (5) who are engaged in transportation and/or storage and/or sale of sand from before the commencement of these rules, shall register themselves on the centralized portal within sixty days from the commencement thereof.
7. Within such time as may be specified by the State Government in a notification published in the Official Gazette, such other persons engaged in any activity in connection with sand, if not already registered on the date of publication of such notification in the manner specified in such notification, shall register themselves with the State Government.
8. The time period, terms and conditions of the registration and fees shall be as specified by the State Government in a notification published in the Official Gazette.

2.25.1 Transport from Lease Area to the destination:

ROM generated at the mining site will be loaded on tractors with the help of labours followed by transportation by Tipper Trucks.

2.25.2 Transport System:

The transportation system is mainly surface transport' assuming the tipper trucks have (10 m^3) capacities. Therefore, there will be traffic of 67 trips per day at the mining site.

2.25.3 Sand Transportation Means:

Both own and hired trucks

2.25.4 Conveyor/ rail/ ropeway/ pipeline:

Not Applicable

2.25.5 Main destination to which riverbed sand is transported (giving both side travel distance):

The material generated at this Mining Lease Area is sand which is used as Road Metal/Building material, hence the distance of destination (both side travel) cannot be furnished, because it varies.

2.25.6 Measures related to transportation:

- Regular water spraying on haulage roads during mineral transportation by rotary type water sprinkler, which will cover whole width of the haulage road in one round.
- Avoid overloading of tippers & consequent spillage on the roads.
- Mineral carrying trucks will be effectively covered by tarpaulin to avoid escape of fines to atmosphere.
- Air quality shall be regularly monitored both in the core zone and the buffer zone.

2.26 Mine drainage:

During the course of mining, the water table in the river shall not be intercepted. The mining shall be restricted to the top 2.7 m from the general ground level. Ground water shall not be intercepted during the mining of sand. In view of it, dewatering of sand pits shall not be required or discharged elsewhere.

2.27 Stacking of mineral rejects and disposal of waste:

The present sand mining locations do not have significant topsoil/clay layer to be preserved elsewhere during the mining operations. The sand deposits inherit gravel, pebbles with them being a part and parcel of river system. During the field visit and information gathered during discussionswith concerned people, 10% of the geological reserves occurring in the sand ghats are provided for these inclusions and accordingly these have been considered during the minable sand reserves. Subsequent to the extraction of sand being done semi-mechanized process with the help of heavy earth moving JCB (preferably Manual), it will be then loaded into tipper trucks (Approx. 10 m^3 capacity) manually or by small loading Machinery (Heavy Earth Moving Excavator). The loaded material is transported to various places for Building construction, and road construction places.

2.27.1 Disposal of Waste (Reject) materials Silt:

The proposed project is the mining of sand from dry part of riverbed, all the excavated material will be saleable, and therefore no mines reject will be generated. Some amount of silt may generatewill be used in haul road development.

2.727.2. The land was chosen for disposal of waste with the proposed justification:

There shall be no waste materials generated during the course of sand mining. Therefore, disposalof solid waste resulting from the sand mine shall not be required.

2.28 Use of Mineral:

Sand is used in almost any type of construction activity. Thus, as the focus of the government is on the improvement of basic infrastructure, both in rural & urban areas, there is a constant need for ensuring a regular supply of these construction raw materials inputs. The production of sand will benefit the state in the form of royalty. Apart from this project operation will provide employment directly & indirectly to the people residing in the vicinity, thus improving the socio-economic status of the area.

There will be also indirect employment in transportation and handling.

2.29 Utilities and Proposed Site Facilities:

a) Utilities:

1. Need for the project and importance in the country:

Purba Bardhaman is a rich district in terms of sand and mineral deposits. The districts endowed minor mineral resources. The region, where the project is situated, people are mostly dependent on agriculture for livelihood. The developments of mining in the area will lead to infrastructure development, improvement of road communication and also provided direct and indirect employment opportunities.

2. Demand Supply Gap:

The demand for sand is ever-growing with the growth of the infrastructure sector in our country. The mineral is used mainly in the construction activities like buildings, pillars etc. The requirement for minerals is always high in the nearby cities and towns. Therefore, sand has a good demand in the domestic market.

3. Import v/s Indigenous Production:

Only in-situ reserves of sand aggregate occurring in the riverbed of Damodar covering an area of 6.65 Ha shall be mined by opencast as indigenous production.

4. Domestic / Export Markets:

Sand is one of the most important dimensional minerals under listed minor minerals. The domestic demand for sand is also increasing due to large scale development of housing complexes, hotels, hospitals, offices, etc. not only in West Bengal but also in other states.

5. Export Possibility:

The entire quantity of production of sand shall be used for local construction and road-making purposes within the district of Purba Bardhaman and within the state of West Bengal. There is no possibility of exporting the minor mineral at present.

b) Proposed Site Facilities:

1. Water Requirement:

The water will be required only for drinking purposes. It is projected that not more than 90 laborers will be required for the proposed project. The total water requirement will be 6 KLD which will be met by installation of tube well within the project site.

Table 2-17: Water Requirement.

Sl. No.	Activity	Water Requirement (In KLD)
1.	Drinking & Domestic	1.5
2.	Green Belt	2
3.	Dust	2.5
Total		**6**

2. Power:

The material will be excavated by a semi open cast method and loaded directly into tractors by the workers themselves. The operation will be done only from sun rise to sun set. So, there is no powerrequirement for the mining activity.

3. Manpower:

There is no permanent influx of the population anticipated, as the workers will be hired locally from nearby villages. Unemployment is very pervasive in the study area. The project will provide employment to around 26 nos of skilled labours, and 60 nos. of non-skilled labours from local proximity and 4 nos of managers/supervisors/technical professionals in the project. It is expected that a large part of the investment in this project will be direct/ indirect role on local population. Hence there will be an overall improvement of the socio-economic status of the people of surrounding areas.

4. Infrastructure and Site Facilities:

Infrastructure facilities like site office, first aid station, rest shelter, potable drinking water facility etc. will be established within the mine area. The following infrastructure facilities

will be made available for the workers:

5. First Aid Facility:

A first aid facility will be made available at site with proper equipment will be maintained as per Mines Act and Mine Rules at the mine site office. First aid -box with all necessary facilities will be maintained and provided.

6. Temporary rest shelter:

The temporary rest shelter with arrangement for drinking water, tea etc., will be provided for the workers working in the mine as they will come from nearby villages at day time only.

7. Washroom:

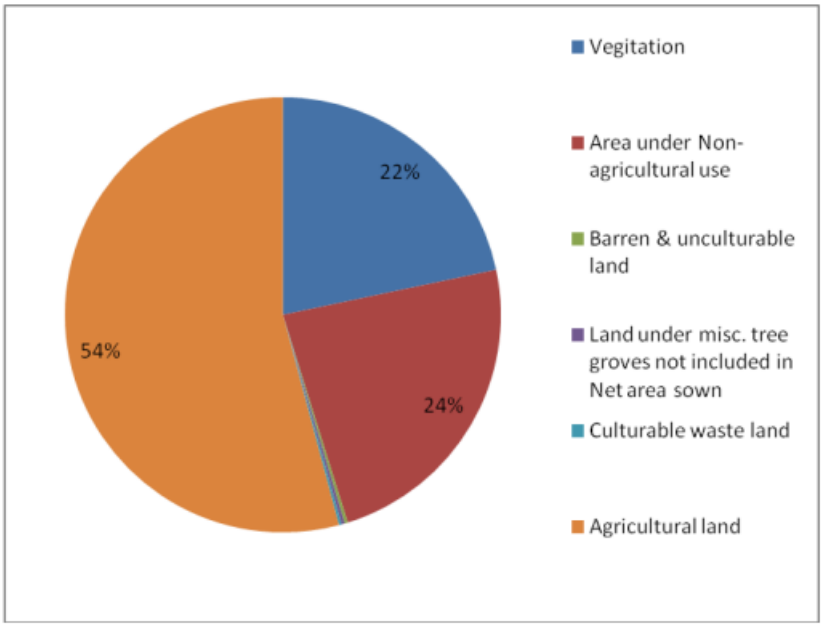
Washroom facilities will be provided to the laborers near the site.

8. Land use:

The land of the mine lease area is for Sand Mining & there will be no change in land use after operation. The final land use of the mine lease area will not change. Extracted minerals will be used in construction purposes and other uses, the workers will be hired locally & temporarily, no housing facility will be required. Land use distribution proposed for quarrying andits allied works and ultimate land use details are given;

Table 2-18: Land use of project site before project activity.

Landuse (2018-19)	**Area (Ha)**
Net Cropped Area	168448
Area under non-agricultural use	38927
Area under forest	73647
Area under current fallow (2016-17)	3377
Cultivable waste land	21417
Gross cropped area	229713
Area cultivated more than once	70495
Cropping intensity	136 (%)



2.30. Project Cost:

The total cost of the project is approx., 25.00275 crores, one year would be approx., 5.00055 crores and there is a budgetary provision that 5% (0.2500275 crore per year) of the project cost will be allocated for the Environmental Management Plan (EMP) and 2% (0.1000110) crore per year) of the project cost will be allocated for Corporate Environmental Responsibility (CER) and health and hygiene (H&H) for causes of poor people of nearby villages. Health and Hygiene will be allocated for a health check-up once in six- months. Extra budgetary provisions will be allocated to lady workers. The Total expenditure of welfare scheme i.e., EMP + CRP & H&H = 7% (0.3500385 crore per year).

CHAPTER – 3

3.1. DESCRIPTION OF THE ENVIRONMENT

3.1.1 General

Sand is a site-specific mineral that occurs mostly along the riverbed and sometimes off the riverbed. Mining activities invariably affect the current environmental status of the site. It has both adverse and beneficial effects. To maintain the environmental commensuration with the mining operation, it is essential to undertake studies on the existing environmental scenario and assess the impact on different environmental components.

3.2 Study area and Sampling Site

The study area is divided into core and buffer zone in view of scientific study. The core zone is the lease area of the mining site and from the boundary of the lease area up to 10 km radius is called buffer zone (Figure: 1-2). The study of the proposed project was undertaken for assessing the base line status of Environmental Parameters like Land, Air, Water (both groundand surface), Soil, Noise and Biological (both flora and fauna) and socio-economic status.

Baseline data has been collected out during the Summer Season (October to December, 2023) by M/s N.D. International Kolkata [NABL Accredited Lab, Certificate No. TC: 5910] in accordance with the Guidelines for EIA issued by the Ministry of Environment Forests and Climate Change, Govt. of India and CPCB, New Delhi. Team of Experts visited the study area for Social & Biological Environmentstudy. The following data, through field survey and other sources, has been collected by M/s Indian Mine Planners and Consultants, Kolkata, for preparing the EIA/EMP for the proposed mining area with related facilities.

- Physical environment (Air, Water, Soil and Noise) baseline data.
- Relevant meteorological data, for previous decades from Indian Meteorological Department (IMD) and primary data.
- Identification of water bodies, hills, roads etc. within 10 Km radius.
- Eco-sensitive places, sanctuaries, biosphere reserves within 10 Km radius.
- Religious places / historical monuments and tourist places within 10 Km radius.
- Study of present environmental protection and mitigation measures in nearby operating similar projects, if any.

Table 3-1: Salient Features of Baseline Environmental Studies.

Attribute	Parameter	Frequency of Monitoring
Micro - meteorological Studies	Wind Details like speed, direction, Temperature, Relative Humidity and Rainfall	3 months data has been collected to assess air Pollution impacts on the surrounding environment.
Ambient Air Quality	PM10, PM2.5, Sulphur Dioxide ($S0_2$), Oxides of Nitrogen (NOx), Carbon monoxide (CO)	3 months data has been collected to assess baseline Air Quality status of the area.
Noise Quality Data	Noise levels	1 middle month data has been collected to identify noise producing areas.
Water Quality, Soil Quality Data and Land Use pattern	Physical & Chemical parameters along with Measurement of heavy metals and land use parameters.	To establish baseline Water Quality, Soil Quality for future reference and Land Use Pattern in the area
Socio-Economic & Demographic Studies	Socio-Economic parameter	To know the present Socio-Economic status of the study area

3.3 Land Environment:

Since mining is essentially an excavation of mineral ore, the land environment is greatly affectedby it, especially in the case of opencast mines. In contrast, underground mines have limited effecton the surface land.

3.4 Land Use Land Cover of the Study Area:

Land Use (LU) refers to man's activities and various uses which are carried out on land. Land Cover (LC) refers to natural vegetation, water bodies, rock / soil, artificial cover and others resulting dueto land transformation. Although land use is generally inferred based on the cover, both the terms land use and land cover are closely related and interchangeable.

Information on the rate and kind of change in the use of land resources is essential to the proper planning, management and regulation of the use of such resources. Satellite imageries are potentially more amenable to digital processing because the remote sensor output can be obtainedin digital format. Land use data are needed in the analysis of environmental processes and problemsthat must be understood if living conditions and standards are to be improved from or maintainedat current levels. It is required to carry out the land use/land cover study for the project study area(10 km radius) to obtain the necessary environmental clearances from statutory authorities. The objective of the study is to carry out land use / land cover study for the proposed project. The LU/ LC study is carried out using the Satellite Imageries (IRS RS2 LISS III / IV Rabi and Khariff) inaddition to Survey of India

toposheets. Appropriate guidelines are followed while preparing the LU / LC map for the project study area.

1) Scope of the Work:

- The LU/LC study shall be carried out for a study area of a 10 km radius, taking the site asthe centre using the satellite imageries (IRS RS2 III / IV 5.8 m Resolution) for Rabi/ Kharif season.
- Procurement of latest satellite imagery (IRS RS2 III/IV 5.8m Resolution) based on availibility) Rabi or Khariff seasons. Satellite imagery processing and interpretation of land use as per land use classification covering 10 km radius of proposed Project Site.
- Calculation of land use breakup w.r.t. each land use category covering 10 km of the proposed Project Site.
- Preparation and submission of reports, satellite imageries and maps.

2) Pre-Field Interpretation:

- Collection of Survey of India Topographical maps on a 1:50,000 scale from Survey of India (SOI).
- Procurement of Satellite Imagery from the National Remote Sensing Centre (NRSC) site Geo Co-ordinates from the site centre taken 10 Km radius.
- Using ERDAS image processing software processed the raw satellite data.
- Using ArcGIS software, converting all base features from the toposheet and overlaying thesame features on the satellite imagery.
- Using remote Sensing techniques, tone, colour, texture and shadow etc. draft land use map is prepared.
- Before site/ground truthing, randomly mark field data checked. With which fieldwork willbe carried out.

3) Site/ground truthing:

- Site visit - capture the Geo-Coordinates of Boundary Pillars and record them in a field notebook.
- Take traverses and observe the land use categories and map them on the field map on thedraft map with field photographs.
- Observe each land use category like single crop/double crop, industrial area, settlements,forest lands, water bodies, wastelands, etc.
- The buffer zone area will randomly traverse for correlating mapping units.
- Collecting secondary data from the agricultural department and local people.

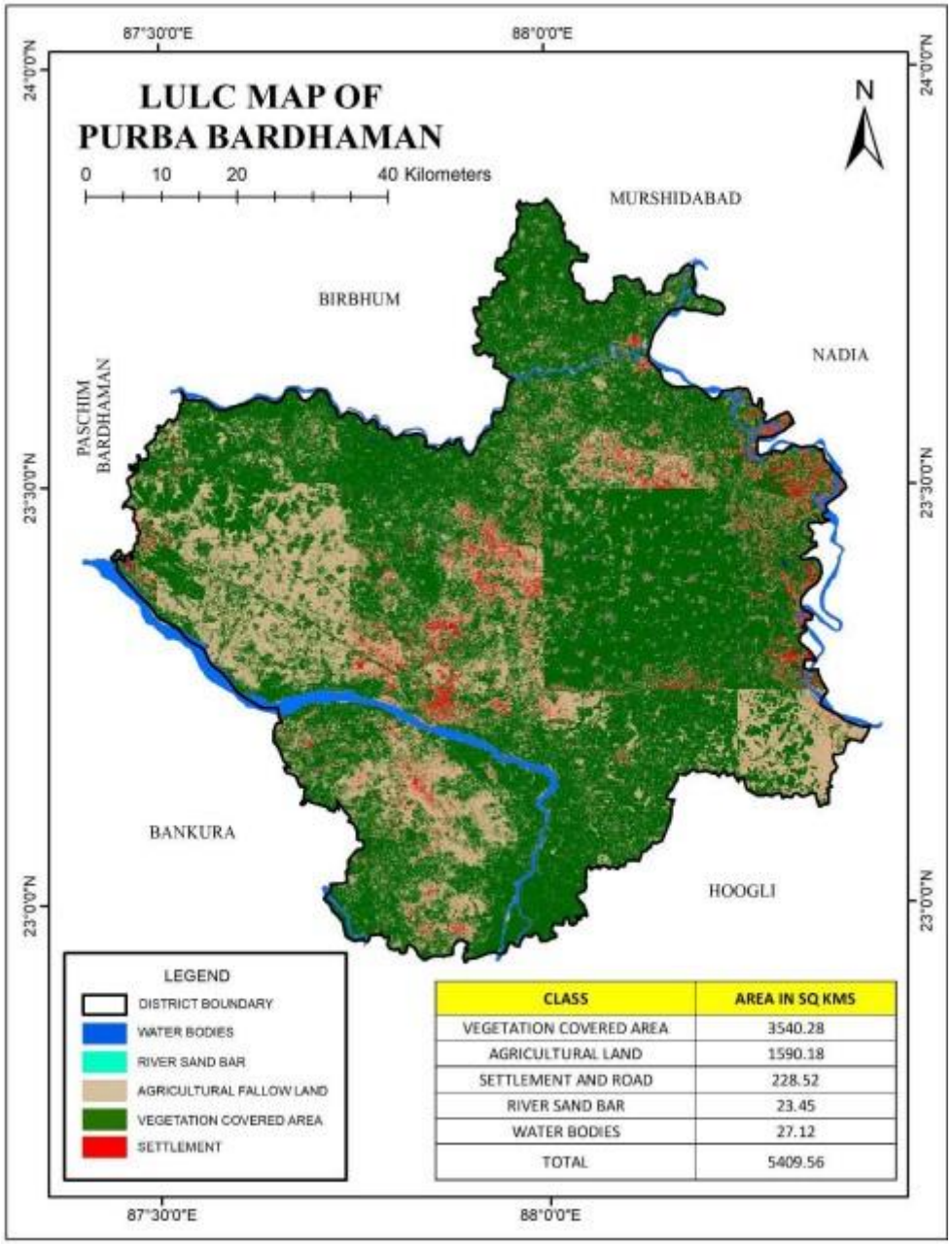


Figure 3-1: Land Use Land Cover map of Purba Bardhaman District

Table 3-2: Land utilization statistics of the district

Year	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Reporting Area	698.76	698.76	698.76	698.76	698.76
Forest Area	21.16	21.16	21.16	21.16	21.16
Area under Nonagricultural use	208.53	211.56	211.92	213.77	214.19
Barren & unculturable land	1.37	0.86	0.65	0.57	0.44
Permanent pastures & other grazing land	0.22	0.26	0.33	0.15	0.06
Land under misc. tree groves not included in Net area sown	1.42	1.99	0.87	0.83	0.98
Culturable waste land	5.6	4.88	6.09	4.45	3.74

Fallow land other than Current fallow	1.37	1.24	1.46	1.25	1.09
Current fallow	4.98	4.35	4.31	3.7	3.31
Net area sown	454.11	452.46	451.97	452.88	453.79

Table 3-3: Land use and Land cover data of buffer zone

Land-use distribution	Area in sq km	Percentage (%)
Agricultural Land	**252.03**	**77.47**
Barren Land	**4.38**	**1.35**
Settlements	**62.11**	**19.09**
Water Body	**6.82**	**2.1**
Grand Total	**329.89**	**100.00**

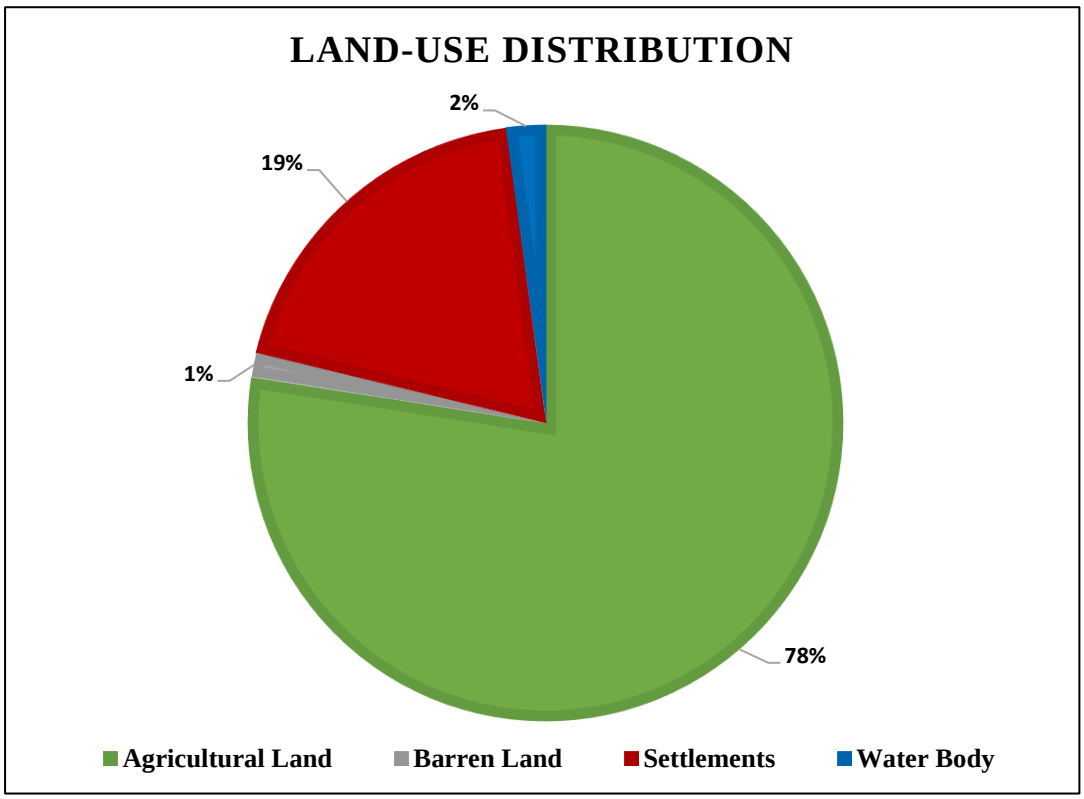


Figure 3-2: Pie chart showing Land use distribution of Buffer Zone Area

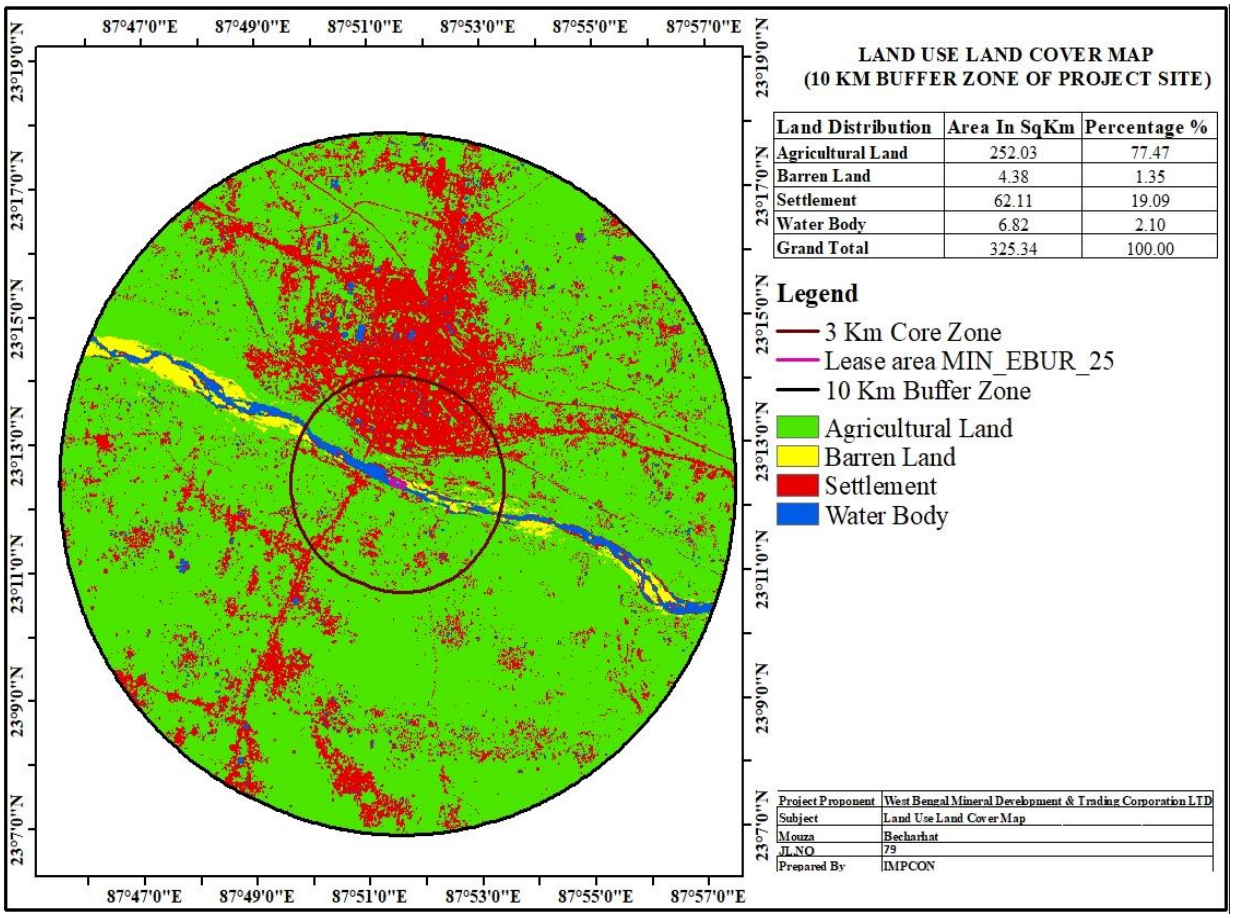


Figure 3-3: Land-use and Land-cover of 10 km buffer zone of the project area

3.5 Conclusion of land use and land cover analysis:

The major land use and land cover is Agricultural Land 77.47%, Developed area second highest by area 19.09%, Barren land 1.35%, and water bodies cover 2.10%. This LULC data are compared with District land use land cover data presented in Figure 3-3.

3.6 Soil:

Soil, also commonly referred to as earth or dirt, is a mixture of organic matter, minerals, gases, liquids, and organisms that together support life. (Some scientific definitions distinguish dirt fromthe soil by restricting the former term to displaced soil.)

Soil consists of a solid phase of minerals and organic matter (the soil matrix), as well as a porous phase that holds gases (the soil atmosphere) and water (the soil solution). Accordingly, soil is a three-state system of solids, liquids, and gases. Soil is a product of several factors: the influence of climate, relief (elevation, orientation, and slope of terrain), organisms, and the soil's parent materials (original minerals) interacting over time. It continually undergoes development by way of numerous physical, chemical and biological processes, which include weathering with associated erosion. Given its complexity and strong internal connectedness, soil ecologists regardsoil as an ecosystem.

To judge the soil properties of the area, soil were taken at 3 locations. The details of the location are

given in Table 3-5. soil samples was collected from surrounding agriculture fields and nearbyarea that are likely to be impacted from the project. Soil quality analysis done for parameters liketexture, moisture, organic matter, conductivity, pH, bulk density, and NPK values. Soil parameterlab analysis results of the 3 locations are given in the table 3-4 and 3-5.

Table 3-4: GPS Coordinate of Soil Sample collection location

Sl. No.	Sampling Location	Location Code	Coordinates		Distance from Project Site	Direction from Project Site
			Latitude	Longitude		
1.	Lease Area	Soil 1	23°12'40.91"N	87°51'22.82"E	0.46 km	North
2.	Salgachchha	Soil 2	23°11'11.76"N	87°52'51.67"E	2.96 km	South-East
3.	Nababhat	Soil 3	23°16'27.13"N	87°49'57.23"E	7.82 km	North-East

Table 3-5: Soil parameters lab analysis results

A. Chemical Test Findings						
Sl No.	**Test Parameter**	**Test Method**	**Unit**	**Result**		
				S1	**S2**	**S3**
1.	Electrical Conductivity (1:2.5 Aqeous Solution)	IS:14767 : 2000 134	µs/cm	138	162.4	148
2.	Nitrogen	IS:14684 : 1999	%	0.038	0.052	0.068
3.	Moisture	IS:2720 (Part-2) : 1973	%	11.25	19.82	19.38
4.	Specific Gravity	NDI/CHEM/SOP/S-03	--	2.12	2.54	2.68
5.	Bulk Density	FAO Method-2007	gm/cm^3	2.46	3.52	1.49
6.	Phosphorus as P	FAO : (Method) U.N.2007	mg/kg	0.211	0.181	0.174
7.	Potassium as K	13.1 of FAO : 2007	mg/kg	0.42	0.31	0.38
8.	Sodium Absorption Ratio	IS 11624:2019	mg/kg	0.69	0.45	0.41
9.	Permeability	NDI/CHEM/SOP/S-05	cm/h	18.38	14.37	17.98
10.	Calcium	The Fertilizer Control Order 1985	mg/kg	0.28	0.45	0.37
Texture of Soil						
11.	Gravel	FAO Method-2007	%	Nil	Nil	Nil
12.	Sand	FAO Method-2007	%	33.60	29.56	31.5
13.	Silt	FAO Method-2007	%	18.72	15.86	15.7
14.	Clay	FAO Method-2007	%	57.16	53.89	63.2

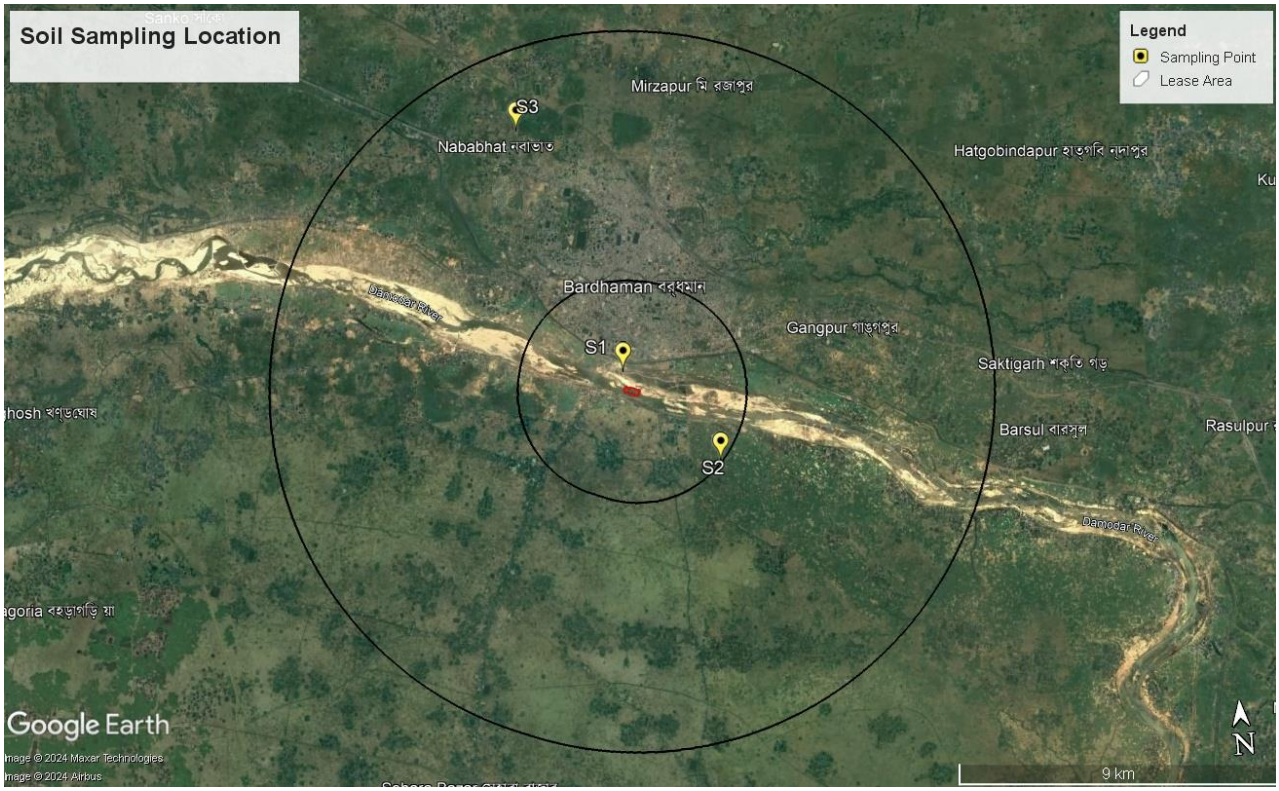


Figure 3-4: Soil Monitoring Locations

Figure 3-5: Soil sampling

3.7 Conclusion of soil parameters analysis:

Samples collected from identified locations indicate pH value of 6.18, 5.86 & 6.32, which shows that the soil is slightly acidic in nature. Organic carbon ranges from 0.35 %, 0.57 % & 0.49 % in the soil samples and, whereas the Potassium is found to be ranging from 0.42 mg/kg, 0.31 mg/kg & 0.38 mg/kg.

3.8 Air Environment:

3.8.1 Climate:

The climate of the area is characterized 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 and November
- Winter: December, January and February

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, a temporary auto weather station was installed to record micro meteorological data on wind speed, wind direction, ambient temperature, solar insolation and Relative humidity on hourly basis.

The primary data from the site was matched with secondary data of IMD nearby station for data proofing. A sophisticated on-site meteorological observatory was established near project site and operated continuously for three months' period (March 2022 to May 2022). The observatorywas 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. Thewind rose diagram for the entire period is shown in Figure below.

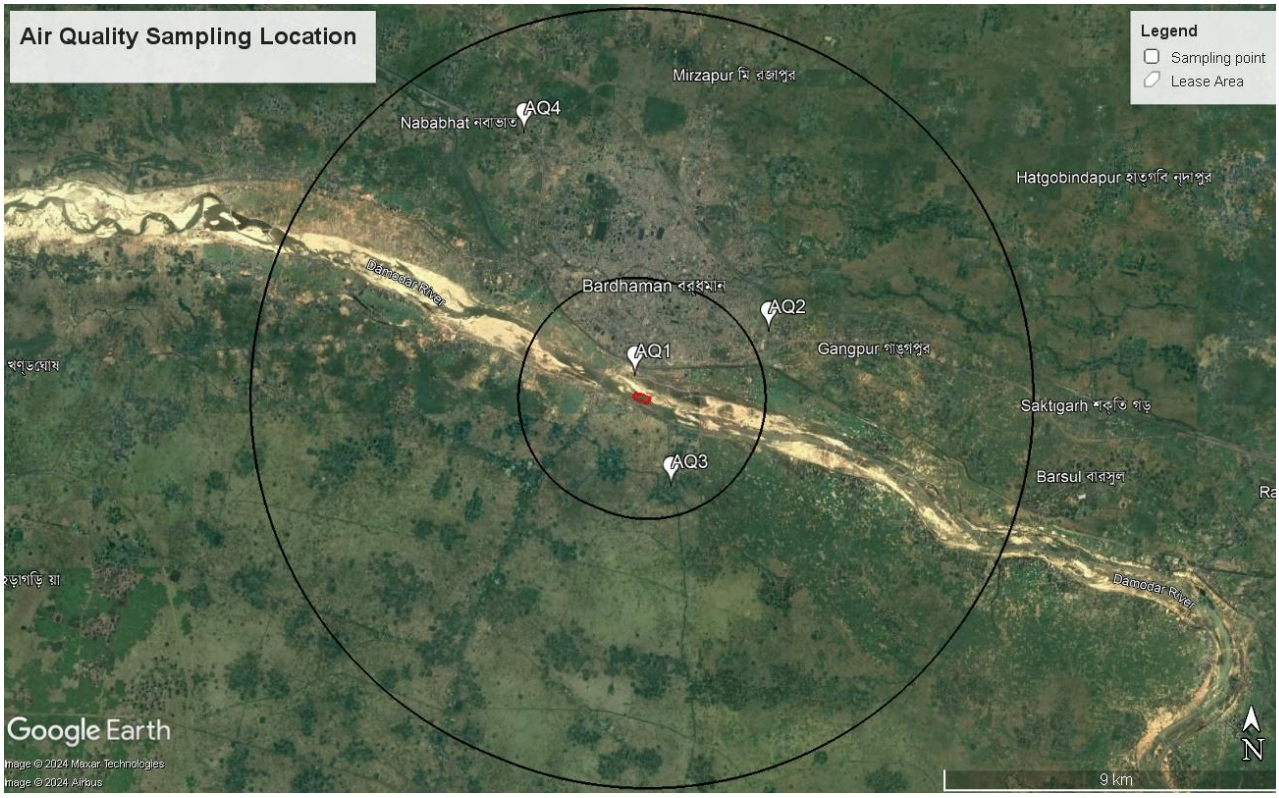


Figure 3-6: Ambient Air Quality Sampling Locations.

Figure 3-7: Onsite meteorological study

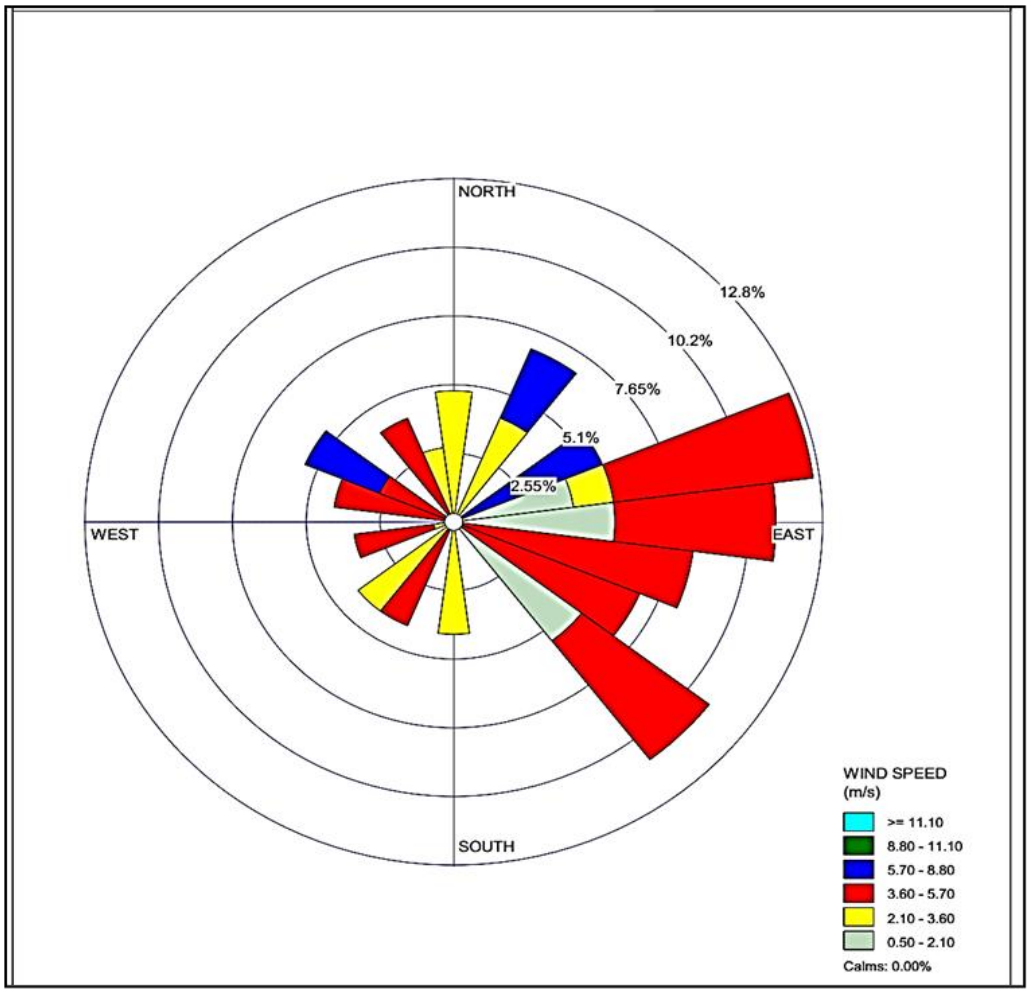


Figure 3-8: Wind rose diagram.

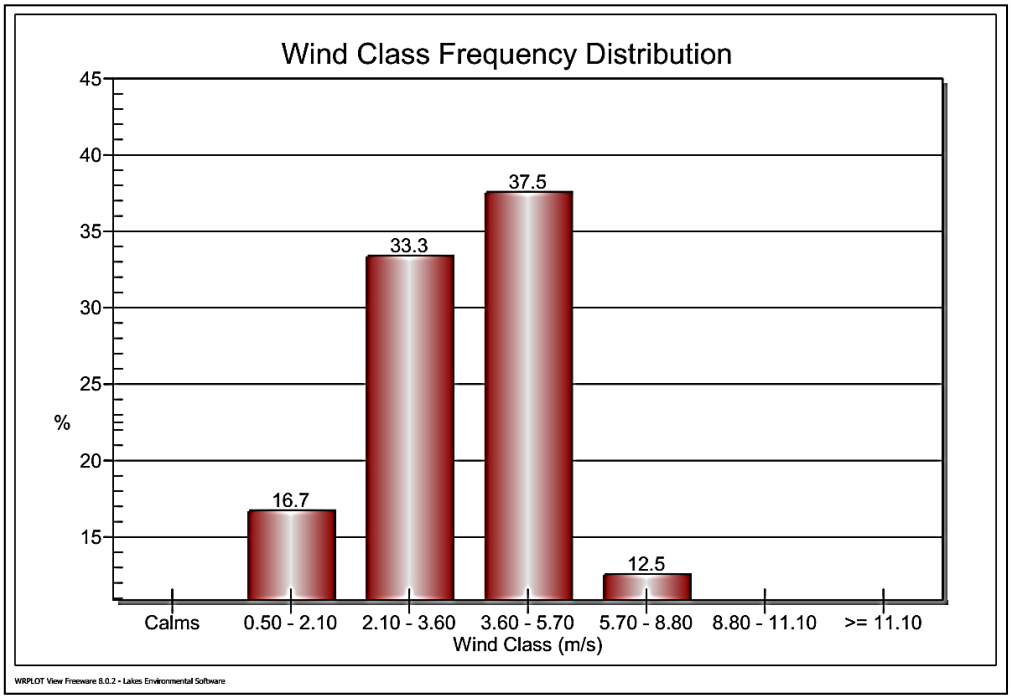


Figure 3-9: Wind Class Frequency Distribution.

3.9 The wind rose Observations:

The predominant wind direction is from the east, with a speed of 3.60 to 5.70m/sec. Calm Percentage (37.5%) of wind direction is more than that the total time of both predominant directions.

3.10 Ambient Air Environment:

An assessment of the existing air quality is required to establish the reference level. To accomplishthis, Ambient Air Quality Monitoring (AAQM) stations were set up within a 10 km radius of the proposed mining area. Data over the baseline status of ambient air quality was generated with following objectives:

- Qualitative analysis of air environment of the area.
- Representation of regional background levels.
- Influence of existing sources of pollution.

The significant contributors/sources of air pollution in the area are.

- Vehicular traffic
- Windblown Dust

3.11 Ambient Air Quality:

The ambient air quality monitoring was carried out at 4 locations. The location and description of AAQM stations is shown in Table 3-6 & Figure below. The parameters monitored during the study period were particulate Matters (PM10), particulate Matters (PM 2.5), Sulphur dioxide (SO_2) and Oxides of Nitrogen (NO_X). The results of AAQM are depicted in Tables 3-7 to 3-12.

Table 3-6: GPS Coordinates of Air Sample collection location

SL.No.	Location Name	Coordinates		Distance from Project Site	Direction from Project Site
		Latitude	Longitude		
1	**Project site**	23°12'41.33"N	87°51'23.94"E	-	-
2	**Alisha**	23°13'18.67"N	87°53'26.57"E	3.60 km	North-East
3	**Chhota Kayrapur**	23°11'8.06"N	87°51'57.01"E	2.23 km	South-East
4	**Nababhat**	23°16'6.24"N	87°49'42.14"E	7.46 km	North-West

Table 3-7: Particulate Matter concentration at different site – PM10.

Location	Minimum (µg/m3)	Maximum (µg/m3)	Average (µg/m3)	98th Percentile (µg/m3)
Project site	58	81	73.23	79.38
Alisha	64	83	73.53	81.34
Chhota Kayrapur	48	85	72.43	83.3
Nababhat	48	81	72.3	79.38

Table 3-8: Particulate Matter concentration at different site – $PM_{2.5}$

Location	Minimum ($\mu g/m^3$)	Maximum ($\mu g/m^3$)	Average ($\mu g/m^3$)	98th Percentile ($\mu g/m^3$)
Project site	41	58	49.67	56.84
Alisha	41	52	47.77	50.96
Chhota Kayrapur	41	58	49.67	56.84
Nababhat	41	58	49.67	56.84

Table3-9: Sulphur dioxide (SO_2) concentration at different site.

Location	Minimum ($\mu g/m^3$)	Maximum ($\mu g/m^3$)	Average ($\mu g/m^3$)	98thPercentile ($\mu g/m^3$)
Project site	10	27	17.27	26.46
Alisha	11	24	17.2	23.52
Chhota Kayrapur	11	26	17.27	25.48
Nababhat	11	26	17.27	25.48

Table3-10: Nitrogen dioxide (NO_X) concentration at different site.

Location	Minimum ($\mu g/m^3$)	Maximum ($\mu g/m^3$)	Average ($\mu g/m^3$)	98th Percentile ($\mu g/m^3$)
Project site	6	19	10.33	18.62
Alisha	5	14	9.8	13.72
Chhota Kayrapur	7	14	9.96	13.72
Nababhat	7	17	10.3	16.66

Table3-11: Carbon Monoxide (CO)concentration at different site.

Location	Minimum ($\mu g/m^3$)	Maximum ($\mu g/m^3$)	Average ($\mu g/m^3$)	98th Percentile ($\mu g/m^3$)
Project site	1	2	1.15	<1.0
Alisha	1	2	1.15	<1.0
Chhota Kayrapur	1	2	1.15	<1.0
Nababhat	1	2	1.15	<1.0

Table3-12: Free Silica (Si) concentration at different site.

Location	Minimum ($\mu g/m^3$)	Maximum ($\mu g/m^3$)	Average ($\mu g/m^3$)	98th Percentile ($\mu g/m^3$)
Project site	4.1	9.5	6.73	9.31
Alisha	3.5	9.5	6.62	9.31
Chhota Kayrapur	3.1	9	6.47	8.82
Nababhat	3.1	9	6.47	8.82

Baseline Scenario:

a) Suspended Particulate Matter (PM10):

Suspended particulate matter in general terms is the particulate matter in suspension in ambient air. It includes dust, smoke etc. In general, some of the important sources of suspended particulatematter are mines. The following sources of suspended particulate matter in the study area are identified:

- Emission due to vehicular movement
- Dust generation from the ground or other mining operations

The minimum and maximum level of PM_{10} recorded within the study area was in the range of 58 µg/m^3 to 91 µg/m^3, with a consolidated 98th percentile range between 79.38 µg/m^3 to 83.3µg/m^3. The 24-hourly average value of PM_{10} is 72.3 µg/m^3, which is within the permissible limit as per National Ambient AirQuality Standards (NAAQS) of 100 µg/m^3, for PM_{10} in industrial, residential, rural and other area.

b) Particulate Matter (PM 2.5):

Fine particulate matter ($PM_{2.5}$) is generated due to all types of fuel combustion and some industrial processes. In general, some of the important sources of particulate matter are mines.

The following are the sources for particulate matter ($PM_{2.5}$)

- Emission due to vehicular movement
- Dust generation from the ground or other mining operations

($PM_{2.5}$) recorded within the study area is in the range of 25µg/m^3 to 58 µg/m^3 and 98 percentilerange between 50.96 µg/m^3 to 56.84 µg/m^3. The 24-hourly average value of $PM_{2.5}$ is 49.67 µg/m^3 which is within the permissible limit as per National Ambient AirQuality Standards (NAAQS) of 60µg/m^3, for $PM_{2.5}$ in industrial, residential, rural and other area.

c) Sulphur Dioxide (SO_2):

Sulphur dioxide gas is an inorganic gaseous pollutant. Sulphur dioxide emissions are expected tobe emitted wherever combustion of any fuel containing Sulphur takes place. The Sulphur in the fuel will combine with oxygen to form Sulphur dioxide. The following sources of Sulphur dioxidein the study area are identified:

- Emissions from domestic/consumption of fuel (coal, diesel, etc.)
- Emissions from machinery equipment's used for mining activity and local residents Sulphur dioxide in the atmosphere is significant because of its toxicity, Sulphur dioxide is capableof producing illness and lung injury. Further it can combine with water (moisture) in the air to form toxic acid aerosols that can corrode metal surfaces, fabrics and leaves of plants.

Sulphurdioxide is an irritant to the eyes and respiratory system. Excessive exposure to Sulphur dioxidecan cause bronchial asthma and other breathing related diseases as it affects the lungs. The minimum and maximum levels of SO_2 recorded within the study area were in the range of 10 µg/m^3 to 27 µg/m^3, and the 98th percentile was recorded between 23.52 µg/m^3 to 26.46 µg/m^3. The 24-hourly average values of SO_2 is 17.27 µg/m^3, which is within the permissible limit as per National Ambient AirQuality Standards (NAAQS) of 80µg/m^3, for SO_2 in industrial, residential, rural and other area.

d) Oxides of Nitrogen (NO_2):

The essential sources of nitrogen oxides are utilities and auto exhaust due to vehicular movementin the mine lease area. The following sources of oxides of Nitrogen in the study area are identified.

- Emissions from field burning of coal
- Emissions from vehicular movements in the study area

Oxides of Nitrogen in the presence of sunlight will undergo reactions with several organic compounds to produce all the effects associated with photochemical smog. NO_x has the inherent ability to produce make deleterious effects by themselves, like toxicity. It causes asphyxiation when its concentration is significant enough to reduce the normal oxygen supply from the air.

The minimum and maximum levels of NO_x recorded within the study area were in the range of 5 µg/m^3 to 19 µg/m^3, with the 98th percentile range between 13.72 µg/m^3 to 18.62 µg/m^3. The 24-hourly average values of NO_x is 10.3 µg/m^3, which is within the permissible limit as per National Ambient AirQuality Standards (NAAQS) of 80µg/m^3, for NO_x in industrial, residential, rural and other area.

e) Carbon Monoxide (CO):

Carbon monoxide (CO) is an odorless, colorless gas formed by the incomplete combustion of fuels. Exposure to CO gas, results in displacement of oxygen in human bodies eventually leading to CO poisoning. The minimum and maximum levels of CO recorded within the study area were in the range of 1mg/m^3 to 2mg/m^3, with the 98th percentile <1.0mg/m^3. The hourly average values of CO is 1.15 mg/m^3, which is well within the permissible limit as per National Ambient AirQuality Standards (NAAQS) of 4µg/m^3, for CO in industrial, residential, rural and other area.

f) Free Silica (Si)

The minimum and maximum levels of free silica recorded within the study area were in the range of 3.1 µg/m^3 to 9.5 µg/m^3, with 98th percentile in the range of 8.82 to 9.31 µg/m^3. The hourly average value of free silica is 6.47 µg/m^3.

3.12 Conclusion of ambient air quality:

The analysis of ambient air quality data for three months consequently indicates quite well ambientair conditions at the site as well as around the site upstream as well as downstream. Particulate matter PM_{10} is within the limits prescribed. SO_2 and NO_2 are well below the limits prescribed. Hence the overall scenario of the study area for ambient air quality is good.

Figure 3-10: Ambient Air Sampling

3.13 Ambient Noise Environment:

A noise survey has been conducted in the study area covering residential transportation, commercial and calm zones. The main objective of noise monitoring in the study area is to establish the baseline noise level, which is needed for assessing the impact of total noise, which is expected to be generated in the proposed project activities. Noise is measured in terms of the loudness of the sound. A sound is a form of energy that propagates through an elastic medium at a speed that is determined by the properties of that medium. Since loudness of sound is important to the effects of noise on people, the dependence of loudness upon frequency must be taken into account in environmental noise assessments. Several methods have been developed by researchers using the frequency spectrum of sound to arrive at the loudness index or the given sound. For measuring the intensity of the sound, "A sound level meter" is used, which gives the intensity of sound in terms of dB (A).

The basic step associated with impact assessment on the noise components of the environment involves the identification and evaluation of the present noise status in the general population. Therefore, noise level measurement was carried out at each ambient air quality station and the site. The objectives of Noise environment studies are.

- To assess the ambient noise level in the study area.
- To characterise the noise pollution area
- To predict the temporal changes in the ambient noise level of the area.

Noise pollution in the study area is associated with Industrial activities, Vehicular traffic. To judge the ambient noise level of the area, noise levels were recorded at 4 locations in dB (A). The details of the location are given in Table 3-13. Monitoring results of the Noise level recorded at 4 locations are given in the table below.

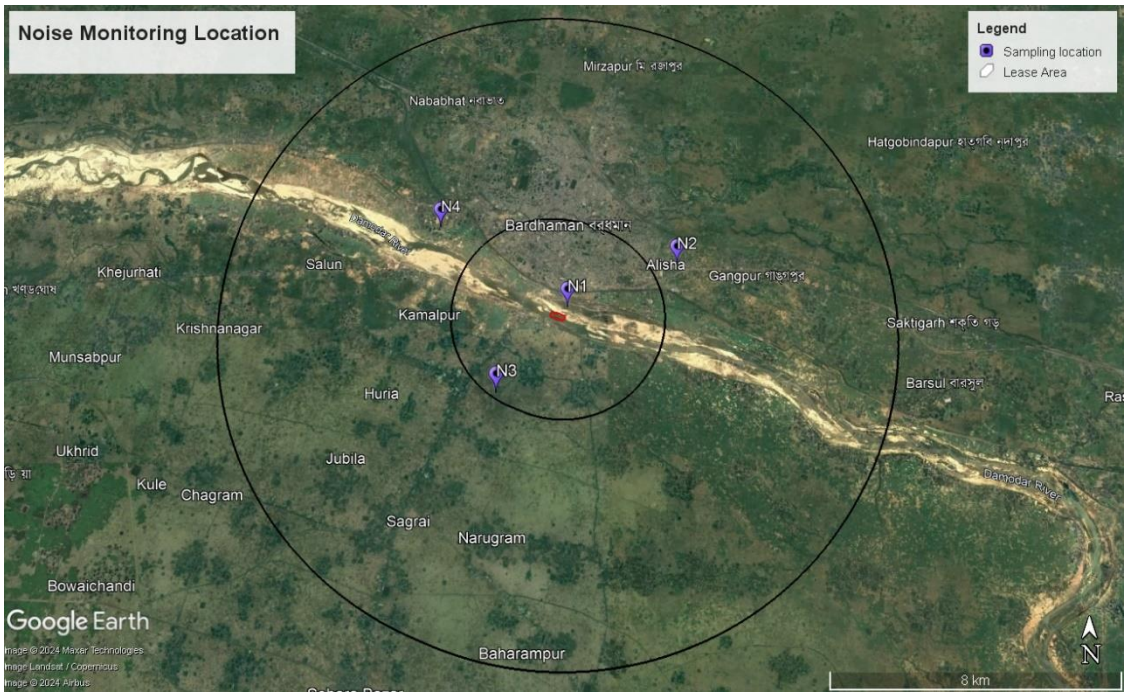


Figure 3-11: Ambient Noise Monitoring Locations

Figure 3-12: Ambient Noise Monitoring at site

Table 3-13: Monitoring results of the Noise level in and around project site.

Noise Level dB(A)Leq						
Location	**DAY TIME**			**NIGHT TIME**		
	Max	**Min**	**Average**	**Max**	**Min**	**Average**
Project site	54.1	40.7	47.86	44	40.4	42.41
Bamchandaipur	55	40.8	45.53	45.8	41.4	43.7
Machhkhara	54.1	42.3	47.51	49.8	42.3	45.13
Kanchan Nagar	50.4	41.8	44.54	46.7	41.8	43.2

Note:

1) Daytime is from 6.00 am to 10.00 pm and Night time is from 10.00 pm to 6.00 am.
2) Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicle hours, loud speakers and bursting of crackers are banned in these zones.

3.13.1 Conclusion of ambient noise level studies:

Noise monitoring reveals that the maximum & minimum noise levels at day time were recorded between as 55 dB(A) & 40.7 dB(A) respectively. The maximum & minimum noise levels at night time were found to be 49.8 dB(A) & 40.4 dB(A) respectively.

The noise level recorded at project site (Station N1) both during day and night time is well within the permissible limit as per "The Noise Pollution (Regulation & Control) Rules, 2000.

The noise level recorded at residential zones (Station N2 and N3) both during day and night time is well within the permissible limit for residential zone as per "The Noise Pollution (Regulation & Control) Rules, 2000.

The noise level recorded in vicinity of industrial zones (Station N4) both during day and night time is well within the permissible limit for industrial zone as per "The Noise Pollution (Regulation & Control) Rules, 2000.

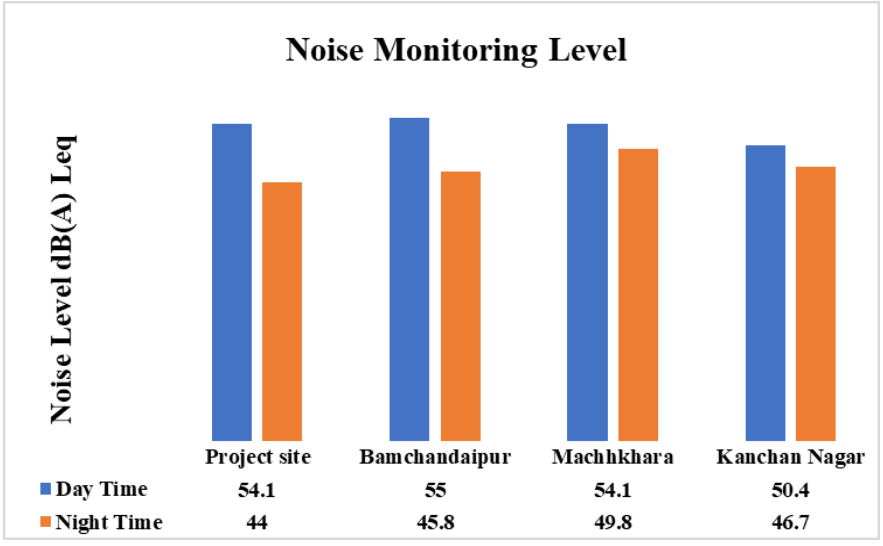


Figure 3-13: Bar Diagram showing day and night time noise level in the monitoring locations

3.14 Water Environment:

Surface water and groundwater samples were collected from different sources within the study area and some important physical and chemical parameters were considered for depicting the baseline status of the study area.

3.14.1 Water Quality Assessment:

Selected water quality parameters for water resource of the study area have been used for describing the water environment and assessing the impacts. About 3 Nos Sampling location areapresented in Table 3-16. ground water samples and 3 nos (Table 3-17). surface water samples werecollected in the study area to assess the water quality. Water samples are drawn from the hand pumps being used by the villagers for domestic needs.

To evaluate the physico-chemical characteristics of the water resources existing in the study area, water samples of ground water sources were collected during the pre-monsoon season and characterized for physico-chemical parameters. There samples were taken as grab sample and were analyzed for various parameters and compared with standards IS: 10500 and IS 2296: Class C specifications.

Table 3-14: GPS Coordinates of Ground water Sample collection location.

Sl. No.	Sampling Location	Coordinates		Distance from Project Site	Direction from Project Site
		Latitude	Longitude		
1.	Chhoto Kayrapur	23°11'15.07"N	87°51'56.60"E	1.97 km	South-East
2.	Pairakhana	23°14'16.36"N	87°51'28.67"E	3.60 km	North
3.	Katrapota	23°15'15.36"N	87°49'36.96"E	6.22 km	North-West

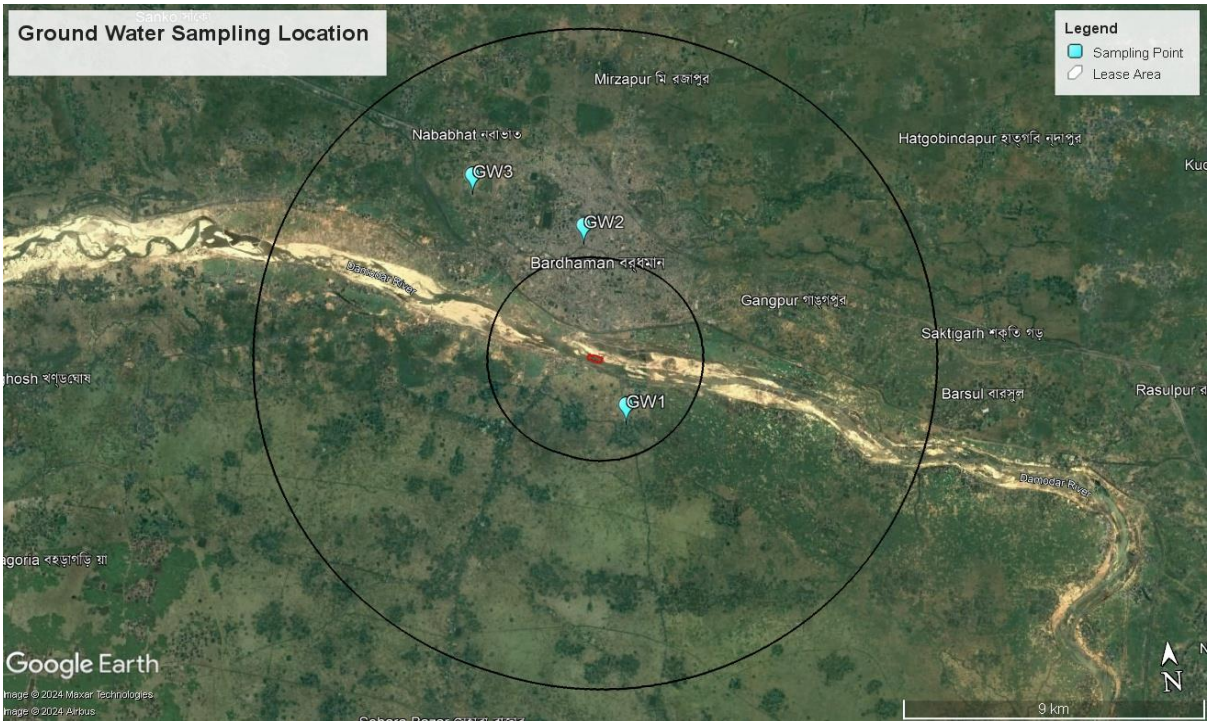


Figure 3-14: Groundwater Quality sampling locations

The physico-chemical characteristics of surface water samples presented in Table below.

Table 3-15: Analysis results of ground water

A. Microbiological Test Findings							
Sl.No	**Parameter**	**Test Method**	**Unit**	**Results**			**Norm as per IS 10500:2012**
				GW-1	**GW-2**	**GW-3**	
1.	Total Coliform/100 ml at 37° for 24 hrs	IS 1622	Cfu	<1 (DL:1)	<1 (DL:1)	<1 (DL:1)	Not Detectable
2.	E. coli/100ml at 44.5° for 24hrs	IS 1622	Cfu	Absent	Absent	Absent	Not Detectable

B. B. Organoleptic and physical parameters								
Sl.No	**Parameter**	**Test Method**	**Unit**	**Results**			**Norm as per IS 10500:2012**	
				GW-1	**GW-2**	**GW-3**	**Al (Max)**	**PL (Max)**
3.	pH at 25°C	APHA, 23rd Edition, 4500 H^+B	-	7.1	6.9	7.2	6.5-8.5	No relaxation
4.	Total Dissolved Solids	APHA, 23rd Edition,2540-C	mg/l	154	139	128	500	2000
C. General Parameters concerning substances undesirable								
5.	Chloride (as Cl)	APHA, 23rd Edition,4500, Cl-B	mg/l	19.5	19.8	19.7	250	1000
6.	Fluoride (as F)	APHA, 23rd Edition,4500, F-C	mg/l	<0.1 (DL:0.l)	<0.1 (DL:0.l)	<0.1(DL: 0.l)	1	1.5
7.	Iron (as Fe)	APHA, 23rd Edition,3500, Fe-B	mg/l	0.36	0.28	0.18	0.3	No relaxation
8.	Nitrate (as NO3)	APHA, 23rd Edition,4500, NO3-B	mg/l	1.23	2.18	2.94	45	No relaxation
9.	Sulphate (as SO4)	APHA, 23rd Edition,4500, SO4-B	mg/l	27.68	27.6	28.39	200	400

10.	Sulphide (as H2S)	APHA, 23rd Edition,4500, S2-B	mg/l	<0.05(DL:O.OS)	<0.05(DL:O.OS)	<0.05(DL:O.OS)	0.05	No relaxation
11.	Total Hardness (as CaCO3)	APHA, 23rd Edition, 2340 C	mg/l	89	76	69	200	600
12.	Arsenic (as As)	APHA, 23rd Edition,3113 B	mg/l	<0.002 (DL:0.002)	<0.002 (DL:0.002)	<0.002(DL:0.002)	0.01	0.05
13.	Chromium (as Cr)	APHA, 23rd Edition,3111 D	mg/l	<0.01 (DL:0.01)	<0.01 (DL:0.01)	<0.01 (DL:0.01)	0.05	No relaxation
14.	Total Suspended Solids	APHA, 23rd Edition, 2540 D	mg/l	16.5	18	12	100mg/l(max)	

Observation & Analysis of Ground Water Quality:

Groundwater samples collected from three locations within a 10 km radius of the proposed site showed all parameters well within the drinking water standards specified in IS 10500 and IS 2296:Class C. Therefore it can be concluded that, all sites of water are suitable for drinking purposes.

Figure 3-15: Ground Water Sampling

Table 3-16: GPS Coordinates of Surface water Sample collection location.

Sl. No.	Sampling Location	Coordinates		Distance from Project Site	Direction from Project Site
		Latitude	Longitude		
1.	Upstream Of the River (SW1)	23°12'39.87"N	87°50'59.71"E	0.85 km	West
2.	Downstream Of the River (SW2)	23°12'11.31"N	87°51'59.18"E	0.65 km	East
3.	Shyamlal Colony (SW3)	23°14'37.05"N	87°51'30.57"E	4.09 Km	North

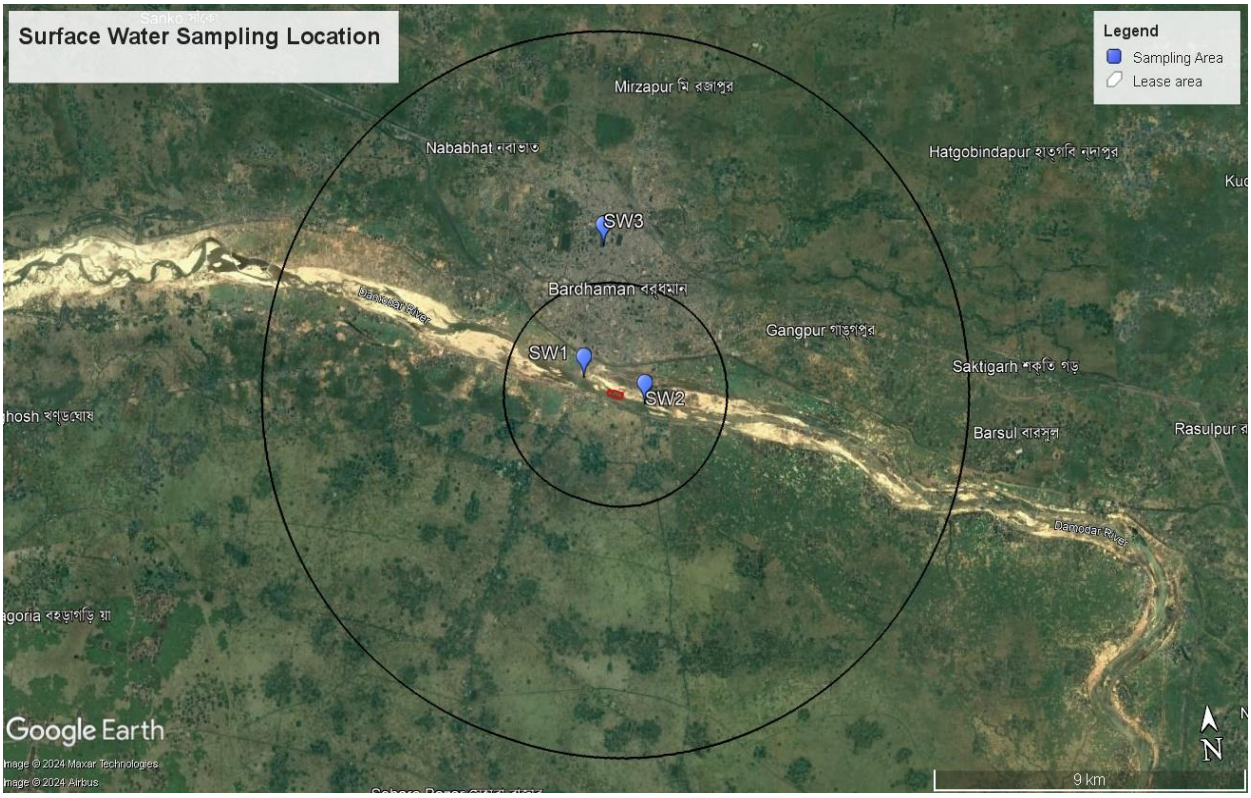


Figure 3-16: Surface water Quality Monitoring Locations

The physico-chemical characteristics of Surface water samples are presented in the Table below.

Table 3-17: Analysis results of surface water

C. Microbiological Test Findings								
Sl.No	**Parameter**	**Test Method**	**Unit**	**Results**			**Norm as per IS 10500:2012**	
				SW-1	**SW-2**	**SW-3**		
1.	Total Coliform/100 ml at 37° for 24 hrs	IS 1622	Cfu	<1(DL:1)	<1(DL:1)	<1(DL:1)	Not Detectable	
2.	E. coli/100ml at 44.5° for 24hrs	IS 1622	Cfu	Absent	Absent	Absent	Not Detectable	
D. B. Organoleptic and physical parameters								
Sl.No	**Parameter**	**Test Method**	**Unit**	**Results**			**Norm as per IS 10500:2012**	
				SW-1	**SW-2**	**SW-3**	**Al (Max)**	**PL (Max)**
3.	pH at 25°C	APHA, 23rd Edition, 4500 H^+B	-	**6.9**	**7.2**	**7.1**	6.5-8.5	No relaxation
4.	Total Dissolved Solids	APHA, 23rd Edition,2540-C	mg/l	**148**	**131**	**112**	500	2000
C. General Parameters concerning substances undesirable								
5.	Chloride (as Cl)	APHA, 23rd Edition,4500, Cl-B	mg/l	28.85	**34.88**	**26.53**	250	1000
6.	Fluoride (as F)	APHA, 23rd Edition,4500, F-C	mg/l	**<0.1 (DL:0.l)**	**<0.1 (DL:0.l)**	**<0.1 (DL:0.l)**	0.25	1.5
7.	Iron (as Fe)	APHA, 23rd Edition,3500, Fe-B	mg/l	**0.28**	**0.18**	**0.19**	0.3	No relaxation
8.	Nitrate (as NO3)	APHA, 23rd Edition,4500, NO3-B	mg/l	**0.92**	**1.82**	**2.34**	45	No relaxation
9.	Sulphate (as SO4)	APHA, 23rd Edition,4500, SO4-B	mg/l	**22.6**	**28.9**	**35.1**	200	400
10.	Sulphide (as	APHA, 23rd	mg/l	**<0.05**	**<0.05**	**<0.05**	0.05	No

	H2S)	Edition,4500, S2-B		**(DL:O.OS)**	**(DL:O.OS)**	**(DL:O.OS)**		relaxation
11.	Total Hardness (as CaCO3)	APHA, 23rd Edition, 2340 C	mg/l	**57**	**68**	**85**	200	600
12.	Arsenic (as As)	APHA, 23rd Edition,3113 B	mg/l	**<0.002 (DL:0.002)**	**<0.002 (DL:0.002)**	**<0.002 (DL:0.002)**	0.01	0.05
13.	Chromium (as Cr)	APHA, 23rd Edition,3111 D	mg/l	**<0.01 (DL:0.01)**	**<0.01 (DL:0.01)**	**<0.01 (DL:0.01)**	0.05	No relaxation
14.	Total Suspended Solids	APHA, 23rd Edition, 2540 D	mg/l	**19**	**21**	**19**	100mg/l(max)	
15.	Biochemical Oxygen Demand at 27°C for 3 days	IS 3025 (Part- 44) 1993	mg/l	**3.6**	**5.1**	**4.6**	30 mg/l(max)	
16.	Chemical Oxygen Demand	APHA, 23rd Edition,5220 B	mg/l	**17**	**35**	**31**	250 mg/l(max)	

3.15 Observation & Analysis of Surface Water Quality:

Surface water samples collected from three locations within 10 km radius of the proposed site showed all parameters analyzed are well within the drinking water standards specified by CPCB

Figure 3-17: Surface Water Sampling.

3.16 Biological Environment:

Biological environment is an essential component that constitutes the total environment of the study area. The study area has a diverse ecological structure and therefore needs a thorough study of all its components.

EIA is essentially a planning tool for preventing environmental problems due to change of any landscape. As per EIA notification, 2006 the study area for biological environment is taken within 5km radius of Sand Mine (MIN_EBUR_25), P.S.- Bardhhaman in Purba Bardhaman district, West Bengal. Study on biological environment has three components in it.

a. Existing species diversity and ecological structure of the study area,

b. Possible impacts of mining on biological environment, and

c. Mitigation measures.

3.17 Existing species diversity and ecological structure of the study area

MIN_EBUR_25 proposed sand mine lease area being 6.65 hectare on the river Damodar River of Purba Bardhaman district, falling under Mouza- Becharhat, Plot No.- 1632(P), 1620(P) & 1560(P), J.L. No.- 79, Block- Bardhhaman II of Purba Bardhaman district of West Bengal.

A. Methodology for the Study

Ecological study was done collecting baseline data to understand the present status of ecological settings of the area. This data also helped us in designing the pollution mitigation plan biologically in such a way that the harmful impacts of the proposed sand West Bengal mine on the vegetation and fauna are avoided or minimised. Different types of habitats with varied vegetation covers are encountered in different ecological condition of the study area. This area is having agricultural lands with very dense human habitation, two reserved forests with some remnants of natural forest, plantation of various exotic species, waterbodies, and degraded lands etc. Random quadrats were laid to study the floral components in the study area in the following manner. The quadrat sizes laid were as follows –

(a) 10m x 10m in agricultural lands

(b) 10m X 10m in the plantation areas

Aquatic flora was studied in line transacts along the aquatic bodies to study aquatic flora Each studied location for vegetation study was marked with a GPS (etrax 10) and coordinates (latitude and longitude) were noted with site characteristics.

B. Present Land-use pattern of the study area

The land use pattern of this vast landscape has been framed from the Satellite Imagery and Toposheet and duly authenticated. Ground truth was also done in different location marking it with GPS coordinates. The land use / land cover pattern of the study area may be classified into following categories: (i) Crop Land (ii) Open areas without scrubs (iii) Settlements and (iv)Water bodies.

The study area is mostly covered with rainfed crops and is under paddy cultivation. A small area is irrigated by ground water for Boro paddy cultivation. A good amount area is also used for cultivation of vegetables etc. The species of herbs, shrubs and trees found in the sampled plots of study area are depicted in the table below.

Table 3-18: List of Tree Species found within 5 km radius of the mining lease area.

Sl. No.	Scientific Name	Local name	Family
1.	*Citrus maxima*	Batabilebo	Rutaceae
2.	*Dalbergia sisso*	Sisso	Fabaceae
3.	*Azadirachta indica*	Neem	Meliaceae
13	*Mangifera indica*	Mango	Anarcardiaceae

11	*Ficus bengalensis*	Banyan	Moraceae
6.	*Artocarpus heterophyllus*	Kathal	Moraceae
7.	*Alstoniascholaris*	Chatim	Apocynaceae
8.	*Anthocephalus chinensis*	Kadam	Rubiaceae
9.	*Aegle marmelos*	Bel	Rutaceae

Table 3-19: List of Shrub Species found within 5 km radius of the mining lease area.

Sl. No.	Scientific Name	Local Name	Family
1.	*Dioscorea bulbifera*	Khamalu	Dioscoreaceae
2.	*Dioscorea floribunda*	Panalu	Dioscoreaceae
3.	*Tephrosia purpurea*		Papilionaceae
4.	*Vitex negundo*	Began	Vitaceae
5.	*Hibiscus rosa-sinensis*	Joba	Malvaceae
6.	*Clerodendron infortunatum*	Ghentu	Verbenaceae
7.	*Croton bonplandianum*	Chuchhuri	Euphorbiaceae

Table 3-20: List of herb species found within 5 km radius of the mining lease area.

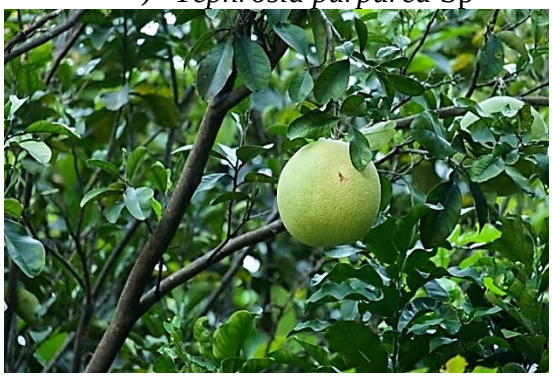
Sl. No.	Scientific Name	Family
1.	*Cyperus iria*	Cyperaceous
2.	*Cyperus kyllinga*	Cyperaceae
3.	*Cyperus rotundus*	Cyperaceae
4.	*Dactylocteniumaegypticum*	Poaceae
5.	*Desmodiumtriflorum*	Papilionaceae
6.	*Desmodiumvolubilis*	Papilionaceae0
7.	*Digitariasanguinales*	Poaceae
8.	*Eclipta alba*	Asteraceae
9.	*Eragrostistenella*	Poaceae
10.	*Euphorbia hirta*	Euphorbiaceae
11.	*Euphorbia microphylla*	Euphorbiaceae
12.	*Evolvulusalsenoides*	Convolvulaceae
13.	*Evolvulusnummularius*	Convolvulaceae
14.	*Fimbristylis japonicum*	Cyperaceae

a) *Croton bonplandianum* Sp

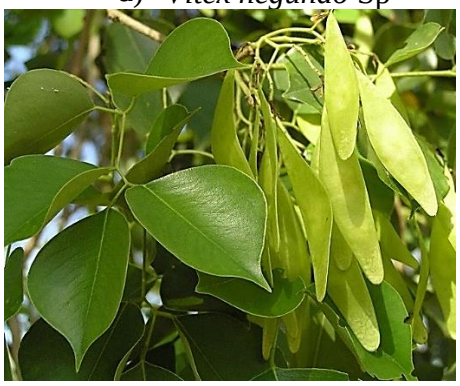
b) *Hibiscus rosa-sinensis* Sp

c) *Tephrosia purpurea* Sp

d) *Vitex negundo* Sp



e) *Citrus maxima* (Batabilebo)



f) *Dalbergia sisso* (Sisso)

g) *Ficus bengalensis* (Banyan)

h) *Azadirachta indica* (Neem)

Figure 3-18: Ecology and Biodiversity study around the project site

Aquatic flora (Both Angiosperms and Pteridophytes)

1. *Azolla pinnata (Salviniaceae)*
2. *Cynodon dactylon (Poaceae)*
3. *Digitaria longiflora (Poaceae)*
4. *Eclipta alba (Asteraceae)*
5. *Hydrodictyon reticulatum (Hydrodictyaceae),*

Table 3-21: List of Faunal Species Found within 5 km radius of the mining lease area.

Phylum: Annelida		
SL.No	**Local Name**	**Scientific Name**
1	Kecho	*Pheretimaposthuma*

Phylum: Arthropoda		
1	Prajapati	*Papilio*sp
2	Moth	*Galleria* sp
3	Moumachi	*Apis*sp
4	Jonaki	*Lampyrisnoctiluca*
5	Arsola	*Periplanetaamericana*
6	Vimrul	*Vespa orientalis*
7	Lalpipra	*Oecophyllasmaragdina*
8	Kakrabicha	*Buthus*sp
9	Tetulbicha	*Scolopendra*sp
Phylum: Mollusca		
1	Sthalsamuk	*Acatinafulica*
2	Jalsamuk	*Pilaglobosa*
3	Gugli	*Bellamyabengalensis*
Fresh water fishes		
1	Mrigelmach	*Cirrhinusmrigala*
2	Bata mach	*Labeobata*
3	Kalbose	*Labeocalbasu*
4	Silver carp	*Hypophthalmichthysmolitrix*
5	Grass carp	*Ctenopharyngodonidella*
6	Cyprinuscarpio	*Cyprinuscarpio*
7	Chang mach	*Channagachua*
8	Sholmach	*Channastriata*
9	Koi mach	*Anabasatestudineus*
10	Phaloimach	*Notopterusnotopterus*
11	Tilapia	*Oreochromismossambicus*
12	Pabdamach	*Ompokpabda*
13	Phutimach	*Puntiusticto*
Class: Amphibia		
1	Kuno bang	*Duttaphrynusmelanostictus*
Class: Reptilia		
1	Loudaga	*Ahaetullanasutas*
2	Jaldhora	*Xenochriphispiscator*
3	Matiali sap	*Elachistodonwestermanni*
4	Jamna sap	*Ptyasmucosus*
Class: Aves		
1	Charaipakhi	*Passer domesticus*
2	Tuntuni	*Orthotomus*sp
3	Satbhaya	*Turdoideseaudatus*
4	Doyel	*Copsychussaularis*
5	Bulbul	*Pycnonotus*sp
6	Kak	*Corvussplendens*
7	Shalik	*Acridotherestristris*
8	Phinge	*Dicrurousadsimilis*
9	Kajalpakhi	*Laniuscristatus*
10	Kat thokra	*Dinopiumbenga*
Class: Mammalia		
1	Katbirali	*Funambuluspennantii*
2	Neul	*Herpestesedwardsii*
3	Mechobiral	*Prionailurusviverrinus*

4	Katas	*Felischaus*
5	Khaksial	*Vulpesbengalensis*
6	Honuman	*Semnopithecus entellus*

3.18 Socio Economic Environment:

Socio – Economic has been recognized as an important component of environment. It focuses primarily on the social and economic effects that are likely to occur as a result of the construction and operation of the proposed mining activities in the area. It includes various factors, viz. demographic structure, availability of basic amenities such as housing, education, health and medical services, occupation, water supply, sanitation, communication and power supply, prevailing diseases in the region as well as features such as places of tourist attraction and monuments of archaeological importance. The study of these parameters helps in identifying predicting and evaluating the likely impacts due to project.

3.19 Objectives:

Objectives of Socioeconomic study as follows:

- To study the demographic structure and facilities available in the study area.
- To identify and assess the impact on socio-economic status of the study area.
- To identify all potential significant adverse and beneficial social impacts of the Project.
- To recommend the mitigation measures to reduce the adverse impact of the project.
- To verify compliance with the environmental regulations and industry's standards.
- To recommend cost effective measures to be implemented to mitigate the expected impact.

3.20 Data Collection:

Primary Data Collection: Primary data means original data that has been collected specially for the purpose. The data collected from the field under the control and supervision of an investigator. This type of data is generally afresh and collected for the first time. It is useful for current studies as well as for future studies. While collecting primary data collection in study area following methods are uses.

1. Observation Method
2. Focussed group discussion (FGD)
3. Surveys and questionnaires

Secondary Data Collection: Secondary data is usually the "Data gathered and recorded by someone else prior to and for a purpose other than the current project". Secondary data are collected from different offices or Govt. websites like Census offices (India Census 2011), Statistical department, Health offices, Land and Revenue department, Zilla Parishad and Non-Governmental org

Baseline data for the socio-economic and cultural environment plays an important role in conducting EIA studies. Any development activity will bring about changes to socio-economic pattern. Data on

the demographic pattern, population characteristics, employment, land usepattern, transport and recreation facilities were collected from Revenue offices and other Govt, agencies. Test check survey was also conducted in some of the villages. All the above said environmental parameters will be used for identification, prediction and evaluation of significant impacts. The Socio-Economic details of the study area are gathered through:

- Identification of villages falling from the study area map.
- Collection of the demographic pattern of villages falling in the area through 2011 censusdata.
- Occupational structure of villages falling in the study area through NIC 2011 census data.
- Details of the amenities available in villages falling in the study area through NIC 2011census data.

It is situated in Purba Bardhaman division is district of West Bengal with administrative headquarter located at Bardhaman city. As per the 2011 Census of India data, recast after bifurcation of Bardhaman district in 2017, Purba Bardhaman district had a total population of 4,835,532. There were 2,469,310 (51%) males and 2,366,222 (49%) females. Population below 6 years was 509,855. As per the 2011 census data, recast after bifurcation of Bardhaman district in 2017, the total number of literates in Purba Bardhaman district was 3,232,452 (74.73% of the population over 6 years) out of which males numbered 1,781,090 (80.60% of the male population over 6 years) and females numbered 1,453,362 (68.66% of the female population over 6 years). As per the 2011 census data, recast after bifurcation of Purba Bardhaman district, Hindus numbered 3,566,068 and formed 73.75% of the population in Purba Bardhaman district. Muslims numbered 1,251,737 and formed 25.14% of the population. Others numbered 21,331 and formed 0.44% of the population. Scheduled Castes and Scheduled Tribes made up 1,487,151 and 327,501 which is 30.75% and 6.77% of the population respectively. According to the 2011 census, 92.86% of the population in what is now Purba Bardhaman district spoke Bengali, 5.03% Santali and 1.66% Hindi as their first language.

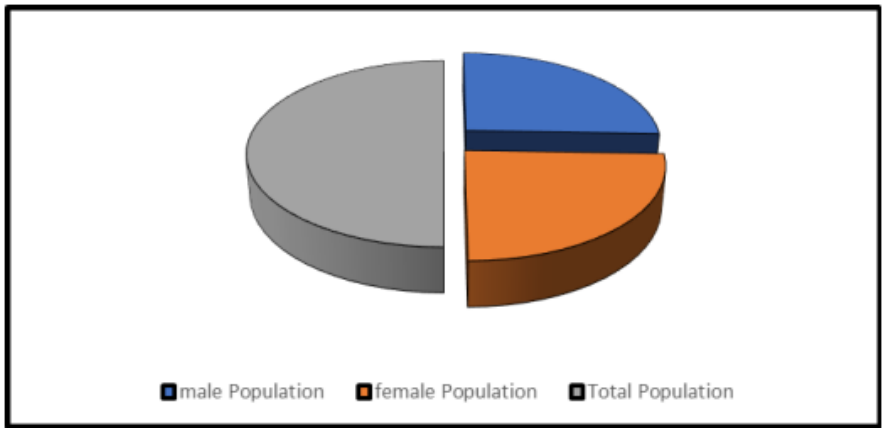


Figure 3-19: Pie Diagram showing distribution of male and female population of the district

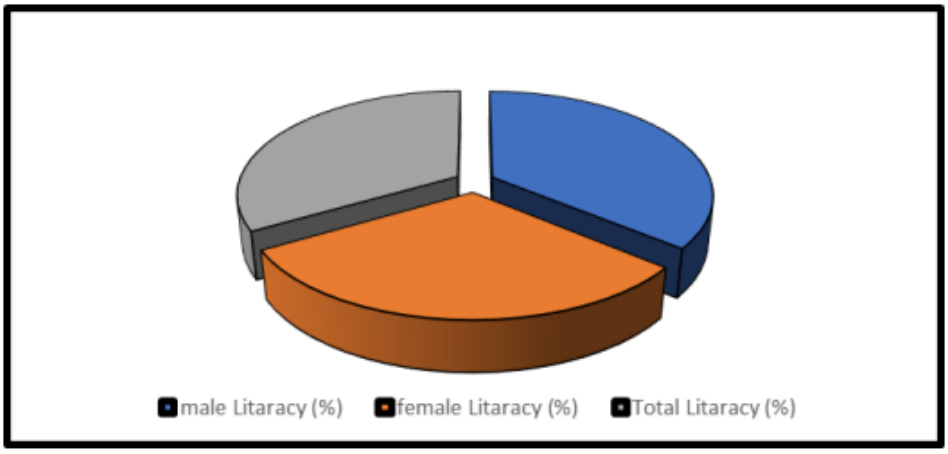


Figure 3-20: Pie Diagram showing distribution of male and female literacy rate of the district

Vivekananda Mahavidyalaya

Belsore Primary School

Figure 3-21: School near the project site

Socio-economic survey has been conducted at 2 nos. of school near the project site. **Vivekananda Mahavidyalaya** is located at an aerial distance of 1.89 km North of the project site. **Belsore Primary School** is located at an aerial distance of 2.46 km, North of the project site.

Kisholoy Childrens' Hospital

Bardhhaman Medical College

Figure 3-22: Hospitals and health centre near the project site

Socioeconomic survey has been conducted at **Kisholoy Childrens' Hospital** located at an aerial distance of 2.94 km North-East of the project site and **Bardhhaman Medical College** located at an aerial distance of 4.66 km, North of the project site.

Table 3-22: Nearest Communication & Infrastructure from the project site

Sl No.	Amenities	Description	Distance from Project site	Direction from the project site
1.	Airport	Durgapur Airport	90 km	North-West
2.	Railway	Bardhhaman Junction railway station	4.25 km	North-North-East
3.	Bus stand	Sadarghat bus stand	1.15 km	North-West
4.	Police station	Kanainatshal Police Line	2.67 km	North-East
5.	Fire Station	Bardhhaman Fire Station	5.37 km	North
6.	Hospital	Kisholoy Childrens' Hospital Bardhhaman Medical College	2.94 Km 4.66 km	North-East North
7.	Post-Office	Sadarghat Post Office	1.28 km	North-West
8.	College	Vivekananda Mahavidyalaya	1.89 km	North
9.	Roads	National highway-19	1.30 km	North
10.	Infrastructure	Krishsk Setu	0.95 km	West

CHAPTER – 4

4.1. Anticipated Environmental Impacts and Mitigation Measures:

Any human activity in any environment produces impact, modifying it to a status which is considered adverse or beneficial according to the damage or improvement it brings about in the physical, biological and socio-economic status of the baseline environment. Depending on the nature of activities and existing status, the impacts are assessed for their importance. On the basisof the impact analysis, the mitigating action and future monitoring requirements are focused on the Environmental Management Plan for countering or minimizing adverse impacts. The magnitude and significance of the environmental pollution caused by mining depend on the method of mining, scale and concentration of mining activity.

The following parameters are of significance in the EIA and are being discussed in detail:

- Land Environment.
- Water Environment.
- Air Environment.
- Noise Environment.
- Biological Environment.
- Socio-Economic Environment.

4.2. Land Environment:

River mining does not involve generation of any overburden/ waste. Thus, no waste dump sites are needed for the proposed activity. The main aspects likely to feature on the land environment are excavation, loading and transportation activities which will not pose any impact to the surrounding land environment.

- **On Agriculture Field**:

Since dry sand mining will be carried out in the riverbed, no impacts onsurrounding agricultural lands are envisaged.

Table 4-1: Anticipated Impacts on Land Environment

Anticipated Impacts	**Mitigation measures**
Obstruction in river flow/ course. ➢ Erosion of channel bed and banks. ➢ Increased in Channel Slope ➢ Change in channel morphology. ➢ Impact on stream's physicalcharacteristics such as channelgeometry, bed elevation in stream roughness of the bed, flowvelocity, discharge capacity,sediment transportation	Mining of minerals will be started from so that water flow / course will not be obstructed. The slicing of the mineral will be done at 2.7 m. ➢ Mining is to be done leaving safety barrier 7.5 m or offset on both sides and maximum barrier should be on concave side of river preferably the flow channel (excavation void created) should be kept straight so asto help avoid erosion as side cutting or

capacity etc. ➢ Impact on ecological equilibrium of riverine regime.	collapsing. ➢ Safety zone or buffer area will be created from the riverbanks to minimize the instability & erosion and to increase the stability of structures. These safety zones will not be mined out. ➢ Quantities will be strictly limited so that sand accumulation rates are sufficient to avoid extended impacts on channel morphology. ➢ Mining will be carried out as perapproved Mine Plan in scientific andsystematic way. ➢ Sand mining will be restricted down to 2.7 m depth or the groundwater level whichever less is. Therefore, the mining will not intersect the ground water table. ➢ Loss of habitat is minimized because the riverbed mining will be carried only in dry bed which will not disturb the riverine ecosystem. ➢ The mine working will remain confined to riverbed only and in no case, mining will disturb any surfacearea outside the riverbed which mayaffect topography or drainage. ➢ The mining from riverbed will not have impact on natural drainage of surrounding areas as the excavated sand from riverbed is filled with firstheavy flow in river during monsoon season.

4.3. Water Environment:

Planned sand mining: To address the issue of loss of aquatic species, it is suggested that sand mining may be done in different streams so that the water stream on another side of the river is allowed to flow in its natural course.

Table 4-2: Anticipated Impacts on Water Environment

Anticipated Impacts	**Mitigation measures**
River water flow pattern might be changed due to riverbed mining. Mining activities will increase riverbed depth, which may result in increase of flow velocity.	➢ No diversion is proposed. There will not be any adverse impact on flow pattern, surface hydrology andground water regime. ➢ Mining activities will be restricted to 2.7 m depth, which will not causemuch change in the flow pattern of the river. ➢ An offset of 7.5 m will be left from both sides of river, which will minimize the chances of bank failure

Change in surface water quality and ground water quality.	➢ There will be no change in surface water quality other than monsoon season as the river channel remains almost dry during the rest period of time. ➢ Ground water quality will not be affected due to mining activities as itis restricted to 2.7 m depth and the mining will not be allowed below thewater table. ➢ Regular monitoring of water samples will be done as precautionary measures
Impact on ground water recharge potential as the thickness of the natural filter materials (sediments) is reduce causing lessinfiltration	➢ Mining will be done as per approved Mine Plan and applicable Rules and Regulation, so that there is no damage on ground water recharge potential due to sand mining.
Wastewater discharge	Portable Bio-toilets will be used; hence no sewage / liquid effluent will be generated and ground or surface water contaminationis also not expected due to percolation.

4.4. Air Environment:

Anticipated Impacts on Air Environment:

- The major source of air pollution from the proposed mining project is dust generation dueto extraction, loading and haulage of sand and wind driven erosion of exposed material.
- Exhaust emissions from vehicles and equipment deployed during the operation phase are also likely to increase the levels of SO_2, NOx, PM, CO and un-burnt hydrocarbons.
- The dust generation will affect the health of the workers as well as the nearby habitation/local population.

Table 4-3: Anticipated Impacts on Air Environment.

Anticipated Impacts	Mitigation measures
➢ Dust from excavation and mining. ➢ Loading, unloading andscreening. Vehicular movement on the haul roads	➢ Water sprinkling will be done on thehaul roads twice in a day. ➢ Plantation will be carried out on approach roads. ➢ Planning transportation routes of mined material so as to reach thenearest paved roads by shortest route. (minimize transportation overunpaved road); ➢ Dust mask provided to the workers engaged at dust generation points like excavations loading and unloading points. ➢ Speed limit will be enforced to reduce airborne fugitive dust from vehicular traffic.

	➢ Deploying PUC certified vehicles to reduce their noise emission. ➢ Spillage from the trucks will be prevented by covering tarpaulin over the trucks.

The Biological mitigation of air pollution can be done by plantation of indigenous species. In this case, on the eastern bank of the river Ajay there is a vast stretch of plain land which is notbeing used for any other purpose. It is, therefore, suggested that the project proponent should takeup plantation activity, in consecutive years, as per the suggestion given below. No exotic and quick growing species will be planted as quick-growing species may invite invasive plant species which exist in the forest fringe area of the locality other than the indigenous ones. Plantation of indigenous species may invite associate speciesof the region like grasses, herbs and shrubs to grow out of their own. A species-mix plantation is also suggested for maintaining high species diversity of the area.

4.5. Noise Environment:

Since the mining operations are non-mechanized, there will not be any noise and vibrations related impacts. However, only noise-generating activities are due to truck movement carrying sand fromthe mining lease area. The noise sources shall not generate sound levels above 90 dB (A). With the resultant value being less than the ambient noise levels, there is no likelihood of excess additionof noise from the mine operation to the surrounding background noise level. As derived above anddue to the fact that there are no human settlements within 200m, no impact of noise on habitation is likely. The same is brought out by the noise measurements, which indicate that the noise levels inthe vicinity are within limits.

Table 4-4: Anticipated Impacts on Noise Environment.

Anticipated Impacts	**Mitigation measures**
➢ Noise Impact due to mining activities. due to vehicular ➢ Noise impact movement ➢ Auditory Impact	➢ The noise levels from all these sources are periodical and restricted to particular operation. ➢ The noise measurement data indicated that present noise levels inthe study area is well within the permissible limits of National Ambient Noise Quality Standards. ➢ Periodical monitoring of noise will be done. ➢ No other equipment except the transportation vehicles will be allowed. Noise generated by this equipment will be intermittent in nature and will not cause much adverse impact. ➢ Proper maintenance of all equipment/

	machines will be carriedout which help in reducing noise during operations. ➢ Plantation will be taken up along the approach roads and vicinity of river bank which will minimize propagation of noise and also arrest dust by acting as barrier on the pathway between source and receptor. ➢ Ear muffs will be provided whileworking with mining equipment. Regular health check-up facility for labours will be conducted for avoiding any kind of health implications arising due to noise related activities.

4.6. Biological Environment:

There will be no major adverse impact of the mining activity on the biological environment. Minor impacts of sand mining activity on the physical environment will mostly be confined to air pollution due to the excavation and transport of the products. Some impacts may be caused due tothe increased load of air-borne particulate matter. The source of suspended particulate matter (SPM) ofdifferent sizes will be mostly the stacks of sand. Trucks carrying sand may also add to SPM in the air due to vehicular pollution.

Another negative impact that can affect the aquatic species composition of Damodar River, particularly in the area from where sand will be mined, is the decline in species richness of both aquatic fauna and flora. The dependence of some people on fishing may be affected to some extent due to mining. During mining operations, aquatic flora may be eliminated locally.

As aquatic fauna like fish etc., is primarily dependent on aquatic flora, there will likely be a negative impact on fish availability in this particular locality. As per the Approved mining plan,the project activity is only done on the identified sand deposited area. There are no diversion and excavation activities done in the river water flowing channel. Therefore, above mentioned impact will be negligible by the current project. Noise pollution will have a harmful impact on the wild fauna, provided sand transport is allowed during the night. But in this case, heavy mining equipment and explosives will not be used. Moreover, human habitation and forest are far from the place of mining. This impact will beminimal and will not need any mitigation measure. It is suggested that transport in heavy vehicles during the night should be avoided. To address the possible adverse impacts on the biological environment due to the mining of sand, the some mitigation measures are suggested. Ecological management of possible pollution can be done at the source. The northern bank of the river adjacent to the project site has an openbarren land where afforestation for mitigating air and noise pollution will be done.

4.7. Socio -Economic Environment:

Table 4-5: Anticipated Impacts on Socio-economic Environment.

Aspect	Anticipated Impacts	Mitigation measures
Habitation	No loss of Habitation	➢ The nearest habitation is beyond 0.65 Km. ➢ All necessary measures are being adopted to avoid disturbance in livelihood to Locality.
Employment	➢ Direct employment to 4 persons. ➢ Indirect employment to about 90 persons. ➢ Improved incomeexpenditure. ➢ Improved microinvestments - savingspatterns	➢ Local people will be employed. ➢ Training will be provided to non-workers and unskilled workers. ➢ Awareness program to motivate people for savingsand investment.
Health Implications	➢ No health-related problems were reported during the primary survey. ➢ No significant health implications likely to arise to the workers due to mining activities.	➢ Regular health camps will be organized for the local people. ➢ Adequate number of medical facilities are situated in the area.
Health impacts on mental, physical, and social well-being.	The proposed project will not impact the mental, physical and social well-being.It will improve the well-being of the people in and around the surrounding area.	➢ Expectations in fair pay, employee care, social responsibility commitments etc. will be timely met. Grievance redressal mechanism will be made to overview and manage complaints arising from the study area.
Loss / gain of selfesteem	A rise in self-esteem due to increase rate of economic growth in the region. Higher degree of self-satisfaction and contentment	➢ Immigration in search of employment will be controlled.
Loss/ gain of culture and religion	The proposed project will follow universal respect for,and observance and protection of, human rights andfundamental freedoms for all	➢ The proposed project will promote neither selective,nor relative, but universal respect through contribution in various festivities, equal observance and protection among employees and societies at large in all CSR activities.

The proposed project is a riverbed sand mine and is providing to their employees all basic facilities.	The mine will promote girl child education, women empowerment, scholarship to encourage the students and will provide donation to build toilet for sanitation facility. Community development will be designed and programmed by engaging with the Panchayats and local authorities.	➢ The mine will give a boost to local population. Monetary gains, education, health, sanitation, waterconservation, plantation and improvement in general environment will lead to positive growth.

4.8. Corporate Environment Responsibility:

Table 4-6: Anticipated Impacts on Corporate Environment Responsibility.

Aspect	Anticipated Impacts	Mitigation measures
The proposed riverbed sand mine project will be providing all basic facilities to their employees	➢ The mine will promote girl child education, women empowerment, scholarship to encourage the students andwill provide donation to build toilet for sanitation purpose. ➢ Community development will be designed and programmed by engaging with the Panchayats and local authorities.	➢ The mine will give boost to local population. Monetary gains, education, health, sanitation, water conservation, plantation and improvement in generalenvironment will lead to positive growth.

4.9. Green Belt Development Plan:

Avenue plantation shall be done of suitable indigenous species during the planning period in open and free government land with permission from the competent Authority. Plantation will also be undertaken along the approach road during the plan period. Suggested species to be planted are listed in Plantation Programme section 10.10.

4.10 Traffic Analysis

4.10.1 Transportation Route:

The minerals excavated will be loaded directly into trucks and transported to the concerned market. The transportation route is shown in the map as given below:

Map Showing Transportation Route

Traffic analysis is carried out by understanding the existing carrying capacity of the roads near to the project site and the connecting main roads in the area. Then depending on the capacity of the mine site, the number of trucks that will be added to the present scenario will be compared to the carrying capacity. Traffic density measurement were made continuously for 24 hours by visual observation and counting of vehicles under five categories, viz., heavy Commercial Vehicles, light Commercial vehicles, cars, two Wheeler and three Wheeler. As the mining site is well connected to the National Highway-19 via State highway-116A. For that, two skilled person were deployed near the NH-19 for a day on dated. Total numbers of vehicles per hour has been calculated. The results of measurements are given in the.

Table 4-7 : Existing Traffic Scenario & LOS

Sl.No	Vehicles Distribution	Number of Vehicles Distribution/Hour	Passenger Car Unit (PCU)	Total Number of Vehicles (PCU)/Day
1.	Heavy Commercial Vehicles	6325	2.2	13915
2.	Light Commercial Vehicles	8546	1.4	11964.4
3.	Cars	6989	1	6989
4.	Two-Wheeler	4025	0.5	2012.5
5.	Three-Wheeler	2545	1.2	3054
Total		28430		28430/24=1184.58 PCU/hour

Table 4-8. Existing Traffic Scenario & LOS

Sl.No	ROAD	V (Volume in PCU/hr)	C (Capacity in PCU/hr)	Existing V/C Ratio	LOS
1	NH-19	1184.58	3600	0.33	B

The existing Level of Service (LOS) is ''B'' i.e., very good.

V= Volume of Vehicles in PCU's/Hour & C= Capacity of Road in PCU's/Hour

Table 4-9 Capacity as per IRC: 64-1990

V/C	LOS	Performance
0.0-0.2	A	Excellent
0.2-0.4	B	Very Good
0.4-0.6	C	Good/Average/Fair
0.6-0.8	D	Poor
0.8-1.0	E	Very Poor

Table 4-10 Modified Traffic Scenario & LOS

Sl.No	ROAD	Increased PCUS/State Highway	V (Volume in PCU/hr)	C (Capacity in PCU/hr)	Existing V/C Ratio	LOS
1	NH-19	24	1184.58+24 = 1208.58	3600	0.34	B

4.10.2 Results

From the above analysis it can be seen that the Transportation load on NH-19 will increase and the LOS will remain same after start of mining operation also, hence, there will be little change on the proposed evacuation roads due to additional traffic. However, Traffic management has been proposed as given below.

4.10.3 Traffic Management

• Roads will be repaired regularly and maintained in good conditions.

• Haul roads will be sprinkled with water to keep the dust suppressed.

• A supervisor will be appointed to regulate the traffic movement near the site.

• Speed breakers will be constructed near accident prone areas to calm the traffic and its speed.

• Signage will be erected at the sensitive & precarious places to caution or provide information to road users.

CHAPTER – 5

5.1. Analysis of Alternatives (Technology & Site):

5.1.1. Analysis of Alternative Site:

No alternative sites have been analyzed, since the project is site specific, and sand is available in the proposed site.

5.1.2. Analysis of Alternatives Technology:

The mine will be operated by an opencast manual method of mining. No other alternative technologies can be used because of the nature and occurrence of the deposit, cost of operation and PMV, capacity of the mine and specification laid by the consumer industry. Project Proponentof the proposed mine is using eco-friendly measures to minimize the impact of mining on the surrounding environment.

CHAPTER – 6

6.1. ENVIRONMENTAL MANAGEMENT PROGRAM

6.1.1. Introduction

Regular monitoring of the various environmental parameters is necessary to evaluate the effectiveness of the management programmed so that the necessary corrective measures can be taken in case there are some drawbacks in the proposed programmed. Since environmental quality parameters at work zone and surrounding area are important for maintaining sound operating practices of the project in conformity with environmental regulations, the post project monitoring work forms part of Environmental Monitoring Program.

6.2. Environmental Monitoring and Reporting Procedure:

Post Monitoring of various environmental parameters will be carried out on regular basis to ascertain the following:

- Status of Pollution within the mine site and in its vicinity.
- Generate data for predictive or corrective purpose in respect of pollution.
- Examine the efficiency of pollution control system adopted at site.
- To assess environmental impacts.

Monitoring will be carried out at site as per the norms of CPCB. Environmental Monitoring Programme will be conducted for various environmental components as per conditions stipulatedin Environmental Clearance Letter issued by MoEF&CC and consent to operate issued by SPCB.Six monthly compliance reports will be submitted to MoEF&CC, the regional office on 1st of June and 1st of December. Quarterly compliance Report for conditions stipulated in Consent to Operatewill be submitted to SPCB on regular basis.

6.3. Environmental Management Cell:

In order to maintain the environmental quality within the stipulated standard, regular monitoring of various environmental components is necessary which will complied as per condition for this an Environmental Management team be constituted.

The core responsibilities of the Environmental Monitoring Cell will be:

- The organization and interpretation of the environmental monitoring data to establisha record of change associated with the implementation of a project or the operation ofan organization.
- The process of verification that all or selected parameters measured by EnvironmentalMonitoring Program are in compliance with regulatory requirements, internal policiesand standards, and established environmental quality performance limits.
- The assessment of the effectiveness of the environmental management system, practices and

procedures.

- The environmental monitoring and audit work will be carried out by qualified personnel.
- A summary of non-compliance of the environmental quality performance limits.
- To implement and monitor the control and protective measures based on the EMP.
- To coordinate the environment related activities to the top management within as wellas with outside concerned agencies.
- To provide of health checkup of workers and the people living in nearby villages.
- To develop greenbelt in the nearby villages, schools, Govt, offices and transportationroutes.

6.4. Environmental Monitoring Schedule:

All the environmental parameters viz. air, water, noise, soil will be monitored regularly in order to detect any changes from the baseline status. Monitoring program will be followed till the mining operations continue as per the CPCB and SPCB guideline.

6.5. Methodology Adopted:

Post project monitoring will be carried out as per conditions stipulated in environmental clearance letter and consent issued by SPCB as well as according to CPCB guidelines. The project site is considered as core zone and the area lying within 10km radius from the mine site is considered as buffer zone, where some impacts may be observed on physical and biological environment. In the buffer zone, slight impact may be observed and that too is occasional. The manual sand mining project particularly have low footprint on buffer zone.

6.6. Detailed budget & procurement schedules:

The monitoring of the environment parameters will be outsourced and carried out by the lab of SPCB or a lab approved by MoEF/NABL.

6.7. Conclusion:

Post Environmental monitoring is an essential step in the EIA process. This justifies the predicted impacts, the efficiency of mitigation measures and the shortcomings of prediction methods, measures and even regulations are to be verified, and EIA practice improved. Environmental indicators could contribute to designing and evaluating monitoring programs, thus improving theestablishment of the cause-effect relationship and the reporting and communication of environmental data.

The Environmental Monitoring Cell will coordinate all monitoring programmes at the site and datathus generated will be furnished as per statutory requirements. The frequency of reporting will be on half yearly basis to the SPCB and to SEIAA. The Environmental audit reports will be prepared for the entire year of operations and will be regularly submitted to regulatory authorities.

CHAPTER – 7

7.1. ADDITIONAL STUDIES

The draft EIA as per the EIA notification dated 14/09/2006 and subsequent amendments is being submitted to SPCB for conducting a public hearing for the proposed mining within the ML area located in Becharhat Mouza of Purba Bardhaman district of West Bengal. The report will be updated after conducting the public hearing by SPCB with the concerns/suggestion of people and stake holders who would attend the public hearing.

7.2. Risk Analysis:

Risk analysis is the systematic study of uncertainties and risks encountered in various areas. Risk analysis is to identify the risks involved in mining operations at various phases. Potential locationsand activities around the proposed site are identified and probable risks are estimated on a person,business and Govt, establishment.

7.3. Risk Prioritization Based on Hazards of Mining:

Sand mining will be by open cast method. Mining will be only within the river site located in Becharhat Mouza of Purba Bardhaman district of West Bengal. The lease area is 6.65 Ha. There is no land degradation due to mining activities as mining is done only on riverbed surface. There will be no overburden (OB) or waste generation as the sand is exposed in the riverbed. There will be neither any stacking of soil nor the creation of OB dumps. So, no dumping area, well as stockpiling area, is required. Therefore, there is no chance of failure of dumps and no slope failure due to OB dump and stockpiling. However, there are various factors which can create unsafe working conditions/ hazards in the mining of minerals. The following types of hazards are identified during sand mining operations.

1) Accidents during Sand/ Mineral loading, transportation and dumping.
2) Accident due to vehicular movement
3) Inundation/ Flooding
4) Quicksand Condition / Bench Slope Failure.

7.4. Mitigation Measures:

7.4.1. Measures to prevent accidents during loading:

The following activities will be done to minimize the risk are:

- The truck will be covered with tarpaulin and maintained to prevent any spillage.
- To avoid danger while reversing the trackless vehicles especially at the embankment and tipping points, all areas for reversing of Lorries should be made man free as far as possible.

- The vehicles must be maintained in good repairs and checked thoroughly at least oncein a week.
- All transportation within the main working will be carried out directly under the supervision and control of the management.
- Opening of the side covers (pattas) should be done carefully and with warning to prevent injury to the loaders.
- Overloading should not be permitted and the maximum permissible speed limit shouldbe ensured.
- The truck drivers should have proper driving license.
- A statutory provision of the fences, constant education, training etc. will go a long wayin reducing the incidents of such accidents.

7.5. Measures to prevent incidents during Inundation/ Flooding:

The following activities will be done to minimize the risk are:

- During monsoon months and heavy rains, the mining operations are ceased.
- There should be mechanism/ warning system of heavy rains and discharges from the upstream dams.
- Inundation of flooding is expected and beneficial for these mines as during this timeonly the mineral reserve gets replenished.

7.6. Precautionary Measure for Sudden Release of Water from Upstream

The following activities will be done to minimize the risk are:

- The mining should be done only during the dry season and under strict supervision.
- Mining activities should be avoided during monsoon season.
- No go zones should be clearly marked and made aware to the mine workers.
- Deep water areas must be identified.

Exposure pathway (e.g., a means to get it in contact with someone), and determination of likely a receptor (someone receiving the stuff that-is migrating). Occupational hazard due to sand mining mainly comes under the physical hazards. Possible Physical hazards are as mentioned below.

7.7. Physical Hazards Due to Mining Operations:

Following health related hazards were identified due to mining operations to the workers: -

- **Light:** The workers may be exposed to the risk of poor illumination or excessive brightness. The effects are eye strain, headache, eye pain and lachrymation, congestion around the cornea and eye fatigue.
- **Heat and Humidity:** The most common physical hazard is heat. The direct effects of heat exposure are burns, heat exhaustion, heat stroke and heat cramps; the indirect effects are

decreased efficiency, increased fatigue and enhanced accident rates. Heat and humidity are encountered in hot and humid condition when temperatures and air temperatures increase in summertime up to 40°C or above in the mining area.

- **Eye Irritation:** During the high windy days in summer the sand & dust could be the problems for eyes like itching and watering of eyes.
- **Respiratory Problems:** Large amounts of dust in air can be a health hazard, exacerbating respiratory disorders such as asthma and irritating the lungs and bronchial passages.
- **Noise Induced Hearing Loss:** Machinery is the main source of noise pollution at themine site.

7.8. Management of Health Hazards:

Table 7-1: Management of Health Hazards.

Particulars	Control Measures
Heat & Light	➢ The mine site will have adequate provision drinking water supply for labours to combat dehydration. Lightweight and loose-fitting clothes having light colorswill give preference to wear. ➢ Rigorous exercise and more physical activities will be avoided in hot weather.
Noise	➢ Noise exposure measurements will be taken to determine the exposure limits and identify the zones.

7.9. Disaster Management Plan:

The following activities will be done to minimize the risk are:

- The shallow depth of activities in riverbed mining will not involve any high-risk accidentdue to side falls/collapse.
- The complete mining operation will be carried out under the Management and control of experienced and qualified Mines Manager.
- All the provisions of Mines Act 1952, MMR 1961 and Mines Rules 1955 and other laws applicable to mine will strictly be complied with.
- During monsoon season the mining activities will be closed.
- All persons in supervisory capacity will be provided with proper communication facilities.
- Proper coordination with Irrigation Department will be maintained so that at the time of releasing water, if any, from the dam suitable warning/ information is given in advance.
- Disaster Warning System" as developed will be strictly implemented.
- Security guards will be posted.
- Provision of rest shelters for mine workers with amenities like resting, drinking water,toilets facilities and site-specific anti-venom provisioning etc. will be provided by lessee.
- First - Aid facilities in the mining area.

7.10. Socio Economic Impact assessment:

7.10.1. Social Impact Assessment:

The proposed mine site has no negative impact on local socio- economic environment. The proposed project willgenerate direct and indirect employment and revenue to Govt, as well as fulfil the demand of construction and requirement of the local and regional market.

The project will provide following facilities to workers:

- Safe drinking water and water coolers shall be provided.
- Conveyance arrangements to hospitals or dispensaries from the proposed project sitewill be provided.
- PPE's (Helmets face masks, gloves, shoes etc.) will be provided to the workers as persafety norms.
- Urinal and lavatories, wash basins, bathrooms. One toilet facility per 50 workers shall be provided.

7.11. Assessment Resettlement and Rehabilitation:

No settlements are present within the ML area, thus there is no need to conduct the Rehabilitationand resettlement study.

CHAPTER – 8

8.1. PROJECT BENEFITS

8.1.1. General

The demand of Sand has been rising in the state as a result of rising in construction activities and development. The sediment in the form of riverbed material (RBM) deposited is ofcritical importance in civil and other infrastructural activities. The proposed project aims to fulfill the demand of sand. The proposed project lies on the riverbed of Damodar River. The quality of Sand is fine and appropriate for mega infrastructural activities. The mineral is used mainly in construction activities like buildings, roads and infrastructure etc. The requirement for minerals is always high in the nearby cities and towns. Therefore, there is always a good demand for minerals in the domestic market. The local region demand is increasing; hence newer areas for Sand reserves are approached. This will also generate much needed employment for the local people. The economy of the area will get a boost and there will be overall growth of the region in terms of education, health, training, transport, automobile, industry.The standard of living accordingly will also get an upliftment on the positive side.

8.2. Employment:

The Socio-Economic Condition of the surrounding villages is poor as there is no significant source of the income. The occupational activities are agriculture, cattle rearing and employment in mines but on daily wages.

- **Direct Employment:**

During the operational phase, about 04 nos. of people will be employed directly. Considering that some of the skilled personnel to be employed for the project will be from outside the area and unskilled/ semiskilled personnel will be from within the study area, the project will add to the wellbeing of the area. In addition to the workforce the indirect employment will also be generated for local persons. It will help in bringing prosperity to the area.

- **Indirect Employment**

The project will also provide some 86 people indirect employment to the people of nearby area of mine site. It will also provide some need-based opportunities to the local public. The project will provide following indirect employment to the local people:

- The sand available will provide agency employment in the value chain analysis, for place utility and retail.
- Transportation and warehousing in the region required to transfer the mineral will eventually be needed and therefore trucks and jobs in logistical activities will come up.
- Local contractors & villagers will be involved in the extraction of sand which will improve their

economic status.

8.3. Improvements in Physical Infrastructure:

The proposed project will enhance the socio-economic activities in the adjoining areas. This will result in following benefits:

- Improvements in physical infrastructure.
- Improvements in social Infrastructure.
- Increase in employment potential.
- Contribution to the exchequer.
- Prevention of illegal mining which will help in sustaining the river and its aestheticvalue.
- Post-mining enhancement of green cover.

8.4. Improvements in Social Infrastructure:

There will be some obvious changes in various environmental parameters due to mining activity. Increase socio-economic activities, creation of new employment opportunities. There will be positive impact in socio-economic areas due to increased economic activities, creation of new employment opportunities. The mine will contribute to the Exchequer of State and Central Government as per norms.

8.5. Plantation:

The lease area is in the riverbed and devoid of any vegetation. Mining activities will not cause any harm to riparian vegetation cover as the working will not extend beyond the safety zone left as per approved mining plan. Plantation will be carried along the village roads through which sandwill be transported and the areas allocated by the Panchayat / State authorities.

Plantation has been proposed on both sides of the roads as greenbelt to provide cover against dust dissemination. Plantation will be done near the mine area and available free government land within the study area to mitigate the ill-effects of mining and to improve the environment of its surrounding area. This will increase the consciousness in workers and nearby villagers for greenery. Suggested species to be planted are listed in Plantation Programmer section 10.8.

8.6. Other Benefits:

The other tangible benefits include metrics and improvements of demonstrating process, systemcost savings, compliant inspections, customer audits, faster product approvals, manufacturing throughput, less rejected material, reduced non-conformance issues, more efficient continuous improvement and project implementation. Intangible benefits include improved staff morale, quick, more accurate and transparent decision making, increased staff accountability and an enhanced culture of quality throughout the organization.

CHAPTER – 9

9.1. ENVIRONMENTAL COST BENEFIT ANALYSIS

The environmental cost benefit analysis is not recommended for this project during scoping stage.

CHAPTER – 10

10.1. ENVIRONMENTAL MANAGEMENT PLAN

10.1.1. Introduction

The Environment Management Plan (EMP) is required to ensure sustainable development in the study area. This section covers the proposed measures required for meeting the prevailing statutory requirements for protecting environment by suitable environmental management practices in connection with the proposed mining and related activities in the area.

The Environmental Management Plan (EMP) has been designed within the framework of various Indian legislative and regulatory requirements on environmental and socio-economic aspects so as to attain sustainable development.

10.2. Air Quality Management:

10.2.1. Impacts on Air Quality:

The impacts envisaged due to mining activity are evaluated based on various factors like production capacity, vehicles involved, transportation of sand to the stocking yard etc. The emission inventory of the pollutants is as follows:

The main air pollutant would be dust or particulate matter generated by handling and transportation of sand. But the impact of mining operations on air quality is negligible as excavation involved only scooping of sand deposits from the riverbed. There will be negligible generation of dust dueto the proposed mining activities because activities are restricted to only scooping sand from dry riverbed manually. The impact of mining operations on air quality is negligible in and aroundthe excavation zone as there is no utilization of machinery.

Dust may be emitted in air due to mineral transportation vehicles. However, this will be temporaryand insignificant as there will be only about approximately 67 trips per day of 10 Cu.m capacity Trucks/ Tractors involved in sand transport.

10.2.2. Controlling Dust Levels:

The environmental control measures proposed to control the fugitive dust includes:

- Haul road will be maintained regularly. Water tankers with spraying arrangement willbe used for regular water sprinkling on the haul roads to ensure effective dustsuppression.
- Speed limits will be prescribed for transport vehicle Regular maintenance of transport vehicles.

- Ore carrying trucks will be effectively covered by tarpaulin to avoid escape of fines tothe ambient air.
- Dumpers will not be overloaded to prevent spillage on the road.
- Plantation / green belt development along approach/ transportation roads; and controlling of SO_2 & NO_2 level. The source of SO_2 & NO_2 would be due to vehicular emissions. This can be controlled by:
    a) Periodic maintenance of the trucks/dumpers used in transport of sand will be done as per manual and/or at regular interval to reduce smoke emissions.
    b) Ambient air quality monitoring will be carried out as per CPCB norms exceptmonsoon season.

10.3. Noise Pollution Control:

Noise will be produced at the mine due to the movement of transport vehicles only. This will be temporary and insignificant as the noise generated by the mining activity is dissipated within a small zone around the mine.

As the mining process involves only extraction of sand from the riverbed manually, there is no major noise generation. In the mine, no machinery will be used. Major noise sources aretransportation vehicles. The noise produced due to vehicle will not be continuous throughout the day.

10.4. Water Requirement and Supply:

About 6 KLD water will be required in the mine for dust suppression, plantation and drinking purposes. Water will be supplied by authorized water transported through tankers from nearby villages.

10.5. Water Quality Management:

10.5.1. Impacts on water quality:

There is no wastewater generation in the sand mine. The only water contaminant is rainwater run-off during the monsoon season. Mining will be carried out in dry riverbed and it will remainabove the ground water table. There will be no impact due to the proposed mining on the water environment and the water flow pattern does not disturb the turbidity and velocity. The impact the aquatic flora & fauna due to the proposed opencast excavation is insignificant as it involves only scooping of sand from the dry river bed which will not disturb the aquatic life present in the river.

In order to ensure that the project activities shall not affect the water environment, the following

measures will be taken up:

10.6. Water pollution control measures:

In order to ensure that the project activities shall not affect the water environment, the following measures will be taken up:

- Mining will be closed during the monsoon season and at the time of floods. This will helpin replenishment of sand in the riverbed.
- Sand will be collected in slices up to depth of 2.7 m or above the ground water level.
- Mining will be restricted minimum 7.5m away (inward) from riverbank to minimize effect of river bank erosion and to avoid consequent channel migration.
- River stream will not be diverted to form in active channels.
- Ground water levels will be monitored regularly in and around sand mining project.
- Mining will be started from north western side and advanced towards eastern side across the river uniformly. In order to maintain safety and stability of river banks, a minimum distance of 7.5 m is left as safety zone.
- Mining at the concave side of the river channel will be avoided to prevent bank erosion.
- Meandering segment of river will be selected for mining in such a way to avoid natural eroding banks and to promote mining on naturally building meander components.
- Water Quality Monitoring for the ground waters, river water and other surface waters shallbe carried out seasonally to ensure that the water quality is not affected by the project activities.

10.7. Waste Management:

No waste or overburden is generated hence waste management is not required.

10.8. Land Environment:

- **Impacts on Land environment**:

The proposed project involves mining of sand from dry bed of the river. The sand excavation activities will form small pits in the river bed temporarily. These pits are filled back naturally by the sediments brought by the river during monsoon. Thus, no reclamation is required as there will not be any change in the land use pattern.

- **Land environment control measures:**

1) Mining in 6.65 Ha. will be carried out leaving 7.5m as undisturbed as safety barrieraround the mine pits.

2) The annual production will be less than replenishment rate of the river.

3) Mining will be restricted minimum 2.7 m away (inward) from river bank to minimizeeffect of river bank erosion and to avoid consequent channel migration

4) Mining at the concave side of the river channel will be avoided to prevent bank erosion. Plantation will be carried out along the banks of the river to control erosionof banks.

5) Slopes of the mine pits will be maintained below 35°.

10.9. Biological Environment:

No RET (Rare, Endanger and Threatened) species has been spotted within the study area. There will be no loss of forest resources like medicinal plants, endangered & rare species during the mining operation. As no deforestation is involved since excavation is done on the deposited sand of a river. The mining will be carried out in dry bed without disturbing the aquatic species and willnot disturb the aquatic life in the river. Since there will be no pollution of the river water due to the proposed mining activity the aquatic biodiversity will not be affected. There will be no habitatfragmentation or blocking of migratory corridors due to the proposed mining activity.

10.10. Plantation Programme:

As the mine lease area is located within the riverbed, it is not suitable for plantation and green belt development, no plantation is proposed in haul roads of the lease area. However, plantation of local species of trees plantation will be carried out along the banks of the river near the mine lease area to form a green belt which will help in reducing the erosion of the river banks and also to actas a dust and noise arresting screen. Plantation will also be carried out along the mineral transportation roads in the nearby villages. About 175 saplings per annum will be planted in during plan period. Also, plantation will be carried out in the available free government areas with in the study area. Species suggested for mixed plantation of species like:

a) ***Acacia sp. (Akashmoni, Sonajhuri)***

b) ***Adina Cordifolia (Haldu, Karam)***

c) ***Aegle marmelos (Bael tree)***

d) ***Albizzia Lebbec (Kalasirish, Kalsish)***

e) ***Anthocephalus cadamba (Kadam)***

f) ***Azadirachta indica (Neem, Nim)***

g) ***Bombax ceiba (Simul, semal)***

h) ***Casuarina equisetifolia (Jhau)***

i) ***Diospyros Melanoxylon (Kend, Tendu)***

10.11. Socio-Economic Environment:

The project activities shall not have any adverse impacts on any of the common property resourcesof the village communities, as the mine lease area is not being used for any purpose by any sectionof the society in this region. There is no Resettlement & Rehabilitation involvement in this project.There is no land acquisition in this project. The project is expected to yield a positive impact on the socio-economic environment. It will help for improving direct and secondary employment opportunities for the local people.

10.12. Employment Potential:

Besides the direct and indirect employment of approx. 90 persons, the company will provide vocationalskill training to the unemployment youth of the neighboring villages through outside agencies. Local villagers residing in the nearby villages shall be employed as semiskilled workers.

10.13. Occupational Health & Safety Measures:

There is no environmental pollution due to the proposed mining as it is proposed to be a manual scooping of sand on the banks of Damodar River. Hence there will be no major occupational health hazards. Periodic Medical Examination shall be conducted to the workers, wherein a detailed examination and health survey including routine tests shall be conducted and records shall be maintained.

- Employee will be adequately trained and educated for involvement and commitmentin to the implementation of health and safety guidelines.
- Monitoring the effects of mining activities on safety and health and conducting regular performance reviews through periodical health check-ups.
- Provision of all necessary resources for safety and health of employees and contractorsengaged in mining.
- Setting of safety and health objectives based on comprehensive strategic plans andmeasure performance against these plans.

- Implementing safety and health management system and assessing the effectivenessthrough periodic audits.
- Organizing regular health check-up of the employee.

10.14. Site Services:

Temporary office shed, Rest shelters, water supply and first aid facilities will be provided at site. Mostly local people will be employed in the mine.

10.15. Safety Provision:

All provisions in safety rules and regulation will be maintained by providing required safety equipment to the employees. The lessee will provide safety shoes, safety helmets to all the employees. The safety precautions will be followed as per the provisions of Mines Rules and standards.

10.16. Environmental Monitoring Programme:

Environmental monitoring will be carried out regularly for ensuring the compliance of environmental standards and conditions stipulated by various regulatory agencies. The services of a recognized laboratory will be hired for monitoring work. Compliance with the conditions will be submitted to the regulatory agencies periodically.

10.17. Budget for Environmental Protection:

It is necessary to include the environmental cost as a part of the budgetary cost component. For this, a sum of Rs. 25.00275 lakhs /annum approx., is allocated for environmental protection activities.This will include the cost of water sprinkling, plantation, environmental monitoring,

Table 10-1: Proposed Budget for Environmental Monitoring/Protection.

Sl.No	Particulars	Amount per annum (INR)
1	Dust suppression	476242.86
2	Plantation and its protection	1012016.07
3	Environmental Monitoring	1012016.07
Total in INR per annum		2500275

10.18. Corporate Environmental Responsibility and Health and hygiene:

As per the MoEF&CC OM No. 22-65/ 2017-IA II(M) dated 01.05.2018, it has been recommendedthat 2% of the project cost will be accorded for Corporate Environmental responsibility and 2% for Health and Hygiene.

Table 10-2: Proposed Budget for Environmental Monitoring/Protection.

Sl.No	Particulars	Amount per annum (INR)
1	Personal Protective Equipment	94617.78
2	Social Welfare Measures	452746.11
3	Health and Hygiene	452746.11
Total in INR per annum		1000110

10.19. Environment Policy:

We recognize the significance of preserving the environment while undertaking our sand mining project. As a responsible entity, we are committed to ensuring that our operations have minimal adverse impacts on the environment and local communities. This policy outlines our approach to environmental conservation and sustainable sand mining practices:

i. **Compliance with Regulations**: We will adhere to all relevant national and local environmental laws, regulations, and guidelines pertaining to sand mining in West Bengal. Our operations will be conducted in full compliance with the stipulated permits and licenses.

ii. **Environmental Impact Assessment (EIA)**: Before commencing any mining activities, we will conduct a comprehensive Environmental Impact Assessment (EIA). This assessment will identify potential environmental risks and help develop appropriate mitigation measures.

iii. **Biodiversity Conservation**: We will take measures to protect and conserve the local biodiversity in the mining area. Special attention will be given to endangered and sensitive species, and their habitats will be preserved to the greatest extent possible.

iv. **Water Management:** Water resources in the vicinity of the mining site will be managed responsibly. We will implement water recycling and conservation techniques to minimize water consumption and prevent contamination.

v. **Dust Control and Air Quality:** To mitigate dust emissions, we will implement effective dust control measures throughout the mining process. Regular air quality monitoring will be conducted to ensure compliance with acceptable standards.

vi. **Rehabilitation and Restoration:** Upon the completion of mining activities, we will rehabilitate and restore the mined-out areas. The land will be reclaimed and revegetated to its original ecological condition or transformed into an ecologically viable alternative.

vii. **Community Engagement:** We will engage in open and transparent communication with the local communities. Their concerns, needs, and suggestions will be considered in our decision-making processes.

viii. **Health and Safety:** Employee safety and health will be our top priority. Adequate safety measures will be implemented to prevent accidents and occupational health hazards.

ix. **Resource Optimization:** We will adopt sustainable practices to optimize the use of natural resources. This includes responsible extraction techniques and efficient use of energy during the mining process.

x. **Monitoring and Reporting:** We will establish a robust monitoring system to continuously assess the environmental impacts of our mining activities. Regular reports will be generated and shared with relevant authorities and stakeholders.

xi. **Continuous Improvement:** We are committed to continuous improvement in our environmental performance. Feedback from stakeholders, scientific advancements, and lessons learned from previous projects will be used to enhance our practices.

xii. **Emergency Response Plan:** We will develop and implement an Emergency Response Plan to address any environmental accidents or unforeseen incidents promptly and effectively.

This environmental policy will serve as a guiding document for our sand mining project. By integrating sustainable practices into our operations, we aim to safeguard the environment and contribute positively to the well-being of local communities and ecosystems. Our commitment to environmental protection aligns with our vision of creating a greener and more sustainable future.

10.20. Organization Manpower:

10.20.1. Organisational Setup:

Environmental monitoring and reporting will be designed to provide a close watch on thesurrounding natural environment and provide early warnings of any adverse changes that may berelated to some dimension of the mining and allied operations.

➢ Man Power:

Environmental Management & Monitoring Division (EMMD) will be manned by adequate staff. Services of retired forest officials may be taken for the effective implementation of plantation schemes. For the development and maintenance of jobs like drainage, settling tanks etc., assistance from the project civil engineering department may be taken. Manpower recommended is included in the Table below.

Table 10-3: Manpower requirement for environmental management & monitoring.

Sl.No	Description	Nos.
1	Manager, (Pollution Control)/ horticultural Supervisor	**04**
2	Field assistant	**26**
3	Labourers (unskilled)	**60**
Total		**90**

CHAPTER – 11

11.1. Summary and Conclusion:

The mining industry in India is a major economic activity which contributes significantly to the economy of India. Unless the mining of the minerals is properly regulated, they can have adverse consequences on the environment and socio-economic components of the society. It also disturbs the air, soil, water and ecological parameters. On the other hand, it develops the economic standard of the region. Issues of Technology for zero waste or low waste mining, relief & rehabilitation, mine closure which otherwise leads to land degradation, are important issues whichrequire continuous attention. In order to mitigate the impact of mineral mining on the environment,a scientific assessment is very important for framing sustainable development strategies. Therefore, the implementation of scientific mining principles through EIA & EMP plays a vital role in sustainable economic growth of our country.

The Environmental Impact Assessment has been prepared to access the present scenario of the study area for the proposed mining activity. Based on the assessment an environment managementplan (EMP) has been prepared, which helps in minimizing the adverse effects of the mining on the surrounding Environment.

The draft Environment Impact Assessment report is being prepared to comply with the Term of reference (TOR) received from MoEF&CC under EIA notification of MoEF dated 1st December 2023 and its amendments for seeking environmental clearance for sand mining in Damodar riverbed over an area of 6.65 Ha. Plot No: 1632(P), 1620(P) & 1560(P) in Becharhat mouza of Purba Bardhaman district of West Bengal. The project proponent has submitted application for prior Environmental Clearance (EC) and State Expert Appraisal Committee has considered the same during 73rd meeting held on 23.03.2023, subsequent to the discussions held on 25.04.2023, State Environmental Impact Assessment Authority (SEIAA) has issued the Terms of Reference (TOR) for conducting the Environmental Impacts Assessment (EIA) study and to prepare EIA report for conducting the Public hearing as part of Environment Clearances Process.

This Environmental Impact Assessment (EIA) report is prepared to comply with the Terms of Reference (TOR) received from SEIAA under EIA notification of the MoEF dated 01-12-2023 and its amendments of MoEF&CC, Govt. of India, for seeking Environmental Clearance (EC) for sand mining in the applied mining lease area measuring 6.65 Ha. falling under category "B1".

The proposed Bardhhaman-II sand mine unit comes under Mouza- Becharhat, J.L. No.: 79, Plot No.- 1632(P),1620(P) & 1560(P), Block-Bardhhaman-II, P.S.- Bardhhaman of Purba Bardhaman district of West Bengal. Geographically the ML area extends from latitude 23°12'22.717"N to

23°12'17.726"N and longitude 87°51'22.412"E to 87°51'35.523"E. The highest elevation of the river sand bed is 95 m AMSL, and the lowest elevation of the lease area is 86 m AMSL. The proposed area falls in SOI top sheet No. 73M/16; OSM No.: F45D16. The study area mapis shown in figure 1-1. The study area of the proposed project comprises 10 Km radius around themining lease boundary. The map showing the core zone (Mine lease area) and Buffer zone (10 km radius from the lease boundary) is shown in Figure1-2.

The Mine Lease area is approx. 0.95 Km of aerial distance from the district headquarters at Bardhaman City. The proposed ML area can be approached by its own conveyance from NH-19, which is 1.30 Km (N) away from the ML area on the North bank of Damodar River.

The proposed mine lease has been granted to "**West Bengal Mineral Development & Trading Corporation Limited"** on 17th February 2023. The mining plan for the Mine lease (ML) area has been approved by Chief Mining Officer, Dte of Mines & Minerals, G. P. Branch, S.B. Unit, Asansol, vide letter no: 234/CMO/XVI/EBUR (553) dated 10thJuly, 2023. The Open Cast Mining method is proposed in the lease area. As per approved mining plan vide letter no: 234/CMO/XVI/EBUR (553) dated 10thJuly, 2023, river bed sand mining will be undertaken over an area of 6.65 Ha. for production **5,34,405.60** m^3 Cu. M of sand for a contract period of Concession of 5 (five) years. The period of concession of the mine lease is 5 years based on the level of exploration and reserveestablished. The cost of mining lease, mining equipment, Environmental protection, Socio-economic development for the present mine lease area is about Rs 25.00275 Crores (For Five Years).

Table 11-1: Salient Features of Baseline Environmental Studies.

Attribute	Parameter	Frequency of Monitoring
Micro - meteorological Studies	Wind Details like speed, direction, Temperature, Relative Humidity and Rainfall	3 months data has been collected to assess air pollution impacts on the surrounding environment.
Ambient Air Quality	PM_{10}, $PM_{2.5}$,Sulphur Dioxide ($S0_2$), Oxides of Nitrogen (NOx)	3 months data has been collected to assess baseline Air Quality status of the area.
Noise Quality Data	Noise levels	1 middle month data has been collected to identify noise producing areas.
Water Quality, Soil Quality Data and Land Use pattern	Physical & Chemical parameters along with measurement of heavy metals and land use parameters.	To establish baseline Water Quality, Soil Quality for future reference and Land Use Pattern in the area

Socio-Economic & DemographicStudies	Socio-Economic parameter	To know the present Socio-Economic status of the study area

11.2. Environmental Monitoring Program:

Regular monitoring of the various environmental parameters is necessary to evaluate the effectiveness of the management programme so that the necessary corrective measures can be taken in case there are some drawbacks in the proposed programme. Since environmental qualityparameters at work zone and surrounding area are important for maintaining sound operating practices of the project in conformity with environmental regulations, the post project monitoringwork forms part of Environmental Monitoring Program. Post Monitoring of various environmentalparameters will be carried out on regular basis to ascertain the following:

- Status of Pollution within the mine site and in its vicinity.
- Generate data for predictive or corrective purpose in respect of pollution.
- Examine the efficiency of pollution control system adopted at site.
- To assess environmental impacts.

Monitoring will be carried out at site as per the norms of CPCB. Environmental Monitoring Programme will be conducted for various environmental components as per conditions stipulatedin Environmental Clearance Letter issued by MoEF&CC and consent to operate issued by SPCB.Six monthly compliance reports will be submitted to MoEF&CC, regional office on 1st of June and 1st of December. Quarterly compliance Report for conditions stipulated in Consent to Operatewill be submitted to SPCB on regular basis.

Post Environmental monitoring is an essential step in the EIA process. This justifies the predicted impacts, the efficiency of mitigation measures and the shortcomings of prediction methods, measures and even regulations are to be verified and EIA practice improved. Environmental indicators could contribute to designing and evaluating monitoring programs, thus improving establishment of the cause effect relationship and the reporting and communication of environmental data.

The Environmental Monitoring Cell will co-ordinate all monitoring programmers at site and data thus generated will be furnished as per statutory requirements. The frequency of reporting will be on half yearly basis to the SPCB and to SEIAA. The Environmental audit reports will be prepared for the entire year of operations and will be regularly submitted to regulatory authorities.

11.3. Environment Management Plan:

- Mining activities will be confined to 2.7 m or ground water level whichever is less depth in the riverbed.
- The approach roads from the mining area to the tar road will be properly sprayed with water for

dust suppression.

- Greenbelt and plantations will be proposed with collaborative assistance from local governing bodies. It will help in dust suppression and will also reduce the noise level.
- Plantation will improve the ecology and aesthetic beauty of the area.
- Measures will be taken to limit the mining activities in the provided lease area by installing properly demarcated pillars and boundaries along the perimeter of the lease area.
- Prior to commencement of mining, a short awareness program will be conducted for labours to make them aware of way of working and various precautions to be taken while at work. Such programs will be repeated periodically.
- It will be ensured that noise produced due to vehicles movement while carrying sand is within the permissible noise level.
- No stacking of Riverbed Material will be done in the riverbed or mining lease area.

11.4. Details of plantation

YEAR	NO. OF PLANTS	LIKELY SPECIES OFPLANTS
1ST YEAR	175	*a)* ***Acacia sp. (Akashmoni, Sonajhuri)*** *b)* ***Adina Cordifolia (Haldu, Karam)*** *c)* ***Aegle marmelos (Bael tree)*** *d)* ***Albizzia Lebbec (Kalasirish, Kalsish)*** *e)* ***Anthocephalus cadamba (Kadam)*** *f)* ***Azadirachta indica (Neem, Nim)*** *g)* ***Bombax ceiba (Simul, semal)*** *h)* ***Casuarina equisetifolia (Jhau)*** *i)* ***Diospyros Melanoxylon (Kend, Tendu).***
2ND YEAR	175	
3RD YEAR	175	
4TH YEAR	175	
5TH YEAR	175	
Total	875	

11.5. Measures for air pollution and dust suppression

Control of Air Pollution Due to Dust, Exhaust Emissions or Fumes During Mining or Processing Operations for Minor Mineral & Related Activities and Containing the Same Within Permissible Limits Specified Under: -

a) Roadside plantations will be done in order to prevent the spreading of dust.

b) Water spraying will be done twice a day over the haul road & roads leading to adjoining state roads.

c) Dust respirators will be provided to the operators of the mine worker.

d) Preventive maintenance shall be carried out on equipment.

e) Every workplace where the air-borne dust is generated is to be sampled and the concentration of the respirable dust will be determined regularly. If any measurement at any workplace and at source, the concentration in excess of measurements shall be carried on and a 6 monthly compliance report will be submitted to the appropriate authority respectively.

f) Silencers will be fitted to the dumpers.

11.6. Measures related to transportation.

- Regular water spraying on haulage roads during mineral transportation by water sprinklers of rotary type, which will cover the whole width of haulage road in one round.
- Avoid over loading of tippers & consequent spillage on the roads.
- Mineral carrying trucks will be effectively covered by tarpaulin to avoid escape of fines to atmosphere.
- Air quality shall be regularly monitored both in the core zone and the buffer zone.

11.7. Measures for controlling NOx level.

The source of NOx is due to vehicular emission. This can be controlled by proper maintenance and servicing of the vehicles. Only PUC certified vehicles will be permitted.

11.8. Measures for noise pollution

There is no drilling and blasting for mineral extraction. Noise pollution will only be due to loading and transporting equipment. Effective steps will be taken to keep the noise level well below the DGMS prescribed limit of 85 dBA. Noise control is achieved by the following:

- Proper care and maintenance of the equipment will be carried out.
- Personal protective equipment will be provided to the workers. Along the haul road plantation shall be done to act as an acoustic barrier.

11.9. Measures on water quality management

There is little flow of water in the riverbed in the post-monsoon period. The area is having an average of 1354.04 mm rainfall in a year. During the rainy season, catchments water flows into the river. During the dry period, the Sand is excavated which gets replenished to some extent during this period. No mining activities will be carried out during the rainy season when there is water flowing in the working area.

CHAPTER – 12

12.1. Disclosure of the consultant

This Draft EIA report is prepared on behalf of the proponents, West Bengal Mineral Development & Trading Corporation Limited by the environmental Consultant, "M/s. Indian Mine Planners and Consultants" (IMPCON). The head office of IMPCON is at Kolkata. Indian Mine Planners & Consultants (IMPCON) was established in 2007 with the prime objective of guiding for total mining solution in Mine Planning for the Mine Entrepreneurs of Government, Public Sectors and Private Sector bodies engaged in the field of mining of Coal, Metallic and non- Metallic deposits. The services are provided by the energetic and highly experienced mine planners and guided by the dynamic, pragmatic, qualified and experienced advisors in the field of mining with an aim to ensure safety, productivity, and sustainable mining with due regard to quality and environment. Currently, IMPCON is an ISO 9001:2015 Certified Company & a QCI – NABET accredited Environment Consultant Organization (ECO), Accredited Prospecting Agency (APA) & Mining Plan Preparation Agency (MPPA) from Jan-2021 and Accredited Exploration Agency (AEA) for Mineral sector.

IMPCON caters to the need of existing as well as new Mining Entrepreneurs for preparing the geological reports, mining feasibility reports, mining plan, detailed mine design, environment impacts assessment (EIA) reports etc. A group of advisors from various disciplines with over 40 years of experience from organizations like Geological Survey of India, Various subsidiaries of Coal India Limited (CIL) including Central Mine Planning & Design Institute Limited (CMPDIL), Steel Authority of India Limited (SAIL), Indian School of Mines etc. provide their valuable guidance.

IMPCON also delivers advisory services in all aspects of geological exploration, geo-technical services, hydrogeology, mine planning & detailed design, electrical installations and maintenance, possible improvement areas of mechanical performance of the high-capacity mining machineries, civil and infrastructural job planning, choice of equipment's for mining, manpower, planning and finally total economics for project viability.

12.2. EIA team:

NAME	FUNCTUIONAL AREA
Dr. N. B. Chanda	Air Pollution Monitoring, Prevention and Control (AP)
	Water Pollution monitoring, prevention and control (WP)
	Geology (GEO)
Dr.A.S. Shannigrahi	Meteorology, Air Quality Modelling, and Prediction (AQ)
Mr. Gopal Chandra Das	Land Use and Land Cover (LU)
	Soil Conservation (SC)
Dr. Tapan Kumar Mishra	Ecology & Biodiversity (EB)
Mr. Sanjib Chattopadhyay	Solid Waste Management (SW)
	Hazardous Waste Management (HW)
Ms. Nidhi Singh Rathod	Socio – Economy (SE)
Mr. Debashish Ghosh	Hydrology, Ground Water and Water Conservation (HG)
Mr. Debashish Basu	Noise and Vibration (NV) & Hazards Management (RH)
Mr. Arpan Chakraborty	TEAM MEMBER
Mr. Sirshendu Hazra	TEAM MEMBER
Mr. Debodyuti Sengupta	TEAM MEMBER
Mr. Partha Pratim Kandar	TEAM MEMBER

12.3. Laboratory partner:

N.D. International is a multinational organisation located in India and Japan. Their laboratory is accredited by NABL, ISO 9001:2015 Certified and recognised by other governmental departments. The Details of their laboratory are:

Name of and address of the Laboratory	Scope of services	Accreditation status
ND International **Address:** 17, Jnan Goswami Sarani, 107b, Block-F, New Alipore, Kolkata, West Bengal, India	Monitoring and Analysis of: • Ambient Air Quality • Noise Quality • Soil Quality • Ground Water Quality	Accredited by NABL, Certificate No. **TC-5910** **Validity:** 06th June 2024

12.4. Related all documents are attached as Annexures.

Annexure I: Mining Plan Approval Letter

GOVERNMENT OF WEST BENGAL
Office of the Chief Mining Officer
COURT ROAD, ASANSOL-713304
DISTT. PASCHIM BARDHAMAN

Tele Fax: 0341-2252407
e-mail : cmo.dmm-wb@nic.in

Memo. No. 234/CMO/XVI/EBUR (553) Dated: Asansol the 10th July, 2023

To,
The Chairman and Managing Director,
West Bengal Mineral Development & Trading Corporation Limited,
WBIIDC Building, 3rd Floor, DJ-Block, DJ-10,
Sector-II, Bidhannagar (Saltlake City),
Kolkata – 700091

Subject- **Approval of "Mining Plan" for mining of 'River-bed Sand' in respect of Sand Block, bearing I.D. MIN_EBUR_25, in Mouza Becharhat, J.L. No. 79, under P.S. Burdwan, in the District of Purba Bardhaman, over an Area of 6.65 Hectares to be leased out to West Bengal Mineral Development & Trading Corporation Limited.**

Ref.- **IC&E Department's Order No. 04(1/351012/2022)-*ICE-12011(99/27/2022-MINES SEC Dept. of ICE* dated 03.01.2023.**
Your QP's submission letter no. IMPCON/KOL/SAND/EBUR/2023-24/122, Dated 03/07/2023.

Sir,

In terms of **Sub rule 2(b) under Rule 4** of the West Bengal Minor Minerals Concession Rules, 2016, I hereby approve the above mentioned **Mining Plan** for **'River-bed Sand'** in **Mouza Becharhat, J.L. No. 79,** Under **P.S. Burdwan,** in the **District** of **Purba Bardhaman,** over an **Area** of **6.65 Hectares** subject to the following conditions:-

01. i) This **Mining Plan** is approved without prejudice in any other laws applicable to the Mine from time to time whether made by Central Govt., State Govt. or any other Government authority.

ii) The **Mining Plan** is approved without prejudice to any order or direction from any court of competent jurisdiction.

02. It is also clarified that the approval of your aforesaid **Mining Plan** does not in any way imply the approval of the Government in terms of any other provisions of Mines & Minerals (Development & Regulation) Act, 1957, West Bengal Minor Minerals Concession Rules, 2016 and West Bengal Sand (Mining, Transportation, Storage and Sale) Rules, 2021, framed there-under and any other laws.

03. It is also clarified that this approval of **Mining Plan** under the West Bengal Minor Mineral Concession Rules, 2016 and West Bengal Sand (Mining, Transportation, Storage and Sale) Rules, 2021 is subject to the provision of Forest (Conservation) Act, 1980, Forest (Conservation) Rules, 1981 and other relevant statutes, orders and guidelines including those issued by Hon'ble Courts of Law (including National Green Tribunal) as may be applicable to the proposed lease area from time to time.

Contd....2/-

Annexure II: TOR Letter

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY

Pranisampad Bhawan, 5th floor, LB 2, Sector-III, Salt Lake, Kolkata – 700 106
e-mail: environmentwb@gmail.com
Web Portal: www.environmentwb.gov.in

No. 2713 / EN / T – II – 1/ 519/ 2023 Date: 01 /12/ 2023

To
West Bengal Mineral Development and Trading Corporation Limited.
13, Nellie Sengupta, sarani ,
2nd floor, Kol- 700087,

Sub: ToR for doing EIA for the proposed Bardhhaman - II Riverbed Sand Mine (MIN_EBUR_25) over an area of 6.65 ha (16.4255 Acres) on the Damodar River at JL No. 79, Mouza Becharhat, Plot No. 1632(P), 1620(P) & 1560(P), Block- Bardhhaman II, PS – Bardhaman, Dist.- Purba Bardhhaman, West Bengal (proposal no SIA/WB/MIN/440154/2023)

Sir,

This is to inform you that SEIAA in its meeting on 17.11.2023 considered your online application (vide Proposal No. SIA/WB/MIN/440154/2023) as well as the recommendations of SEAC for issuance of ToR and agreed with the recommendation.

The ToR for conducting EIA study is attached herewith (annexure 1).

The ToR is valid for a period of 3(three) years from the date of issue. EIA/EMP is to be submitted before the expiry of the ToR for consideration of EC application.

Enclo: Annexure 1

(Dharmdeo Rai)
Member Secretary, SEIAA

No. 2713 /EN/T-II-1/519/2023 Date: 01 /12/ 2023

Copy forwarded for the information to:

The Secretary, State Level Expert Appraisal Committee, 'Paribesh Bhavan', LA, Salt Lake Sector III, Kolkata- 700106

Member Secretary, SEIAA

Annexure III: Letter of Intent

WBMDTC LTD. 81
24/04/2023
DOCKET NO. 1601

Government of West Bengal
Department of Industry, Commerce and Enterprises
Mines Branch
4, Abanindranath Tagore Sarani (Camac Street), Kolkata-700016

No.261 -ICE-12011(99)/27/2022-MINES Date:20.04.2023

From : The Deputy Secretary
to the Government of West Bengal.

To : The Chairman and Managing Director
West Bengal Mineral Development & Trading Corporation Ltd.,
WBIIDC Building, Sector-II, Bidhannagar,
Kolkata-700091.

Sub : Provisional Grant Order for Sand Blocks auctioned by WBMDTCL, reg.

Ref : Your Memo No.MDTC/SAND/003/Part-6/948 dated 12.04.2023

Sir,

With reference to the above subject, I am directed to inform you that Provisional Grant Order is hereby accorded by this Department to the West Bengal Mineral Development and Trading Corporation Ltd. for the 47 nos. of sand blocks auctioned by the Corporation in 6th and 7th phase.

I am also directed to request you kindly to arrange for preparation of Mining Plans and obtain Environment Clearance from the competent authority as well as other statutory clearances as per norms in order to execute Mining Lease in due course.

Yours faithfully

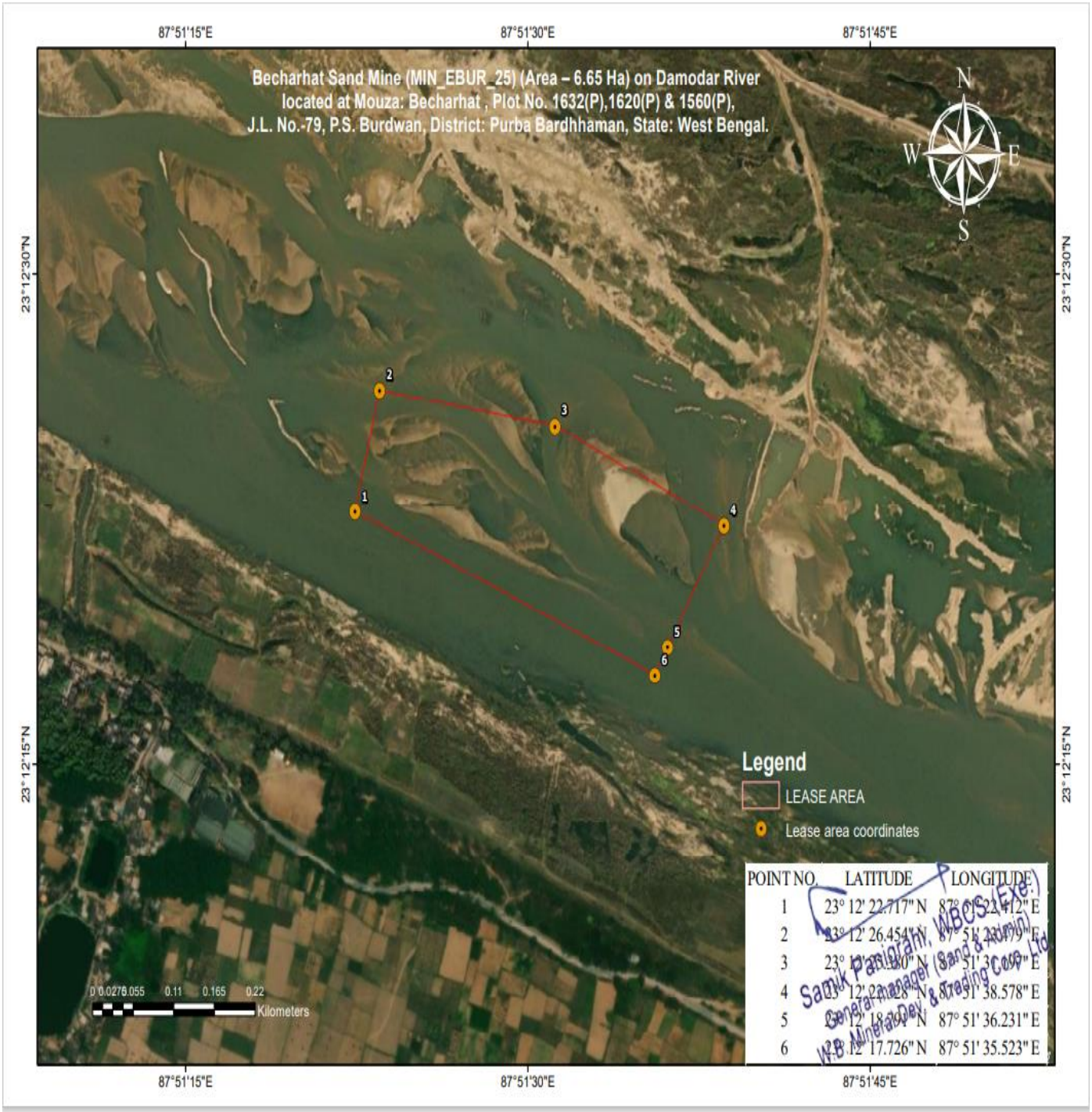
Deputy Secretary

No.261/1(2)-ICE-12011(99)/27/2022-MINES Date:20.04.2023

Copy forwarded to:

1. PA to Secretary, (Mines), Dept of I,C & E, with request to place it for kind appraisal of the authority
2. Chief Mining Officer, WB, for kind information and necessary action.

Deputy Secretary


87°51'15"E
87°51'30"E
87°51'45"E
23°12'30"N
23°12'15"N
Becharhat Sand Mine (MIN_EBUR_25) (Area – 6.65 Ha) on Damodar River
located at Mouza: Becharhat , Plot No. 1632(P),1620(P) & 1560(P),
J.L. No.-79, P.S. Burdwan, District: Purba Bardhhaman, State: West Bengal.
N
W
E
S
1
2
3
4
5
6
Legend
LEASE AREA
Lease area coordinates
0 0.0275 0.055 0.11 0.165 0.22
Kilometers
POINT NO. LATITUDE LONGITUDE
1 23° 12' 22.717" N 87° 51' 33.412" E
2 23° 12' 26.454" N 87° 51' 33.079" E
3 23° 12' 30.180" N 87° 51' 37.009" E
4 23° 12' 23.028" N 87° 51' 38.578" E
5 23° 12' 18.[illegible] N 87° 51' 36.231" E
6 23° 12' 17.726" N 87° 51' 35.523" E

Annexure IV: Approved Mining Plan

Approved vide, Memo. No. 234/ems
Dated 16/02/2023

MINING PLAN INCLUDING MINE CLOSURE PLAN
RIVER BED MINING FOR SAND
AT DAMODAR RIVER
As per West Bengal Minor Mineral Concession Rules 2016 & Sand Mining Rules, Govt. of WB 2021)

LESSEE: **West Bengal Mineral Development & Trading Corporation Limited**

ADDRESS: 3rd Floor, DJ – 10, WBIIDC Building,
DJ Block, Sector – II, Salt Lake,
Kolkata-700091, West Bengal

Office of the Chief Mining Officer • Govt. of West Bengal

POTENTIAL ZONE CODE (as per DSR): PBBD_BD2_DA_13(XIIIB)

SAND BLOCK CODE: MIN_EBUR_25

MINERAL: Riverbed Sand

RIVER: Damodar River; P.S.: Burdwan

DISTRICT: Purba Bardhhaman

APPROVED
10/02/2023
(Joydeb Das)
Chief Mining Officer
Govt. of West Bengal

MOUZA	PLOT NO.	J.L. NO.	RIVER	AREA
Becharhat	1632(P), 1620(P)& 1560(P)	79	Damodar	6.65 Ha (16.4255 Acres)

PREPARED BY:

Dr. N. B. Chanda
Qualified Person
M/S Indian Mine Planners & Consultants

Annexure V: Project Site Located on Toposheet

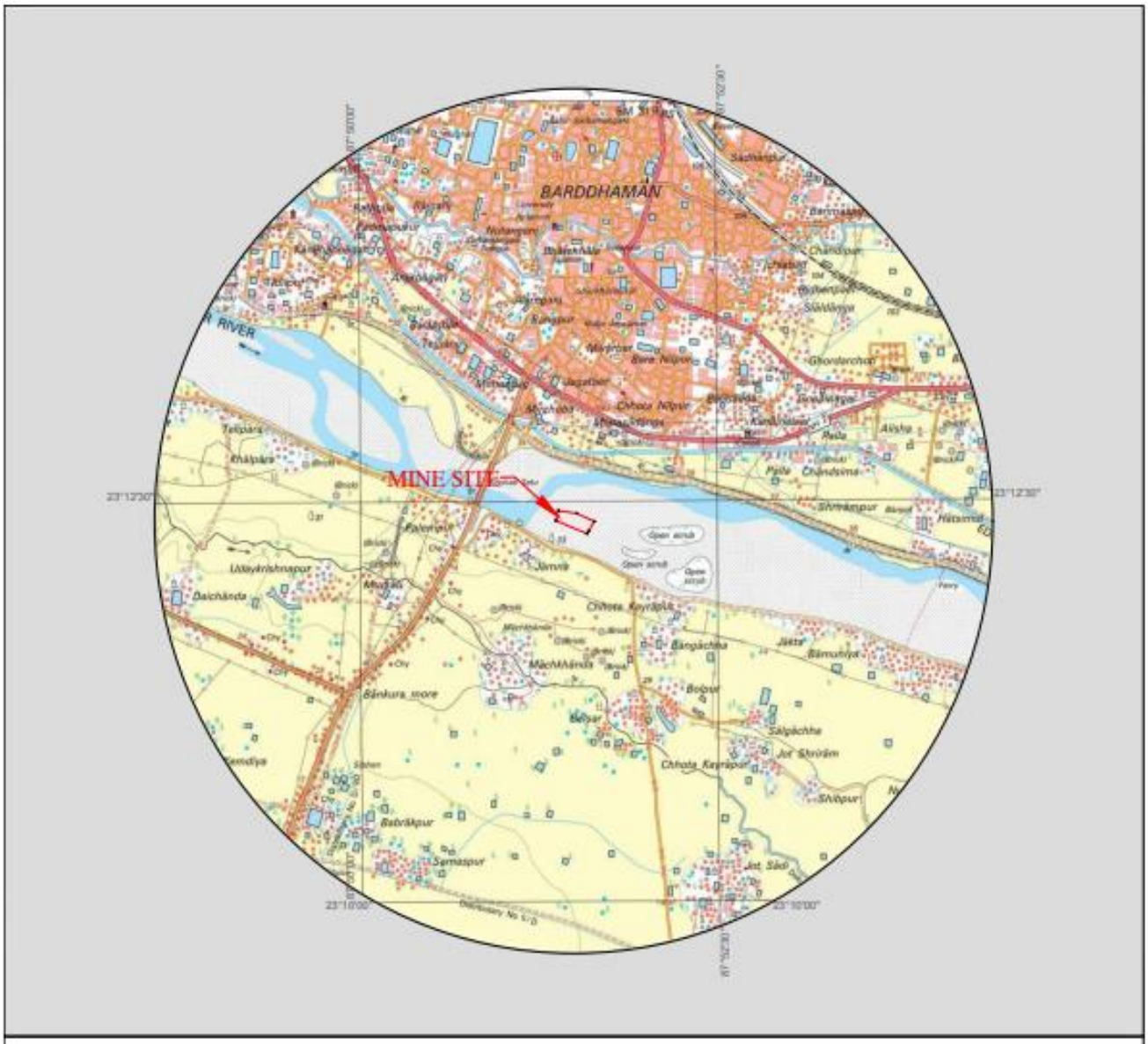


PLATE NO. - 2

BECHARHAT SAND MINING LEASE (MIN_EBUR_25)
MOUZA - BECHARHAT
BLOCK - BARDHAMAN-II, DIST. - PURBA BARDHAMAN, STATE - WEST BENGAL
JL No. - 79, PLOT NO(P)- 1620(P) & 1580(P)
AREA - 16.432 Acres (6.65 Ha)

WBMDTCL

TOPOGRAPHICAL PLAN

SCALE -1:50000 | DATE: JUNE, 2023

PREPARED BY:
M/S INDIAN MINE PLANNERS AND CONSULTANTS

INDEX

BLOCK BOUNDARY

SCALE: 1:50000
ALL SCALE ARE IN METER

Annexure VI: Baseline Data (Lab Report)

N.D. INTERNATIONAL

GOVERNMENT REGISTERED

An ISO 9001:2015 Company Certificate : 20DQHH82

035-CS-QMS

TEST REPORT

SAMPLE DRAWN BY US:

Certificate No. NL(M)/23-24125826 Date: January ,2024 Page -1 of 1

Name of Customer : Indian Mine Planners and Consultants

Address : GE-61, Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107

: Site Address: - MIN_EBUR_25 (Bardhhaman-II).

Description of Sample : Ambient Air

TEST FINDINGS:

Sl, No.	Date of Monitoring	Collection Source : AQ-1					
		PM 10 (pg/m³)	PM 2.5 (pg/m³)	SO2 (pg/m³)	NOx (pg/m³)	CO(ppm)	Si (pg/m³)
1	02-Oct-23	81	54	15	9	< 1.0	6.1
2	05-Oct-23	71	41	17	8	< 1.0	8.8
3	08-Oct-23	71	45	14	7	<1.0	4.1
4	11-Oct-23	66	48	19	8	< 1.0	6.6
5	14-Oct-23	74	51	20	8	< 1.0	6.4
6	17-Oct-23	78	55	21	9	< 1.0	6.7
7	20-Oct-23	70	46	20	10	1	6.5
8	23-Oct-23	81	52	21	10	< 1.0	5.8
9	26-Oct-23	70	44	22	9	< 1.0	4.6
10	29-Oct-23	76	56	19	9	< 1.0	6.2
11	01-Nov-23	81	55	15	9	< 1.0	6.1
12	04-Nov-23	72	41	17	8	< 1.0	9.4
13	07-Nov-23	73	45	14	7	< 1.0	4.1
14	10-Nov-23	66	48	19	8	< 1.0	6.6
15	13-Nov-23	70	47	14	10	1	6.1
16	16-Nov-23	74	50	18	8	1	5.1
17	19-Nov-23	75	47	18	9	1	4.4
18	22-Nov-23	70	55	22	10	1	4.8
19	25-Nov-23	79	51	26	10	1	6.4
20	28-Nov-23	69	49	20	9	< 1.0	8
21	01-Dec-23	64	47	21	11	1	9.5
22	04-Dec-23	75	48	17	10	< 1.0	9.1
23	07-Dec-23	81	54	15	14	1	6.6
24	10-Dec-23	71	58	15	12	1	6.2
25	13-Dec-23	71	52	21	12	< 1.0	6.1
26	16-Dec-23	66	58	11	11	1	9
27	19-Dec-23	69	54	16	14	2	8
28	22-Dec-23	74	52	13	11	< 1.0	6.6
29	25-Dec-23	78	46	13	17	2	8.6
30	28-Dec-23	70	47	16	14	1	5.8
MAX		**81**	**58**	**27**	**19**	**2**	**9.5**
MIN		**58**	**41**	**10**	**6**	**1**	**4.1**
Average		**73.23**	**49.7**	**17.3**	**10.33**	**1.46**	**6.73**

...END OF TEST REPORT...

For N.D. International

K.P. De - CEO (Authorised Signatory)

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2 Results relate only to the parameters tested.
3 The remaining sample after test will be retained for 15 days from the date of issue of certificate.

SKR

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E-mail : hdinternational@gmail.com, Website : www.ndinternational.in

N.D. INTERNATIONAL

GOVERNMENT REGISTERED

An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

SAMPLE DRAWN BY US:

Certificate No. NL(M)/23-2125835 Date: January ,2024 Page -1 of 1

Name of Customer : Indian Mine Planners and Consultants

Address : GE-61,Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107

: Site Address: - MIN_EBUR_25 (Bardhhaman-II).

Description of Sample : Ambient Air

TEST FINDINGS:

Sl, No.	Date of Monitoring	Collection Source : AQ-2					
		PM 10 (pg/m³)	PM 2.5 (pg/m³)	SO2 (pg/m³)	NOx (pg/m³)	CO(ppm)	Si (pg/m³)
1	02-Oct-23	74	54	15	9	< 1.0	6.1
2	05-Oct-23	74	41	17	8	< 1.0	8.8
3	08-Oct-23	71	45	14	5	<1.0	3.5
4	11-Oct-23	70	47	19	8	< 1.0	6.6
5	14-Oct-23	64	51	20	8	< 1.0	6.4
6	17-Oct-23	69	55	21	9	< 1.0	6.7
7	20-Oct-23	72	46	20	10	1	7
8	23-Oct-23	58	51	21	10	< 1.0	5.8
9	26-Oct-23	69	44	22	9	< 1.0	4.6
10	29-Oct-23	74	56	19	9	< 1.0	6.2
11	01-Nov-23	81	54	15	9	< 1.0	6.1
12	04-Nov-23	75	41	17	8	< 1.0	9.4
13	07-Nov-23	71	45	14	7	< 1.0	7.5
14	10-Nov-23	78	48	19	8	< 1.0	6.6
15	13-Nov-23	73	47	14	10	2	6.1
16	16-Nov-23	74	50	15	8	1	5.1
17	19-Nov-23	78	47	18	9	2	4.4
18	22-Nov-23	79	55	22	10	1	4.8
19	25-Nov-23	83	51	24	10	1	6.4
20	28-Nov-23	71	46	20	9	< 1.0	8
21	01-Dec-23	64	47	21	11	1	9.5
22	04-Dec-23	75	48	14	10	< 1.0	9.1
23	07-Dec-23	81	54	15	14	2	6.6
24	10-Dec-23	71	58	10	12	1	6.2
25	13-Dec-23	76	52	21	12	< 1.0	6.1
26	16-Dec-23	78	58	14	11	2	9
27	19-Dec-23	74	54	11	14	2	8.1
28	22-Dec-23	77	52	13	11	< 1.0	6.6
29	25-Dec-23	78	46	14	14	2	8.6
30	28-Dec-23	70	47	16	14	1	5.5
MAX		**83**	**58**	**24**	**14**	**2**	**9.5**
MIN		**64**	**41**	**11**	**5**	**1**	**3.5**
Average		**73.53**	**49.44**	**17.2**	**9.8**	**1.2**	**6.6**

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An ISO 9001:2015 Company Certificate : 20DQHH82

035-CS-OHS

TEST REPORT

SAMPLE DRAWN BY US:

Certificate No. NL(M)/23-2125840 Date: January ,2024 Page -1 of 1

Name of Customer : Indian Mine Planners and Consultants

Address : GE-61,Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107

: Site Address: - MIN_EBUR_25 (Bardhhaman-II).

Description of Sample : Ambient Air

TEST FINDINGS:

Sl, No.	Date of Monitoring	Collection Source : AQ-3					
		PM 10 (pg/m³)	PM 2.5 (pg/m³)	SO2 (pg/m³)	NOx (pg/m³)	CO(ppm)	Si (pg/m³)
1	02-Oct-23	81	51	15	9	< 1.0	6.1
2	05-Oct-23	73	41	17	8	< 1.0	8.8
3	08-Oct-23	74	45	14	5	<1.0	3.5
4	11-Oct-23	66	47	19	8	< 1.0	6.6
5	14-Oct-23	74	51	20	8	< 1.0	6.4
6	17-Oct-23	78	47	21	9	< 1.0	6.7
7	20-Oct-23	70	46	20	10	1	6.5
8	23-Oct-23	85	51	21	10	< 1.0	5.8
9	26-Oct-23	71	44	22	9	< 1.0	3.1
10	29-Oct-23	74	46	19	7	< 1.0	6.2
11	01-Nov-23	81	52	15	9	< 1.0	6.1
12	04-Nov-23	75	41	17	8	< 1.0	9.4
13	07-Nov-23	71	45	14	7	< 1.0	4.1
14	10-Nov-23	66	48	19	8	< 1.0	6.6
15	13-Nov-23	70	47	14	10	1	6.1
16	16-Nov-23	74	50	15	8	1	5.1
17	19-Nov-23	78	47	18	9	1	5.4
18	22-Nov-23	70	52	22	10	1	4.8
19	25-Nov-23	81	51	26	10	1	6.4
20	28-Nov-23	69	46	20	9	< 1.0	8
21	01-Dec-23	48	47	21	11	1	9.5
22	04-Dec-23	74	48	14	10	< 1.0	9.1
23	07-Dec-23	81	51	15	14	1	6.6
24	10-Dec-23	73	47	11	12	1	6.2
25	13-Dec-23	71	58	21	12	< 1.0	6.1
26	16-Dec-23	65	46	14	11	1	9
27	19-Dec-23	69	52	11	14	2	8
28	22-Dec-23	74	49	13	11	< 1.0	6.6
29	25-Dec-23	78	46	14	14	2	8.6
30	28-Dec-23	70	47	16	14	1	5.8
MAX		**85**	**52**	**26**	**14**	**2**	**9.5**
MIN		**48**	**41**	**11**	**7**	**1**	**3.1**
Average		**70.77**	**49.7**	**17.3**	**9.96**	**1.0**	**6.5**

...END OF TEST REPORT...

For N.D. International

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TEST REPORT

SAMPLE DRAWN BY US:

Certificate No. NL(M)/23-2125852 Date: January ,2024 Page -1 of 1

Name of Customer : Indian Mine Planners and Consultants

Address : GE-61,Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107

: Site Address: - MIN_EBUR_25 (Bardhhaman-II).

Description of Sample : Ambient Air

TEST FINDINGS:

Sl. No.	Date of Monitoring	Collection Source : AQ-4					
		PM 10 (µg/m³)	PM 2.5 (µg/m³)	SO2 (µg/m³)	NOx (µg/m³)	CO(ppm)	Si (µg/m³)
1	02-Oct-23	81	54	15	9	<1.0	6.1
2	05-Oct-23	71	41	17	8	<1.0	8.8
3	08-Oct-23	71	45	14	7	<1.0	3.1
4	11-Oct-23	68	47	19	8	<1.0	6.6
5	14-Oct-23	74	51	20	8	<1.0	6.4
6	17-Oct-23	78	55	21	9	<1.0	6.7
7	20-Oct-23	70	46	20	10	1	6.7
8	23-Oct-23	81	51	21	10	<1.0	5.8
9	26-Oct-23	70	44	22	9	<1.0	4.6
10	29-Oct-23	74	56	19	9	<1.0	6.2
11	01-Nov-23	81	54	15	9	<1.0	6.1
12	04-Nov-23	71	41	17	8	<1.0	8.4
13	07-Nov-23	71	45	14	7	<1.0	4.1
14	10-Nov-23	66	48	19	8	<1.0	6.6
15	13-Nov-23	70	47	14	10	1	6.1
16	16-Nov-23	74	50	15	8	1	5.1
17	19-Nov-23	78	47	18	9	1	4.4
18	22-Nov-23	70	55	22	10	1	4.8
19	25-Nov-23	81	51	26	10	1	6.4
20	28-Nov-23	69	46	20	9	<1.0	8
21	01-Dec-23	48	47	21	11	1	8.5
22	04-Dec-23	74	48	14	10	<1.0	8.1
23	07-Dec-23	81	54	15	14	1	6.6
24	10-Dec-23	71	58	11	12	1	6.2
25	13-Dec-23	71	52	21	12	<1.0	6.1
26	16-Dec-23	66	58	14	11	1	9
27	19-Dec-23	69	54	11	14	2	8
28	22-Dec-23	74	52	13	11	<1.0	6.6
29	25-Dec-23	78	46	14	17	2	8.3
30	28-Dec-23	70	47	16	14	1	5.8
MAX		**81**	**58**	**26**	**17**	**2**	**9**
MIN		**48**	**41**	**11**	**7**	**1**	**3.1**
Average		**72.3**	**49.67**	**17.3**	**10.3**	**1.3**	**6.5**

...END OF TEST REPORT...

For N.D. International

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TEST REPORT

SAMPLE DRAWN BY US:

Certificate No. NL(M)/23-2125860 | Date: January ,2024 | Page -1 of 1

Name of Customer : Indian Mine Planners and Consultants

Address : GE-6, Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107

: Site Address: - MIN_EBUR_25 (Bardhhaman-II).

Description of Sample : Weather Monitoring

Sampling Location : AQ-1

TEST FINDINGS:

Sl. No	Date	Time	Temperature (^{0}C)	Humidity (%)	Wind Direction (Degree)	Wind Speed (m/Sec)
1	12-Oct-23	6:00 AM	20.3	88	143	4.4
2	12-Oct-23	10:00 AM	24.6	71	231	5.3
3	12-Oct-23	2.00 PM	21.7	57	129	3.1
4	12-Oct-23	6:00 AM	23.4	77	55	0.6
5	12-Oct-23	10:00 AM	30.7	84	42	4.7
6	13-Oct-23	2.00 PM	22.4	76	332	3.6
7	13-Oct-23	6:00 AM	27.8	65	231	4.8
8	13-Oct-23	10:00 AM	24.5	71	352	3.7
9	13-Oct-23	2.00 PM	23.1	66	180	5.5
10	13-Oct-23	6:00 AM	31.5	61	277	4.1
11	13-Oct-23	10:00 AM	34.3	79	183	5.9
12	14-Oct-23	2.00 PM	22.6	58	177	1.3
13	14-Oct-23	6:00 AM	30.7	63	339	0.6
14	14-Oct-23	10:00 AM	22.4	53	27	2.8
15	14-Oct-23	2.00 PM	27.8	73	99	5.7
16	14-Oct-23	6:00 AM	24.5	71	57	3.6
17	14-Oct-23	10:00 AM	23.1	71	15	4.8
18	15-Oct-23	2.00 PM	20.3	66	177	3.7
19	15-Oct-23	6:00 AM	24.6	61	236	5.5
20	15-Oct-23	10:00 AM	21.7	79	183	3.7
21	15-Oct-23	2.00 PM	30.7	58	177	5.5
22	15-Oct-23	6:00 AM	22.4	63	339	4.1
23	16-Oct-23	10:00 AM	27.8	79	27	5.9
24	16-Oct-23	2.00 PM	24.5	58	99	4.4
25	16-Oct-23	6:00 AM	23.1	63	55	5.3
26	16-Oct-23	10:00 AM	34.3	53	42	3.1
27	16-Oct-23	2.00 PM	22.6	73	332	3.7
28	17-Oct-23	6:00 AM	30.7	88	231	5.5
29	18-Oct-23	10:00 AM	22.4	71	352	4.1
30	19-Oct-23	2.00 PM	21.7	57	183	5.9
31	20-Oct-23	6:00 AM	23.4	76	177	1.3
32	21-Oct-23	10:00 AM	30.7	65	339	0.6
33	22-Oct-23	2.00 PM	22.4	71	27	5.5
34	23-Oct-23	6:00 AM	27.8	67	99	3.7
35	24-Oct-23	10:00 AM	28.4	73	57	5.5

...END OF TEST REPORT...

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An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

SAMPLE DRAWN BY US:

Certificate No. NL(M)/23-2125868 Date: January ,2024

Name of Customer : Indian Mine Planners and Consultants

Address : GE-6, Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107

: Site Address: - MIN_EBUR_25 (Bardhhaman-II).

Description of Sample : Ambient Noise Level

Sampling Location : N-1, N-2, N-3 & N-4

TEST FINDINGS:

Date	Time	Day Time Noise Level in dB (A)-Leg				
		N1	N2	Date	N3	N4
17-10-2023	6 AM - 7 AM	40.7	44.6	19-10-2023	47	48.2
	7AM - 8 AM	47	55		45.2	42.5
	8 AM - 9 AM	46.2	45.9		50.4	41.8
	9 AM - 10 AM	50.4	42.7		43.9	45.2
	10 AM - 11 AM	48.7	40.8		45	50.4
	11 AM - 12 PM	49	42.4		46	46.9
	12 PM - 1 PM	51.5	43.9		44.6	44
	1 PM - 2 PM	46.2	45		51	46
	2 PM - 3 PM	50.4	46		53.4	44.6
	3 PM - 4 PM	44.8	43.1		48.7	45.6
	4 PM - 5 PM	41.3	43.7		49	42.3
	5 PM - 6 PM	49.5	44		44.6	49.8
	6 PM - 7 PM	54.1	51.4		42.3	44
	7 PM - 8 PM	53.8	48.7		49.8	46
	8 PM - 9 PM	47	49		54.1	44.6
	9 PM - 10 PM	45.2	42.3		45.2	40.8
Date	**Time**	**Night Time Noise Level in dB (A)-Leg**				
		N1	**N2**	**Date**	**N3**	**N4**
17-10-2023	10 PM - 11 PM	41.7	43.2	19-10-2023	44	46.7
	11 PM - 12 AM	40.8	45.4		46	42
18-10-2023	12 AM - 1 AM	40.4	45.6	20-10-2023	44.6	44.6
	1 AM - 2 AM	43.4	42.3		44.6	42.3
	2 AM - 3 AM	44	45.8		42.3	41.8
	3 AM - 4 AM	43.1	42.2		49.8	42
	4 AM - 5 AM	43.5	41.4		44.6	43
	5 AM - 6 AM	41.7	44.7		40.8	44.5

Note: Limits as per CPCB for Residencial Area, Day Time (6:00 am to 10:00 pm): 55 dB(A), Night Time (10:00 pm to 6:00 am): 45 dB(A) Commercial area Day Time (6:00 am to 10:00 pm), Night Time (10:00 pm to 6:00 am):55 dB(A).

...END OF TEST REPORT...

For N.D. International

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N.D. INTERNATIONAL

GOVERNMENT REGISTERED

An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

Certificate No. NL(M)/23-2125863 Date: 10.01.2024

SAMPLE DRAWN BY US: Page -1 of 1

Name of Customer	: Indian Mine Planners and Consultants
Address	: GE-6, Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107
Description of Sample	: Ground Water
Collection Source	: MIN_EBUR_25 (Bardhaman-II).GW1
Sampling Done by	: Mr. A. Mondal & R. Mondal
Environmental Condition	: Temperature : 29^0 C, Humidity : 62%
Sample Drawn on	: 13.12.2023
Sample Received on	: 15.12.2023
Analysis Started on	: 15.12.2023
Analysis Completed on	: 19.12.2023
Method of Sampling	:IS-1622:1981, IS-17614(P-25):2022(Bact), IS-17614(P-5):2021(Chem),
Mode of Sampling	: Grab Sampling Plan:NDI/FM/52A

A. MICROBIOLOGICAL TEST FINDINGS :

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012
1	Total Coliform/ 100ml @ 37°C for 24 hours	IS 1622	Cfu	<1 (D1.:1)	Not Detectable
2	E. coli/I 00 ml @ 44.5°C for 24 hours	IS 1622	-	Absent	Not Detectable

B. ORGANOLEPTI C & PHYSICAL PARAMETERS:

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012	
					AL(Max.)	PL(Max.)
3	pH at 25 c	APHA 23rd Edn.4500 H" B	-	7.1	6.5-8.5	No relaxation
4	Total Dissolved Solid	APHA 231'd Ed n2540-C	mg/L	154	500	2000

C. GENERAL PARAMETERS CONCERNING SUBTANCES UNDESIRABLE :

5	Chloride (as Cl)	APHA 23rd Edn.4500 Cl-8	mg/L	19.5	250	1000
6	Fluoride (as F)	APHA 23rd Edn, 4500-F-C	mg/L	<0.1 (DL:0.1)	1.0	1.5
7	Iron (as Fe)	APHA 23rd Edn, 31500- Fe B	mg/L	0.36	0.3	No relaxation
8	Nitrate (as NO_3)	APHA 23rd Edn,4500- NO_3 B	mg/L	1.23	45	No relaxation
9	Sulphate (as SO_4)	APHA 23rd Edn, 4500 SO_4-B	mg/L	27.68	200	400
10	Sulphide as (H2S)	APHA 23rd Edn, 4500 S^2-D	mg/L	<0.05 (DL:O.OS)	0.05	No relaxation
11	Total Hardness (as $CaCO_3$)	APHA 23rd Edn, 2340 C	mg/L	89	200	600
12	Arsenic (as As)	APHA 23rd Edn, 3113B	mg/L	<0.002 (DL.:0.002)	0.01	0.05
13	Totnl Chromium (as Cr)	APHA 23rd Edn, 3111 D	mg/L	<0.01 (DL.:0.01)	0.05	No relaxation
14	Total Suspended Solids	APHA 23rd Edn, 2540 D	mg/L	16.5	100 mg/L (max)	
15	Biochemical Oxygen Demand at 27°C for 3 days	IS 3025 (Part - 44) 1993	mg/L	2.8	30 mg/L (max)	
16	Chemical Oxygen Demand	APHA 23rd Edn, 5220 B	mg/L	21	250 mg/L (max)	

Note : 1. AL- Acceptable Limit. 2. PL- Permissible Limit. 3. DL- Detection Limit

As per IS 10500:2012 Total Coliform should be Not Detectable/100ml, which is equivalent to <1 Cfu/100 ml as per IS : 1622.

Remarks : Bacteriologically : Satisfactory for the above tested parameters

Chemically : Satisfactory for the above tested parameters.s

Statement of Conformity is applied considering Decision Rule as per ISO Guide 98-4

...END OF TEST REPORT...

For, N.D. International

Sweta Mukherjee
(Microbiologist)
(Authorised Signatory)

N.D. INTERNATIONAL KOLKATA

For, N.D. International

K.P. De - CEO
Authorised Signatory

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3. The remaining sample after test will be retained for 15 days from the date of issue of certificate.

MB-II

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N.D. INTERNATIONAL

GOVERNMENT REGISTERED

An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

Certificate No. NL(M)/23-2125868 — Date: 10.01.2024

SAMPLE DRAWN BY US: — Page -1 of 1

Name of Customer	: Indian Mine Planners and Consultants
Address	: GE-6, Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107
Description of Sample	: Ground Water
Collection Source	: MIN_EBUR_25 (Bardhhaman-II).GW2
Sampling Done by	: Mr. A. Mondal & R. Mondal
Environmental Condition	: Temperature :29°C, Humidity : 62%
Sample Drawn on	: 13.12.2023
Sample Received on	: 15.12.2023
Analysis Started on	: 15.12.2023
Analysis Completed on	: 19.12.2023
Method of Sampling	:IS-1622:1981, IS-17614(P-25):2022(Bact), IS-17614(P-5):2021(Chem),
Mode of Sampling	: Grab — Sampling Plan:NDI/FM/52A

A. MICROBIOLOGICAL TEST FINDINGS :

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012
1	Total Coliform/ 100ml @ 37°C for 24 hours	IS 1622	Cfu	<1 (D1.:1)	Not Detectable
2	E. coli/I 00 ml @ 44.5°C for 24 hours	IS 1622	-	Absent	Not Detectable

B. ORGANOLEPTI C & PHYSICAL PARAMETERS:

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012	
					AL(Max.)	PL(Max.)
3	pH at 25 c	APHA 23rd Edn.4500 H+ B	-	6.9	6.5-8.5	No relaxation
4	Total Dissolved Solid	APHA 231'd Ed n2540-C	mg/L	139	500	2000

C. GENERAL PARAMETERS CONCERNING SUBTANCES UNDESIRABLE :

5	Chloride (as Cl)	APHA 23rd Edn.4500 Cl-8	mg/L	19.8	250	1000
6	Fluoride (as F)	APHA 23rd Edn, 4500-F-C	mg/L	<0.1 (DL:0.I)	1.0	1.5
7	Iron (as Fe)	APHA 23rd Edn, 31500- Fe B	mg/L	0.28	0.3	No relaxation
8	Nitrate (as NO_3)	APHA 23rd Edn,4500- NO_3 B	mg/L	2.18	45	No relaxation
9	Sulphate (as SO_4)	APHA 23rd Edn, 4500 SO_4-B	mg/L	27.6	200	400
10	Sulphide as (H2S)	APHA 23rd Edn, 4500 S2-D	mg/L	<0.05 (DL:O.OS)	0.05	No relaxation
11	Total Hardness (as $CaCO_3$)	APHA 23rd Edn, 2340 C	mg/L	76	200	600
12	Arsenic (as As)	APHA 23rd Edn, 3113B	mg/L	<0.002 (DL:0.002)	0.01	0.05
13	Totnl Chromium (as Cr)	APHA 23rd Edn, 3111 D	mg/L	<0.01 (DL:0.01)	0.05	No relaxation
14	Total Suspended Solids	APHA 23rd Edn, 2540 D	mg/L	18	100 mg/L (max)	
15	Biochemical Oxygen Demand at 27°C for 3 days	IS 3025 (Part - 44) 1993	mg/L	3.8	30 mg/L (max)	
16	Chemical Oxygen Demand	APHA 23rd Edn, 5220 B	mg/L	19	250 mg/L (max)	

Note : 1. AL- Acceptable Limit. 2. PL- Permissible Limit. 3. DL- Detection Limit

As per IS 10500:2012 Total Coliform should be Not Detectable/100ml, which is equivalent to <1 Cfu/100 ml as per IS : 1622.

Remarks : Bacteriologically : Satisfactory for the above tested parameters

Chemically : Satisfactory for the above tested parameters.

Statement of Conformity is applied considering Decision Rule as per ISO Guide 98-4

...END OF TEST REPORT...

For, N.D. International

Sweta Mukherjee
(Microbiologist)
(Authorised Signatory)

N.D. INTERNATIONAL KOLKATA

For, N.D. International

K.P. De - CEO
Authorised Signatory

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3. The remaining sample after test will be retained for 15 days from the date of issue of certificate.

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N.D. INTERNATIONAL

GOVERNMENT REGISTERED

An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

Certificate No. NL(M)/23-2125875 Date: 10.01.2024

SAMPLE DRAWN BY US: Page -1 of 1

Name of Customer	: Indian Mine Planners and Consultants
Address	: GE-6, Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107
Description of Sample	: Ground Water
Collection Source	: MIN_EBUR_25 (Bardhhaman-II).GW3
Sampling Done by	: Mr. A. Mondal & R. Mondal
Environmental Condition	: Temperature :29°C, Humidity : 62%
Sample Drawn on	: 13.12.2023
Sample Received on	: 15.12.2023
Analysis Started on	: 15.12.2023
Analysis Completed on	: 19.12.2023
Method of Sampling	:IS-1622:1981, IS-17614(P-25):2022(Bact), IS-17614(P-5):2021(Chem),
Mode of Sampling	: Grab Sampling Plan:NDI/FM/52A

A. MICROBIOLOGICAL TEST FINDINGS :

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012
1	Total Coliform/ 100ml @ 37°C for 24 hours	IS 1622	Cfu	<1 (DL:1)	Not Detectable
2	E. coli/1 00 ml @ 44.5°C for 24 hours	IS 1622	-	Absent	Not Detectable

B. ORGANOLEPTI C & PHYSICAL PARAMETERS:

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012	
					AL(Max.)	PL(Max.)
3	pH at 25 c	APHA 23rd Edn.4500 H+ B	-	7.2	6.5-8.5	No relaxation
4	Total Dissolved Solid	APHA 231'd Ed n2540-C	mg/L	128	500	2000
C. GENERAL PARAMETERS CONCERNING SUBTANCES UNDESIRABLE :						
5	Chloride (as Cl)	APHA 23rd Edn.4500 Cl-8	mg/L	19.7	250	1000
6	Fluoride (as F)	APHA 23rd Edn, 4500-F-C	mg/L	<0.1 (DL:0.1)	1.0	1.5
7	Iron (as Fe)	APHA 23rd Edn, 31500- Fe B	mg/L	0.18	0.3	No relaxation
8	Nitrate (as NO_3)	APHA 23rd Edn,4500- NO_3 B	mg/L	2.94	45	No relaxation
9	Sulphate (as SO_4)	APHA 23rd Edn, 4500 SO_4-B	mg/L	28.39	200	400
10	Sulphide as (H2S)	APHA 23rd Edn, 4500 S^2-D	mg/L	<0.05 (DL:O.OS)	0.05	No relaxation
11	Total Hardness (as $CaCO_3$)	APHA 23rd Edn, 2340 C	mg/L	69	200	600
12	Arsenic (as As)	APHA 23rd Edn, 3113B	mg/L	<0.002 (DL:0.002)	0.01	0.05
13	Totnl Chromium (as Cr)	APHA 23rd Edn, 3111 D	mg/L	<0.01 (DL:0.01)	0.05	No relaxation
14	Total Suspended Solids	APHA 23rd Edn, 2540 D	mg/L	12	100 mg/L (max)	
15	Biochemical Oxygen Demand at 27°C for 3 days	IS 3025 (Part - 44) 1993	mg/L	3.2	30 mg/L (max)	
16	Chemical Oxygen Demand	APHA 23rd Edn, 5220 B	mg/L	45	250 mg/L (max)	

Note : 1. AL- Acceptable Limit. 2. PL- Permissible Limit. 3. DL- Detection Limit

As per IS 10500:2012 Total Coliform should be Not Detectable/100ml, which is equivalent to <1 Cfu/100 ml as per IS : 1622.

Remarks : Bacteriologically : Satisfactory for the above tested parameters

Chemically : Satisfactory for the above tested parameters.

Statement of Conformity is applied considering Decision Rule as per ISO Guide 98-4

...END OF TEST REPORT...

For, N.D. International

Sweta Mukherjee
(Microbiologist)
(Authorised Signatory)

N.D. INTERNATIONAL KOLKATA

For, N.D. International

K.P. De - CEO
Authorised Signatory

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An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

Certificate No. NL(M)/23-24/12557 Date: 10.01.2024

SAMPLE DRAWN BY US: Page -1 of 1

Name of Customer	: Indian Mine Planners and Consultants
Address	: GE-6, Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107
Description of Sample	: Surface Water
Collection Source	: MIN_EBUR_25 (Bardhhaman-II).SW1
Sampling Done by	: Mr. A. Mondal & R. Mondal
Environmental Condition	: Temperature :29°C, Humidity : 62%
Sample Drawn on	: 13.12.2023
Sample Received on	: 15.12.2023
Analysis Started on	: 15.12.2023
Analysis Completed on	: 19.12.2023
Method of Sampling	:IS-1622:1981, IS-17614(P-25):2022(Bact), IS-17614(P-5):2021(Chem),
Mode of Sampling	: Grab Sampling Plan:NDI/FM/52A

A. MICROBIOLOGICAL TEST FINDINGS :

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012
1	Total Coliform/ 100ml @ 37°C for 24 hours	IS 1622	Cfu	<1 (DL:1)	Not Detectable
2	E. coli/I 00 ml @ 44.5°C for 24 hours	IS 1622	-	Absent	Not Detectable

B. ORGANOLEPTI C & PHYSICAL PARAMETERS:

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012	
					AL(Max.)	PL(Max.)
3	pH at 25 c	APHA 23rd Edn.4500 H^+ B	-	6.9	6.5-8.5	No relaxation
4	Total Dissolved Solid	APHA 231'd Ed n2540-C	mg/L	148	500	2000

C. GENERAL PARAMETERS CONCERNING SUBTANCES UNDESIRABLE :

5	Chloride (as Cl)	APHA 23rd Edn.4500 Cl-8	mg/L	28.85	250	1000
6	Fluoride (as F)	APHA 23rd Edn, 4500-F-C	mg/L	<0.1 (DL:0.1)	1.0	1.5
7	Iron (as Fe)	APHA 23rd Edn, 31500- Fe B	mg/L	0.28	0.3	No relaxation
8	Nitrate (as NO_3)	APHA 23rd Edn,4500- NO_3 B	mg/L	0.92	45	No relaxation
9	Sulphate (as SO_4)	APHA 23rd Edn, 4500 SO_4-B	mg/L	22.6	200	400
10	Sulphide as (H_2S)	APHA 23rd Edn, 4500 S^{2-}D	mg/L	<0.05 (DL:O.OS)	0.05	No relaxation
11	Total Hardness (as $CaCO_3$)	APHA 23rd Edn, 2340 C	mg/L	57	200	600
12	Arsenic (as As)	APHA 23rd Edn, 3113B	mg/L	<0.002 (DL:0.002)	0.01	0.05
13	Totnl Chromium (as Cr)	APHA 23rd Edn, 3111 D	mg/L	<0.01 (DL:0.01)	0.05	No relaxation
14	Total Suspended Solids	APHA 23rd Edn, 2540 D	mg/L	19	100 mg/L (max)	
15	Biochemical Oxygen Demand at 27°C for 3 days	IS 3025 (Part - 44) 1993	mg/L	3.6	30 mg/L (max)	
16	Chemical Oxygen Demand	APHA 23rd Edn, 5220 B	mg/L	17	250 mg/L (max)	

Note : 1. AL- Acceptable Limit. 2. PL- Permissible Limit. 3. DL- Detection Limit

As per IS 10500:2012 Total Coliform should be Not Detectable/100ml, which is equivalent to <1 Cfu/100 ml as per IS : 1622.

Remarks : Bacteriologically : Satisfactory for the above tested parameters

Chemically : Satisfactory for the above tested parameters.

Statement of Conformity is applied considering Decision Rule as per ISO Guide 98-4

...END OF TEST REPORT...

For, N.D. International

Sweta Mukherjee
(Microbiologist)
(Authorised Signatory)

N.D. INTERNATIONAL KOLKATA

For, N.D. International

K.P. De - CEO
Authorised Signatory

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An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

Certificate No. NL(M)/23-24/12560 Date: 10.01.2024

SAMPLE DRAWN BY US: Page -1 of 1

Name of Customer	: Indian Mine Planners and Consultants
Address	: GE-6, Rajdanga Main road,East Kolkata Township Project,E.M Bypass,Kol-107
Description of Sample	: Surface Water
Collection Source	: MIN_EBUR_25 (Bardhhaman-II).SW2
Sampling Done by	: Mr. A. Mondal & R. Mondal
Environmental Condition	: Temperature:29°C, Humidity : 62%
Sample Drawn on	: 13.12.2023
Sample Received on	: 15.12.2023
Analysis Started on	: 15.12.2023
Analysis Completed on	: 19.12.2023
Method of Sampling	:IS-1622:1981, IS-17614(P-25):2022(Bact), IS-17614(P-5):2021(Chem),
Mode of Sampling	: Grab Sampling Plan:NDI/FM/52A

A. MICROBIOLOGICAL TEST FINDINGS :

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012
1	Total Coliform/ 100ml @ 37°C for 24 hours	IS 1622	Cfu	<1 (D1.:1)	Not Detectable
2	E. coli/I 00 ml @ 44.5°C for 24 hours	IS 1622	-	Absent	Not Detectable

B. ORGANOLEPTI C & PHYSICAL PARAMETERS:

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012	
					AL(Max.)	PL(Max.)
3	pH at 25 c	APHA 23rd Edn.4500 H+ B	-	7.2	6.5-8.5	No relaxation
4	Total Dissolved Solid	APHA 231'd Ed n2540-C	mg/L	131	500	2000

C. GENERAL PARAMETERS CONCERNING SUBTANCES UNDESIRABLE :

5	Chloride (as Cl)	APHA 23rd Edn.4500 Cl-8	mg/L	34.88	250	1000
6	Fluoride (as F)	APHA 23rd Edn, 4500-F-C	mg/L	<0.1 (DL:0.I)	1.0	1.5
7	Iron (as Fe)	APHA 23rd Edn, 31500- Fe B	mg/L	0.18	0.3	No relaxation
8	Nitrate (as NO_3)	APHA 23rd Edn,4500- NO_3 B	mg/L	1.82	45	No relaxation
9	Sulphate (as SO_4)	APHA 23rd Edn, 4500 SO_4-B	mg/L	28.9	200	400
10	Sulphide as (H_2S)	APHA 23rd Edn, 4500 S^2-D	mg/L	<0.05 (DL:O.OS)	0.05	No relaxation
11	Total Hardness (as $CaCO_3$)	APHA 23rd Edn, 2340 C	mg/L	68	200	600
12	Arsenic (as As)	APHA 23rd Edn, 3113B	mg/L	<0.002 (DL.:0.002)	0.01	0.05
13	Totnl Chromium (as Cr)	APHA 23rd Edn, 3111 D	mg/L	<0.01 (DL.:0.01)	0.05	No relaxation
14	Total Suspended Solids	APHA 23rd Edn, 2540 D	mg/L	21	100 mg/L (max)	
15	Biochemical Oxygen Demand at 27°C for 3 days	IS 3025 (Part - 44) 1993	mg/L	3.8	30 mg/L (max)	
16	Chemical Oxygen Demand	APHA 23rd Edn, 5220 B	mg/L	25	250 mg/L (max)	

Note : 1. AL- Acceptable Limit. 2. PL- Permissible Limit. 3. DL- Detection Limit

As per IS 10500:2012 Total Coliform should be Not Detectable/100ml, which is equivalent to <1 Cfu/100 ml as per IS : 1622.

Remarks : Bacteriologically : Satisfactory for the above tested parameters

Chemically : Satisfactory for the above tested parameters.

Statement of Conformity is applied considering Decision Rule as per ISO Guide 98-4

...END OF TEST REPORT...

For, N.D. International

Sweta Mukherjee
(Microbiologist)
(Authorised Signatory)

N.D. INTERNATIONAL KOLKATA

For, N.D. International

K.P. De - CEO
Authorised Signatory

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N.D. INTERNATIONAL

GOVERNMENT REGISTERED

An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

Certificate No. NL(M)/23-24/12565 Date: 10.01.2024

SAMPLE DRAWN BY US: Page -1 of 1

Name of Customer	: Indian Mine Planners and Consultants
Address	: GE-61, Rajdanga Main road, East Kolkata Township Project,E.M Bypass,Kol-107
Description of Sample	: Surface Water
Collection Source	: MIN_EBUR_25 (Bardhhaman-II).SW3
Sampling Done by	: Mr. A. Mondal & R. Mondal
Environmental Condition	: Temperature: 29°C, Humidity: 62%
Sample Drawn on	: 13.12.2023
Sample Received on	: 15.12.2023
Analysis Started on	: 15.12.2023
Analysis Completed on	: 19.12.2023
Method of Sampling	:IS-1622:1981, IS-17614(P-25):2022(Bact), IS-17614(P-5):2021(Chem),
Mode of Sampling	: Grab Sampling Plan:NDI/FM/52A

A. MICROBIOLOGICAL TEST FINDINGS :

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012
1	Total Coliform/ 100ml @ 37°C for 24 hours	IS 1622	Cfu	<1 (D1.:1)	Not Detectable
2	E. coli/I 00 ml @ 44.5°C for 24 hours	IS 1622	-	Absent	Not Detectable

B. ORGANOLEPTI C & PHYSICAL PARAMETERS:

Sl. No.	Test Parameters	Test Method	Unit	Results	Norms as per IS 10500 : 2012	
					AL(Max.)	PL(Max.)
3	pH at 25 c	APHA 23rd Edn.4500 H^+ B	-	7.1	6.5-8.5	No relaxation
4	Total Dissolved Solid	APHA 231'd Ed n2540-C	mg/L	112	500	2000
C. GENERAL PARAMETERS CONCERNING SUBTANCES UNDESIRABLE :						
5	Chloride (as Cl)	APHA 23rd Edn.4500 Cl-8	mg/L	26.53	250	1000
6	Fluoride (as F)	APHA 23rd Edn, 4500-F-C	mg/L	<0.1 (DL:0.1)	1.0	1.5
7	Iron (as Fe)	APHA 23rd Edn, 31500- Fe B	mg/L	0.19	0.3	No relaxation
8	Nitrate (as NO_3)	APHA 23rd Edn,4500- NO_3 B	mg/L	2.34	45	No relaxation
9	Sulphate (as SO_4)	APHA 23rd Edn, 4500 SO_4-B	mg/L	35.1	200	400
10	Sulphide as (H2S)	APHA 23rd Edn, 4500 S^{2-}D	mg/L	<0.05 (DL:O.OS)	0.05	No relaxation
11	Total Hardness (as $CaCO_3$)	APHA 23rd Edn, 2340 C	mg/L	85	200	600
12	Arsenic (as As)	APHA 23rd Edn, 3113B	mg/L	<0.002 (DL.:0.002)	0.01	0.05
13	Totnl Chromium (as Cr)	APHA 23rd Edn, 3111 D	mg/L	<0.01 (DL:0.01)	0.05	No relaxation
14	Total Suspended Solids	APHA 23rd Edn, 2540 D	mg/L	19	100 mg/L (max)	
15	Biochemical Oxygen Demand at 27°C for 3 days	IS 3025 (Part - 44) 1993	mg/L	4.6	30 mg/L (max)	
16	Chemical Oxygen Demand	APHA 23rd Edn, 5220 B	mg/L	31	250 mg/L (max)	

Note : 1. AL- Acceptable Limit. 2. PL- Permissible Limit. 3. DL- Detection Limit

As per IS 10500:2012 Total Coliform should be Not Detectable/100ml, which is equivalent to <1 Cfu/100 ml as per IS : 1622.

Remarks : Bacteriologically : Satisfactory for the above tested parameters

Chemically : Satisfactory for the above tested parameters.

Statement of Conformity is applied considering Decision Rule as per ISO Guide 98-4

...END OF TEST REPORT...

For, N.D. International

Sweta Mukherjee
(Microbiologist)
(Authorised Signatory)

N.D. INTERNATIONAL KOLKATA

For, N.D. International

K.P. De - CEO
Authorised Signatory

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N.D. INTERNATIONAL

GOVERNMENT REGISTERED

An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

Format No.:.NDI/FM/81

Certificate No. NL(M)/23-24/15867 Date: 16.01.2024

SAMPLE SUBMITTED BY PARTY : Page -1 of 1

Name of Customer	: Indian Mine Planners and Consultants
Address	: GE-61, Rajdanga Main road, East Kolkata Township Project,E.M Bypass,Kol-107
Description of Sample	: Soil
Collection Source	: MIN_EBUR_25(Bardhhaman-II), S1
Sampling Done by	: Mr. A. Mondal & R. Mondal
Environmental Condition	: Temperature: 29°C, Humidity: 62%
Sample Drawn on	: 13.12.2023
Analysis Started on	: 14.12.2023
Analysis Completed on	: 22.12.2023

A. CHEMICAL TEST FINDINGS:

Sl. No.	Test Parameters	Test Method	Unit	Result
1	Electrical Conductivity (I: 2.5 Aqeous solution)	IS 14767 :2000 134	µs/cm	138
2	Nitrogen	IS 14684:1999	%	0.038
3	Moisture	IS 2720 (Par1-2) :1973	%	11.25
4	Specific Gravity	NDI/CHEM/SOP/S-03	-	2.12
5	Bulk Density	FAO Method: 2007	gm/cm^3	2.46
6	Phosphorus as P	FAO: (METHOD)U. N 2007	Mg/g	0.211
7	Potassium as K	13.1 of FAO :2007	mg/g	0.42
8	Sodium Absorbtion Ratio (SAR)	IS 11624:2019	-	0.69
9	Permeability	NDI/CHEM/SOP/S-05	cm/h	18.38
10	Calcium as Ca	Tbt Fertilizer Control Order 1985	mg/g	0.28
Texture of Soil				
11	Gravel	FAO Method: 2007	%	Nil
12	Sand	FAO Method: 2007	%	33.60
13	Slit	FAO Method: 2007	%	18.72
14	Clay	FAO Method:2007	%	57.16

...END OF TEST REPORT...

For N.D. International

K.P. De - CEO (Authorised Signatory)

1 The test report shall not be reproduced, except in full, without written approval of the company.
2 Results relate only to the parameters tested.
3 The remaining sample after test will be retained for 15 days from the date of issue of certificate.

SKR

107B, Block-F, New Alipore, Kolkata-700 053, Phone : 4021-6600-17 (18 Lines), 4021 6600 (Direct), Mob.: 9830654565, 9830789456
E-mail : hdinternational@gmail.com, Website : www.ndinternational.in

N.D. INTERNATIONAL

GOVERNMENT REGISTERED

An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

Format No.:.NDI/FM/81

Date: 16.01.2024

Certificate No. NL(M)/23-24/15871

SAMPLE SUBMITTED BY PARTY :

Name of Customer	: Indian Mine Planners and Consultants
Address	: GE-61, Rajdanga Main road, East Kolkata Township Project,E.M Bypass,Kol-107
Description of Sample	: Soil
Collection Source	: MIN_EBUR_25 (Bardhhaman-II)., S2
Sampling Done by	: Mr. A. Mondal & R. Mondal
Environmental Condition	: Temperature: 29°C, Humidity: 62%
Sample Drawn on	: 13.12.2023
Analysis Started on	: 14.12.2023
Analysis Completed on	: 22.12.2023

A. CHEMICAL TEST FINDINGS

Sl. No.	Test Parameters	Test Method	Unit	Result
1	Electrical Conductivity (I: 2.5 Aqeous solution)	IS 14767 :2000 134	µs/cm	162.4
2	Nitrogen	IS 14684:1999	%	0.052
3	Moisture	IS 2720 (Parl-2) :1973	%	19.82
4	Specific Gravity	NDI/CHEM/SOP/S-03	-	2.54
5	Bulk Density	FAO Method: 2007	gm/cm^3	3.52
6	Phosphorus as P	FAO: (METHOD)U. N 2007	Mg/g	0.181
7	Potassium as K	13.1 of FAO :2007	mg/g	0.31
8	Sodium Absorbtion Ratio (SAR)	IS 11624:2019	-	0.45
9	Permeability	NDI/CHEM/SOP/S-05	cm/h	14.37
10	Calcium as Ca	Tbt Fertilizer Control Order 1985	mg/g	0.45
Texture of Soil				
11	Gravel	FAO Method: 2007	%	Nil
12	Sand	FAO Method: 2007	%	29.56
13	Slit	FAO Method: 2007	%	15.86
14	Clay	FAO Method:2007	%	53.89

...END OF TEST REPORT...

For N.D. International

K.P. De - CEO (Authorised Signatory)

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3 The remaining sample after test will be retained for 15 days from the date of issue of certificate.

SKR

107B, Block-F, New Alipore, Kolkata-700 053, Phone : 4021-6600-17 (18 Lines), 4021 6600 (Direct), Mob.: 9830654565, 9830789456
E-mail : hdinternational@gmail.com, Website : www.ndinternational.in

N.D. INTERNATIONAL

GOVERNMENT REGISTERED

An ISO 9001:2015 Company Certificate : 20DQHH82

TEST REPORT

Format No.:.NDI/FM/81

Certificate No. NL(M)/23-24/15882 Date: 16.01.2024

SAMPLE SUBMITTED BY PARTY : Page -1 of 1

Name of Customer	: Indian Mine Planners and Consultants
Address	: GE-61, Rajdanga Main road, East Kolkata Township Project,E.M Bypass,Kol-107
Description of Sample	: Soil
Collection Source	: MIN_EBUR_25 (Bardhhaman-II)., S3
Sampling Done by	: Mr. A. Mondal & R. Mondal
Environmental Condition	: Temperature: 29°C, Humidity: 62%
Sample Drawn on	: 13.12.2023
Analysis Started on	: 14.12.2023
Analysis Completed on	: 22.12.2023

A. CHEMICAL TEST FINDINGS:

Sl. No.	Test Parameters	Test Method	Unit	Result
1	Electrical Conductivity (I: 2.5 Aqeous solution)	IS 14767 :2000 134	µs/cm	148
2	Nitrogen	IS 14684:1999	%	0.068
3	Moisture	IS 2720 (Par1-2) :1973	%	19.38
4	Specific Gravity	NDI/CHEM/SOP/S-03	-	2.68
5	Bulk Density	FAO Method: 2007	gm/cm^3	1.49
6	Phosphorus as P	FAO: (METHOD)U. N 2007	Mg/g	0.174
7	Potassium as K	13.1 of FAO :2007	mg/g	0.38
8	Sodium Absorbtion Ratio (SAR)	IS 11624:2019	-	0.41
9	Permeability	NDI/CHEM/SOP/S-05	cm/h	17.98
10	Calcium as Ca	Tbt Fertilizer Control Order 1985	mg/g	0.37
Texture of Soil				
11	Gravel	FAO Method: 2007	%	Nil
12	Sand	FAO Method: 2007	%	31.5
13	Slit	FAO Method: 2007	%	15.7
14	Clay	FAO Method:2007	%	63.2

...END OF TEST REPORT...

For N.D. International

K.P. De - CEO (Authorised Signatory)

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SKR

107B, Block-F, New Alipore, Kolkata-700 053, Phone : 4021-6600-17 (18 Lines), 4021 6600 (Direct), Mob.: 9830654565, 9830789456
E-mail : hdinternational@gmail.com, Website : www.ndinternational.in

Annexure VII: Non-Cluster Certificate

Government of West Bengal
Department of Industry, Commerce and Enterprises
Mines Branch
4, Abanindranath Tagore Sarani (Camac Street), Kolkata-700016

Memo No.: 521(iv) -ICE/O/MIN/GEN-MIS/02/2023 **Date: 11-08-2023**

NON – CLUSTER CERTIFICATE

This is to certify that, Sand Block No. MIN_EBUR_25, of M/S West Bengal Mineral Development & Trading Corporation Limited, comprising of an area of 6.65 Ha, falls in Damodar River and Administratively covers under BARDHHAMAN - II block in PURBA BARDHHAMAN District is "**Not Clustering**" with any existing Mining Lease within 500 metre radius granted by the Department of Industry, Commerce and Enterprises, Govt. of West Bengal. The Geo - Coordinates of this Sand Block are furnished below:

POINT No.	LATITUDE	LONGITUDE
1	23° 12' 22.717" N	87° 51' 22.412" E
2	23° 12' 26.454" N	87° 51' 23.479" E
3	23° 12' 25.380" N	87° 51' 31.197" E
4	23° 12' 22.328" N	87° 51' 38.578" E
5	23° 12' 18.791" N	87° 51' 36.231" E
6	23° 12' 17.725" N	87° 51' 35.523" E

This is also to be stated, that if any Sand Blocks are found in future which may form a cluster situation with the Sand Block MIN_EBUR_25, West Bengal Mineral Development and Trading Corporation Limited has to conduct the Cumulative Impact Study as per the prevailing norms and prepare the EIA – EMP including Sand Block MIN_EBUR_25 for processing of Environmental Clearance for the future Sand Mine Block.

Deputy Secretary
to the Govt. of West Bengal
SAMIK PANIGRAHI, W.B.C.S. (Exe.)
Deputy Secretary
Dept. of Industry, Commerce & Enterprises
Govt. of West Bengal

Annexure VIII: CER Undertaking

WEST BENGAL MINERAL DEVELOPMENT & TRADING CORPORATION LTD.
(A Govt. of West Bengal Undertaking)

CIN : U14219WB1973SGC028707
Regd. Office : WBIIDC Building, 3rd Floor
DJ-10, Sector-II, Salt Lake, Kolkata-700091
Phone : 033-2359-0073
Website : mdtcl.wb.gov.in

Memo No: MDTC/SAND/002(iv)/2165(ii) Date : 11.08.2023

Undertaking

Undertaking is hereby provided to incur the expenses towards Corporate Environmental responsibility (CER) as per MOEF & CC's notifications Nos. F-No. 22-65/2017-IA.III dt. 30th September, 2020 and 1st May, 2018 with respect to our Sand Project- Bardhhaman – II Riverbed Sand Mine (MIN_EBUR_25) comprising an area of 6.65 Ha, and administratively falls under Mouza – Becharhat, Block – Bardhhaman – II, District – Purba Bardhhaman. The Said Sand Block is bounded by the following Geo-coordinates.

POINT No.	LATITUDE	LONGITUDE
1	23° 12' 22.717" N	87° 51' 22.412" E
2	23° 12' 26.454" N	87° 51' 23.479" E
3	23° 12' 25.380" N	87° 51' 31.197" E
4	23° 12' 22.328" N	87° 51' 38.578" E
5	23° 12' 18.791" N	87° 51' 36.231" E
6	23° 12' 17.725" N	87° 51' 35.523" E

WBMDTCL is committed to make the expenses up to a maximum limit of 2% of the total project cost. It is to be noted that, all the expenditure will be made in due consultation with the district authorities and also as per the recommendation of the district authorities. The main objective of this expenses shall be peripheral development and environment protection. The scope of work shall be followed but not limited to the activities listed below:

1. Infrastructure development.
2. Drinking water facility.
3. Electricity development including Solar projects.
4. Roads and drains.
5. Creation of water body for community use.
6. Solid Waste Management System and Scientific Studies.
7. Skill Development Programs.
8. Embankment Protection

This is also to be stated that, all communication in this regard shall be made to the Chairman SEIAA, West Bengal and activities shall be monitored under the project. The statement of expenses shall be captured in the six-monthly compliance reports to be submitted to SEIAA.

Authorised Signatory
West Bengal Mineral Development and Trading Corporation Limited
Samik Panigrahi, WBCS (Exe.)
General manager (Sand & Admin)
W.B. Mineral Dev. & Trading Corp. Ltd.

Annexure IX: Transportation Route Map

Annexure X: Comprehensive Sand Transport Plan

Comprehensive Sand Transportation Plan

Bardhhaman-II Sand Mine MIN_EBUR_25 of West Bengal Mineral Development and Trading Corporation Limited is Located at Mouza: Becharhat, Plot No: 1632(P), 1620(P) & 1560(P), J.L.No:-79, Block- Bardhhaman II, District- Purba Bardhhaman, State:- West Bengal. Sand from MIN_EBUR_25 Sand Block will be transported through the fair-weather approach road which is not black topped. The approach road will be strengthened before transportation of sand beyond the river bed. The study area is located in a remote area and the approach road from the study area is a narrow 10.0 m width single lane unpaved road which is about 760 m connecting the study area with the unpaved village Road which after 600 m meets the NH-19. In no circumstances the approach road within the riverbed will be hard topped. The Daily production need required around 12 trucks (considering one 200 CFt. Capacity truck Covering 10 trips) to ply which is not adding much traffic to the existing conditions. Water sprinkling shall be done beforehand of sand transportation per day.

Annexure XI: NABET Certificate

National Accreditation Board for Education and Training

QCI/NABET/ENV/ACO/23/3079 December 28, 2023

To,

Indian Mine Planners and Consultants
DLF Galleria, Room No 409,
New Town, Action Area-1,
Kolkata, West Bengal-700156

Sub.: Extension on the Validity of Accreditation till March 27, 2024– regarding
Ref.: 1. Certificate no. NABET/EIA/2023/SA 0182
2. Request e-mail dated December 27, 2023

Dear Sir/Ma'am,

This has reference to the accreditation of your organization under the QCI-NABET EIA Scheme and your request email dated December 27, 2023. It is to inform your good self that the validity of **Indian Mine Planners and Consultants** is hereby extended till **March 27, 2024,** or the completion of the existing application/accreditation process, whichever is earlier.

2. The above extension is subject to the submission of required documents/information concerning your existing application, timely submission/closure of NC/Obs (if any), and applicable fee (pending if any) during the application/accreditation process.

3. You are requested not to use this letter after the expiry of the above-stated date.

With best regards.

(A K Jha)
Senior Director
QCI-NABET

QUALITY COUNCIL® OF INDIA
Creating an Ecosystem for Quality

National Accreditation Board for Education and Training

Certificate of Accreditation

Indian Mine Planners and Consultants, Kolkata

GE-61, Rajdanga Main Road, Behind Gateway Hotel, Em-Bypass, Kolkata- 700107, West Bengal.

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	Mining of minerals including opencast/ underground mining	1	1 (a) (i)	A

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated August 02, 2022 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/22/2621 dated December 20, 2022. The accreditation needs to be renewed before the expiry date by Indian Mine Planners and Consultants, Kolkata, following due process of assessment.

Sr. Director, NABET
Dated: December 20, 2022

Certificate No.
NABET/EIA/2023/SA 0182

Valid up to
March 14, 2023

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

Annexure XII: NABL Certificate

National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

N. D. INTERNATIONAL

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

17, JNAN GOSWAMI SARANI, 107B, BLOCK-F, NEW ALIPORE, KOLKATA, WEST BENGAL, INDIA

in the field of

TESTING

Certificate Number: TC-5910

Issue Date: 07/06/2022 Valid Until: 06/06/2024

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : N. D. INTERNATIONAL

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer