

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

FOR

SHYAMPUR STONE MINE

TOR Identification No. TO25B0108WB5888045N Dated 29.08.2025

AREA: 1.290 HA

**(As per West Bengal Minor Minerals Concession Rules, 2016) (CATEGORY B1-
MINOR MINERAL QUARRY)**

MINE ADDRESS

MOUZA – SHYAMPUR-JL NO. 112 AREA: 1.290 HA. PLOT No.-807,

POST: SALTORA, P.S. & BLOCK: SALTORA

DIST: BANKURA-722158, WEST BENGAL

AS PER RAIYATI POLICY GAZETTE NOTIFICATION NO.

668/CI/O/MIN/GEN-MISS/17/2022

LOI No. BNK/BS/2023/1/2023-7 Dated 10.03.2023 and Extended LOI-

MDTC/Raiyati/Ext. Of LOI/1938 dated 04.10.2024

PROJECT PROPONENT: SHRI DHIREN GHOSH

MOUZA – DIGTORE, PO-SALTORA

P.S. & BLOCK – SALTORA

DISTRICT - BANKURA, WEST BENGAL-722158 PH. NO.-+91-7001104491

MAIL ID: mangal.ghosh50@gmail.com

**(Period – Approved Mine plan is being be valid for the 5 year or until approved quantity
exhausted/mined whichever is earlier)**



PREPARED BY

M/s. ANACON LABORATORIES PVT. LTD., NAGPUR

QCI-NABET Accredited EIA Consultant for

**(Sector 1- 1(a)(i) Mining of Minerals including opencast and underground mining,
MoEF&CC (GOI) and NABL Recognized Laboratory, ISO 9001:2015, ISO 14001:2015,**

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&

Swarup Kumar Tripathy

EIA-CO-ORDINATOR-Mining-RA-365TH AC MEETING: AUGUST 22, 2023

NABET, QCI

SEPTEMBER-2025

DECLARATION BY THE APPLICANT

I do hereby declare that the Draft EIA/EMP report in respect of Shyampur Stone Mine over an area of 1.290 Ha (3.19 Acres) JL No. – 112; Plot No. – 807; Mouza – Shyampur; P.S. & Block– Saltora, District – Bankura, West Bengal-722158 (Proposal No. SIA/WB/MIN/544405/2025 & TOR No. TO25B0108WB5888045N) is being granted by SEIAA West Bengal and this draft EIA/EMP report has been prepared by the Environment Consulting Organization i.e. M/S Anacon Laboratories Pvt. Ltd., Nagpur and its Branch Office at Contai, West Bengal as per the TOR prescribed by SEIAA West Bengal File No. EN/T-II-1/185/2025 dated 29.08.2025.

The contents (information and Data) of the report about our project are correct and true to our knowledge & belief.

DHIREN GHOSH

Proprietor

PROJECT PROPONENT
DHIREN GHOSH
Applicant No. BNK/BS/2023/1
Vill-Digtore, Post-Saltora
Block & P.S.-Saltora,
Dist-Bankura-722158
West Bengal

UNDERAKING BY THE CONSULTANT

This is to certify that we, M/s Anacon Laboratories Pvt. Ltd. Nagpur and its branch office at Contai, West Bengal having NABET Accreditation no. NABET/EIA/23-26/RA-0304 [Sl. No. 1 (a) (i), Cat 'A'] dated 13th March, 2024 and validity upto 29th September 2026 have prepared in EIA/EMP report of "Shyampur Stone Mine" for extraction of 3,54,887.10 MT for 5 years period of Stone from over an area of 1.29 Ha. at Mouza: Shyampur, J.L. No.: 112, Plot No.: 807, Block & P.S.: Saltora, District: Bankura on behalf M/s Dhiren Ghosh (Project Proponent) as per LoI issued by M/s WBMDTCL LoI No.: BNK/BS/2023/1/2023-7 Dated: 10.03.2023 and extended LOI Memo No. MDTC/RAIYATI/Ext. of Loi/1938 Dated 04.10.2024. & TOR issued by SEIAA (West Bengal) File No. EN/T-II-1/185/2025 dated 29.08.2025.

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

Swarup Kr. Tripathy

Swarup Kr. Tripathy
EIA Coordinator
M/s. Anacon Laboratories Pvt. Ltd.
Date: 09.09.2025



DECLARATION BY EXPERT

Declaration by Experts contributing to the “Stone Block (Shyampur Stone Mine, Potential Block-BNK_BS_ZONE_1), Mouza: Shyampur-JL No. 112, Plot No. 807, Under PS & Block-Saltora, Dist: Bankura, Over and area-1.29 Ha (3.19 Acre) West Bengal by Mr. Dhiren Ghosh and the LOI has been issued from M/s. WBMDTCL, Kolkata, Govt. of West Bengal located at BANKURA, WEST BENGAL.

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

EIA Co-ordinator:






Name: Mr. Swarup Kr. Tripathy







Signature and Date: 

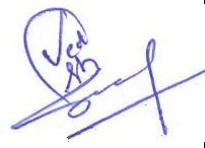


Period of involvement: December 2024 to till grant EC


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Functional area experts:

S. No.	Functional areas	Name of the expert/s	Involvement (Period and task**)	Signature and date
1.	AP*	Dr. D. G. Garway	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	
2.	WP*	Dr. D. G. Garway	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	
3.	SHW*	Dr. D. G. Garway & Mr. Swarup Tripathy	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	
4.	SE*	Ms. Shilpa Chandekar	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	
5.	EB*	Mr. Shrikant Vyawahare	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	

S. No.	Functional areas	Name of the expert/s	Involvement (Period and task**)	Signature and date
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7.	SC*	Mr. Swarup Tripathy	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	
8.	AQ*	Mr. Mohammad Akhtar	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	
9.	NV*	Mr. Gyanchand Bohra	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	
10.	LU*	Mr. Swarup Tripathy	December 2024 to till grant of EC (Identification & Assessment of Impacts, Suggestion Mitigation Measures and as EC)	
11.	RH*	Mr. Rakesh Gupta	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	

S. No.	Functiona l areas	Name of the expert/s	Name of the Team Member/ s	Involvement (Period and task**)	Signature and date
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	AQ	Mr. Mohammad Akhtar			
2.	LU	Mr. Swarup Tripathy	Mr. Amol G. Gadekar	December 2024 to till grant of EC (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	
3.	RH	Mr. Rakesh Gupta	Miss. Bhumika Gawande	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	

S. No.	Function areas	Name of the expert/s	Name of the Team Member/s	Involvement (Period and task**)	Signature and date
4.	EB	Mr. Shrikant Vyawahare	Mr. Prashant H. Shende	December 2024 to September 2025 (Identification & Assessment of Impacts, Suggestion Mitigation Measures)	

Declaration by the Head of the accredited consultant organization/ authorized person

I, Dr. D.G. Garway, hereby confirm that the above-mentioned experts prepared the Draft EIA/EMP report in respect to Stone mine project i.e. Shyampur Stone Mine (Mouza: Shyampur-JL No. 112, Plot No. 807, Under PS & Block-Saltora, Dist: Bankura, Over and area- 1.29 Ha (3.19 Acre), West Bengal by Mr. Dhiren Ghosh and the LOI has been issued from WBMDTCL, Kolkata, Govt. of West Bengal.

“It is certified that no unethical practice like ‘copy and paste’, and used external data / text without proper acknowledgement, while preparing this EIA report”.

I also confirm that the consultant organization shall be fully accountable for any mis-leading information mentioned in this statement.

Signature:




Name: Dr. D. G. Garway

Designation: Head of ACO & MD

Name of the EIA consultant organization: M/s. Anacon Laboratories Pvt. Ltd.

NABET Certificate No. & Issue Date:

Accreditation Certificate No.: QCI-NABET Accreditation vide Certificate No: NABET/EIA/23-26/RA304_Rev-01-Valid-Sept. 29, 2026.

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Executive summary

The proposed project is Shyampur Stone Mining Project located under Mouza & Village-Shyampur-JL No. 112 Plot No.- 807, Post: Saltora-722158, P.S. & Block – Saltora, District - Bankura, West Bengal. The proposed project has been granted under the Raiyati Policy and its LOI has been granted by WBMDTCL, Govt. Bengal and the land area is about 1.29 Hectare (3.19 Acre) for excavation of stone upto 5 years in which the Mine plan also being approved by Govt. West Bengal on that basis SEIAA has granted the ToR. The area is located in Survey of India Toposheet No.- SOI-73 I/14 Old- F45 C/14 New, 73 I/15 Old-F45 C/15 New, 73 M/2 Old-F45 D/2 New and 73 M/3 Old-F45 D/3 and bounded by latitude 23°29'52.67"N to 23°29'48.48"N and longitude 86°57'20.58"E to 86°57'26.48"E the area is non-forest private land in nature. The ground elevation is 150 m to 160 m above mean sea level.

As per MoEFCC, New Delhi Gazette EIA notification dated 14th September 2006 and its subsequent amendment thereafter, the proposed mining project is forming Cluster with Deep Black Stone Project of Sri Sarandeep Singh Saini at. Jagannath Plaza, 202, Santa Dangal, Asansol Municipal Corporation, P.O. Burnpur, P.S. Hirapur, District Paschim Bardhaman-713325, West Bengal, comprising an area of 4.223 Hectares (10.44 Acres), falling in Mouza - Mouchuria, J.L. No. 111, Plot No. 35 (P), P.O & P.S - Saltora, District - Bankura, State West Bengal. In terms of Paragraph 7(iii) of the Notification No. S.O. 141(E) dated 15.01.2016 issued by Ministry of Environment Forest and Climate Change. Therefor the project is categorised as category 'B1' project.

The mining plan has been prepared by Qualified Person Mr. Gyanchand Bohra and approved for five years by Mining Officer In-Charge of Purulia Zone, Directorate of Mining & Minerals, G.P. Branch Campus, North Lake Road, P.O. & Dist.- Purulia, 723101

The proposed mining activity is supposed to excavate approximately 23,978.85 Cu.M. of Stone per year and 1,19,894.29 Cu.M. Of Stone for total five years solely by open cast manual method process.

The lease area comes under barren land which is having Non-Agriculture/ Non-Forest Pvt. Land. The area is having elevation ranges from 150 m to 160 m above mean sea level. 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 total manpower of 20 no's will be involved with the project, about 10 local people are directly employed in the mine along with 02 mining mate supervisor, may be part time) and 02 Guard. Hence there will be an overall improvement of socio-economic status of the people of surrounding areas.

A total water requirement of 5 KLD will be envisaged with the proposed project with 3.6 KLD allocated for dust suppression, 0.63KLD allocated for green belt, and 0.57 KLD for Miscellaneous Use and 0.20KLD allocated for domestic purpose (Drinking).

The total cost of the project would be approx. Rs. 60 Lakhs and Rs. 12.25 lakhs of the project cost will be allocated for the Environmental Management Plan (EMP) and 2% (3.33Lakhs) 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 + CER = Rs.15.58 Lakhs

CHAPTER 1

1.0 INTRODUCTION

This chapter contains the general information of the proposed project such as the background of the project, the profile of the project proponent, name and contact address with e-mail, project consultants, the purpose of the project, brief description of the project, with its importance, applicable environmental regulations, objectives and methodology for EIA studies, and the scope of the EIA study.

1.1 PURPOSE OF THE REPORT

Environmental Impact Assessment (EIA) gives details about the various impacts on the local community and surrounding environment due to proposed stone mine. To meet the demand of various government projects being executed in the region, the project proponent tends to open the proposed stone mining project in the region. The proposed stone mining project having lease area 1.29 Ha. is proposed to be located within (Non-Forest Private Land), Near Village: Shyampur, PO: Saltora, PS: Saltora, District: Bankura.

The proposed mining area of 1.29 Ha is located at (Non-Forest Private Land), Near Village: Shyampur, PO: Saltora, PS: Saltora, District: Bankura. As recommended by Office of the Mining Officer-In- Charge of Purulia Zone, Directorate of Mines & Minerals, G.P. Branch, Campus, North Lake Road, Post & District: Purulia-723101 and the plan is valid for 5 years. The total mining area is 1.29 Ha, is **CLUSTERING** with Deep Black Stone Project of Sri Sarandeep Singh Saini, Jaganath Plaza 202, Santa Dungal, Asansol (M. Corp.), P.O. Burnpur, P.S. Hirapur, District Paschim Bardhaman, PIN 7 13325 (W.B.) comprising an area of 4. 223 Hectares (10.44 Acres), falling in Mouza: Mouchuria, J.L. No. 111, Plot No. 35(P), P.S. & Block Saltora, District Bankura, State West Bengal within a radius of 500 meters so the area outcome after clustering is more than 5 Ha. Hence, EIA has to be prepared for the project. (**Annexure VII**)

To fulfil the statutory requirement, the Form1, PFR along with other additional was submitted to SEAC/SEIAA, West Bengal, Kolkata –700106. The project has been granted ToR vide File No. EN/T-II-1/185/2025, Proposal No. SIA/WB/MIN/544405/2025 & TOR Identification No. TO25B0108WB5888045N and grant of date on 29th August 2025. A copy of ToR is enclosed as **Annexure I**. This EIA-EMP report is prepared in line the ToR granted by SEIAA,

As per EIA Notification dated 14th September, 2006 and subsequent amendment the project is categorized under Category “B1”; Project Activity 1(a) Mining of Minerals and requires Environmental Clearance (EC) to be obtained from State Environment Impact Assessment Authority, West Bengal.

M/s Anacon Laboratories Pvt. Ltd. a QCI-NABET accredited environment consultant organization has been assigned to undertake an Environmental Impact Assessment (EIA) study and preparation of Environment Management Plan (EMP) for various environmental components, which may be affected due to the impacts arising out of the proposed stone quarry mining project.

This EIA report is prepared based on the granted ToR conditions recommended by SEIAA, West Bengal.

1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1 IDENTIFICATION OF THE PROJECT

The proposed quarry area of 1.29 Ha is located within the (Non-Forest Private Land), Near Village: Shyampur, PO: Saltora, PS: Saltora, District: Bankura. The location of the proposed quarry site is about 18.0 Km away from the NH60 towards east side.

The mining Plan has been prepared by M/s. Anacon Laboratories Pvt. Ltd., Nagpur and its RQP Mr. Gyan Chand Bohra is being engaged for this purpose which has been prepared as per the guidelines prescribed under West Bengal Minor Mineral Concession Rules 2016-(**Annexure-VIII**) and other allied statutes for preparation of quarry plan. The quarry plan was approved by Office of the Mining Officer-In- Charge of Purulia Zone, Directorate of Mines & Minerals, G.P. Branch, Campus, North Lake Road, Post & District: Purulia-723101 for the five years validity period vide letter no. 161/MO/Purulia/XI/BNK/04/IN-SITU/25 Dated 08th May 2025. The approved mining plan with progressive mineclosure plan enclosed as **Annexure II** and its approved Geological Reserve by Sr. Geologist, Govt. of West Bengal, Directorate of Mines and Mineral, Bankura, vide Memo No. BANKURA/SG/SBU/GR/18 Dated 30.11.2023-**Annexure-IX** and its LOI has been granted by West Bengal Mineral Development & Trading Corporation Limited, Kolkata, Govt. of West Bengal vide Memo No. BNK/BS/2023/1/2023-7 and its subsequent extension vide Memo No. MDTC/RAIYATI/Ext.of loI/1938 Dated 04.10.2024-**Annexure-III**. The proposed mine site is located outside the Reserve Forest Area and the site is not within any protected area under Archeological, Religious, Cultural heritage or Défense establishments.

The estimation of the Mineable reserve has been made considering the deposit to be massive and continuous. The mineable reserve is estimated to be as 1,19,894.29 CUM or 3,54,887.10 MT for mining contract period of 5(Five) years as well as this mining plan is having maximum validity of 5 (five) years only. Therefore, the maximum allowable quantity for extraction will be 1,19,894.29 CUM or 3,54,887.10 MT for five years. The method of mining adopted is open cast mining.

1.2.2 IDENTIFICATION OF THE PROJECT PROPONENT

M/S. Dhiren Ghosh, Mouza – Digtore, Po-Saltora , P.S. & Block – Saltora, District - Bankura, West Bengal-722158, Ph. No.-+91-7001104491, Mail Id: mangal.Ghosh50@Gmail.Com in that a LOI has been issued from **West Bengal Mineral Development & Trading Corporation Limited, Kolkata, Govt. of West Bengal vide Memo No. BNK/BS/2023/1/2023-7 and its subsequent extension vide Memo No. MDTC/RAIYATI/Ext.of loI/1938 Dated 04.10.2024-Annexure-III.** , which intends to open a quarry of stone at raiyati land near Shyampur village, District: Bankura. Here the Mine Plan has been approved in the name of Mr. Dhiren Ghosh having letter no. 161/MO/Purulia/XI/BNK/04/IN-SITU/25 Dated 08th May 2025 by Office of the Mining Officer-In- Charge of Purulia Zone, Directorate of Mines & Minerals, G.P. Branch, Campus, North Lake Road, Post & District: Purulia-723101 for the five years validity period.

The proposed stone quarry mining project to meet the local demand of stones for Stone Crusher Units as well as for supply to various government, semi-government and private agencies for civil construction purposes as well as PWD and NHIDCL Road construction projects. The proposed stone quarry mining project having lease area 1.29 Ha. is located at Block: Saltora, Near Village: Shyampur, PO: Saltora, PS: Saltora, District: Bankura. The site is being recommended by Officer-In- Charge of Purulia Zone, Directorate of Mines & Minerals, G.P. Branch, Campus, North Lake Road, Post & District: Purulia-723101 as well as West Bengal Mineral Development & Trading Corporation Limited, Kolkata, Govt. of West Bengal.

1.3 BRIEF DESCRIPTION OF THE PROJECT

1.3.1 NATURE & SIZE OF THE PROJECT

The proposed stone quarry mining project having lease area 1.29.0 Ha. (Non-Forest Private Land) is proposed to be located at, Near Village: Shyampur, PO: Saltora, PS: Saltora, District: Bankura. The maximum allowable quantity for extraction will be 1,19,894.29 CUM or 3,54,887.10 MT for five years.

The total mining area is 1.29 Ha, which is Clustering with Deep Black Stone Project of Sri Sarandeep Singh Saini, Jaganath Plaza 202, Santa Dangal, Asansol (M. Corp.), P.O. Burnpur, P.S. Hirapur, District Paschim Bardhaman, PIN 7 13325 (W.B.) comprising an area of 4. 223 Hectares (10.44 Acres), falling in Mouza: Mouchuria, J.L. No. 111, Plot No. 35(P), P.S. & Block Saltora, District Bankura, State West Bengal within a radius of 500 meters So the area outcome is more than 5 Ha and total area after clustering is about 5.62 Ha. Hence, EIA has to be prepared for the project. The project is categorized under

Category “B1”; as per EIA Notification dated 14th September, 2006 and subsequent amendment. The details of the project proponent and project are given in **Table 1.1**.

Table 1.1: Details of the Project Proponent and the Project

Particulars	Descriptions
Name of Project	Shyampur Stone Mine Proposed lease area of stone mine is at Shyampur mouza & village Shyampur, Block-Saltora, District Bankura.
The Mineable Area	1.29 Ha
Quantity recommended for Extraction	Total 1,19,894.29 CUM or 3,54,887.10 MT for five years.
Period allowed for Mining	5 (Five) years subject to additional Mining Plan approval.
Method of Mining	Open Cast Mining
Project cost	Rs. 60 Lakhs
Land use pattern	The proposed area consists of Non-Agricultural land/Barren Land
Name of the Applicant & authorized signatory	Mr. Dhiren Ghosh
Registered Address	Mouza – Digtore, Po-Saltora P.S. & Block – Saltora, District - Bankura, West Bengal-722158 Ph. No.-+91-7001104491 Mail Id: mangal.Ghosh50@Gmail.Com
Designation of the Authorized Signatory	Office of the Mining Officer-In- Charge of Purulia Zone, Directorate of Mines & Minerals, G.P. Branch, Campus, North Lake Road, Post & District: Purulia-723101 for the five years validity period.
Name of the NABET Accredited Consultant	M/s Anacon Laboratories Pvt. Ltd.
NABET Accreditation Number	QCI/NABET/ENV/ACO/23/2879-Validity: 29/09/2026
Address of the consultant	FP-34, 35, Food Park, MIDC, Butibori, Nagpur – 441122
Contact number of the consultant	+91-9547330719

1.3.2 LOCATION OF THE PROJECT

The location of the proposed quarry site is about 18.0 Km away from the NH60 towards east side. The approach road is connected with National Highway 60 through a motorable road. The site is free from human habitation within a radius of about 0.5 Km. The topographical features of the study area depicted by the toposheet are shown in **Table 1.2** and study area map showing core and buffer zone are given in **Figure 1.1**.

Table 1.2: Topographical Features of the Study Area

Particulars	Descriptions																																																																																																									
Project location	Mouza & Village: Shyampur, Post: Shyampur, PS & Block: Saltora, Dist: Bankura , West Bengal -722158																																																																																																									
GPS Co-Ordinates of Project	<table border="1"> <tbody> <tr><td>BP1</td><td>23°29'52.659"N</td><td>86°57'22.372"E</td></tr> <tr><td>BP2</td><td>23°29'52.612"N</td><td>86°57'22.527"E</td></tr> <tr><td>BP3</td><td>23°29'52.349"N</td><td>86°57'22.527"E</td></tr> <tr><td>BP4</td><td>23°29'52.069"N</td><td>86°57'22.497"E</td></tr> <tr><td>BP5</td><td>23°29'51.803"N</td><td>86°57'23.165"E</td></tr> <tr><td>BP6</td><td>23°29'51.592"N</td><td>86°57'23.578"E</td></tr> <tr><td>BP7</td><td>23°29'52.291"N</td><td>86°57'23.962"E</td></tr> <tr><td>BP8</td><td>23°29'50.986"N</td><td>86°57'23.802"E</td></tr> <tr><td>BP9</td><td>23°29'50.712"N</td><td>86°57'23.723"E</td></tr> <tr><td>BP10</td><td>23°29'50.441"N</td><td>86°57'23.682"E</td></tr> <tr><td>BP11</td><td>23°29'50.359"N</td><td>86°57'24.126"E</td></tr> <tr><td>BP12</td><td>23°29'50.638"N</td><td>86°57'24.367"E</td></tr> <tr><td>BP13</td><td>23°29'50.812"N</td><td>86°57'24.399"E</td></tr> <tr><td>BP14</td><td>23°29'50.940"N</td><td>86°57'24.476"E</td></tr> <tr><td>BP15</td><td>23°29'50.815"N</td><td>86°57'24.828"E</td></tr> <tr><td>BP16</td><td>23°29'50.660"N</td><td>86°57'25.151"E</td></tr> <tr><td>BP17</td><td>23°29'50.601"N</td><td>86°57'25.293"E</td></tr> <tr><td>BP18</td><td>23°29'50.612"N</td><td>86°57'25.343"E</td></tr> <tr><td>BP19</td><td>23°29'50.777"N</td><td>86°57'25.430"E</td></tr> <tr><td>BP20</td><td>23°29'50.886"N</td><td>86°57'25.581"E</td></tr> <tr><td>BP21</td><td>23°29'50.737"N</td><td>86°57'25.841"E</td></tr> <tr><td>BP22</td><td>23°29'50.660"N</td><td>86°57'26.099"E</td></tr> <tr><td>BP23</td><td>23°29'50.322"N</td><td>86°57'26.530"E</td></tr> <tr><td>BP24</td><td>23°29'50.192"N</td><td>86°57'26.515"E</td></tr> <tr><td>BP25</td><td>23°29'50.061"N</td><td>86°57'26.462"E</td></tr> <tr><td>BP26</td><td>23°29'50.004"N</td><td>86°57'26.489"E</td></tr> <tr><td>BP27</td><td>23°29'49.809"N</td><td>86°57'26.980"E</td></tr> <tr><td>BP28</td><td>23°29'49.169"N</td><td>86°57'26.813"E</td></tr> <tr><td>BP29</td><td>23°29'48.146"N</td><td>86°57'26.471"E</td></tr> <tr><td>BP30</td><td>23°29'48.564"N</td><td>86°57'24.913"E</td></tr> <tr><td>BP31</td><td>23°29'48.438"N</td><td>86°57'24.824"E</td></tr> <tr><td>BP32</td><td>23°29'48.574"N</td><td>86°57'24.073"E</td></tr> <tr><td>BP33</td><td>23°29'49.282"N</td><td>86°57'23.676"E</td></tr> <tr><td>BP34</td><td>23°29'49.117"N</td><td>86°57'21.409"E</td></tr> <tr><td>BP35</td><td>23°29'52.699"N</td><td>86°57'20.564"E</td></tr> </tbody> </table>	BP1	23°29'52.659"N	86°57'22.372"E	BP2	23°29'52.612"N	86°57'22.527"E	BP3	23°29'52.349"N	86°57'22.527"E	BP4	23°29'52.069"N	86°57'22.497"E	BP5	23°29'51.803"N	86°57'23.165"E	BP6	23°29'51.592"N	86°57'23.578"E	BP7	23°29'52.291"N	86°57'23.962"E	BP8	23°29'50.986"N	86°57'23.802"E	BP9	23°29'50.712"N	86°57'23.723"E	BP10	23°29'50.441"N	86°57'23.682"E	BP11	23°29'50.359"N	86°57'24.126"E	BP12	23°29'50.638"N	86°57'24.367"E	BP13	23°29'50.812"N	86°57'24.399"E	BP14	23°29'50.940"N	86°57'24.476"E	BP15	23°29'50.815"N	86°57'24.828"E	BP16	23°29'50.660"N	86°57'25.151"E	BP17	23°29'50.601"N	86°57'25.293"E	BP18	23°29'50.612"N	86°57'25.343"E	BP19	23°29'50.777"N	86°57'25.430"E	BP20	23°29'50.886"N	86°57'25.581"E	BP21	23°29'50.737"N	86°57'25.841"E	BP22	23°29'50.660"N	86°57'26.099"E	BP23	23°29'50.322"N	86°57'26.530"E	BP24	23°29'50.192"N	86°57'26.515"E	BP25	23°29'50.061"N	86°57'26.462"E	BP26	23°29'50.004"N	86°57'26.489"E	BP27	23°29'49.809"N	86°57'26.980"E	BP28	23°29'49.169"N	86°57'26.813"E	BP29	23°29'48.146"N	86°57'26.471"E	BP30	23°29'48.564"N	86°57'24.913"E	BP31	23°29'48.438"N	86°57'24.824"E	BP32	23°29'48.574"N	86°57'24.073"E	BP33	23°29'49.282"N	86°57'23.676"E	BP34	23°29'49.117"N	86°57'21.409"E	BP35	23°29'52.699"N	86°57'20.564"E
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Toposheet No.	Toposheet No. SOI-73 I/14 Old- F45 C/14 New, 73 I/15 Old-F45 C/15 New, 73 M/2 Old-F45 D/2 New and 73 M/3 Old-F45 D/3 New present in and around the project site as well as 10 km radius.																																																																																																									
Nearest Railway Station	Raniganj- approx. 21 Km towards NE direction. Madhukunda Railway Station is about 16.5 km at NW																																																																																																									
Nearest Airport	Kaji Najrul Airport is about 26 km NE																																																																																																									
Nearest Highway	NH 60 is about 18 km E																																																																																																									

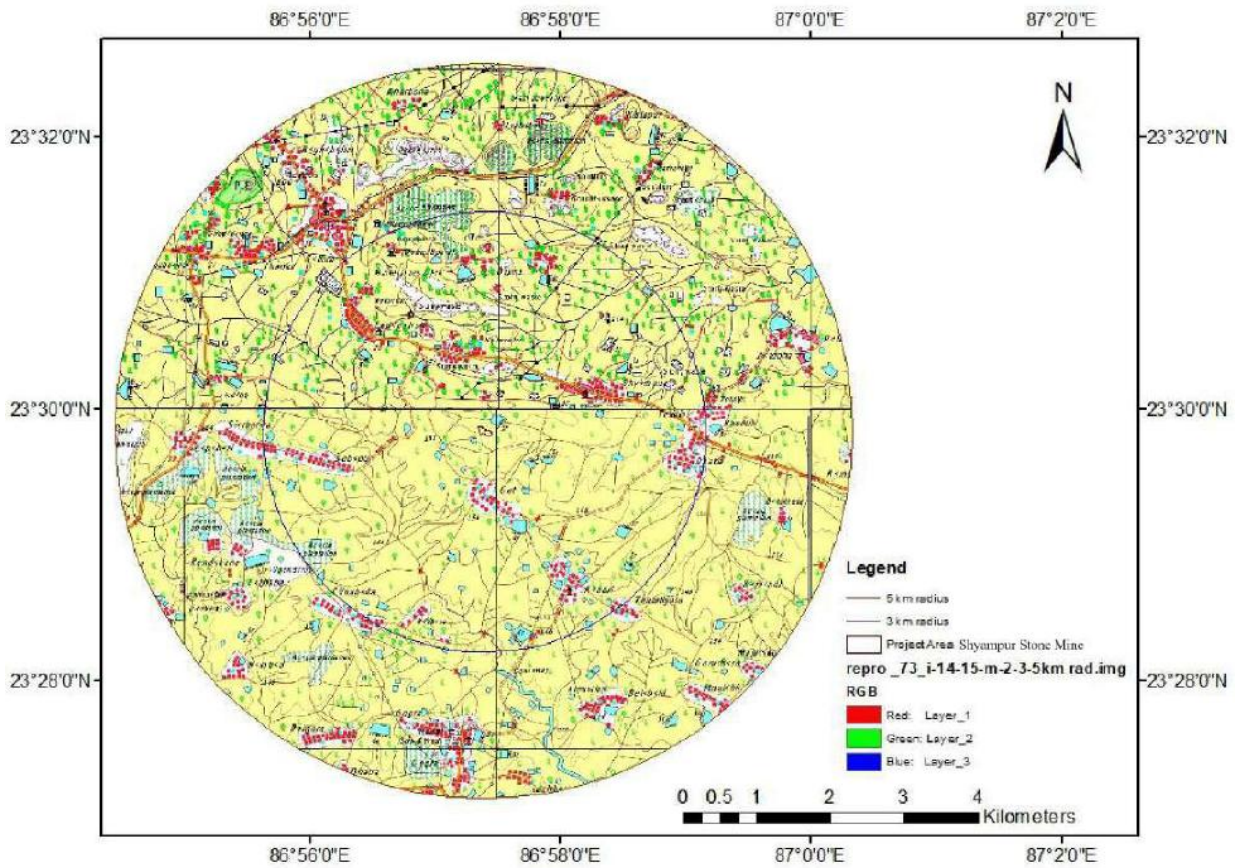


Figure 1.1: Toposheet of 5 km radius from study area

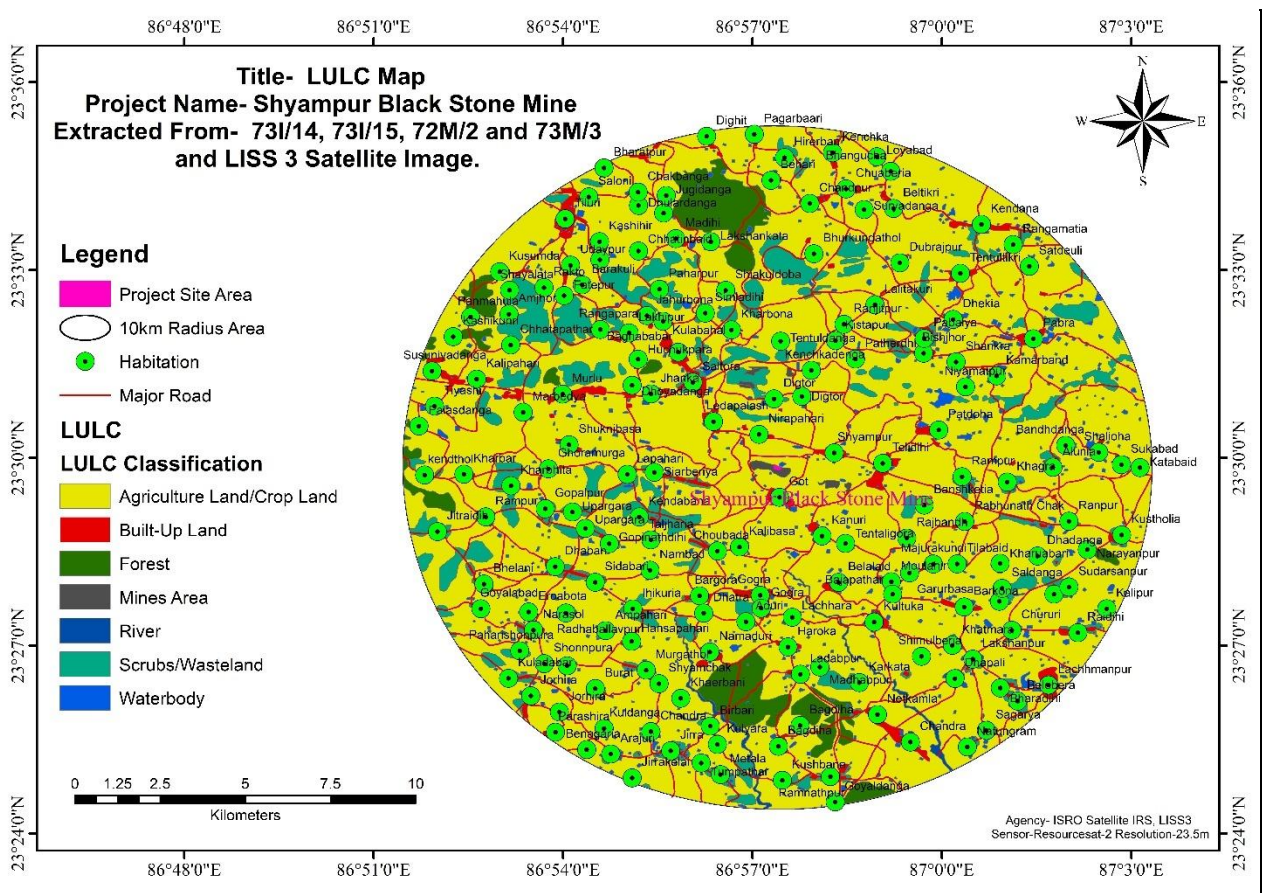


Figure 1.2: Toposheet of 10 km radius from study area

1.3.3 IMPORTANCE OF THE PROJECT TO THE COUNTRY, REGION

The proposed Shyampur Stone Mine project of Shyampur will fulfill the local demand of stones for Stone Crusher Units as well as for supply to various government, semi-government and private agencies for civil construction purposes as well as various road projects like PWD and NHIDCL. There is a demand of stone products like roadmetals, stone chips of different sizes in Durgapur as well as Asansol and adjoining areas and this quarry will meet up the requirement of such stone products to some extent. Stones are often used as building material. Its strength and long life make it suitable for a number of purposes; it had become a major source for infrastructure development i.e. construction of roads, building and bridges etc. The people in the surrounding areas will be benefitted by generation of employment opportunities as well as growth of economic activities. Proposed project provides revenue to Govt. exchequer in GST, cess and excise duties till mine lease contract period of seven years.

1.4 SCOPE OF THE EIA STUDY

The report represents Environmental Impact Assessment & Environmental Management Plan for the proposed stone quarry mining project. As per the requirements stated in the Environmental Impact Assessment Notification 2006 and its subsequent amendments, Environmental Impact Assessment (EIA) study has been undertaken to assess the environmental impacts arise out from the proposed quarry project and accordingly developed a site-specific environmental management plan and risk mitigation measures incorporated in the report. Baseline environmental studies have been conducted during the post-monsoon season (1st March, 2025 – 31st May 2025) as per the ToR issued by SEIAA, Bidhannagar, Kolkata –700106. The copy of terms of reference is attached as **Annexure I**. The detailed conditions in terms of reference with corresponding compliances are mentioned in beginning of the chapter scheme.

The scope of study includes:

- Field sampling of environmental attributes at various representative locations in the study area to establish the baseline environmental status;
- Primary data collection for various environmental components
- Collate and compile secondary data including socio-economic data from published literature / government publications;
- Identifying various existing pollution loads due to various mining activities;
- Predicting incremental levels of pollutants in the study area due to the proposed project activities;
- Evaluating the predicted impacts on various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact

assessment methodologies;

- To prepare an Environment Management Plan (EMP), outlining the measures for improving the environmental quality for environmentally sustainable development; and identifying critical environmental attributes that are required to be monitored in the post-project scenario.

Field studies were conducted to determine existing status of various environmental attributes as outlined in **Table 1.3**.

Table 1.3: Environmental Attributes and Frequency of Monitoring

Sr. No.	Attributes	Parameters	Frequency
1	Meteorology	Wind speed and wind direction, Temperature, Relative humidity and Rainfall.	Continuous with hourly recording through setting up of automatic meteorological station at site and data from Secondary sources: i.e. IMD station at Bishnupur.
2	Ambient Air Quality	PM10, PM2.5, SO2, NO2, CO, VOC, NH3. Heavy metals from particulate matter	24 hourly samples twice a week for three months identified at 8 locations. CO monitored 8 hourly samples in 24 hours.
3	Water quality	Physical and Chemical parameters, Bacteriological and demand parameters as per IS-10500.	Grab samples were collected once during study period prepared and brought to the laboratory for analysis. Surface Water (SW) and Ground water (GW) monitoring, once in a monitoring period. No. of Locations: 4 locations within 10 km radius study area (SW), 8 locations (GW).
4	Soil characteristics	Soil profile, characteristics, soil type and texture, heavy metals, NKP value, organic matter, CEC and exchangeable cations.	Once during study period at 8 locations within 10 km radius of study area.
5	Noise levels	Noise levels in dB(A)	At every location data monitored hourly for 24 hours, once during EIA study. Identified at 8 locations
6	Land use	Land use for different categories.	Based on NRSC image, preparation of FCC, Image and slope observation through field studies. Abstracts of census of India 2011 and village directory
7	Geology	Geological history	Based on data collected from secondary sources.
8	Hydrogeology	Drainage pattern, nature of streams, aquifer characteristics, recharge and discharge areas	Hydro-geological data based on data collected from secondary sources
9	Biological Environment	Study of terrestrial flora and faunal diversity and aquatic ecological studies within 10 km radius	Through field visits, relevant sample collection as per in-house SOP and secondary data collection from the District Forest Authority
10	Socio-Economic	Socio-economic characteristics: infrastructure resources, health status, economic resources.	Based on data collected from secondary sources like abstracts of census of India 2011 and village directory 2001

	aspects		
11	Risk assessment and Disaster Management Plan	Identify the areas where disaster can occur by fires and explosions and release of toxic substances.	It is observed periodically and updated in-line with MSHIC rule 1989 (during operational phase).

1.4.1 APPLICABLE LEGISLATION

The lists of applicable laws for the project are as follows:

- EIA Notification, 2006 and amendments thereof
- The Noise (Regulation and Control) Rules, 2000
- The Water (Prevention and Control of Pollution) Act, 1974.
- The Water (Prevention and Control of Pollution) Cess Act, 1977.
- The Water (Prevention and control of Pollution) Cess (Amendment) Act, 2003.
- The Air (Prevention and Control of Pollution) Act, 1981.
- The Environment (Protection) Act, 1986.
- The Public Liability Insurance Act, 1991.
- The National Environment Tribunal Act, 1995.
- Solid Waste Management Rules, 2016.
- The Batteries (Management and Handling) Rules, 2001.

1.4.2 STRUCTURE OF THE EIA REPORT

EIA report contains baseline data, project description and assessment of impacts and corresponding mitigation measures for preparation of Environmental Management Plan.

This report is structured in the following chapters:

Chapter1: Introduction

This chapter describes the profile of the project proponent, name and contact address with e-mail, project consultants, the purpose of the project, brief description of the project, applicable environmental regulations, objectives and methodology for EIA studies etc.

Chapter2: Project Description

This chapter gives a brief description of the project such as the type of project, need for the project, its location, approachability, layout, etc. of the proposed quarry project, the project implementation schedule, estimated cost of development etc.

Chapter3: Description of the Environment

This chapter presents details of the baseline environmental status for microclimate, air quality, noise, water quality (surface and ground), soil quality, flora, fauna and socio-economic status in 10 Km radius of the proposed project site.

Chapter4: Anticipated Environmental Impact and Mitigation Measures

This chapter discusses the possible sources of pollution and environmental impacts due to the project during operation phases and suggests the mitigation measures.

Chapter5: Analysis of Alternatives

This chapter discusses the analysis of the various alternatives for the technology as well as the site and gives the selection of the most feasible alternative.

Chapter6: Environmental Monitoring Program

This chapter discusses the details about the environmental monitoring program during operation phases. The technical aspects of monitoring, the effectiveness of mitigation measures are covered in this chapter.

Chapter7: Additional Studies

This chapter covers information about Public Consultation and Hazard Identification and Risk Assessment Studies for the operation phase, the safety precautions that are taken during operation phase.

Chapter8: Project Benefits

This chapter presents the benefits from the project.

Chapter9: Environmental Cost Benefit Analysis

Environmental Cost Benefit Analysis was not recommended during the Scoping stage of the project.

Chapter10: Environmental Management Plan

This chapter deals with the EMP for the proposed stone quarry mining projects and indicates the measures proposed to minimize the likely impacts on the environment during construction and operation phases and budgetary allocation for the same.

Chapter11: Summary and Conclusion

This chapter deals with the overall justification for implementation of the project and explanation of how adverse effects have been mitigated.

Chapter12: Disclosure of Consultants

This chapter deals with the details of consultants engaged and the NABET accreditation details of environmental consultants.

1.5 COMPLIANCE TO TOR

1.5.1 COMPLIANCE TO STANDARD TOR AND ADDITIONAL TOR

The compliance to the Standard ToR for conducting EIA study for non-coal mining projects and information to be included in EIA/EMP report is given in Table 1.4.

Table 1.4: Compliance to ToR for the proposed Stone Mine Projects

S. No.	Description	Compliance in the Draft EIA Report
TOR Conditions		
1. Project Details		
1.1	<p>The Executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on following points:</p> <ol style="list-style-type: none"> 1) Project name and location (Village, District, State, Industrial Estate (if applicable). 2) Products and capacities. If expansion proposal, then existing products with capacities and reference to earlier EC. 3) Requirement of land, raw material, water, power, fuel, with source of supply (Quantitative). 4) Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes. 5) Measures for mitigating the impact on the environment and mode of discharge or disposal. 6) Capital cost of the project, estimated time of completion. 7) Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt./private land, status of its acquisition, nearby (in 2-3 km.) water body, population, within 10km. other industries, forest, eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary). 8) Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population. 9) Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk. 10) Likely impact of the project on air, water, land, flora-fauna and nearby population. 11) Emergency preparedness plan in case of natural or in plant emergencies. 12) Issues raised during public hearing (if applicable) and response given. 13) Environment Management Plan (EMP) as per Office Memorandum issued by the MoEF & CC vide F. No. 22-65/2017-IA.III dated 30.09.2020 with proposed expenditure. 14) Occupational Health Measures. 15) Post project monitoring plan. 	<p>Since this is a new project all the details has been incorporated in Draft EIA Report for Public Hearing purpose also all this structure has already being incorporated in Form-I and PFR which applied for ToR in this scenario ToR has been granted by SEIAA.</p>

2.1	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.	Since this is new project, this compliance is not applicable.
2.2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	The LOI has been granted by M/s. West Bengal Mineral Development & Trading Corporation Limited (WBMDTCL) issued LOI No. BNK/BS/2023/1/2023-7 Dated 10.03.2023 and extended LOI No. MDTC/RAIYATI/Ext. of LOI/1938 Dated 04.10.2024 – (Annexure-III)
2.3	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.	<p>The documents including mine plan and Draft EIA being submitted are compatible with one another mentioning following information: Mining Lease Area- 1.29 Ha which has been clustering with Deep Black Stone Project having its area 4.223 Ha i.e. above 5 Ha so, Public Hearing and EIA report is mandatory as Cat-B1 Project.</p> <p>Project Proponent: M/s. Dhiren Ghosh; Shyampur Stone Mine, Proposed Production- 1,19,894.29 Cum. (for 5 years)</p> <p>No mines waste will be generated as whole mined material is saleable. Small amount of domestic waste such as Gutkha pouch, some eatable items will be generated, will be managed by laborers itself as per existing lease. Separate bins will be provided near mine site.</p> <p>Mining Method-Opencast manual.</p> <p>Refer Chapter-2 for all above information's</p>
2.4	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 an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	<p>Toposheet No. of mining lease area is provided in EIA/EMP Report.</p> <p>Refer Chapter-1</p> <p>The land-use of the study area with proper demarcated features is enclosed with the report, Land Use pattern & land use map is given in chapter 3, Refer Chapter-3, section-3.2</p>
2.5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Land Use pattern & land use map is given in Chapter 3, Refer Chapter-3, section-3.2
2.6	Details about the land proposed for mining activities should be given with information as to	Complied and included draft EIA Report

	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.	Proposed Stone mine of Shyampur Stone Mine has been granted for lease over an area of 1.29 Ha land to M/s Dhiren Ghosh for a period of 5 years by the Office of the WBMDTCL- Kolkata. The mining process will be done land use policy of the State & there is no land diversion has been proposed.
2.7	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 of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	Yes, the proponent Company has a well laid down Environment Policy. The hierarchical system or administrative order of the company has been given in the EIA report., Refer, Chapter-6, Fig: - 6.1
2.8	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.	No underground mining required. The proposed method of Mining will be Open-cast semi-mechanized mining method by forming benches. For extraction of the stone under the semi-mechanized opencast mining method, three (03) numbers of benches each of 6 m depth and 6 m width will be maintained. Details are given in Chapter 2 . As the planned operation and production is small in scale, blasting pattern will be kept simple row blasting with simple blasting parameters. Low intensity scientific controlled blasting will be done. All the safe guards' measures is provided whose details are given in Chapter -4 . of the EIA Report. Policies relating to mine safety has been adopted and same has been incorporated in Chapter 7 of EIA/EMP Report.
2.9	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 10 km zone from periphery of the lease has been considered as the study area. The Buffer map of the study area is attached with report. Small amount of top soil will be generated which will be utilize as green belt development purpose. All the details in the EIA report are for the life of the mine period. Refer Chapter-2 . Approved Mine Plan-

		Annexure-IV
2.10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Complied-Landuse delineating forest area, agricultural land, grazing land, wild life sanctuary, national park, etc. Land use details of study area discussed in Chapter 3 EIA Report.
2.11	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.	Complied- No land for any Over Burden dumps for outside the mine lease is proposed. The mining lease area is Rayati Land as per the Socio-Economic Survey, there is no project affected person (PAP) by the proposed mining activities. Hence, no R & R plan is envisaged; as there is no displacement of people from there respective areas, therefore, R & R is Not Applicable.
2.12	A Certificate from the Competent Authority in the 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.	There is no forest land within the lease area
2.13	Status of forestry clearance for the broken up area 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.	No forest land is involved in the lease area; therefore, deposition of netpresent value (NPV) and compensated Afforestation is not indicated.
2.14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	There is no forest land involved in the leased-out area. Hence, this act is not applicable for this project.
2.15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No RF/PF is present within the 10 km radius of the lease area. However, the vegetation detail of the study area is incorporated with the report, Refer Chapter-3,
2.16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area	The details Impacts & their mitigation measures are given in Chapter 4 of EIA/EMP Report.

	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.	
2.17	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 authenticated by 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 is no any National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger / Elephant Reserves are present within 10 km study area. Refer Chapter-1
2.18	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 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.	Detailed biological study of core zone and buffer zone within 10 km radius of the periphery of the mine lease for flora fauna, endangered & endemic species is incorporated in the EIA/EMP report. Refer Chapter-3. There is no Schedule I species found within the proposed lease area
2.19	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 considered.	Not Applicable. The Mine site does not fall under the Critically Polluted Area and 'Aravali Range' and it does not attract any court restriction for mining operation.
2.20	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 project does not falls in Coastal Area.

<p>2.21</p>	<p>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 requirements, and action programmes prepared and submitted accordingly, integrating the sectorial programmes 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 aspects should be discussed in the Report.</p>	<p>Not Applicable</p> <p>The whole mining lease area is a Rayati Land. No houses, villages connecting road infrastructure existing in the area will be disturbed. There will be no significant project affected person (PAP) by the proposed mining activities. Therefore, there is no need for R & R plan study. Hence, not applicable</p>
<p>2.22</p>	<p>One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season); 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.</p>	<p>Primary Baseline data has been collected from March-2025 to May-2025 Pre Monsoon season. The raw data of the Ambient Air Quality as per the CPCB notification of 2009, water quality, noise level, soil and flora and fauna including the monitoring location has been given in the Chapter 3 of the EIA-EMP report. The environmental monitoring has been carried out by NABL approved laboratory.</p>
<p>2.23</p>	<p>Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling 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.</p>	<p>Complied.</p> <p>The Air quality modelling details is incorporated in Section-4.2 of Chapter 4. The wind rose diagram has been prepared which is showing wind is blowing from S and predominant wind direction is at WNW and shown in the Chapter-3 Figure 3.2.1.</p>
<p>2.24</p>	<p>The water requirement for the Project, its availability and source should be furnished. A</p>	<p>The water required during the operation phase is about 5.0 KLD</p>

	<p>detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.</p>	<p>Domestic Purpose-0.20 KLD Dust Suppression-3.6 KLD Green Belt- 0.63 KLD Miscellaneous uses-0.57 Total-5.0 KLD The drinking water required for the construction workers will be sourced from Gram panchayat through water tankers. No Mining activities shall be carried out during rainy season. The project do not consume any process water except for drinking, dust suppression and plantation. Water will be procured from near villages/ local authorities through tankers. The Rain water collected in the mine pit will be pump out and used for plantation and sprinkling purpose for dust suppression. Refer Chapter-2</p>
2.25	<p>Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.</p>	<p>Water requirement will be fulfilled by private water tanker for drinking purpose and from local vendors for dust suppression and green belt development. So, no clearance is required.</p>
2.26	<p>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.</p>	<p>The project does not consume any process water except for drinking, dust suppression & plantation. Plantation is proposed which will increase the water holding capacity & help in recharging of ground water. No artificial rainwater harvesting is proposed for the present project in lease area.</p>
2.27	<p>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.</p>	<p>Surface and Ground water quality result are given in Chapter 3 Section 3.4.7</p>
2.28	<p>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 Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.</p>	<p>Mining has been restricted upto 118 m depth however as per the approved GR report till 104.5 m RL no ground water interception has been encounter. Hence, the strata of ground water is not being disturb, so no Hydro geological Report will not require for this project. Refer- Chapter-3.</p>
2.29	<p>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.</p>	<p>No any water body is situated or passing from lease area. No modification or diversion due to the proposed mining activity.</p>

2.30	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.	Please refer to section 3.4.5 in the Chapter 3 of EIA/EMP Report for detailed information on the geology.
2.31	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 the species which are tolerant to pollution.	Plantation/afforestation will be done as per program i.e., along the road sides and near civic amenities, as per mine plan. Post plantation, the area will be regularly monitored in every season for evaluation of success rate. List of plants selected for green belt development if incorporated in Chapter-6 .
2.32	Impact on local transport infrastructure due to the 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, 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 shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	There will be about 2 dumpers carrying the minerals per day. The projection has been done based on the mineral transportation. The details of traffic analysis are discussed in the report. Refer Chapter-4 under section 4.9.
2.33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Complied included in Chapter 2
2.34	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Complied included in Chapter 2 under sub-heading 2.5 having Figure 2.6 (A to D) .
2.35	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	The Mines Act & the Mines Rules 1955 will be followed for Occupational Health and Safety. Project Specific occupational health mitigation measures with requested facilities has been given as a part of Environmental Risk Assessment in the Chapter 10 under Section 10.4.8 of EIA-EMP Report. Periodical Medical Examination schedules are given in Chapter 10 under section 10.4.8 of EIA-EMP Report
2.36	Public health implications of the Project and	The proposed site is away from the nearest habitation and adverse health impact on the local

	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.	people is not anticipated, even though periodical health check-up camp will be organized under the EMP activity. Stone quarry mining can cause such as Skin Diseases, Lung diseases, Stomach diseases and Eye/Skin. Impact of Stone quarry mining on Public health implication & remedial measures has been detailed in Chapter- 10, Section
2.37	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 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.
2.38	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 given in the Chapter 10 of EIA-EMP Report.
2.39	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.	Noted Public Hearing points raised and commitment of the Project Proponent will be submitted in Final EIA report
2.40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	Not Applicable
2.41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The capital cost & the EMP cost is earmarked for EMP. Refer, Chapter-2.
2.42	A Disaster management Plan shall be prepared and included in the EIA/EMP Report	A Disaster Management Plan has been prepared and incorporated in Chapter 7 of EIA-EMP Report
2.43	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Benefits of the project is discussed in detail under Chapter -8 2% of the capital cost of the project cost will be used as CER cost. Annexure-V
2.44	Besides the above, the below mentioned general points are also to be followed: a. Executive Summary of the EIA/EMP Report (enclosed as Annexure – A). 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.	Noted- Complied EIA-EMP Report has been prepared as per the guideline issued from MOEF&CC under EIA notification-2006 and its subsequent amendments. a. Executive summary of the EIA/EMP Report shall be submitted. b. All documents are properly referenced with index and continuous page numbering. c. The source and period of baseline data collection has been provided respective

	<p>using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.</p> <p>e. Where the documents provided are in a language other than English, an English translation should be provided.</p> <p>f. The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.</p> <p>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-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.</p> <p>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 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.</p> <p>i. As per the circular no. J-11011/618/2010-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, as may be applicable.</p> <p>j. The EIA report should also include</p> <p>(i) surface plan of the area indicating contours of main topographic features, drainage and mining area,</p> <p>(ii) geological maps and sections and</p> <p>(iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.</p>	<p>sampling stations.</p> <p>d. Details of testing reports of air, water, soil & noise have been enclosed in EIA report. Refer Chapter-3.</p> <p>e. Executive summary of EIA/EMP Report is being submitted with EIA report in English language.</p> <p>f. The Questionnaire is being submitted along with EIA Report.</p> <p>g. All the instructions for the proponent and instructions for the consultants issued by MOEFCC vide O.M. No. J/11013/41/2006/- IA. II (I) dated 4th August, 2009 are being followed.</p> <p>h. There will be no major changes in basic scope and project parameters from Form-1 & PFR. If any changes after PH, shall be incorporated in final EIA report.</p> <p>i. Since this is a new project, this compliance is not required.</p> <p>j. Surface plan cum geological section, geological has been incorporated in chapter 2 of EIA report.</p>
<p>3. B. Additional Conditions Imposed By SEAC:</p>		
<p>3.1</p>	<p>The PP should provide the ownership documents for the plantation area and its distance from the project site. The PP should also mark the plantation area on the safety barrier in their plan and should clearly mention how they will undertake the plantation with reference to the excavated safety barrier</p>	<p>Noted- Complied EIA-EMP Report has been prepared as per the guideline issued from MOEF&CC under EIA notification-2006 and its subsequent amendments.</p>

CHAPTER 2

2.0 PROJECT DESCRIPTION

This chapter gives details about the type of the project, its location and layout, the resource requirement, the details of the waste/ emissions management measures and other salient features are outlined in this chapter.

2.1 TYPE OF PROJECT

Mr. Dhiren Ghosh is intent to open the proposed stone mining project at, village: Shyampur, PO: Saltora, PS:Saltora, District: Bankura. The proposed stone mining project having lease area 1.29 Ha. As per LOI has been granted by West Bengal Mineral Development & Trading Corporation Limited, Kolkata, Govt. of West Bengal vide Memo No. BNK/BS/2023/1/2023-7 and its subsequent extension vide Memo No. MDTC/RAIYATI/Ext.of LoI/1938 Dated 04.10.2024-**Annexure-III**. The total mining area is 1.29 Ha, is CLUSTERING with Deep Black Stone Project of Sri Sarandeep Singh Saini, Jaganath Plaza 202, Santa Dangal, Asansol (M. Corp.), P.O. Burnpur, P.S. Hirapur, District Paschim Bardhaman, PIN 7 13325 (W.B.) comprising an area of 4. 223 Hectares (10.44 Acres), falling in Mouza: Mouchuria, J.L. No. 111, Plot No. 35(P), P.S. & Block Saltora, District Bankura, State West Bengal within a radius of 500 meters So the area outcome is more then 5 Ha and actual area after clustering is about 5.62 Ha. (**Annexure-VII**) Hence, EIA has to be prepared for the project. The project is categorized under Category “B1”; as per EIA Notification dated 14th September, 2006 and subsequent amendment. The maximum allowable quantity for extraction will be 1,19,894.29 Cu.M. for five years as per mining plan and the method adopted is open cast mining.

2.2 NEED FOR THE PROJECT

Stones are often used as building material. Its strength and long life make it suitable for a number of purposes; it had become a major source for infrastructure development i.e. construction of roads, building and bridges etc. There is a demand of stone products like road metals, stone chips of different sizes in Bankura, Asansol as Durgapur and adjoining areas and this quarry will meet up the requirement of such stone products to some extent. The proposed Shyampur Stone Mine will fulfills the local demand of stones for Stone Crusher Units as well as for supply to various government, semi-government and private agencies for civil construction purposes. The people in the surrounding areas will be benefitted by generation of employment opportunities as well as growth of economic activities. Proposed project provides revenue to Govt. exchequer in GST, cess and excise duties till mine lease contract period of five years.

Table 2.1: Salient features of the proposed stone quarry project

Particulars	Description
Location of the Project	Shyampur Stone Mine, Near Village: Shyampur, PO: Saltora , PS: Saltora , District: Bankura
Name of the Mineral to be mined	Black Stone
Capacity of Proposed Production per annum	23,978.85 Cu.M. per year and 1,19,894.29 Cu.M. for 5 (five) years
Land use pattern	Non-Agricultural land/Barren Land
Method of Mining	Open cast mining
Cost of the Project	60.00 Lakhs
Total lease area	1.29 Ha.
Lease Period	5 Years as Approved mine plan for 5 years.
Geological Reserve	4,80,240.25 cum
Water Requirement	5 KLD ; Source: Supply from local vendor

2.3 LOCATION OF THE PROJECT & DESCRIPTION OF AREA

Proposed Shyampur Stone Mine (area 1.29 Ha.) in Shyampur, JL No.: 112, Plot No.: 807, Post: Saltora, P.S. & Block: Saltora, Dist: Bankura-722158, West Bengal. The proposed quarry site is about 18 Km away from the NH60 towards East side. The approach road is connected with village road through a motorable road. The site is free from human habitation within a radius of about 0.5 Km.

Table 2.2: Location of the project & description of area

Particulars	Description																																							
Power Requirement	NA																																							
Man Power Utilization	Total requirements- 20 Nos. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>S. No.</th> <th>Designation</th> <th>Numbers</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Mine Manager</td> <td>01</td> </tr> <tr> <td>2.</td> <td>Mining Foreman</td> <td>01</td> </tr> <tr> <td>3.</td> <td>Mine Mate cum blaster</td> <td>01</td> </tr> <tr> <td>4.</td> <td>Excavator (Operator)</td> <td>01</td> </tr> <tr> <td>5.</td> <td>Dumper Operator</td> <td>05</td> </tr> <tr> <td>6.</td> <td>Driller</td> <td>01</td> </tr> <tr> <td>7.</td> <td>Helper</td> <td>02</td> </tr> <tr> <td>8.</td> <td>Water Sprinkling Helper</td> <td>01</td> </tr> <tr> <td>9.</td> <td>Miner/ General Labour</td> <td>03</td> </tr> <tr> <td>10.</td> <td>Security Guard</td> <td>02</td> </tr> <tr> <td>11.</td> <td>Clerk</td> <td>01</td> </tr> <tr> <td>12.</td> <td>Peon</td> <td>01</td> </tr> </tbody> </table>	S. No.	Designation	Numbers	1.	Mine Manager	01	2.	Mining Foreman	01	3.	Mine Mate cum blaster	01	4.	Excavator (Operator)	01	5.	Dumper Operator	05	6.	Driller	01	7.	Helper	02	8.	Water Sprinkling Helper	01	9.	Miner/ General Labour	03	10.	Security Guard	02	11.	Clerk	01	12.	Peon	01
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12.	Peon	01																																						
No. of Working Days	300 Days (1 Shift)																																							
Solid Waste Generation	The top soil should be removed and utilize for developing green belt plantation purpose.																																							
Budgetary Provison for EMP	5% of Project Cost is allocated for Environmental Management Plan																																							
Corporate Environment Responsibility (CSR Cost)	2 % of Project cost is allocated for CSR cost																																							
Health and Hygiene	2 % of Project Coat is allocated for health and hygiene cost.																																							

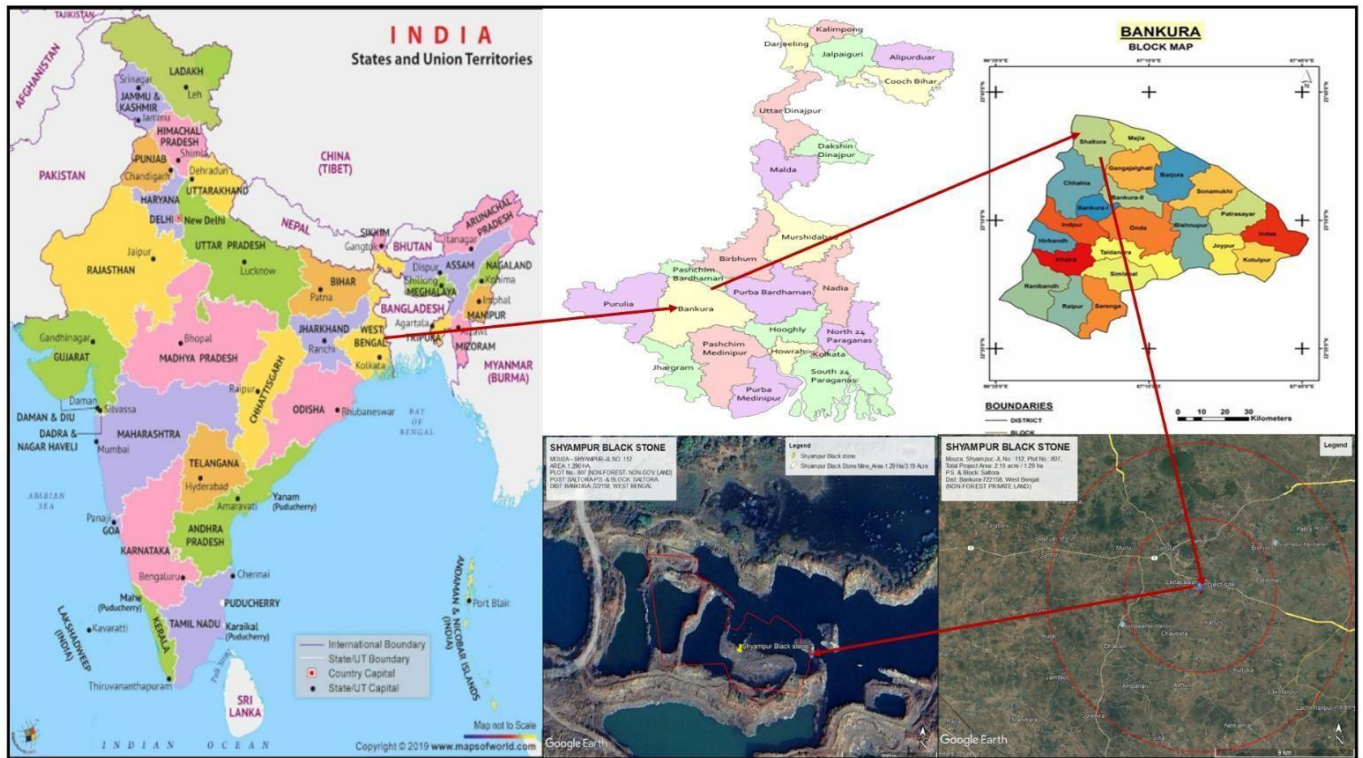


Figure 2.1: Location Map of proposed project sites

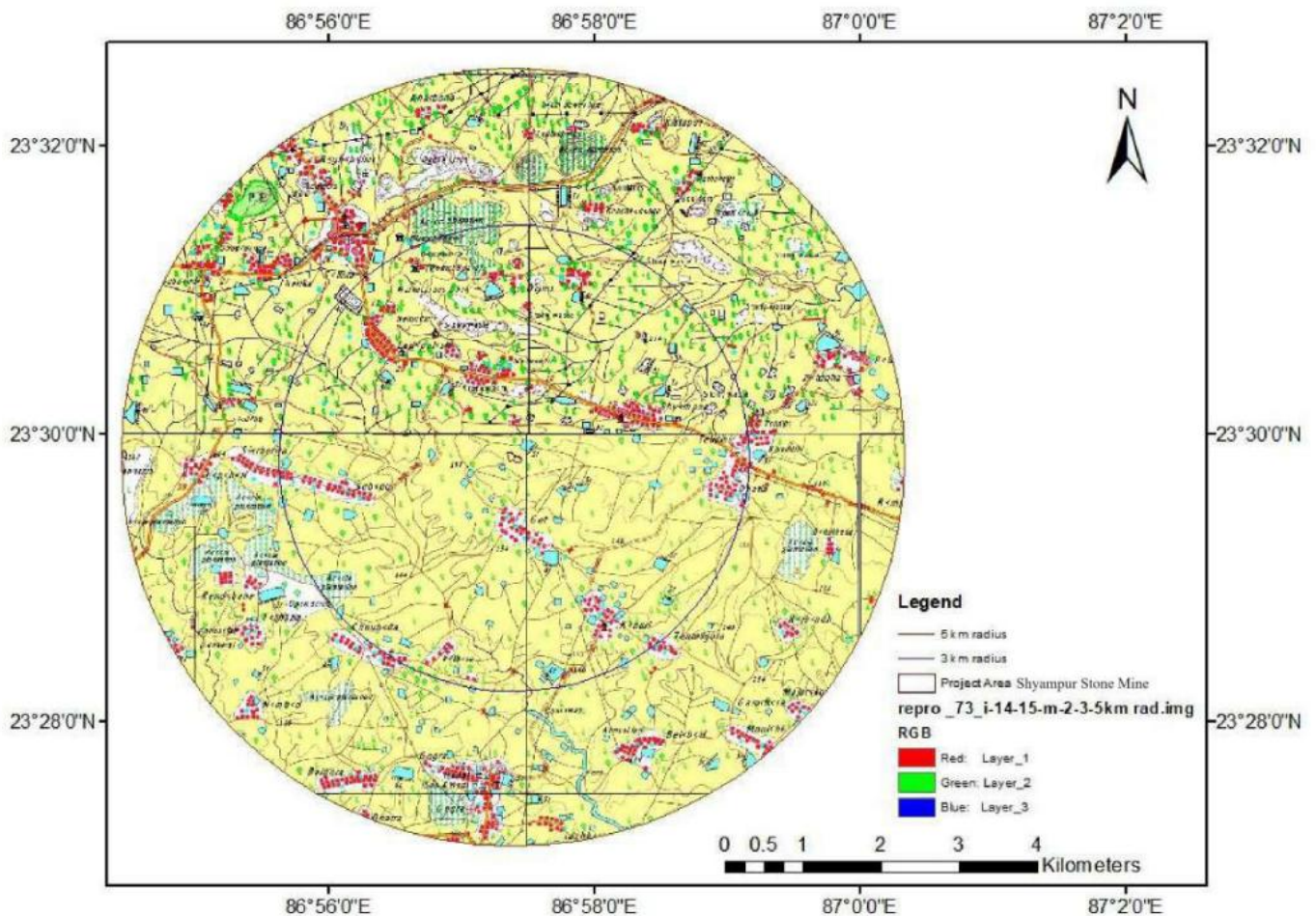


Figure 2.2: Topographical Map covering 10 Km Radius of Study Area.

2.4 TOPOGRAPHY AND GEOLOGY OF THE AREA

2.4.1 PHYSIOGRAPHY AND DRAINAGE

Bankura district can broadly divided into two division. Dissected plateau being the eastern fringe of Chota Nagpur region in west and undulating vast alluvial plain in east. Floodplain and interfluves are found at eastern region and elevation gradually rises giving rise to isolated hillocks, broken low ridges interspersed with valleys at western region of the district.

The drainage pattern of the area is found to be dendritic in nature. The major sources of water in the buffer area are Dhapalijor River (flows at 1.5km away in south western direction) and Damodar River (flows at 15 km away in north eastern direction). Dhapalijor River is an ephemeral River and is on most occasions dry throughout the year. Surface run-off water of the project area flows through the natural slope which is towards north. Figure 7 represent the Drainage Map of the study area of 5 Km radius.

2.4.2 REGIONAL GEOLOGY

The geology of the Bankura district includes ancient granites and gneisses of the Chota Nagpur Granite Gneiss Complex in the north and central areas, with younger sedimentary rocks like mica schists, shales, and sandstones to the south. Lateritic soils, gravels, and sandstones are common in many parts, alongside deposits of recent alluvium along the Damodar River. The geological landscape also features prominent hills formed by differential erosion, such as Biharinath and Susunia hills, which are made of granite and gneiss.

2.4.3 GENERAL GEOLOGY OF THE AREA

The Bankura district is divisible geologically into three north-south trending wide belts. The westernmost one comprises metamorphic of Archaean age and Chota Nagpur Gneissic Complex, Singhbhum Group of rocks and anorthosites belonging to Proterozoic age. In the northern part occurs Gondwana Supergroup of rocks with commercial coal seams as an extension of the famous Raniganj Coalfield. The central part is occupied by laterite and older alluvium of Pleistocene age, whereas the easternmost part is made up of Quaternary sediments and recent alluvium. The diverse litho-units along with geological formations and age are presented Table 2.3.

Table 2.3: General stratigraphy of Bankura District

AGE		GEOLOGICAL UNIT	LITHOLOGY
Pleistocene to Recent	Quaternary	Kasai Formation	Sand and silt
		Dintikri Formation	Alternating layers of sand, silt and clay
		Sijua Formation	Clay impregnated with caliche
		Lalgrah Formation	Ferruginous sediments with rock fragments
		Unclassified Quaternary	Sand, Silt and clay (un-oxidized or occasionally oxidized)
Cenozoic(undiff.)			Laterite
Tertiary			Clay and grit
			Ferruginous gritty sandstone and shale

Carboniferous to Triassic	Gondwana Super group		Mahadeva Formation	Red sandstone, red clay
			Panchet Formation	Sandstone, shale
		Damud Group	Raniganj Formation	Sandstone, shale, coal
			Barakar Formation	Sandstone, shale, coal and fireclay
Proterozoic				Quartz vein
				Kuilapal granite
		Singhbhum Group		Hornblende schist and epidiorite
				Quartzite
				Mica schist, occasionally garnetiferous
				Calc-gneiss and granulite
				Granet-staurolite schist with Kayanite
				Garnetiferous phyllite
		Anorthosite suite of Bankura-Purulia		Anorthosite
				Gabbroic anorthosite
	Pyroxenite/pyroxene granulite			
Archaean(?) Proterozoic		Chotanagpur Complex	Gneissic	Dolerite
				Granite gneiss
				Felspathic schist
				Pink granite/biotite granite gneiss
				Hornablende-biotite-granite gneiss
				Hornablende schist
Archaean		Unclassified Metamorphics		Quartzite, quartz schist
				Phyllite and mica schist
				Garnetiferous sillimanite-biotite schist
				Amphibolite, hornblende schist and epidiorite

2.5 PROJECT DETAILS AND ACTIVITIES (AS PER APPROVED MINE PLAN)

2.5.1 PHYSICAL PROPERTIES

The physical property of Stone quarry is described in **Table 2.4**.

Table 2.4: Physical properties of Stone quarry

Properties	Feature
Specific Gravity	2.63 gm/cm ³
Porosity	Quite low
Moisture absorption	<1%
Hardness	80-90 N/mm ²
Bulk density of in situ	2.96 MT/m ³

2.5.2 CHEMICAL PROPERTIES

The mineral composition of the stone is defined below in Table 2.5:

Table 2.5: Chemical Composition of Shyampur Granulites

Major oxides (wt%)	BH-01	BH-02
SiO ₂	47.30	48.80
Al ₂ O ₃	11.50	11.70
Fe ₂ O ₃	11.73	12.10
CaO	10.01	9.80
MgO	11.04	10.65
K ₂ O	0.71	0.49
Na ₂ O	3.97	4.30
TiO ₂	0.83	0.80
LOI	0.70	0.40
Total	97.79	99.04

Based on chemical analysis of selected samples, mineral concentrates were predicting pyroxene granulite rock type, Source Approve GR Report.

2.6 SIZE OR MAGNITUDE OF OPERATION

The proposed Shyampur Stone Mine is recommended for 5(five) year by the Govt. of West Bengal to extract rock boulders from the location and is demarcated at Village: Shyampur, Block Saltora, Dist: Bankura under Raiyati Policy by Govt. of West Bengal. The total estimated volume of the proposed stone quarry is estimated and recommended as 3,54,887.10 MT in 5 (Five) years. The quarry has been designed to work for 300 days per year on single shift basis. Mining will be carried out only up to a maximum depth of 118 m. Blast hole drilling will be carried out by compressed air operated drills and blasting by slurry mixed Emulsion and booster to break the hard and compact stone. Excavation and loading will be done by excavators at the mine site.

2.7 RESERVE ESTIMATION

The total estimated volume of the proposed Shyampur Stone Mine is estimated and recommended as 1,19,894.29 Cu.M. for 5(five) years. Proposed quantity from this quarry site is @ 23,978.85 Cu.M. per year approximately. The reserve of the mineral in the area, the mine is designed to produce 23,978.85 Cu.M. of stone boulders in average per annum. The schedule of year wise production of the stone boulders from first to fifth year is as below:

Table 2.6: Year wise distribution of production details (MT)

Year	Production (MT)
1st Year	69,302.98
2nd Year	71,534.95
3rd Year	63,621.48
4th Year	81,290.16
5th Year	69,137.49

2.7.1 PRODUCTION PLAN

A tentative scheme of mining, annual program and plan for excavation from year to year for first 5 years. Year wise Production Programme is given below table 2.7 and year wise production plan are presented in Figure 2.3 (A to E):

Table 2.7: Production Plan of Shyampur Black Stone Mine

Year	Proposed Extraction of Stone per year (Cu.M.)	Overburden removal per year (Cu.M.)	Total material to be handled per year (Cu.M.)	Total material to be handled per day (Cu.M.)
1st Year	23,413.16	0	23,413.16	78.04
2nd Year	24,167.21	0	24,167.21	80.55
3rd Year	21,493.74	0	21,493.74	71.64
4th Year	27,462.89	0	27,462.89	91.54
5th Year	23,357.26	0	23,357.26	77.85

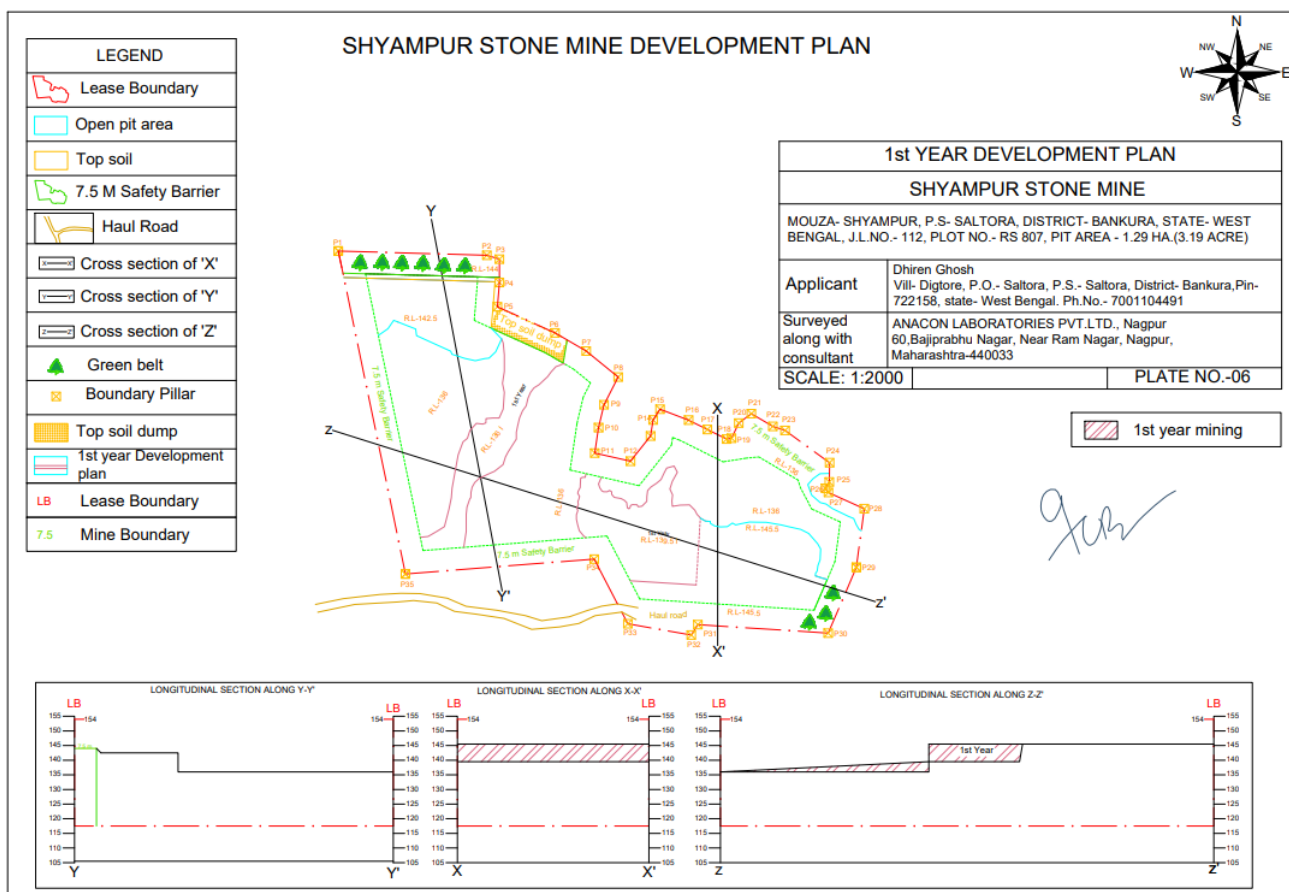


Figure 2.3 (A): 1st Year Production Plan

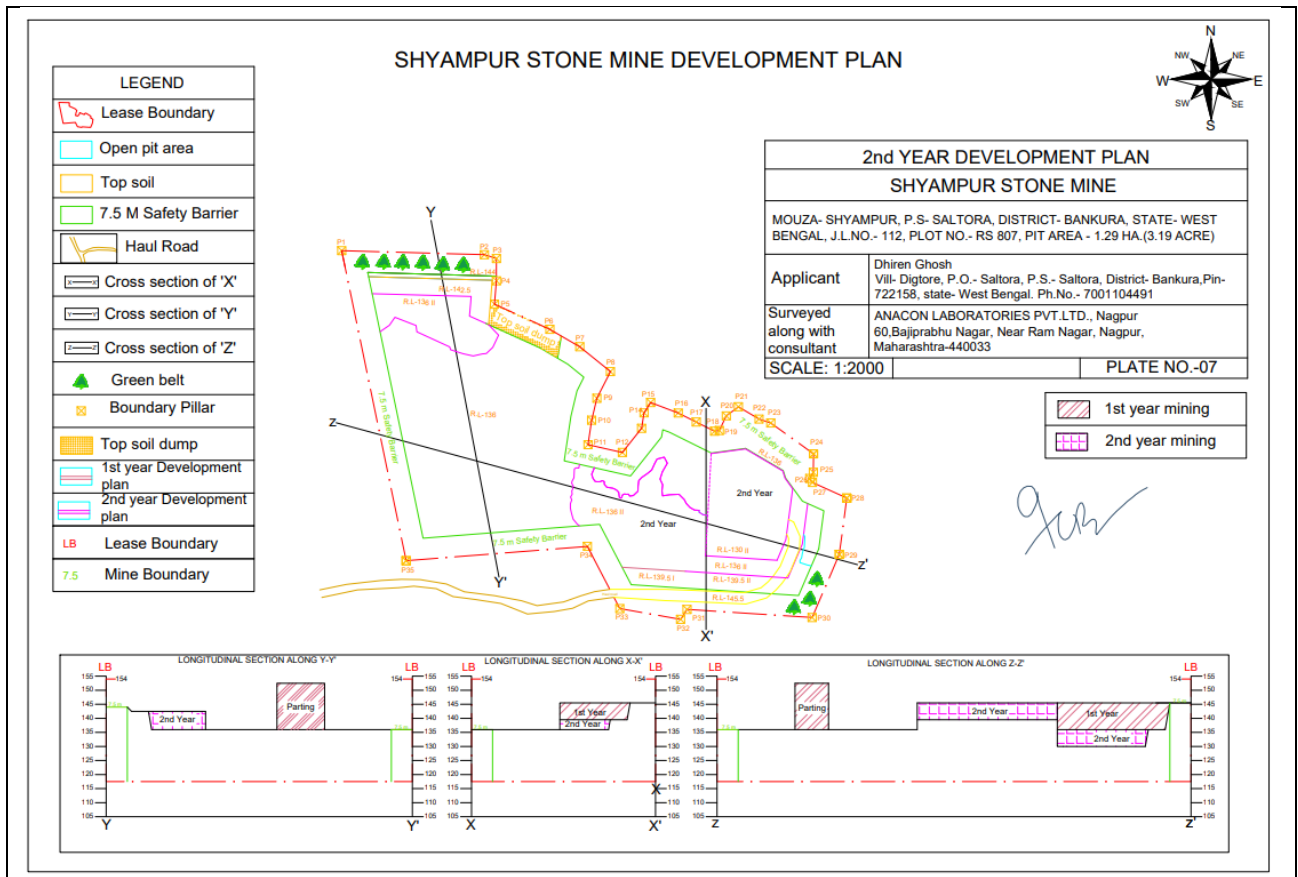


Figure 2.3 (B): 2ndYear Production Plan

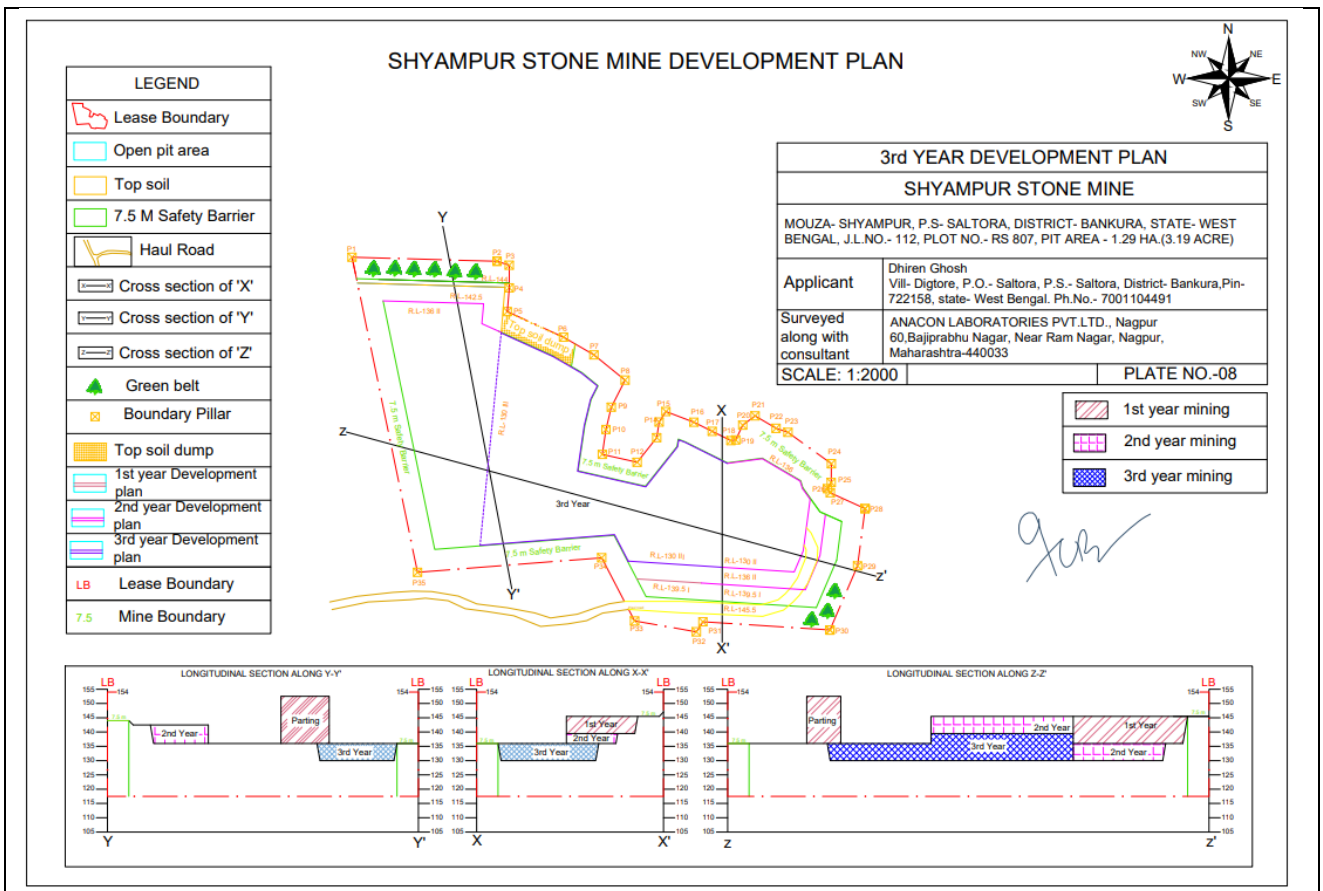


Figure 2.3 (C): 3rdYear Production Plan

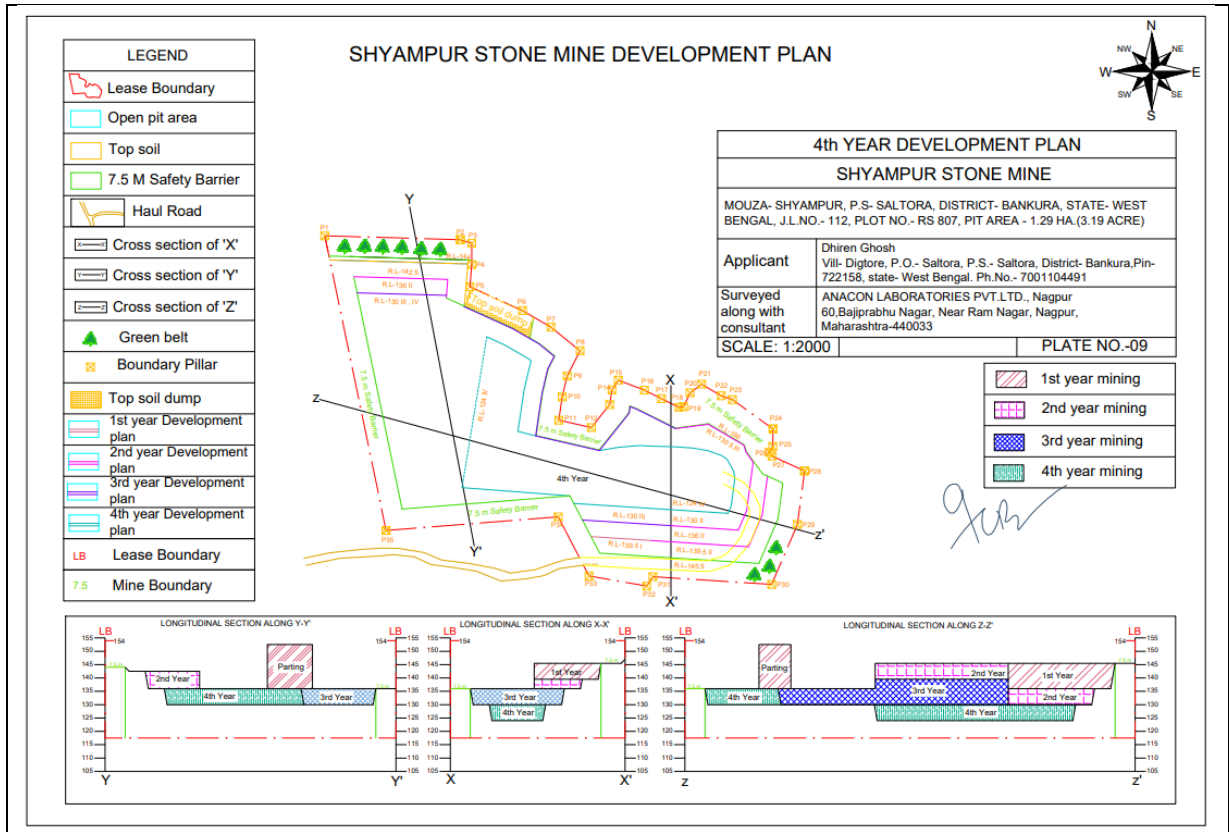


Figure 2.3 (D): 4thYear Production Plan

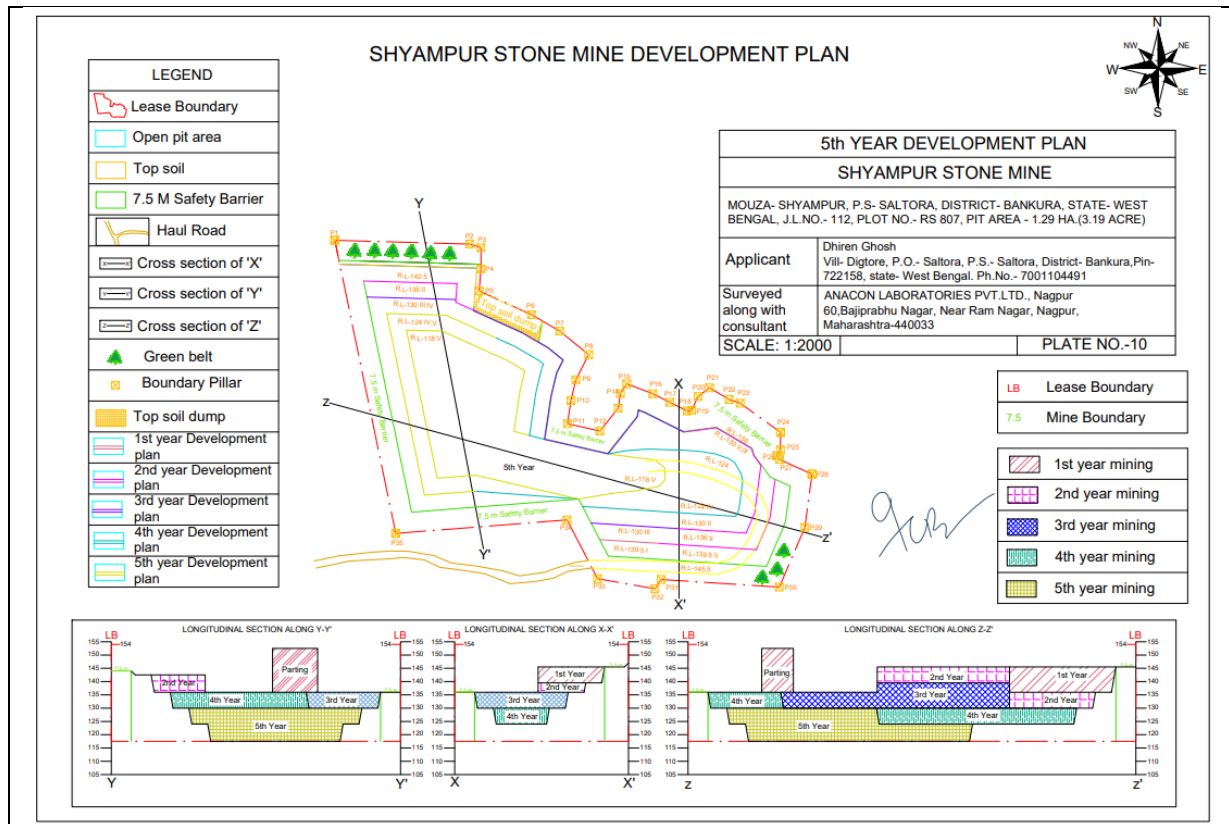


Figure 2.3(E): 5thYear Production Plan

2.8 PROJECT DESCRIPTION WITH PROCESS DETAIL

2.8.1 METHOD OF MINING

Mine will be developed by opencast method of mining. The topsoil will be utilized separately for future use of plantation/vegetation in the safety zone as well as adjoining to the Mining Lease area for the green belt development which is about 300 m distance towards SW direction. Subsequently, the working face will be prepared for box cut within the proposed earmarked area with the help of deep hole drilling and blasting to achieve the target production in accordance with the proposed production rate. The blasted rock of black stone will be stacked at the stack yard for transportation as on requirement of the consumers or market demands. The mine has been extensively worked out. The extent of present working is shown in subsequent Plates. Depth of black stone exposed in different section lines in the plate are shown in above table No. 10.

The mining operation in this mine will be carried out by opencast mechanized method. This is a safe, scientific and economical viable method to be adopted for the said mine. Accordingly, Topsoil, overburden and black stone will be mucking from the mine face to stack yard or dump yard by deploying the H.E.M.M (Heavy Earth Moving Machinery) with the help of a dumper-shovel combination. For achieving proper rock breakage with productivity,

cost-effectiveness and environment protection point of view, the mine will adopt the deep holes blasting with the use of controlled blasting technique.

From an operational point of view, the mine design will be kept of parameters like bench height 6 m, spacing 3.5 m & burden 3 m, sub-grade drilling (10% of the bench height) and inclination of drilling 15 degree. For safe and scientific mine operation, the mine would be adopted to the following bench design parameter, as per guideline of the DGMS.

During next five years planning will be done to bring the quarries into proper shape with regular benches. The following measures will be adopted to make the mine working systematic.

- a) Safety barrier is intact in some patches on the surface. In these patches top soil will kept and vegetation will be established.
- b) Below the high wall at existing pit bottom 7.5 m safety barrier will be left and benches will be developed by box cut and trenching
- c) Incidence of soil is only 1.5m in different boreholes. Since the entire area is excavated only a limited quantity of soil will be removed and that will be stacked along the safety barrier.

EXTENT OF MECHANISATION

As stated earlier this will be manual quarry with compressed air drilling and blasting. Boulders will be loaded to the trucks/dumpers manually or mechanically and transport to therespective destinations.

MINING EQUIPMENT

Table 2.8: List of Mining Equipment

S. no.	Type of Machine	Nos.	Size/ Capacity	Purpose
1.	Wagon Drill (Dia 90 mm)	01 Nos.	25m/hr.	For blast hole drilling
2.	Shovel (Back Hoe)	02 Nos.	0.9 m3	1 for black stone production and 1 no. for spare.
3.	Compressor	1 Nos.	300 cfm	-
4.	Jack Hummer	1 Nos.	2000 rpm	For secondary drilling
5	Dumper	02 Nos.	10 Metric Ton	1 for black stone transportation & 1 no. for spare.
6	Water tanker (sprinkler)	01 Nos	-	For water spraying at dust Suppression.
7	Portable Pump	01 Nos.		For De-Watering

(** some machineries will be deployed on hiring basis)

USE OF EXPOLSIVES

The question of using of explosives for breaking of stones is not advisable. But keeping the hardness and compactness of the deposit, the project proponent may approach the competent authority for getting the permission.

PRIMARY BLASTING PARAMETERS

Table 2.9: Primary Blasting parameters

Blast Hole Diameter (D) (mm)	15 x Bench Height (BH) in meters = 15 x 6 Meter = 90 mm
Burden (B)	3.0 m
Burden Spacing (S)	3.5 m
Average Depth of Blast Hole	6 m
Tonnage Factor	2.96
Daily Production target	236.59 MT/day
Maximum number of holes blasted in a round	2
Maximum number of holes will need to be blasted per day	[{236.59 MT/(3.5 m x 3.0 m x 6.0 m)x 2.96}] = 1.26 approximately 2
Powder factor (PF)	0.7 kg/ m ³ or 4.03 Ton/Kg
Charge Per Hole (Explosive Used)	Blast Volume x PF = (3.5 m x 3 m x 6 m) x 0.7 Kg/m ³ =44.1 Kg

TYPE OF EXPLOSIVES

Site Mixed Emulsion (SME) & booster will be used for blasting.

BLASTING OPERATION

- The blasting operation shall be undertaken by competent persons (Blasting) as per Mining Rules & Regulation in force with maximum precaution to make the blasting operation safe.
- Frequency of blasting can be optimized by use of delay detonators to reduce the noise and ground vibration within the threshold limit.
- Blasting Pattern, stemming, charge per hole should be designed on the basis of field trials to control the flying rocks.
- Adequate sirens, signals, posting of guards at strategic points before blasting shall have to be provided.

STORAGE OF EXPLOSIVES

Storage of Explosive: No explosive will be stored in the mine. Blasting operations will be carried out with mobile explosive van by outsourced PESO approved authorized / licensed agency. For storage and use of explosives, necessary permission from Petroleum and Explosives Safety Organization (PESO) of Government of India will be obtained as per Indian Explosive Rule, 2008.

PROPOSED OF MINING METHODOLOGY

- Mining will be carried out strictly as per Mining Act/Rules.
- Mining will be done in Day time and dry seasons only.
- Required safe corridor will be maintained.
- Mining will be restricted to the depth of 6 m.
- Ground water will not be disturbed. The mining will be done 118 m above ground.
- Angle of repose for mining will not be more than 45 degrees.

2.9 UTILITIES REQUIREMENT

2.9.1 WATER REQUIREMENT

Water is required in the project site for various purposes like spraying to control the dust generation.

Water is also used during the drilling process. The water requirement will be around 5.0 KLD. Table

2.10 details of water requirement.

Table 2.10: Details of Water Requirement

Sl.No.	Activities	Demand (KLD)
1	Domestic Purpose	0.20
2	Mine a. Drilling b. Dust suppression	3.6
3.	Green Belt 210 trees (3 liters/ trees)	0.63
4.	Miscellaneous uses	0.57
	Total	5.00

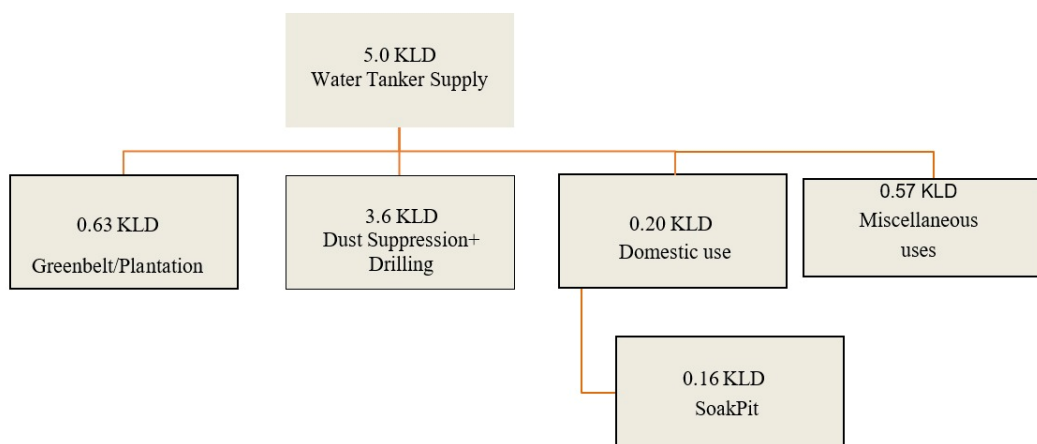


Figure 2.4: Water Balance Diagram of Shyampur Stone Mine

2.10 POWER REQUIREMENT

The proposed SHYAMPUR STONE MINE does not require any power supply for the mining operation. It is proposed to operate in a single shift of 12 hours with 1 hour lunch interval between 1 Pm to 2 Pm. However, if required, necessary statutory permissions will be taken from WBSEDCL. DG set or solar Power System will be used for office purposes during office time.

2.11 MANPOWER REQUIREMENT

Project will create direct & indirect employment opportunities within the surrounding region. Unit will use good faith efforts to employ local people from the nearby villages depending upon the availability of skilled & un-skilled man-power surrounding the project site. In operation phase, the proposed project would require significant workforce of non-technical and technical persons. The Employment opportunity will be created for skilled and especially unskilled people. 20 peoples are working at project site both statutory, skilled semi-skilled, unskilled & other workers and 5-10 people will get secondary employment opportunities with allied and related industries, such as transportation, maintenance, shops, garages, eateries, etc. Table 2.11 Manpower details for the proposed Shyampur stone mine.

Table 2.11: Manpower details of proposed Shyampur Black Stone Mine

Category		Description		Heads
A	Statuary Personnel	i	Mine Manager	1
		ii	Mine Foreman	1
		iii	Mine Mate cum Blaster	1
B	Skilled Personnel	i	Excavator (Operator)	1
		ii	Dumper Operator	5
		iii	Driller	1
C	Semi-Skilled Personnel	i	Helper	2
		ii	Water Sprinkling Helper	1
D	Unskilled Personnel	i	Miner/General Labourer	3
		ii	Security Guard	2
E	Other Personnel	i	Clerk	1
		ii	Peon	1
Total Personnel engaged in Mine operation				20

The above man power is adequate to meet out the production schedule and the machinery strength envisaged in the mining plan and also to comply with the stationary provisions of mine safety regulation. It is been ensured that the labours will not be deployed less than 18 years, No Child labours will engage or entertained for any kind of proposed mining operations. All the labours engaged for mining operations will be insured till the end of life of mine.

2.12 PROPOSED INFRASTRUCTURE

2.12.1 INDUSTRIAL AREA (PROCESSING AREA)

Not applicable

2.12.2 RESIDENTIAL AREA (NON-PROCESSING AREA)

Not Applicable

2.12.3 GREENBELT

Since the area comprise of hard rock without any significant soil cover, the area is difficult for sustenance of vegetation. However, thin layer of top soil will be scrapped off, wherever observed, and will be stacked separately in the safety zone area. This top soil will be used for plantation. The 7.5 meter safety barrier shall be used for green belt development at 2m spacing left all round and shall be used for plantations of trees. Neem, Karanja, Mango, Kusum, Accacia, Guava etc. species will be selected. The main aim of the green belt development is to arrest dust and noise generated from the mine and also to form a visual barrier.

Appropriate plant species of different life forms will be grown to develop the vegetation cover and thereby provide habitat for the faunal species. The sapling list of plant species suggested includes the following criteria:-

- Tree species which are well adapted to local environmental setting, tall, bearing larger canopy cover and leaf area.
- Tree species of different size classes (small, medium and larger) were suggested to maintain the different canopy levels at vertical profile.
- Fruit trees in the selection list would help to attract birds and fruit eating bats which are locally available.
- Wild species were suggested to provide habitat for faunal species, increase the faunal species diversity and maintain the naturalness.

Table 2.12: Greenbelt/plantation details

Year	Name of the saplings to be planted	No. of saplings proposed	Targeted Survival Rate	Plant after survival	Location
1st	Neem, Karanja,	525	75%	395	Safety Barrier & Outside the ML area
2nd	Arjun, Gamar, Mango, Kusum,	525		395	Safety Barrier & Outside the ML area
3rd	Accacia,			Maintenance and nourishment of the plantation will be done during the last three years	
4th	Guava,				
5th	Babul, Bot, etc.				
Total		= 1050		=790	

*Note: Since the mining lease area is 1.29 ha, 7.5 m safety barrier has been utilized for green belt development purpose is about 4.75 % under 0.059 Ha present at ML area and remaining 28.25% i.e.

0.361 Ha will be utilized for green belt purpose in adjoining plot area at mouza – Mouchuria, Jl.- 111, Plot no. 294 and 419, having area – 1acre/0.404 Ha which is about 300 m distance from the lease hold area towards WSW direction where total 850 no. of saplings is proposed for green belt development. Since the first 2 years will be the Green Belt plantation drive and last 3 years will be the maintenance and nourishment of plantation for their growth as well as survival status.

2.12.4 HEALTH & EDUCATION:

- The infrastructure like, toilets, first aid stations etc. will be developed at mine site.
- Local people will be employed on priority basis as per their skills.
- As a part of Corporate Social Responsibility, it is proposed to spent 2% of Total Project Cost per annum for various social development activities like conducting medical checkups for the local people, Assistance to Local Schools, Scholarships to needy Students, Sanitations and Drinking Water Facilities, etc.
- Medical facilities to the workers employed at site.
- Direct & indirect development of the society.
- Further, indirect means of earnings will be created in the area of contractual jobs, vehicle driving, shops, construction etc. Therefore, this project brought a positive impact on the adjoining society.
- An occupational health unit will be organized and the proposed measures will be adopted:
 - Pre & Periodical Medical Checkup program for all the workers.
 - Compulsory medical checkup program and first-aid box with necessary equipment will be provided.
 - Training for workers regarding occupational hazards.
 - Safety equipment i.e. dusts mask, safety shoes, gloves etc.

2.12.5 CONNECTIVITY (TRAFFIC AND TRANSPORTATION ROAD/RAIL/ METRO/ WATER WAYS ETC.)

- The road from the proposed mining area to main road is already in existence; the same road will be maintained and utilized for transportation.
- The Nearest Railway station is Madhukunda Railway station which is about 16.5 Km in NW direction from the mine
- Site Nearest road to the proposed mining area are Gangajalghati- Saltora Road which is about 1.5Km in N direction. SH-8 (Durgapur-Purulia) is about 3.5 Km in NW

2.12.6 DRINKING WATER MANAGEMENT (SOURCES & SUPPLY OF WATER)

Water is required in the project site for various purposes like spraying to control the dust generation. Water is also used during the drilling process. The water requirement will be around 5.0 KLD and source will be by water tankers.

2.12.7 SHELTERS & SEWAGE SYSTEM

Rest shelter for the quarry workers with drinking water facility will be provided. Mobile Toilets will be provided for the mine employees. Domestic effluent from the toilets will be discharged which will be carried through mobile toilets van.

2.12.8 INDUSTRIAL WASTE MANAGEMENT

Not Applicable

2.12.9 SOLID WASTE MANAGEMENT

There is hardly any waste as the soil and the weathered zone excavated material will be marketed for filling up of foundation of building, roads, etc. Hence, there is no solid waste generation during this quarrying operation.

2.12.10 OTHER SITE SERVICES:

The proposed mining area will be comprised of basic amenities, office and other requirements as per Mining rules and regulations at the base camp near the proposed quarry area, Proper HSE and PPE rules for workers should be maintained" The following facilities are to be provided for smooth running of the mine.

1. Rest shelter for the quarry workers with drinking water facility.
2. First Aid room with ambulance facility
3. Site office and store with toilets
4. Arrangement of open space for emergency assembly with siren.

2.13 PROGRESSIVE MINE CLOSURE PLAN

(Prepared as per West Bengal Minor Minerals Concession Rules,2016)

2.13.1 INTRODUCTION

Table 2.13: Project description

a	Name of The Project	SHYAMPUR STONE MINE
	Address of The Project	MOUZA- SHYAMPUR, JL NO.:112, AREA: 1.290 HA. PLOT NO.- 807 [NON-FOREST- NON-GOV. LAND] POST: SALTORA, P.S.& BLOCK: SALTORA, DIST: BANKURA-722158, WEST BENGAL
	Name of The Applicant	SHRI DHIREN GHOSH
	Address of The Applicant	MOUZA – DIGTORE-PO-SALTORA P.S. & BLOCK – SALTORA DISTRICT - BANKURA, WEST BENGAL-722158 PH. NO.-+91-7001104491
b	Project Area	3.19 acre/1.29 Ha (With Approach Road 0.084 Acre/0.034Ha)
c	Status of the Applicant	PRIVATE
d	Mineral(s) which are occurring in the area and which the applicant intends to mine	BLACK STONE
e	Whether the area is recorded to be in forest (please specify whether protected, reserved etc.)	Non-Forest land
f	Ownership/Occupancy:	Proprietorship
g	Topo Sheet No:	Toposheet No. SOI-73 I/14 Old- F45 C/14 New, 73 I/15 Old-F45 C/15 New, 73 M/2 Old- F45 D/2 New and 73 M/3 Old-F45 D/3 New present in and around the project site as well as 10 km radius.
h	Latitude & Longitude:	Details in Chapter 2.0
i	Present land use pattern	Non-Agricultural land/Barren Land
j	Present Method of mining and mineral processing	No mining is being carried at present.

2.13.2 REASONS FOR CLOSURE

The quarries will not be abandoned during plan period hence mine closure is not envisaged

2.13.3 STATUTORY OBLIGATIONS

As per rule 14 of WBMMCR 2016, for every fresh grant of mining lease a progressive mine closure plan is required to be submitted.

2.13.4 CLOSER PLAN PREPARATION DETAILS

Table 2.15: QP & applicant details

Name of the Applicant	SHRI DHIREN GHOSH
Address of the Applicant	Mouza – Digtore-Post-Saltora P.S. & Block – Saltora District - Bankura, West Bengal-722158 Ph. No.-+91-7001104491

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

Name of qualified Person	Gyan Chand Bohra -Qualified Person
Address	C/o. Anacon Laboratories Pvt. Ltd. Nagpur- Regional Office- Contai, West Bengal-721401

2.13.5 REVIEW OF IMPLEMENTATION OF MINING PLAN/SCHEME OF MINING INCLUDING FIVE YEARS PROGRESSIVE CLOSURE PLAN UP TO THE FINAL CLOSURE PLAN OF THE MINE

Preparation of Progressive Mine Closure Plan (PMCP) came into force through the vide notification no, GSR 330 (E) dated 10.04.2003. The proposals for construction of different protective measures are as follows during the 5 years plan period:

Table 2.15: Planning details during five years period

Year	Particulars	Proposed
During 5 Years Plan Period	Construction of retaining Wall	Nil
	Afforestation	1050
	AAQ	As per MoEFC&C Guideline
	Water Quality	
	Noise Level Monitoring	

2.13.6 PROGRESSIVE MINE CLOSURE PLAN & MINE OUT LAND

The entire leasehold is almost excavated and the black stone deposit is yet to bottom up. There is only 1.5m soil available over the black stone deposit which is spread in the safety barrier area for plantation.

2.13.7 WATER QUALITY MANAGEMENT

Only accumulated rain water will be discharged to seasonal nallah and regular water quality management will be done.

2.13.8 AIR QUALITY MANAGEMENT

Ambient air quality monitoring will be done at regular intervals.

2.13.9 WASTE MANAGEMENT

The waste to be generated during the plan period is mostly soil and weathered rock which will be utilized for green belt development purpose and as per plan; a total of 6752.85 Cum will be generated.

2.13.10 TOP SOIL MANAGEMENT

Limited quantity of soil will be available during planned period that will be spread over safety barrier area for plantation.

2.13.11 DISPOSAL OF MINING MACHINERY

Not envisaged during this planned period. A detail closure plan will be submitted 6 months prior to the closing of this mine.

2.13.12 INFRASTRUCTURE

Rest shelter, First-Aid room, drinking water and labour shed will be erected.

2.13.13 SAFETY AND SECURITY

DGMS approved safety shoes and helmets will be provided to all the miners. Drill operator will be provided with a dust mask and ear muffs. Workmen will be medically examined periodically. The pit boundary will be fenced with wire fencing; mine roads will be properly marked. The permanent security guard will be engaged to secure the safety matters of the mine.

2.13.14 DISASTER MANAGEMENT AND RISK ASSESSMENT

First aid facility provided at mines and a vehicle is available for any emergency or any type of accident.

2.13.15 CARE AND MAINTENANCE DURING TEMPORARY DISCONTINUANCE

Notice of Temporary discontinuance will be sent to concerned authorities and government departments. Pit will be fenced and a security guard will be posted to take care of pits and others.

As such all infrastructures will be movable type it may be shifted as on requirement.

2.13.16 ECONOMIC REPERCUSSIONS OF CLOSURE OF MINE AND MANPOWER RETRENCHMENTS

Not envisaged during the planned period.

2.13.17 TIME SCHEDULING FOR RECLAMATION & REHABILITATION

This will be provided in the final closure plan.

2.13.18 ABANDONMENT COST

The tentative cost for implementing the protective and rehabilitation measures proposed in the mining activity is limited is not applicable.

2.13.19 FINANCIAL ASSURANCE

Financial assurance has been computed on the basis of area put to various uses indicated in the circular. For the purpose of mining operation in any area, financial assurance shall be furnished by every lease holder. The amount of financial assurance shall be Rupees fifteen Thousand (15,000) per Hectare of the mining lease area put to use for mining and allied activities or Rupees Fifty Thousand (50,000) whichever is higher, As per the provisions of the West Bengal Minor Minerals Concession Rules, 2016, financial assurance for SHYAMPUR STONE MINE- Dhiren Ghosh has been estimated to Rs. 50,000/- which will be deposited to the concerned authority as per the payment norms specified in the clause 18.2 of West Bengal Minor Minerals Concession Rules, 2016.

2.13.20 FINAL MINE CLOSURE PLAN (FMCP)

The life of the mine as per the present conceptual plan will be 5 years. It is 1.290 Ha. proposed and suggested to develop the mine scientifically and systematically to excavate the entire mineral reserve of the leasehold area, as per the estimated Black stone reserve (UNFC-332). So, after 5 years, the lease owner can apply for a lease renewal, provided further black stone reserve (UNFC 332) would be established through vertical drilling.

CHAPTER-3

3.0 DESCRIPTION OF ENVIRONMENT

3.1 INTRODUCTION

This chapter of the report provides an overview of the environmental baseline conditions within the study area of 10 km radius from the periphery of project site. An environmental baseline monitoring was carried out during **pre-monsoon season (1st March 2025 – 31st May 2025)** along with secondary data as a part of EIA studies for proposed stone mining project having lease area 1.29 Ha. is proposed to be located within Near Village -Shyampur, P.O- Saltora, P.S.- Saltora, District- Bankura, West Bengal-722158.

The methodology adopted for carrying out baseline environmental monitoring was as per the guidelines given in the EIA Manual of MoEF&CC (Refer **Annexure VI** – Environmental Standards). Baseline data in the study area was collected by conducting field study/primary sampling during the study period with respect to the different environmental attributes as given Table 3.1:

Primary Data Collection

Primary data collection includes:

- Ambient air quality
- Ground water / surface water quality
- Land-use pattern
- Geology and Hydrogeology
- Noise levels
- Soil quality within core and buffer zones
- Flora and Fauna
- Socio Economic and demographic profile of the area

Primary data was collected by monitoring various environmental components/ parameters in the core as well as buffer zone during the study period; and details of which are given in **Table 3.1**.

Table 3.1: Primary Data Collection

Sl. No.	Description
1.	<p>Air Environment Meteorology Hourly Meteorological data (Continuous) through data logger for Temp. (Min. & Max.), RH, Rainfall, Wind Speed, Wind Direction and Solar Radiation</p> <p>Ambient air quality monitoring (24 hourly), twice a week over three months Parameters: PM10, PM2.5, SO2, NO2, CO, Benzene, BaP and heavy metals in PM10 Filter papers such as Pb, As, Ni. No. of sampling locations: 8 locations within 10 km radius study area</p>
2.	<p>Noise Environment Leq (dB A) Day time and Night time with hourly measurement, once in a season. No. of sampling locations: 8 locations within 10 km radius study area</p>

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

3.	Water environment Surface Water (SW) and Ground water (GW) monitoring, once in a monitoring period No. of Locations: 8 locations within 10 km radius study area (GW), 4 locations (SW). Tested for physico-chemical, Bacteriological and demand parameters as per IS-10500.
4.	Soil environment Soil sampling, once in a season. No. of sampling locations: 8 locations within 10 km radius study area
5.	Land use Environment LULC survey, once in a season. Location: Project Site (Core) and buffer zone 10 km radial distance from the project site
6.	Geology and Hydrogeology Geology and Hydrogeology survey, once in a season. Location: Project Site (Core) and buffer zone 10 km radial distance from the project site
7	Biological Environment Biodiversity survey, once in a season. Location: Project Site (Core) and buffer zone 10 km radial distance from the project site
8	Socio-economic Environment Socio-economic survey based on collection on the infrastructural facilities at the villages, perception and need priorities of the villagers. Data is being collected once in a season. Location: Core and buffer zone.

Secondary Data Collection

This includes review of secondary published information on:

- Socio-economic conditions, demographic structure and infrastructure resource base etc.(Census 2011).
- Sensitive areas such as biosphere reserve, forests, sanctuaries, places of historical, archaeological tourist importance, etc.
- NRSC satellite imagery of LISS III & LISS IV, BHUVAN, Survey of India toposheet.
- Use of Climatological Normal Book for meteorology.

3.2 AIR ENVIRONMENT

The baseline status for air environment includes reconnaissance, identification and selection of specific significant air pollutants due to the proposed project activity and measuring their existing levels. The data required to assess the ambient status was collected, analyzed and evaluated through a well-designed ambient air quality monitoring (AAQM) network.

3.2.1 METEOROLOGY

The meteorological data recorded during the study period was very useful for selection of sampling locations as per upwind and downwind directions for proper on-site monitoring to be undertaken for various meteorological variables in order to generate the site-specific data. Hourly basis continuously data was collected during **pre-monsoon season (1st March 2025 – 31st May 2025)** and the generated

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data was then compared with the meteorological data collected by nearest India Meteorological Department (IMD) station located at Bishnupur, West Bengal.

TEMPERATURE

The winter season starts from December and continues till the end of February. January is the coldest month with the minimum temperature at 9°C. The temperature starts increasing rapidly during the onset of pre monsoon season from March to May. During pre-monsoon season, the maximum temperature was observed 45°C with the minimum temperature 12.1°C. The maximum temperature in the monsoon season was observed to be 35.8°C, whereas the minimum temperature was observed 22.7°C. In the post-monsoon, day temperature decreases slightly with the maximum temperature 33.6°C. The monthly variations in temperature are presented in **Table 3.2**.

RELATIVE HUMIDITY

The relative humidity was observed around 50% to 79% during pre-monsoon period. In monsoon period, the relative humidity ranged between 77% to 84%. During the post monsoon season, the relative humidity was observed between 76 % to 87% and in winter season, the relative humidity was observed to be 56% to 87%. The variations in relative humidity are presented in **Table 3.2**.

RAINFALL

The annual average rainfall based on the IMD data recorded was as 1100 mm-1500 mm. The rainfall gradually decreased after September. The maximum number of rainy days was observed in the month of July. Annual and monthly variations in rainfall are presented in **Table 3.2**.

Table 3.2: Micrometeorological data from IMD-Bishnupur-1991-2020)

Month	Temperature (°c)		Humidity (%)		Monthly Rainfall (mm)
	Min	Max	Min	Max	
January	9	25.6	70	80	19.4
February	15.5	29.2	56	78	18.6
March	20.2	34.6	50	68	22
April	24.3	45.0	62	75	58
May	24.0	32.0	21	84	115.5
June	24.1	32.0	21	84	251.3
July	25.7	32.8	21	84	351.8
August	25.7	32.7	19	83	311.2
September	25.5	32.8	19	83	225.7
October	23.0	32.1	79	83	106.1
November	17.7	29.9	77	84	11.2
December	13.0	26.5	76	87	9.2
Range	9 – 45		21 – 87		Total – 1500

Source: From climatological Normal book of 1991-2020.

METEOROLOGICAL CONDITIONS AT SITE

The weather monitoring station was installed close to the project site, to record temperature, wind speed, wind direction, relative humidity and rainfall. The hourly minimum, maximum values monitored during pre-monsoon season (1st March 2025 – 31st May 2025) are presented in Table 3.3.

Table 3.3: Summary of Meteorological Observations at Site

Month	Temperature (°C)		Relative Humidity (%)		Rainfall Monthly Total (mm)
	Min	Max	Min	Max	
May- 2025	24	32	21	84	115.5
June – 2025	24	32	21	84	251.3
Range	24-32		21-84		Total = 366.8

WIND SPEED/ DIRECTIONS

The meteorological data with respect to wind speed and direction was collected and presented in the form of wind roses and shown in Figure 3.1 and the summary of site-specific wind pattern is presented in Table 3.4.

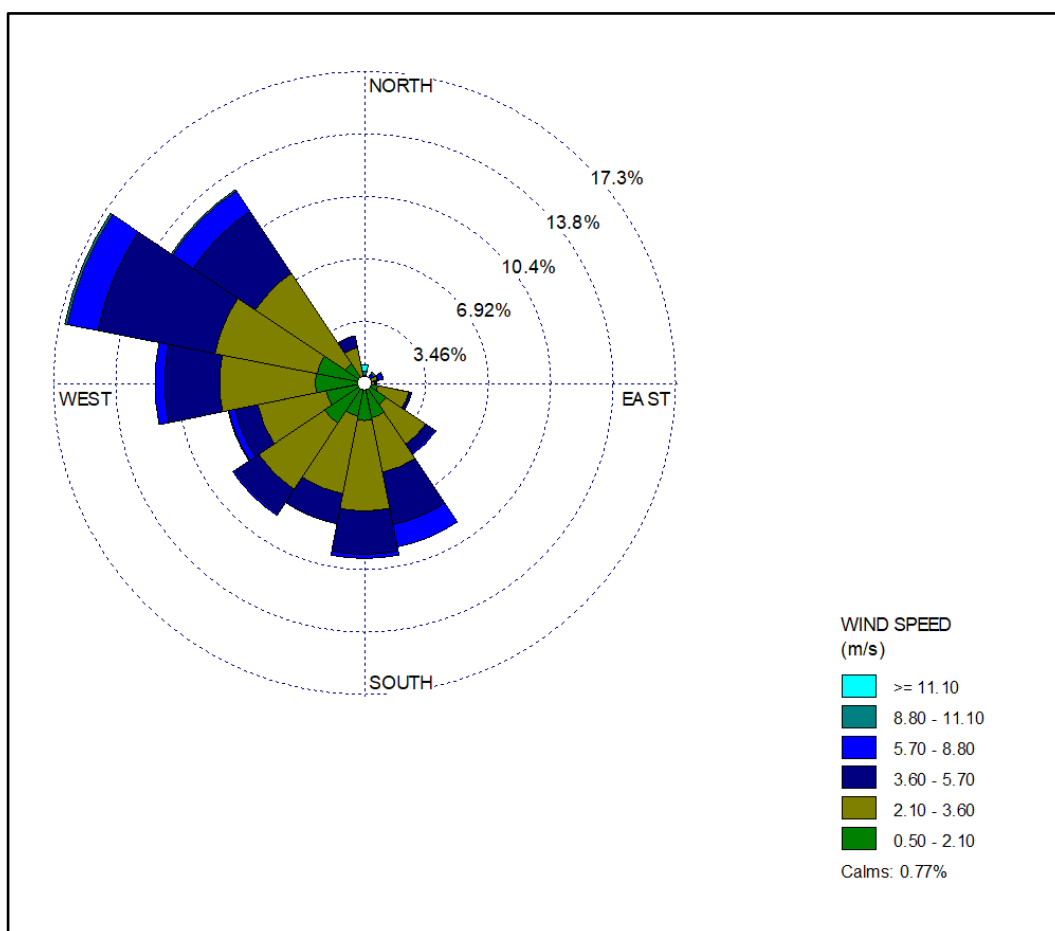


Figure 3.1: Site Specific Windrose (1ST March 2025 – 31ST May 2025)

Table 3.4: Summary of Site-specific predominant wind pattern

Predominant Wind Direction	Period: 1 st March 2025 – 31 st May 2025
First Predominant Wind Direction	SE (13.90%)
Second Predominant Wind Direction	E (9.60%)
Calm conditions (%)	2.22
Avg. Wind Speed (m/s)	2.07

3.2.2 BASELINE STATUS

The ambient air quality monitoring with respect to parameters of significance was carried out during pre-monsoon season (1st March 2025 – 31st May 2025). The major sources of air pollution in the region are Industrial operations, mining activity, heavy traffic, domestic activities and rural conditions. The prime objective was to assess the existing air quality of the area.

A] METHODOLOGY FOR AIR QUALITY MONITORING

SELECTION OF MONITORING LOCATIONS (IS: 5182 PART XIV)

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

- Meteorological conditions on synoptic scale.
- Topography of the study area.
- Representatives of regional background.
- Population and sensitive areas.
- Representation of valid cross-sectional distribution in downwind direction.
- Access and security of site.

B] METHODOLOGY OF AMBIENT AIR QUALITY MONITORING

Table 3.5: Parameters & methodology of AAQ as per standard norms

Sl. No.	Parameter	Test Method	Unit	NAAQS as per CPCB Guideline, 2009
1.	Particulate Matter (PM10)	IS: 5182: Part-23 -2006	µg /m ³	100 (24 hrs)
2.	Particulate Matter (PM2.5)	CPCB NAAQS , Regulations, 2009	µg /m ³	60 (24 hrs)
3.	Sulphur dioxide (as SO ₂)	IS: 5182: (Part-2) 2001	µg /m ³	80 (24 hrs)
4.	Nitrogen dioxide (as NO ₂)	IS: 5182: (Part-6) 2006	µg /m ³	80 (24 hrs)
5.	Carbon Monoxide (as CO)	IS: 5182 (Part 10): 1999	mg /m ³	2.0 (8 hrs)
6.	Ammonia (as NH ₃)	CPCB NAAQM , Regulations, 2009	µg /m ³	400 (24 hrs)
7.	Ozone (as O ₃)	IS: 5182 (Part 9): 1974	µg /m ³	100 (24hrs)
8.	Benzene (as C ₆ H ₆)	IS: 5182 (Part 11): 2006	µg /m ³	05 (Annual)

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9.	Benzopyrene (as BaP)	IS: 5182 (Part 12): 2004	ng /m ³	01 (Annual)
10.	Lead (as Pb)	CPCB NAAQM , Regulations, 2009	μg /m ³	01 (24 hrs)
11.	Arsenic (as As)		ng /m ³	06 (Annual)
12.	Nikel (as Ni)		ng /m ³	20 (Annual)

Ambient air monitoring was carried out weekly twice at 8 locations. The details about monitoring locations are depicted in Figure 3.2 and presented in Table 3.6

Table 3.6: Details of Air Monitoring Locations

Code	Monitoring Locations	Distance (km) / Dir. w.r.t Plant	Coordinates	Justification
AAQ1	Project Site		23.497001,86.956189	Core Zone
AAQ2	Gote - Mouchuria	S	23.487779,86.958830	Nearest Habitation
AAQ3	Ledapalash	WNW	23.508747,86.941745	Upwind Direction
AAQ4	Saltora	NW	23.520681,86.930984	Upwind Direction
AAQ5	Dhatala	ESE	23.494915,86.983591	Downwind Direction
AAQ6	Kanuri	SE	23.482518,86.966136	Downwind Direction
AAQ7	Shyampur	ENE	23.502666,86.973218	Crosswind Direction
AAQ8	Dightor	NNE	23.517368,86.963419	Crosswind Direction

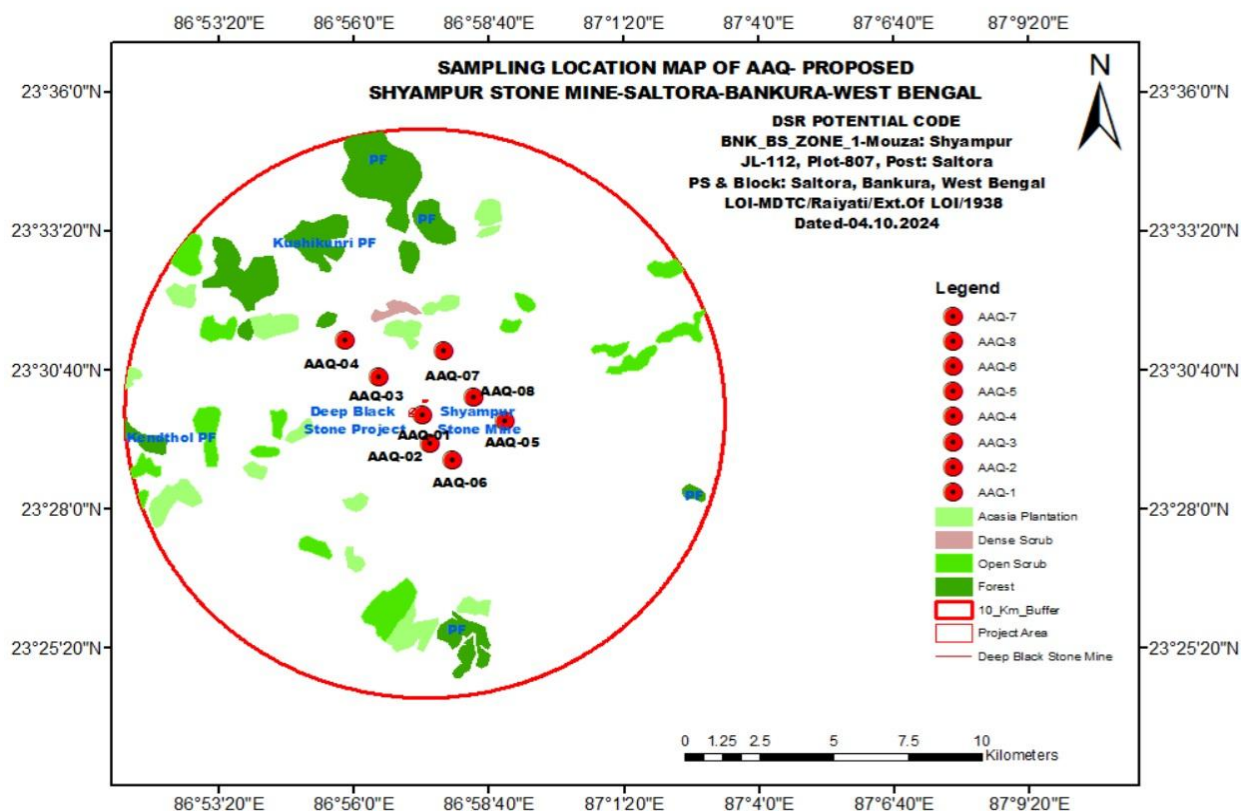


Figure 3.2: Ambient Air Quality Monitoring Locations.

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

Ambient Air Quality Monitoring was carried out on 24 hourly basis for PM₁₀, PM_{2.5}, SO₂, and NO₂ for parameters as mentioned in the above table and analyzed as per analytical methods given above and 8 hourly samples were collected for carbon monoxide.

PRESENTATION OF PRIMARY DATA

Various statistical parameters like 98th percentile, average, maximum and minimum values were computed from the observed raw data for all the AAQ monitoring stations. The results of monitoring carried out are presented in **Annexure VI (a)**. The summary of these results are given in **Tables 3.7 & 3.8**. These levels were compared with the prevailing environmental quality standards prescribed by Central Pollution Control Board (CPCB) for Industrial, Residential, Rural and other area. 12 parameters were taken into consideration and presented in **Annexure VI (a)**, as per CPCB guidelines.

Table 3.7: Summary of Ambient Air Quality Results

Sr. No.	Location		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO
			µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³
1	Project Site	Min	65.3	26.6	5.7	14.6	BLQ(LOQ-0.5)
		Max	79.9	41.2	20.3	29.2	BLQ(LOQ-1.0)
		Avg	72.6	33.9	13.0	21.9	BLQ(LOQ-0.5)
		98th	80.1	41.4	20.5	29.4	BLQ(LOQ-0.5)
2	Gote Mouchuria	Min	55.8	14.6	4.6	18.8	BLQ(LOQ-0.5)
		Max	70.4	29.2	19.2	33.4	BLQ(LOQ-1.0)
		Avg	63.1	21.9	11.9	26.1	BLQ(LOQ-0.5)
		98th	70.6	29.4	19.4	33.6	BLQ(LOQ-0.5)
3	Ledapalash	Min	50.3	17.6	6.2	13.6	BLQ(LOQ-0.5)
		Max	64.9	32.2	20.8	28.2	BLQ(LOQ-1.0)
		Avg	57.6	24.9	13.5	20.9	BLQ(LOQ-0.5)
		98th	65.1	32.4	21.0	28.4	BLQ(LOQ-0.5)
4	Saltora	Min	55.5	12.5	2.6	9.8	BLQ(LOQ-0.5)
		Max	70.1	27.1	17.2	24.4	BLQ(LOQ-1.0)
		Avg	62.8	19.8	9.9	17.1	BLQ(LOQ-0.5)
		98th	70.3	27.3	17.4	24.6	BLQ(LOQ-0.5)
5	Dhatala	Min	48.3	14.3	5.1	19.0	BLQ(LOQ-0.5)
		Max	62.9	28.9	19.7	33.6	BLQ(LOQ-1.0)
		Avg	55.6	21.6	12.4	26.3	BLQ(LOQ-0.5)
		98th	63.1	29.1	19.9	33.8	BLQ(LOQ-0.5)
		Min	56.1	18.0	7.3	19.8	BLQ(LOQ-0.5)
		Max	70.7	32.6	21.9	34.4	BLQ(LOQ-1.0)
		Avg	63.4	25.3	14.6	27.1	BLQ(LOQ-0.5)

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6	Kanuri	98th	70.9	32.8	22.1	34.6	BLQ(LOQ-0.5)
7	Shyampur	Min	52.0	23.1	3.6	15.8	BLQ(LOQ-0.5)
		Max	66.6	37.7	18.2	30.4	BLQ(LOQ-1.0)
		Avg	59.3	30.4	10.9	23.1	BLQ(LOQ-0.5)
		98th	66.8	37.9	18.4	30.6	BLQ(LOQ-0.5)
8	Dightor	Min	53.0	19.6	8.8	22.8	BLQ(LOQ-0.5)
		Max	67.6	34.2	23.4	37.4	BLQ(LOQ-1.0)
		Avg	60.3	26.9	16.1	30.1	BLQ(LOQ-0.5)
		98 th	67.8	34.4	23.6	37.6	BLQ(LOQ-0.5)
CPCB Standard			100 (24hr)	60 (24hr)	80 (24hr)	80 (24hr)	2 (8hrs)

Table 3.8: Concentration of Heavy Metals & VOCs in Ambient Air

Location	Pb($\mu\text{g}/\text{m}^3$)	As (ng/m^3)	Ni (ng/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)	BaP(ng/m^3)
Project Site	BLQ (LOQ-0.2)	BLQ (LOQ-2.0)	BLQ (LOQ-10.0)	BLQ (LOQ-0.01)	BLQ (LOQ-0.01)
Gote Mouchuria	BLQ (LOQ-0.2)	BLQ (LOQ-2.0)	BLQ (LOQ-10.0)	BLQ (LOQ-0.01)	BLQ (LOQ-0.01)
Ledapalash	BLQ (LOQ-0.2)	BLQ (LOQ-2.0)	BLQ (LOQ-10.0)	BLQ (LOQ-0.01)	BLQ (LOQ-0.01)
Saltora	BLQ (LOQ-0.2)	BLQ (LOQ-2.0)	BLQ (LOQ-10.0)	BLQ (LOQ-0.01)	BLQ (LOQ-0.01)
Dhatala	BLQ (LOQ-0.2)	BLQ (LOQ-2.0)	BLQ (LOQ-10.0)	BLQ (LOQ-0.01)	BLQ (LOQ-0.01)
Kanuri	BLQ (LOQ-0.2)	BLQ (LOQ-2.0)	BLQ (LOQ-10.0)	BLQ (LOQ-0.01)	BLQ (LOQ-0.01)
Shyampur	BLQ (LOQ-0.2)	BLQ (LOQ-2.0)	BLQ (LOQ-10.0)	BLQ (LOQ-0.01)	BLQ (LOQ-0.01)
Dightor	BLQ (LOQ-0.2)	BLQ (LOQ-2.0)	BLQ (LOQ-10.0)	BLQ (LOQ-0.01)	BLQ (LOQ-0.01)
CPCB Standard	1 (24 hrs)	6 (Annual)	20 (Annual)	5 (Annual)	1 (Annual)

BLQ- Below Limit of Quantification

3.2.3 OBSERVATIONS

The observations for pre-monsoon season (March – 2025 to May – 2025) are summarized below:

PARTICULATE MATTER (PM₁₀)

A maximum concentration of PM₁₀ is 72.6 $\mu\text{g}/\text{m}^3$ was observed at the AAQM-1 and minimum value of 55.6 $\mu\text{g}/\text{m}^3$ was observed at AAQM-5.

PARTICULATE MATTER (PM_{2.5})

A maximum concentration of PM_{2.5} is recorded to be 33.9 $\mu\text{g}/\text{m}^3$ at AAQM-1 and minimum

value of 19.8 $\mu\text{g}/\text{m}^3$ was observed at AAQM-4.

SULPHUR DIOXIDE (SO₂)

Maximum concentration of SO₂ is observed to be 16.1 $\mu\text{g}/\text{m}^3$ at AAQM -8 and minimum value of 9.9 $\mu\text{g}/\text{m}^3$ observed at AAQM-4.

OXIDES OF NITROGEN (NO_x):

Maximum concentration of NO_x is observed to be 30.1 $\mu\text{g}/\text{m}^3$ at AAQM-8 and minimum value of 17.1 $\mu\text{g}/\text{m}^3$ observed at AAQM-4.

CARBON MONOXIDE (CO):

Maximum and Minimum concentrations in the region are observed same that is BLQ(LOQ-0.5). The results are compared with the standards prescribed by Central Pollution Control Board (CPCB). The overall ambient air quality around the proposed mine lease is within the limits of ambient air quality standards prescribed by CPCB.

If we consider the overall concentration of the main criteria pollutants then the minimum and maximum concentration of the criteria pollutants during the study period at the project site are shown in the table 3.9.

Table 3.9: Concentration of AAQ Range of the study area

Sr. No.	Name of Pollutant	Range	
		Min	Max
1	PM10 ($\mu\text{g}/\text{m}^3$)	55.6	72.6
2	PM2.5 ($\mu\text{g}/\text{m}^3$)	19.8	33.9
3	SO2 ($\mu\text{g}/\text{m}^3$)	9.9	16.1
4	NO2 ($\mu\text{g}/\text{m}^3$)	17.1	30.1
5	CO ($\mu\text{g}/\text{m}^3$)	BLQ(LOQ-0.5)	BLQ(LOQ-0.5)

Heavy metals were estimated from PM10 to know the concentration levels in particulate matter and observed that all concentrations were found to be within the standard limit. Overall concentrations of heavy metals were found to be within the prescribed limits.

3.2.4 INTERPRETATION OF AIR QUALITY ASSESSMENT IN THE STUDY AREA

The air quality of different locations has been compared with the respective NAAQS. The air quality has been categorized into four broad categories based on an Exceedance Factor (the ratio of average concentration of a pollutant with that of a respective standard). The Exceedance Factor (EF) is calculated for major pollutants as follows:

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

Exceedance Factor = (Observed Average concentration of criteria pollutant) / (National Ambient Air Quality Standard for the respective pollutant).

The four air quality categories are:

Critical pollution (C) : when EF is > 1.5

High pollution (H) : when the EF is between 1.0 - < 1.5

Moderate pollution (M) :when the EF between 0.5 - < 1.0

Low pollution (L) : when the EF is < 0.5

Table 3.10: Exceedance Factor of the Study Area

Location	PM 10		PM 2.5		SO 2		NO 2	
	EF	Pollution Category	EF	Pollution Category	EF	Pollution Category	EF	Pollution Category
Project Site	0.64	Moderate	0.41	Low	0.11	Low	0.19	Low
Gote Mouchuria	0.57	Moderate	0.36	Low	0.08	Low	0.17	Low
Ledapalash	0.60	Moderate	0.38	Low	0.09	Low	0.18	Low
Saltora	0.65	Moderate	0.44	Low	0.11	Low	0.22	Low
Dhatala	0.68	Moderate	0.48	Low	0.12	Low	0.19	Low
Kanuri	0.63	Moderate	0.40	Low	0.10	Low	0.21	Low
Shyampur	0.66	Moderate	0.46	Low	0.10	Low	0.21	Low
Dightor	0.62	Moderate	0.42	Low	0.11	Low	0.20	Low

It has been observed that all the locations are falling into Moderate pollution category on the basis of Exceedance Factor for PM10 and for PM2.5 at all the locations are falling in low category. Hence, Exceedance Factor for SO2 and NO2 which indicates the overall ambient air quality of study area is low polluted category.

At project site fugitive emission may be generated during construction activity, loading and unloading of raw material and products which may contribute in the ambient air quality at project site and nearest location towards down wind direction.

AIR QUALITY INDEX (AQI)

According to the Indian Government (CPCB), Indian AQI range is from 0-500, from 0 being good and 500 being severe. There are eight major pollutants to be taken into account for AQI calculation, viz. particulate matter (PM 10 and PM 2.5), carbon monoxide (CO), ozone (O3), nitrogen dioxide (NO2), sulfur dioxide (SO2), ammonia (NH3), and lead (Pb).

To calculate AQI, data for a minimum of three pollutants must be present, of which one should be either PM10 or PM2.5, AQI ranging from 0-500 has different concentrations for each pollutant and has health effects accordingly. Table 3.11 shows the AAQ Index.

Table 3.11: AAQ Index

Good (0–50)	Minimal Impact	Poor (201–300)	Breathing discomfort to people on prolonged exposure
Satisfactory (51–100)	Minor breathing discomfort to sensitive people	Very Poor (301–400)	Respiratory illness to the people on prolonged exposure
Moderate (101–200)	Breathing discomfort to the people with lung, heart disease, children and older adults	Severe (>401)	Respiratory effects even on healthy people

INDIAN AQI RANGE & PROBABLE IMPACTS:

0-50: This range defines air quality as good as it shows minimal or no impact on health.

51-100: This is a satisfactory air quality range and it can show effects such as breathing difficulty insensitive groups.

101-200: The range shows moderate air quality with impacts such as breathing discomfort for children and elderly people, and people already suffering from lung disorders and heart disease.

201-300: AQI falling in this range communicates that the air quality is poor and shows health effects on people when exposed for the long term. People already suffering from heart diseases can experience discomfort from short exposure.

301-400: This range shows very poor air quality and causes respiratory illness for a longer duration of exposure.

401-500: This is the severe range of AQI causing health impacts to normal and diseased people. It also causes severe health impacts on sensitive groups.

Table 3.12: AAQ Index for the Study Area

Location	AQI – Range		AQI Category
	Min	Max	
Project Site	28.5	42.65	Satisfactory
Gote Mouchuria	23.45	38.05	Satisfactory
Ledapalash	21.93	36.52	Satisfactory
Saltora	20.1	34.7	Satisfactory
Dhatala	21.67	36.27	Satisfactory
Kanuri	25.3	39.9	Satisfactory
Shyampur	23.62	38.22	Satisfactory
Dightor	26.05	40.65	Satisfactory

3.3 NOISE ENVIRONMENT

The environmental assessment of noise from the proposed quarrying activity and vehicular traffic can be undertaken by taking into consideration various factors like potential damage to hearing, physiological responses, and annoyance and general community responses.

The impact of noise sources on surrounding community depends on:

- Characteristics of noise sources (instantaneous, intermittent or continuous in nature). It can be observed that steady noise is not as annoying as one which is continuously varying in loudness;
- The time of day at which noise occurs, for example high noise levels at night in residential areas are not acceptable because of sleep disturbance; and
- The location of the noise source, with respect to noise sensitive land use, which determines the loudness and period of exposure.

The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise.

The main objective of noise monitoring in the study area is to establish the baseline noise levels, and assess the impact of the total noise expected to be generated by blasting and other quarrying activities.

METHODOLOGY FOR NOISE MONITORING

I. GENERAL

- a) The station located at the ambient level i.e. away from the direct source, away from any vibration and any obstruction.
- b) Categorize the area with land use pattern.
- c) Reconnaissance survey of study area,
- d) Existing topography,
- e) Land use pattern,
- f) Surrounding location (existing industries),
- g) GPS receiver is used to record the location,
- h) Background noise levels,
- i) Climatic condition during sampling, temperature, cloud cover, solar radiation.

II. SPECIFIC

Tripod stand was used at above the ground level of 1 to 1.5 m for areas.

III. POSITIONING OF THE INSTRUMENT

- a) Microphone placed 1.2 -1.5m above the ground level.
- b) In dry conditions with a wind speed of less than 5 m/s.
- c) Instrument was isolated from strong vibrations and shock.

MONITORING TIME

The monitoring was carried out minimum 75% of the prescribed Day time (06.00 am to 10.00 pm) and Night time (10.00 pm to 06.00 am). The exercise has to be carried out for 6 to 8 hours in the said time frame of day & night. It is always preferable to have large number of data sets thus 1 minute sampling frequency is recommended.

IV. MONITORING PARAMETERS:

Leq - Equivalent Continuous Sound Pressure Level (with 1 hour sampling period at all locations).

Table 3.13: Summary of Noise Monitoring Methodology

Environment Component	Sampling Location	Unit	Sampling Frequency	Sample Collection		Instrument/ Methodology
				Sampling Equipment	Detection Limit	
Ambient Noise levels	8 locations	Decibels-dB (A)	Once during the study period (hourly reading for 24 hrs at each location)	Noise level Meter	30-75 dB (A)	SLM 100 [IS 9876-1981 (Reaffirmed 2001)]

V. NOISE MONITORING LOCATIONS

Site of an area was selected to meets the manmade land use pattern as prescribed in the standard e.g. Industrial, Commercial, Residential and Silence Zone. Eight (8) locations were identified based on the activities in the village area, traffic and sensitive areas like hospitals and schools. The noise monitoring locations are shown in **Figure 3.3** and details are given in **Table 3.14**.

Table 3.14: Noise Monitoring Locations

StationCode	Locations	Dist. (Km)/ Dir.	Lat/Long	Monitoring Zone
N1	Project Site		23.497232,86.956090	Industrial Area
N2	Ledapalash	S	23.507637,86.940211	Residential Area
N3	Shyampur	WNW	23.502704,86.973205	Commercial Area
N4	Dhatala	NW	23.494845,86.983576	Commercial Area
N5	Mouchuria Primary School	ESE	23.489738,86.958360	Silence Zone
N6	Neropahari Primary School	SE	23.505917,86.954636	Silence Zone
N7	Saltora	ENE	23.520710,86.930987	Residential Area
N8	Kanuri	NNE	23.483013,86.966336	Residential Area

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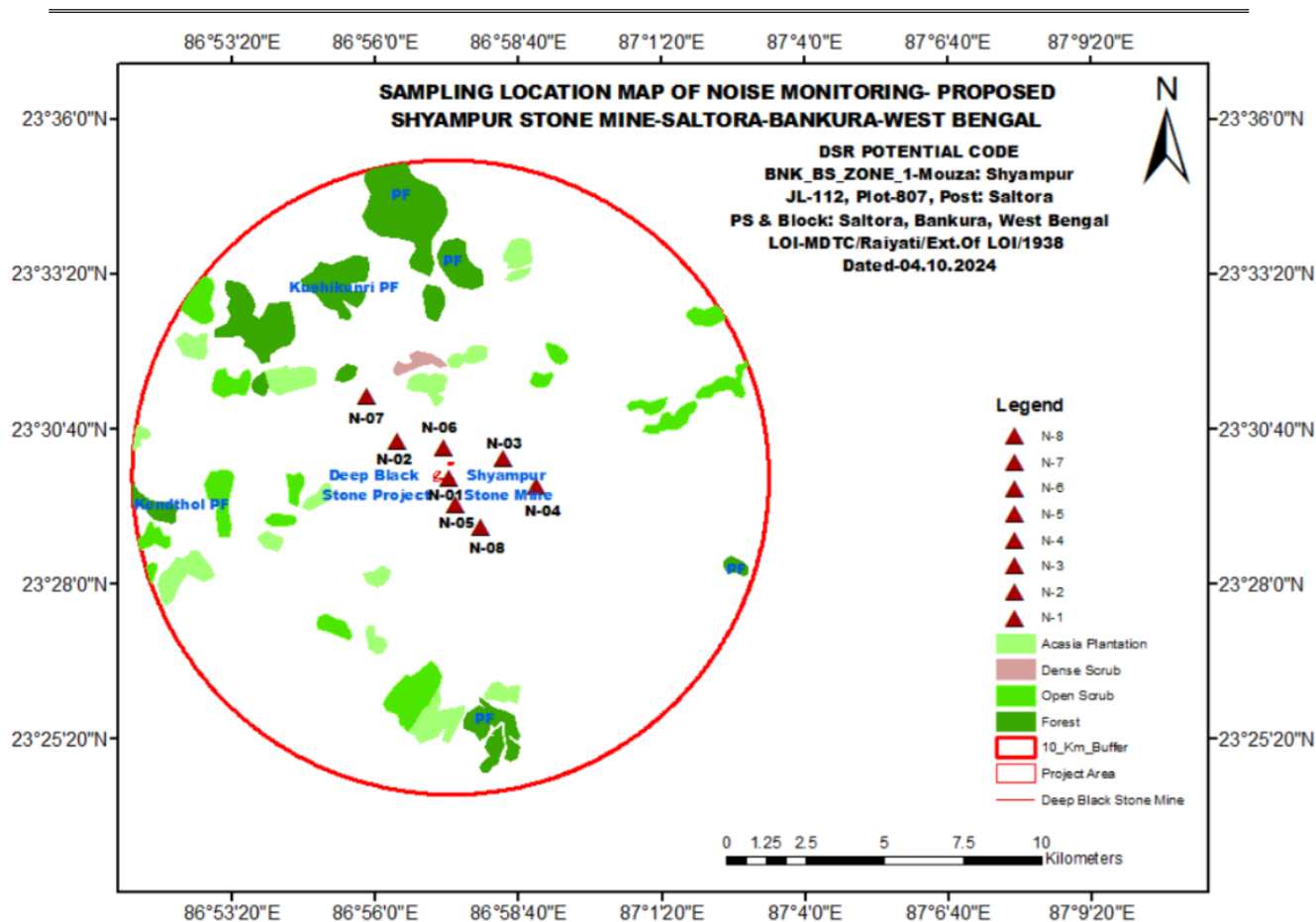


Figure 3.3: Ambient Noise Monitoring Locations

3.3.1 NOISE MONITORING

Table 3.15: Details of Noise Monitoring Data

Sr. No.	Monitoring Locations	Equivalent Noise Level	
		LeqDay	LeqNight
Residential Area			
N2	Ledapalash	72.6	59.2
N8	Kanuri	53.9	42.1
N7	Saltora	54.2	42.1
CPCB Standards dB(A)		55.0	45.0
Commercial Area			
N3	Shyampur	61.5	52.8
N4	Dhatala	63.9	52.0
CPCB Standards dB(A)		65.0	55.0
Silence Zone			
N5	Mouchuria Primary School	52.3	38.9
N6	Neropahari Primary School	51.8	31.9
CPCB Standards dB(A)		50.0	40.0
Industrial Area			

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

N1	Project Site	70.3	61.5
CPCB Standards dB(A)		75.0	70.0

3.3.2 OBSERVATION AND INTERPRETATION

Leq was monitored at all locations considering residential, commercial, industrial and sensitive locations. Equivalent noise levels (Leq) were monitored at the Project Site and observed as **70.3 dB (A)** & **61.5 dB (A)** during day and night time respectively. Marginally high noise levels, though within the Standards, in some parts of the developed areas may be due to the ongoing moving traffic. Thus, overall ambient noise quality with respect to various zones was found to be within prescribed limits by CPCB.

3.3.3 NOISE LEVELS DUE TO TRAFFIC IN THE STUDY AREA

- Medium traffic was observed on the main roads passing through the villages during day time, contributed significantly to the increase in noise levels in the nearby residential areas. During night time, traffic was less.
- The major commercial activities in the region were the local markets at various places. Other than regular human activities, the traffic, particularly, industrial goods vehicles were the noise generating sources creating marginal increase in noise levels in these areas.

3.4 WATER ENVIRONMENT

3.4.1 GEOLOGY AND HYDROGEOLOGY

GEOLOGICAL FIELD SURVEY METHODOLOGY

- i. Secondary data collection for the study with the help of satellite imageries, GSI reports and research paper if available, it is very helpful for planning of field survey in 10 km radius.
- ii. During field survey, ground truth verification of geological features is done. During field survey GPS, toposheet map and Google imagery plays very important role.
- iii. Geological sequence is observed along sites such as Nallah cutting, Exposures along Road/Highway construction sites and nearby opencast mining areas.
- iv. Geological maps are prepared with the help of District Resource Map of GSI and data collected through field survey.

HYDROGEOLOGICAL SURVEY METHODOLOGY

- i. Secondary data collection for the study area with the help of CGWB/SWID brochures and data available with state ground water departments like long term water levels data, groundwater usage, etc.
- ii. During field survey well inventory is critically done to assess water level scenario in particular season to verify the secondary data.

-
- iii. In case of mining projects pumping test are carried out to assess the aquifer parameters.
 - iv. Groundwater level maps are prepared as per water level data of Govt. agencies and data collected through field survey.
 - v. Groundwater recharge and harvesting techniques are suggested as per CGWA/SWID guidelines.

3.4.2 REGIONAL GEOLOGY

The Bankura district is divisible geologically into three north-south trending wide belts (Figure 3.4 and 3.5). The western most one comprises metamorphics of Archaean age and Chotanagpur Gneissic Complex, Singhbhum Group of rocks and anorthosites belonging to Proterozoic age. In the northern part occurs Gondwana Supergroup of rocks with commercial coal seams as an extension of the famous Raniganj Coalfield. The central part is occupied by laterite and older alluvium of Pleistocene age, whereas the easternmost part is made up of Quaternary sediments and Recent alluvium. The diverse litho-units along with geological formations and age are presented Table 3.16.

The E-W trending pyroxene granulite body is present at the northern part of the district has been reported to be associated with Bengal anorthosite suite. The Bengal anorthosite-granulite complex is a unique petrological association for this part of the eastern Indian shield. The precise age is not known, but the acid gneisses of the complex (Bengal gneiss) have often been correlated in a general way with the adjoining Chotonagpur granite gneiss (~ 1600 Ma, after Sarkar, 1983). The tectonic trend of the complex is also conformable with the regional east-west Satpura strike (De, 1969), but the total lithological ensemble rather contrasts with that of the adjoining areas, and is similar to the Eastern Ghat petrographic province (cf. Coorey, 1962; De, 1969), though it is apparently isolated. The granulite's basically belong to the transitional hornblende-pyroxene granulite facies and may locally have late overprints of hydration (Mukherjee, unpublished, Ph.D. thesis, Jadavpur Univ., 1984). Thus, while a brown hornblende is present in the country rock granulite's mantled by pyroxene and/or garnet, a late green hornblende occurs to the near exclusion of the brown variety in the xenolithic type. Thus, in relation to the anorthosite, the following contrasting assemblages characterize the two modes of granulites: (1) Brown hornblende + cpx + opx + plagioclase + ilmenite ± garnet ± quartz ± sphene ± biotite ± chlorite (country rock granulite). (2) Green hornblende + cpx + plagioclase + ilmenite ± opx ± garnet ± quartz ± sphene ± epidote ± biotite ± chlorite ± hematite (xenolithic granulite). However, Shyampur project area consists of the former type of granulite. General stratigraphic succession of Bankura district is furnished below in table no: 3.16.

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

Table 3.16: General Stratigraphy of Bankura District

Age		Geological Unit	Lithology
Pleistocene To Recent	Quaternary	Kasi Formation	Sand and Silt
		Daintikri Formation	Alternating layers of sand, silt and clay
		Sijua Formation	Clay impregnated with caliche
		Lalgarh Formation	Ferruginous sediments with rock fragments
		Unclassified Quaternary	Sand, Silt and clay (Un-oxidized or occasionally oxidized)
Cenozoic (undiff)			Laterite
Tertiary			Clay and grit
			Ferruginous gritty sandstone and shale
Carboniferous to Triassic	Gondwana Supergroup	Mahadeva Formation	Red Sandstone, Red Clay
		Panchet Formation	Sandstone and shale
		Raniganj Formation	Sandstone, Shale Coal
		Damuda Group	Barakar Formation
Proterozoic			Quartz Vein
			Kuilapal granite
		Singhbhum Group	Hornblende schist and epidiorite
			Quartzite
			Mice schist, occasionally garnetiferous
			Garnet-staurolite schist with kayanite
		Anorthosite suite of Bankura-Purulia	Garnetiferous phyllite
Anorthosite			
Gabbroic anorthosite			
Pyroxenite/ Pyroxene granulite			
Archaean (?) Proterozoic		Chotonagpur Gneissic complex	Dolerite
			Granite gneiss
			Felspathic schist
			Pink granite/ biotite-granite gneiss
			Hornblende-biotite-granite gneiss
			Hornblende schist
Archean		Unclassified Metamorphics	Quartzite, quartz schist
			Phyllite and mica schist
			Garnetiferous sillimanite-biotite schist
			Amphibolite, hornblende schist and epidiorite

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

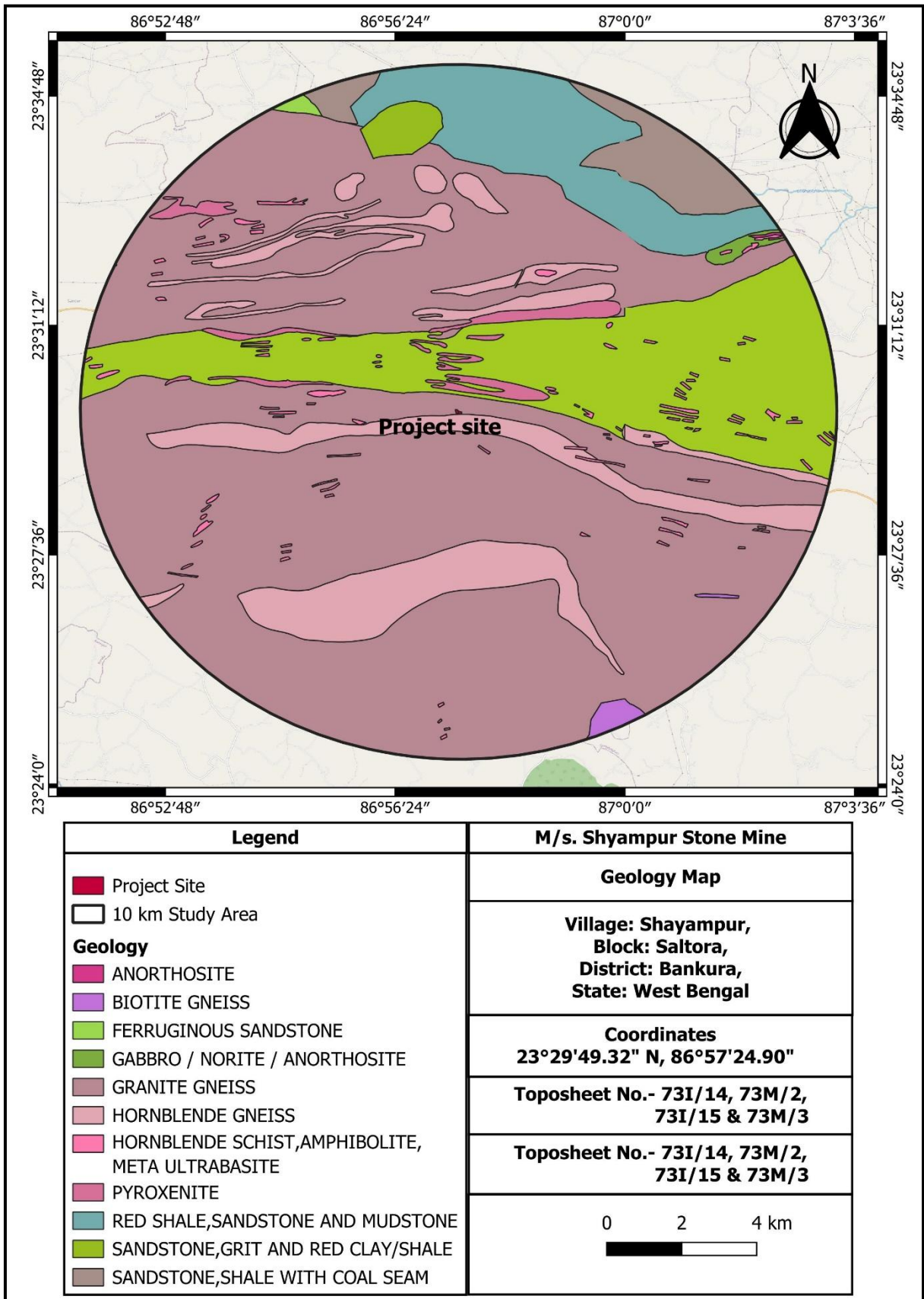


Figure 3.5: Geological Map of the Study Area

(Source: District Resource Map and GSI-Bhukosh Portal)

3.4.3 GENERAL GEOLOGY OF THE AREA

The Shyampur Stone Mine project area consists of Dolerite associated with Meta-Basic Rock and is situated under Saltora Block of Bankura District and geologically the area falls under Chhotanagpur Gneissic Complex (CGC) compassed by Bengal Anorthosite Suites. The main rock types present within the study area are Dolerite associated with Meta-Basic Rock and Granite Gneiss. The regional trend of the rocks is E-W and moderately dipping towards north. The dolerites of CGC are occurring as older enclaves within the anorthosite suite of rocks. The anorthosite suite of rocks comprising anorthosite, gabbroic anorthosite and anorthositic gabbros, have been emplaced within the metamorphites and gneisses as concordant and discordant bodies and associated with norite, pyroxene granulite and other basic rocks. Figure 6 represents the geological map of the project area.

3.4.4 PHYSIOGRAPHY & TOPOGRAPHY

Bankura district can broadly divided into two division. Dissected plateau being the eastern fringe of Chota Nagpur region in west and undulating vast alluvial plain in east. Floodplain and interfluves are found at eastern region and elevation gradually rises giving rise to isolated hillocks, broken low ridges interspersed with valleys at western region of the district.

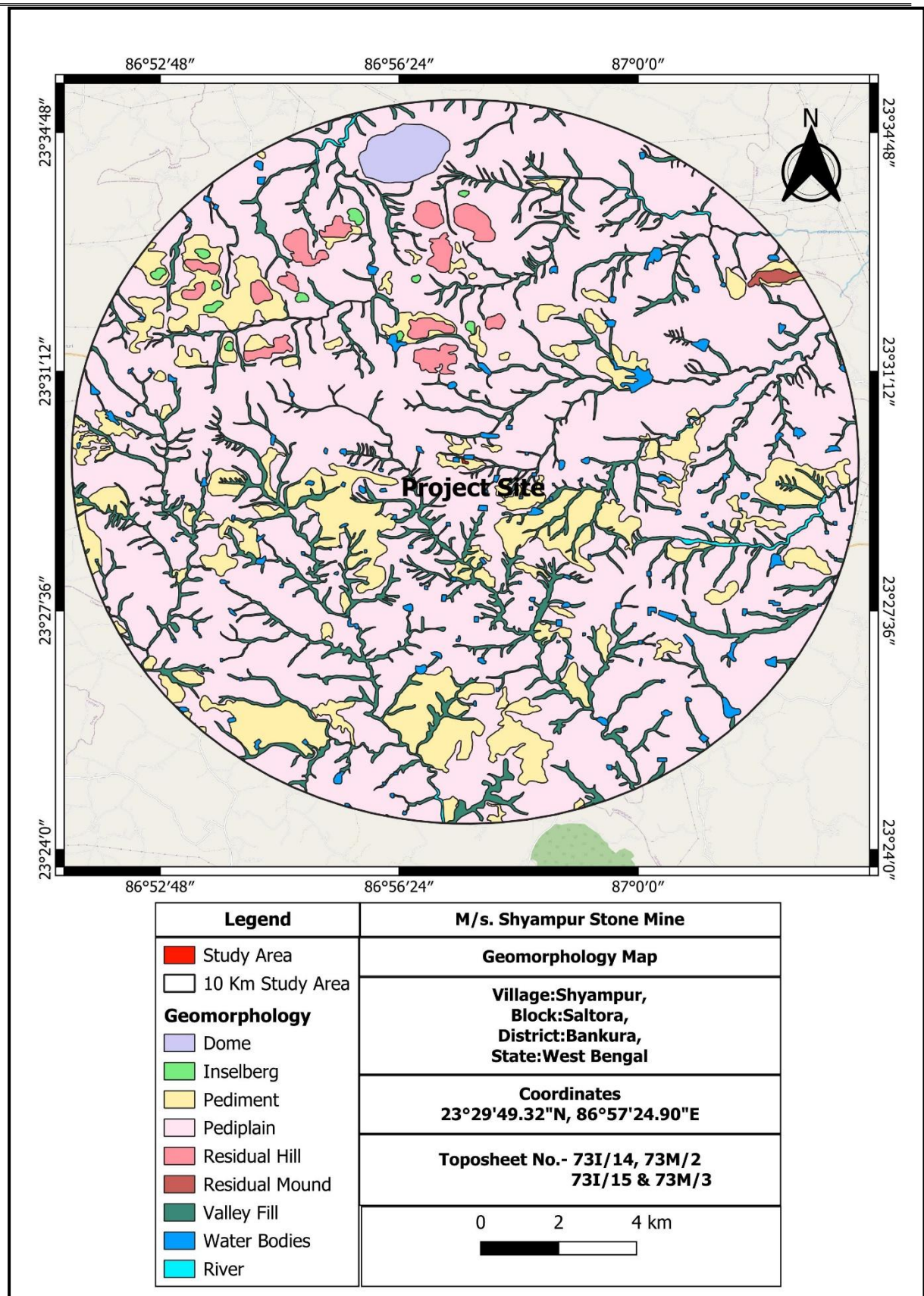
Topography

The Shyampur stone mine project area belongs to the dissected plateaus of Chota Nagpur region. Elevation of the area varies from 162 m AMSL TO 172 M AMSL.

3.4.5 GEOMORPHOLOGY

The geomorphology of the study area is primarily dominated by pediplains, which cover the major part of the landscape. These are interspersed with residual hills, residual mounds, inselbergs, and domes, representing erosional remnants of ancient rock formations. Physiographically, the area exhibits an undulating to gently sloping terrain, with moderate relief features. In addition, valley fills and scattered water bodies such as ponds and tanks are observed, which support surface water storage and groundwater recharge. the study area drained by Damodar River and its distributary Gaighata jhor. The drainage system in the area is well-developed, showing a dendritic to sub-dendritic pattern, controlled by the underlying lithology and structure. The overall geomorphic setting indicates a matured landscape with prominent erosional and depositional features. A geomorphological map is given in Figure 3.6.

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal



.Figure 3.6: Geomorphological Map of the Study Area
(Source: District Resource Map and GSI-Bhukosh Portal)

3.4.6 HYDROGEOLOGY

Based on geology and mode of occurrence of groundwater the underline area of the district has been divided into three sectors

- Western sector covered by crystalline rocks of Archean age.
- Middle sector covered by laterite and Older Alluvium formation of Pleistocene age
- Eastern sector covered by Recent Alluvium

Western sector covered by crystalline rocks of Archean age: - The weathered sement rock that attributes favourable condition for percolation of rain water. The block Saltora falls under this sector

The Pre-Monsoon depth to water level 0 to 10 mbgl is observed in the study area and post-monsoon depth to water level 0 to 5 mbgl is observed in major parts of the area. The yield ranges from 1 to 40 litre/sec. As per CGWA Categorization of Assessment Units as per Dynamic Ground Water Resources of India the area comes under Safe category. A hydrogeological feature is shown in **Figure 3.7**.

**SOURCE: AQUIFER MAPPING AND MANAGEMENT OF GROUND WATER RESOURCES CGWB, BANKURA DISTRICT WEST BENGAL 2022*

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

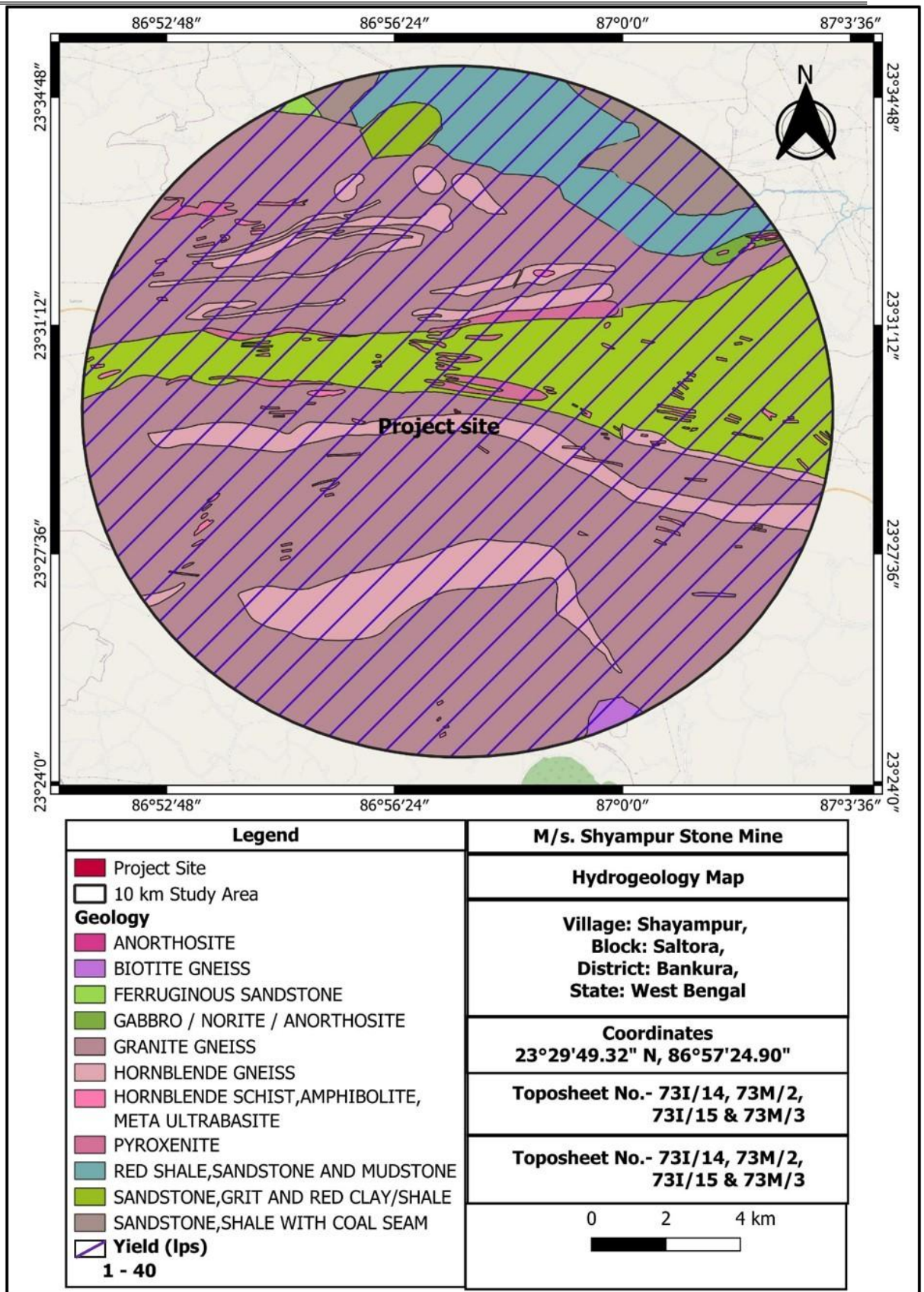


Figure 3.7: Hydrogeological Map of the Study Area

(Source: District Resource Map and GSI-Bhukosh Portal)

3.4.7 SURFACE AND GROUND WATER QUALITY ASSESSMENT

Analytical Procedures for Water Quality Parameters:

Followings are the methodologies adopted for analysis of ground and surface water:

Sample Container: Cleaned polyethylene container having tight cap are used during sampling. Sterile glass containers are used for collecting samples for microbiological analysis and glass bottles also used for oil & grease analysis in water sampling.

Quantity of Sample: A 200 ml sample is required for microbiological test in sterilized bottle; 1 liter sample is required for analysis of general parameters of drinking water. A two liter sample can suffice for most physical and chemical analysis. For certain special determinations, larger sample may be required.

Sample Collection: In the case of sample collection for the determination of physico- chemical parameters precaution should be taken to fill the sampling container completely and stopper them in such a way that there is no air above the sample. This limits interaction with the gas phase and agitation during transport (thus avoiding the contact of carbon dioxide contain from the air which prevents variation in pH; hydrogen carbonates are not converted into precipitable carbonates; iron has less tendency to be oxidized, thus limiting color variations; etc.,)

Time interval between Collection and Analysis: The shorter the time that elapses between collection of a sample and its analysis, the more reliable will be the analytical results. Otherwise the samples must be stored in dark and at low temperature until it is submitted to laboratory for analysis.

Sample Preservation: Water sample preserved at 4°C in a refrigerator. Waste water sample usually the decomposed rapidly at room temperature, therefore, certain test, namely, dissolved oxygen, sulphides, residual chlorine, nitrite, pH, etc., should be carried out or fixed at site. For certain other test, preservatives should be added immediately to individual samples of the same water or waste water in different sampling bottles for each test.

Table 3.17: Methodology adapted as per IS: 10500:2012 Specification of Water

Sr. No.	Parameters	Methodology	Requirement as per IS 10500: 2012 (Drinking Water Specifications) Including Amendment No. 2	
			Acceptable Limit	Permissible Limit #
1.	pH	IS 3025 (Part 11) : 1983	6.5 to 8.5	No relaxation
2.	Electrical Conductivity at 25°C	IS 3025 (Part 14) 2013	--	--
3.	Turbidity	IS 3025 (Part 10) : 1984	1	5
4.	Dissolved Oxygen	IS 3025 (Part 38) :1989	--	--
5.	Total dissolved solids	IS 3025 (Part 16) : 1984	500	2000
6.	Total suspended solids	IS 3025 (Part 17) :1984	--	--
7.	Total Alkalinity (as CaCO ₃)	IS 3025 (Part 23) : 1986	200	600
8.	Total hardness (as CaCO ₃)	IS 3025 (Part 21) : 2009	200	600
9.	Calcium (as Ca)	IS 3025 (Part 40) : 1991	75	200

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

10.	Magnesium (as Mg)	IS 3025 (Part 46) : 1994	30	100
11.	Potassium (as K)	IS 3025 (Part 45) :1993	--	--
12.	Sodium (as Na)	IS 3025 (Part 45) :1993	--	--
13.	Sulphate (as SO ₄)	IS 3025 (Part 24) : 1986	200	400
14.	Nitrate (as NO ₃)	APHA Method 23 rd Edition	45	No relaxation
15.	Chloride (as Cl)	IS 3025 (Part 32) :1988	250	1000
16.	Fluoride (as F)	IS 3025 (Part 60) : 2008	1.0	1.5
17.	Total Nitrogen (as N)	IS 3025 (Part 34) : 2019	--	--
18.	Chemical oxygen demand	IS 3025 (Part 58) : 2006	--	--
19.	Biochemical oxygen demand(at 27°C for 3 days)	IS 3025 (Part 44) :1993	--	--
20.	Oil & grease	IS 3025 (Part 39) :1991	--	--
21.	Total Phosphate (as PO ₄)	IS 3025 (Part 31) : 1988	-	-
22.	Iron (as Fe)	IS 3025 (Part 2) : 2019	1.0	No relaxation
23.	Copper (as Cu)	IS 3025 (Part 2) : 2019	0.05	1.5
24.	Manganese (as Mn)	IS 3025 (Part 2) : 2019	0.1	0.3
25.	Cobalt (as Co)	IS 3025 (Part 2) : 2019	-	-
26.	Cadmium (as Cd)	IS 3025 (Part 41) : 1992	0.003	No relaxation
27.	Arsenic (as As)	IS 3025 (Part 37) : 1988	0.01	No relaxation
28.	Lead (as Pb)	IS 3025 (Part 2) : 2019	0.01	No relaxation
29.	Zinc (as Zn)	IS 3025 (Part 2) : 2019	5	15
30.	Nickel (as Ni)	IS:13428 : 2005 (Annexure L)	0.02	No relaxation
31.	Total Chromium (as Cr)	IS 3025 (Part 2) : 2019	0.05	No relaxation
32.	Total coliform	IS 15185 : 2016	Absent	Absent
33.	Faecal coliform	IS 1622 : 1981	-	-

3.4.8 SURFACE AND GROUND WATER SAMPLING LOCATIONS

12 water samples were collected from various sampling locations, **Eight (8)** from groundwater and **Five (5)** from surface water sources. These samples were collected as grab samples, preserved and analyzed for various parameters. The samples were analyzed as per the procedures specified in standard methods for the examination of water and wastewater published by American Public Health Association (APHA/IS 10500).

The water sampling locations are listed in **Table 3.18** and are depicted in **Figure 3.8**. The physico-chemical characteristics of surface and groundwater are presented in **Annexure VI (b)**.

Table 3.18: Details of Water Sampling Locations

S. N.	Locations	Dis.(km)/Dir	LAT/LONG
GROUND WATER			
1	Project Site		23.499734,86.957635
2	Gote - Mouchuria	S	23.488867,86.958681
3	Ledapalash	WNW	23.507637,86.940211
4	Sebapur	WSW	23.492946,86.935545
5	Dhatala	ESE	23.495072,86.983811
6	Kanuri	SE	23.483013,86.966336
7	Shyampur	ENE	23.502576,86.973143

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

8	Dightor	NNE	23.516552,86.963378
S. N.	Locations	Dis.(km)/Dir	LAT/LONG
SURFACE WATER			
1	Nr. Project Site		23.497360,86.956361
2	Gote - Mouchuria	ENE	23.500454,86.979388
3	Ledapalash	NW	23.507102,86.940300
4	Shyampur	NNE	23.504177,86.963789

Source: Field monitoring & analysis by ALPL Nagpur

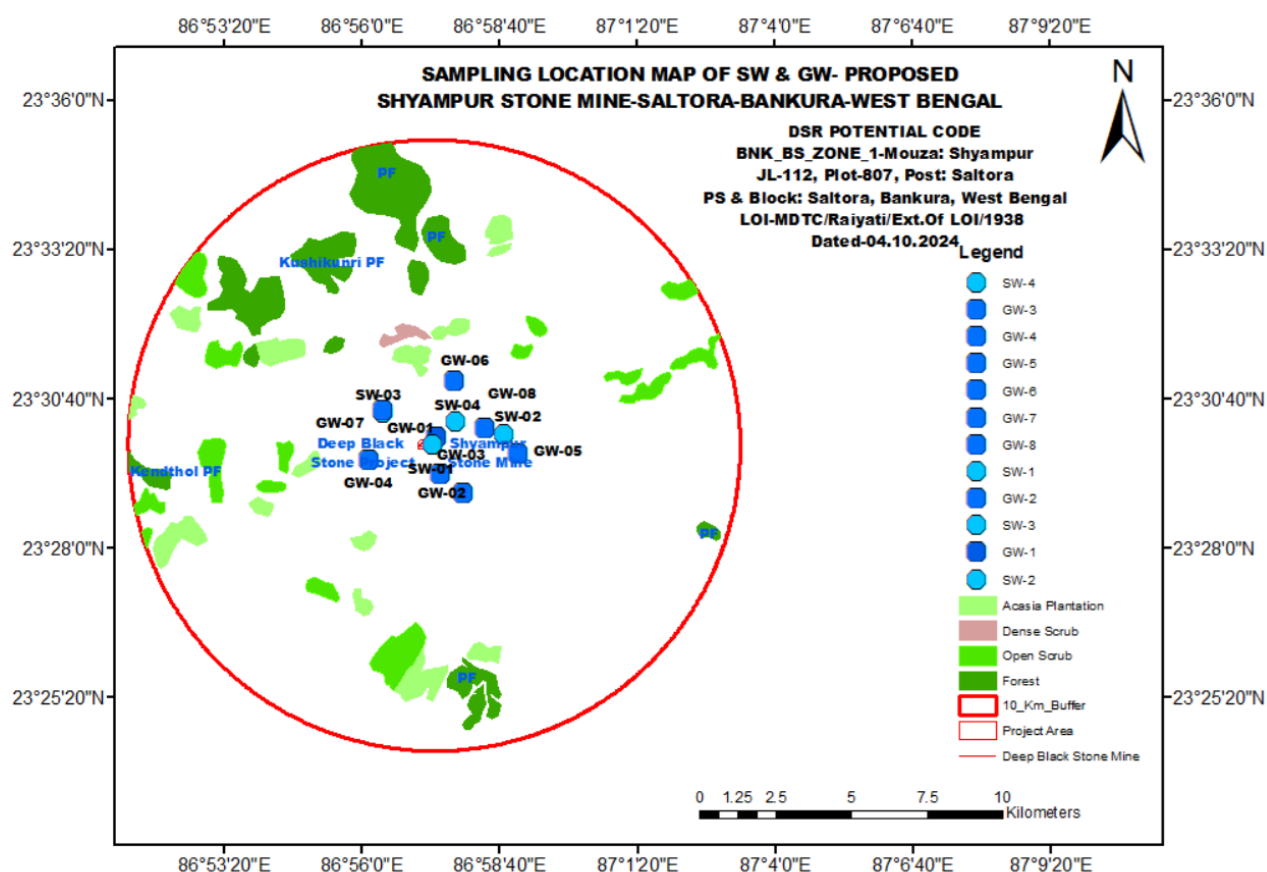


Figure 3.8: Sampling Map for Surface and Ground Water location points

Table 3.19: Surface Water Quality Report

S. N.	Test Parameter	Measure-ment Unit	Project Site	Gote Mouchuria	Ledapalash	Shyampur
			(SW-1)	(SW-2)	(SW-3)	(SW-4)
1	pH	-	7.47	7.94	8.06	7.54
2	Electrical Conductivity at 25°C	µs/cm	324	416	522	356
3	Turbidity	NTU	0.1	0.1	0.1	0.1
4	Dissolved Oxygen	mg/l	5.9	5.6	5.8	5.9
5	Total dissolved solids	mg/l	286	398	492	287
6	Total suspended solids	mg/l	14	BLQ(LOQ-10)	BLQ(LOQ-10)	BLQ(LOQ-10)

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

7	Total Alkalinity (as CaCO ₃)	mg/l	68.5	91.8	107.1	81.6
8	Total hardness (as CaCO ₃)	mg/l	182	276	296	248
9	Calcium (as Ca)	mg/l	92	202	214	192
10	Magnesium (as Mg)	mg/l				
11	Potassium (as K)	mg/l	9.24	7.24	8.94	4.14
12	Sodium (as Na)	mg/l	27.24	18.26	21.37	18.26
13	Sulphate (as SO ₄)	mg/l	21.20	16.24	24.26	15.04
14	Nitrate (as NO ₃)	mg/l	8.24	8.26	12.20	8.34
15	Chloride (as Cl)	mg/l	58.25	89.84	96.16	112.18
16	Fluoride (as F)	mg/l	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)
17	Total nitrogen (as N)	mg/l	6.16	3.04	5.06	3.16
18	Chemical oxygen demand	mg/l	2.5	2.9	3.1	2.6
19	BOD (at 27°C for 3 days)	mg/l	BLQ(LOQ-4)	BLQ(LOQ-4)	BLQ(LOQ-4)	BLQ(LOQ-4)
20	Oil & grease	mg/l	10.3	14.3	15.2	13.8
21	Total Phosphate (asPO ₄)	mg/l	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)
22	Iron (as Fe)	mg/l	0.15	0.20	0.16	0.25
23	Copper (as Cu)	mg/l	BLQ(LOQ-0.01)	BLQ(LOQ-0.01)	BLQ(LOQ-0.2)	BLQ(LOQ-0.2)
24	Manganese (as Mn)	mg/l	BLQ(LOQ-0.01)	BLQ(LOQ-0.01)	BLQ(LOQ-0.2)	BLQ(LOQ-0.2)
25	Cobalt (as Co)	mg/l	BLQ(LOQ-0.02)	BLQ(LOQ-0.02)	BLQ(LOQ-0.2)	BLQ(LOQ-0.2)
26	Cadmium (as Cd)	mg/l	BLQ(LOQ-0.01)	BLQ(LOQ-0.01)	BLQ(LOQ-0.002)	BLQ(LOQ-0.002)
27	Arsenic (as As)	mg/l	BLQ(LOQ-0.01)	BLQ(LOQ-0.01)	BLQ(LOQ-0.01)	BLQ(LOQ-0.01)
28	Lead (as Pb)	mg/l	BLQ(LOQ-0.01)	BLQ(LOQ-0.01)	BLQ(LOQ-0.01)	BLQ(LOQ-0.01)
29	Zinc (as Zn)	mg/l	BLQ(LOQ-0.02)	BLQ(LOQ-0.02)	BLQ(LOQ-0.02)	BLQ(LOQ-0.02)
30	Nickel (as Ni)	mg/l	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)
31	Total Chromium (as Cr)	mg/l	BLQ(LOQ-0.02)	BLQ(LOQ-0.02)	BLQ(LOQ-0.02)	BLQ(LOQ-0.02)
32	Total coliform	Per 100 ml	BLQ(LOQ-2)	BLQ(LOQ-2)	BLQ(LOQ-2)	BLQ(LOQ-2)
33	Fecal coliform	MPN/100ml	BLQ(LOQ-2)	BLQ(LOQ-2)	BLQ(LOQ-2)	BLQ(LOQ-2)

Source: Field monitoring & analysis by ALPL Nagpur

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

Table 3.20: Ground Water Quality Report

S. N.	Test Parameter	Measurement Unit	Project Site	Gote Mouchuria	Ledapalash	Sebapur	Dhatala	Kanuri	Shyampur	Dightor
			(GW-1)	(GW-2)	(GW-3)	(GW-4)	(GW-5)	(GW-6)	(GW-7)	(GW-8)
1	pH @ 25 ⁰ C	-	7.74	8.26	8.26	7.14	8.26	7.28	8.16	8.06
2	EC at 25 ⁰ C	µs/cm	364	426	268	426	326	527	510	244
3	Turbidity	NTU	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
4	Dissolved Oxygen	mg/l	6.4	5.4	4.2	6.3	4.3	5.4	6.2	6.2
5	Total Dissolved Solids (TDS)	mg/l	228	398	197	387	286	497	487	204
6	Total Suspended Solids	mg/l	BLQ(LOQ-10)	BLQ(LOQ-10)	BLQ(LOQ-10)	BLQ(LOQ-10)	BLQ(LOQ-10)	BLQ(LOQ-10)	BLQ(LOQ-10)	BLQ(LOQ-10)
7	Total Alkalinity (as CaCO ₃)	mg/l	132.86	91.47	85.72	107.1	117.3	76.5	76.75	81.6
8	Total Hardness (as CaCO ₃)	mg/l	70	387	174	242	262	282	282	168
9	Calcium (as Ca)	mg/l	72	214	128	184	196	210	206	84
10	Magnesium (as Mg)	mg/l								
11	Potassium (as K)	mg/l	8.26	7.42	5.26	7.18	8.26	11.10	8.91	7.64
12	Sodium (as Na)	mg/l	24.52	21.28	14.04	21.20	24.27	26.24	20.24	23.84
13	Sulphate (as SO ₄)	mg/l	12.37	19.24	21.29	18.26	19.42	28.18	20.94	16.54
14	Nitrate (as NO ₃)	mg/l	BLQ(LOQ-2)	BLQ(LOQ-2)	8.26	8.24	5.04	11.24	10.04	7.20
15	Chloride (as Cl)	mg/l	53.74	121.04	157.4	94.70	80.84	121.90	96.64	70.90
16	Fluoride (as F)	mg/l	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

S. N.	Test Parameter	Measurement Unit	Project Site	Gote Mouchuriana	Ledapalash	Sebapur	Dhatala	Kanuri	Shyampur	Dightor
			(GW-1)	(GW-2)	(GW-3)	(GW-4)	(GW-5)	(GW-6)	(GW-7)	(GW-8)
17	Total Nitrogen(as N)	mg/l	3.16	3.16	4.06	3.70	8.26	5.21	4.16	3.26
18	Oil & grease	mg/l	BLQ(L OQ-4)	BLQ(LO Q-4)	BLQ(LOQ-4)	BLQ(LO Q-2)	BLQ(LOQ-4)	BLQ(LOQ-4)	BLQ(LO Q-4)	BLQ(LOQ-4)
19	Total Phosphate(as PO4 ⁻)	mg/l	BLQ(L OQ-2)	BLQ(L OQ-0.1)	BLQ(L OQ-0.1)	BLQ(L OQ-0.1)	BLQ(LOQ-0.1)	BLQ(LOQ-0.1)	BLQ(L OQ-0.1)	BLQ(LOQ-0.1)
20	Iron (as Fe)	mg/l	0.07	0.04	0.12	0.06	0.09	0.16	0.18	0.20
21	Copper (asCu)	mg/l	BLQ(LOQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(LOQ-0.02)	BLQ(L OQ-0.02)	BLQ(LOQ-0.02)
22	Manganese(as Mn)	mg/l	BLQ(L OQ-0.02)	BLQ(LO Q-0.02)	BLQ(LOQ-0.02)	BLQ(L OQ-0.02)	BLQ(LOQ-0.02)	BLQ(LOQ-0.02)	BLQ(L OQ-0.02)	BLQ(LOQ-0.02)
23	Cobalt (asCo)	mg/l	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(LOQ-0.02)	BLQ(L OQ-0.02)	BLQ(LOQ-0.02)
24	Cadmium(as Cd)	mg/l	BLQ(L OQ-0.002)	BLQ(L OQ-0.002)	BLQ(L OQ-0.002)	BLQ(L OQ-0.002)	BLQ(L OQ-0.002)	BLQ(LOQ-0.002)	BLQ(L OQ-0.002)	BLQ(LOQ-0.002)
25	Arsenic (asAs)	mg/l	BLQ(L OQ-0.01)	BLQ(L OQ-0.01)	BLQ(L OQ-0.01)	BLQ(L OQ-0.01)	BLQ(L OQ-0.01)	BLQ(LOQ-0.01)	BLQ(L OQ-0.01)	BLQ(LOQ-0.01)
26	Lead (asPb)	mg/l	BLQ(L OQ-0.01)	BLQ(L OQ-0.01)	BLQ(L OQ-0.01)	BLQ(L OQ-0.01)	BLQ(L OQ-0.01)	BLQ(LOQ-0.01)	BLQ(L OQ-0.01)	BLQ(LOQ-0.01)
27	Zinc (as Zn)	mg/l	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(LO Q-0.02)	BLQ(LOQ-0.02)	BLQ(LOQ-0.02)	BLQ(L OQ-0.02)	BLQ(LOQ-0.02)
28	Nickel (asNi)	mg/l	BLQ(L OQ-0.1)	BLQ(L OQ-0.1)	BLQ(L OQ-0.1)	BLQ(L OQ-0.1)	BLQ(L OQ-0.1)	BLQ(LOQ-0.1)	BLQ(L OQ-0.1)	BLQ(LOQ-0.1)
29	Total Chromium (as Cr)	mg/l	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(L OQ-0.02)	BLQ(LOQ-0.02)	BLQ(L OQ-0.02)	BLQ(LOQ-0.02)
30	Total Coliform	Per 100 ml	BLQ(L OQ-2)	BLQ(LO Q-2)	BLQ(LOQ-2)	BLQ(LO Q-2)	BLQ(LOQ-2)	BLQ(LOQ-2)	BLQ(LO Q-2)	BLQ(LOQ-2)
31	Feacal Coliform	MPN/100 ml	BLQ(L OQ-2)	BLQ(L OQ-2)	BLQ(LOQ-2)	BLQ(L OQ-2)	BLQ(LOQ-2)	BLQ(LOQ-2)	BLQ(L OQ-2)	BLQ(LOQ-2)

Source: Field monitoring & analysis by ALPL Nagpur

3.4.9 OBSERVATIONS AND INTERPRETATION

A. SURFACE WATER QUALITY

The physico-chemical characteristics of the surface water are presented in **Table 3.19** and are compared with the IS-2296:1992 standards.

The analysis results indicate that the pH ranged between 7.47 – 8.06 which is well within the specified standard of 6.5 to 8.5. The pH of water indicates whether the water is acid or alkaline. The TDS was observed to be 286-492 mg/l which is within the permissible limit of 2000 mg/l. The total hardness recorded was in the range of 182-296 mg/l as CaCO₃ which is also within the permissible limit of 600 mg/l. The levels of chloride and sulphate were found to be in the range of 58.25-112.18 mg/l and 15.04-24.26 mg/l respectively.

Dissolved oxygen (DO) refers to the amount of oxygen (O₂) dissolved in water. Because fish and other aquatic organisms cannot survive without oxygen, DO is one of the most important water quality parameters. The reported value of range of 5.6-5.9 mg/l. Phosphorus (as PO₄) is an important nutrient for plants and algae. Because phosphorus is in short supply in most fresh waters, even a modest increase in phosphorus can cause excessive growth of plants and algae that deplete dissolved oxygen (DO) as they decompose. PO₄ concentration was found to be in the range of BLQ(LOQ-0.1) mg/l. COD ranges from 2.5-3.1 mg/l and BOD ranges from BLQ(LOQ-4) mg/l.

REMARKS

Coliform group of organisms are indicators of fecal contamination in water. All surface water samples were found to be bacteriologically contaminated. Presence of total coliforms in surface water indicates that a contamination pathway exists between any source of bacteria (septic system, animal waste, etc.) and the surface water stream. A defective well can often be the cause when coliform bacteria are found in well water. For surface water, treatment followed by chlorination or disinfection treatment is needed before use for domestic purpose. Groundwater samples were not found to be bacteriologically contaminated.

B. GROUNDWATER QUALITY

The physico-chemical characteristics of groundwater are presented in **Table 3.20** and compared with the IS-10500 standards. The analysis results indicate that the pH ranged 7.14 – 8.26. The TDS was ranging from 197 – 497 mg/l. Total hardness was found to be in the range of 70-387 mg/l. The fluoride concentration was found to be in the range of BLQ(LOQ-0.1) mg/l. The nitrate and sulphate were found in the range of BLQ(LOQ-0.1)-11.24 mg/l and 12.37-21.29 mg/l respectively. The chloride concentration was found in the range of 53.74-121.90 mg/l. The Total suspended solid concentration was found below detection limit BLQ

(LOQ –10) mg/l at all sampling location. Heavy metals like As, Pb, Ni was found below detection limit i.e. BLQ (LOQ-0.01), BLQ (LOQ-0.01), BLQ (LOQ-0.1) respectively and Iron was found in the range of 0.04 to 0.20 mg/l.

GROUND WATER QUALITY INTERPRETATION

Each of the groundwater samples were analysed for various parameters such as pH, total hardness, calcium, magnesium, bicarbonate, chloride, TDS, fluoride, nitrate, iron, sulphate, manganese, turbidity, total alkalinity, sodium, potassium, electrical conductivity and carbonate. In order to assess water quality, a concept is introduced - for computing WQI (Water Quality Index) of Groundwater; three steps are followed (*Ramakrishnaiah et al, 2009*) and (*mpcb.gov.in*):

In the first step, each of the selected parameters has been assigned a weight (wi) according to its relative importance in the overall quality of water for drinking purposes. The relative weight of chemical parameters as considered by Ramakrishnaiah et al. is given in the following **Table 3.21**.

Table 3.21: Relative Weight of Chemical Parameters

Parameters	Indian Standards (Desirable Limit)	Weight	Relative Weight
pH	6.5-8.5	4	0.09856
Total Hardness	200	2	0.04878
Calcium	75	2	0.04878
Magnesium	30	2	0.04878
Bicarbonate	244	3	0.07317
Chloride	250	3	0.07317
Total Dissolved Solids	500	4	0.09756
Fluoride	1.0	4	0.09756
Manganese	0.05	4	0.09756
Nitrate	45	5	0.12195
Iron	1.0	4	0.09756
Sulphate	200	4	0.09756

In the second step, the relative weight (Wi) is computed.

In the third step, a quality rating scale (Qi) for each parameter is assigned by dividing its concentration in each water sample by its respective standard according to the guidelines laid down in the BIS and the result is multiplied by 100.

For computing the WQI, the SI is first determined for each chemical parameter, which is then used to determine the WQI as per the following equation: (SI_i = Wi * Qi) and (WQI = ΣSI_i) where SI_i is the subindex of ith parameter; qi is the rating based on concentration of ith parameter and n is the number of parameters. The computed WQI values are classified into five types; “excellent water” to “water, unsuitable for drinking” is given in **Table 3.22**.

Table 3.22: Water Quality Classification Based on WQI Value

S. N.	WQI Value	Water Quality
1.	< 50	Excellent
2.	50 - 100	Good
3.	100 - 200	Poor
4.	200 - 300	Very Poor
5.	>300	Unsuitable for Drinking

(Source: Ramakrishnaiah etc. al.2009)

Based on above literature support and the water quality sampling and analysis reports the WQI is as follows –

Table 3.23: Location wise Water Quality Assessment

S. N.	Locations	WQI	Quality	Remark
1.	Project Site	69.66	Good	Water quality assessments based upon above physico-chemical parameters showed quality of ground water samples is good.
2.	Gote-Mouchuria	65.12	Good	
3.	Ledapalash	70.52	Good	
4.	Sebapur	75.65	Good	
5.	Dhatala	81.49	Good	
6.	Kanuri	74.14	Good	
7.	Shyampur	66.19	Good	
8.	Dightor	66.31	Good	

3.5 LAND USE OF STUDY AREA

The land-use & land cover map of the 10 km radial study area from the periphery of project site has been prepared using Resource SAT-2, sensor-LISS-3 having 23.5m spatial resolution and date of pass 3rd February 2025 satellite image with reference to Google Earth data. In order to strengthen the baseline information on existing land use pattern, the following data covering 10 km radius is approximate about 23°24'21.83"N to 23°35'17.92"N latitude and 86°51'21.09"E to 87°3'12.83"E longitude and elevation 100-450 meters are used as per the project site confined within that area.

Land use pattern of the study area as well as the catchment area was carried out by standard methods of analysis of remotely sensed data and followed by ground truth collection and interpretation of satellite data. The outcome of land use study is presented below in subsequent tables and figures.

Table 3.24: Data Specification used for present study

Satellite/ Image	Sensor	Path & Row	Spatial resolution	Date of Acquisition
Resource SAT-2	LISS-3	106-055	23.5 m	3 rd February 2025

The objectives of Land use studies are:

- To determine the present land use pattern as per EIA-EMP norms by MoEF & CC.
- To determine the drainage pattern present in the study area.

3.5.1 METHODOLOGY

The land use pattern of the study area was studied by analysing the available secondary data published in the District Primary Census abstract of the year 2001 & 2011.

Salient features of the adopted methodology are given below:

Table 3.25: Salient features of the adopted methodology

<ul style="list-style-type: none">• Acquisition of satellite data	<ul style="list-style-type: none">• Preparation of base map from Survey of India toposheets
<ul style="list-style-type: none">• Data analysis using visual interpretation techniques	<ul style="list-style-type: none">• Ground truth studies or field checks using GPS
<ul style="list-style-type: none">• Finalization of the map	<ul style="list-style-type: none">• Digitization using head up vectorization method
<ul style="list-style-type: none">• Topology construction in GIS	<ul style="list-style-type: none">• Area calculation for statistics generation
<ul style="list-style-type: none">• Masking	

3.5.2 PRE-FIELD INTERPRETATION OF SATELLITE DATA

The False Color Composite (FCC) of LISS-3 satellite imagery having 23.5 m spatial resolution satellite data at 1:50,000 scale was used for pre-field interpretation work. Taking the help of toposheets, geology, geo-morphology and by using the image elements, the features were identified and delineated the boundaries roughly. Each feature was identified on image by their image elements like tone, texture, color, shape, size, pattern and association. A tentative legend in terms of land cover and land use was formulated. The sample area for field check is selected covering all the physiographic, land use/land cover feature cum image characteristics. Figure 3.9 shows the FCC of 10 KM radius of LISS-3 Imagery.

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

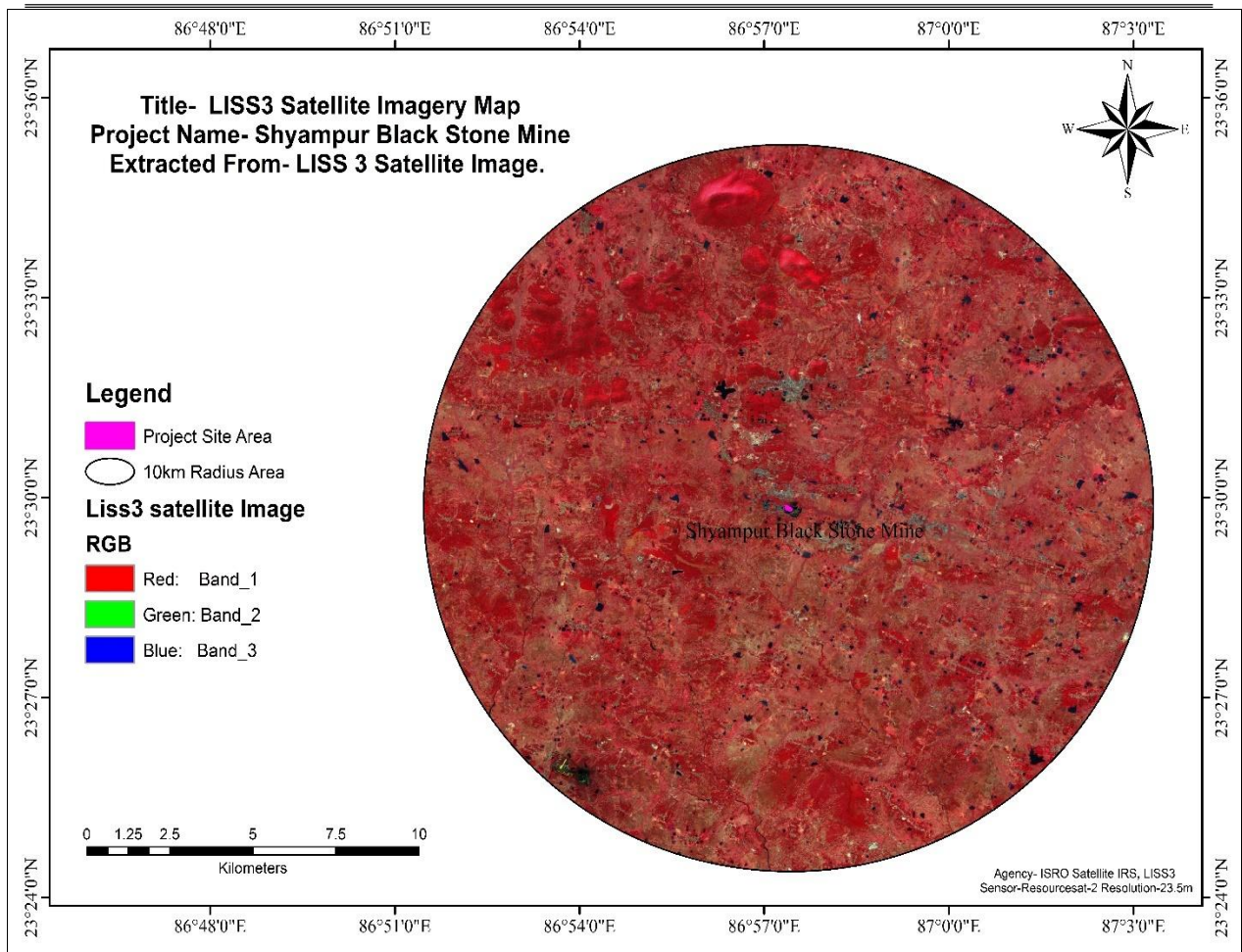


Figure 3.9: FCC OF 00-10 KM Radius with Project Location

3.5.3 GROUND TRUTH COLLECTION

Both topo sheets and imagery were carried for field verification and a transverse plan using existing road network was made to cover as many representative sample areas as possible to observe the broad land use features and to adjust the sample areas according to field conditions. Detail field observations and investigations were carried out and noted the land use features on the imagery.

3.5.4 POST FIELD WORK FOR LAND USE/LAND COVER CLASSIFICATION

The base maps of the study area were prepared, with the help of Survey of India Toposheets on 1:50,000 scale. Preliminary interpreted land use and the land cover features boundaries from IRS P6 False Colour Composite were modified in light of field information and the final thematic details were transferred onto the base maps. The final interpreted and classified thematic map was cartograph. The cartographic map was categorically differentiated with standard colour coding and described features with standard symbols. All the classes were identified and marked by the standard legend on the map as per the level I and II LULC classification based on NRSC-TR-LU & CD-01-90. **Table 3.26** represents the LU/LC

classification system. Total area of 10 km radius is about 318.99 sq. km.

Table 3.26: LULC Classification System

Sr. No.	Level-I	Level-II
1	Built-up land	Settlement
		Industrial Settlement
		Road Infrastructure
2	Agricultural Land/ Crop Land	Single Crop
		Double Crop
3	Forest Area	Protected Forest
4	Scrubs/Wastelands	Open Scrub
		Wasteland
5	Waterbodies	River/Nala/Stream/Canal
		Dam/Pond/Lake/Tank
6	Mines Area	Stone Quarry

3.5.5 LAND USE/LAND COVER CLASSIFICATION- INTERPRETATION

Total Six major land use/land cover classes were demarcated in the study area following Level I classification (Table3.5.2) furthermore a level II classification also adopted as per the requirement of MoEF& CC in which total 16 classification has been classified in the study area. A thematic map of 1:50,000 scale was generated incorporating these classified categories considering the area of the project. The area represents flat steep slope drained by number of small tributaries rises from hill ranges which is surrounded to the study area . The 10 Km study area mainly covered by Agriculture land which is 79.70% of the total area. The hill range represents a gently slope and drained by a number of rivers and nalas like Gandheshwari Nadi, Dhapalijor Nadi and Gaighata jor are following in 10 km study area.

Then there are ponds, lakes, Tanks and Baandh are observed in the study area such as Saltora Jhil, Neyamatpur Korapara Dam, Pedar Bandh and Boro Bandh are major waterbodies in 10 Km Radius area. River and Nalas which are present in 10Km radius area and their general trend and distance of these waterbodies observed in the study area are present in Table No. 3.26 and Figure 3.11 represent the drainage pattern of the study area.

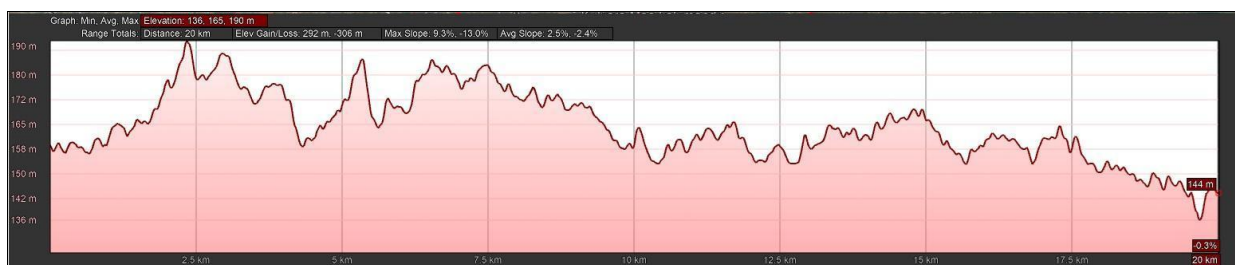


Figure 3.10A: Represents (Slope) of the Study area within 10 (Km) radius i.e. NW to SE Profile

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal



Figure 3.10B: Represents (Slope) of the Study area within 10 (Km) radius i.e. NE to SW Profile

Table 3.27: Distance & Direction of River/Stream/ Nala Within the 10 Km Radius

Sr. No.	Name of the Water Body	Distance (KM)	Direction
1	Gandheshwari Nadi	9.16	NW
2	Dhupalijor Nadi	9.20	SE
3	Gaighata Jor	9.23	NW
4	Saltora Jhil	3.42	NW
5	Neyamatpur Korapara Dam	5.1	NE
6	Pedar Bandh	7.41	NE
7	Boro Bandh	9.48	SE

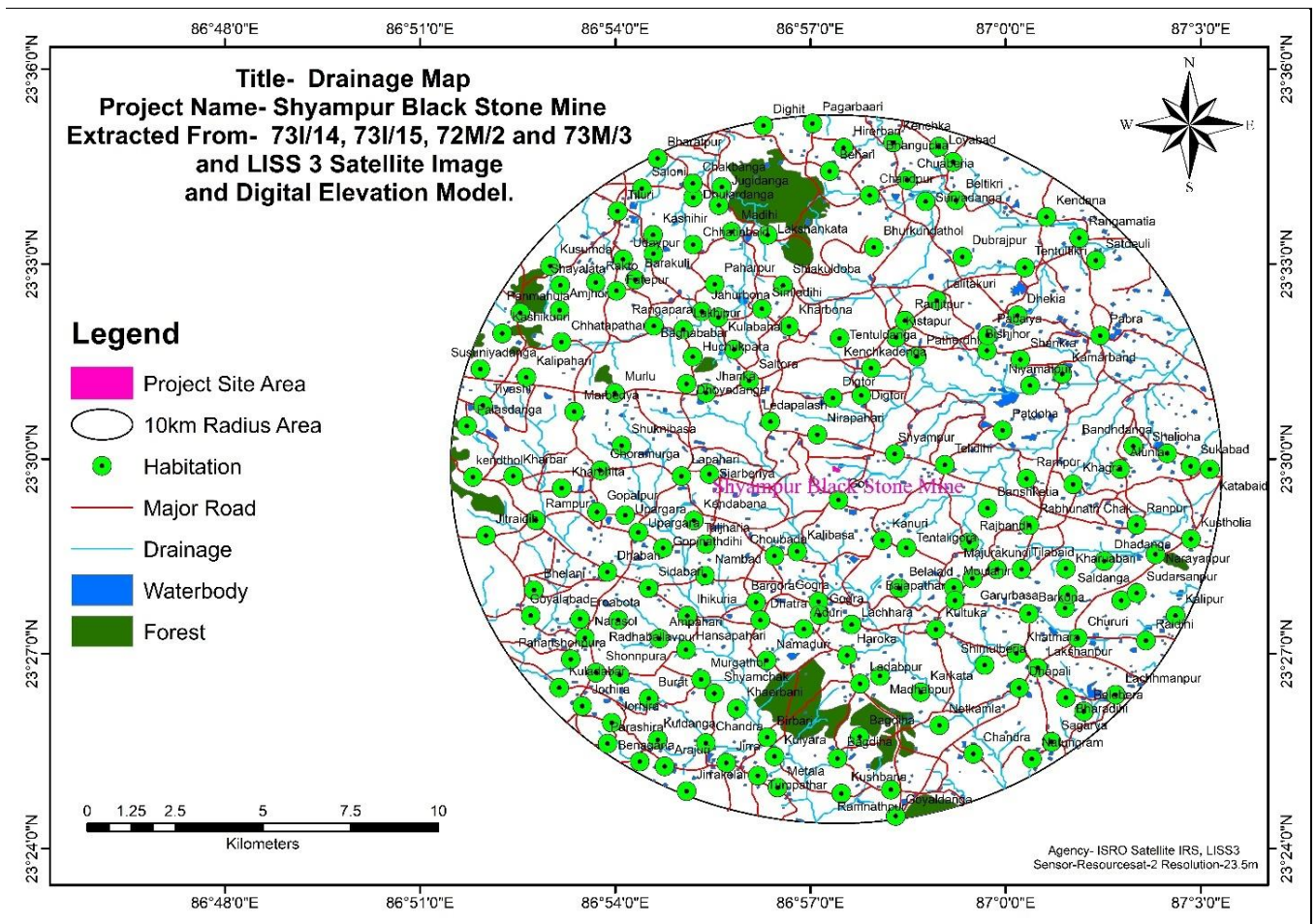


Figure 3.11: Represents Drainage Pattern of the Study Area

As per the classification extracted by the visual interpretation method or on-screen digitization of the Resource Sat-2 Imagery, sensor LISS-3 and subsequent Table 3.5.4 and Figure 3.5.4 represents that the

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

agriculture area covered highest category of Land such as 79.70 % (254.22 sq.km) including plantation, orchards constitute the category of land use includes double and single cropping pattern in the 10 km radius area. Thereafter the presence of scrubs and wasteland including barren land, land with scrubs and open scrubs as seen from the figure is about 9.46 % (30.17 sq.km). Thereafter the presence of settlement/industrial settlement and road infrastructure category are about i.e., 4.14 % (13.22 Sq.km) of the total area. No railway line were noticed in 10km study area. Thereafter the presence of forest area covers 3.77 % (12.04 sq.km) which only includes protected forest in total 10Km study Area respectively. Thereafter the presence of water bodies including the river, canal, nala, stream, pond, area and tributaries as seen from the figure are about 2.75 % (8.77 sq.km). Thereafter the presence of some Stone Quarry as seen from the figure which are about 0.18 % (0.57 sq.km). Maximum settlements were seen in North-Western and Center parts of the study area which is shown in figure. The terrain presumably makes it difficult to visualize some of the other features of the total project area. It is also observed that the area is prominent zone for various connectivity points of view such Raghunathpur Road, Raniganj Road and Saltora-Gangajalghati Road which is under the 10 km radius of the study area as well as numerous metal roads were also present in the study area; it seems that the transportation of raw materials and finished goods will be easily movable as the connectivity is prominent in the study area. It is also observed that the open scrub area and barren land are dominant in Western and North Western part of the study area.

Table 3.28: LU/LC and its coverage within 10 Km Radius

LU/LC Classification System				
S.No.	Level-I	Level-II	Area (Sq. Km ²)	Percentage (%)
1	Built-up land	Settlement	8.43	2.64
		Industrial Settlement	0.91	0.29
		Road Infrastructure	3.88	1.22
2	Agricultural Land/ Crop Land	Single Crop	192.85	60.46
		Double Crop	61.37	19.24
3	Forest Area	Protected Forest	12.04	3.77
4	Scrubs/Wastelands	Open Scrub/Land With Scrub	25.44	7.98
		Wasteland	4.73	1.48
5	Waterbodies	River/Nala/Stream	1.16	0.36
		Pond/Tank/Dam	7.61	2.39
6	Mines Area	Mines Area (Stone Quarry)	0.57	0.18
		Total	318.99	100.00

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

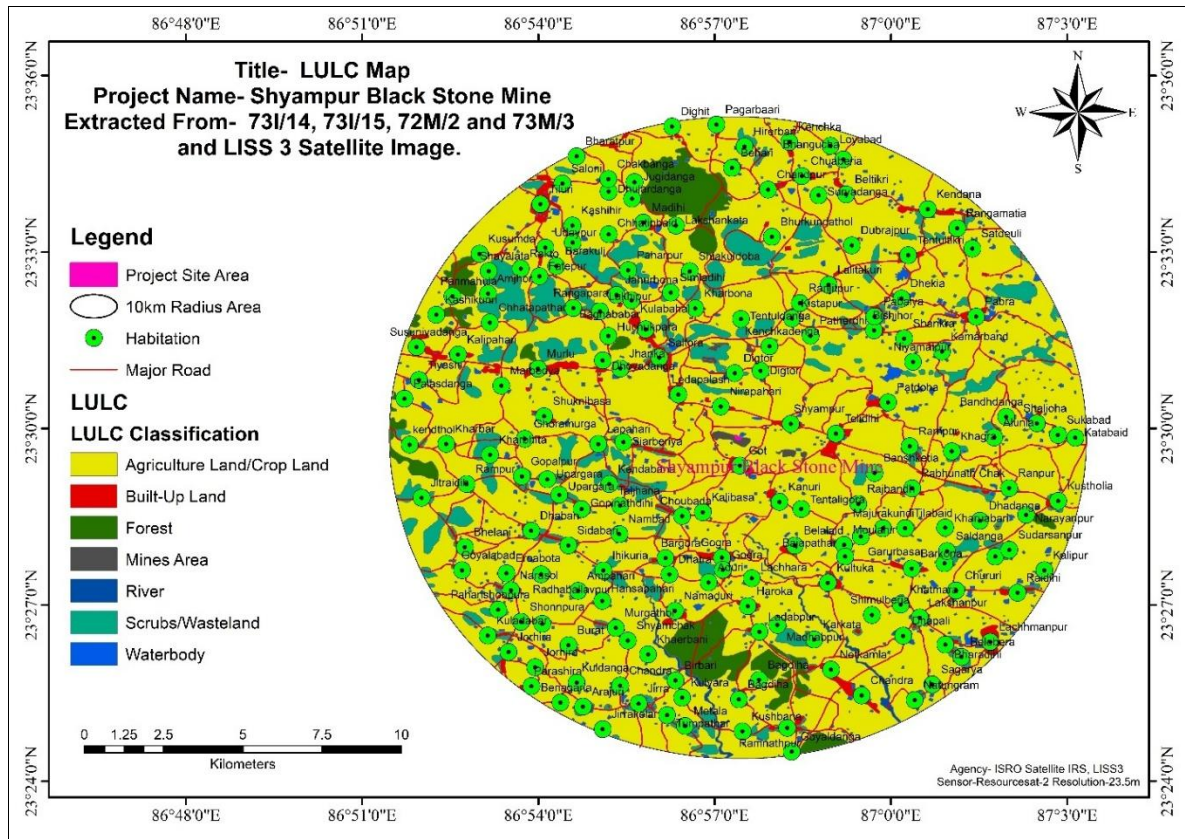


Figure 3.12: LU/LC Details of 10 Km Radius

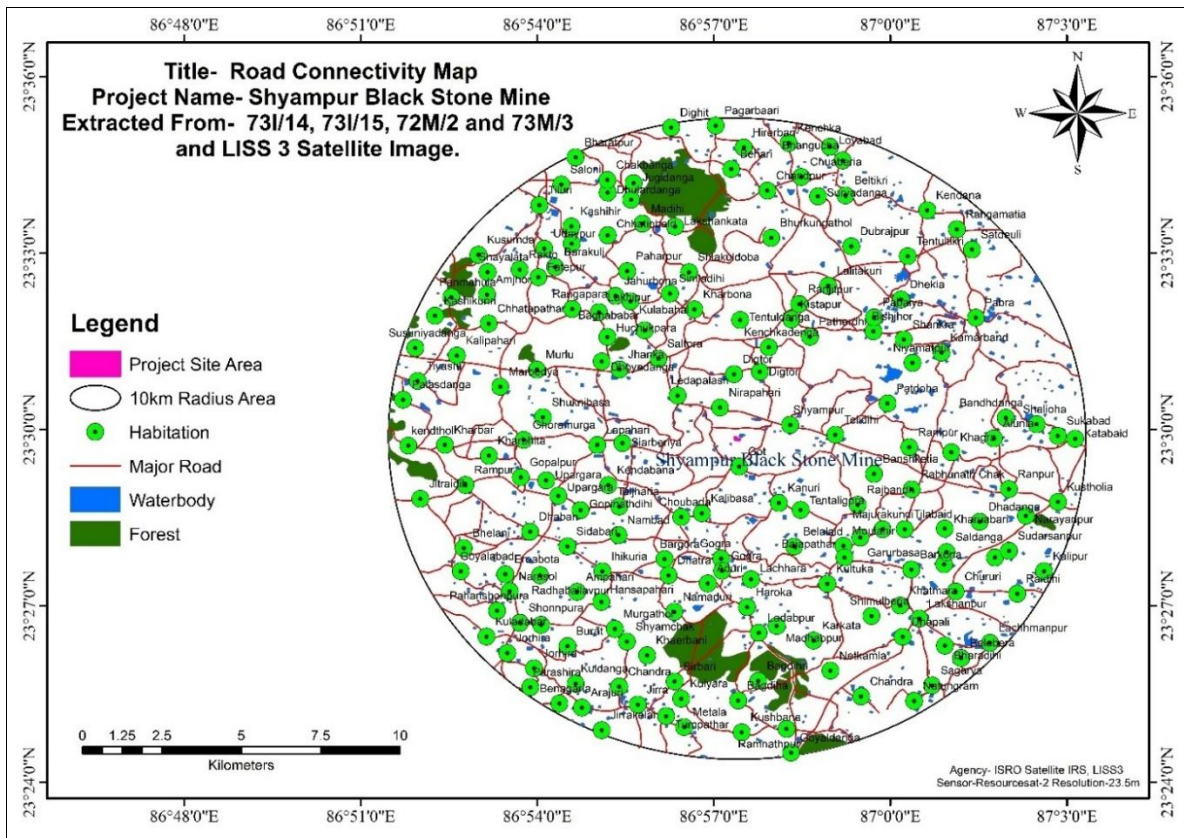


Figure 3.13: Road Network Details of 10 Km Radius

LULC Bifurgation of Shyampur Black Stone Mine

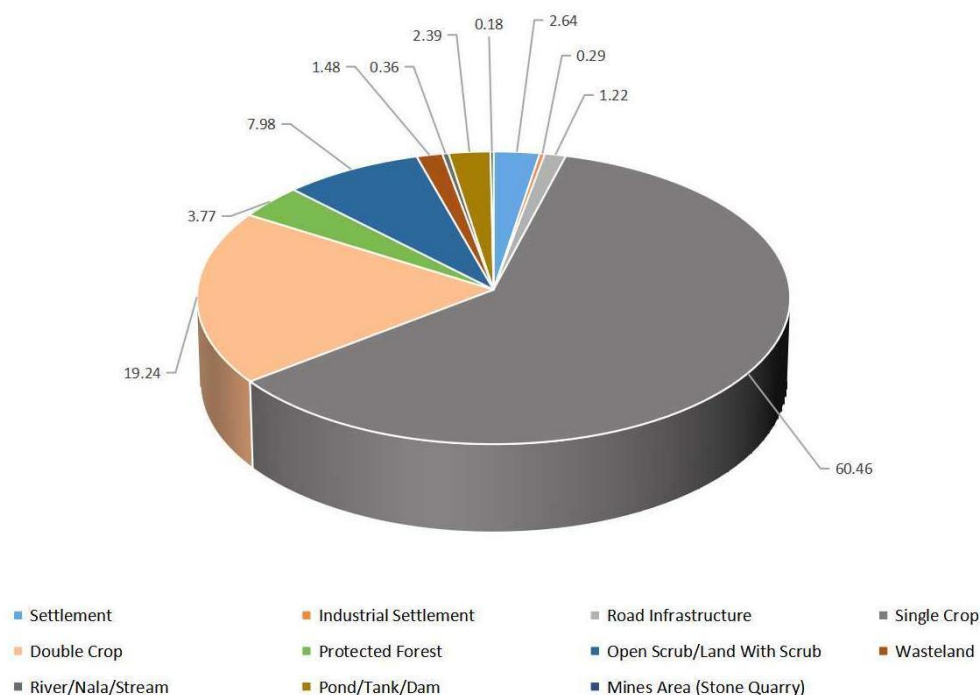


Figure 3.14: Pie-Chart distribution of LU/LC Classification within 10 Km Radius

3.5.6 TERRAIN ANALYSIS

Project site and its terrain consist of flat undulating slopes. The terrain is characterized by agricultural land, Forest land, built up land including settlements and Industrial settlement and open scrub and wasteland. There were agricultural fields in the vicinity of the areas. Some of these agricultural fields have also received sediments carried by rainwater run-offs and overflows from the lakes. Thus, the terrain could be described as a mixed terrain with open scrub, wastelands, agriculture and mining lands covered with a network of natural and manmade watercourses, which are facing the adverse effects of soil erosion from some portion of undulating terrain. Figure 3.15 represents the contour map i.e., elevation details of the project site.

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

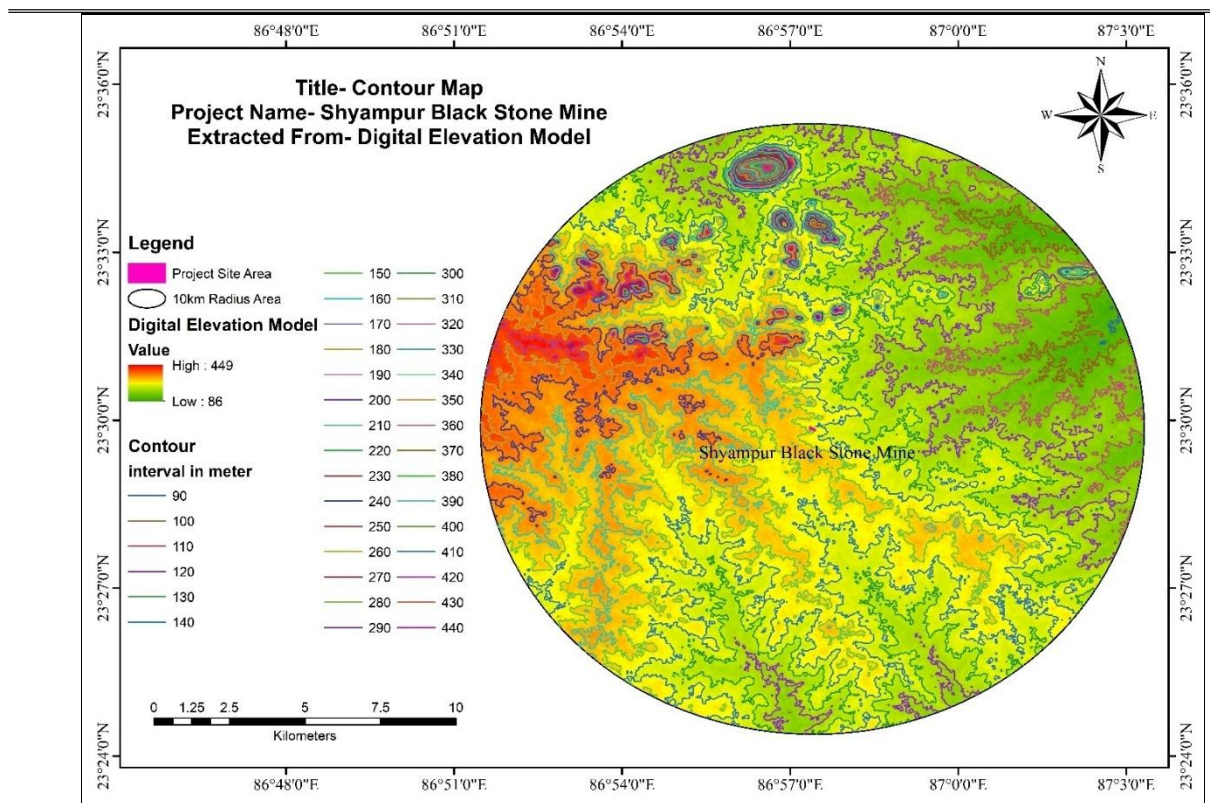


Figure 3.15: Contour Map within 10 Km Radius

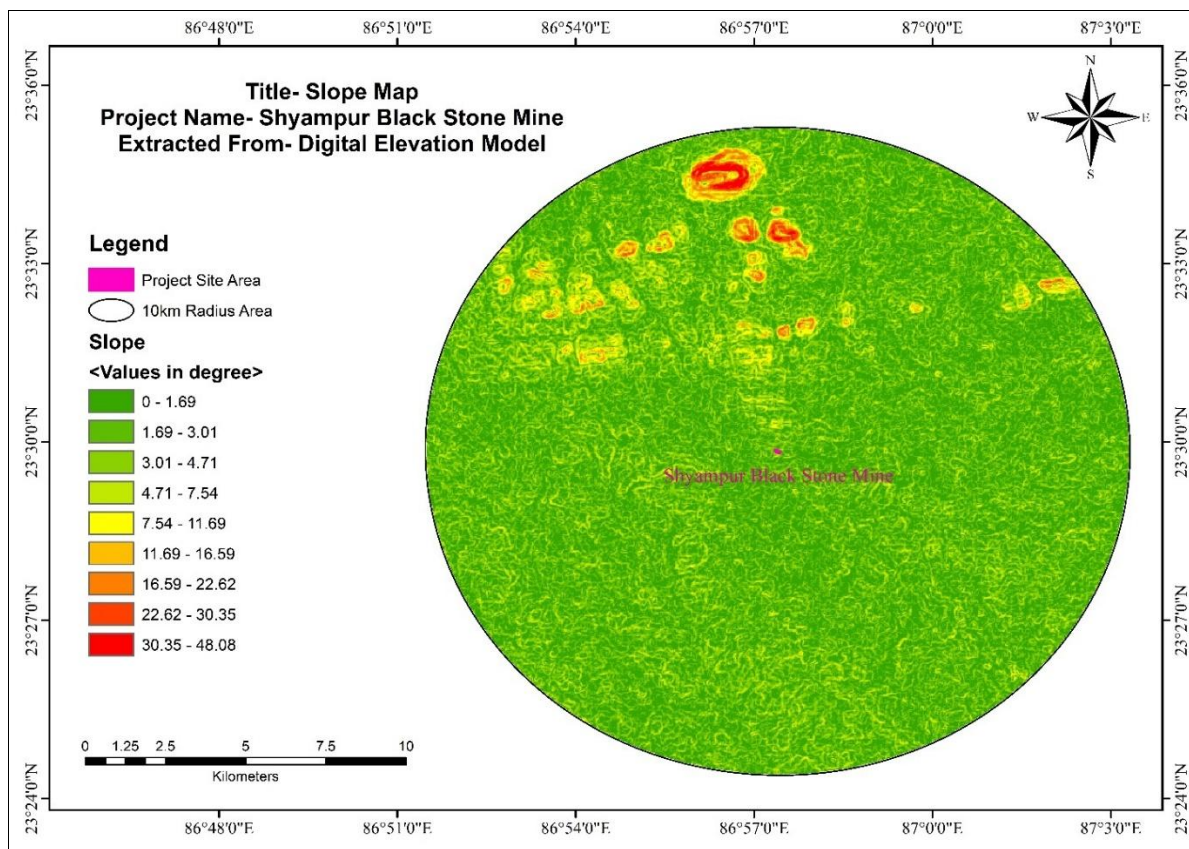


Figure 3.16: Slope Map within 10 Km Radius

3.5.7 DIGITAL ELEVATION MODEL AND TERRAIN MAPPING

Scientific literatures use the terms digital elevation model (DEM), digital terrain model (DTM) and digital surface model (DSM) for different type of geographic studies. The term digital surface model represents the earth's surface and includes all objects on it. In contrast to a DSM, the digital terrain model represents the bare ground surface without any objects like plants and buildings. The term Digital Elevation Model is often used as a generic term for DSMs and DTMs, only representing height information without any further definition about the surface. In this report the term DEM is used as a generic term for DSMs and DTMs. The DEM has been generated from the CartoSat-1 data having 2.45-meter spatial resolution. **Figure 3.17** shows the 3D DEM of the area.

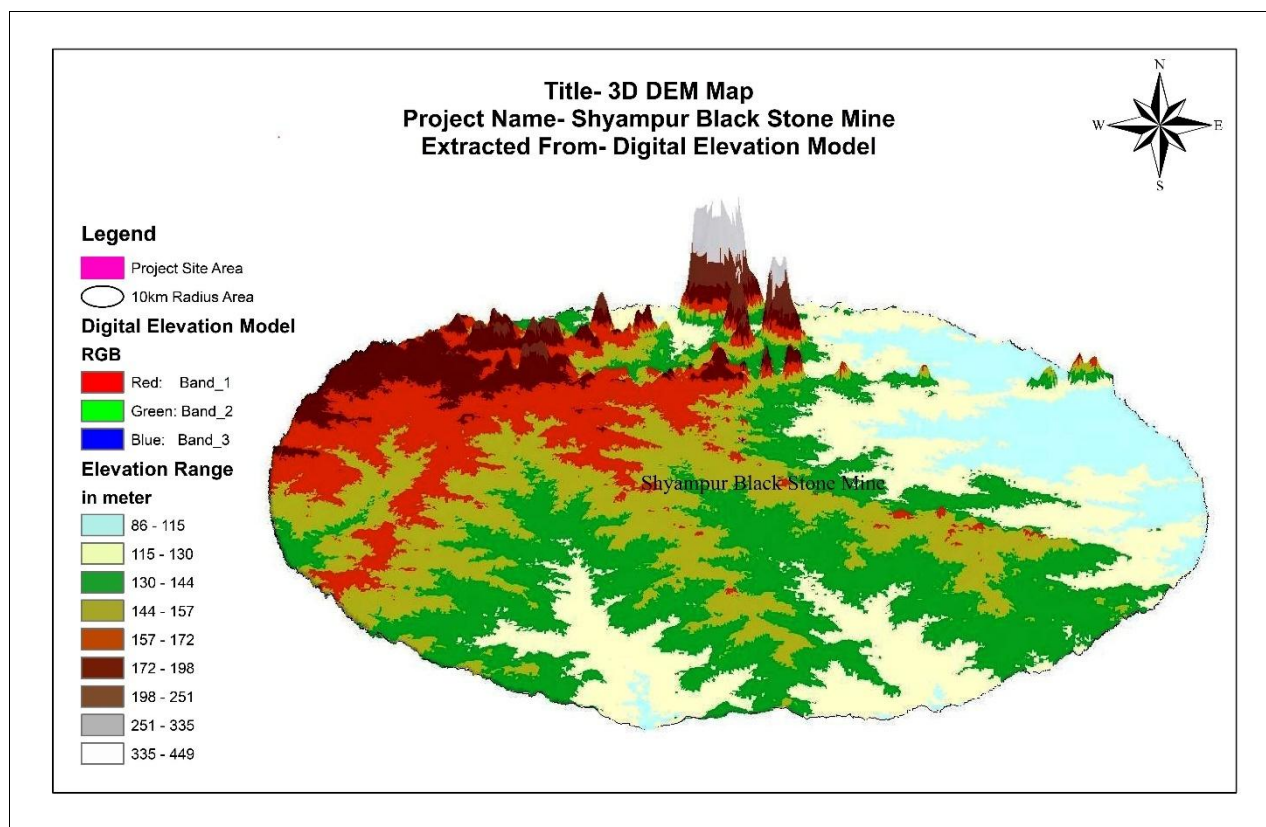


Figure 3.17: Slope Map within 10 Km Radius

3.6 BASELINE STATUS OF SOIL

3.6.1 MATERIALS USED

- a. Spade or auger (screw or tube or post hole type)
- b. Khurpi
- c. Core sampler
- d. Sampling bags
- e. Plastic tray or bucket

3.6.2PROCEDURE

- a. Divided the field into different homogenous units based on the visual observation and farmer's experience.
- b. Removed the surface litter at the sampling spot.
- c. Driven the auger to a plough depth of 15 cm and draw the soil sample.
- d. Collected at least 10 to 15 samples from each sampling unit and place in a bucket or tray.
- f. If auger is not available, make a 'V' shaped cut to a depth of 15 cm in the sampling spot using spade.
- g. Removed thick slices of soil from top to bottom of exposed face of the 'V' shaped cut and place in a clean container.
- h. Mixed the samples thoroughly and remove foreign materials like roots, stones, pebbles and gravels.
- i. Reduced the bulk to about half to one kilogram by quartering or compartmentalization.
- j. Quartering is done by dividing the thoroughly mixed sample into four equal parts. The two opposite quarters are discarded and the remaining two quarters are remixed and the process repeated until the desired sample size is obtained.
- k. Compartmentalization is done by uniformly spreading the soil over a clean hard surface and dividing into smaller compartments by drawing lines along and across the length and breadth. From each compartment a pinch of soil is collected. This process is repeated till the desired quantity of sample is obtained.
- l. Collected the sample in a clean cloth or polythene bag.
- m. Label the bag with information like name of the farmer, location of the farm, survey number, previous crop grown, present crop, crop to be grown in the next season, date of collection, name of the sampler etc.

3.6.3STANDARD SOIL CLASSIFICATION

Table 3.29: Standard soil classification

Sl.	Soil Test	Classification
1.	pH	< 4.5 Extremely acidic; 4.51- 5.50 Very strongly acidic. 5.51- 6.00 moderately acidic; 6.01- 6.50 slightly acidic. 6.51- 7.30 Neutral; 7.31- 7.80 slightly alkaline. 7.81- 8.50 moderately alkaline; 8.51- 9.0 strongly alkaline. >9.01 very strongly alkaline.

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

2.	Organic Carbon (%)	Upto 0.2: very less; 0.21-0.4: less. 0.41-0.5 medium; 0.51- 0.8: on an average sufficient. >1.0 more than sufficient.
3.	Nitrogen (Kg/ha)	Upto 50 very less; 51-100 less. 101-150 good; 151-300 Better. >300 sufficient.
4.	Phosphorus (Kg/ha)	Upto 0.2: very less; 16-30 less. 31-50 medium; 51-65 on an average sufficient.66- 80 sufficient; >80 more than sufficient.
5.	Potash (Kg/ha)	0-20 very less; 20-180 less. 181-240 medium; 241-300 average. 301-360 Better; >360 more than sufficient.

3.6.4 RELATIONSHIP OF CEC WITH PRODUCTIVITY AND ABSORPTIVITY

Table 3.30: Relationship of CSE with Productivity and absorptivity

Sr. No.	CEC Range (meq/100g)	Productivity	CEC Range (meq/100g)	Absorptivity
1.	< 10	Very Low	<10	Low
2.	10 – 20	Low	10 – 20	Moderate
3.	20 – 50	Moderate	20 – 30	Moderately high
4.	> 50	High	30 – 40	High

3.6.5 SOIL SAMPLING LOCATION

For studying soil profile of the region, sampling locations were selected to assess the existing soil conditions in and around the project site representing various landuse conditions. The physical, chemical and heavy metal concentrations were determined. The samples were collected by ramming a core-cutter into the soil from 15 cm up to a depth of 60cm. Total 8 representative samples were collected from different locations within the study area and analyzed. The details of the soil monitoring locations are given in **Table 3.31** and shown in **Figure 3.18**. The international pipette method (Black, 1964) was adopted for determination of particle size analysis. The physical parameters such as bulk density, porosity and water holding capacity were determined by following KR box method (Keen andracekowski) 1921.

Table 3.31: Details of Soil Sampling locations

S. N.	Locations	Dist. (km)/Dir.	Lat/Long	Soil sampling area
1	Project Site		23°29'49.06"N, 86°57'24.11"E	Barran land
2	Gote - Mouchuria	S	23°29'20.93"N, 86°57'30.79"E	Agriculture Land
3	Ledapalash	WNW	23°30'28.05"N, 86°56'25.18"E	Agriculture Land
4	Saltora	NW	23°31'14.47"N, 86°55'50.80"E	Agriculture Land
5	Dhatala	ESE	23°29'54.02"N, 86°58'59.10"E	Agriculture Land
6	Kanuri	SE	23°28'57.45"N, 86°57'58.32"E	Agriculture Land
7	Shyampur	ENE	23°30'16.08"N, 86°57'58.62"E	Agriculture Land
8	Dightor	NNE	23°31'2.75"N, 86°57'48.05"E	Agriculture Land

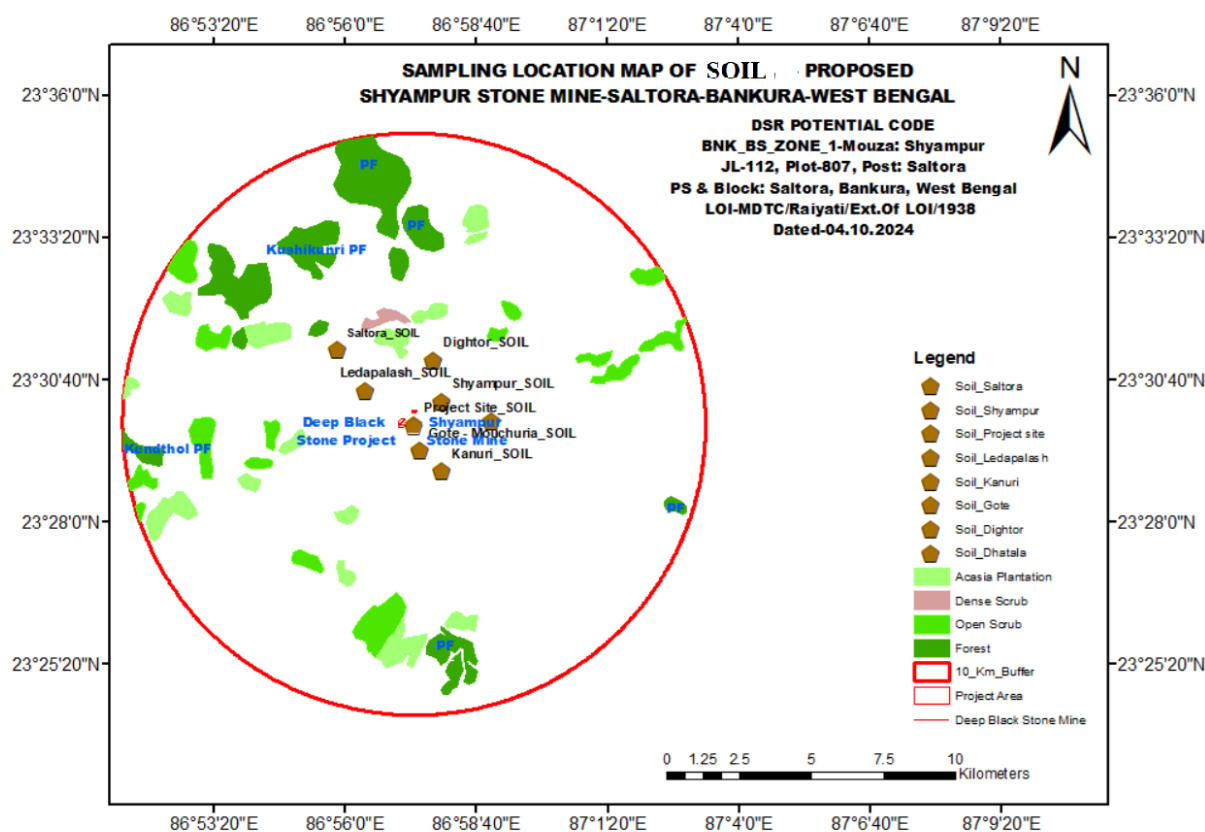


Figure 3.18: Soil Sampling location map within 10 Km Radius

3.6.6 SOIL CHARACTERISTIC AND INTERPRETATION

A. PHYSICAL CHARACTERISTICS OF SOIL

Physical characteristics of soils were determined through specific parameters viz. particle size distribution, bulk density, porosity, water holding capacity, texture and are presented in Table 3.32.

Regular cultivation practices increase the bulk density of soils thus inducing compaction. This results in reduction in water percolation rate and penetration of roots through soils. The soils with low bulk density have favorable physical conditions whereas those with high bulk density exhibit poor physical conditions for agriculture crops. The bulk density of the soil in the study area ranged between 1.186 - 1.292 g/cc which indicates favorable physical condition for plant growth. The water holding capacity is between 51.43 – 55.41%. Infiltration rate, in the soil is in the range of 11.17 – 13.61 mm/hr as shown in Table 3.32.

B. CHEMICAL CHARACTERISTICS OF SOIL

Data collected for chemical characteristics of soils through selected parameters viz. pH, soluble cations and anions, exchangeable cations, organic content and fertility status in the form of NPK values and organic matter are presented in Table 3.32.

pH is an important parameter indicative of alkaline or acidic nature of soil. It greatly affects the microbial population as well as solubility of metal ions and regulates nutrient availability. Variation in the pH of the soil in the study area is presented in **Table 3.5.5** and it is found to be from slightly acidic to neutral (7.52 – 7.92) in reaction. Electrical conductivity, a measure of soluble salts in the soil is in the range of 262 – 346 $\mu\text{S}/\text{cm}$ as shown in **Table 3.32**.

The important water-soluble cations in the soil are calcium and magnesium whose concentration levels ranged from 103.34 – 144.43 mg/Kg and 75.95 – 88.40 mg/Kg respectively. Chloride is in the range of 80.93 – 118.28 mg/Kg.

C. NUTRIENT STATUS

Organic matter and organic carbon present in the soil influences its physical and chemical conditions and is responsible for stability of soil aggregates. Organic matter and organic carbon were found in the range of 0.89% – 1.20% and 0.52 – 0.70% as shown in **Table 3.32**.

D. HEAVY METALS CONTENT IN THE SOIL

Plant requires some of the heavy metals at microgram levels for their metabolic activities. These heavy metals are also termed as macronutrients. Their efficiency becomes a limiting factor in the plant growth, but at the same time their higher concentration in soils may lead to toxicity. Some of the heavy metals were estimated and their concentration levels are presented in **Table 3.32**.

Table 3.32: Soil Analysis Results

S. N.	Test Parameter	Measurement Unit	Project Site	Gote Muchuria	Ledapal ash	Saltora	Dhatala	Kanuri	Shyampur	Halang Juli
			(S-1)	(S-2)	(S-3)	(S-4)	(S-5)	(S-6)	(S-7)	(S-8)
1	Infiltration rate	mm/hr	2.37	2.42	2.47	2.45	2.52	2.57	2.60	2.64
2	Bulk density	g/cm ³	1.08	1.07	1.13	1.10	1.71	1.22	1.26	1.29
3	Porosity	%								
4	Water holding capacity	%	25.4	26.2	27.4	28.3	28.9	29.4	30.6	40.5
5	Particle size distribution									
	Sand	%	20	22	25	21	19	17	18	20
	Silt	%	38	37	31	33	32	36	34	35
	Clay	%	42	41	44	46	49	47	48	45
6	Texture	-	Clay loam	Sandy Clay	Sandy Clay loam	Sandy Clay	Silty Loam	Sandy Clay	Sandy Clay	Sandy Silt

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

7	pH (1:2.5 Aq. Extract) at 25°C	-	7.98	7.32	7.39	7.41	7.91	7.26	7.98	7.88
8	Electrical Conductivity (1:2.5 Aq Extract)	µs/cm	188.9	132.8	156.8	186.9	188.9	189.9	213.8	188.5
9	Water soluble Calcium (as Ca)	mg/Kg	341.9	321.09	332.6	299.8	331.26	341.41	325.61	256.8
S. N.	Test Parameter	Measurement Unit	Project Site	Gote Mouchuria	Ledapalash	Saltora	Dhatala	Kanuri	Shyampur	Dightor
			(S-1)	(S-2)	(S-3)	(S-4)	(S-5)	(S-6)	(S-7)	(S-8)
	Ca)									
10	Water soluble Magnesium (as Mg)	mg/Kg	391.86	348.49	341.9	398.61	351.56	348.51	356.51	312.26
11	Water soluble Sodium (as Na)	mg/Kg	341.61	342.51	349.6	198.41	342.41	232.51	342.21	351.8
12	Water soluble Potassium (as K)	mg/Kg	356.82	341.59	341.8	224.98	351.91	391.56	398.28	399.81
13	Water soluble Chloride (as Cl)	mg/Kg	342.82	348.21	356.8	332.58	347.92	341.08	328.29	303.21
14	Water soluble Sulphate (as SO ₄)	mg/Kg	508.41	508.21	408.51	408.51	399.51	508.41	508.21	12.84
15	Exchangeable Sodium (as Na)	mg/Kg	256.61	451.32	132.8	432.21	241.56	256.56	332.5	256.58
16	Exchangeable Potassium (as K)	mg/Kg	298.91	358.21	352.8	451.51	357.79	312.28	348.51	332.21
17	Exchangeable Calcium (as Ca)	mg/Kg	17.09	16.05	16.6	14.99	16.56	17.07	16.3	12.84
18	Exchangeable Magnesium (as Mg)	mg/Kg	19.6	17.4	17.09	19.93	17.6	17.42	17.8	15.62
19	Sodium adsorption ratio (SAR)	-								
20	Total Organic matter	%	1.91	1.88	1.41	1.29	1.34	1.29	1.24	1.09
21	Total Organic Carbon	%	1.10	1.09	0.82	0.75	0.78	0.75	0.72	0.63
22	Available Nitrogen (asN)	Kg/hect	53.37	54.62	55.89	43.07	52.68	57.98	54.06	55.06

23	Available Phosphorous(as P)	Kg/hect	0.14	0.1	0.11	0.1	0.13	0.12	0.13	0.11
24	Available Potassium (as K)	Kg/hect	46.48	45.26	43.99	56.82	47.18	41.89	45.81	44.82
25	CEC	meq/100 g	122.56	132.28	191.82	122.08	142.58	122.28	122.29	158.21
26	Total Arsenic (As)	mg/Kg	1.92	1.81	1.59	2.01	1.53	0.99	0.84	1.31
S. N.	Test Parameter	Measurement Unit	Project Site	Gote Moucuria	Ledapalash	Saltora	Dhatala	Kanuri	Shyampur	Dightor
			(S-1)	(S-2)	(S-3)	(S-4)	(S-5)	(S-6)	(S-7)	(S-8)
27	Available Boron (as B)	mg/Kg	0.94	0.27	1.01	1.21	1.10	1.85	1.21	1.06
28	Total Cadmium (as Cd)	mg/Kg	1.56	1.21	2.06	1.06	0.99	1.12	1.48	1.83
29	Total Chromium (as Cr)	mg/Kg	26.27	25.01	26.69	28.91	26.43	24.10	25.49	22.01
30	Available Copper (asCu)	mg/Kg	148.49	141.91	149.65	151.49	140.39	138.46	49.06	153.49
31	Total Lead (as Pb)	mg/Kg	46.60	47.41	47.89	49.08	43.93	42.68	44..54	43.49
32	Total Nickel (as Ni)	mg/Kg	19.01	18.91	17.68	15.01	19.41	20.23	19.41	17.01
33	Total Cobalt (as Co)	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND
34	Available Iron (as Fe)	mg/Kg	7891.49	6564.79	9479.68	8842.53	5946.47	5789.49	7941.91	6579.49
35	Available Manganese(as Mn)	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND
36	Available Zinc (as Zn)	mg/Kg	265.19	261.99	249.64	251.94	261.01	275.41	251.60	247.97
37	Total Selenium (as Se)	mg/Kg	ND	ND	ND	ND	ND	ND	ND	ND

Source: ALPL Nagpur

3.6.7 INTERPRETATION

The bulk density of the soil in the study area ranged between 1.07 – 1.71 g/cm³ which indicates favorable physical condition for plant growth. pH is found to be 7.52 – 7.92 in reaction. Based on the pH values, soil nature in the study area is found to be from slightly acidic to neutral. As based on result of available concentration of major nutrients fertility

status of soil with respect to NPK value is found to be in the range of 43.07-57.98 kg/hect (quality good to better), 0.1-0.14 kg/hect (quality average sufficient to more than sufficient) and 41.89-56.82 kg/hect (quality average to better) respectively. Organic carbon was found in the range of 0.63% - 1.10% (quality average sufficient).

3.7 BIOLOGICAL ENVIRONMENT

3.7.1 INTRODUCTION

The biological environment of a region includes all living organisms and serves as a key indicator of biodiversity, typically measured through species richness. Flora and fauna, as integral components of this system, are uniquely adapted to their environmental conditions and participate in complex ecological interactions. However, environmental changes can disrupt these systems, potentially leading to biodiversity loss. Therefore, establishing a baseline understanding of biodiversity is essential especially when planning development activities.

This study aims to assess the biological environment in and around the proposed project by M/s Shyampur Stone Mine. The survey covers both the core project site and a 10-kilometer buffer zone. Its primary objectives are to document existing biodiversity, evaluate potential ecological impacts, and recommend suitable mitigation measures. Given the critical role of biodiversity in Environmental Impact Assessments (EIA), this report supports informed decision-making to promote ecological sustainability and minimize adverse effects on local ecosystems.

3.7.2 SCOPE, AIM AND OBJECTIVES

- To inventories floral and faunal components of project area (project site /core zone and 10 km. radius / buffer zone).
- To locate / demarcate and understand ecological setting of the project area in terms of national parks / wildlife sanctuary / protected and reserve forests / tiger reserve / Eco-sensitive Areas / wetlands etc. within 10 km. radius from project site (if any).
- To identify Schedule-I, rare, endemic and endangered species within the project study area and prepare conservation plan for same.
- To identify impact zone and evaluate the likely impact of the proposed project on floral and faunal components of the project study area.
- To suggest / prepare action plan to mitigate likely impacts on the biodiversity of the project area through greenbelt development around project area to reduce/ mitigate likely impacts.

3.7.3 STUDY AREA

Core zone and Buffer zone

Core Zone: Project site considered as a core zone (1.29 Ha)

Buffer Zone: Surrounding area up to 10 km radius from the project boundary considered as a buffer zone for biodiversity sampling.

Delineation of the study area

The proposed M/s Shyampur Stone Mine project located in Mouza - Digtore, PO- Saltora, P.S. & Block – Saltora, District - Bankura, West Bengal State. As per the bio-geographical classification the project area comes under Biogeographic Province: Chhotanagpur Plateau (6B) as per the classification by the Wildlife Institute of India.

The terrain is almost plain without much undulation; except along the riverine of river Gandheshwari and Dhapalijor. The river Gandheshwari and river Dhapalijor are passing through the Southern part of the study area traversing through the zig-zag way along its path. In consideration of study area, the project site predominantly covered by agricultural fields (~79.70%) followed by open scrubs and wasteland (~9.46%), buildup area (~4.15%), forest area (~3.77%), waterbodies (~2.75%) and mines area (~0.18%).

Bankura district, located in western West Bengal, lies between the Chota Nagpur Plateau and the Bengal plains, giving it a diverse geographical and topographical character. The western region features undulating terrain with lateritic soil, rocky outcrops, and low hills such as Biharinath, while the eastern part consists of fertile alluvial plains ideal for agriculture. As per Champion & Seth (1968), the district's vegetation is classified as Tropical Dry Deciduous Forest, dominated by *Sal (Shorea robusta)* and associated species.

The region experiences a tropical climate with hot, dry summers from March to June, where temperatures often exceed 40°C; a monsoon season from June to September, bringing moderate to heavy rainfall averaging around 1,200 mm; and cool, dry winters from November to February, with temperatures dropping to approximately 10°C. The climate supports a mix of dry deciduous vegetation and seasonal agriculture, but erratic rainfall patterns can impact water availability and crop yields.

Ecological sensitivity/ habitats of the study area

There is No National Park, Wildlife Sanctuary, Biosphere Reserve, Tiger Reserve, within the 10 km radial distance within study area. The nearest wildlife sanctuary to the project site is Samantapara Wildlife Sanctuary, located approximately 69.90 km to the east. Additional sanctuaries within a 110 km radius of the site are also illustrated in **Figure 3.19**. Details of the sensitive ecological attributes is given in **Table 3.33**.

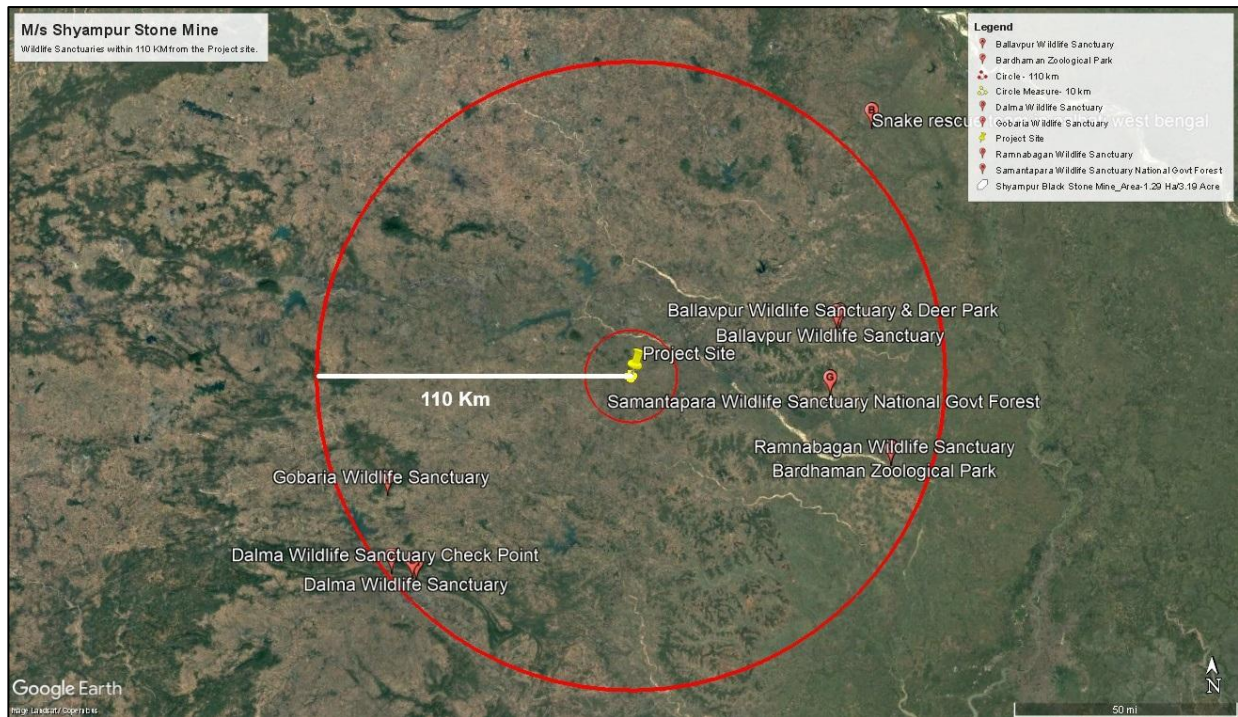


Figure 3.19: Wildlife Sanctuaries within 10 Km Radius from the project site

Table 3.33: Details of the forests and water bodies in buffer zone

Sl. No.	Name of Forest	Distance	Direction
1	Biharinath Parbat Protected Forest	7.0	N
2	Sar Pahari	5.67	N
3	Ledi Pahari	5.25	N
4	Pirargoriya PF	8.63	NW
5	Kashikunri PF	8.31	NW
6	Kendthol PF	8.60	W
Sl. No.	Name of River	Distance	Direction
1	Gandheshwari Nadi	9.16	SW
2	Dhapalijor Nadi	9.20	SE
3	Gaighata Jor	9.23	NE
4	Saltora Jhil	3.42	NW
5	Neyamatpur Korapara Dam	5.1	NE
6	Pedar Bandh	7.41	NE
7	Boro Bandh	9.48	SE

3.7.4 STUDY PERIOD

A field study for biodiversity inventory was carried out during July 2025, covering various villages like Got, Shyampur, Sebapur, Dhatia, Kanuri, Banshketia, Siarberiya, Aradang, Ledapalash, Kalibasa, Nirapahari, etc.

and habitats like Gandheshwari Nadi, Dhapalijor Nadi, Biharinath Parbat Protected Forest, Ledi Pahari, Sar Pahari, etc of the study area.

Timing of Species Observation:

- Birds and Butterfly: Observed during dawn.
- Nocturnal and Burrowing Animals: Observed after sunset.
- Animals: Observed in the morning and evening.
- Plants: Observed during the afternoon.

3.7.5 METHODOLOGY

Secondary/ Desktop Literature review

No site specific (project site) data is available of flora and fauna, however information available on websites of Botanical Survey of India (BSI), Zoological Survey of India (ZSI), eBird, published literature, reports and research papers have been consulted.

Primary/ Field Data collection

A) FLORA

During the study, the vegetation of the area was evaluated through systematic primary surveys and consultations with local communities to gather traditional ecological knowledge about the presence, distribution, and uses of various plant species. On-site visual survey method was used to observe and record plant species. GPS and mapping tools were used to identify and mark survey locations within the study area.

Quantitative Analysis:

Quantitative analysis uses the quadrat method. The study area was divided into quadrats (sampling units) to ensure representative sampling, with quadrat sizes ranging from 1m x 1m to 10m x 10m, based on the overall size of the study area and the density of vegetation. Sampling involved randomly placing quadrats within the study area to avoid bias, identifying and counting all plant species present within each quadrat, and recording data on species abundance, density, and frequency.

B) FAUNA

The presence of mammals was documented through both direct (sighting during survey) and indirect evidence (animal call, foot print, scat, etc). Transect lines were employed to search for indirect signs such as animal burrows, scat, pellets, feeding marks, and tracks. A colored pictorial guide was utilized during interviews with local residents (Burnham et al., 1980; Rodgers, 1991; Sale and Berkmuller, 1988; Daniel, 1992; Katel et al., 2022).

Several methods have been used to analyse the effects of human activities on aquatic environments. Visual inspection with binoculars for distant observations like Water birds was conducted. Auditory surveys listened for calls of species like frogs and toads. These searches involved turning over cover objects like logs and boulders (Welsh, 1987). Local communities provided traditional ecological knowledge through interviews and interactions, enriching the findings.

Standard survey methods were employed for the avifauna. The point count method was used for bird counting, complemented by opportunistic surveys to compile an avifaunal checklist. Identification of species was also made by their calls, particularly for those not directly observed or concealed in vegetation or the canopy (Sridharan, 1989; Bhupathy, 1991; Bibby et al., 1992; Hutto et al., 1986).

C) PLANKTONS

The methodology for surveying planktons involved selecting representative water bodies and using plankton nets with specific mesh sizes to collect both phytoplankton and zooplankton. Water samples were collected and preserved samples were examined under a microscope in the laboratory to identify plankton species. Among aquatic biota, phytoplankton and zooplankton have fast growth rates and therefore can provide meaningful and quantifiable indicators of ecological change in short timescales.

D) AGRICULTURE

The agricultural assessment of the area was conducted through a structured approach, combining primary surveys and consultations with local communities to document traditional ecological knowledge. A systematic on-site visual survey was carried out to observe and record agricultural practices, crop patterns, and land use. This method ensured comprehensive data collection, contributing to a well-rounded understanding of agricultural of the study area.

3.7.6 BASELINE STATUS OF BIODIVERSITY

FOREST VEGETATION

TERRESTRIAL FLORA

The following account of floral diversity, based on the field survey conducted for a short duration, is aimed only to give a general pattern of vegetation of this region as a baseline data validated by secondary data from various available literatures, Indian Biodiversity Information System (IBIS), eFloraofIndia, Flowers of India etc. was referred as secondary data for the validation of primary data collected during the baseline survey. In addition, relevant scientific research papers were consulted to strengthen the ecological context and ensure taxonomic accuracy.

(Sal), *Diospyros tomentosa* (Tamal) and *Tectona grandis* (Teak). Frequent shrubs observed are *Calotropis gigantea* (Akanda), *Nerium odorum* (Karabi), *Ziziphus jujuba* (Siyakul) and *Mallotus repandus* (Donkar). Herbaceous species include *Ocimum sanctum* (Ban Tulsi), *Curcuma caesia* (Nilkantha), *Senna occidentalis* (Kolkesundafu), *Tridax procumbens* (Toraful) and *Alternanthera sessilis* (Mati konduri).

Overall, 101 species were reported from buffer zone of the proposed site, out of which maximum species of trees (38) also herbs (38) followed by shrubs (18) and climbers (7). A detailed inventory of floral diversity is presented in **Annexure X A**

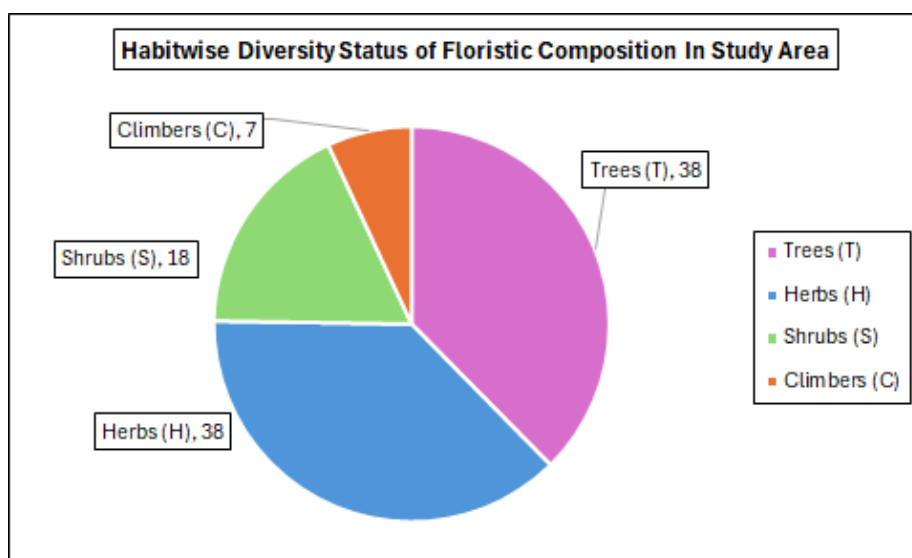


Figure 3.21: Habitatwise diversity status of floristic composition

AQUATIC FLORA

The study area features freshwater ecosystems such as ponds, rivers, canals, and nalas, primarily located in low-lying marshy zones and swamps. These water bodies support aquatic vegetation used for domestic purposes and serve as habitats for birds. A total of 10 aquatic plant species, commonly known as hydrophytes or aquatic macrophytes, were identified during the survey. These include the following species across different categories:

Table 3.34: Details of the species & its category

Sr. No.	Category	Species
1	Free floating hydrophytes	<i>Eichhornia crassipes</i> (Water Hyacinth), <i>Lemna minor</i> (Common Duckweed).
2	Suspended submersed hydrophytes	<i>Utricularia aurea</i> (Bladderwort), <i>Ceratophyllum demersum</i> (Hornwort).
3	Anchored submerged hydrophytes	<i>Hydrilla verticillata</i> (Hydrilla).
4	Anchored hydrophytes with floating shoots	<i>Potamogeton crispus</i> (Curled Pondweed), <i>Ipomea aquatica</i> (Water spinach), <i>Ludwigia aquarium</i>

5	Emergent amphibious hydrophytes	<i>Sagittaria sagittifolia</i> (Arrowhead)
6	Rooted hydrophytes with floating leaves	<i>Nilumbo nucifera</i>

NON-FOREST VEGETATION

The study in non-forest area follows Forest Survey of India 1992 guidelines. They are classified into eight categories for data analysis.

- a) **Farm forestry:** Trees along the farm bunds and in small patches up to 0.1 ha. in area,
- b) **Roadside plantation:** Trees planted along the road side,
- c) **Village woodlot:** Naturally growing or planted trees on community /private land,
- d) **Block plantation:** Compact plantations covering an area of more than 0.1 ha. and not falling in any of the above,
- e) **Pond side plantation:** Trees planted in and around water ponds,
- f) **Railway side plantation:** Trees planted along the railway lines,
- g) **Canal side plantation:** Trees planted along the canals,
- h) **Others:** Trees not falling in any of the above categories.

AGRICULTURAL DIVERSITY

The study area has a semi-humid climate with medium rainfall, supporting dry deciduous vegetation and seasonal agriculture. Agriculture, covering 79.70% of the land, relies heavily on monsoon rains, with tube wells used for irrigation during dry periods. The alluvial soil favors crops like paddy, wheat, maize, chana, pigeon pea and vegetables. Erratic rainfall affects water availability and crop yields. Detailed information on agricultural and horticultural crops in the study area is provided in **Annexure – X (B)**.

PLANKTONS DIVERSITY

Phytoplankton and zooplankton are integral part of any aquatic ecosystem. They not only serve as food for aquatic animals, but also play important role in maintaining the biological balance and quality of the aquatic ecosystem. The present work has been conducted to enlist phytoplankton and zooplankton genera occurring in waterbodies present in the study area. Details of the present study is provided in **Annexure – X (C)**.

A) *Phytoplankton*

Common phytoplankton species in study area includes *Oedogonium*, *Melosira*, *Anabaena*, *Diatoma*, *Euglena* and *Oscillatoria*. Monitoring of plankton composition and density helps in early detection of ecological stress, ensuring the sustainable use of the reservoir's resources for both human and environmental needs.

B) Zooplankton

Common zooplankton species in study area includes *Daphnia*, *Cyclops* and *Moina*. Their abundance and diversity are influenced by factors such as temperature, pH, dissolved oxygen, and nutrient levels in the water.

FAUNA DIVERSITY

A) Mammals

According to the primary and secondary data overall, 12 mammal species were reported from buffer zone of the proposed site presented in **Annexure X (D)**. *Semnopithecus entellus* (Common Langur), *Macaca mulatta* (Rhesus macaque), *Herpestes edwardsii* (Indian Gray Mongoose), *Felis chaus* (Jungle Cat), *Canis aureus* (Jackal), *Vulpes vulpes* (Fox) and *Hystrix indica* (Indian Porcupine), etc. are generally observed in different parts of the study area.

B) Herpetofauna (Reptiles and Amphibians)

Overall, 15 species were reported, list of Amphibians and Reptiles recorded in the study area of proposed project site is presented in **Annexure X (E)**.

According to primary and secondary data, some of the reptiles and amphibian species viz., Split keelback (*Atractus schistosus*), Indian Cobra (*Naja Naja*), Chequered keelback (*Fowlea piscator*), Common Indian Krait (*Bungarus caeruleus*), Common Rat Snake (*Ptyas mucosus*), Indian Toad (*Bufo parietalis*), Indian Burrowing Frog (*Sphaerotheca breviceps*), Indian Skipping Frog (*Euphlyctis cyanophlyctis*), Indian Bull Frog (*Hoplobatrachus tigerinus*) are generally observed in the study area.

C) Avifauna

Almost 53 species of birds can be found in this region. During the survey around Water bodies, Forest and agriculture field, different bird species spotted like Black Drongo (*Dicrurus macrocercus*), Scaly-breasted Munia (*Lonchura Punctulata*), Common Myna (*Acridotheres tristis*), Spotted Dove (*Spilopelia chinensis*), Oriental Magpie Robin (*Copsychus saularis*), Little cormorant (*Phalacrocorax niger*), and Pond heron (*Ardeola grayii*) etc. List of birds observed in the study area are presented in **Annexure X (C)**.

D) Fishes

The Gandheshwari Nadi, Dhapalijor Nadi and ponds serves as a vital ecosystem that sustains fish populations in the region. Among the most prevalent species are *Pampus chinensis* (Pomfret), *Labeo rohita* (Rohu), *Puntius chola* (Swamp Barbs), *Catla catla* (Catla), *Hypophthalmichthys molitrix* (Silver carp) and *Cirrhinus mrigala* (Mrigal Carp), which are of significant commercial importance

in the water body. List of 8 fish species observed in the study area are presented in **Annexure X (C)**.

E) Invertebrates (Arthropods)

The study area hosts a variety of insects, including ants such as army ants and fire ants, which play roles in soil aeration and nutrient cycling. Beetles like tiger beetles and longhorn beetles contribute to decomposition. Moths, including hawk moths and tiger moths, are active at night, while cicadas fill the air with their calls during the day. Grasshoppers are frequently seen in meadows, and termites thrive in decaying wood. Orb-weaving spiders and jumping spiders are also commonly spotted in the underbrush and trees.

The Chocolate pansy (*Junonia iphita*), Common Emigrant (*Catopsilia Pomona*), Blue pansy (*Junonia orithya*), Striped Tiger (*Danaus genutia*), Common Mormon (*Papilio polytes*), Lime Swallowtail (*Papilio demoleus*), Pea Blue (*Lampides boeticus*), Indian Skipper (*Spialia galba*) are a butterfly species often seen fluttering amidst the study area's flowering plants, adding a touch of color to the green landscape.

Overall, 40 insect's species were reported from buffer zone of the proposed site, out of which maximum species of butterflies (48) followed by other insects (12). List of Invertebrates recorded in the study area of proposed project site is presented in **Annexure X (C)**.

3.7.7 PHYTO-SOCIOLOGICAL STUDY

Phytosociology is the scientific study of plant communities, focusing on their composition, structure, distribution, and interactions within a particular habitat. It examines relationships among plant species, their abundance, and how they adapt to environmental factors like soil, climate, and other organisms. Key aspects of phytosociology include identifying species composition, assessing quantitative metrics such as density (number of individuals of a species per unit area), frequency (percentage of sample plots in which a species occurs), and dominance (total area occupied by a species, often measured by basal area). Additionally, it involves grouping plant communities into associations or types based on shared characteristics, calculating biodiversity indices (e.g., Shannon-Wiener Index) to measure ecological balance, and understanding the ecological roles plants play, such as providing habitat or resources for fauna.

An important component of phytosociology is the Importance Value Index (IVI), which quantifies the ecological significance of plant species in a community. The IVI is calculated using three parameters: relative density, the proportion of individuals of a species to the total number of individuals of all species; relative frequency, the proportion of sample plots where a species occurs compared to all species; and relative dominance, the proportion of basal area a species occupies relative to the total basal area. By integrating these analyses, ecologists can monitor ecosystems, assess changes, and develop strategies for conservation, ensuring the sustainability and health of plant communities.

The data collected from study area gives insights into the distribution and characteristics of trees, shrubs, and herbs based on their frequency, density, basal area, abundance, and IVI (Importance Value Index). The result of phyto-sociological studies shows that dominant tree species of study area are *Shorea robusta*, *Diospyros melanoxylon*, *Terminalia bellerica*, *Buchanania lanzan*, *Embllica officilanis*, *Madhuca indica*, *Terminalia tomentosa* etc.

3.7.8 RET (RARE, ENDANGERED AND THREATENED) STATUS AND ENDEMISM

The biodiversity aspects in the form of endemic status and conservation status have been enumerated for all the plant and animal species found in the area during ecological survey. The Red List of the IUCN has been screened to verify their conservation status. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity. For wild animal species, schedule of the Wildlife (Protection) Amendment Act 2022 has been screened. Wild Life (Protection) Act, 1972, as amended on 20th December 2022, is an Act to provide for the protection of wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto with a view to ensuring the ecological and environmental security of the country. The Wild life (Protection) Amendment Act, 2022 has come into force since 1st April 2023.

A. RET Flora of the Study Area

Among the recorded species, *Tectona grandis* (Teak) is listed as Endangered (EN). *Aegle marmelos* (Bel) and *Pterocarpus marsupium* (Piasal) fall under Near Threatened (NT) status, *Cleistanthus collinus* (Kargalli) and *Gossypium hirsutum* (Tula) are categories as Vulnerable (VU), as per the IUCN Red List 2025-1. Of the remaining species, 46 are categorized as Least Concern (LC), 3 as Data Deficient (DD), and 47 as Not Evaluated (NE), based on the latest IUCN assessment.

B. RET Fauna of the Study Area

- **As per IUCN RED (2025-1) List**

All the species are categorized as least concern as per IUCN 2025-1 list (<https://www.iucnredlist.org/>).

- **As per Indian Wildlife Protection Act, 1972 (as amended in 2022 and enforced in 2023)**

Some of the sighted faunas were given protection by the Indian Wild Life (Protection) Amendment Act, 2022 by including them in different Schedule. A detailed wildlife conservation and management plan is prepared for the conservation on Schedule-I species with budgetary provision and enclosed as **Annexure- X (E)**.

There is total 12 nos. of schedule-I species were found in study area. While rest of the faunal species are categories as Schedule-II species as per Wild Life (Protection) Amendment Act, 2022. The detailed inventory of faunal species provided in **Annexure X (C)**.

Table 3.35: Schedule-I Fauna within study area

SR.	Scientific Name	Common Name	As per IUCN RED List
1	<i>Felis chaus</i>	Jungle Cat	LC
2	<i>Canis aureus</i>	Jackal	LC
3	<i>Vulpes vulpes</i>	Fox	LC
4	<i>Herpestes edwardsii</i>	Indian Grey Mongoose	LC
5	<i>Hystrix indica</i>	Indian Porcupine	LC
6	<i>Naja naja</i>	Indian Cobra	LC
7	<i>Ptyas mucosa</i>	Common Rat Snake	LC
8	<i>Atretium schistosum</i>	Split keelback	LC
9	<i>Fowlea piscator</i>	Chequered keelback	LC
10	<i>Accipiter badius</i>	Shikra	LC
11	<i>Tyto alba</i>	Barn owl	LC
12	<i>Pericrocotus cinnamomeus</i>	Small Minivet	LC

C) Endemic Flora and Fauna of the Study Area

De Candolle (1855) first used the concept of “Endemic”, which is defined as an area of a taxonomic unit, especially species which has a restricted distribution or habitat, isolated from its surrounding region through geographical, ecological or temporal barriers. Among recorded plant species none were assigned the status of endemic plant of this region.

3.7.9 BIOLOGICAL DATA INTERPRETATION & CONCLUSION

The biological assessment of the proposed M/s Shyampur Stone Mine project reveals a clear ecological distinction between the core and buffer zones. The core zone, covering 1.29 hectares, is entirely barren and predominantly covered with sand, lacking any significant vegetation; however, localized waterlogging has been observed within the mining site. indicating low ecological sensitivity and limited biodiversity impact from mining activities. In contrast, the buffer zone within a 10 km radius is ecologically vibrant, featuring tropical dry deciduous forests, agricultural lands, and water bodies that support a diverse range of flora and fauna. A total of 101 plant species were recorded, including endangered and near-threatened species such as *Tectona grandis* and *Aegle marmelos*, as per the IUCN Red List 2025-1. The faunal diversity includes 12 mammal species, 15 herpetofauna, 53 bird species, and a healthy mix of aquatic organisms, with several

species falling under Schedule-I of the Wildlife Protection Amendment Act, 2022. Although no national parks or wildlife sanctuaries are located within the immediate vicinity, the presence of protected forests and water bodies calls for careful ecological monitoring and conservation planning. Overall, the site presents a viable opportunity for development with manageable environmental implications, provided that biodiversity protection is integrated into the project's long-term strategy.

3.8 SOCIO-ECONOMIC ENVIRONMENT

3.8.1 INTRODUCTION

The proposed Shyampur Stone Mine, located at Mouza Shyampur, Block Saltora, District Bankura, West Bengal, covers a lease area of 1.29 Ha and will be operated through a conventional opencast semi-mechanized method. Although categorized as B2, the mine forms a cluster with the adjoining M/s. Deep Black Stone Project (4.223 Ha), situated 147 m to the west, resulting in a combined cluster area of 5.513 Ha.

A systematic socio-economic study is carried out by collecting primary data from the surrounding villages and analysing secondary data from official Census Abstracts of 2011. Additionally, updated demographic trends are reviewed using geo-spatial analysis and projections for the year 2021 to understand population growth and settlement patterns.

Field surveys and stakeholder consultations are conducted to capture current livelihood conditions, infrastructure availability, and local expectations. The collected data is analysed to identify existing socio-economic gaps and to predict potential changes post project implementation.

This approach helps in interpreting how the proposed project will impact employment generation, income levels, infrastructure development, and overall quality of life in the project influence area. The analysis further ensures that any anticipated adverse impacts are addressed through proper planning and mitigation strategies.

3.8.2 OBJECTIVES OF THE STUDY

Socio-economic factors play a crucial role in evaluating such large-scale industrial projects, as they directly impact the local population. The present socio-economic study has been undertaken with the following objectives:

- **Employment Impact** Assessing direct and indirect job opportunities from quarrying, stone crushing, transport, and allied activities.
- **Livelihood Shifts** Understanding how local people may shift from agriculture to mining-related occupations.
- **Occupational Health & Safety** Evaluating risks related to dust, noise, blasting, and suggesting measures to protect workers and nearby residents.
- **Land Use & Agriculture Studying** how stone mining may affect agricultural productivity and land

availability in the region.

- **Water & Resource Use Assessing** impact on groundwater, surface water, and community access due to quarrying.
- **Local Infrastructure Pressure** Analysing effects of increased transportation (stone carrying trucks) on roads, traffic, and safety.
- **Community Perception Identifying local concerns** regarding blasting, dust pollution, and overall acceptability of the project.
- **Skill Development** Exploring opportunities for training local youth in mining operations, machinery handling, and allied trades.
- **Need base Assessment :**

Overall aim: To generate insights that guide inclusive planning, improve quality of life, and ensure the project contributes positively to local development.

3.8.3 METHODOLOGY ADOPTED FOR THE STUDY

The approach and methodology adopted for conducting socio-economic study is divided in Six parts as mentioned below:

3.8.4 WORK PLAN:

Based on the methodology presented above, a work plan for the socioeconomic study was developed. This work plan includes the following tasks and activities'

Desktop work:

The desktop works consist of preparation of study area map, literature study of the socio- economic status of the area, Identification of locations with the help of maps and land uses. The major impact zones are identified and locations are selected. After selection of number of locations to be surveyed, the same are marked on maps.

Develop baseline conditions:

This Sub Clause can be considered as a preparatory work which includes the following steps.

Primary Survey & Secondary Surveys:

A survey is conducted to know the baseline, midline and end line conditions of the study area and the people in study area. Primary survey consists of reconnaissance surveys, public consultations, Interviews, Focused group discussions etc. Both Qualitative and Quantitative data is collected using structured questionnaires for household level enumeration by qualified enumerators.

Secondary Survey consists of Quantitative and Qualitative data collection and researching based on secondary sources i.e., Census data, Govt. Portals, administrative offices and various departments.

The sociological aspects considered for the study are human settlements, demography and caste composition, infrastructures, education, health, drinking water, power supply, communication, transportation, literacy, sex ratio, people's willingness for industrial activity etc.

Data analysis and socioeconomic assessment:

Develop a sampling strategy to select participants or data sources, considering factors such as population demographics, geographical location, and study scope. Ensure the sample represents the target population for findings to be generalized. Compare and interpret data collected from primary and secondary surveys to understand the socio-economic landscape of the study area. Compile and analyse all socio-economic data to create a report with both qualitative and quantitative interpretations. The report includes suggestions, advice, and plans for allocating Corporate Environmental Responsibility (CER) funds. Assess probable significant impacts and identify mitigation measures to address them effectively. Analyse and present gathered information in various visual formats for easy interpretation and decision-making.

Data entry and verification

Dealing with large amount of data requires a systematic approach for data coding, tabulating and entry. It should be noted that, before data entry, the collected data should be verified. Such verification could be carried out for all collected data or for the random sample of the data. This depends usually on the quality of the procedures of data collection.

Data analysis

Analysis will involve standard statistical analysis of the data and information collected. The analysis should be based upon the criteria developed before.

Socioeconomic impacts assessment and identification of main areas of concern:

One of the main objectives of socioeconomic assessment is to identify various socioeconomic positive and negative impacts. The socioeconomic impacts assessment should highlights possible relationships between assessed socioeconomic variables and the environmental quality in the study site. Such an assessment could guide the following step of the work. Also, the areas of concern (issues and opportunities) of socioeconomic structure of the study site have to be identified.

Details of Demographic Details

The demographic data used in this report has been sourced from secondary data, including the Primary Census Abstracts for 2011, the District Census Handbook 2011, and GeoIQ (<https://geoiq.io/places/RI5uFqR8nj>)

In total, the study considers demographic data from 158 villages located within a 10 km radius of the project site. analysis of the socio-economic characteristics and population distribution at varying distances from the proposed project. This will help in understanding the potential socio-economic impacts on the local communities at different proximity levels to the project.

Table 3.36: Population Details in study area (Census 2011)

Zones	Total household	Total Population	Total Male	Total Female	Total 0-6 child	Total SC	Total ST	Population Literate	Population Illiterate
10 km	31680	152301	77739	74562	18931	48933	30775	85888	66413
In %	4.81		51.04	48.96	12.43	32.13	20.21	32.13	20.21

Source: Primary census abstract 2011, District Bankura & Purulia State West Bengal.

Table 3.37: Predicted population details in study area (2021)

Zones	Total Population	Total Male	Total Female
10 km	293755	155744	138011
In %		53.02	46.98

Source: GeoIQ website (<https://geoiq.io/places/RI5uFqR8nj>)

Note Details are presented in **Annexure XI A**

Population Growth Analysis

The population of the study area has shown a remarkable increase over the last decade. In 2011, the total population was recorded at 152,301, which rose significantly to 293,755 in 2020. This reflects an absolute increase of 141,454 persons, indicating that the population has almost doubled within a span of nine years. The decadal growth rate is approximately 92.86%, while the compound annual growth rate (CAGR) during 2011–2020 is estimated at 7.57% per annum. Such a high growth trend suggests both natural increase and the possibility of in-migration driven by livelihood opportunities in the region. From a socio-economic perspective, this demographic expansion is expected to create both opportunities and challenges. On one hand, the growing population provides a larger workforce and potential consumer base, which can support regional economic development. On the other hand, it also places considerable pressure on existing infrastructure, natural resources, and basic services such as housing, healthcare, education, water supply, and sanitation. This pattern of growth highlights the urgent need for sustainable planning and investment in social development measures to ensure that the rising population translates into inclusive and balanced growth rather than socio-economic stress..

Interpretation of Population Increase

The sharp increase in population from 152,301 in 2011 to 293,755 in 2020 reflects a substantial demographic transformation in the study area. The growth of nearly 93% within a decade indicates not only a high natural growth rate but also the possibility of migration inflows due to emerging livelihood opportunities. This demographic surge suggests that the area is becoming more economically active and socially dynamic, with a larger labor force available to support developmental activities. However, such a steep rise also implies mounting pressure on local infrastructure, public utilities, land, and natural resources. Housing, healthcare, sanitation, education, and transport facilities are likely to face increasing demand, necessitating significant improvements in planning and service delivery. While the population growth opens avenues for market expansion and workforce availability, it simultaneously raises concerns of unemployment, underemployment, and environmental stress if adequate socio-economic interventions are not undertaken. Therefore, the interpretation of this population increase points to the dual reality of growth opportunity for economic advancement on one hand and heightened socio-economic challenges on the other.

Socio-Economic Planning for Population Growth: A Strategic Approach

The population projections based on the growth between 2011 and 2021 highlight the need for comprehensive socio-economic planning to manage the increasing population. With projected growth, there will be greater demands on infrastructure, healthcare, education, and employment opportunities. To address these challenges, it is essential to focus on expanding transportation networks, enhancing healthcare services, and ensuring adequate housing. Additionally, investment in skill development programs and sustainable agricultural practices will be crucial to meet food security and employment needs. As population growth places increased pressure on resources, strategic planning in water management, sanitation, and environmental sustainability will be vital for maintaining a balanced and thriving community.

Details of sex ratio in the study area

Between 2011 and 2021, the sex ratio in the study area registered a modest improvement. The overall sex ratio increased from 910 females per 1,000 males in 2011 to 919 females per 1,000 males in 2021. This upward trend may be attributed to improved healthcare facilities, greater awareness of gender equality, and better access to nutrition and education for women and girls.

The sex ratio for the female child population (0–6 years) also showed a positive shift, rising from 929 in 2011 to 938 in 2021, reflecting enhanced survival rates of female children and gradual reduction in gender bias at birth and early childhood.

In addition, the sex ratio among Scheduled Castes (SC) improved from 919 in 2011 to 924 in 2021, while that of Scheduled Tribes (ST) increased from 961 in 2011 to 966 in 2021. These gradual but consistent improvements highlight progress in healthcare access, social awareness, and developmental initiatives, particularly benefiting marginalized groups **Figure 3.22**

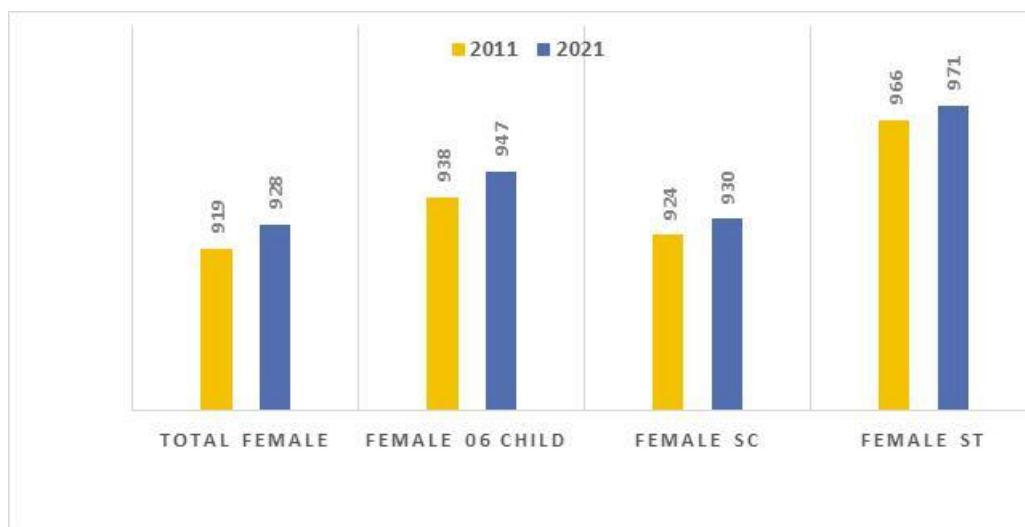


Figure 3.22: Sex Ratio in the study area

These projections highlight the need for focused interventions to address the challenges faced by females, particularly in Scheduled Castes and Scheduled Tribes. Given the steady population increase, it is essential for the study area to focus on improving education, healthcare, and welfare programs for women, especially in marginalized communities. Additionally, continued efforts are needed to ensure that the gender ratio remains balanced and that women in all groups have access to equal opportunities for socio-economic advancement.

Details of employment pattern

The majority of people in rural sector are farmers (cultivators) & agricultural labours which indicates dominant agricultural economy. A small segment of population is engaged as household industry worker. But in urban sector the existing scenario is completely reversed as most of the people there are engaged in non-agricultural activity especially in local hotels/restaurants and as drivers and some people also operates their vans/jeeps/cars as tourist vehicle.

Annual income helps in identifying families below poverty line. During the field surveys, income of a household through all possible sources was recorded. Agriculture and allied activities were reported to be the major source of income followed by non-farm wage labour, business, government service and private service. The other important sources of income include government pension and income from selling of fodder.

- The identification of the current economic characteristics of the study area is also an important part of defining the employment pattern of the study area.
- There are different types of employment pattern, that may be classified as: Persons who had worked for at least six months or 183 days are classified as main workers and persons classified as marginal workers who had participated in any economic or productive activity for less than six months or 183 days during the last one year. Non workers are those who had not worked any time in the year.
- Employment and main worker employment pattern in the study area is given in **Table 3.38 Details are presented in Annexure XI B**

Table 3.38: Employment & Main Employment Pattern in the study area

Zones	Breakup of Total Employment		Breakup of total Workers		Breakup of total Main Worker			
	Total Workers	Total Non Workers	Total Marginal Workers	Total main Workers	Cultivators	Agricultural workers	Household industry workers	Main other workers
2011	61204	91097	27016	34188	9784	7681	1058	15665
2021	67324	100207	29718	37607	10762	8449	1164	17232

Source: Primary census abstract 2011, District Bankura & Purulia State West Bengal.

The employment trends from 2011 to 2021 indicate an evolving labour market with a shift toward more diverse economic sectors. Agriculture continues to dominate but is seeing a move towards marginal employment. Meanwhile, the growing number of main workers suggests increasing opportunities in non-agricultural sectors. As the population grows and the economy diversifies, it becomes essential to focus on infrastructure development, education, and employment creation to ensure that all members of society can participate in the labour market and benefit from sustainable socio-economic growth. Regional development strategies should aim to balance agricultural sustainability with urban expansion to promote a thriving and inclusive economy.

Infrastructures facilities

Table 3.39: Infrastructure facility in the study area

Infrastructure facilities	Availability (In percentage) As per year 2011, Census District Bankura & Puruliya State West Bengal.
Educational Facilities	100
Drinking water	100
Road	70.51
Power	100

Communication	97.00
Transportation	85.35
Govt. PHC & SC	48.00
Bank & Society	33.33
Drainage	48.00
Recreation	93.02

3.8.5 SOCIO-ECONOMIC SURVEY METHODOLOGY :

The study was conducted into Three parts as under:

Part one: Secondary analysis of socio-economic census data involved referencing the 2011 census data to determine the status of amenities. This was corroborated with information from the respective village/town panchayat offices and compared with village amenities data from the 2011 district census handbooks for sample villages/towns within a 10 km radius.

Part two: The project site is within the premises and do not require any additional space for construction, the Social Impact Assessment (Primary Survey) was done by having detailed discussion with the Proponent and villagers in surrounding villages. The villages were selected by using Systematic Random Sampling procedure by population of the villages covering the project area with 10% of sample villages (14) villages with additional project site village) within 10 km radial distance from project site. and indicated in table 3.40.

Part Three: The Company decided to undertake development programs in phase manners for the villages in the study area. In first phase, the Management of the company decided to undertake surrounding villages in the radial distance 10 km from the project site. In order to know, the Company Management hired external Private. recognized professional to explore the needs and the demand of the community. The expert has used the format and demand sheets to collect the data through Focus Group Discussions and also using various Participatory Learning & Action (PLA) Techniques.

Table 3.40: List of surveyed villages

S.No	V illage Name	S.No	V illage Name
1	Shyampur	8	Patdoha
2	Bagulia	9	Sebapur
3	Dighit	10	Krishnapur

4	Shiarbedia	11	Ledapalash
5	Kanuri	12	Adhuri
6	Chaubata	13	Karkata
7	Dhatla	14	Netkamla

SALIENT OBSERVATION OF THE SURVEY / STUDY AREA.

Livelihoods

Agriculture (Cultivation, Farming)

Agriculture serves as the principal source of livelihood for a majority of the population residing in the study area, with field observations and stakeholder discussions indicating a strong dependence on traditional cultivation practices. The Study area benefits from a favourable monsoonal climate and access to irrigation, which supports the predominance of paddy cultivation not only in terms of land coverage but also in production volume. Most households are engaged in paddy farming, and yields of approximately 10 -12 quintals per acre were commonly reported during field interactions

Apart from paddy, farmers also cultivate wheat, maize, and gram (chana) during the Rabi season, while maize is commonly grown in the Kharif season. Along with these, vegetable farming such as tomatoes, brinjals, okra, cucumber, and pigeon pea plays an important role in meeting household consumption needs as well as in supplying the local market. This crop diversity not only strengthens nutritional security but also provides additional income opportunities, especially for small and marginal farmers.

Agricultural Production & Marketing

Agricultural production in the study area primarily supports subsistence needs, with a portion of the yield entering local markets. Survey findings highlight the continued reliance on traditional farming methods, though a gradual adoption of modern techniques is evident among progressive farmers aiming to enhance productivity.

Local mandis and cooperatives facilitate the sale of agricultural produce, but inadequate storage infrastructure often leads to post-harvest losses. Strengthening market linkages and introducing modern storage solutions could significantly benefit farmers, reduce wastage and improve income stability.

Labor Demand for Proposed site

The proposed mining project will generate direct as well as indirect employment opportunities, thereby supporting the socio-economic development of the surrounding study area. A conscious effort will be made to employ local people from nearby villages, depending on the availability of both skilled and unskilled manpower. This not only provides livelihood opportunities but also strengthens community participation in the project.

During the operational phase, approximately 20 persons will be engaged directly at the project site, including

statutory staff, skilled operators, semi-skilled helpers, unskilled labourers, and support personnel. This workforce is considered adequate to meet the production targets and machinery requirements as outlined in the mining plan, while also ensuring compliance with statutory provisions of mine safety regulations.

In addition to the direct employment, the project is expected to generate indirect livelihood opportunities for about 5 -10 persons through allied and ancillary activities such as transportation, equipment maintenance, petty repair shops, garages, local eateries, and other service-based enterprises. Such secondary employment avenues hold special significance for marginal households, providing supplementary income and reducing dependence solely on agricultural work.

The distribution of manpower across categories ensures inclusivity of different skill levels: statutory positions such as Mine Manager, Foreman, and Blaster ensure technical compliance; skilled operators including excavator, dumper, and driller manage core operations; semi-skilled and unskilled labourers support daily activities, while clerical and support staff maintain smooth administrative functioning.

Overall, the project will strengthen local economic resilience by enhancing income levels, improving employment security, and generating new livelihood linkages in the surrounding area.

Economic Benefits trade & Commerce

At present, the local economy of the region is largely dependent on agriculture and small-scale trading activities. Most households earn their livelihood through farming and sale of agricultural produce in nearby markets. However, due to limited industrial development, opportunities for large-scale trade, organized commerce, and industrial linkages remain restricted. Local shops and vendors cater only to basic daily needs, and the absence of major industries has kept the flow of goods and services relatively small in volume and value.

With the establishment of the proposed project, the economic base of the region is expected to undergo significant transformation. The project will attract investment, generate employment opportunities, and create a demand for various goods and services. This, in turn, will promote ancillary businesses such as transport, supply chains, repair workshops, food stalls, and small-scale industries, strengthening the local trade network. The circulation of money within the region will increase, providing better income to shopkeepers, traders, and service providers. In addition, large-scale procurement of raw materials and machinery during the construction and operational phases will link the area with wider commercial markets, improving trade flows. Over time, the project is likely to enhance the region's integration with regional and national economic systems, making trade and commerce more vibrant and sustainable.

Health Care

Medical facilities are available in the surrounding villages through Primary Health Centres (PHCs) and sub-centres. Each village has an appointed health worker by the Government to ensure basic medical care and maternal-child health services. For advanced treatment, people depend on the nearest township, Saltora, where hospitals and

private clinics are accessible. However, villagers expressed the need for improved infrastructure, availability of specialist doctors, and better ambulance services to ensure timely healthcare, especially in emergency situations.

Social Well-being

The social well-being of the community is closely tied to economic stability and access to basic services. The project has the potential to enhance social well-being by creating jobs, improving infrastructure, and providing better educational and healthcare facilities. However, it is essential to manage the social changes carefully to ensure that the benefits are equitably distributed and that any adverse impacts are mitigated.

Education

In the study area, access to basic education is available, with primary and middle schools located within or near the villages. However, the overall interest in education among the local youth appears to be mixed while some are well-educated and aware of future career opportunities, others show limited interest in pursuing studies due to various socio-economic and infrastructural challenges. Although foundational education is accessible, the condition of existing schools reveals gaps in essential facilities. Many schools lack a reliable water supply, proper sanitation (especially toilets for girls), functional computers, a sufficient number of textbooks, and other learning aids.. Moreover, while the town of located s Saltora from the project site offers primary and secondary schools education, regular transportation remains a barrier for many students. These constraints not only affect the quality of education but also limit the overall motivation of children and youth to continue their studies. Enhancing the quality of educational infrastructure and promoting awareness about the importance of education would be key to fostering long-term socio-economic development in the study area.

Rural Water Supply

In the rural areas of the study area, drinking water facilities are primarily dependent on hand pumps, open wells, and tube wells. In certain villages, water is also supplied through tankers to meet the basic needs of the community. However, during the summer season, acute scarcity of water is observed due to the depletion of groundwater levels and drying up of surface water sources. This situation often compels villagers, particularly women, to travel longer distances to fetch water for domestic use.

The irregular and limited availability of water during peak summer not only affects household consumption but also impacts sanitation, livestock rearing, and small-scale agricultural activities. Strengthening rural water supply systems through rainwater harvesting, groundwater recharge measures, and provision of piped water schemes can significantly reduce the seasonal stress faced by the villagers.

Sanitation

Sanitation facilities in the study area are inadequate and require substantial improvement. Open drains were observed in several locations, leading to unhygienic conditions, foul odours, and an increased risk of waterborne diseases. The condition of the drainage system was particularly poor in some parts of the village, causing

frequent stagnation of wastewater during the monsoon season. Although garbage bins were provided, their placement and maintenance were inconsistent, reducing their effectiveness. To address these issues, the project should incorporate comprehensive sanitation measures, including the construction of household and community toilets, proper solid waste management systems, and well-planned drainage infrastructure. Such improvements are essential for reducing disease incidence, promoting public hygiene, and enhancing the overall living standards in the area.

Road Connectivity

The road conditions in the study area are not satisfactory. Internal village roads are poorly maintained, with uneven surfaces, potholes, and lack of proper drainage, which makes commuting difficult especially during the rainy season. The approach roads to the site are narrow and dusty, causing inconvenience for both residents and transport vehicles. Improvement in road infrastructure through the proposed project, such as proper surfacing, widening of roads, and provision of drainage, could enhance accessibility, reduce dust pollution, and support safe and efficient transportation for both the community and project operations.

Electricity

The electricity supply in the study area is generally functional; however, occasional power cuts create difficulties in daily rural life. While most households are connected to the grid, there are no streetlights along the village roads, making it difficult and unsafe for residents to move around at night. If the proposed project contributes to strengthening the power infrastructure by ensuring a reliable power supply, installing new transmission lines, and providing street lighting it would not only support the project's operations but also significantly improve the quality of life for the local population.

Banking Facility

Access to banking facilities is limited in the study area, with only a few branches of nationalized banks and cooperative societies. The project can stimulate financial inclusion by encouraging the establishment of more banking services. This will facilitate economic transactions, savings, and access to credit for local businesses and individuals.

Transportation

During the socio-economic survey, it was observed that transportation facilities in the surrounding villages are limited. Public transport services are irregular and villagers are largely dependent on private vehicles such as two-wheelers, tractors, and auto-rickshaws for commuting. In some villages, shared jeeps and auto services are available but their frequency is low, causing difficulties, especially for school-going children, women, and elderly people. The condition of internal roads connecting hamlets to main roads is poor, with uneven surfaces and lack of proper maintenance, making travel inconvenient during monsoon. Due to limited public transport and poor road connectivity, villagers face challenges in accessing healthcare, education, and market facilities

located at distant places. Improved road infrastructure and reliable transport services are essential to strengthen connectivity and enhance socio-economic development of the area.

Awareness and opinion of the respondents about the project

During the socio-economic survey, it was observed that a significant number of respondents were aware of the upcoming project. Many villagers had prior knowledge about the proposed mining activity through local discussions, Gram Panchayat meetings, and word of mouth. The general opinion about the project was mixed while some residents welcomed it in the hope of improved employment opportunities and development in the area, others expressed concerns regarding environmental pollution, water availability, and its possible impact on agriculture and health.

Curiosity and Interest:

Despite limited awareness, local stakeholders, including community leaders and residents, exhibited a genuine interest in understanding the project's broader implications. Many expressed curiosity about potential benefits such as job creation, infrastructure development, and enhanced economic opportunities. This indicates a positive attitude and a willingness to engage constructively with the project once they receive detailed and transparent information.

Concerns and Misconceptions: Many respondents were aware of the upcoming project and shared their concerns regarding its potential impact on the environment. A prominent worry was related to possible deterioration in air and noise water quality, which they believed could affect agricultural output and human health. Some community members expressed apprehension that the project might lead to increased pollution levels, affecting soil fertility, crop production, and causing health problems such as respiratory and skin issues. There were also doubts about whether the promised benefits such as employment generation and infrastructure development would be equitably distributed. While several people viewed the project as a potential opportunity for development, others expressed concern about its implications for the environment and their traditional way of life.

Suggestions and Expectations: During field interactions with the local community, residents highlighted key concerns related to education, healthcare, employment, water availability, and recreational spaces. These insights have been further analysed to develop actionable recommendations, ensuring that the project addresses both immediate needs and long-term socio-economic development goals.

Field consultations with local communities revealed key challenges and expectations in the project area. Education remains a pressing concern, with shortage of teachers, poor infrastructure, and lack of financial support discouraging higher studies. To address this, the project should support scholarships, awareness

drives, and basic infrastructure like toilets and safe drinking water in schools. Healthcare access is also limited, forcing villagers to depend on urban centers. Establishing mobile health camps, strengthening Primary Health Centers, and ensuring regular availability of doctors and medicines can significantly improve community well-being. Employment is a major expectation, especially among youth. Skill development programs tailored to mining and allied activities, along with priority recruitment of local residents, will enhance livelihood opportunities. Collaboration with vocational institutes can further improve employability. Water scarcity during summer months remains a critical issue. Village-level purification units, and promotion of rainwater harvesting can ensure long-term water security.

Finally, transparent communication and grievance redressal mechanisms are essential to build trust. A responsive system for addressing local concerns will ensure accountability and strengthen community relations throughout the project lifecycle.

3.8.6 CONCLUSION

The socio-economic assessment of the proposed Shyampur Stone Mine project highlights a dual reality in the study area: persistent developmental gaps alongside significant potential for growth. The villages currently face challenges such as inadequate educational and healthcare facilities, limited employment opportunities, and insufficient infrastructure for water supply, sanitation, and road connectivity. At the same time, agriculture, which sustains many households, is constrained by outdated techniques and lack of proper market access.

The implementation of the project is expected to generate both direct and indirect employment, particularly benefiting unskilled and semi-skilled workers from the surrounding villages. Enhanced livelihood opportunities, coupled with improvements in infrastructure and social services, can help bridge existing gaps in education, healthcare, and basic amenities. The project also holds the potential to stimulate allied economic activities such as transportation, small-scale enterprises, and services, thereby strengthening local trade and commerce.

However, concerns raised by the local population regarding environmental impacts, water scarcity, and health risks must be addressed through effective mitigation measures, community engagement, and transparent grievance redressal mechanisms. Additionally, long-term planning in areas like skill development, migration management, and sustainable agricultural practices will be essential to ensure equitable distribution of project benefits.

In conclusion, while the Shyampur Stone Mine project can act as a catalyst for socio-economic development in the region, its success will depend on balancing economic growth with environmental sustainability and social equity. Proactive measures, guided by the EIA will be crucial in ensuring that the project contributes to an improved quality of life and sustainable development in the study area.

CHAPTER-4

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 IDENTIFICATION OF IMPACTS

This chapter provides overview of the potential impacts on various environmental components due to the proposed quarry area of 1.29 Ha is located within the Near Village Shyampur, PO-Saltora, PS- Saltora, District- Bankura, West Bengal.

Identification of impacts and mitigation measures of the same in EIA study helps in quantification and evaluation of impacts. During baseline study several impacts can be identified but it is necessary to identify the critical impacts both positive and negative on various components of the environment that are likely due to the proposed stone quarry mining projects.

The environmental impacts can be categorized as either primary or secondary. Primary impacts are the ones that are caused directly due to the project activity on environmental attributes, whereas secondary impacts are indirectly induced. The construction and operation phase of the project activity comprises various activities, each of which may have either positive or negative impact on some or other environmental attributes. The proposed project activities would impart impact on the environment in two distinct phases:

- During construction phase - Temporary or short -term impact
- During operation phase - May have long term impact

The construction and operation phase of the project comprises of various activities each of which will have an impact on some or other environmental parameters. Various impacts during the construction and operation phase on the environmental parameters have been studied to estimate the impact on environment.

4.2 POLLUTION POTENTIAL

Table 4.1: Pollution Potential

Particulars	Assessment	Remarks
Climatic condition	<ul style="list-style-type: none"> • To study the changes if any in present climatic condition. 	To explore Mining related Best Available Technique (BAT).
Air	<ul style="list-style-type: none"> • Changes in ambient levels and ground level concentrations due to total emissions from line and area sources. • Effects on soils, materials, vegetation, and human health, if any. 	Through ISCST-3 Air Quality Dispersion Modeling studies & Vehicular Traffic Load Study.
Noise	<ul style="list-style-type: none"> • Changes in ambient levels due to noise generated from equipment and movement of vehicle. • Effect on fauna and human health. 	Mathematical Noise Modeling Studies.
Water	<ul style="list-style-type: none"> • Availability to competing users, • Changes in quality, 	Avoid surface and ground water contamination.

Particulars	Assessment	Remarks
	<ul style="list-style-type: none"> Sediment transport. 	
Land	<ul style="list-style-type: none"> Changes in land use and drainage pattern. Changes in land quality including effects of waste disposal. Changes in riverbank and their stability. Land subsidence. 	Waste Minimization and scientific disposal. Land subsidence studies needs to be conducted.
Biological	<ul style="list-style-type: none"> Study of Possible impact on surrounding vegetation, stress on habitat and Impact on REET species, breeding and nesting grounds, if any. 	Prediction of possible impacts.
Socio-Economic	<ul style="list-style-type: none"> Impact on the local community including demographic changes. Impact on economic status. Impact on human health. Impact of increased traffic. 	Impacts studies through need based assessment.

Various possible environmental impacts are identified due to the mining activities.

4.3 IMPACT AND MITIGATION MEASURES DURING CONSTRUCTION PHASE

Since the proposed project is Stone quarry mining activity, no major construction activities are proposed. Therefore, there will not be any environmental impact in terms of construction phase.

4.4 IMPACT AND MITIGATION MEASURES DURING OPERATION PHASE

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

4.4.1 LAND ENVIRONMENT

➤ Impact on Land Environment

• Change in land-use

At present whatsoever mining activity carried out in the proposed lease area is not so big. The socio-economic status of the surrounding villages is rural with dominant agriculture economy. The surrounding area is thinly populated. There will be no adverse on the land use pattern of the buffer zone. However, the land use pattern of the entire cluster area will significantly change due to mining activity. There will be formation of water bodies during the conceptual period of mining due to excavation of the Stone quarry.

Management, Storage and preserved of the Top Soil

Topsoil will be generated from lease area of proposed Stone Quarry mining site within the Near Village Shyampur, PO-Saltora, PS- Saltora, District- Bankura, West Bengal.

- a. The generated topsoil will be utilized for green belt development.
- b. Dumps of top soil will be designed in such a way that its slop stability is maintained and out flow of dumped material is restricted.

- c. Soil will be stored in such a manner that the bacterial organisms should not die, the best way is to grow grasses/ vegetation on the top soil dump.
- d. Such separately preserved topsoil will be used for land utilization and for plantation.

➤ **Mitigation Measures for Land Environment**

The mitigation measure of the land environment includes:

- Before the mining activity the top soil/or waste rock and non-saleable mineral will be scrapped and stored in the lease area and will be utilized for plantation purpose. Balance top soil if any preserved separately will be used to spread over partially reclaimed land.
- At the end of conceptual period the excavated quarry will converted into water reservoir to supply water for local use like irrigation and pisciculture.
- Due to manual mining operation emission from the Stone quarry mines are very less, there will be no impact on the surrounding soil quality and cropping pattern of the area.
- The propose project falls under the seismic zone –III. Since this project will not have physical infrastructure to be constructed, no impact of seismicity is envisaged in this project. Further, this project will not change/alter the seismic behaviour of the area.

4.4.2 AIR ENVIRONMENT

➤ **Impact on Air Environment**

The proposed stone quarry mining project having lease area 1.29 Ha. and is under the Near Village Shyampur, PO-Saltora, PS- Saltora, District- Bankura, West Bengal. The maximum allowable quantity for extraction will be 1,19,874.29 Cu.M. for five years (23,978.85 Cu.M. per year) and the method adopted is open cast mining. The mining of stone will be carried out by highly mechanized open-cast mining system. Emphasis is given to scientific mine planning by adopting adequate pollution control techniques while mining.

Air pollution sources in the operation of mine

The main sources of air pollution with regard to the proposed mining project for the purpose of estimation of increase in air pollutants are identified due to –

- (i) Loading/unloading of stones.
- (ii) Transportation of stones by trucks on the Haul roads from mining benches.
- (iii) D.G. set operations power supply.
- (iv) Combined impacts of PM10, PM2.5, SO₂, NO_x & CO are considered due to mining activities occurred simultaneously on various sampling locations.

Water tankers with spraying arrangement are used for regular water sprinkling on the haul roads to ensure effective dust suppression. The dumpers are well maintained so that exhaust smoke does not contribute abnormal values of noxious gases and un-burnt hydrocarbons.

In order to assess the impact due stone production of 23,978.85 Cu.M per year (maximum allowable quantity for extraction, working days 300) on air environment, due to various mining activities (loading/unloading, Transportation of stones by trucks on the Haul roads, D.G. set operation), impact was predicted over a radial distance of 10,000 m, ground level concentration (GLC) calculation /Contribution of GLC carried out.

Anticipated Impacts on Air Environment

Stone deposit will be carried out by opencast manual mining method, where Particulate Matter (PM₁₀ & PM_{2.5}) will be the main pollutants generated in mining activities. The emissions of Sulphur dioxide (SO₂), Oxides of nitrogen (NO_x) and Carbon Monoxide (CO) contributed by diesel operated equipment and vehicles movement are considered marginal as properly maintained vehicles with PUC certificate will be operated on the haul road of mining areas. Prediction of impacts on air environment is carried out taking into consideration the proposed production and net increase in all air pollutant's emission. This air quality prediction has been carried out at all AAQMS (Ambient Air Quality Monitoring Stations) located within 10 km radius of the study area.

- i. Loading, unloading and stone crushing in mining area considered as area sources.
- ii. Transportation from mining benches by trucks moving on the haul road at the outer boundary of mining area which are covered with tarpaulin considered by line sources.
- iii. DG set operation as power supply

Water tankers with spraying arrangement of sprinklers with high efficiency (>50%) will be used Stone deposit will be carried out by opencast manual mining method, where Particulate Matter (PM₁₀ & PM_{2.5}) will be the main pollutants generated in mining activities. The emissions of Sulphur dioxide (SO₂), Oxides of nitrogen (NO_x) and Carbon Monoxide (CO) contributed by diesel operated equipment and vehicles movement are considered marginal as properly maintained vehicles with PUC certificate will be operated on the haul road of mining areas. Prediction of impacts on air environment is carried out taking into consideration the proposed production and net increase in all air pollutant's emission.

Water tankers with spraying arrangement of sprinklers with high efficiency (>50%) will be used for regular water sprinkling on the haul roads to ensure effective dust suppression. Mining activities will be

carried out during non-monsoon months in day time only. It is in practice that mining will be carried out as per market demand and stone will not be piled up at the project site.

Emission of Pollutant from Mining area

The emission rates for the different sources in the mining area were calculated primarily based on emission factor equation given in latest USEPA's AP-42 guidelines. Further the emission estimation equations given in "TSP Emission Factors for different mining activities for Air Quality Impact Prediction as collated from different Sources" by S P Banerjee and CMRI were also considered since these are based on the study conducted in India for the estimation of emission rate of respirable suspended particulate matter from various open cast mining activities. In addition, as the proposed mine development will be undertaken in environmentally friendly manner as per the stipulated guidelines, activity specific control factors are considered in calculation the emission rates.

Emission Inventory

An emission inventory study was conducted to evaluate the amount of different pollutants contributed by each mining activity. The study was carried out for all the mining activities and air monitoring locations e.g. transport on haul road, loading-unloading, and DG set operation etc.

Emission Inventory of Particulate Matter (PM₁₀ & PM_{2.5}), SO₂, NO_x and CO

Due to the proposed stone mining activity, the major emissions involved include dust emissions. Some amount of SO₂, NO_x and CO will be generated due to plying of mine machinery like compressors, Jack Hammer, etc. and transportation vehicles. However, considering the magnitude of mining operation and thereby production, the gaseous emissions will be insignificant and will be diluted and dispersed in the immediate vicinity. The built up of gaseous pollutant in the atmosphere is not envisaged.

Air pollution sources in the project are identified from following mining activities

Dust generation is major impact on the ambient air quality of the area. The dust will be dispersed in the nearby areas of the dust generated due to mining operations, particulate matter less than 10 micron size are of more significance due to their possibility of entering in the human body through respiration. The incremental concentration of PM₁₀, PM_{2.5}, SO₂, NO_x and CO in the nearby areas is estimated using computer modeling using ISCST-3 model and is presented in following paragraphs.

No other pollutant emissions are envisaged due to the proposed stone mining operations.

Calculated Emission Rates

Loading / Unloading of Material

$$E = k \times 0.0016 (u/2.20)^{1.3} \times (2/M)^{1.4} \text{ kg/ton} \quad \text{--- AP42 (Nov 2006)}$$

Where,

E = Emission Factor, kg/ton

k = Particle size multiplier, 0.74 for PM10

M = Moisture Content, %

u = Mean wind speed, m/s

Transportation

Unpaved in coal mines

$$E = 2.82 (s/12)^{0.8} (W/3)^{0.5} (M/0.2)^{-0.4} \text{ kg/VKT} \quad \text{AP 42 (1998) S13.2.2, EET p12}$$

Where s = silt content, %

W = vehicle gross weight, t

M = moisture content in %

VKT = Vehicle kilometres travelled

Table 4.2: Summary of Calculated Emissions Rate

Sl. No.	Activity	Emission Rate (gm/sec)
1.	Due to Loading/Unloading	PM ₁₀ = 72.6
		PM _{2.5} =33.9
2.	Due to Haul Road	PM ₁₀ = 72.6
		PM _{2.5} =33.9
3.	DG Set – 87.2 kVA	PM ₁₀ = 72.6
		PM _{2.5} = 33.9
		SO ₂ =13.0
		CO = BLO(LOQ-0.5)
		NO _x = 21.9

Meteorological Data

The meteorology of the project area plays very important role in dispersion of pollutants and buildup of pollution within the atmosphere. In the present study, **pre monsoon (2025)** Meteorological data has been taken to find the dispersion of pollutant concentration. The mixing height, which is an important parameter to express the dispersive potential of atmosphere, has been taken from the atlas of hourly mixing height and assimilative capacity of atmosphere in India (S.D. Attri et al., 2008). Predominant wind direction for pre monsoon season (Mar to May 2025) is SE and ESE. Wind rose diagram of winter season is used for modelling is shown given below in **Figure 4.1**.

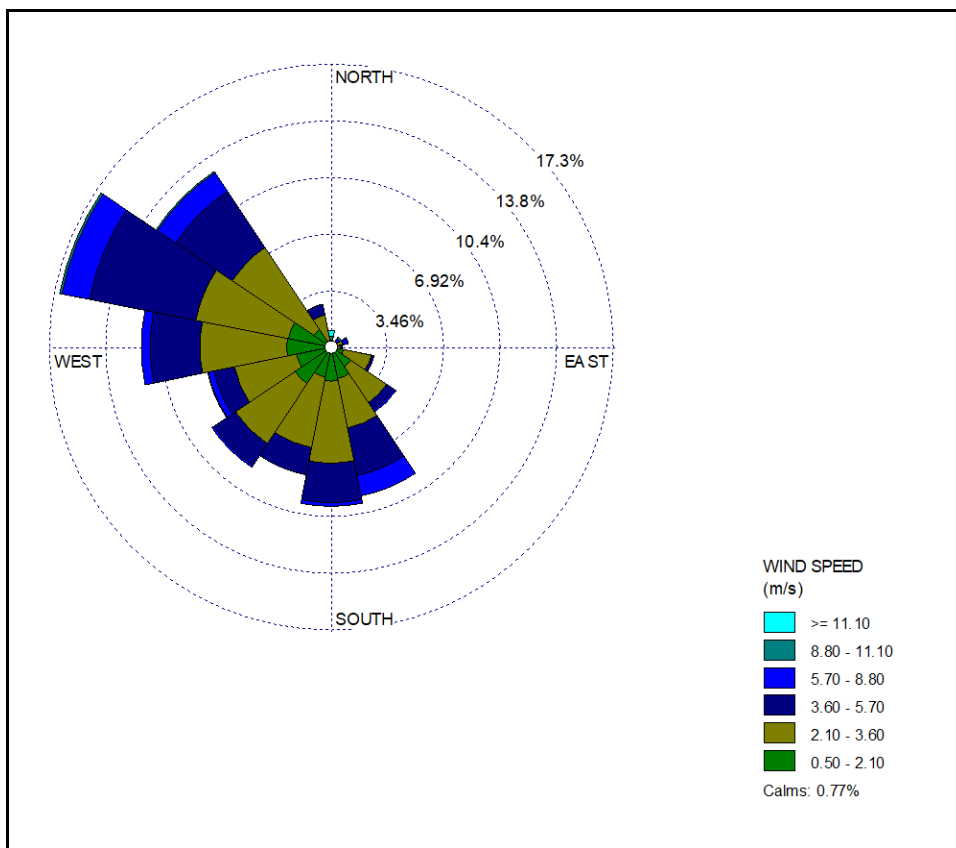


Figure 4.1: Wind Rose Diagram for 1st March 2025 to 31st May 2025

Base-line data:

Eight (8) ambient air quality sampling locations are finalized to study the baseline status around the proposed site and impacts have been predicted at various locations. The predicted incremental concentrations of PM₁₀, PM_{2.5}, SO₂, NO₂ and CO are superimposed on maximum monitored background concentrations of ambient air quality. Baseline concentrations are observed to be maximum at the following ambient air quality monitoring locations as shown in **Table 4.3**.

Table 4.3: Maximum baseline Concentrations (µg/m³)

Code	Location	Maximum Concentrations(µg/m ³)				
		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO
AAQ1	Project Site	72.6	33.9	13.0	21.9	BLQ(LO Q-0.5)
AAQ 2	Gote Mauchuria	63.1	21.9	11.9	26.1	BLQ(LO Q-0.5)
AAQ 3	Ledapalash	57.6	24.9	13.5	20.9	BLQ(LO Q-0.5)

Code	Location	Maximum Concentrations($\mu\text{g}/\text{m}^3$)				
		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO
AAQ 4	Saltora	62.8	19.8	9.9	17.1	BLQ(LO Q-0.5)
AAQ 5	Dhatala	55.6	21.6	12.4	26.3	BLQ(LO Q-0.5)
AAQ 6	Kanuri	63.4	25.3	14.6	27.1	BLQ(LO Q-0.5)
AAQ 7	Shyampur	59.3	30.4	10.9	23.1	BLQ(LO Q-0.5)
AAQ 8	Dightor	60.3	26.9	16.1	30.1	BLQ(LO Q-0.5)
Limit (Industrial, Residential, Rural and other area) ($\mu\text{g}/\text{m}^3$)		100 (24hr)	60 (24hr)	80 (24hr)	80 (24hr)	2 (8hrs)

Note: The total projected concentrations considering maximum monitored 24 hourly baseline monitoring of all pollutants are found to be within the prescribed standards set by CPCB/MoEF&CC as shown in above table.

Calculated/ contributed ground level concentrations due to proposed mine:

Calculated concentrations due to various mining activities in the present case, a model simulation was carried out for study period for proposed mine of ground level concentration (GLC). The maximum rise of ground level concentration (GLC) for stone query, particulate matter (generated from the different activities in the mining areas is carried out. The emissions of Sulphur dioxide (SO₂), Oxides of nitrogen (NO_x) and Carbon Monoxide (CO) contributed by diesel operated equipment and vehicles movement.

The maximum 24-hourly calculated concentrations for mining activity like for loading/unloading, transportation on haul road and D.G. set operations for PM_{2.5}, PM₁₀, SO₂, NO₂ and CO, was found to be 0.7 $\mu\text{g}/\text{m}^3$, 1.2 $\mu\text{g}/\text{m}^3$, 0.00095 $\mu\text{g}/\text{m}^3$, 0.65 $\mu\text{g}/\text{m}^3$, 0.54 $\mu\text{g}/\text{m}^3$ in the ENE directions respectively and depicted in **Table 4.3**.

It was observed that GLC's of PM₁₀, PM_{2.5}, SO₂, NO₂ and CO are localized due to average wind speed (3.22 m/s) and 0.77% calm conditions. It was observed that maximum GLC's of PM₁₀, PM_{2.5}, SO₂, NO₂ and CO due to impact of all pollutants are found to be below the stipulated standards of CPCB/ MoEF&CC as shown in **Table 4.4**.

Table 4.4: Max. Baseline, Incremental and Projected GLCs of PM₁₀, PM_{2.5}, SO₂, NO₂ & CO Conc. Due to loading-unloading, Transportation and DG set

Item	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	CO (µg/m ³)
Maximum baseline conc. in the study area	33.8	75.9	11.1	21.4	876
Maximum predicted incremental concentration due to proposed stone query	0.7	1.2	0.00095	0.65	0.54
Total Projected GLC	34.5	77.1	11.10095	22.05	876.54
National Ambient Air Quality Standards	60	100	80	80	2

The isopleths for incremental GLC's of PM₁₀, PM_{2.5}, SO₂, NO₂ and CO are superimposed on 10 km radius of the study area are shown in following **Figure 4.2, 4.3, 4.4, 4.5 & 4.6.**

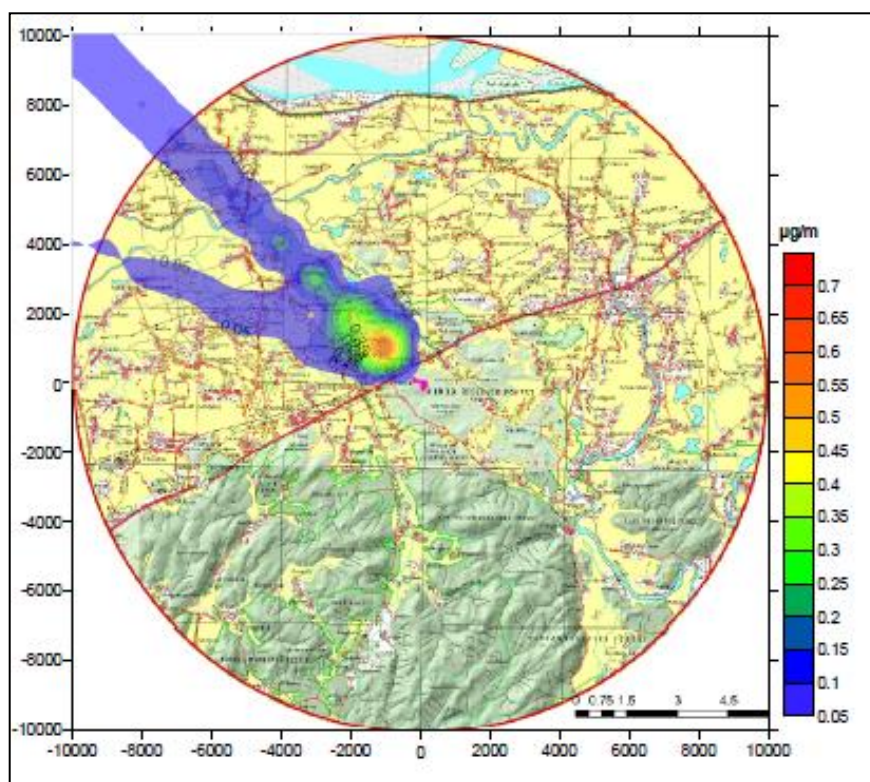


Figure 4.2: Isopleths of GLC's for PM_{2.5} (µg/m³) are superimposed on max. monitored PM_{2.5} concentration within 10km radius of the study area

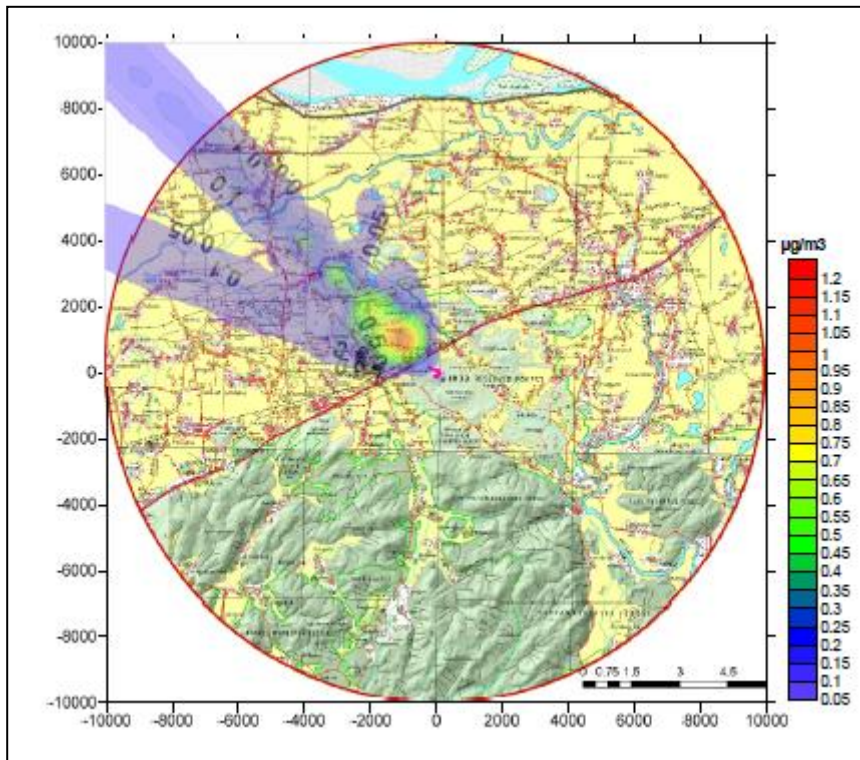


Figure 4.3: Isopleths of GLC's for PM₁₀ (µg/m³) are superimposed on max. monitored PM₁₀ concentration within 10km radius of the study area

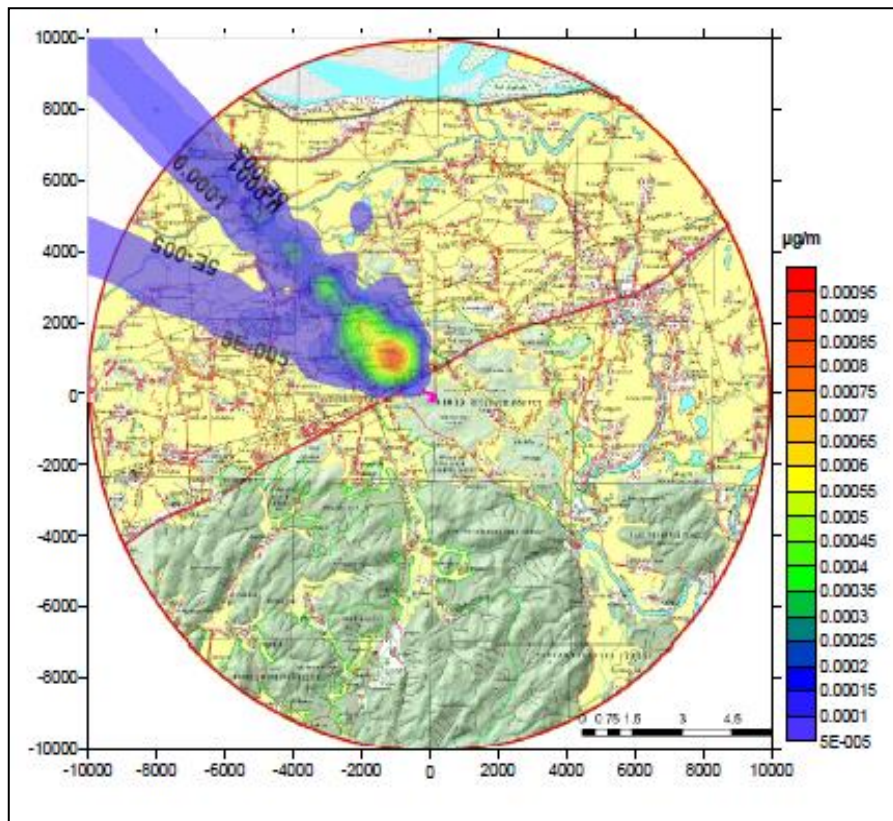


Figure 4.4: Isopleths of GLC's for SO₂ (µg/m³) are superimposed on max. monitored SO₂ concentration within 10km radius of the study area

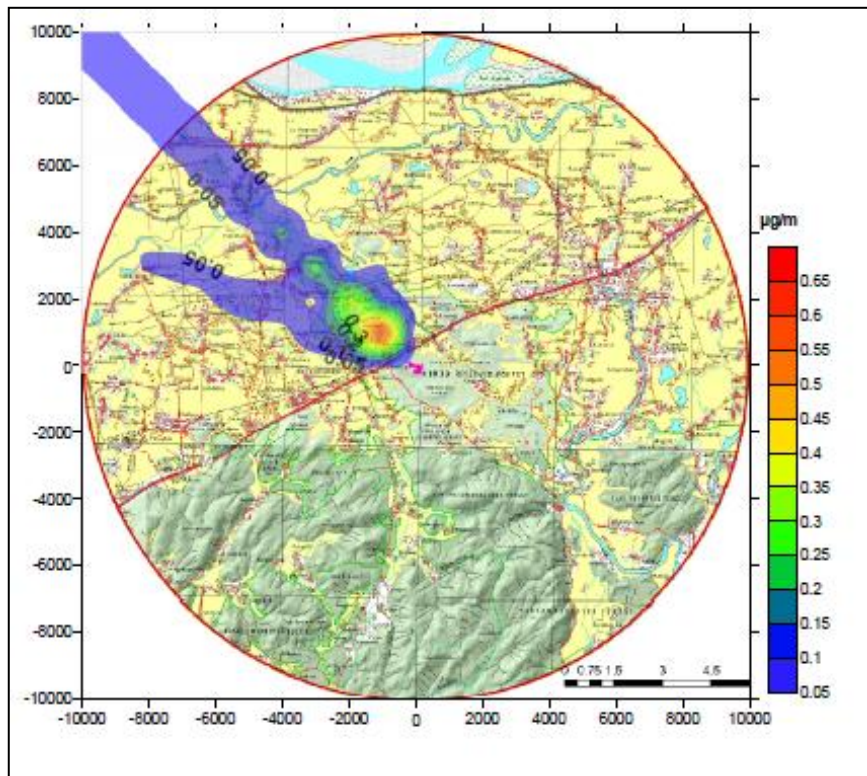


Figure 4.5: Isopleths of GLC's for NO₂ ($\mu\text{g}/\text{m}^3$) are superimposed on max. monitored NO₂ concentration within 10km radius of the study area

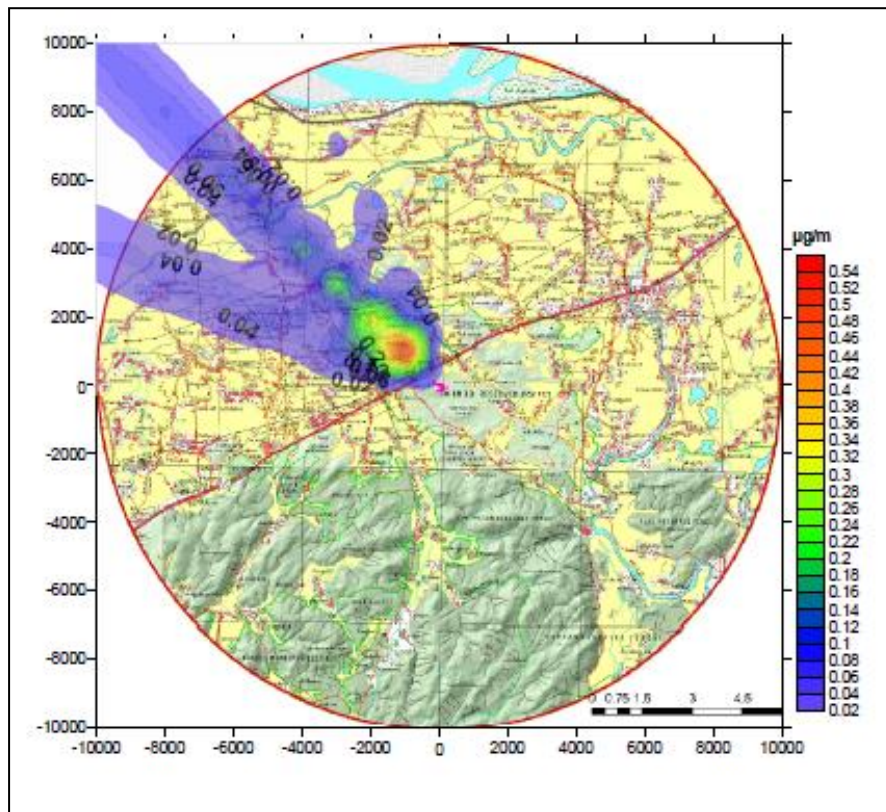


Figure 4.6: Isopleths of GLC's for CO ($\mu\text{g}/\text{m}^3$) are superimposed on max. monitored CO concentration within 10km radius of the study area

Impacts on Nearest Habitation

The predicted resultant ambient air quality in proposed project has been obtained by superimposing incremental concentration over the present maximum baseline particulate matter levels. The resultant ambient air quality is given in **Table 4.5**.

Table 4.5: Resultant concentration nearby villages

Receptor	PM ₁₀ in µg/m ³ (Limit 100)			PM _{2.5} in µg/m ³ (Limit 60)			SO ₂ in µg/m ³ (Limit 80)		
	Max Baseline	Incremental	Resultant	Max Baseline	Incremental	Resultant	Max Baseline	Incremental	Resultant
AAQ1	70.8	0.49	72.6	29.1	0.28	33.9	10.6	0.00	13.0
AAQ2	62.6	0.40	63.1	26.5	0.23	21.9	7.8	0.00	11.9
AAQ3	69.4	0.15	57.6	25.8	0.09	24.9	9.1	0.00	13.5
AAQ4	75.9	0.15	62.8	31.5	0.09	19.8	11.1	0.00	9.9
AAQ5	75.6	0.14	55.6	33.8	0.08	21.6	10.3	0.00	12.4
AAQ6	71.2	0.19	63.4	31.6	0.11	25.3	9.3	0.00	14.6
AAQ7	74.8	0.11	59.3	32.1	0.07	30.4	9.4	0.00	10.9
AAQ8	68.4	0.11	60.3	29.1	0.06	26.9	10.3	0.00	16.1

Receptor	NO _x in µg/m ³ (Limit 80)			CO in µg/m ³ (Limit 2)		
	Max Baseline	Incremental	Resultant	Max Baseline	Incremental	Resultant
AAQ1	17.6	0.26	21.9	690	0.22	BLQ(LOQ-0.5)
AAQ2	15.6	0.22	26.1	594	0.18	BLQ(LOQ-0.5)
AAQ3	17.1	0.08	20.9	642	0.07	BLQ(LOQ-0.5)
AAQ4	21.4	0.08	17.1	689	0.07	BLQ(LOQ-0.5)

AAQ5	18.5	0.08	26.3	784	0.06	BLQ(LOQ-0.5)
AAQ6	20.2	0.1	27.1	773	0.09	BLQ(LOQ-0.5)
AAQ7	19.2	0.06	23.1	876	0.05	BLQ(LOQ-0.5)
AAQ8	17.4	0.06	30.1	637	0.05	BLQ(LOQ-0.5)

Note: The total projected concentrations considering maximum monitored 24 hourly baseline monitoring of all pollutants are found to be within the prescribed standards set by CPCB/MoEF&CC as shown in above table.

These projected background concentrations due to proposed stone mining operations are found to be within the stipulated CPCB/MOEF&CC standards for ambient air quality. Therefore, ambient air quality of the surrounding area of the proposed stone mining project will not be degraded

Discussion of Results and Conclusion

ISCST3 - Model was used for prediction of impact of air pollutants during worst case meteorological conditions i) Loading/unloading and ii) transportation of stone by trucks on Haul roads by using area and line source model& iii) D.G. set operations to predict GLC's of PM₁₀, PM_{2.5}, SO₂, NO₂ & CO during these conditions. Prediction was made due to loading /unloading and transportation of stones by trucks on haul road over the length of 1000m. Total projected 24 hourly maximum GLC's of PM₁₀, PM_{2.5}, SO₂, NO₂ & CO are found to be 72.6 µg/m³, 33.9 µg/m³, 16.1 µg/m³, 30.1 µg/m³ and BLQ(LOQ-0.5) µg/m³. These projected background concentrations due to proposed stone mining operations are found to be within the stipulated CPCB/MOEF&CC standards for ambient air quality. Therefore, ambient air quality of the surrounding area of the proposed stone mining project will not be affected

Hence it is inferred that considering contributed concentration levels, the pollution load exerted due to mining activity is already contributed in ambient air and concluded insignificant.

➤ **Mitigation Measures To Be Taken**

The overall impact on air quality due to mining project is expected to be insignificant. However, to further minimize the pollutant concentration especially particulate matter, the following control measure should be adopted by the project proponent

- Checking of vehicles and machinery to ensure compliance to Indian Emission Standards
Transportation vehicles and machinery to be properly and timely maintained and serviced regularly

to control the emission of air pollutants in order to maintain the emissions of NO₂ and SO₂ within the limits established by CPCB.

- 5 KLD water required towards dust suppression purpose for which 1 no. of water tanker with 5000-liter capacity will be hired and used for water sprinkling twice in a day in haul roads, site, loading and unloading site. Water sprinkling on transport road side, stock yard (if any), will be done by tractor mounted water sprinkler.
- Regular compaction and grading of haul roads will be done to clear the accumulation of loose material
- All the mines' workers will be provided with the dust masks.
- Trees can act as efficient biological filters. As this is a small lease, the area available for plantation is very less. However, a well-planned plantation programme has been proposed for the mining area to arrest the dust pollution within the lease boundary. There is the proposal for continuous plantation along the cluster boundary and both side of the road connecting the cluster.
- Vehicles with valid PUC shall be used for transporting the minerals to avoid the exhaust emission.
- A greenbelt development plan is prepared with local species. The greenbelt on the periphery will reduce the dust level sits
- Sharp drill bits will be used for drilling and regrinding will be done periodically to reduce generation of dust.
- Regular monitoring of the air quality as per the monitoring plan detailed in Chapter 6 of this EIA report, shall be adopted during the operation phase, to ensure that, the air quality is within the desired limits prescribed by CPCB.

Adoption scientific mining methods to reduce dust emission from point and line source

Scientific methods of mining and pollution control systems will be adopted in the mine to control dust emissions from point and line sources, as follows:

Point Source: These includes drilling, loading, unloading, manual sizing and grading activities

- Adoption of wet drilling/ drills with dust arrestors to control dust generation during drilling.
- Avoiding secondary blasting by use of rock breakers.
- Reducing dropping height of excavator bucket while loading material into dumpers/tippers.
- Reducing dropping height for trucks during unloading.
- Provision of fixed water sprinkling arrangement at crusher.

Line Source: These includes Haul roads & approach roads

- Development of plantation along approach road.
- Periodic maintenance of tippers/dumpers used for Mineral transport.
- Periodic maintenance of haul roads
- Blacktopping/ paving of approach road connecting the mine lease area to SH/NH
- Regular water sprinkling on haul roads.
- Transport of Graded ore to the buyer’s location through trucks covered with tarpaulin.

4.4.3 IMPACT DUE TO TRANSPORTATION OF STONE AGGREGATES

The finish products of Shyampur stone quarry are stone aggregate. The estimated quantity of stone aggregate of proposed project is as follows:

Table 4.6: Estimated Quantity

Description	CUM for 5 Years	CUM per day	No. of trucks day
Mineable reserve as per approved mine plan	119894.29	79.92	2
No. of Trips = No. of Trucks x 2			4 trips per day

Note: Raw material and product and waste generation are considered for ultimate capacity.

Thus overall, **23978.85** cubic meter per annum stone aggregate will be transported through road (considering 300 working days) for the stone quarry mine. Thus, around **2 trucks per day i.e., 4 trips per day** will be required to transport the materials by road with the capacity of each truck 10 MT is being considered (Truck capacity – 15-20 MT).

The emission of CO, HC, NOx and PM from the trucks has been calculated for the proposed project, based on the emission factor in gm/km of Trucks / Trailer / Bus (Source: Central Pollution Control Board) (Ref. **Tables-4.7 (A) & 4.7(B)**).

Table 4.7 (A) : Emission Factors

Mode	CO gm/km-hr	HC gm/km-hr	NOx gm/km-hr	PM gm./kw-hr
Emission norms for Heavy Diesel vehicles (Trucks/ Trailer/ Bus/ 4 wheeler)	1.5	0.96	3.5	0.02

Source: Central Pollution Control Board

Table 4.7 (B) : Daily Emission For Trucks

Parameters	CO gm/km-hr	HC gm/km-hr	NO _x gm/km-hr	PM gm./kw-hr
Total Emissions for 80 trips/day (in gm/km)	6	3.84	3.5	0.02

There will be NO_x emission impact observed 0.08 gm/km-hr on the surrounding environment due to 40 dumpers/day. The impact due to the emission of other pollutants will be insignificant. This quantum spread over the whole day at Maximum production is considered low and shall not make significant impact on the transportation route on the road.

4.4.3.1 Traffic Impact Assessment on adjacent road due to transportation of stone aggregate:

Based on the traffic V/C ratio and LoS were calculated at monitoring location. The V/C ratio and LoS at adjacent road are given below.

Table 4.7 (C): Present Traffic Density and Number of Vehicles Per Day At National Highway – 60

S. No.	Vehicles Distribution	Number of Vehicles Distribution/ Day	Passenger Car Unit (PCU)	Total Number of Vehicle (PCU)/Day
		NH-60		NH-60
1.	Cars	1300	1	1300
2.	Buses	50	3	50
3.	Two wheelers	900	0.5	900
4.	Three wheelers	30	1.5	30
5.	Trucks	1100	3	1100
Total =		3380	-	3380

Table 4.7 (D): Proposed Traffic Contribution Due to Activity Of Proposed Project

Sl. No.	Mode of Transportation	Total Trips /day	Passenger Car Unit (PCU)	PCU
1.	Trucks/Dumpers/Bus	4	3	4
2.	Car	1	1	1
3.	Two / Three-Wheeler	8	0.5	8
Total				13

Table 4.7 (E): Existing and Changed Level of Service on National Highway – NH-60

Road	Increased PCU's- V (VOLUME IN PCU/DAY)	C (CAPACITY IN PCU/DAY)	Existing V/C Ratio	Modified V/C Ratio	LoS
NH-60	3380 + 13 = 3393	15000	0.4387	0.4575	C (GOOD/AVG /FAIR)

Relevant Standard (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

➤ From the results it is observed that after proposed expansion project, the level of service on Goalpara Guwahati Road will be “**D (0.4 to 0.6)**” i.e. **Good/ Average/ Fair**.

So, the additional load of **(4 trips/day)** will add insignificant contribution on the carrying capacity of the concerned road. Hence it is concluded that it is not likely to have any significant adverse effect.

Mitigation Measures

- BS-VI vehicles will be used for the transportation of stone aggregates.
- With stringent traffic management system within the project site, scope for air pollution due to movement of goods transports will be minimized. The layout of the project has generous area earmarked for greenery development. This will act as effective media for arresting the emissions within the project site.
- The vehicular traffic plying in and out of the project site is being/ will be one of the significant sources of air pollution. If the site is not properly regulated, it can create disruption in free traffic movement leading to air pollution problems. This difficulty can be tackled to a great extent by properly regulating the traffic and by following strict and disciplined vehicular movement and operation at the project site. By imposing vehicular emission standards, this problem can be further curbed to a large extent. Adequate and planned road network will be set up at the project site for smooth movement of the goods vehicles.
- It would be ensured that all the vehicles plying in the working zone are properly tuned and maintained to keep emissions within the permissible limits. At loading and unloading points, arrangement for Water sprinkling will be made so that dust generation during transportation of materials will be minimized

further.

- All the internal roads within the plant shall be metalled; hence dust arising from the internal roads shall be insignificant. The greenbelt development shall further help in reduction in fugitive emissions.

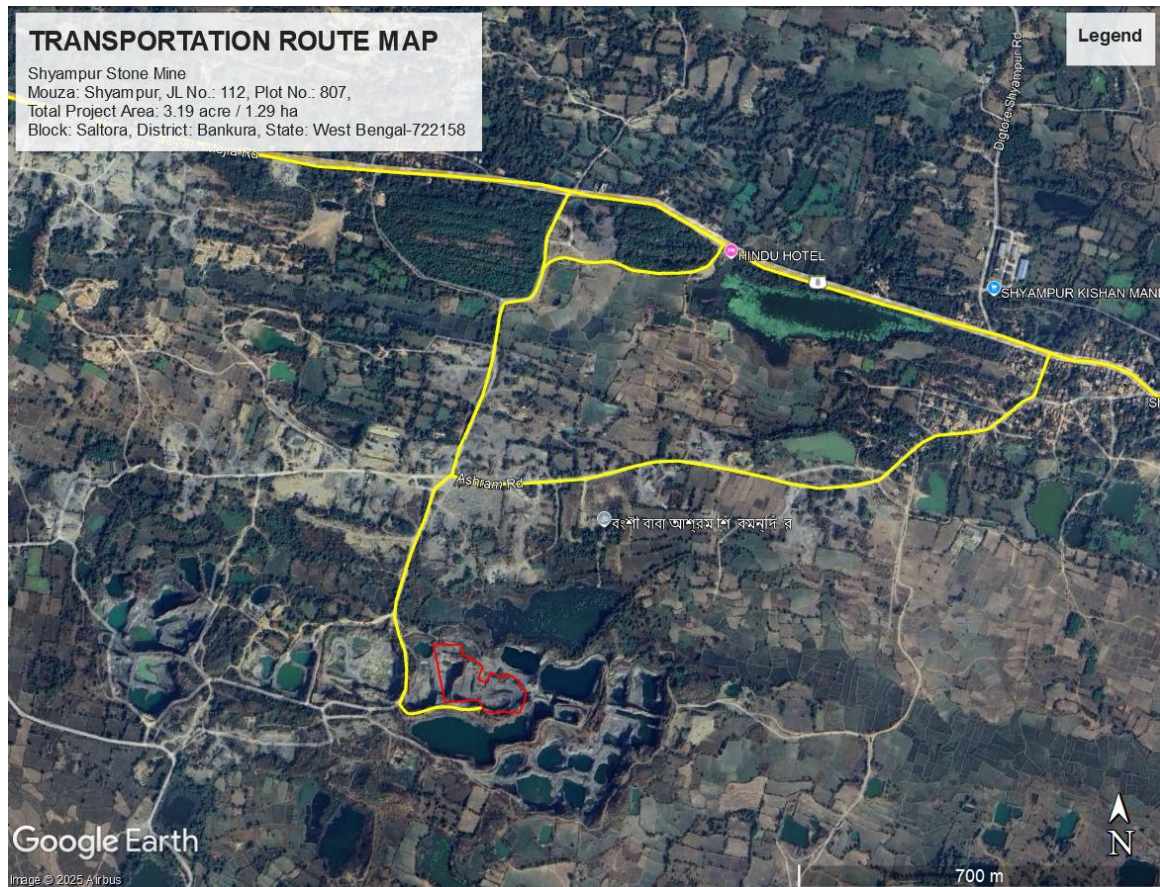


Figure 4.7: Road Connectivity

4.4.4 NOISE ENVIRONMENT

➤ Impact On Noise Environment

The noise and vibration along with dust are generated due to the operation of mining equipment and movement of transporting vehicles. In any situations, noise levels near residential areas should not exceed the Central Pollution Control board (CPCB), limits i.e. 55 dB(A). It is recommended to put an acoustic barrier near the crusher plant to attenuate the noise propagation.

Gound Vibration

Since very few explosives are used in mining, ground shaking will not be as severe or the potential for flying rocks to form.

➤ Mitigation Measures for Noise Environment

- No noise polluting work shall be carried out in the night hours.
- Provision of PPE's for the workers.
- Vehicles to be serviced regularly and maintained properly to avoid any unwanted generation of

noise or vibration from them.

- Green belt plantation and garden trees will help in reducing the noise, traffic related pollution and heat island effects.
- Proper lubrication, muffling and modernization of equipment shall be used to reduce the noise during operation phase.
- Vibration and noise due to blasting will be reduced by adopting controlled blasting technique.
- Blasting will be avoided under unfavourable conditions.
- Rock breakers is being/ will be used instead of secondary blasting.
- Regular monitoring of the noise levels as per the monitoring plan detailed in Chapter 6 of this EIA report, shall be adopted during the operation phase, to ensure that, the noise levels are within the limits prescribed by CPCB.

4.4.5 WATER ENVIRONMENT

➤ Impact On Surface Water Resources

No surface water source such as rivers, streams & dam exists in the mining area. Proper maintenance of transport vehicle & prevention of washing transport vehicle in ponds etc be helpful to control water pollution. Garland drains of appropriate size will be constructed along with settling tank at mine boundary to manage the drainage and runoff. As the mining activity is manual and there is no chemical or physical contamination of the water body, the impact on the surface water quality will be insignificant.

• **Impact due to Water use in Mines**

In stone mining operation water will be mainly used for domestic purpose, dust suppression, plantation and washing of heavy earth moving machineries. Only 5 KLD of water will be used for this purpose. The water required for dust suppression and plantation purpose will be met through the rain water which will be stored in the exhausted mining pits. Only about 0.20 KLD of drinking water will be required for domestic use which is being sourced through tanker.

• **Impact on Ground Water**

Mining for each successive year is proposed to its optimum depth of mineral bed and the mining will not go to touch the ground water table so there is no chance to disturbance in ground watertable. The dug-out pit will help in recharging of ground water by decreasing the runoff. Natural pits will be used for rainwater conservation and harvesting.

After complete extraction of mineral from land and the balance un-reclaimed pit is proposed to be developed as per approved final quarry closure plan.

➤ Mitigation Measures for Water Environment

- Provision of temporary toilets for laborers.
- Domestic waste water will be treated into septic tank followed by soak pit outside of the proposed cluster project with a safe distance and no wastewater will be allowed to be get discharged into the water body.

- All stacking and loading areas should be provided with proper garland drains.
- Check dams should be provided to prevent solids from wash off.
- Construction of garland drains around freshly excavated and dumped areas so that flow of water with loose material is prevented.
- The mine water should be passed through specially constructed catch pits to arrest any loose material being carried away with water.
- Any areas with loose debris within the leasehold should be planted.
- Garland drains should be constructed surrounding the waste dumps and should be connected to the surface water reservoir to avoid the run-off mixing directly to natural water channels before settling.
- Ground water table will not be intersected during the mining activity

4.4.6 BIOLOGICAL ENVIRONMENT

- There will not be any clearance of vegetation due to the proposed mining project since there is no vegetation within the mining lease area
- The fauna in the vicinity of the mine is restricted to few common small species. There will be no impact on fauna due to this mining project

Impact on Flora

- As it is a mining project of stone quarry activities will be confined to core zone only. The project area is surrounded by agricultural land. There is no forest land involved in mine lease area. Thus, no direct impact is foreseen on the flora of the forest area because of mining operation. The activities related to mining as transportation of material and passage of workers to and from mining area may have an adverse impact on the road side flora, if adequate control measures will not be taken into consideration.
- Significant reduction in total chlorophyll content at road side plant species may affects the plant species by affecting the plant metabolism. The reduction in chlorophyll concentration corresponds directly to the reduction in plant growth.

Impact on Fauna

- The mining, specifically, will have no adverse impact on fauna whereas the operational activities such as human activity, transportation and noise generation may have an adverse impact on fauna.
- No wild life sanctuary is present within 10 km radius of study area. No major wildlife observed within mine lease area during the survey period. Considering size of mine and management practice by scientific method of mining with proper Environmental Management Plan including pollution control measures especially for air and noise, which will not cause any adverse impact on the surrounding animals.
- Fencing around the entire mine lease area is recommended in order to restrict the entry of stray animals into the mining area.
- Green belt development will be carried out which will help in arresting dust and minimizing sound

level arising from the mining operation.

- Some fauna will move from the area of the road side as a result of habitat loss and physical disturbance.

➤ **Impact Mitigation Measures for Biological Environment**

- Green Belt will be developed around the lease boundary, haul roads and plantation will be done on undisturbed area, reclaimed area, dump site, workshop & mine office.
- Total area of green belt proposed would be nearly 1050 of trees that will be planted throughout the boundary of the mining lease and surrounding area.
- Indigenous Plan species will be planted in consultation with local Forest Department.

Impact Mitigation Measures for Flora

- Plantation will be carried out on approach roads and nearby vicinity at river banks areas.
- Native plant species which are resistant and pollution tolerant and comparatively well acclimatized should be grown along roadsides. Selection of plant species, shall be preferred to consider certain factors as agro climatic suitability, height and canopy architecture, growth rate and habit and aesthetic looks (foliage, conspicuous and attractive flower color).
- Annual bio-monitoring of roadside plants exposed to vehicular pollution will be done to assess the impact of dust load.

Mitigation Measures for Fauna

- All equipment should have sound-control devices not less effective than those provided on the original equipment. Motorized equipment used should be adequately muffled and maintained.
- Use exhaust silencers and optimized acoustical pipe lagging (acoustical wrapping) to minimize the noise levels.
- Mining will be carried out on the dry part of the lease area to avoid disturbance to the aquatic habitat
- Thus, there will be no loss for wildlife.
- Operation and storage of heavy equipment within riparian habitat will be restricted.
- Access roads will not encroach into the riparian zones.

4.4.7 SOCIO-ECONOMIC ENVIRONMENT

- For the mining work, an average of 20 workers will be required in the project sites, which will be met from skilled and unskilled labours from the local population as far as possible. Thus, the project can provide employment to local workers during the operation of mines.
- The area is considered as industrially backward. The population in general does not have opportunities of earning from employment. The only employment to depend on is agriculture, which is seasonal.
- There is no human settlement in or around the mining block areas, hence no clearance of human settlement is required for the mining operation.

- The proposed mining project activity does not involve any resettlement and rehabilitation processes as the project is freshly designed at representative site where none of the settlement is present.
- The mining activity could lead to increased nuisance level from air emissions and noise due to transportation of material and equipment as well as laborers.

➤ **Mitigation Measures for Socio-Economic Environment**

In order to mitigate the adverse impacts likely to arise in the surrounding area due to proposed project activity, it is necessary to formulate an effective mitigation plan. The suggestions are as follows:

Before Commencing and During Initial Phase:

- Communication with the local community should be institutionalized and done on a regular basis. The forum could provide opportunities to discuss local critical issues and prepare programmes of mutual benefits.
- Information regarding the proposed development plan, community programmes etc. should be communicated to the local community.

Mining and Dragging Phase:

- Project proponent should take appropriate steps to keep environment clean and healthy during construction phase.
- Provision of adequate drinking water, rest room, first aid instrument and toilet facilities should be made available on project site also in labour camp site.
- Water shall be sprinkle/spread over the truck and road to suppress dust during transportation of mining material to control air pollution and thereby avoid adverse health impact.
- A barrier located in the direction of the wind, with a height of approximately three times the height of the storage pile, would reduce PM10 emissions between 50% and 80%.
- While transportation of dragging material, truck, tractors should be covered.
- Proper Training and awareness programme should be carried out so that the workers understand the importance of wearing the personal protective and safety equipment's.

COVID-19 Pandemic:

- Regular cleaning i.e. microbial disinfection of labour assembly point, machine operator cabin, Common Instrument, office, canteen, labour colony etc.
- Sanitization/ Hand wash stations.
- Temperature checkup and maintenance of log of the same at labour camp and project site.
- Regular medical check-up of all the workers and staff, First aid and essential medical services should be provided at site.

4.5 SUMMARY OF ENVIRONMENT IMPACTS AND MITIGATION MEASURES

The summary of the Impacts and Mitigation measures for the above-mentioned environmental attributes is as summarized in **Table 4.8**.

Table 4.8: Summary of Impacts and Mitigation Measures

Activity	Environmental Attributes	Causes	Impact Characteristics			
			Nature	Duration	Reversibility	Significance & Mitigation measures
Transportation of stone quarry	Air quality (PM and gaseous emissions)	Transportation of stone quarry in trucks & exhaust emission from vehicles	Direct Negative	ShortTerm	Reversible	Medium, Regular emission checks will be performed.
	Noise levels	Noise generation from vehicles	Direct Negative	ShortTerm	Reversible	Insignificant, if regular vehicle maintenance is done.
	Risk	Risk of accidents during transit	Direct Negative	LongTerm	Irreversible	Insignificant, if safety measures are taken to prevent accidents
Mining activities / laying of Haul roads	Air quality (PM and gaseous)	Operation of machinery, blasting & others	Direct Negative	ShortTerm	Reversible	Insignificant, if regular water sprinkling can be done
	Noise levels	Generation from use of machinery, blasting	Direct Negative	ShortTerm	Reversible	Insignificant, if properly maintained machineries can be used and PPEs to be provided to workers
	Ecology	Loss of vegetation	Direct Negative	ShortTerm	Reversible	Insignificant, No cutting of trees and green belt development is envisaged.
Waste water discharge	Water	Only Domestic waste water	Direct Negative	LongTerm	Reversible	In the process there will be discharge of domestic waste water, which will be taken into septic tank and soak pit that will not cause any impact on the water environment of the area.
Green Belt	Air	Dispersion of Air emission from mining activity	Positive	LongTerm	Reversible	Very High positive Impact due to development of a proper green belt along the periphery of the premises.
Employment	Socio Economic	Direct & Indirect Employment	Direct Positive	LongTerm	Reversible	Positive Impact due to hiring of manpower from the nearby area. Substantial benefits in the form of contracts to local agencies for different services Employment generation in transport sector as several local conveyance trips and trucks loadings will be handled every day.

4.6 IMPACT MATRIX

The impact matrix is meant for the assessment of impacts associated with almost any type of project. Matrix method incorporates a list of impacting activities and their likely environmental impacts, presented in a matrix format. Combining these lists as horizontal and vertical axes in the matrix allows the identification of cause effect relationships, if any, between specific activities and impacts. The impact matrix for the actions identified in **Table 4.9** along with various environmental parameters. A rating scale has been devised to give severity of impacts in the following manner.

- o Beneficial (positive) impact – Long term
- o Low beneficial impact – Short term
- o Strong adverse (negative) impact – Long term
- o Low adverse impact (localized in nature) – Short term
- o No impacts on environment

Table 4.9: Impact Matrix

S.N.	Activity	Positive Impact		Negative Impact		No Impact
		Short Term	Long Term	Short Term	Long Term	
Construction Phase- No construction activities are involved in the proposed stone quarry mining project						
Operation Phase						
1.	Displacement and resettlement of local people					√
2.	Change in land use					√
3.	Trees/vegetation					√
4.	Shifting of equipment, machinery and material			√		
5.	Pressure on infrastructure and transportation system			√		
6.	Impact on air quality including dust generation			√		
7.	Noise Pollution			√		
8.	Traffic			√		
9.	Impact on the land/soil environment			√		

10.	Impact on groundwater/surface water					√
11.	Health and safety conditions of people					√
12.	Disposal of solid waste			√		
13.	Employment opportunities	√				
14.	Quality of life	√				
15.	Economic output	√				
16.	Occupational health					√

4.7 CONCLUSION

From the above, it can be concluded that, the stone quarry mining activity in the proposed mining lease area will not create any significant negative impact on physical features, water, noise and air environment. Proposed plantation will improve the aesthetic look and ecology of the surrounding environment. The proposed project will generate direct and indirect employment for the local population and thereby economy of the area will improve and there will be overall growth of the region in all terms.

CHAPTER-5

5.0 ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 SITE SELECTION

A project's choice of appropriate location is just as important as its choice of suppliers and technology. The proposed quarry area of 1.29 Ha is located within the Near Village Shyampur, P.O-Saltora, P.S- Saltora, District- Bankura, West Bengal. The location of the proposed quarry site is about 18 E Km away from the NH60. The proposed site is not within any protected area under Archeological, Religious, Cultural heritage or Defense establishments. The location of the proposed mine site has been recommended by the M/s. WBMDTCL, Kolkata, Govt. of West Bengal under Raiyati policy. Therefore, alternate sites have not been assessed.

5.2 SELECTION OF ALTERNATIVE TECHNOLOGY

Maximum allowable quantity for extraction will be 119,874.29 Cu.M. for five years and 23,978.85 Cu. M. Solid waste generated from the site and other wastes like plastics, papers, cardboards etc. will be properly collected, segregated and reused/disposed-off properly. The waste comprises mainly overburden, which are top soil and left out rock fragments which are not usable. The top soil and waste rock fragments etc. shall have to be preserved for reclamation purposes in future. The method of mining adopted is open cast mining in single shift manual mining without any change in technology.

CHAPTER-6

6.0 ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

The Monitoring Methodologies, Post Project Environment Monitoring, APCD Performance Monitoring Schedule, and other topics are covered broadly in this chapter.

A monitoring plan has been prepared to make sure that the terms of the environmental licences and the applicable laws are followed. The monitoring plan also makes sure that the project is developed sustainably and that the suggested measures for preventing and mitigating pollution are followed.

The mitigation measures suggested in Chapter-4 will be implemented so as to reduce the impact on environment due to the operations of the project.

6.2 ENVIRONMENTAL MONITORING

Environment Monitoring is important for assessing the extent to which the project's installed pollution control equipment is working. The Central Pollution Control Board/Pollution Control Board West Bengal (WBPCB) recommendations shall be followed for the sampling and analysis of the environmental variables.

The sample location and frequency will follow the guidelines set forth by the CPCB and WBPCB. An impact assessment research is typically conducted over a brief period of time, as this study was, and the data cannot capture all of the modifications brought about by human or natural activity. Consequently, it is important to have a frequent monitoring plan of the environmental factors in order to account for changes in the environment.

6.3 OBJECTIVE OF ENVIRONMENTAL MONITORING:

- To implement the pollution control measures as suggested in Environmental Management Plan and recommended in EC.
- To check the efficacy of installed controlling measures.
- To strictly adhere to the pattern of parameters that has been considered vital.
- To ensure compliance with other conditions stipulated in Environmental Clearance for the project.
- To set up a database for forthcoming Impact Assessment Studies for novel projects.
- To ensure occupational Health and Safety in work environment.

The attributes, which require regular monitoring, are listed below:

1. Air Quality;
2. Noise Levels;
3. Surface and ground water Quality;
4. Soil Quality;
5. Socio Economic Aspects and Community Development and
6. Ecological Preservation and Afforestation.

6.4 MONITORING EQUIPMENT, PARAMETERS AND MEASUREMENT METHODOLOGIES

An "Environmental Management Cell (EMC)" will be established in order to meet the above goals. This cell will be in charge of post-operation monitoring and EMP execution. Monitoring equipment will be installed as per requirement for different environmental components in the project site at the designated location by consideration of proposed project. The collected samples will be analysed for project specific parameters to find out the concentration levels. The equipment's details along with parameters and methodologies are given in **Table 6.1**

Table 6.1: Equipment's Details along with Parameters and Methodologies

Environment	Equipment	Parameters	Methodologies
Air Environment	RDS, FPS and Stack Kit	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ , CO, O ₃ , NH ₃ , Pb, As, Ni, Benzene and BaP.	Requirement as per NAAQS – 2009 and Test Method IS 5182 & IS 11255 and as per CPCB Guideline.
Noise Environment	Sound level meter	Noise level: Day and Night	Requirement as per CPCB Guideline and Test Method IS 9989:1981 (R2001)
Water Environment	pH meter, conductivity meter, Turbidity meter, flame photometer, spectrophotometer, hot plate, DO meter, microscope, incubator, balance, AAS etc.	Physico-chemical and bacteriological. Parameters as per project requirement specific parameters (IS-10500 and wastewater quality parameters (pH, TSS, TDS, COD, BOD, Oil &	Requirement as per IS 10 500: 2012 and Applicable Test Method- Chemical Testing - IS 3025 and APHA Biological Testing IS 15185 & IS 1622

Environment	Equipment	Parameters	Methodologies
		Grease & heavy metals)	
Land Environment	Auger, spade	Physico-chemical, available NPK, CEC, organic carbon, organic matter, water holding capacity, density PH, EC, porosity, particle size analysis, heavy metals.	Method Manual, Soil Testing in India, Dept. of agriculture and corporation, Govt. of India.

6.5 IMPLEMENTATION SCHEDULE FOR ENVIRONMENTAL PARAMETERS

The mitigation measures suggested in **Chapter 4** will be implemented so as to reduce the impact on environment due to the operations of the proposed stone quarry mining project. In order to facilitate easy implementation of mitigation measures, following phases as per the priority implementation are given in **Table 6.2**.

Table 6.2: Environmental Monitoring Schedule for Proposed Stone Quarry Mining Project

Sr. No	Particulars	Locations	Frequency of Monitoring	Duration of Sampling	Parameters required to be monitored	Responsibility
1 AIR ENVIRONMENT						
Meteorological Data						
i	Meteorological data to be monitored at the plant (On line weather monitoring station)	At Mine office	Daily	Continuous monitoring	Temperature, Relative Humidity, Rainfall, wind direction & wind speed.	Environmental Officer /Mines Manager
Air Quality						
ii	Ambient air quality	8 (1 in core zone and 1 in near habitation 6 in buffer zone	Quarterly	24 hours Continuously	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ and CO	Environmental Officer /Mines Manager

Sr. No .	Particulars	Locations	Frequency of Monitoring	Duration of Sampling	Parameters required to be monitored	Responsibility
		i.e. 2 in upwind 2 in downwind & 2 in crosswind .)				
2 WATER ENVIRONMENT						
i	Ground Water quality and level in the Area	8 Set of grab Samples for ground in the vicinity of the project site	Quarterly	Grab Sampling	As per IS: 10500:2012	Environmental Officer /Mines Manager
ii	Surface water quality	4 sets of surface water in the vicinity of the project site	Quarterly	Grab Sampling	As per IS: 10500:2012	
3 NOISE ENVIRONMENT						
i	Ambient Noise Monitoring	8 locations (1 nr. Office, 1 nr. Mining area location within Mine boundary, High noise generating areas within the lease and 1 locations of nearest habitation and 1 of nearest road)	Quarterly	Continuous for 24 hours	Sound pressure level (Leq)	Environmental Officer /Mines Manager
4 LAND ENVIRONMENT						

Sr. No.	Particulars	Locations	Frequency of Monitoring	Duration of Sampling	Parameters required to be monitored	Responsibility
i	Soil quality	8 locations in the project impact area	Twice in a year	Composite	pH (at 25°C), Color, Texture, Moisture, Content (%), Soil Texture, Bulk Density, Water Holding Capacity, Chloride, Calcium, Sodium, Potassium, Magnesium, Organic Matter, Available Nitrogen as N, Available Phosphorous, Zinc, Manganese, Lead, Cadmium, Copper, Chromium	Environmental Officer /Mines Manager
5 OCCUPATIONAL HEALTH & CSR ACTIVITIES						
i	Occupational Health monitoring of employees	-	Once in a year		Respirable disorders, heart diseases, diabetes, reproductive and child health, ENT problems, etc.	Safety officer/ Mines Manager

Sr. No.	Particulars	Locations	Frequency of Monitoring	Duration of Sampling	Parameters required to be monitored	Responsibility
6.	SOCIO-ECONOMIC ENVIRONMENT					
i	Implementation of CSR activities & Implementation and monitoring of Capex under EMP for Socio-economic development	Nearby villages based on physical target	Yearly	Implementation status and need based assessment	Organizing health camps in surrounding villages with qualified doctors and supporting staff inviting surrounding people for health check-up. CPCB Protocol to be followed during the health camps. Monitoring of physical Target in line with the timeline defined in EC condition pertaining to EMP for SE development	Public Relationship Officer reporting to Mine Manager
.7	BIOLOGICAL ENVIRONMENT					
i	Greenbelt Development/ Plantation	Earmarked Plantation area/all along the quarry site periphery	Continuous	Monitoring of Physical condition of plant	Growth & survival rate records to be maintained	Environmental Officer /Mines Manager

6.5.1 DATA ANALYSIS

All the parameters pertaining to above environmental components will be analysed as per prescribed Indian Standards procedure. EMC shall ensure all parameters should be in prescribed limit as per CPCB/Pollution Control Board, West Bengal.

6.5.2 REPORTING SCHEDULE

The Mine Owner will ensure reporting of environmental monitored data in following manner:

- Online Continuous Emission Monitoring System to PCB, West Bengal/CPCB on continuous basis.
- Submission of Post project monitoring analysis data viz. Air, Noise, Water and Soil to PCB, West Bengal and CPCB on monthly/quarterly basis.
- Online submission of Environmental Statement Form – V for financial year.
- Whereas, submission of analysis report to Regional Officer, MoEF&CC and PCB, West Bengal on six monthly basis as a part of EC compliance report.

6.5.3 DETAILED BUDGET AND PROCUREMENT SCHEDULE

When proposed project comes into operation, NABL/MoEF&CC accredited lab (Third party) will be engaged to monitor all the environmental components as per CPCB/SPCB norms. The budgetary allocation towards Environmental Protection activities is given in **Table 6.3**.

Table 6.3: Environmental Management Cost

Sr. No.	Component	Description	Capital Cost (Rs. in Lakhs)	Recurring cost per annum (Rs. in Lakhs)	Total recurring cost in lease period (Rs. in Lakhs)
1.	Air Pollution Control	Dust Suppression (Water tanker & maintenance of water tanker & machineries for water sprinkling. (Rent))		0.30	1.50
		Air (8 samples)		0.20	1.00
Total			-	0.50	2.50
2.	Water Pollution Control	Purchase of mobile toilets with its maintenance	0.50	0.05	0.25
		Water samplings (4 SW & 4 GW samples)		0.20	1.00
Total			0.50	0.25	1.25
3.	Noise pollution	Noise (8 samples)		0.10	0.50
Total			-	0.10	0.50
4.	Environmental Monitoring & Management	Electronic display board near the main gate (Rent)		0.10	0.50
		Monitoring & reporting cost of registered		0.10	0.50

Shyampur Stone Mine (area 1.29 Ha.) in Non-Forest Private Land Area in Bankura District of West Bengal

		laboratory			
		Total	-	0.20	1.00
5.	Occupational Safety	Provision of safety shoes, dust mask, safety goggles, ear plugs, safety helmets, etc to workers.	0.60	0.10	0.50
		Construction of Rest Shelters & First Aid Centre	0.40	0.10	0.50
		Annual health checkup of workers & health camp		0.10	0.50
		Ambulance for workers and villagers-1 No.(Rent)		0.10	0.50
		Training to Staff		0.10	0.50
		Total	1.00	0.50	2.50
6.	Plantation & Green Belt Development	Plantation and Green Belt Development for the entire lease period	1.00	0.50	2.50
		Maintenance/ monitoring of sapling for green belt development for 2 years	-	0.50	1.00
		Total	1.00	1.00	3.50
7.	Others	Construction and maintenance of Haul Road	1.50	0.20	1.00
		Total	1.50	0.20	1.00
		Grand Total	4.00	2.75	12.25

CHAPTER-7

7.0 ADDITIONAL STUDIES

7.1 PUBLIC CONSULTATION

The report is being submitted to state pollution control board for the purpose of public hearing/consultation process. After completion of the public consultation, all necessary details will be incorporated in the EIA. The Final EIA-EMP report will be submitted to MoEF&CC for obtaining environmental clearance for the proposed mining project.

7.2 HAZARD IDENTIFICATION AND RISK ASSESSMENT

Risk is the likelihood of negative outcomes or anticipated losses as a result of the interaction between unstable conditions and natural or man-made hazards. Risk assessment is a process that identifies the type and extent of risk by examining potential dangers and assessing vulnerable situations that may endanger people's lives or cause harm to the environment that supports them. The following are the objective of risk assessment:

- (i) Determining the risk mitigation strategies to put the possible risk within an acceptable range;
- (ii) Identifying emergency scenarios and suggesting mitigation methods;
- (iii) Assessing risk levels resulting from the mining of stone quarries.

To remove risk and its effects on the proposed stone mining project, the Risk Assessment and Management Plan must be implemented.

The following types of hazards are identified at proposed stone quarry mine:

- Fire in HEMM, electric panels, oil room, diesel storage and near magazine;
- Inundation in rainy season due to seasonal nallas adjacent river and barrier gets breached or when impermeable barriers are removed; and
- Failure of slope of benches or dumps giving rise to slide of material.

This risk of slope failure is subject to stratigraphic disposition of various rock formation coupled with prevailing hydrological conditions & pit design.

The case of fire in equipment could be a possibility and for which emergency plan must be prepared and this be controlled to reduce it immediately at the source itself and not to allow it to spread. The relief to the person who might be inside the machine or standing close by is also to be considered along with the revival of machines and preventing of the fire to spread it further.

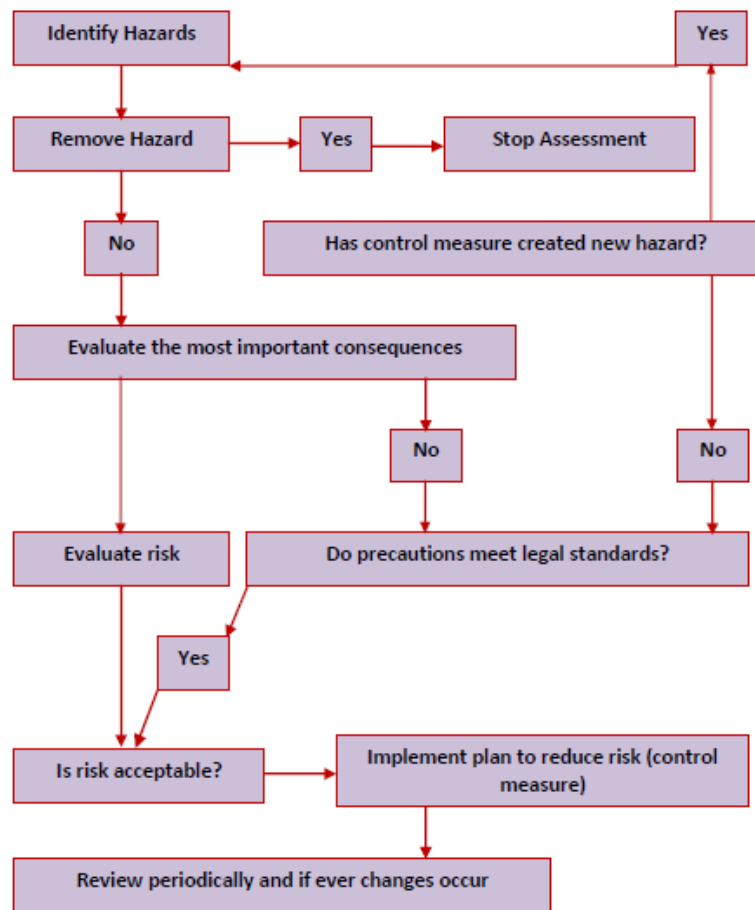


Figure 7.1: Identification of Hazards in Open Cast Mine

However, a team of trained persons must be kept in readiness all the time, who can deal not only with fire emergency but also other emergencies if arise inside mine or off site emergency of any sort. So to deal the above emergencies, the Emergency Plan is prepared. There are various factors, which can cause disaster in the mine. The mining activity has several disaster prone areas as described below:

Blasting

The blasting pattern will be kept straightforward, with basic blasting parameters, due to the small-scale operation and production that will take place in the mine. There will be low-intensity, scientifically controlled blasting.

Overburden

No overburden is generating due to the mining.

Heavy Machinery

The majority of accidental events involve the use of Wagon Drill, Jack Hammer, dumpers, and other heavy machinery are frequently caused by human mistake and mechanical failure.

Water Logging

The following actions can be taken to prevent water logging at the mine site:

- Properly determining the location of the water body;
- Preventing surface water body water from entering the mine;
- Draining mine water using pumps of appropriate capacity;
- Correctly marking surface water bodies along with their highest flood level on the mine.

7.2.1 Safety Measures

Safety Measures at the Proposed Opencast Mining Project

- The mine will be semi mechanized opencast mine and is planned for working with shovel dumper system which requires proper benching not only for slope stability but also for movement of dumpers and other heavy machinery. The inclination of the mining sides at the final stage i.e. at the dip most point will not exceed 45° to the horizontal (This angle is measured between the line joining the crest of the bottom most bench to the crest of the top most bench and the horizontal line);
- All mining operations both within the mine and outside will be conducted as per the conditions laid down by DGMS and under the strict supervision of competent persons appointed under Metalliferous Mines Regulation, 1961.
- Slope study (for mining benches and dumps) and blasting study will be carried out after commencement of mining operation.

Measures Suggested to Avoid Accidents due to Blasting

- Preparation of charge and charging and stemming of holes will be done by a qualified blaster. Proper stemming of holes will be always carried out;
- Before a shot is charged, stemmed or fired, sufficient warnings by signal will be given over the entire area falling within the danger zone and ensure that all persons within such area have taken proper shelter;
- Delay detonators will be used between holes or group of holes and rows of blasting as per the face configuration and advance planning. Short delay in blasting of successive blast holes effectively reduce the vibration problem and prevent flying fragments which may cause injury to local inhabitants within danger zone;
- Proper inspection after shot firing will be done by the blaster;
- All necessary precautions as enumerated under 106(2)(b) of MMR 1961 will be taken;
- Free face will be sufficiently cleared of any loose material before blasting;

- Number of holes to be blasted at a time will be kept minimum to control the vibration and noise;
- Mostly holes will be fired towards the free face;
- Blasting will be avoided during foggy weather and high wind velocity;
- Over charging will be avoided. The maximum charge per delay will be kept within limit to minimize ground vibration;
- Drilling parameters like spacing, burden, depth and diameter of hole will be properly designed and spacing/burden ratio will be always be more than one;
- No secondary blasting will be done, instead rock breaker will be deployed; and
- Holes will be drilled at 10-degree inclination from vertical so more explosive energy is utilized in productive way as in vertical hole only 50% of energy is utilized in productive way.

Measures to Prevent the Danger of Overburden

- Proper terracing of the dump slopes, with a maximum bench height of 10 meters; and
- In flat areas where the dumping operations have come to an end, the slope angle should be flattened by about 5° lower than the angle of repose which varies from site to site but not more than 28°.
- Planting vegetation as early as possible over the over-burden dump slopes;
- Provide drainage channels along the overburden dump toe for additional protection, in such a way that a distance of 15 m should be maintained left between the overburden dump and the bench; and
- If a mine is abandoned, the bench and overburden dump should be separated from each other by digging a trench of 6 to 10 m width.

Measures to Prevent Accidents due to Trucks and Dumpers

- All transportation within the main working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point specially for the guidance of the drivers at night;
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free, and there should be a light and sound device to indicate reversing of trucks; and

- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the intensity of such events.

Key Areas of Risk are:

Table 7.1: Key areas of Risk

Area of Risk	Type of Risk	Persons at Risk
Drilling operation	Noise generation, slippery of accessories, related injuries	Drillers and helpers
Handling of explosives	Air blast , ground vibration, fly rock, improper shelters, stray current and lightning	Blasters and helpers, surrounding employees and public dwellings if nearby
Excavators, loading operation	Swing over the cabin of tippers, under cutting in the faces, not using the safety devices, operating without proper signaling, unauthorized operations	Operators and helpers/ spotters
Hauling equipment	Operating at unsafe speed, not using the safety devices, unauthorized operation/ riding.	Drivers & helpers
Misc. machines, vehicles and equipment	Mechanical, hydraulic, auto electrical operational and maintenance	Operators, mechanics and helpers

Preventive Measures:

- Excavators, dumpers, dozers, drill will be equipped with automated gadgets;
- Preventive maintenance for noise reductions, break downs etc.;
- Drills with water sprinkling system for dust suppressions;
- Conducting ground vibration studies to measure Peak Particle Velocity (PPV);
- Regular monitoring of air quality within the mining area;
- Maintenance of roads, with water drainage preventing the slippery surfaces.
- Providing safety shoes, ear muffs, masks etc.;
- Warning notice boards indicating time of blasting and not trespass the area;
- Not exposing the workmen at site in the area high levels without proper ear muffs;
- Spotters with proper signalling system while loading;
- Imparting training to the workmen regarding safety measures to be practiced;
- Display of safety standards at important areas of operation; and
- Periodic medical check-ups.

Asst. Mangers are the shift in charges and responsible for the safety of individual shifts. Key persons will be identified for the safety of individual shifts. To carry out/ implement the above responsibilities the Mines Dept. has adequate staff and executives. The organizational structure to control emergencies is as follows:

Emergency Contact Details

The list of concern authorities to be contacted in case of emergency are given in **Table 7.2**.

Table 7.2: List of concern authorities

Sr. No.	Particulars	Telephone Numbers
1.	Police/Bomb Disposal Squad	100
2.	Fire services	101
3.	Emergency (Police, Medical and Fire)	102/108
4.	Commissioner of Rescue & Relief	1070

The mining department will appoint the necessary employees and executives, who will be significantly strengthened, to carry out and perform the duties mentioned above. The following is the organisational structure in place to handle emergencies:

7.2.2 On-Site Emergency Planning

Disaster Management Plan in case of fire applicability is as under:

To deal with fire efficiently and quickly at different location of mine including HEMM.

Source of Fire:

1. HEMM;
2. Oil & Lubricant Room; and
3. Diesel Pump/storage area.

Responsibilities

- Anyone noticing any indication of a fire must instantly begin calling for help by shouting FIRE, FIRE (Aag, Aag). They must also take urgent action to offer warning by continuously blowing the siren and take action to put out the fire using nearby appliances.

➤ **Duties of Mine Official:** -

The mine officials receiving the warning shall immediately inform following on phone.

- Firefighting station – for sending fire-fighting team.
- Security main gate – to inform senior person and to prevent unauthorized entry.
- Shift Engineer – to manage with available resources till then.
- Mines Manager – for overall supervision and control.

After giving information reach the spot, remove man & machinery and take steps to tackle the fire in accordance with the firefighting instructions. Inform at security office to get ambulance if required.

➤ **Duties of Fire Fighting Team: -**

On receiving warning the team shall reach the site of fire and depending on its nature, class and extent shall take steps to extinguish it and rescue persons if involved in fire.

➤ **Duties of Mines Manager:**

- On receipt of information about fire the Manager shall forthwith rush to the spot and assess the extent of fire. He shall supervise the fire-fighting operation and make necessary arrangement for medical aid to affected person, if any.
- Inform to senior officials and the statutory bodies.

The site main controller will be chosen from the senior management of the works with general responsibility of directing operations from the emergency control centre after relieving the site incident controller of the responsibility for overall control.

The specific responsibilities of the site main controller include:

- To decide (if not decided already) whether a major emergency exists or is likely, requiring the emergency services and the off-site emergency plan;
- To exercise direct operational control of the mine outside the affected area;
- Continually to review and assess possible developments to determine the most probable course of events;
- To assess the shutting down of all operation and then evacuation, in consultation with the site incident controller and key personnel;
- To ensure that casualties are receiving adequate attention;
- To liaise with Chief Officers of the fire and police services and with the Mines Safety Directorate and the district authorities;
- To control the movement of traffic within the mines;
- To arrange for a log of the emergency to be maintained;
- To issue authorized statements of the news media; and
- To control rehabilitation of affected areas after the emergency.

Emergency Control Centres (ECC)

The emergency control center is the place from which the operations to handle the emergency will be directed and coordinated. The site main controller, key personnel and the senior officers of the fire and police services will attend it. The center will be equipped to receive and transmit information and directions from and to the incident controller and other areas of the works, as well as outside. The emergency control center should be sited in the areas of the minimum risk.

Post Disaster Analysis and Evaluation

When the emergency is over, the team will carry out a detailed analysis of the causes of the accident, evaluate the influence of various factors and minimize them for future. At the same time, the adequacy of the Disaster Preparedness Plan will be evaluated and shortcomings will be rectified for the subsequent improvement of the plan.

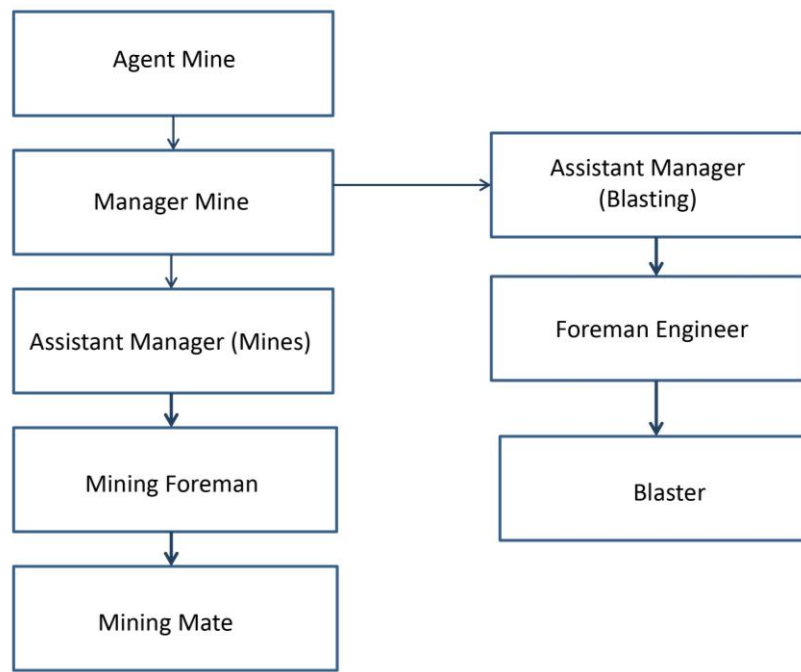


Figure 7.2: Onsite Emergency Flow Chart

7.2.3 Off-Site Emergency Planning

A vital part of any hazard control strategy is the off-site emergency plan. It must be predicated on the incidents that the mine management has determined have the potential to impact both the surrounding environment and human populations. The study that was done to establish the foundation for the on-site plan logically leads to the off-site plan, and as a result, the two plans ought to work in tandem. The ability to adapt a well-thought-out off-site emergency plan to situations outside of those for which it was designed is its most important characteristic.

The following outlines the many responsibilities that may be played in carrying out an off-site plan. It is likely that the local government or the site administration will be in charge of the off-site plan. In any case, the plan needs to designate an emergency coordinator who would assume ultimate responsibility for the actions conducted off-site. Similar to the on-site plan, the emergency coordinating officer must be able to function out of an emergency control centre. In many situations, a prompt judgement will be necessary regarding the advice to be given to

those who are "within range" of the accident - specifically, whether or not they should be urged to get indoors or evacuate.

Role of the Emergency Coordinating Officer (ECO)

An emergency coordinating officer (ECO), who may be a senior fire officer or police officer depending on the situation, will be in charge of the coordination of the various emergency services. The site's primary controller and the ECO will communicate often. Once more based on local arrangements, in the event of extremely serious incidents with significant or prolonged off-site consequences, external control may be transferred to a senior local authority administrator or possibly to an administrator chosen by the state or national government.

Role of the Local Authority

In certain regions, the local government is responsible for creating the off-site strategy. They might have assigned an Emergency Planning Officer (EPO) to handle all of this work as part of the EPO's responsibilities to have the local authority region ready for a variety of different emergencies. In order to gather the data that will serve as the foundation for the plan, the EPO will need to communicate with the works. For the same reasons that on-site plans are necessary, off-site plan rehearsals must be organised by the EPO.

Role of the Police

In general, a senior officer designated as the emergency coordinating officer takes overall command of the police during an emergency. During an emergency, the police's official responsibilities include regulating traffic and safeguarding people and property. Controlling viewers, evacuating people, identifying the deceased and dealing to casualties, and alerting families of the deceased or injured are among the duties.

Role of the Fire Authorities

Normally, the senior fire brigade officer assumes charge of a fire after receiving instructions from the site event controller upon arriving at the scene. For other incidents, such explosions and chemical leaks, the senior fire department official might also be held accountable in a comparable manner.

Fire officials in charge of large-scale hazardous works in their region had to be familiar with the locations of all combustible material warehouses, water supply sites, and foam supply points for firefighting apparatus.

Role of the Health Authorities

Following a significant accident, health authorities such as physicians, surgeons, hospitals, ambulances, and so forth have a crucial role to play and have to be included in every emergency plan. All general hospitals may have the knowledge and experience to handle this in all but the most extreme circumstances. In significant fires, injuries will ensue from the impact of thermal radiation to variable degrees.

7.2.4 Emergency Organization

Setting an Emergency Organisation is recommended. The Emergency Organisation will be headed by a senior executive (Mine Manager), who is in charge of the mine's operations. His role would be "Site Controller." In the mine, the Assistant Mines Manager would be assigned as the Incident Controller in accordance with the General Organisation chart. The Site Controller would receive reports from the Incident Controller.

For his part, each incident controller creates a team that will manage the incident using the staff members under his supervision. The reporting officer, who would notify the site controller and incident controller of the incident, would be the shift in charge.

Emergency coordinators would be designated to handle tasks including extinguishing fires, rescuing people, providing transportation, rehabilitating injured parties, and offering vital support services. Personnel from the Personnel Department, Security In-charge, and Essential Services would be involved in this. These individuals would all be regarded as key personnel.

The pump house in-charge, electrical fitters, electrical supervisors, and other maintenance personnel would be called in for emergency operations throughout each shift. Some employees of the mine offices would be recruited and their services used as messengers to ensure prompt communication in the event of an electrical failure or communication system breakdown. These employees would all be deemed essential employees.

In the event of an emergency in any area of the mine, the following mine officers will be in charge of coordination. Emergency responsibilities are given in **Table 7.3**.

Table 7.3: Emergency Responsibilities

Person	Responsibility
Head of the department/ Mine Agent	Site Controller
Section In charge / Mine Manager	Accident Controller/ Communication officer
Employee who gives the first information about the incident/accident	Primary Controller
P & A Dept. (HOD)	Liaison officer

7.2.5 Emergency Communication

Anyone who observes an emergency fire, fire spreading, etc. should inform the Emergency Control Centre and his immediate superior. The Site Controller would be evaluated by the person in charge of the Emergency Control Centre. The Site Controller makes an assessment regarding an anticipated On Site Emergency after confirming the details with the Shift In-charge or the local Incident Controller. All of the incident controllers and emergency coordinators would be informed about this. The site controller would command the emergency warning system to activate simultaneously.

Key Personnel and their Responsibility

1. Site Controller

The head of the department/ mine agent shall have an overall responsibility for controlling the incident/accident and directing the personnel.

- 1 To prepare a full proof plan for control of accident like, landslides, subsidence flood and other natural calamities;
- 2 To inform statutory bodies of the State and Central Government;
- 3 To inform communication officer about the emergency, control center and assembly point;
- 4 To provide all assistance and call for Fire Squad, Security Officer and other services required for removing/ control of danger;
- 5 To ensure that all necessary personnel assemble at assembly point; and
- 6 To make arrangements for medical treatment to the personnel got injured seriously.

2. Accident Controller/Mines Manager

- 1 Mock rehearsal of management plan prepared for accident;
- 2 To withdraw men/ machines from the affected area with priority for safety of personnel, minimize damage to the machines, environment and loss of material;
- 3 To act as an accident controller to all the later arrived;
- 4 To make a report based on the facts and figure and submit to the Site Controller; and
- 5 To communicate to the site in charge and make arrangement for the transportation of the injured personnel.

3. Primary Controller

- 1 To inform the Accident Controller/ Mine Manager from the nearest means of communication about the location and the nature of accident;
- 2 To assist in clearing any obstruction in relief of accident;
- 3 To carry out all instructions of accident controller; and

4 To provide first aid treatment and communicate to the shift in-charge.

Emergency Control Center (ECC)

For the time being, Mine Office Block is identified as Emergency Control Center. It would have external Telephone, Fax, Telex facility. All the Site Controller/ Incident Controller Officers, Senior Personnel would be located here. Also, it would be an elevated place.

The following information and equipment are to be provided at the Emergency Control Center (ECC):

- 1 Intercom, telephone;
- 2 Fire suit/goggles/gloves/helmets;
- 3 Hand tools, wind direction/velocities indications;
- 4 Public address megaphone, hand bell, telephone directories;
- 5 Site plan;
- 6 Emergency lamp/torchlight/batteries;
- 7 Plan indicating locations of hazard inventories, sources of safety equipment, work road plan, assembly points, rescue location vulnerable zones, escape routes;
- 8 Hazard chart;
- 9 Emergency shutdown procedures;
- 10 Nominal roll of employees;
- 11 List of key personnel, list of essential employees, list of Emergency Co-ordinators;
- 12 Duties of the key personnel;
- 13 Address with telephone numbers and key personnel, emergency coordinator, essential employees; and
- 14 Important address and telephone numbers including Government agencies, neighbouring industries and sources of help, outside experts, population details around the mine.

A. Assembly Point

Depending on the location of the mine, a number of assembly places would be identified where workers not directly involved in emergency management would gather for protection and rescue. Basic amenities like water and an emergency breathing apparatus would be prepared. Several places should be earmarked as assembly points due to the scale of mine. Assembly points are to be used based on where the hazard is located.

B. Emergency Power Supply

Diesel generators will be available in case of supply interruptions, and they will start up as soon as power goes out. Thus, the emergency power supply is connected to the administrative

building, mine lighting, water pumps, emergency control centre, and other auxiliary services.

C. Fire Fighting Facilities

First Aid & Fire-fighting equipment suitable for emergency should be maintained in each operation areas of the mine as per statutory requirements.

D. Location of Wind Sock

On the top of the administration block, windsocks would be installed to indicate the direction of the wind at the emergency response.

E. Emergency Medical Facilities

In the medical centre and emergency control room, supplies for treating burns from chemicals, fires, and other sources would be kept on hand, along with stretchers and gas masks. Assistance from private medical professionals would be sought. The government hospital would be contacted in case of an emergency.

Facilities for first assistance would be expanded. The names of the local medical staff and facilities would be updated and prepared. The maintenance of certain medications that are required for the emergency treatment of burn patients and those who are impacted by toxicity. Emergency medical supplies, including breathing apparatus, would be supplied and maintained. On the basis of mutual support, local industry managements would be asked for assistance in this respect.

F. Ambulance

An ambulance with driver availability in all the shifts, emergency shift vehicle would be ensured and maintained to transport injured or affected persons. Number of persons would be trained in first aid so that, in every shift the first aid personnel must be available.

Emergency Actions

A. Emergency Warning

Emergency communications would be acquainted to both the people outside and the employees inside the mine. There would be an emergency alert system put in place.

B. Evacuation of Personnel

Personnel who are not connected must evacuate to the assembly point in case of emergency. Operators must evacuate and follow emergency shutdown procedures. A copy of each shift's employee deployment is kept on file by Time Office. All of the rescue teams are capable of evacuating people if necessary.

C. All Clear Signal

Additionally, the Site Controller issues an all-clear signal following an incident after conferring

with the Incident Controllers and incident Coordinators. The District Emergency Authority, Police, and Fire Service personnel are notified by the Site Controller when assistance is needed or if the situation escalates into an offshore emergency.

Care and Maintenance during Temporary Discontinuance

In the event that the mine is temporarily shut down because of unexpected circumstances, the following preservation and care must be done:

- Notice to be served to all the concerned authority;
- The mining pit area shall be covered by temporary fencing;
- All access roads/ openings to the pit/ face shall be closed by parapet wall as per rule;
- Warning shall be displayed on the “Notice Board” at appropriate places;
- Security personnel shall be posted at every entry point;
- No unauthorized person shall be allowed to enter into the mine without prior permission of the management;
- Mine benches shall be dressed and properly sloped for its stability;
- Garland drain shall be made all around the mine and dumps to prevent water flow towards mine for prevention of land slide/side fall and siltation etc.;
- All men and machinery shall be withdrawn from the mine and shall be kept in a compact and safe place; and
- All safety precautions shall be taken care as per the given rules

7.3 OCCUPATIONAL HEALTH AND SAFETY

7.3.1 Occupational Health

The two main causes of the anticipated occupational health issues are noise and accidents. The required safety gear will be provided to employees in order to mitigate these risks and make plans to keep them within TLVs.

• Operation and Maintenance

During the operation phase, noise is the main cause of occupational health problems because it can impair hearing. Every worker will receive the required personal protective equipment. The following appropriate personal protection equipment will be provided to the working staff:

- 1 Industrial DGMS approved Safety Helmet;
- 2 DGMS approved Safety Shoes;
- 3 Zero power plain goggles with cut type filters on both ends;
- 4 Welders equipment for eye and face protection;

- 5 Cylindrical type ear plug;
- 6 Safety belt/line man's safety belt; and
- 7 Canvas cum leather hand gloves with leather palm.

All working personnel will be medically examined as per the provision of Mines Rules 1955. This is in addition to the pre-employment medical examination.

7.3.2 Safety Organization

There will be an appointment of a trained and experienced safety officer. The duties of a safety officer include identifying dangerous situations and unsafe worker behavior and offering advice on corrective measures. They also organize training programmes, conduct safety audits, and offer expert professional advice on a range of topics pertaining to occupational health and safety. He is also in charge of making sure that the statutes and safety regulations are followed. In compliance with the terms of the contract, each contractor shall appoint a single safety officer in addition to the ones employed by the industry to guarantee worker safety.

After construction is completed, safety officers will be posted in line with the Mines Act, and their roles and responsibilities will be as specified by the Act.

7.3.3 Safety Plan

During the construction and operation phases, there is concern for the safety of both personnel and materials. In the mine, a safety plan is created and put into action. Emergency plans are used to describe what level of preparedness an industry is for potential disasters. It is possible for the disaster to occur as a result of building collapse, fire, explosion, etc.

The project proponent will formulate a safety policy with the following regulations, keeping in mind the need for safety during the phases of operation and maintenance:

- To take action to guarantee that all known safety issues are taken into account in the design, operation, and maintenance of machinery and equipment;
- To allot appropriate resources to maintain the safe and healthy state of work;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use;
- To advise staff members about any devices, instruments, or procedures they use at work that could pose a risk to their health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up to date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at

the work;

- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate fire-fighting service together with training facilities for personnel involved in this service;
- To organize collection, analysis and presentation of data on accident, sickness and incident involving people injury or injury to health with a view to taking corrective, remedial and preventive action;
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees;
- To publish/notify regulations, instructions and notices in the common language of employees;
- To prepare separate safety rules for each type of occupation/processes involved in amine;
- To ensure regular safety inspection by competent persons at suitable intervals of all buildings, equipment, workplaces and the operations;
- Enclosures and hoods for noise-generating equipment will be provided whenever possible;
- Controlled blasting techniques with an optimal amount of explosive and 100% use of non-electrical initiation system;
- Secondary blasting will be completely avoided;
- Blasting will take place in the afternoon when fewer people are around;
- A thick belt of trees will be phased in around the mine's perimeter to attenuate noise;
- Trees will be planted on both sides of haul roads;
- Workers will be provided with personal protective equipment;
- Overcharging will be avoided;
- Periodic vibration monitoring will be conducted;
- Drilling parameters like burden, depth, diameter, and spacing will be suitably designed to give proper blast.

7.3.4 Safety Training

The Safety Officers, along with faculty members invited from Professional Safety Institutions and mines VT centre, will provide safety training. Safety training will be given to contractor labourers in addition to regular staff. Safety films and brochures are presented to employees in order to raise awareness of safety. The following are some suggested safeguards and corrective actions to stop fire-radiation:

- Segmenting cable galleries, employing appropriate sealing methods for cable passageways

and cracks in all directions, and ensuring efficient manual and automated firefighting operations will all help in locating and identifying the location of the fire;

- Fire guards for cable shafts would prevent the spread of fire in a horizontal direction;
- An effective approach of protecting conveyor galleries is to use a dependable fire detection system with appropriate zoning and alert interlocks;
- Maintaining a high standard of housekeeping assists in removing fire hazards, and a regular fire watch system enhances both fire prevention and firefighting; and
- Adequate fire monitoring by all parties involved would be ensured.

7.3.5 Health and Safety Monitoring Plan

Every employee's health will be monitored according to mine's regulations to detect any health issues that may arise from exposure to heat, dust, or noise.

CHAPTER-8

8.0 PROJECT BENEFITS

8.1 INTRODUCTION

The socioeconomic status of the people will not be negatively impacted by mining; on the other hand, mining operations will boost living standards. The mining industry gives locals work opportunities and contributes revenue generation, both of which improve the people's financial situation. In addition to the project's overall effects on the community, it is believed that improving services in the areas of health, education, and social awareness including care for the environment and ecosystem is essential. The different improvements are described as follows:

8.2 BUSINESS GENERATION AND EMPLOYMENT POTENTIAL

For Foreman cadre and Mining Mate positions, statutory persons are required. Youth from the area will be given preference for jobs in the mine. Indirect employment will also be created as a result of the several mining related businesses, such as maintenance operations, tea shops, motels, etc. Local labour will be used for plantation operations with appropriate maintenance, watch and ward duties, and mineral mining, loading, and unloading. There will be a total of 20 workers needed for mining operations. This will contribute to the area's financial situation improving. The only employment opportunities in the area are related to agriculture. But because of the current mining activity, the employment will be created for both skilled and unskilled workers. The State Government levies a royalty charge and contributes to the district mineral fund and cess for the purpose of excavating stone quarries. These actions indirectly benefit the local population. The current cultural events, which include local folk dance, singing, theatre, and other activities, won't alter. In actuality, the mining industry will improve the general state of society's economy, which will eventually contribute to the enhancement of the socioeconomic environment as a whole.

8.3 IMPROVEMENTS IN THE PHYSICAL INFRASTRUCTURE

A variety of entrepreneurs will be encouraged to establish their businesses in the surrounding areas by the proposed mining operation. A good market potential will be presented by the extracted material. Plantations will be placed alongside roadsides, riverbanks, and public facilities as part of the reclamation plan. The mining project in the area contributes to the improvement of the physical infrastructure, including the roads, public transit vehicles, water and sanitary facilities, mine worker housing and rest areas, safety equipment, etc.

8.4 SOCIAL BENEFITS

The proposed stone quarry mining will significantly boost economic status of the surrounding. Infrastructure development in and around the project site will follow developments in company activity. In and around the leasing area, amenities like healthcare and education will be developed and made available to the local population as well. The proposed mining project activity does not involve any rehabilitation and resettlement process as the project is freshly designed at representative site where none of the settlement is present.

Healthcare promotional activities will be undertaken by the proponents. Health checkup camps will be conducted annually which will increase the general health status of the residents in the nearby villages. Educational activities will be promoted by the proponents by providing scholarships to students annually. About 20 people will be benefitted by way of direct and indirect employment generation.

8.5 EMP FOR SOCIAL AND INFRASTRUCTURE DEVELOPMENT

The proponent of the proposed mining project is conscious of its social responsibilities, and in order to uphold these obligations, the unit will, to the greatest extent feasible, use unskilled and semi-skilled labour from the surrounding villages for the proposed project. The unit aims to create as much indirect employment as possible in the surrounding villages by hiring local contractors for both the construction and operation phases. The proponents of the project will conduct a number of activities in neighbouring villages and will make a reasonable contribution to social development as part of EMP.

The total estimated cost of project is 60 lakh in addition to the activities along with budgetary provision i.e. Rs. 1.2 lakhs @2.0 % of project cost provided under CER. As per MoEF&CC, New Delhi Vide its OM dtd. 30th September 2020 a budgetary provision of Rs. 12.25 Lakhs will be provided towards EMP for Socio economic Development and based on public hearing outcome. Although the heads can be changed on the basis of local demand analysis at the time of Public Hearing and recommendation of SEAC.

Table 8.1: Need Based Activities by the proposed mining project

Proposed Programme	Amount (Rs. In Lacs)					
	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year	Total
Free Health Camps & donation of Medicine to villagers	0.12	0.10	0.15	0.08	0.10	0.55
Provision of Dust bin in nearby villages	0.05	0.04	0.03	0.05	0.03	0.20
Toilet facility to nearby people	0.08	0.05	0.07	0.10	0.15	0.45
Total	0.25	0.19	0.25	0.23	0.28	1.2

8.6 FINANCIAL BENEFITS

The proposed project will contribute additional revenue to the Central and State exchequer in the form of excise duty, income tax, state sales tax or GST, tax for interstate movement, corporate taxes etc. Indirect contribution to the Central and State exchequer will be there due to income by way of registration of trucks, payment of road tax, income tax from individual as well as taxes from associated units. Thus, the proposed project will help the Government by paying different taxes from time to time, which is a part of revenue and thus, will help in economic status of the area.

8.7 OTHER TANGIBLE BENEFIT

- Decreases the rate of migration from the project villages as the employment opportunity will be created in the surrounding villages.
- Development of socio economic status of the people in the project area.
- Plantation of economic important trees in the open spaces around the mining lease area which are accessible to the local people.

CHAPTER 9

9.0 ENVIRONMENTAL COST BENEFIT ANALYSIS

The environmental cost benefit analysis is not recommended for this project during scoping stage. Mining is one of the primary and oldest industries & contributes significantly towards growth rate of India. The mining projects require huge resources, both financial & technical therefore projects got proposed based on economic evaluation as well as considering environmental protection. A remarkable growth has been seen in maintaining environmental sustain ability along with development in recent years. The proposed Shyampur Stone Mine comes under located at Mouza: Shyampur, J.L. No. – 112, Plot No. – 807, Post: Shyampur, P.S. & Block: Saltora District: Bankura, State: West Bengal-722158, Area- 1.29 Ha. The proposed production capacity of stone will be 354887.06 MT for 5 years belongs to M/s. Dhiren Ghosh. The lease area is non-forest Government occupied revenue land. Proposed cost of project is Rs. 60 Lakhs

- No forest land involvement, so no diversion of forest land.
- No R &R involvement
- Not covered under Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 as no such area is involved in it
- No National Park, Sanctuaries, Biosphere Reserve, Wildlife Corridors, Tiger/Elephant reserves within study area, hence threat to biodiversity is minimal
- No critically polluted areas present in study area
- No diversion of any perennial surface water body

The project will provide socio economic benefits to the local people and the region directly & indirectly such as wages generation and benefit to state government. This project will definitely create more environmental; economic and social benefits to the society at large. It can be concluded that there will be no ecological loss or significant environmental disturbance in the area as all mine operation will be conducted as per applicable rules of Metalliferous Mines Regulation (MMR)-1961; Mines Act-1952, Mines Rules 1955, Mineral concession rules (MCR) 2016, Mineral Conservation and Development Rules (MCDR) 2017 for safe, scientific & systematic working. Refer EMP Table.

CHAPTER 10

10.0 ENVIRONMENT MANAGEMENT PLAN

An Environmental Management Plan (EMP) is a site-specific plan created to ensure that the project is carried out in a way that is sustainable for the environment. This chapter provides a brief summary of the EMP's specifics.

10.1 INTRODUCTION

Preventing avoidable losses of environmental resources and values as a result of environmental management is the main goal and advantage of using environmental impact assessments in the project planning stage itself. Environmental management comprises recommendations for a post-project monitoring programme in addition to protection, mitigation, and enhancement actions. To prevent negative effects, environmental management may recommend changing the project site or how it is operated. The study area's industrial growth must be balanced within the bounds of allowable assimilative capacity and with the prudent use of the region's nonrenewable resources.

The Environment Management Plant (EMP) is necessary to ensure sustainable development in the study area of the proposed project site; therefore, it must be a comprehensive plan that involves the cooperation and contributions of the affected population of the study area, the government, the proposed company, and regulatory agencies like the Pollution Control Board operating in the region.

In order to minimize the influence on the ecosystem and to mitigate the requirements given by the regulatory authority, environmental impact has been detected, anticipated, and evaluated during construction and operation activities. Control mechanisms for potential environmental impacts are provided by the environmental management plan. The following articles cover the Environmental Management System for various environmental attributes.

10.2 OBJECTIVES OF EMP

- Overall conservation of environment.
- Minimization of waste generation and pollution.
- Judicious use of natural resources and water.
- Safety, welfare and good health of the work force and populace.
- Ensure effective operation of all control measures.
- Vigilance against probable disasters and accidents.
- Monitoring of cumulative and long term impacts.
- Ensure effective operation of all control measures.

10.3 EMP during the Construction Phase

There is no significant construction operations planned for this project because it is a stone quarry mining operation. Thus, there is no need for an environmental management plan during the construction phase.

10.4 EMP during the Operation Phase

10.4.1 Air Environment

Gaseous emissions are anticipated during the operation phase from the trucks and equipment used for mining. Monitoring of ambient air quality for PM10, PM2.5, SO2, NOx, and CO will continue at the designated sites in accordance with the environmental monitoring strategy outlined in this EIA report's Chapter 6. In order to lower the emissions of fugitive and gaseous pollutants during the operation phase, the following general measures are suggested to be implemented at the proposed mining site:

- The project site will have water sprayed to suppress dust.
- Barricades will be provided along the mining operation zones to act as noise and dust barriers.
- A greenbelt development plan incorporating native species has been designed. The peripheral greenbelt will lower the amount of dust.
- Minimize vehicle idling time, provide enough parking, and arrange traffic properly for smooth traffic flow.
- All vehicles used for the transportation of minerals must have a valid PUC certificate. The truck must also be covered to prevent fugitive dust emissions.
- All equipment and vehicle engines and exhaust systems shall be maintained in compliance with manufacturer's specifications to ensure that exhaust emissions do not above the permitted levels. To guarantee compliance, this should be periodically monitored.
- To minimize dust generation, drill bits with sharp edges will be utilized, and regrinding will be done on a regular basis.

10.4.2 Noise Environment

- It is advised to implement the following environmental management strategies to mitigate the negative effects on noise levels during operation:
- Along the mining activity areas, barricades will be erected to act as dust and noise barriers.
- No work that contributes to noise pollution will be done at night.
- All vehicles used in the transportation of minerals must have a valid PUC certificate. Vehicles must be serviced and maintained on a regular basis to prevent unwanted noise or

vibration.

- Garden trees and green belts reduce noise, traffic-related pollution, and the heat island effect.
- To minimize noise during operation, equipment must be properly lubricated, muffled, and modernized.
- By using a controlled blasting process, blasting-related noise and vibration will be minimized.
- We will refrain from blasting in adverse circumstances.
- Secondary blasting will be replaced with rock breakers.

10.4.3 Water Environment

- It is expected that the Shyampur Stone Mine project will demand 5.0 KLD of water in total.
- It is necessary to provide adequate and suitable sanitary facilities, such as temporary restrooms, to provide hygienic conditions at the project site.
- A safe distance away from the block area is designated for the treatment of domestic wastewater into a septic tank and then a soak pit; no wastewater will be allowed to be discharged into the water body.
- Vehicle maintenance areas will be positioned to minimize the risk of unintentional oil spills contaminating nearby water bodies.

10.4.4 Soil Environment

The following environmental management measures should be implemented throughout the operation period to minimize any negative effects on the land environment.

- To make sure that the proposed mining activities have no negative effects on the soil quality, the soil quality will be regularly monitored (every six months).
- In the ensuing monsoon seasons, the land use which was temporarily altered by the excavation process would naturally return.
- Regular inspections will be conducted to verify any instances of river bank erosion brought on by mining operations. Before the monsoon season, the river bank will be restored and appropriate action will be taken if any abnormal situations are noticed.
- The labelling and handling procedures will be upheld, and the appropriate storage arrangements and safety measures will be implemented to prevent the leakage of oil, diesel, etc. from vehicles and equipment.

10.4.5 Biological Environment

- A green belt will be created around the lease boundary, and plantations on reclaimed land, undisturbed areas, workshops, and mining offices will be established. In cooperation with

the Forest Department, native plants will be planted.

- It has been suggested that a green belt be created around the mining area's edge in three rows, separated by two metres. There will be 1050 saplings to be planted in total.
- Since there isn't much vegetation in the mining lease area, there won't be any vegetation clearing as a result of the proposed mining project.
- There are only a handful common tiny types of wildlife in the mine's immediate neighbourhood.
- This mining project won't have an effect on the wildlife.

10.4.6 Socio-economic Environment

- As high-skilled labourers from the local community are to be deployed (an average of 20 per day), housing for construction workers will not be available at the project site.
- Although this traffic isn't expected to cause any annoyance on the primary access route, an efficient traffic management plan must be created to prevent congestion on the main roadways.
- Since there is no habitation in or near the mining block areas, no human habitation clearance is necessary for mining operations.
- Since the project is being planned at a representative site without any settlement, there will be no resettlement or rehabilitation procedures involved in the proposed mining project activity.
- Because labourers and supplies must be transported, air pollution and noise levels could rise as a result of mining operations.

10.4.7 Rehabilitation & Resettlement (R&R) Action Plan

Since no one is living in the core zone, either permanently or temporarily, and the entire mining lease area is private land, resettlement and rehabilitation are not relevant.

10.4.8 Occupational Hazards and Safety

There is a strong correlation between productivity and positive employer-employee relations and occupational safety and health. The two main elements affecting occupational health in stone quarry mining projects are land degradation and dust. Employee safety during maintenance, operations, and other activities must adhere to mine policies and procedures.

The risks associated with working in mines include falls from elevated areas, equipment injuries, and noise and dust pollution. The DGMS has provided the essential safety rules against various workplace dangers. These principles will be followed carefully by the management.

According to the Ministry of Labour and Employment's report on occupational safety and health, those who work in mines are subjected to many workplace dangers that have a negative impact on their health. Among the most significant ones are vibration, heat, humidity, dust, and noise.

The project proponent will take all required actions under Occupational Safety and Health Management to improve the working conditions in the mine. Issues with occupational health and safety arise at every stage of the mining cycle.

The following categories are used to classify these:

- Occupational health and safety in general
- Explosives use;
- Vibration and noise;
- Mining hazards, including fires, explosions, cramped areas, and environments low in oxygen.

System of Detection of Occupational Diseases in Mines

According to the Mines Act, the industry must do worker health surveillance and medical examinations in order to identify occupational disorders. The following are the fundamental components of any health surveillance system that must be implemented in mines:

- Initial Medical Examination of persons to be employed in mines.
- Periodic Medical Examination once every five years. General physical examination, chest radiographs, lung function tests and audiometry.
- Classification of chest radiographs of workers as per ILO Classification.
- Medical examination within one year of superannuation.
- Evaluation of all cases of suspected pneumoconiosis by Pneumoconiosis Medical Board.
- Maintenance of medical records till the person is in service and 10 years thereafter.

Assessment Occupational Risk and Arrangement

The following lists the potential health effects of stone quarry mining operations on mine workers along with recommended mitigating measures.

Table 10.1: Possible Impact on Health of Mine Worker and Mitigation Measure

Type of diseases	Causes	First Aid Measures	Exposure Control / Personal Protection
Skin Diseases	Because of vigorous reaction with water, it causes severe irritation when placed in contact with moist skin or eyes.	<ul style="list-style-type: none"> First Aid for Eyes: Medicated Dust or powder should be flushed from the eyes with running water for 15 minutes. If irritation persists obtain medical assistance. 	<ul style="list-style-type: none"> Personal Protective Equipment
Skin Diseases	Over expression of LOI can cause Itching Rash or hives		1. Eye protection requirements: Safety glasses are recommended.
Stomach diseases	Stomach upset and diarrhea may occur		2. Skin protection requirements: Protective gloves are recommended, to prevent mechanical irritation.
Inhalation	Respiratory irritant. Accumulation in lungs may be responsible for benign pneumoconiosis, but is not considered to cause pulmonary functional impairment.	<ul style="list-style-type: none"> First Aid for Ingestion: Obtain medical assistance at once. First Aid for Inhalation: Breathing difficulty, caused by inhalation of dust or fume requires removal to fresh air. If breathing has stopped perform artificial respiration and seek medical assistance at once. 	3. Respiratory protection: Not normally required, use an appropriate respirator if airborne dust concentration exceeds the OSHA, standards.
Eye/Skin	Eye irritant		4. Other protective equipment: Eye wash fountain should be readily available in areas of use or handling.
Lung diseases	Inhalation may cause coughing, sneezing, labored breathing. It may then evolve into burns with perforation of the nasal septum, abdominal pain, nausea and vomiting.	<ul style="list-style-type: none"> First Aid for Ingestion: Obtain medical assistance at once. 	<ul style="list-style-type: none"> Ventilation Requirements:
Fever	Magnesium in the form of nascent magnesium oxide can cause metal fume fever with cough, chest pain, and flu like fever, if inhaled in sufficient quantity.	<ul style="list-style-type: none"> First Aid for Skin: Skin cuts and abrasions can be treated by standard first aid. Skin contamination with dust or powder can be removed with soap and water. If irritation 	<ul style="list-style-type: none"> 1. Local Exhaust: Recommended, when excavation or any other operation where dust are created. Environmental Surveillance: 1. If the operation generates dust or fumes, exposure to airborne materials should be determined by having air samples

		persists obtain medical assistance.	taken in the employees breathing zone and work area.
Breathe diseases	Exposure to silicon dioxide has been linked with small vessel vacuities, autoimmune diseases, kidney damage, and rheumatoid arthritis.	First Aid for Inhalation: Breathing difficulty, caused by inhalation of dust or fume requires removal to fresh air. If breathing has stopped perform artificial respiration and seek medical assistance at once.	

Safety Precautions & Mitigation Measures

Adequate safety and health precautions will also be taken in order to prevent any negative effects that various contaminants may have on the workers' health.

- It is essential to observe all safety precautions, including the usage of protective gear such dust masks, helmets, shoes, non-breakable goggles, and knee pads, as needed. Programmes for raising awareness of safety issues, prizes, safety-related posters, slogans, etc., will be promoted.
- Continuous testing and maintenance of all equipment in accordance with manufacturer's instructions.
- Close observation of the elements in the workplace and work procedures that could have an impact on the environment and the health of employees
- Operating the mine in accordance with authorized environmental and mining plans.
- Offering drinking water and portable restrooms as well as other facilities at rest areas for mine workers; instructing staff on how to utilize safety equipment and administer first aid in a vocational training facility.
- A Medical Officer's periodic medical examination of every employee.
- The mine site will be provided with First Aid Facility.

10.5 ENVIRONMENT MANAGEMENT CELL

In addition to an environmental management plan, a permanent organizational structure responsible for conducting environmental monitoring and ensuring the efficient implementation of mitigation measures is also required. To this end, the project proponent will provide roles to officers belonging to different fields in order to coordinate the administration and execution of environmental control measures. In essence, this department measures ambient air quality, water and effluent quality, noise level, etc. and reports the results to the appropriate external agency or department as necessary. The department responsible for

environmental and safety will also handle the preparation of environment statement, carrying out environment audit, preparation of Consent to establish & Consent to operate. The tentative schematic diagram also shown as follows for the same.

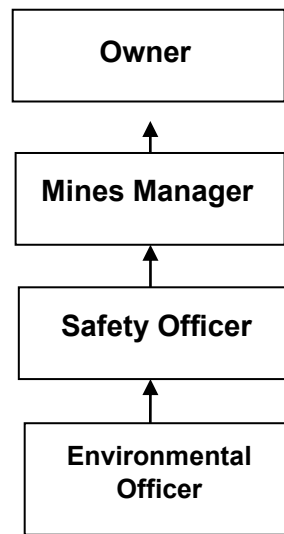


Figure 10.1: Environmental Management Cell

In order to carry out the environmental monitoring, EMC will perform the following activities:

- EMC will regulate the application of environmental control measures in accordance with the authorized action plan.
- Recognize and document the barriers to environmental planning and execution.
- Maintaining systematic records and documentation about environmental issues.
- Lab analysis and field observation.
- Plantation development observation.
- Adherence to the regulatory bodies' environmental regulations.
- Discussion of environmental issues with the relevant departments. Communicate and coordinate with agencies of the State and Federal Governments.
- To keep an eye on environmental standards' adherence.
- Constantly raising environmental performance standards.
- Adhering to appropriate monitoring and documenting protocols in order to create better
- The mine site's environmental management system.
- To keep up with regulatory requirements and arrange for the necessary certificates or consents viz., air and water.
- To carry out annual environmental monitoring and send the report to the SPCB.

10.6 GREEN BELT DEVELOPMENT

The design of the Greenbelt development programme will adhere to the natural limitations of the Stone Mine region. Specifically, the selection of species will take into account the indigenous flora that is known to be robust to various conditions.

Greenbelt development is necessary for:

1. Landscaping and providing shelter
2. Help in reducing Pollution level
3. Surface air purification by providing oxygen and letting SPM to settle on the leaves.
4. To attenuate noise generation by movement of vehicles and other machinery.
5. Improve ecological conditions.
6. Improves the aesthetics & beneficially influence the microclimate of the surrounding.

The following characteristics will be taken into consideration while selecting plant species for green belt development and tree plantation.

1. They should be local indigenous and drought resistant species.
2. They should be fast growing and tall trees.
3. They should be perennial and evergreen.
4. They should have thick canopy cover.
5. The planting should be in appropriate alternate rows around the site to prevent lateral
6. Pollution dispersion
7. The trees should maintain regional ecological balance and conform to soil and hydrological conditions. Indigenous species should be preferred.
8. Native species will be planted as per CPCB guidelines.

Plantation Programme

Since the area comprise of hard rock without any significant soil cover, the area is difficult for sustenance of vegetation. However, thin layer of top soil will be scrapped off, wherever observed, and will be stacked separately in the safety zone area. This top soil will be used for plantation. The 7.5 meter safety barrier shall be used for green belt development at 2m spacing left all round and shall be used for plantations of trees. Neem, Karanja, Mango, Kusum, Accacia, Guava etc. species will be selected. The main aim of the green belt development is to arrest dust and noise generated from the mine and also to form a visual barrier.

Appropriate plant species of different life forms will be grown to develop the vegetation cover and thereby provide habitat for the faunal species. The sapling list of plant species suggested includes the following criteria:-

- Tree species which are well adapted to local environmental setting, tall, bearing larger canopy cover and leaf area.
- Tree species of different size classes (small, medium and larger) were suggested to maintain the different canopy levels at vertical profile.
- Fruit trees in the selection list would help to attract birds and fruit eating bats which are locally available.
- Wild species were suggested to provide habitat for faunal species, increase the faunal species diversity and maintain the naturalness.

Table 10.2: Proposed Greenbelt/plantation details

Year	Name of the saplings to be planted	No. of saplings proposed	Targeted Survival Rate	Plant after survival	Location
1st	Neem, Karanja,	525	75%	395	Safety Barrier & Outside the ML area
2nd	Arjun, Gamar,	525		395	Safety Barrier & Outside the ML area
3rd	Mango,				Maintenance and nourishment of the
4th	Kusum,				
5th	Accacia, Guava, Babul, Bot, etc.				plantation will be done during the last three years
Total		= 1050		=790	

*Note: Since the mining lease area is 1.29 ha, 7.5 m safety barrier has been utilized for green belt development purpose is about 4.75 % under 0.059 Ha present at ML area and remaining 28.25% i.e. 0.361 Ha will be utilized for green belt purpose in adjoining plot area at mouza – Mouchuria, Jl.- 111, Plot no. 294 and 419, having area – 1acre/0.404 Ha which is about 300 m distance from the lease hold area towards WSW direction where total 850 no. of saplings is proposed for green belt development. Since the first 2 years will be the Green Belt plantation drive and last 3 years will be the maintenance and nourishment of plantation for their growth as well as survival status.

10.7 BUDGETARY ALLOCATION FOR ENVIRONMENTAL MANAGEMENT PLAN

The project's environment protection, management, pollution control, and monitoring systems will be funded with an initial budget of Rs 4 lakhs for capital costs and Rs 12.25 lakhs for recurring costs. Appropriate budgetary provisions will also be made, as well as recurring expenditure for the project's environmental management.

Table 10.3: Environment Management Cost

Sr. No.	Component	Description	Capital Cost (Rs. in Lakhs)	Recurring cost per annum (Rs. in Lakhs)	Total recurring cost in lease period (Rs. in Lakhs)
1.	Air Pollution Control	Dust Suppression (Water tanker & maintenance of water tanker & machineries for water sprinkling. (Rent))		0.30	1.50
		Air (8 samples)		0.20	1.00
Total			-	0.50	2.50
2.	Water Pollution Control	Purchase of mobile toilets with its maintenance	0.50	0.05	0.25
		Water samplings (4 SW & 4 GW samples)		0.20	1.00
Total			0.50	0.25	1.25
3.	Noise pollution	Noise (8 samples)		0.10	0.50
Total			-	0.10	0.50
4.	Environmental Monitoring & Management	Electronic display board near the main gate (Rent)		0.10	0.50
		Monitoring & reporting cost of registered laboratory		0.10	0.50
Total			-	0.20	1.00
5.	Occupational Safety	Provision of safety shoes, dust mask, safety goggles, ear plugs, safety helmets, etc to workers.	0.60	0.10	0.50
		Construction of Rest Shelters & First Aid Centre	0.40	0.10	0.50
		Annual health checkup of workers & health camp		0.10	0.50
		Ambulance for workers and villagers-1 No.(Rent)		0.10	0.50
		Training to Staff		0.10	0.50
Total			1.00	0.50	2.50
6.	Plantation & Green Belt Development	Plantation and Green Belt Development for the entire lease period	1.00	0.50	2.50
		Maintenance/ monitoring of sapling for green belt development for 2 years	-	0.50	1.00
Total			1.00	1.00	3.50
7.	Others	Construction and maintenance of Haul Road	1.50	0.20	1.00
Total			1.50	0.20	1.00
Grand Total			4.00	2.75	12.25

CHAPTER 11

11.0 SUMMARY AND CONCLUSION

11.1 INTRODUCTION

Environmental Impact Assessment (EIA) gives details about the various impacts on the local community and surrounding environment due to proposed stone quarry. To meet the demand of various government projects being executed in the region, the project proponent tends to open the proposed stone quarry mining project in the region. The proposed stone quarry mining project having lease area 1.29 Ha. is proposed to be located within the Near Village Shyampur, PO-Saltora, PS- Saltora, District- Bankura, West Bengal.

The proposed quarry area of 1.29 Ha is located within the Near Village Shyampur, PO-Saltora, PS- Saltora, District- Bankura, West Bengal. As recommended by Directorate of Geology and Mining, Govt. of West Bengal the mining plan is allowed for 5 years. The total mining area is more than 1.29 Ha, hence, EIA has to be prepared for the project.

This EIA-EMP report is prepared in line with Standard ToR being granted by SEIAA, West Bengal for other similar projects.

As per EIA Notification dated 14th September, 2006 and subsequent amendment the project is categorized under Category “B2” but it CLUSTERING with Deep Black Stone Project of Sri Sarandeep Singh Saini, Jaganath Plaza 202, Santa Dungal, Asansol (M. Corp.), P.O. Burnpur, P.S. Hirapur, District Paschim Bardhaman, PIN 7 13325 (W.B.) comprising an area of 4. 223 Hectares (10.44 Acres), falling in Mouza: Mouchuria, J.L. No. 111, Plot No. 35(P), P.S. & Block Saltora, District Bankura, State West Bengal within a radius of 500 meters so the area outcome after clustering is more than 5 Ha. Hence, EIA has to be prepared for the project.; Project Activity 1(a) Mining of Minerals and requires Environmental Clearance (EC) to be obtained from State Environment Impact Assessment Authority, West Bengal. (**Annexure-VII**)

This EIA report is prepared based on the Standard ToR conditions recommended by SEAC/SEIAA, West Bengal for other similar projects and project related technical details provided by The Divisional Forest Officer, Bankura Forest Division.

11.2 PROJECT DESCRIPTION

In order to ensure mineral conservation, systematic mining and protection of environment, the West Bengal Minor Mineral Concession Rules (AMMCR), 1994 has been replaced by AMMCR, 2013 and it has been made mandatory to prepare Mining Plan LoI No.

BNK/BS/2023/1/2023-7 dtd.10.03.2023 & its extended LoI No. is MDTC/RAIYATI/Ext. of LoI/1938 dated-04.10.2024 and progressive Mine Closure Plan for grant of any mineral concessions like "Mining Lease", "Mining Contract" or "Mining Permit" in respect of minor minerals for systematic and scientific development of all mines, quarries as well as river bed mining. The responsibility of preparation of "Mining Plan" in respect of any mine applied for mineral concession has been entrusted to technical experts known as "Qualified Person" (QP) and this has been made mandatory for all mines and quarries.

In the present case, the proposed Shyampur Stone Mine Area is recommended for 5(five) year by the Govt. of WEST BENGAL to extract rock boulders from the location and is demarcated by the Department of Environment and Forest, Govt. of West Bengal.

EXTENT OF MECHANISATION:

As stated earlier this will be manual quarry with compressed air drilling and blasting. Boulders will be loaded to the trucks/dumpers manually or mechanically and transport to the respective destinations.

Proposed of mining methodology

- Mining will be carried out strictly as per Mining Act/Rules.
- Mining will be done in Day time and dry seasons only.
- Required safe corridor will be maintained.
- Mining will be restricted to the depth of 6 m.
- Ground water will not be disturbed. The mining will be done 118 m above ground.
- Angle of repose for mining will not be more than 30degree.

11.2.1 LIST OF REQUIRED EQUIPMENT’S/ MATERIALS

MINING EQUIPMENT:

Table 11.1: List of Mining Equipment

Sl.No.	Type of Machine	Nos.	Size/ Capacity	Purpose
1.	Wagon Drill (Dia 90 mm)	01 Nos.	25m/hr.	For blast hole drilling
2.	Shovel (Back Hoe)	02 Nos.	0.9 m ³	1 for black stone production and 1 no. for spare.
3.	Compressor	1 Nos.	300 cfm	-
4.	Jack Hammer	1 Nos.	2000 rpm	For secondary drilling
5	Dumper	02 Nos.	10 Metric Ton	1 for black stone transportation & 1 no. for spare.
6	Water tanker (sprinkler)	01 Nos	-	For water spraying at dust Suppression.
7	Portable Pump	01 Nos.		For De-Watering

(some machineries will be deployed on hiring basis)**

USE OF EXPLOSIVES:

The question of using of explosives for breaking of stones is not advisable. But keeping the hardness and compactness of the deposit, the project proponent may approach the competent authority, Office of the Deputy Commissioner, Bankura for Blasting Permission and obtain NOC from the Pollution Control Board of West Bengal.

Solid and Hazardous Waste Generation

The top soil should be removed and stored separately. The waste rock dumps are first utilized to fill the void up to a planned level. The top soil stored separately should then be laid over it to sustain plan growth. Small amount of domestic waste by the workers at the site will be generated.

11.3 UTILITIES REQUIREMENT

11.3.1 Water Requirement & Source

The total water requirement shall be 5.0 KLD for domestic and sprinkling purpose, which will be sourced from Water Tanker of the village. The proposed site has high rainfall due to south-west monsoon and retreating monsoon seasons.

- Dust suppression – 3.6KLD
- Green Belt – 0.63 KLD
- Domestic – 0.20 KLD.
- Miscellaneous uses- 0.57

11.3.2 Power Requirement & Supply

The proposed SHYAMPUR STONE MINE does not require any power supply for the mining operation. It is proposed to operate in a single shift of 12 hours with 1 hour lunch interval between 1 Pm to 2 Pm. However, if required, necessary statutory permissions will be taken from WBSEDCL. DG set or solar Power System will be used for office purposes during office time.

11.3.3 Manpower Requirement

The proposed mining project will generate direct & indirect employment. About 20 per day people will get direct employment, and some persons will also be affected indirectly and employed with allied and related industries, such as transportation, maintenance, etc. Following staff & workers are proposed to be employed:

Table 11.2: Manpower Details

Category		Description	Heads	
A	Statuary Personnel	i	Mine Manager	1
		ii	Mine Foreman	1
		iii	Mine Mate cum Blaster	1
B	Skilled Personnel	i	Excavator (Operator)	1
		ii	Dumper Operator	5
		iii	Driller	1
C	Semi-Skilled Personnel	i	Helper	2
		ii	Water Sprinkling Helper	1
D	Unskilled Personnel	i	Miner/General Labourer	3
		ii	Security Guard	2
E	Other Personnel	i	Clerk	1
		ii	Peon	1
Total Personnel engaged in Mine operation			20	

11.3.4 Fire Fighting Facilities

In order to combat any occurrence of fire in mining area premises, fire protection facilities are envisaged for the mining operation. All mining units, office buildings, parking areas of HEMM, etc. will be provided with adequate number of portable fire extinguishers to be used as first aid fire appliances

11.3.5 Project Cost

The project cost of the project is estimated as **Rs. 60 Lakhs.**

11.4 EXISTING ENVIRONMENTAL SCENARIO

11.4.1 Baseline Environmental Studies

The baseline environmental quality data for various component of environment viz. Air, Noise, Water, and Land are given in **Table 11.3.**

Table 11.3: Baseline study report

Baseline Data Generation	Pre-monsoon Season (Period: 18 th June 2025- 26 th June 2025)		
METEOROLOGICAL DATA	First Predominant Wind Direction - WNW (16.94%) Second Predominant Wind Direction - NW (12.91%) Calm conditions (%) – 0.77 Avg. Wind Speed (m/s) - 3.22		
AAQ PARAMETERS AT 8 LOCATIONS	PM ₁₀ = 55.6– 72.6 µg/m ³ ; PM _{2.5} = 19.8-33.9 µg/m ³ SO ₂ = 9.9– 16.1 µg/m ³ ; NO ₂ = 17.1 – 30.1 µg/m ³ CO = BLQ(LOQ-0.5) mg/m ³ ;		
GROUND WATER QUALITY AT 8 LOCATIONS	Parameters	Unit	Range
	pH	-	7.14 – 8.26
	EC	µs/cm	244 – 527
	TDS	mg/l	197 – 497
	Total hardness	mg/l	70 - 282
	Chloride	mg/l	53.74 – 157.4
	Sulphate	mg/l	12.37 – 28.18
	Nitrate	mg/l	5.04 – 11.24
Fluoride	mg/l	BLQ(LOQ-0.1)	

Baseline Data Generation	Pre-monsoon Season (Period: 18 th June 2025- 26 th June 2025)		
	Iron	mg/l	0.04– 0.20
	Cadmium	mg/l	BLQ(LOQ-0.002)
	Arsenic	mg/l	BLQ(LOQ-0.01)
	Zinc	mg/l	BLQ(LOQ-0.02)
	Lead	mg/l	BLQ(LOQ-0.01)
	Chromium	mg/l	BLQ(LOQ-0.02)
SURFACE WATER QUALITY AT 4 LOCATIONS	Parameters	Unit	Range
	pH	-	7.47 – 8.06
	EC	µs/cm	324 – 522
	TDS	mg/l	286 -492
	Total hardness	mg/l	182– 296
	DO	mg/l	5.6 – 5.9
	BOD	mg/l	BLQ(LOQ-4)
	COD	mg/l	2.5 – 3.1
	Chloride	mg/l	58.25 – 112.18
	Sulphate	mg/l	15.04 – 24.26
	Nitrate	mg/l	8.24 – 12.20
	Fluoride	mg/l	BLQ(LOQ-0.1)
	Iron	mg/l	0.15 – 0.25
	Cadmium	mg/l	BLQ(LOQ-0.002)
	Arsenic	mg/l	BLQ(LOQ-0.01)
	Zinc	mg/l	BLQ(LOQ-0.02)
	Lead	mg/l	BLQ(LOQ-0.01)
	Chromium	mg/l	BLQ(LOQ-0.02)
	Total Coliform	MPN/100 ml	BLQ(LOQ-2)
NOISE LEVELS AT 8 LOCATIONS	<p>Residential Area – 53.9 to 72.6 dBA for day time and 42.1 to 59.2 dBA for night time.</p> <p>Commercial Area – 61.5 to 63.9 dBA for day time and 52.0 to 52.8 dBA for night time.</p> <p>Silence Zone – 51.8 dBA to 52.3 dBA for day time and 31.9 dBA to 38.9 dBA for night time.</p> <p>Industrial area – 70.3 dBA for day time and 61.5 dBA for night time.</p> <p>Noise levels at each station were observed within CPCB standards.</p>		
SOIL QUALITY AT 8 LOCATIONS	Parameters	Unit	Results
	pH	-	7.32-7.98
	Organic Carbon	%	0.63-1.10
	Nitrogen	Kg/hec	43.07 – 57.98
	Phosphorus	Kg/hec	0.1 – 0.14
	Potassium	Kg/hec	224.98 – 399.81
	Sodium Adsorption Ratio	-	1.04– 1.29
Biological Environment	Flora		

Baseline Data Generation	Pre-monsoon Season (Period: 18 th June 2025- 26 th June 2025)
	<p>There are many trees, shrubs, herbal species found in the district. The following tree species are noticeable in the district, viz., Akashmoni (<i>Acacia auriculiformis</i>). Mango (<i>Magnifera indica</i>), Arjuna (<i>Terminalia arjuna</i>), Bot (<i>Ficus bengalensis</i>), Bel (<i>Aegle marmelos</i>), Chhatim (<i>Alstonia scholaris</i>), Haritaki (<i>Terminalia chebula</i>), Jarul (<i>Lagerstoemia flos-reginae</i>), Jhau (<i>Casuarina equisetifolia</i>), Kdam (<i>Anthocopharus cadamba</i>), Kendu (<i>Diospyros melanexylon</i>), Madar (<i>Erythrina stricta</i>), Mahua (<i>Bassia ratifolia</i>), Neem (<i>Azadirachta indica</i>), Palaash (<i>Butea freundosia</i>), Piasal (<i>Peterocarpus marsupim</i>), Sal (<i>Shorea robusta</i>), Tamal (<i>Diospypos tomentosa</i>), Teak (<i>Tectona grandis</i>) etc. Akanda (<i>Calotropis gigantean</i>), Bantulsi (<i>Ociumum sanctum</i>), Dhutura (<i>Dhatura strmonium</i>), Karabi (<i>Nerium odorum</i>), Kul (<i>Zizyphus xylopyra</i>), Nilkantha (<i>Curcuma caeria</i>) etc. are some of the noticeable shrubs and herbs species found in the district.</p> <p>Fauna</p> <p>The Bankura district is having a poor fauna in regard to the number of species as well as in their population. The continuous deforestation followed by human occupation over the area is the main cause for it. Among the wild animals carnivores like the leopard or panther are rarely found. Apart from this, jungle cat (common name: ban-biral, scientific name: <i>Felis chaus</i>) and the leopard cat (common name: chitabiral, scientific Name: <i>Prionailurus bengalensis</i>) are occasionally seen in the area. Wolf (common name: nekre, scientific name: <i>Canis lupus</i>) is quite rare whereas the jackal (common name: sial, scientific name: <i>Canis aureus</i>) and the fox (common name: khek-sial, scientific name: <i>Vulpes vulpes</i>) are largely seen in the area. In the Susunia hill region sloth bear (common name: bhaluk, scientific name: (<i>Melursus ursinus</i>) is seen. Indian mongoose (<i>Herpestes edwardsii</i>) and grey mongoose (<i>Herpestes edwardsii</i>) are seen in and outside the village areas. Hyaenas (<i>Hyaenidae</i> sp.) are found in the area though nocturnal. The rhesus macaque (common name: lal-bandar, scientific name: <i>Macaca mulatta</i>) and the langur (common name: Hanuman, scientific name: <i>Semnopithecus</i> sp.), squirrel (<i>Sciuridae</i> sp.) and the porcupine (<i>Erethizon dorsatum</i>) are even noticed throughout the area. House mouse (<i>Mus musculus</i>), field mouse (<i>Apodemus sylvaticus</i>), shrew</p>

Baseline Data Generation	Pre-monsoon Season (Period: 18th June 2025- 26th June 2025)
	(common name: chhucha, scientific name: Soricidae sp.) and bats (common name: badur, scientific name: Chiroptera sp.) are seen in the area.
Socio Economy	The total population of 1,52,301 (as per the 2001 census) within 10 km radius. out of which 32.13% is Scheduled Caste and 20.21% is Scheduled Tribes. The literacy rates of male and female is 32.13% of the total population.

11.4.2 Land Use Land Cover Classification

In consideration of land cover pattern within the study area, major land use is Agriculture Land (79.7 %) followed by Forest land (3.77%) within study area.

The Land Cover classes and their coverage are summarized in **Table 11.4**

Table 11.4: LULC and its coverage

LU/LC Classification System				
S.No.	Level-I	Level-II	Area (Sq. Km ²)	Percentage (%)
1	Built-up land	Settlement	8.43	2.64
		Industrial Settlement	0.91	0.29
		Road Infrastructure	3.88	1.22
2	Agricultural Land/ Crop Land	Single Crop	192.85	60.46
		Double Crop	61.37	19.24
3	Forest Area	Protected Forest	12.04	3.77
4	Scrubs/Wastelands	Open Scrub/Land With Scrub	25.44	7.98
		Wasteland	4.73	1.48
5	Waterbodies	River/Nala/Stream	1.16	0.36
		Pond/Tank/Dam	7.61	2.39
6	Mines Area	Mines Area (Stone Quarry)	0.57	0.18
		Total	318.99	100.00

11.5 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

11.5.1 Air Environment:

The impact on air environment mainly depends on magnitude of operation and threshold limit of the project. The source of emission will be mainly in form of fugitive emission and point source.

The mathematical **Model ISCST-3** was used for predicting the GLCs due to proposed greenfield project

TABLE 11.5: Predicted Incremental Ground Level Concentrations

Pollutant	Incremental Concentration ($\mu\text{g}/\text{m}^3$)
PM ₁₀	1.20
PM _{2.5}	0.70
SO ₂	0.00095
NO _x	0.65
CO	0.54

Mitigation Measures

The overall impact on air quality due to mining project is expected to be insignificant. However, to further minimize the pollutant concentration especially particulate matter, the following control measure should be adopted by the project proponent

- Checking of vehicles and machinery to ensure compliance to Indian Emission Standards Transportation vehicles and machinery to be properly and timely maintained and serviced regularly to control the emission of air pollutants in order to maintain the emissions of NO₂ and SO₂ within the limits established by CPCB.
- 5 KLD water required towards dust suppression purpose for which 1 no. of water tanker with 5000-liter capacity will be hired and used for water sprinkling twice in a day in haul roads, site, loading and unloading site. Water sprinkling on transport road side, stock yard (if any), near the crusher unit etc. will be done by tractor mounted water sprinkler.
- Regular compaction and grading of haul roads will be done to clear the accumulation of loose material
- All the mines' workers will be provided with the dust masks.
- Trees can act as efficient biological filters. As this is a small lease, the area available for plantation is very less. However, a well-planned plantation programme has been proposed for the mining area to arrest the dust pollution within the lease boundary. There is the proposal for continuous plantation along the cluster boundary and both side of the road connecting the cluster.

- Vehicles with valid PUC shall be used for transporting the minerals to avoid the exhaust emission.
- A greenbelt development plan is prepared with local species. The greenbelt on the periphery will reduce the dust level sits
- Sharp drill bits will be used for drilling and regrinding will be done periodically to reduce generation of dust.
- Regular monitoring of the air quality as per the monitoring plan detailed in Chapter 6 of this EIA report, shall be adopted during the operation phase, to ensure that, the air quality is within the desired limits prescribed by CPCB.

Additional Measures to Reduce/Control Pollution Control

Scientific methods of mining and pollution control systems will be adopted in the mine to control dust emissions from point and line sources, as follows:

Point Source: These includes drilling, loading, unloading, manual sizing and grading activities

- A] Adoption of wet drilling/ drills with dust arrestors to control dust generation during drilling.
- B] Avoiding secondary blasting by use of rock breakers.
- C] Reducing dropping height of excavator bucket while loading material into dumpers/tippers.
- D] Reducing dropping height for trucks during unloading.
- E] Provision of fixed water sprinkling arrangement at crusher.

Line Source: These includes Haul roads & approach roads

- F] Development of plantation along approach road.
- G] Periodic maintenance of tippers/dumpers used for Mineral transport.
- H] Periodic maintenance of haul roads
- I] Blacktopping/ paving of approach road connecting the mine lease area to SH/NH
- J] Regular water sprinkling on haul roads.
- K] Transport of Graded ore to the buyer's location through trucks covered with tarpaulin.

11.5.2 Noise Environment

➤ **Impact On Noise Environment**

The noise and vibration along with dust are generated due to the operation of mining equipment and movement of transporting vehicles. In any situations, noise levels near residential areas should not exceeded the Central Pollution Control board (CPCB), limits i.e. 55 dB(A). It is

recommended to put an acoustic barrier near the crusher plant to attenuate the noise propagation.

Ground Vibration

Since very few explosives are used in mining, ground shaking will not be as severe or the potential for flying rocks to form.

➤ **Mitigation Measures for Noise Environment**

- No noise polluting work shall be carried out in the night hours
- Provision of PPE's for the workers
- Vehicles to be serviced regularly and maintained properly to avoid any unwanted generation of noise or vibration from them
- Green belt plantation and garden trees will help in reducing the noise, traffic related pollution and heat island effects.
- Proper lubrication, muffling and modernization of equipment shall be used to reduce the noise during operation phase.
- Vibration and noise due to blasting will be reduced by adopting controlled blasting technique.
- Blasting will be avoided under unfavorable conditions.
- Rock breakers are being/ will be used instead of secondary blasting.
- Regular monitoring of the noise levels as per the monitoring plan detailed in Chapter 6 of this EIA report shall be adopted during the operation phase, to ensure that, the noise levels are within the limits prescribed by CPCB.

11.5.3 Water Environment

➤ **Impact On Surface Water Resources**

No surface water source such as rivers, streams & dam exists in the mining area. Proper maintenance of transport vehicle & prevention of washing transport vehicle in ponds etc. be helpful to control water pollution. Garland drains of appropriate size will be constructed along with settling tank at mine boundary to manage the drainage and runoff. As the mining activity is manual and there is no chemical or physical contamination of the water body, the impact on the surface water quality will be insignificant.

• *Impact due to Water use in Mines*

In stone mining operation water will be mainly used for domestic purpose, dust suppression, plantation and washing of heavy earth moving machineries. Only 5 KLD of water will be used for this purpose. The water required for dust suppression and plantation purpose will be met

through the rain water which will be stored in the exhausted mining pits. Only about 0.20 KLD of drinking water will be required for domestic use which is being sourced through tanker.

- *Impact on Ground Water*

Mining for each successive year is proposed to its optimum depth of mineral bed and the mining will not go to touch the ground water table so there is no chance to disturbance in ground water table. The dug-out pit will help in recharging of ground water by decreasing the runoff. Natural pits will be used for rainwater conservation and harvesting.

After complete extraction of mineral from land and the balance un-reclaimed pit is proposed to be developed as per approved final quarry closure plan.

- *Mitigation Measures for Water Environment*

- Provision of temporary toilets for laborers
- Domestic waste water will be treated into septic tank followed by soak pit outside of the proposed cluster project with a safe distance and no wastewater will be allowed to be get discharged into the water body
- All stacking and loading areas should be provided with proper garland drains
- Check dams should be provided to prevent solids from wash off.
- Construction of garland drains around freshly excavated and dumped areas so that flow of water with loose material is prevented.
- The mine water should be passed through specially constructed catch pits to arrest any loose material being carried away with water.
- Any areas with loose debris within the leasehold should be planted.
- Garland drains should be constructed surrounding the waste dumps and should be connected to the surface water reservoir to avoid the run-off mixing directly to natural water channels before settling.
- Ground water table will not be intersected during the mining activity.

11.5.4 Vehicular Movement

All the major finished materials / products i.e. stone aggregates will be transported through trucks by road to the end users.

11.5.5 Biological Environment

- There will not be any clearance of vegetation due to the proposed mining project since there is no vegetation within the mining lease area
- The fauna in the vicinity of the mine is restricted to few common small species. There will be no impact on fauna due to this mining project

Impact on Flora

- As it is a mining project of stone quarry activities will be confined to core zone only. The project area is surrounded by agricultural land. There is no forest land involved in mine lease area. Thus, no direct impact is foreseen on the flora of the forest area because of mining operation. The activities related to mining as transportation of material and passage of workers to and from mining area may have an adverse impact on the road side flora, if adequate control measures will not be taken into consideration.
- Significant reduction in total chlorophyll content at road side plant species may affects the plant species by affecting the plant metabolism. The reduction in chlorophyll concentration corresponds directly to the reduction in plant growth.

Impact on Fauna

- The mining, specifically, will have no adverse impact on fauna whereas the operational activities such as human activity, transportation and noise generation may have an adverse impact on fauna.
- No wild life sanctuary is present within 10 km radius of study area. No major wildlife observed within mine lease area during the survey period. Considering size of mine and management practice by scientific method of mining with proper Environmental Management Plan including pollution control measures especially for air and noise, which will not cause any adverse impact on the surrounding animals.
- Fencing around the entire mine lease area is recommended in order to restrict the entry of stray animals into the mining area.
- Green belt development will be carried out which will help in arresting dust and minimizing sound level arising from the mining operation.
- Some fauna will move from the area of the road side as a result of habitat loss and physical disturbance.

➤ **Impact Mitigation Measures for Biological Environment**

- Green Belt will be developed around the lease boundary, haul roads and plantation will be done on undisturbed area, reclaimed area, dump site, workshop & mine office.
- Total area of green belt proposed would be nearly 1250 of trees that will be planted throughout the boundary of the mining lease and surrounding area.
- Indigenous Plant species will be planted in consultation with local Forest Department.

Impact Mitigation Measures for Flora

- Plantation will be carried out on approach roads and nearby vicinity at river banks areas.
- Native plant species which are resistant and pollution tolerant and comparatively well

acclimatized should be grown along roadsides. Selection of plant species, shall be preferred to consider certain factors as agro climatic suitability, height and canopy architecture, growth rate and habit and aesthetic looks (foliage, conspicuous and attractive flower color).

- Annual bio-monitoring of roadside plants exposed to vehicular pollution will be done to assess the impact of dust load.

Mitigation Measures for Fauna

- All equipment should have sound-control devices not less effective than those provided on the original equipment. Motorized equipment used should be adequately muffled and maintained.
- Use exhaust silencers and optimized acoustical pipe lagging (acoustical wrapping) to minimize the noise levels.
- Mining will be carried out on the dry part of the lease area to avoid disturbance to the aquatic habitat
- Thus, there will be no loss for wildlife.
- Operation and storage of heavy equipment within riparian habitat will be restricted.
- Access roads will not encroach into the riparian zones.

11.5.6 Socio-Economic impact

- For the mining work, an average of 20 workers will be required in the project sites, which will be met from skilled and unskilled labours from the local population as far as possible. Thus, the project can provide employment to local workers during the operation of mines.
- The area is considered as industrially backward. The population in general does not have opportunities of earning from employment. The only employment to depend on is agriculture, which is seasonal
- There is no human settlement in or around the mining block areas, hence no clearance of human settlement is required for the mining operation.
- The proposed mining project activity does not involve any resettlement and rehabilitation process as the project is freshly designed at representative site where none of the settlement is present.
- The mining activity could lead to increased nuisance level from air emissions and noise due to transportation of material and equipment as well as laborers.

11.6 ENVIRONMENTAL MONITORING PROGRAM

Environment Monitoring is important for assessing the extent to which the project's installed pollution control equipment is working. The Central Pollution Control Board/Pollution Control

Board West Bengal (WBPCB) recommendations shall be followed for the sampling and analysis of the environmental variables.

The sample location and frequency will follow the guidelines set forth by the CPCB and WBPCB. An impact assessment research is typically conducted over a brief period of time, as this study was, and the data cannot capture all of the modifications brought about by human or natural activity. Consequently, it is important to have a frequent monitoring plan of the environmental factors in order to account for changes in the environment.

11.7 ADDITIONAL STUDIES

11.7.1 Public Consultation

The report is being submitted to state pollution control board for the purpose of public hearing/consultation process. After completion of the public consultation, all necessary details will be incorporated in the EIA. The Final EIA-EMP report will be submitted to MoEF&CC for obtaining environmental clearance for the proposed mining project.

11.7.2 Risk Assessment & Disaster Management Plan

Risk is the likelihood of negative outcomes or anticipated losses as a result of the interaction between unstable conditions and natural or man-made hazards. Risk assessment is a process that identifies the type and extent of risk by examining potential dangers and assessing vulnerable situations that may endanger people's lives or cause harm to the environment that supports them. The following are the objective of risk assessment:

- (iv) Determining the risk mitigation strategies to put the possible risk within an acceptable range;
- (v) Identifying emergency scenarios and suggesting mitigation methods;
- (vi) Assessing risk levels resulting from the mining of stone quarries.

To remove risk and its effects on the proposed stone quarry mining project, the Risk Assessment and Management Plan must be implemented.

11.8 PROJECT BENEFITS

The proponent of the proposed mining project is conscious of its social responsibilities, and in order to uphold these obligations, the unit will, to the greatest extent feasible, use unskilled and semi-skilled labour from the surrounding villages for the proposed project. The unit aims to create as much indirect employment as possible in the surrounding villages by hiring local contractors for both the construction and operation phases. The proponents of the project will conduct a number of activities in neighbouring villages and will make a reasonable contribution to social development as part of EMP.

The total estimated cost of project is 60 lakhs. in addition to the activities along with budgetary provision i.e. Rs. 1.2 lakhs @ 2.0 % of project cost provided under CER. As per MoEF&CC, New Delhi Vide its OM dtd. 30th September 2020 a budgetary provision of Rs. 1.2 Lakhs will be provided towards EMP for Socio economic Development and based on public hearing outcome. Although the heads can be changed on the basis of local demand analysis at the time of Public Hearing and recommendation of SEAC.

Table 11.6: Need Based Activities by the proposed mining project

Proposed Programme	Amount (Rs. In Lacs)					
	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year	Total
Free Health Camps & donation of Medicine to villagers	0.12	0.10	0.15	0.08	0.10	0.55
Provision of Dust bin in nearby villages	0.05	0.04	0.03	0.05	0.03	0.20
Toilet facility to nearby people	0.08	0.05	0.07	0.10	0.15	0.45
Total	0.25	0.19	0.25	0.23	0.28	1.20

11.9 ENVIRONMENTAL MANAGEMENT PLAN

The firm will invest about Rs. 12.25 Lakhs Capital cost on environment management plan and spent about Rs. 2.75 lakhs per year for operation and maintenance.

11.10 OVERALL JUSTIFICATION FOR IMPLEMENTATION OF THE PROJECT

As discussed, it is safe to say that the collection of minor minerals from the proposed lease area is not likely to cause any significant impact on the ecology of the area as the mineral and waste generated both are non-toxic and will not harm the surrounding environment.

Adequate measures will be taken to control the fugitive emissions to be generating during mining operation. Socio-economic condition of the surrounding villages will improve in long run due to involvement of local population and improvement of infrastructure facilities.

Green belt development in the statutory boundary, approach roads, schools are proposed with the participation of local people will help in improving ecology. This proposed plantation in the area will improve the aesthetic look along with betterment of ecology and socio – economic environment of the surrounding areas.

CHAPTER- 12

DISCLOSURE OF THE CONSULTANT

12.1 DISCLOSURE OF THE CONSULTANT

12.1.1 INTRODUCTION

Anacon established in 1993 as an analytical testing laboratory and now a leading Environmental Consultancy firm backed by testing lab for environment and food in Central India region. The lab is well equipped with basic infrastructural facilities and manpower. We are rendering our services in this field to various industries since last 32 years. We are a group of experienced former Scientists from the Government Institutions and recognized by **Ministry of Environment & Forests, New Delhi for carrying out environmental Studies &** accredited by Quality Council of India (QCI) for conducting Environmental studies vide accreditation Certificate No: **NABET/EIA/23-26/RA 0304_Rev.01 dtd. 13 March, 2024 valid till 29 September, 2026** as category ‘A’ consultant organization in 21 Sectors viz. Mining projects, Offshore and onshore oil and gas exploration, development & production, Thermal Power Plants, Coal Washeries, Metallurgical Industries, Cement Plants, Asbestos milling & asbestos based products, Chemical fertilizers, Pesticides industry & pesticide specific intermediates, Petro-chemical complexes, Synthetic Organic Chemical Industries, Distilleries, Oil & gas transportation pipeline, Isolated storage & handling of hazardous chemicals, Air ports, Industrial estates/ parks/ complexes/areas, export processing Zones, Special Economic Zones, Biotech Parks, Leather Complexes, Ports, Harbours, Jetties, Marine terminals, Break Waters and dredging, Highways, Common Effluent Treatment Plants (CETPs), Building and Construction Projects and township and area development projects.

Our organization is also certified by **ISO 9001:2015, 14001:2015 and ISO 45001:2018** & our Lab division is accredited by **National Accreditation Board for Testing & Calibration Laboratories (NABL, Govt. of India) for Chemical, Biological & Mechanical Testing vide certificate No. TC-12998 for 2316 parameters for Water, Food & Agricultural products, Cereals, Pulses, Bakery products, Spices & Condiments, Milk & Dairy products & Chemical Testing of Ores & Minerals, Coal/Coke & Cosmetic products.** We are also approved by 'Bureau of Indian Standards (BIS)'. We are recognized by Indian Bureau of Mines (IBM) as a RQP for preparation of Mine Plan / Scheme. Anacon has received approval by Govt. of India, “APEDA” - Export Quality Certification for Agricultural produce such as fresh fruits vegetables, cereals & Pulses etc. (as per US & European guidelines).

We are pleased to inform you that we have received “**MSME National Award 2010**” for

“**Outstanding Entrepreneurship Performance**” on 2nd Sept. 2011 at Vigyan Bhawan, New Delhi.

We are also working for various industries in the sectors of Steel, Cement, Power, Distilleries, Textile and Pharmaceuticals. Our activities are spread in the states of Assam, Chhattisgarh, Jharkhand, Kerala, Madhya Pradesh, Orissa & Maharashtra. Our esteemed client group includes many large-scale industries from private as well as the Public Sector Units. National Productivity Council, BALCO, MECON, TATA STEEL, LAFARGE, GRASIM, Ultra Tech Cement Ltd., RAYMONDS, LUPIN, Ranbaxy, GAIL, Seagram & Sagar Distilleries and Sponge Iron are our major clients. To know more about our Group and the assignments completed please visit us at www.anaconlaboratories.com.

We have expanded and commissioned laboratory at Butibori Food Park, Nagpur at Plot Nos. FP 34, 35 equipped with highly sophisticated imported equipments, like GC MSMS, LC MSMS (both triple quad), HPLC, UPLC, ICP, ICP MS, AAS, UV-Vis, FTIR, IC, CHNS analyser etc. for chemical analysis for the samples viz. Water, Air, Chemical, Fertilizer, Mineral, Metal, Coal, Food, Agricultural Products, Pesticides, Insecticides, Ores, etc.,

We have successfully carried out studies related to Air, Noise, Water, Wastewater, Hazardous Waste, Land Environment, Ecology, Risk & Hazard management and Socio-economy as a part of EIA studies of various industries. We have also carried land use and land cover studies based on the satellite imageries.

Our operations are spread over in six different states in Central India region with branches at Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Maharashtra and Delhi.

12.1.2 CREDENTIALS & QUALITY SYSTEMS

Our laboratory is registered with following Govt. departments for providing technical services in the field of environment. The registration numbers are as follows;

1. Recognized by Ministry of Environment & Forests (**MoEF**) vide F.No. LB/99/7/2021-INST LAB-HO-CPCB-HO/Pvt./1943 dated **7th January, 2025 valid upto 08/01/2026**.
2. National Accreditation Board for Mechanical Testing & Calibration Laboratories (**NABL**) has granted us Accreditation vide Certificate No.TC -12998 w.e.f. 09.01.2024 to 08.01.2026
3. National Accreditation Board for Chemical Testing & Calibration Laboratories (**NABL**) has granted us Accreditation vide Certificate No. TC -12998 w.e.f. 09.01.2024 to 08.01.2026
4. National Accreditation Board for Biological Testing & Calibration Laboratories (**NABL**) has granted us Accreditation vide Certificate No TC -12998 w.e.f. 09.01.2024 to

08.01.2026

5. Approved by Bureau of Indian Standards (BIS) for ISI mark certification vide No. WROL/LRS/OSL (7124116) dt. 13.04.2018 for package drinking water, milk and its products
6. Authorized by Food Safety & Standards Authority of India under FSS Act.
7. **ISO 9001:2015** vide Registration No. 99 100 22189, **ISO14001:2015** vide registration No. 99 104 01348 and **ISO 45001:2018** vide registration No. 99 117 00832.
8. Accredited as EIA Consultant Organization under NABET-QCI, vide accreditation Certificate No: **NABET/EIA/23-26/RA 0304_Rev.01 dtd. 13 March, 2024 valid till 29 September, 2026** as category 'A' consultant organization in 21 Sectors.
9. Mah. Govt.WQM2003/PK26(2) PP12 Dt.1.9.2004 – Drinking water quality monitoring
10. Mah. Govt. JSP 2004/PK3715 PP11Dt.28.04.2004 – Hydrogeological survey
11. RQP/NGP/328/2005/B dt.01.02.2005 – Indian Bureau of Mines for preparation of mine plan, mine closure plan.
12. SPCB, Odisha No.3091 dt.13.02.2008
13. RSPCB, empanelment of environment consultant & analytical laboratory in continuation to Board's circular no. F.14 (3) Corres/RPCB/Plg/3491-3514 dt.14.12.2009 & Dt.25.3.2010 as testing lab under EPA & Env. Consultant.
14. RSPCB recognition of laboratory for Air pollution studies vide notification dated May 20, 2009 and published in Rajasthan Gazette Extraordinary dated June 22, 2009.

For the organizational statutory requirement, the registration numbers are as follows;

1. Company Law Board Registered
2. Provident Fund Registered
3. Professional tax Registered
4. ESIC Registered
5. GST Registered
6. Income Tax – Registered
7. MSME Registered

12.1.3 SERVICES OFFERED

Table 12.1: Services Offered

Air (Monitoring / Survey / Modeling etc., Pl. specify)	Yes - Stack and Ambient Air Quality Monitoring, Survey / Modeling as per MoEF requirements. Specific gas monitoring like PM ₁₀ , PM _{2.5} , HC, CO, O ₂ , CO ₂ & VOCs using state of art microprocessor based portable kits.
Water : Surface, sea, inland & groundwater (Monitoring / Survey / Modeling etc., Pl. specify) Geohydrological Survey	Yes - Monitoring of Water Environment in EIA projects, hydrogeological survey and water shed development.
Soil (Analysis, Remediation, Salt water intrusions, Water Harvesting etc.)	Yes – Monitoring of land environment in EIA projects.
Plant (Effect of pollution, Treatment Technologies, Pollution Indicators etc.)	Yes - The effect of pollutant from various industrial sectors has been evaluated in terrestrial ecology of EIA project.
Assessment & impact studies on Biodiversity (Flora and Fauna)	Yes – Studies on biodiversity has been reported in EIA projects.
Municipal Solid Wastes (Analysis, Management – Handling, Storage, Transportation, Treatment and Disposal, Site Identification, remediation, Development/ Evaluation of Technology etc.)	Yes National Productivity Council is utilizing our services for monitoring and analysis of solid waste samples, which includes sampling and analysis of solid waste samples. Anacon lab can undertake the consultancy project on solid waste management for municipal corporation, resorts and newly developed cities. Preparation of detailed feasibility report is an expertise of Anacon lab.
Hazardous Wastes (Quantification, Site Assessment, Designing / Monitoring of Treatment Facilities, Technology Assessment etc., Pl. specify)	Yes – The project on development of landfill site including Engineering design, Hydrogeological studies and Environmental quality in respect of the Air, Water and Soil have been successfully completed for Force Motors (Bajaj Tempo), Kinetic Motors and Pratibha Syntex, Pithampur, Indore (MP)
Noise (Monitoring/Survey, Modeling etc.)	Yes – The monitoring of the Noise Environment in the Impact zone of the industries and in plant have been carried out by Anacon Lab.
Bio-Medical Wastes (Quantification, Site Assessment, Designing / Monitoring of Treatment Facilities Tech. Assessment etc., Pl. Specify)	Yes – The survey of Hospital waste management have been carried out in few cases.
Hazardous Chemicals (Site assessment, Inspection of Storages, Major Accident Hazards, Preparation /	Yes – The storage of the hazardous chemicals have been assessed in respect of fugitive emissions and risk assessment for Pharmaceutical

assessment of Safety Report, risk assessment /Onsite / offsite Emergency Plan preparation etc.)	Industries at Lupin, Mandideep, Bhopal (M.P). Four dumping sites developed maxi cap 8000 Tons for BALCO, Korba, Chhattisgarh.
Plastic Wastes (Management, recycling/reuse technology evaluation etc.)	Yes – On the similar line of solid waste management, studies on the plastic waste management could be undertaken by Anacon Laboratories Pvt. Ltd.
Electronic Waste (Management, recycling/reuse, technology evaluation etc.)	No
Environmental Education/Awareness (Projects approved/ grants received /campaigns carried out etc.)	Yes - Conducted Workshop at Raipur on 14.2.04 Theme - Latest Trends in Mining Technical and Legislative requirements, 67 participants attended. ; Conducted several Environment Awareness programs for PCB on different topics and also at Educational institutions/P.G. Departments. College students along with HOD have visited Anacon Laboratories Pvt. Ltd., for Educational tour. Anacon Laboratories Pvt. Ltd., has participated as a Key participant at CII seminar in the field of mining industries at Raipur Dt. 22.03.2006.
Environmental Impact Assessment (EIAs carried out/ sector wise expertise in EIA/ clearances obtained from MoEF / State Government etc.)	Yes - Successfully completed 350 EIA studies and 108 EIA presented before MoEF& environmental clearance is granted; remaining presented at State level & the environmental clearance is granted, till end of Jan'2025.
Environmental Audit/s (Details of the audits conducted along with client list and Purposes of such audits)	Yes for various types of Industries. Conducted water audits for 22 Reserve banks in India
Energy Audits / Water Audits (Expertise available, list of the clients and details on such audits)	Yes - Energy Audit for L & T Hirmi, Raipur on STP to conserve energy. In this exercise saving of the 40 % energy is suggested. L&T Awarpur consultancy for 3 STP's 1600 KLD, 300 KLD, 100 KLD with recycling options commissioned in 2010.
Environmental Planning & Management (Projects undertaken/ expertise for actual field implementation of the EMP)	Yes - The special efforts have been put up by Anacon for Seagram Distilleries Pvt. Ltd., and Sagar Industries & Distilleries Pvt. Ltd., Nashik for planning and implementation of EMP. Other projects also have been executed on Environmental Planning and Management.
Others (R&D Projects) (State briefly the other activities of your organization and the success Stories, if any)	Yes – 1.Conducted feasibility studies for pyrite recovery plant for 1000 TPD Cap for GHCL Lignite mine to reduce Sulphur from 7 % to 2 %

	2. Identification of route cause for river bed drying (300 m width) for Lafarge, Sonadih, Raipur
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12.1.4 FACILITIES

Anacon offer wide range of services in indoor and outdoor monitoring and analytical characterization in the field of Environment. Further, it is ably supported by highly skilled and experienced team of professionals in the fields of Science, Engineering, Ecology, Meteorology, Social Planning, Geo & Hydro-geology, and Environmental Planning.

Besides the regular monitoring equipment such as Respirable Dust Samplers, PM 2.5 Automatic Weather Monitoring Stations, Stack Monitoring Kits, Personal Samplers, Noise Meters, Portable Water Kits etc., the other major specialized equipment include:

Anacon Laboratories has well equipped with sophisticated instrument such as **Thermo ICAP 6300 ICP UK make – OES Radial View Spectrometer** with Standard Gas System for analysis of heavy metals, required for the analysis of water (130 parameters as per various categories of IS standards for water), wastewater & Hazardous waste + Gas Chromatograph.

We have expanded and commissioned biggest state of art Environment and Food testing laboratory in Central India region at Butibori Food Park, Nagpur at Plot Nos. FP 34, 35 equipped with highly sophisticated imported equipments, like GC MSMS, LC MSMS (both triple quad), HPLC, UPLC, ICP, ICP MS, AAS, XRF, UV-Vis, FTIR, IC, CHNS Analyser etc. for chemical analysis for the samples viz. Water, Air, Chemical, Fertilizer, Mineral, Metal, Coal, Food, Agricultural Products, Pesticides, Insecticides, Ores, etc., kindly visit us at www.anaconlaboratories.com.

Anacon Laboratories has established the facilities for Ambient Air Quality by using US Make Meteorological Station and High Volume Sampler. Stack Monitoring is also undertaken. The methodology for estimation of SO₂, NO_x, SPM, PM₁₀, P.M._{2.5} has been established along with project specific pollutant e.g. HM, CO, O₃, CO₂ VOC, HC etc.

12.1.5 ACHIEVEMENTS

1. Anacon laboratory recognized under Environment Protection (EP) Act by GOI in 2007, Environment Division with its best mind power and industrial knowledge competency that allows it to compare with the standards set by GOI as a Competent Organization.
2. Anacon has organized 10 days training program for the FDA officials, Government of Maharashtra from 16.08.2010 to 27.08.2010 on newly announced “Food Safety & Standards Act, 2011”
3. Anacon has received “MSME National Award 2010” for “Outstanding Entrepreneurship Performance in service sector” on 2nd Sept. 2011 at Vigyan Bhawan, New Delhi.

4. Anacon has signed MOU with Nagpur University, Nagpur to Promote Academic and Research Cooperation in Feb'2012. Under this program Post Graduate i.e. post M.Sc., M. Tech students professional training programs and R&D projects are undertaken on regular basis to meet Industry – Academia requirements for human resource development.
5. Dr. (Mrs.) Sugandha Garway, Director, ANACON Laboratories Pvt. Ltd. has been selected on the panel of the National food standards harmonization / development process for our country by Food Safety Authority of India.
6. Anacon has signed the MOU dtd. 26th Dec. 2012 for soil testing for a period of two years from Agriculture Department, Government of Chhattisgarh, season wise soil samples are collected for each farm and analyzed, fertilizer dosing is advised on appropriate time in order to increase crop yield and Soil health cards are issued to every farmer of different districts of Chhattisgarh.
7. Anacon has executed the work of water Quality monitoring to maintain overall residual chlorine in the entire city of Nagpur for period from 16.06.2007 to 31.01.2012 and in the period Anacon team has worked sincerely to the best of our ability by utilizing all Technical expertise to the entire satisfaction of the Municipal authorities concerned. Anacon has delivered consistent results from 5 years as a result which water borne deceases i.e. jaundice & gastro have been reduced to the extent of 80 %. Nagpur Municipal Corporation is leading in India for successful implementation of 24 x 7 water supply scheme under JNURM scheme, GOI and Anacon contributed for improving water quality in the entire city of Nagpur. Anacon has also designed & developed dedicated website for tracking the Water quality of the city.
8. Anacon has executed the work of "Source apportionment studies "of National Environmental Engineering Research Institute (NEERI), Nagpur vide Order No. Outsource/S.A (APC)/2007-GL dt. 22.01.2008 & Order No. Outsource/S.A (APC)/2007-GL dt.02.05.2008 for 236 Air Dust Samples for 33 elements using ICPA instrument, all results submitted as per Internationally approved procedures and standards, and also Quality Assurance & Quality Control (QA/QC) procedures were followed strictly during analysis.
9. Anacon Lab is executing the project of Rajiv Gandhi Science and Technology commission, Government of Maharashtra, for" Evaluation studies of water purification systems in 16 schools of the rural areas nearby Nagpur.
10. Anacon has completed the TRANSIT SURVEY of SEONATH RIVER, M/s Lafarge India Pvt. Ltd., Sonadih Cement Plant, Raipur (C.G.) Sonadih river width 300 M, bed was

drying, route cause analysis was identified and corrective measures suggested were implemented by Lafarge and the solution was provided successfully.

11. Training has been imparted on "Pesticide residue analysis" to scientists of National Test House, Mumbai & "Coal analysis" to scientists of NALCO, Orissa.
12. ANACON has signed MOU with Nagpur University & Kada College Ahmednagar to undertake joint collaborative projects, imparting training to students & staff & to provide incubation centre for research projects undertaken by academicians.
13. ANACON has also completed mapping of water quality of 2 districts of Madhya Pradesh.