

Draft Environmental Impact Assessment Report
FOR
Environmental Clearance for Proposed Kharia Fire clay China clay
Mine Project

S.N .	Name of Applicant	Number and date of Terms of reference	Plot no.	Area of applied lease (Ha)	Address of Applied land
1	M/s.Sharma Minerals Joypore, Md.Golam Kibria Mallick	Vide letter no. 1996/EN /T-II-I/ 111/2023 , Dated 18/08/2023	425 to 478, 481 to 484, 500 to 540, 543 to 555, 568 to 587 etc	7.02	Village – Kharia P.S. –Md Bazar, Dist- Birbhum , State - WestBengal

FOR
Mining Lease Cluster Area 7.02 Ha .
Category –B1

Prepared by

ULTRA-TECH

ENVIRONMENTAL CONSULTANCY AND LABORATORY

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Certificate No.: NABET/EIA/2023/RA 0194_Rev 01 Validity Upto 18/10/2024



National Accreditation Board for Education and Training



Certificate of Accreditation

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13.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated Jan 27, 2021 and Supplementary assessment minutes Feb 11, 2022 posted on QCI-NABET website.

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Signed for and on behalf of NABL



N. Venkateswaran
Chief Executive Officer

Declaration by Experts contributing to the EIA

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





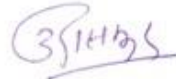
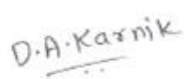
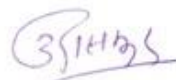
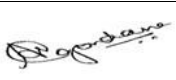
EIA Coordinator Name: Mr. Deo Narayan

Date/Signature:



Period of Involvement: From March 2023 to till date

Functional Area Experts

S.N	Functional Area Experts Involved			Period of Involvement
	FA	Name/s	Signature	
1	AP	Mr. Adhikrao Govind Yewale		March 2023 to till date
2	WP	Mrs. Rekha Margam		
3	AQ	Mr. Deo Narayan		
4	EB	Mrs. Padmini Sindhey		
5	SE	Mr. Yogesh Raskar		
6	SHW	Mrs. Deepa Tamhane (Karnik)		
7	LU	Mr. Yogesh Raskar		
8	RH	Ms. Ashwini Ganvir		

Declaration by Experts contributing to the EIA

Project Name: Fire clay & china clay Mining Project

Client Name: M/s. Sharma Minerals Joypore, Partner – Md. Golam Kibria Mallick

Period of EIA: From March 2023

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

EIA coordinator: Mr. Deo Narayan



Period of involvement: March 2023 to till date

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

I, Niranjan Tamhane, hereby, confirm that the above-mentioned experts have prepared the EIA report for “*Proposed Fire clay & china clay Mining Project having an area of 7.02 Ha is situated near Village/Mouza-Kharia, District –Birbhum, and State-West Bengal. Owned by M/s. Sharma Minerals Joypore*”

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



Name: Niranjan Tamhane

Designation: Managing Director

Name of the EIA consultant organization: ULTRA – TECH

NABET Certificate No.& Date: NABET/EIA/2023/RA0194 valid till 18/10/2024

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List of Abbreviations

MT	:	Metric Tonne
MTPA	:	Metric Tonnes Per Annum
NAAQS	:	National Ambient Air Quality Standards
NABET	:	National Accreditation Board for Education and Training
NDIR	:	Non-Dispersive Infra-Red
NDIR	:	Non-Dispersive Infra-Red
NH	:	National Highway
NOC	:	No Objection Certificate
NPV	:	Net Present Value
NW	:	North West
OSHAS	:	Occupational Health and Safety Assessment Series
PAP	:	Project Affected People
PFR	:	Pre-Feasibility Report
PM	:	Particulate Matter
PP	:	Project Proponent
PPE	:	Personal Protective Equipment
RET	:	Rare Endangered and Threatened
RQP	:	Recognized Qualified Person
RWH	:	Rain Water Harvesting
SC	:	Scheduled Caste
SE	:	Socio Economic
SEAC	:	State Expert Appraisal Committee
SEIAA	:	State Environmental Impact Assessment Authority
SHW	:	Solid and Hazardous Wastes
SOP	:	Standard Operating Procedures
SPCB	:	State Pollution Control Board
SPL	:	Sound Pressure Level
SSE	:	South-South East
ST	:	Scheduled Tribe
STP	:	Sewage Treatment Plant
SW	:	Surface Water
ToR	:	Terms of Reference
TPA	:	Tonnes Per Annum
WP	:	Water Pollution
AAQ	:	Ambient Air Quality
AP	:	Air Pollution
CA	:	Compensatory Afforestation
CER	:	Corporate Environment Responsibility
CO	:	Carbon Monoxide
CPCB	:	Central Pollution Control Board
CRZ	:	Coastal Regulation Zone
CSR	:	Corporate Social Responsibility
CTE	:	Consent to Establish

CTO	:	Consent to Operate
DG	:	Diesel Generator
DGMS	:	Directorate General of Mines Safety
DO	:	Dissolved Oxygen
EC	:	Environmental Clearance
EIA	:	Environmental Impact Assessment
EMC	:	Environment Management Cell
EMP	:	Environmental Management Plan
EPA	:	Environmental Protection Agency
FAE	:	Functional Area Experts
GIS	:	Geographic Information System
GLC	:	Ground Level Concentration
GMMCR	:	Chattishgarh Minor Mineral Concession Rules
GoI	:	Government of India
GPS	:	Global Positioning System
GW	:	Ground Water
Ha	:	Hectare
IBM	:	Indian Bureau of Mines
IMD	:	Indian Meteorological Department
INR	:	Indian Rupee
ISO	:	International Standards Organization
kLD	:	kilolitres per Day
kVA	:	kilo Volt Ampere
kWH	:	kilo Watt Hour
LSG	:	Local Self Government
LULC	:	Land Use & Land Cover
MoEF& CC	:	Ministry of Environment, Forest and Climate Change

Preface

This EIA report is prepared for the proposed Fire clay & China clay Mining Project at Village/ Mouza–Kharia, District:-Birbhum State:WestBengal. The mine lease area attracts cluster condition with total quarrying area more than 5 hectares and hence requires Environmental Impact Assessment study and Environment Management Report for obtaining Environmental Clearance as per the NGT judgement order dated 13th September 2018 and Office Memorandum of MoEF&CC dated 12th Decemebr 2018, the provisions of EIA Notification, 2006 and its subsequent amendments.

Disclaimer:

This EIA report has been prepared with all reasonable skills, knowledge, care and diligence by M/s ULTRA TECH, Environmental Consultancy & Laboratory Thane, the QCI-NABET accredited and national level leading Environmental Consultancy Organization within the terms of the contract with the Project Proponent incorporating their General Terms and Conditions of Contract and taking in to account of the resources devoted to it by the contract. The report was discussed with the project proponent in detail before releasing.

This EIA report has been prepared using information received from the Project Proponent (PP), collecting primary data and compilation of secondary data from available resources. ULTRATECH is not responsible for the origin and authenticity of the information, drawings or design details provided by the PP.

Declaration by the Project Proponents

I, Md. Golam Kibria Mallick (Partner of M/s. Sharma Minerals, Joypore), hereby confirm that, M/s. ULTRA TECH Environmental Consultancy and Laboratory has prepared the Draft EIA Report for the Proposed Fire clay & China clay Mining. Mining Project at Kharia Village/Mouza, Birbhum District, and West Bengal State.

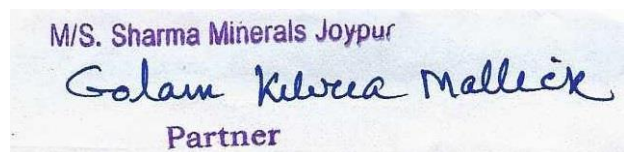
We hereby undertake the ownership of the Draft EIA Report.

Md. Golam Kibria Mallick

Partner of M/s. Sharma Minerals Joypore

Vill – Nirbhaypur, P.O – Seweakuri, P.S – Md. Bazar

Dist. – Birbhum, West Bengal, PIN - 731127



M/S. Sharma Minerals Joypur
Golam Kibria Mallick
Partner

Place: Birbhum

Date: / /2023

CHAPTER.1 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 Preamble

Environmental Impact Assessment (EIA) refers to the anticipation of various impacts of a project on the environment and the local community. The proposed project is a cluster project of Mining of Fire clay & China clay Mine (Total lease area of applied mine – 7.02 Ha for the Mineral Fire clay & China clay) at Village/Mouza – Kharia, District: Birbhum, State: West Bengal. Details of the entire lease are discussed in the further chapters. The lease holder of the cluster is Md. Golam Kibria Mallick Partner of M/s. Sharma Minerals Joypore, with 7.02 ha. TOR issued in favour of project proponent whose details is as follow

Md. Golam Kibria Mallick – *TOR vide letter no.1996/EN /T-II-I/ 111/2023 , Dated 18/08/2023-, dated 01/03/2023*

A copy of the TOR is enclosed as **Annexure-1**. This EIA report is prepared in line with TOR conditions obtained from SEAC, West Bengal.

The mineral extracted will be Fire clay & China clay using Open cast semi-mechanized method of mining with Loader cum Excavator and Dumper method. This mining project falls under Category 'B1' Project or activity 1(a) as per EIA Notifications 2006, and its subsequent amendments. The lease is falling in the cluster as per EIA Notification 14/09/2006 of MoEF&CC vide S.O. dated the 14/08/2018, 12/12/2018, 20/04/2022, 09/05/2022, 28/04/2023 and read with NGT order dated 13/09/2018 and 07/12/2022. The proposed mining project requires Environment clearance under the EIA Notification dated 14th Sept. 2006 & 14.08.2018 and its subsequent amendments. According to MoEF&CC OM vide letter No. L-11011/175/2018-IA-II (M) Dated 12.12.2018 directed that all the area from 5 to 25 ha falling under category B2 will be considered as B1 including cluster situation. As the applied mining leases comes in Kharia Fire clay & China clay mine having total area 7.02 hectarea and cluster area including these applied mines is 20.09 hect therefore the project is categorized as "B1", and thus requiring prior environmental clearance from the State Environmental Impact Assessment Authority (SEIAA)/State Expert Appraisal Committee (SEAC) West Bengal.

Proponent has appointed M/s ULTRA TECH Environmental Consultancy & Laboratory to carry out the Environmental Impact Assessment (EIA) studies and preparation of Environmental Management Plan (EMP) for obtaining Environmental Clearance (EC) from the State Environmental Impact Assessment Authority (SEIAA) of West Bengal. The proposed Fire clay & China clay mining project covers an area of 7.02 Hect Private. And non forestland. ULTRA TECH is an established consultant firm in the field of Environmental Services with an experience of about 37 years.

1.2 Identification of the Project Proponent

The proposed project of Fire clay & China clay mine are the mining projects near Village/Mouza–Kharia, District: Birbhum, State: West Bengal

The mining lease area of Kharia Fire clay & China clay mine covers an area of 7.02 Ha under Plot no 425 to 478, 481 to 484, 500 to 540, 543 to 555, 568 to 587, etc of Md. Golam Kibria Mallick, M/s. Sharma Minerals Joypore, as lease holder of the mine lease area.

1.3 Identification of the Project

The proposed project of Fire clay & china clay mine are the mining projects near Village/Mouza–Kharia, District: Birbhum, State: West Bengal

Md. Golam Kibria Mallick

Lease deeds are granted for China clay & Fire Clay mine over an area of 7.02 Ha. Under Plot No. 425 to 478, 481 to 484, 500 to 540, 543 to 555, 568 to 587 at Village & Mouza – Kharia, P.S – Md. Bazar, District: Birbhum to project proponent M/s Sharma Minerals by Govt. of West Bengal vide registration no. 2617 on dated 08/04/1983.

Copy of lease deeds is enclosed as **Annexure 2**.

The proposed mine lease area is non-forest, private land grant to M/s. Sharma Minerals Joypore, mineable reserve of Fire clay & China clay mine is estimated for upto 6-meter depth is 4763 MT. The method of mining adopted is Open cast semi-mechanized method of mining with Loader cum Excavator and Dumper.

As per MoEF Notification dated 15.01.2016 Appendix – XI (6) ‘A cluster shall be formed when the distance between the peripheries of one lease is less than 500 m from the periphery of other lease in a homogeneous mineral area’. The proposed mining blocks fall under the cluster having a total area of 20.09 Ha with a total of 2 no. of mines. The lease area details in the cluster are given in Table 1.1

District mining office has prepared composite cluster map with certification in accordance with the NGT order dated 13/09/2018. The same was submitted by District Mining office to SEIAA. The copy of Cluster Map is enclosed as **Annexure 4**. As per Office Memorandum (OM) of MoEF&CC dated 12th December 2018, cluster or an individual lease size exceeding 5 ha, the EIA/ Environmental Management Plan (EMP) has to be made applicable in the process of grant of prior EC. The mining project area falls under Category ‘B1’ project or activity 1(a) as per EIA Notification 2006, and its subsequent amendments. EIA and EMP are required for obtaining EC for the proposed mining project based on Standard Terms of Reference (ToR).

Summary of Cluster			
SN	Particulars of Mines		Area in Hectare
1	M/s. Sharma Minerals Joypore	=	7.02
2	M/s. Patalnagar Minerals and Industries Pvt. Ltd	=	13.07
Total Area of all 2 Mines (1+2)		=	20.09



Government of West Bengal
Office of the District Land & Land Reforms Officer, Birbhum
At+P.O.-Suri, P.S.-Suri, Dist.-Birbhum, W.B., Pin-731101.
M dlro.bir@gmail.com



Memo No: M&M/ 4104 /DL&LRO(B)/2023

Date: 11/10/2023

To
M/S. Sharma Minerals Joypure,
(Kharia Fire Clay & China Clay Mine)
Partner-Md. Golam Kibria Mallick,
Vill.-Kharia, P.O.-Md.Bazar, PS.-Md.Bazar,
Dist.-Birbhum, West Bengal, Pin-731127.

Sub: Cluster Certificate with respect to M/S. Sharma Minerals Joypure.

Ref : (i) No. 01/1(22)-ICE-12011(99)68/2022-MINES dated-02.01.2023 issued by the Secretary, Department of Industry, Commerce & Enterprises, Govt. of W.B.
(ii) Your application dated-27/06/2023.

This is to certify that the M/S. Sharma Minerals Joypure in Birbhum District, Covering an area-7.02 Ha, falls under Mouza-Kharia, J.L. No. 145 distributed over Plot Nos. 425 to 478, 481 to 489, 500 to 540, 543 to 555, 568 to 587 etc. is clustering with one China Clay-Fire Clay mine namely, M/S. Patelnagar Minerals & Industries Pvt. Ltd. in Mouza-Kharia, J.L. No. 145 distributed over Plot Nos. 250, 252, 261, 735, 758, 5224 etc., area-13.07 Ha under Md.Bazar PS in Birbhum District. It has been observed that the above China Clay- Fire Clay mine is found within 500-meter radius of M/S. Sharma Minerals Joypure and is having lease expiry date as 06.11.2034.

The Geo-Coordinates of two aforementioned mines as per approved Mining Plan are given below :

Cardinal Point No.	Latitude	Longitude
M/S Sharma Minerals Joypure in Mouza-Kharia, J.L. No. 145, Area-7.02 Ha		
Boundary Pillar No. A	23°59'38.011" N	87°35'22.183" E
Boundary Pillar No. B	23°59'36.484" N	87°35'21.736" E
Boundary Pillar No. C	23°59'38.207" N	87°35'27.611" E
Boundary Pillar No. D	23°59'38.029" N	87°35'32.019" E
Boundary Pillar No. E	23°59'35.195" N	87°35'32.035" E
Boundary Pillar No. F	23°59'35.132" N	87°35'33.539" E
Boundary Pillar No. G	23°59'33.700" N	87°35'37.827" E
Boundary Pillar No. H	23°59'32.460" N	87°35'40.117" E
Boundary Pillar No. I	23°59'31.328" N	87°35'39.926" E
Boundary Pillar No. J	23°59'30.940" N	87°35'38.431" E
Boundary Pillar No. K	23°59'31.807" N	87°35'37.346" E
Boundary Pillar No. L	23°59'30.869" N	87°35'34.968" E
Boundary Pillar No. M	23°59'32.062" N	87°35'31.570" E
Boundary Pillar No. N	23°59'30.131" N	87°35'31.855" E
Boundary Pillar No. O	23°59'31.818" N	87°35'30.630" E
Boundary Pillar No. P	23°59'31.122" N	87°35'27.436" E
Boundary Pillar No. Q	23°59'31.499" N	87°35'24.563" E
Boundary Pillar No. R	23°59'31.619" N	87°35'21.866" E
Boundary Pillar No. S	23°59'35.195" N	87°35'22.104" E

Page 1 of 2

Additional District Magistrate and
District Land & Land Reforms Officer
Birbhum

Cardinal Point No.	Latitude	Longitude
M/S. Patelnagar Minerals & Industries Pvt. Ltd. in Mouza-Kharia, J.L. No. 145, Area-13.07 Ha		
Boundary Pillar No. A	23°59'28.8906" N	87°34'53.9100" E
Boundary Pillar No. B	23°59'27.6647" N	87°34'53.7294" E
Boundary Pillar No. C	23°59'24.5391" N	87°34'50.4694" E
Boundary Pillar No. D	23°59'18.0858" N	87°34'48.2698" E
Boundary Pillar No. E	23°59'16.9038" N	87°34'48.1812" E
Boundary Pillar No. F	23°59'12.3036" N	87°35'09.3903" E
Boundary Pillar No. G	23°59'11.9568" N	87°35'11.4838" E
Boundary Pillar No. H	23°59'08.6895" N	87°35'20.7413" E

Environmental Clearance may please be granted in accordance with the merit of the mine.

Ch-11/23
Additional District Magistrate and
District Land & Land Reforms Officer,

Birbhum
Additional District Magistrate and
District Land & Land Reforms Officer

Date: Birbhum / /2023.

Memo No: M&M /

/1(2) /DL&LRO(B)/2023

Copy forwarded to:

1. The Deputy Secretary, to the Government of West Bengal, Department of Industry, Commerce & Enterprises (Mines Branch), 4, Abanindranath Tagore Sarani (Camac Street), Kolkata-700016.
2. CA to the District Magistrate, Birbhum for kind appraisal of the District Magistrate.

Additional District Magistrate and
District Land & Land Reforms Officer,
Birbhum.

Figure 1.1: Kharia Cluster Lease area details

1.4 Brief description of the nature, size and location of the project

The proposed project of Kharia Fire clay & China Clay Mine covers an area of 7.02 Ha under Plot no 425 to 478, 481 to 484, 500 to 540, 543 to 555, 568 to 587, etc. of Md. Golam Kibria Mallick, Partner of M/s. Sharma Minerals Joypore. The proposed method of mining is Open cast semi-mechanized method of mining with Loader cum Excavator and Dumper, details given in **Table 1**.

Table 1.1: Details of the Project Proponent and the Project

Particulars	Descriptions																																																												
Name of Project	Kharia Fire clay & China clay Mine projects, Area: 7.02 ha (Pvt. Land)																																																												
Project location	Village/Mouza- Kharia District- Birbhum State- WestBengal																																																												
Name of the Applicant & Registered Address	Md. Golam Kibria Mallick Partner of Kharia Fire Clay & China Clay Mines M/s. Sharma Minerals Joypore Joypore, Vill – Nirbhaypur, P.O – Seweakuri, P.S – Md. Bazar Dist. – Birbhum, West Bengal, PIN - 731127																																																												
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Geographical Location : GPS Co-Ordinates of Project	<table border="1"> <thead> <tr> <th>Point</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr><td>A</td><td>23°59'38.011" N</td><td>87°35'22.183" E</td></tr> <tr><td>B</td><td>23°59'36.484"N</td><td>87°35'21.736" E</td></tr> <tr><td>C</td><td>23°59'38.207" N</td><td>87°35'27.611" E</td></tr> <tr><td>D</td><td>23°59'38.029"N</td><td>87°35'32.019" E</td></tr> <tr><td>E</td><td>23°59'35.195" N</td><td>87°35'32.035" E</td></tr> <tr><td>F</td><td>23°59'35.132" N</td><td>87°35'33.539" E</td></tr> <tr><td>G</td><td>23°59'33.700" N</td><td>87°35'37.827" E</td></tr> <tr><td>H</td><td>23°59'32.460" N</td><td>87°35'40.117" E</td></tr> <tr><td>I</td><td>23°59'31.328" N</td><td>87°35'39.926" E</td></tr> <tr><td>J</td><td>23°59'30.940" N</td><td>87°35'38.431" E</td></tr> <tr><td>K</td><td>23°59'31.807" N</td><td>87°35'37.346" E</td></tr> <tr><td>L</td><td>23°59'30.869" N</td><td>87°35'34.968" E</td></tr> <tr><td>M</td><td>23°59'32.062" N</td><td>87°35'31.570" E</td></tr> <tr><td>N</td><td>23°59'30.131" N</td><td>87°35'31.855" E</td></tr> <tr><td>O</td><td>23°59'31.818" N</td><td>87°35'30.630" E</td></tr> <tr><td>P</td><td>23°59'31.122" N</td><td>87°35'27.436" E</td></tr> <tr><td>Q</td><td>23°59'31.499" N</td><td>87°35'24.563" E</td></tr> <tr><td>R</td><td>23°59'31.619"N</td><td>87°35'21.866" E</td></tr> <tr><td>S</td><td>23°59'35.195" N</td><td>87°35'22.104" E</td></tr> </tbody> </table>	Point	Latitude	Longitude	A	23°59'38.011" N	87°35'22.183" E	B	23°59'36.484"N	87°35'21.736" E	C	23°59'38.207" N	87°35'27.611" E	D	23°59'38.029"N	87°35'32.019" E	E	23°59'35.195" N	87°35'32.035" E	F	23°59'35.132" N	87°35'33.539" E	G	23°59'33.700" N	87°35'37.827" E	H	23°59'32.460" N	87°35'40.117" E	I	23°59'31.328" N	87°35'39.926" E	J	23°59'30.940" N	87°35'38.431" E	K	23°59'31.807" N	87°35'37.346" E	L	23°59'30.869" N	87°35'34.968" E	M	23°59'32.062" N	87°35'31.570" E	N	23°59'30.131" N	87°35'31.855" E	O	23°59'31.818" N	87°35'30.630" E	P	23°59'31.122" N	87°35'27.436" E	Q	23°59'31.499" N	87°35'24.563" E	R	23°59'31.619"N	87°35'21.866" E	S	23°59'35.195" N	87°35'22.104" E
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Project brief	<ul style="list-style-type: none"> The area of 1 applied mines of Kharia Fire clay & China clay mining project is 7.02 Ha, <table border="1"> <thead> <tr> <th><i>Lessee</i></th> <th><i>Production</i></th> </tr> </thead> <tbody> <tr> <td>Md. Golam Kibria Mallick Partner of M/s.SharmaMineralsJoypore</td> <td>4763 MTPY</td> </tr> </tbody> </table> Open cast semi-mechanized method of mining with Loader cum Excavator and Dumper 	<i>Lessee</i>	<i>Production</i>	Md. Golam Kibria Mallick Partner of M/s.SharmaMineralsJoypore	4763 MTPY																																																								
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Project Cost	Cost of Project is 200 lacs
Designation of the Authorized signatory	Lease Holder
Name of the NABET Accredited Consultant	ULTRA TECH Environmental Consultancy and Laboratory
NABET Accreditation Number	NABET/EIA/2023/RA0194 valid till 18Oct. 2024
Address of the consultant	ULTRA TECH Environmental Consultancy and Laboratory, NABET Accredited EIA Consulting Organization Unit No. 206, 224, 225 Jai Commercial Complex, Eastern Express Highway, Opposite Cadbury Factory, Khopat, Thane (West) – 400 061Tel: 022-2534 2776, 7498562574
Email id of the consultant	kolkata@ultratech.in
Contact number of the consultant	022-2534 2776, 7498562574

1.5 Need for the Project and Its Importance to the Country and or Region

The mining project falls in the area of the district Birhum, West Bengal devoid of sufficient agriculture activities and other industrial growth. The earning sources of the region are limited. The region has scarcity of water. Mineral wealth of the state West Bengal provides the employment opportunity to the people of the state. Mining is one of the major core sector industries which play a crucial role in the process of country economic development.

The basic objective of the project is the effective utilization of minerals for the industrial development in this region or country. The Kharia Fire clay & China clay products generated is used for manufacturing of The mineral is indigenously consumed in the industries e.g. ceramics, textiles and fertilizer. China clay also finds its use in foundry, asbestos cement, cosmetics, electrodes, chemical, electrical and abrasive. The composition of Fire clay & China clay available in the area is acceptable for industry use.

1.6 Scope of the EIA Study

EIA integrates the environmental concerns in the developmental activities so that it can enable the integration of environmental concerns and mitigation measures in project development. The study includes detailed characterization of existing status of environment in an area of 10 km radius around project site. In order to get an idea about the existing state of the environment, various environmental attributes such as meteorology, air quality, water quality, soil quality, noise level, ecology and socio-economic environment are studied/monitored. Environmental baseline monitoring has been carried

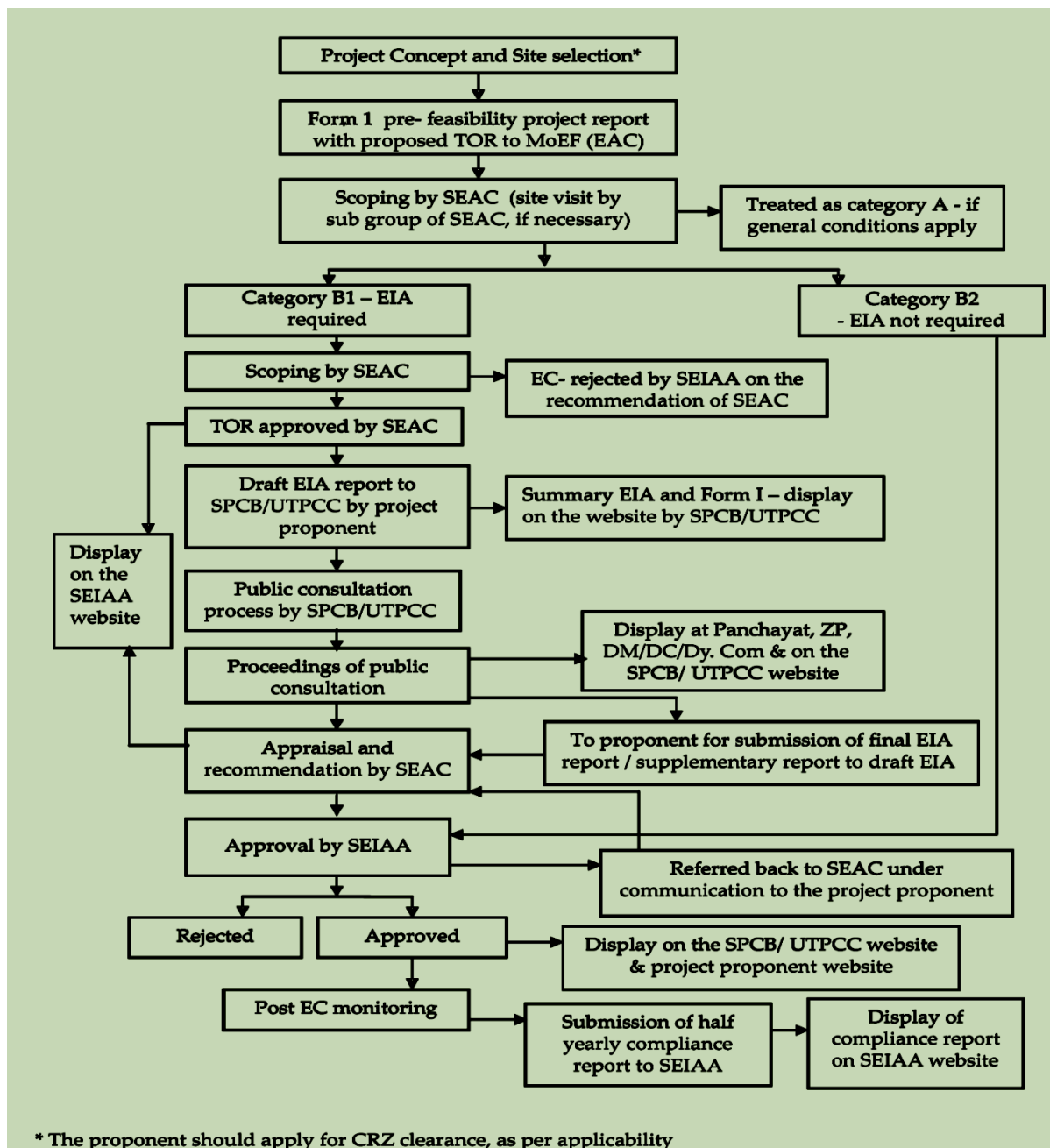
out during summer season (1stMarch 2023 to 31stMay 2023) and used to identify potential significant impacts. The report is prepared as per the TOR granted by the SEIAA, West Bengal.

The scope of the study broadly includes: -

The scope of the study broadly includes: -

- Comply with the ToR No. 1996/EN/T-II-1/111/2023 dated 18.08.2023 issued by SEAC of West Bengal.
- Environmental baseline monitoring, to establish the baseline status of the study area.
- Collection of available secondary data.
- Identification of Environmental Aspects and its associated impacts on the environment.
- Prediction of impacts on environmental attributes.
- Evaluate the predicted impacts on the various environmental attributes in the study area by using scientifically developed and widely accepted EIA Methodologies.
- Preparation of EMP outlining the measures for improving the environmental quality.
- Identification of critical environmental attributes, which require monitoring.
- To check the compliance of operations as per the statutory Consent/Legal requirements
- To delineate the post-project environmental quality monitoring programme to be pursued by the Project Proponent.

This EIA report is prepared, based on the standard ToR for conducting Environment Impact Assessment study for non-coal mining projects issued by the Ministry of Environment, Forest and Climate Change (MoEF&CC). This report addresses the environmental impacts of the proposed mining project and proposes the mitigation measures for the same. The flow chart depicting the stages to obtain the prior Environmental Clearance for the project is given below:



1.7 Applicable Environmental Regulations/Legislations

Understanding of the applicable environmental legislative framework is crucial for understanding the scope of the EIA study. With respect to prevention and control of environmental pollution, the following Acts and Rules of MoEF&CC (Ministry of Environment Forests and Climate Change), GoI(Government of India) govern the proposed project.

1.7.1 Details of the Study Area

The study area for the present EIA study is the area covered within the 10 km radius from the boundary of the facility. Core zone and buffer zone of study area marked on Toposheet is given in **Figure 1.2** below:-

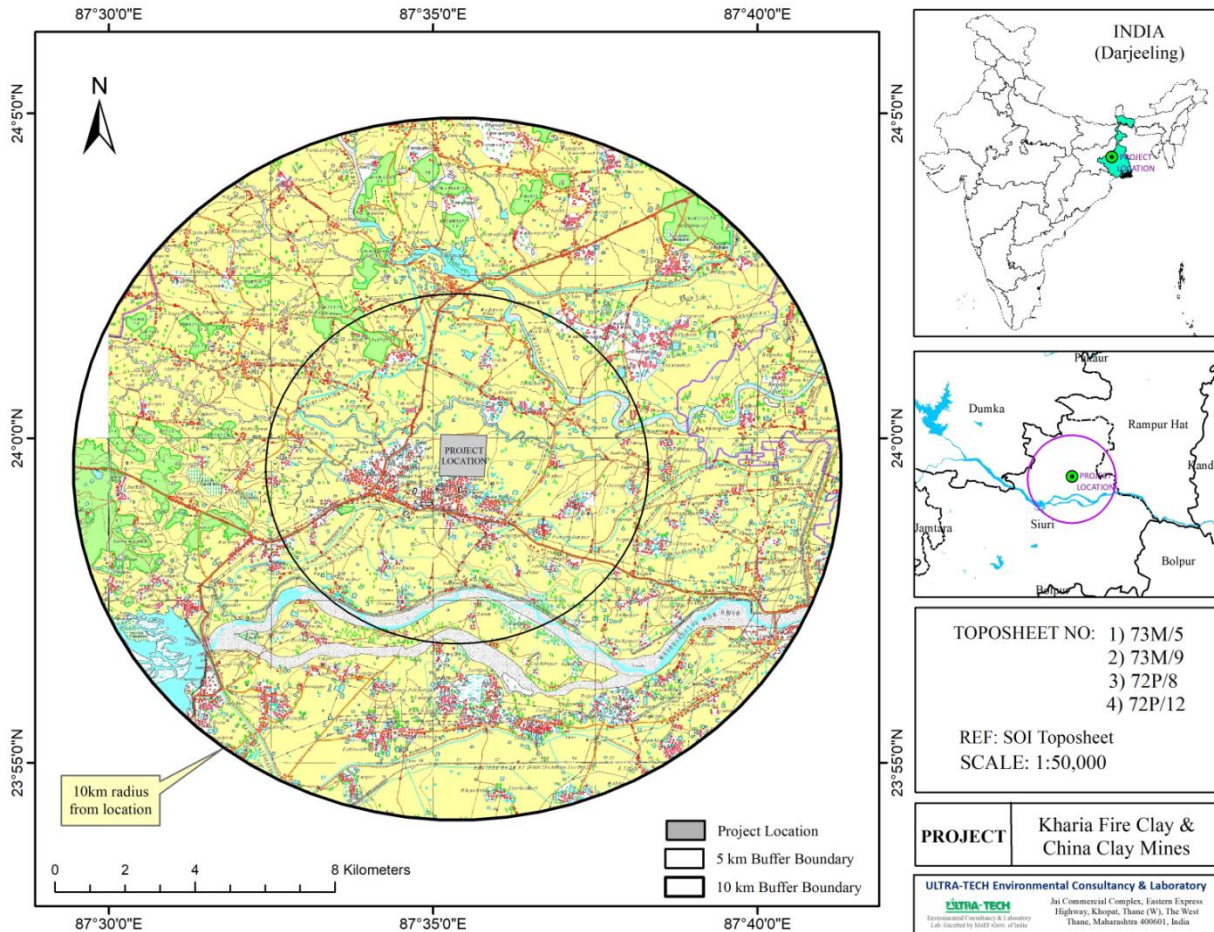


Figure 1.2: Toposheet of the 10 km study area

1.7.2 Methodology of the EIA Study

EIA study has been conducted within an area of 10 km radius around the proposed mining lease area of Kharia Block with due consideration to the cluster situation. The EIA/EMP has been prepared based on EIA Notification 2006, as amended from time to time and the approved ToR. The various steps involved in the study include:

- Identification of significant environmental parameters and assessing the status within the impact zone.
- Prediction of impacts envisaged due to proposed scheme on various environmental parameters.
- Evaluation of impacts after super imposing the predicted scenario developed by using AERMOD model over the baseline scenario.
- Collection of site-specific meteorological data at the mine sites.

- Carrying out a site -specific ecological study.
- Carrying out a site -specific study for the Core and Buffer Zone for ambient air, water, soil, land use, socio economic status etc.
- Literature review that includes identification of relevant data from various government agencies and other sources for socio-economy, demography, meteorology, land use, ecology, etc.
- Identify various existing pollution loads due to mining and domestic activities in the buffer zone.
- Evaluate the predicted impacts on the various environmental attributes in the study area by using scientifically developed and widely accepted EIA Methodologies.
- Preparation of EMP outlining the measures for improving the environmental quality.
- Reconnaissance survey was conducted by the team of ULTRA TECH along with the concerned officials of proposed lease area and sampling locations were identified on the basis of:
 - Predominant wind directions in the study area as recorded from the site
 - Existing topography, drainage pattern and location of surface water bodies like ponds, canals, and rivers
 - Locations covering 120 deg sector
 - Location of villages/towns/sensitive areas
 - Areas which represent baseline conditions
 - Collection, collation and analysis of baseline data for various environmental attributes.
 - The field observations are used to:
 - To observe the baseline environmental status of study area
 - Identify extent of negative impacts on community/natural resources

1.8 Structure of the EIA Report

EIA report contains baseline data, project description and assessment of impacts and mitigation measures for preparation of Environmental Management Plan. The report is organized in following twelve chapters

Chapter 1: 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.

Chapter 2: 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 project, the project implementation schedule, estimated cost of development etc.

Chapter 3: 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 etc.

Chapter 4: 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.

Chapter 5: 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.

Chapter 6: 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.

Chapter 7: Additional Studies

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

Chapter 8: Project Benefits

This chapter presents the benefits from this project.

Chapter 9: Environmental Cost Benefit Analysis

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

Chapter 10: Environmental Management Plan

This chapter deals with the EMP for the proposed Kharia Fire clay & China Clay mining project and indicates the measures proposed to minimize the likely impacts on the environment during and operation phases and budgetary allocation for the same.

Chapter 11: Summary and Conclusion

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

Chapter 12: Disclosure of Consultants

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

1.9 Compliance to ToR

1.9.1. 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 1.2**.

Table 1.2: Compliance to ToR for the proposed Kharia Fire clay & China clay Mine Projects

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
A. Standard Terms of Reference		
1.	Year-wise production details since 1994	In case of fresh EC past production is not

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
	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.	applicable and in case of existing mines certified past production will be submitted from the date of grant of prior EC at the time of appraisal of project before SEAC.
2.	A copy of the document in support of the fact that Proponent is the rightful lessee of the mine should be given.	Lease Deed was issued by Govt. of West Bengal vide registration no. 2617 on dated 08/04/1983 enclosed as <i>Annexure -2 of the Draft EIA Report.</i>
3.	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	Complied. All documents including approved mine plan, EIA and Public Hearing are compatible with one another in terms of the lease area, production levels, waste generation and its management, mining technology etc. and all documents are in the name.
4.	All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/geomorphology and geology of the area should be provided including longitude, latitude. 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).	Complied, High resolution satellite image used for land use study and Google earth image, Geology, Geomorphology & Ecological features of the study area is given in <i>Figure 1.2, 2.1, 2.2, 2.3, 2.5 of Chapter 2 and 3.1, of Chapter 3 of the Draft EIA Report.</i>
5.	Information should be provided in Survey of India Toposheet in 1:50000 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, stream and rivers and soil characteristics.	Complied. Toposheet image, Geological map, etc. are given in <i>Figure 2.2, 2.5 Chapter 2 of the Draft EIA Report.</i>
6.	Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority	The documents of details of lands which is proposed for mining are enclosed as <i>Annexure – 2 & 5 of the Draft EIA Report.</i> Land diversion is not needed for undertaking quarrying activity as quarry lease is being granted by State Government through District Authorities.

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
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 spell 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 firms/companies are having well laid down Environment policy approved by its owners. Standard operating Procedures (SoPs) have been incorporated in the Environment Policy of the leaseholder. The hierarchical system or administrative order of the proponent to deal with the environmental issues and for ensuring compliance with the EC condition etc. Lessee has a well laid down Environment Policy which includes follow-up environmental awareness among the employees and encourage them to work in an environmentally Responsible Manner. Trained, educate and inform our employees about environmental management issues that may not affect their work and Health. Where required by legislation or where significant health, safety or environmental hazards exist, develop and maintain appropriate emergency and spill response programmes. The Company is aware about environmental issued and insuring compliances and conditions which applicable for the project. These all has been given in <i>Chapter 10 Environmental Monitoring Programme.</i>
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, mode of working is semi - mechanized. Top soil and overburden will be removed by excavator. Policies relating to mine safety have been adopted and same has been incorporated in <i>Chapter 7, Section 7.2&7.3, of Draft EIA Report.</i>
9.	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	The Study area of the proposed mining project comprises of 10 km radius around the cluster boundary of applied mine lease has been prepared and given in <i>Chapter-2, Figure-2.1& 2.2 of the Final EIA Report.</i> Waste generated are ordinary daily use material like newspapers, food waste, disposal material,

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
		<p>packing material etc. shall be generated and it shall be stored in dustbins and will be disposed of as per the guidelines of village gram panchayat.</p> <p>Data like reserves, waste generation up to life of mine is given in <i>Chapter 2, para 2.6 of the Draft EIA Report.</i></p>
10	<p>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.</p>	<p>Complied. Land use delineating forest area, agricultural land, grazing land, wild life sanctuary, national part etc. Land use details of study area discussed in <i>Section 3.5.5 figure 3.11 & Table 3.3 in Chapter-3. Of the Draft EIA Report.</i></p>
11	<p>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.</p>	<p>If required, land for any Over Burden Dumps outside the mine lease will be submitted at the time of appraisal of project.</p> <p>The mining lease area is Private land and 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 their respective areas, therefore, R& R is not applicable.</p>
12	<p>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</p>	<p>Not Applicable.</p> <p>No forest land within the proposed project site. No national park and wild life century is situated in study area.</p>

SN	Description	Compliance in the Draft EIA Report																																									
TOR Conditions																																											
to assist the Expert Appraisal Committees.																																											
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.	Not applicable.																																									
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 involvement of forest land in the Project area. Hence it is not applicable																																									
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	<table border="1"> <tbody> <tr><td>Candpur PF</td><td>8.5 km</td></tr> <tr><td>Maubela RF</td><td>10.32 km</td></tr> <tr><td>Ghaga RF</td><td>12.11 km</td></tr> <tr><td>Kalaipahari RF</td><td>12.62 km</td></tr> <tr><td>Rampur PF</td><td>3.47 km</td></tr> <tr><td>Lungalblanla PF</td><td>5.65 km</td></tr> <tr><td>Phulpahari PF</td><td>7.38 km</td></tr> <tr><td>Harinsngh RF</td><td>8.08 km</td></tr> <tr><td>Dewanganj PF</td><td>7.83 km</td></tr> <tr><td>Nschintapur RF</td><td>6.6 km</td></tr> <tr><td>Chanda PF</td><td>7.5 km</td></tr> <tr><td>Bishnapur PF</td><td>7 km</td></tr> <tr><td>Gopalnagad PF</td><td>9.23 km</td></tr> <tr><td>Rampara PF</td><td>8.9 km</td></tr> <tr><td>Birpur PF</td><td>5.92 km</td></tr> <tr><td>Paspur PF</td><td>7.98 km</td></tr> <tr><td>Dobandhi PF</td><td>7.16 km</td></tr> <tr><td>Open mixed Jungle</td><td>8.08km</td></tr> <tr><td>RS Jbdhapur PF</td><td>15 km</td></tr> <tr><td>Dhobagram PF</td><td>17.15 km</td></tr> </tbody> </table>	Candpur PF	8.5 km	Maubela RF	10.32 km	Ghaga RF	12.11 km	Kalaipahari RF	12.62 km	Rampur PF	3.47 km	Lungalblanla PF	5.65 km	Phulpahari PF	7.38 km	Harinsngh RF	8.08 km	Dewanganj PF	7.83 km	Nschintapur RF	6.6 km	Chanda PF	7.5 km	Bishnapur PF	7 km	Gopalnagad PF	9.23 km	Rampara PF	8.9 km	Birpur PF	5.92 km	Paspur PF	7.98 km	Dobandhi PF	7.16 km	Open mixed Jungle	8.08km	RS Jbdhapur PF	15 km	Dhobagram PF	17.15 km	
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16	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	Wild Life Sanctuary - none around 10 km National Park - none around 10 km. Hence Not Applicable. The study has been done for the project and it has been assessed that there will no adverse effect will be on wildlife because there is no wild life activity found. Details given in Ecological Environment Section 3.7 of Chapter 3 of the Draft EIA Report.																																									
17	Location of National Parks, Sanctuaries,	Not Applicable																																									

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
	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.	National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves etc. are not available within study area of 10 km, hence not applicable.
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 alongwith 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.	Complied. Details given in <i>Section 3.7 as Biological Environment of Chapter 3.</i> There is no Schedule I species found within the proposed area.
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 'Rajmahal Trap' and it does not attract any court restriction for mining operation. The valid and lawful Lease Deed of this project site has been granted to the project proponent by the Govt. of West Bengal is enclosed as Annexure-2
20	Similarly, for coastal Projects, A CRZ map	Not Applicable as the project does not falls in Coastal area.

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
	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).	
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral 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.	Not Applicable. The whole mining lease area is a private land. No houses, villages connecting road and 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 of R&R plan study. Hence Not applicable.
22	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	Primary Baseline data has been collected from 1 st March 2023 to 31 st May 2023 (Summer season).. The raw data of ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna including the monitoring locations has been given in the Chapter 3 of the Draft EIA Report. Date wise collected baseline AAQ, data have formed part of EIA report. The details of the same are given in section 3.6, Chapter 3 of the Draft EIA Report. The environmental monitoring has been carried out by NABL approved laboratory. <i>Baseline Monitoring report is attached as</i>

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
	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.	<i>Annexure 9 of the Draft EIA Report.</i>
23	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 predominant wind direction may also be indicated on the map.	Complied. The air quality modeling details is incorporated <i>in section 4.7.1, 4.10.2, Table 4.3& 4.4, Figure-4.2 to 4.5 Chapter 4 of the Draft EIA Report.</i> The wind rose diagram has been prepared which is showing wind is blowing from NW, shown in <i>Chapter-3, Figure 3.12 of the Draft EIA Report.</i>
24	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	The water required during the operation phase is 9.65 KLD <i>Chapter-2, Section 2.8.1 of the Draft EIA Report.</i> The drinking water required for the construction workers will be sourced from gram panchayat through water tankers.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not Applicable No groundwater will be abstracted for use at mine site. Water will be arranged from local body through tankers NOC from Gram Panchayat for supply of water annexed in Annexure-7 of the Draft EIA Report.
26	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	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 used for stone cutting, plantation and sprinkling purpose for dust

SN	Description	Compliance in the Draft EIA Report								
TOR Conditions										
		suppression.								
27	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	Surface & Ground water quality results are given in <i>Chapter 3, Section 3.6</i> and lab analysis report attached as <i>Annexure 10 of the Draft EIA Report</i> .								
28	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	Working will be carried out till 6meter of depth whereas water is expected 8 - 10 meter BGL across the applied areas. Therefore working will not Intersect groundwater table. The details of groundwater of the area given in <i>section 3.4 & 3.4.2 of chapter 3 of the Draft EIA Report</i> .								
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	No any water body is situated or passing from lease area. No modification or diversion due to the proposed mining activity.								
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.	<p>Please refer to <i>Section 3.4 & 3.4.2 in the Chapter 3 of Draft EIA Report</i> for detailed information on the Geology & Hydrology of the project area.</p> <table border="1"> <tr> <td>Site Elevation</td> <td>39 m – 51 m</td> </tr> <tr> <td>Ultimate Working Depth</td> <td>6 m</td> </tr> <tr> <td>AMSL</td> <td>50 m</td> </tr> <tr> <td>BGL</td> <td>Pre Monsoon ->12 m BGL Post Monsoon - >8 m BGL</td> </tr> </table>	Site Elevation	39 m – 51 m	Ultimate Working Depth	6 m	AMSL	50 m	BGL	Pre Monsoon ->12 m BGL Post Monsoon - >8 m BGL
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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	A time bound greenbelt development plan is given in <i>Table 2.14 of chapter 2 and Table 10.5 of Chapter-10 of the Draft EIA Report</i> .								

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
	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.	
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.	Traffic Survey has been conducted and given in the <i>Section 3.9 of the Chapter 3 of the Draft EIA Report.</i>
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Temporary shelter along with temporary toilet connected to the soak pit at certain distance and drinking water from the mining lease area will be provided to the mine workers. Details of the infrastructure facilities to be provided for the mine workers is given in <i>section 2.8.4 Chapter-2 of the DraftEIA Report.</i>
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.	After complete extraction of mineral if complete reclamation of land will not be possible due to no sufficient quantity of material available for reclamation, at conceptual stage remaining unreclaimed pit will be developed as water reservoir.

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
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 and the Mines Rules, 1955 will be followed for Occupational health and safety. Project specific occupational health mitigation measures with required facilities has been given as a part of Environmental Risk assessment in the Chapter 7 under Section 7.2 & 7.3 of Draft EIA-Report . Periodical medical examination schedules are given in Chapter 6 of Draft EIA Report .
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	The proposed site is away from the nearest habitat and there is not adverse health impact over the local people is anticipated, even though periodically health check-up camp will be organized under the EMP activity. Detailed in Chapter- 10, Section - 10.4.8. of the Draft EIA Report .
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.	Socio-economic study incorporated in Section 3.8 Chapter of the Draft EIA Report .
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.	Environment Management Plan is given in the Chapter 10 of Draft EIA Report .
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. After conducted the public hearing, Public Hearing points raised and commitment of the Project Proponent will be submitted in Final EIA Report .
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	There have no litigation pending against the project.

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
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.	Cost of the project and EMP cost details are given in <i>Chapter 10, Section 10.7 of Draft EIA report.</i>
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 <i>Section 7.5 of Chapter 7 of the Draft EIA report.</i>
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.	The benefit of the project has been discussed in the <i>Chapter 8, of Dreaft EIA Report.</i>
44	Besides the above, the below mentioned general points are also to be followed: -	
a.	Executive Summary of the EIA/EMP Report.	Executive Summary enclosed as separate document.
b.	All documents to be properly referenced with index and continuous page numbering.	Compiled.
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	Compiled.
d.	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project	All the analysis/testing reports of water, air, soil; noise etc. using the NABL accredited laboratories. All analysis/testing Report of water, air, soil noise etc. are incorporated in <i>Chapter-3 & 4 and annexed in Annexure 10 of the Draft EIA Report.</i>
e.	Where the documents provided are in a language other than English, an English translation should be provided	The documents provided are in English language.
f.	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Not Applicable
g.	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No.	Agreed to the condition & followed.

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
	J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.	
h.	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission 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.	There are no changes made in the basic scope and project parameters
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	This is a fresh new application for EC, hence not applicable.
j.	The EIA report should also include (i) Surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) Sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	All the figures have been incorporated <i>in the Chapter 2 of EIA report.</i>
B Additional Terms of Reference: -		
A	Cluster certificate from the competent authority.	The Cluster Certificate is submitted by Annexure -4
B	Slide slope, mining bench and mine closure plan to be included in Mining plan during EC application.	Project Proponent will be submitted in the time <i>Final EIA Report.</i>

SN	Description	Compliance in the Draft EIA Report
TOR Conditions		
C	Subsurface hydro-geological study of the area(within 3 km, radius) to be done. Level of ground water table to be checked	Project Proponent will be submitted in the time <i>Final EIA Report.</i>
D	Source of water and power source to be maintained. Plan of providing drinking water and other amenities for the labours.	Project Proponent will be submitted in the time <i>Final EIA Report.</i>
E	A progressive Greenbelt plan may be prepared. Afforestation/ vegetation should be attempted alongside the village roads or ther public land. This may be done with prior approval of the local self-governing bodies. If no public land is available for the purpose the project proponent shall arrange for land with his personal means. To enhance success/ survival rate the plantation shall be attempted during the first two years of the project life and the plantation so done shall be taken care of during the rest of the project life. Species of the plant selected should be self-sustaining in that particular region.	A progressive green belt plan is submitted by Annexure - 7
F	A safety fencing to be provided around the water-filled pit.	Compiled
G	Preservation of top-soil/ weathered rock, if any , for planatation.	Top soil is to be prevent for future plantation.
H	Pollution control plan for the dumping site	Project Proponent will be submitted in the time <i>Final EIA Report.</i>
I	A revised need-based EMP may be prepared in accordance with the MoEF&CC office memorandum vide F.No.22-65/2017.IA.III dated 30.09.2020. Record of communications made in this regard with the identified/intended beneficiaries (school/ institutions etc) may also be uploaded.	The revised need based activity is prepared in accordance with the MoEF&CC office memorandum vide F.No.22-65/2017.IA.III dated 30.09.2020 in section 10.8 in Chapter - 10.

CHAPTER 2 .Project Description

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 the Project

Applied Kharia Fire clay & China clay Mine of Md. Golam Kibria Mallick Partner of, M/s. Sharma Minerals Joypore having area 7.02 Ha,

Total area comes to 7.02 ha for, Md. Golam Kibria Mallick. Partner of M/s. Sharma Minerals Joypore This area comes under ownership of one proponent and located in Village Kharia of, District Birbhum .

As per EIA notification 14/09/2006 and its amendment notification of MOEFCC vide S.O. dated the 14/08/2018, 12/12/2018, 20/04/2022, 09/05/2022 and read with NGT order dated 13/09/2018; environmental clearance for minor minerals including cluster situation is required to be obtained under B1 category. Therefore, Cluster Situation comprising total mineralized area of applied two projects is 20.09 hectares are re-categorized as B2 category for consideration of environmental clearance.

Applied land situated at Plot No. 425 to 478, 481 to 484, 500 to 540, 543 to 555, 568 to 587, etc (Md. Golam Kibria Mallick, Partner of, M/s. Sharma Minerals Joypore, 7.02 Ha), of district Birbhum Mouza/village Kharia. The information about the mines falling within a radius of 500 meters has been sought by submitting the application for the mineral Mine lease. In this regard, the report was issued by Indian Bureau of Mines. According to above, information about the mines coming within a radius of 500 meters and there is one lease in the area including proposed whose ownership lease details are as follows.

Table 2.1 – Lease Details into the Cluster

Sl. No	Lesee's Name	Village	Owner of the Land	Plot No.	Area (Ha)	Lease Period
1.	Golam Kibria Mallick, M/s. Sharma Minerals Joypore	Kharia	Pvt. Land	425 to 478, 481 to 484, 500 to 540, 543 to 555, 568 to 587, etc	7.02	Upto 07.04.2033
2.	M/s. Patalnagar Minerals & Industries Pvt.Ltd.	Kharia	Pvt. Land	250,252,261,735,758,52 24 etc..	13.07	Upto 06.11.2034
Total					20.09	

This chapter includes the location, physiographic feature of the area, description and characteristics of catchment area, regional / catchment area and local geology, mineral reserves, method of mining, annual rate of production and conceptual mining details. As per the MoEF&CC notification the project comes under category B1 (Cluster situation) and will be appraised at SEAC, West Bengal. The brief details of the project have been given in the Table 2.2.

Table 2.2: Environmental Setting of Proposed Kharia Fire clay & China clay Mining Project

Name of the Project	Kharia fire clay & China clay Mine																																																														
Location of the Project	Village /Mouza – Kharia, District – Birbhum																																																														
Geographical Coordinates:	<table border="1"> <thead> <tr> <th>Point</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr><td>A</td><td>23°59'38.011" N</td><td>87°35'22.183" E</td></tr> <tr><td>B</td><td>23°59'36.484"N</td><td>87°35'21.736" E</td></tr> <tr><td>C</td><td>23°59'38.207" N</td><td>87°35'27.611" E</td></tr> <tr><td>D</td><td>23°59'38.029"N</td><td>87°35'32.019" E</td></tr> <tr><td>E</td><td>23°59'35.195" N</td><td>87°35'32.035" E</td></tr> <tr><td>F</td><td>23°59'35.132" N</td><td>87°35'33.539" E</td></tr> <tr><td>G</td><td>23°59'33.700" N</td><td>87°35'37.827" E</td></tr> <tr><td>H</td><td>23°59'32.460" N</td><td>87°35'40.117" E</td></tr> <tr><td>I</td><td>23°59'31.328" N</td><td>87°35'39.926" E</td></tr> <tr><td>J</td><td>23°59'30.940" N</td><td>87°35'38.431" E</td></tr> <tr><td>K</td><td>23°59'31.807" N</td><td>87°35'37.346" E</td></tr> <tr><td>L</td><td>23°59'30.869" N</td><td>87°35'34.968" E</td></tr> <tr><td>M</td><td>23°59'32.062" N</td><td>87°35'31.570" E</td></tr> <tr><td>N</td><td>23°59'30.131" N</td><td>87°35'31.855" E</td></tr> <tr><td>O</td><td>23°59'31.818" N</td><td>87°35'30.630" E</td></tr> <tr><td>P</td><td>23°59'31.122" N</td><td>87°35'27.436" E</td></tr> <tr><td>Q</td><td>23°59'31.499" N</td><td>87°35'24.563" E</td></tr> <tr><td>R</td><td>23°59'31.619"N</td><td>87°35'21.866" E</td></tr> <tr><td>S</td><td>23°59'35.195" N</td><td>87°35'22.104" E</td></tr> </tbody> </table>			Point	Latitude	Longitude	A	23°59'38.011" N	87°35'22.183" E	B	23°59'36.484"N	87°35'21.736" E	C	23°59'38.207" N	87°35'27.611" E	D	23°59'38.029"N	87°35'32.019" E	E	23°59'35.195" N	87°35'32.035" E	F	23°59'35.132" N	87°35'33.539" E	G	23°59'33.700" N	87°35'37.827" E	H	23°59'32.460" N	87°35'40.117" E	I	23°59'31.328" N	87°35'39.926" E	J	23°59'30.940" N	87°35'38.431" E	K	23°59'31.807" N	87°35'37.346" E	L	23°59'30.869" N	87°35'34.968" E	M	23°59'32.062" N	87°35'31.570" E	N	23°59'30.131" N	87°35'31.855" E	O	23°59'31.818" N	87°35'30.630" E	P	23°59'31.122" N	87°35'27.436" E	Q	23°59'31.499" N	87°35'24.563" E	R	23°59'31.619"N	87°35'21.866" E	S	23°59'35.195" N	87°35'22.104" E
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Maximum Temperature	40°C - 45°C																																																														
Minimum Temperature	6°C – 10°C																																																														
Maximum rainfall	1130 mm																																																														
Size of the Project	7.02 ha																																																														
Nearest Highway	NH-14: 1.42 Km, WNW SH-11: 1.3 km, S																																																														
Nearest railway station	Sainthia Junction Railway Station Aerial Distance–9.95 Km, SE																																																														
Nearest Airport	Kazi Nazrul Islam Airport Aerial Distance –54.6 Km, SSW																																																														
Nearest town/City	Suri 11 Km,SSW (Aerial Distance)																																																														
Nearest water body	Mayurakshi River – 3.53 Km, S																																																														

Major water bodies within 10 km radius	Mayurakshi River – 3.53 Km, S
Densely populated or built-up area	Md Bazar –2.08 , W
Archaeologically important places	None within 10 km radius
Protected areas as per Wildlife Protection Act (Tiger reserve, Elephant reserve, Biospheres, National parks, Wildlife sanctuaries, community reserves and conservation reserves)	None within 10 km radius
Reserved / Protected Forests	Candpur PF Lungalblanla PF Phulpahari PF Maubela RF Kalaipahari RF
Defense Installations	None within 10 km radius
Seismicity	Since project site comes under Seismic zone II, which is least active zone for earthquakes as per IS: 1893 (Part 1: 2002).
State, National boundaries	West Bengal-Jharkhand State border – 10.2 km, NW
Wildlife Sanctuary	None within 10 km radius
National Park	None within 10 km radius
Biosphere reserves	None within 10 km radius
Important migration routes of birds	None within 10 km radius
Ramsar sites (Wetlands of International Importance)	None within 10 km radius

Unique or threatened ecosystems	None within 10 km radius
Important topographical features, including ridges, river valleys, shorelines, and riparian areas	None within 10 km radius
Mangrooves	None within 10 km radius
Physical Sensitive Receptors	None within 10 km radius
Notified Ground Water Zone by CGWA	None within 10 km radius
Critically Environmental polluted Area	None within 10 km radius
Pollution Sources	None within 10 km radius

Certificate of mining office for sensitive structure with 500 meters from boundary of applied land is given in **Annexure 4**.

2.2 Need and Justification of the Project

The mining project falls in the area of the district Birbhum, West Bengal devoid of sufficient agriculture activities and other industrial growth. The earning sources of the region are limited. The region has scarcity of water. Mineral wealth of the state West Bengal provides the employment opportunity to the people of the state. Mining is one of the major core sector industries which play a crucial role in the process of country economic development.

The basic objective of the project is the effective utilization of minerals for the industrial development in this region or country. The Fire clay & China clay products indigenously consumed in the industries e.g. ceramics, textiles and fertilizer. China clay also finds its use in foundry, asbestos cement, cosmetics, electrodes, chemical, electrical and abrasive. The project will also provide additional revenue to State Government and create direct and indirect employment opportunities, which will catalyze overall growth of the State and improve the quality of life of the people living in the region and transform the region's economy from predominantly agricultural to significantly industrial and accelerate the pace of regional development of region. There is huge demand of stone chip/ boulders in the region as well as throughout country.

Processed china clay in India is consumed mainly by the ceramics sector. Besides ceramics, the other industries which consume this mineral in substantial quantities are paper, paint, plastics and rubber. Crude china clay is consumed mainly by the cement units, and insecticide and refractory sectors. Minor uses are in pharmaceuticals, cosmetics, textile, ink, ultramarine, fibre glass, soaps and detergents.

2.3 Project Location & Description of the Area

The proposed mining lease area is located in A Kharia village/Mouza, and Birbhum District of West Bengal State. Kharia China Fireclay & China clay mine of Md. Golam Kibria Mallick (Partner of M/s. Sharma Minerals Joypore), who is in area can be located in the Survey of India Toposheet No. 73M/5, 73M9, 72P/8, 72P/12. The mining area is a Pvt. Land. Nearest Bus Stand Patalnagar bus stop situated about 1.3 km distance whereas Nearest Railway Station is located at Sainthia Junction Railway Station 9.95 km in southeast from the lease area. The location Index map of the project sites are given in Figure 2.1 below-

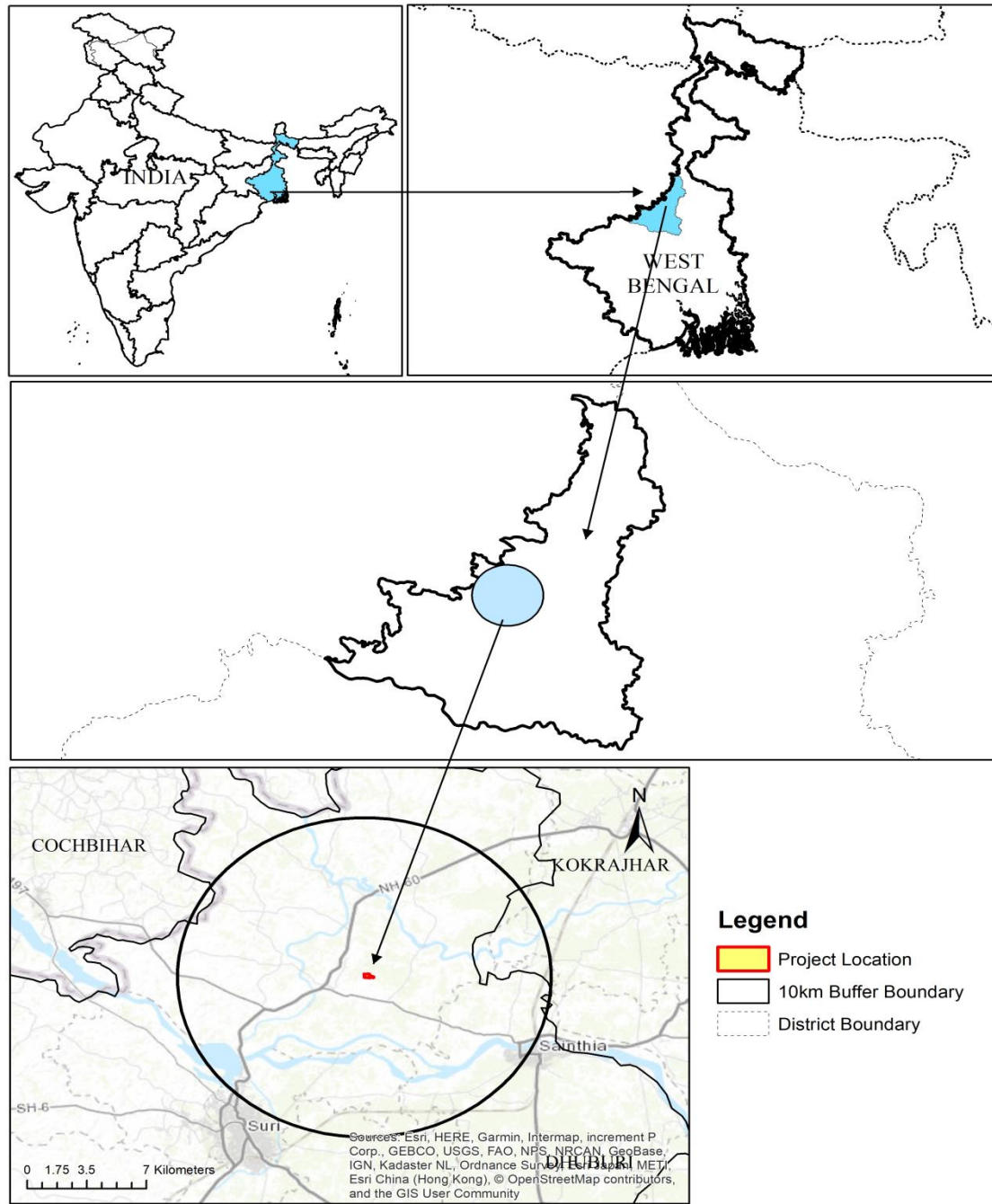


Figure 2.1: Location Map of proposed project sites

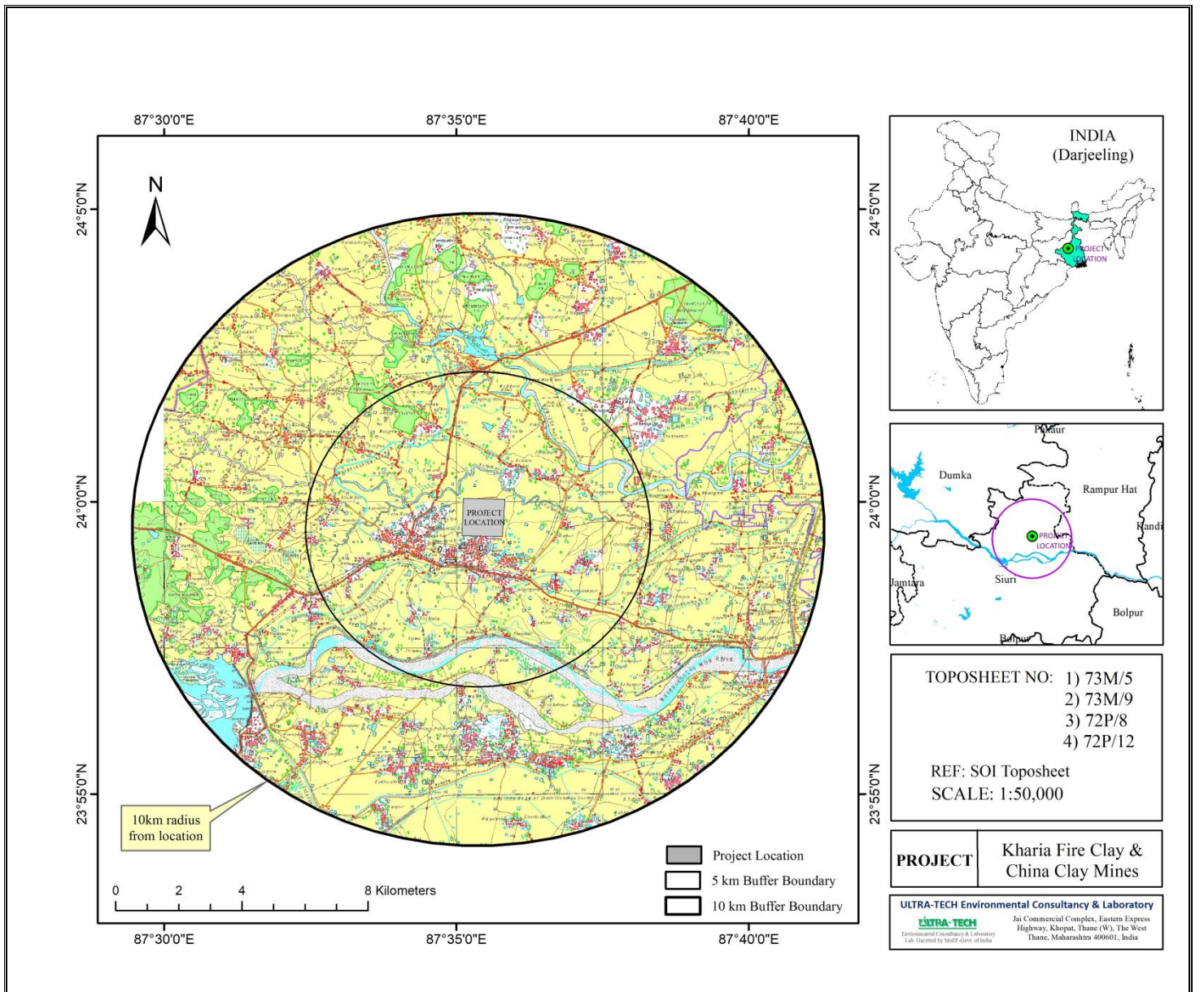


Figure 2.2: Topographical Map Covering 10 Km Radius of Study Area

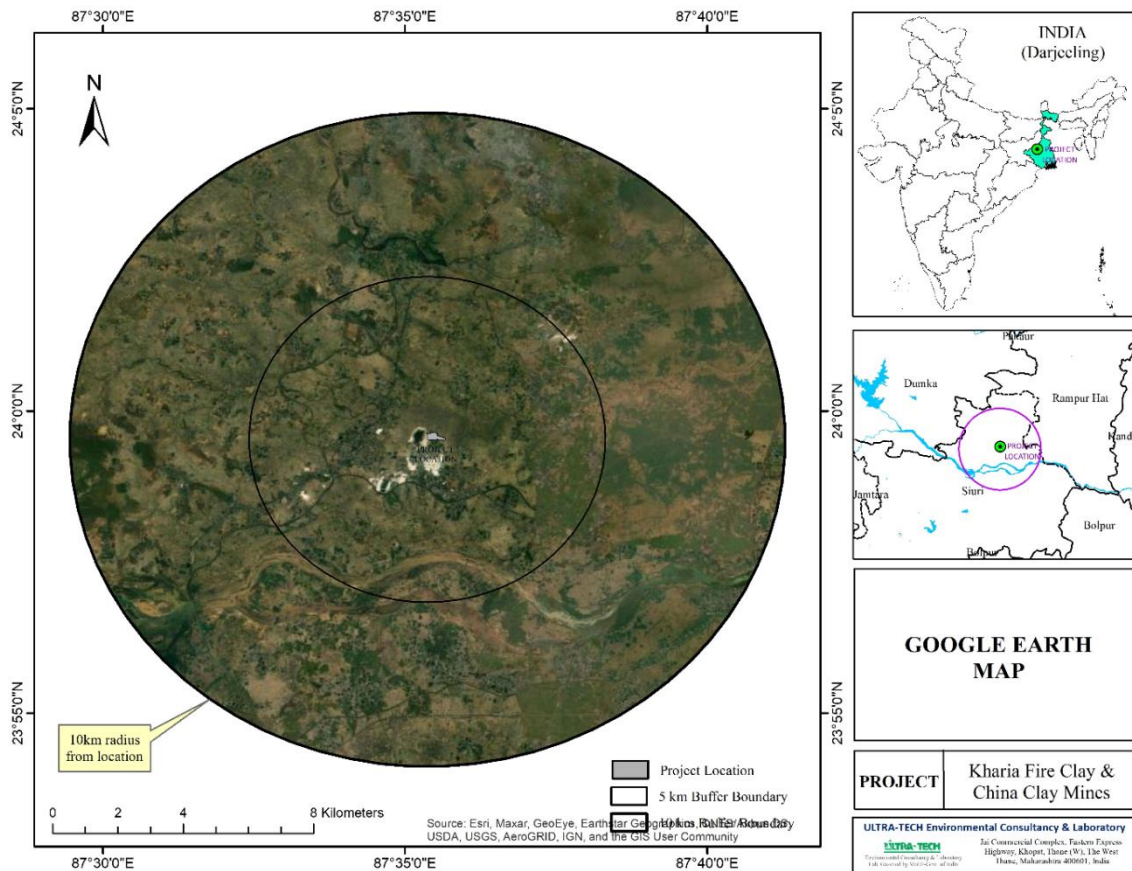


Figure 2.3: Google Earth Map of 10 km Radius from the Project Site



Figure 2.4: Photograph of Project Site of Kharia Fire clay & China clay Mine

2.3.1 Land Schedule

The total area granted for mining lease is coming within the non forest waste land. The land details with plot no. in respect of Kharia Fire clay & China clay Mine Lessee is Md. Golam Kibria Mallick Partner of, M/s. Sharma Minerals Joypore attached as Annexure 5.

Table 2.3: Land Schedule of Kharia Fire clay & China Clay Mine

Name of the Mines	Name of Lessee	Forest Land	Non-Forest Land			
			Private Agricultural Land (Ha)	Grazing Land	Barren Land	Others
Kharia Fire clay & China clay	Md. Golam Kibria Mallick Partner of M/s. Sharma Minerals Joypore	NIL	7.02	NIL	NIL	NIL

2.3.2 Topography and geology of the Area

2.3.2.1 Topography:

The area is having a gentle undulating topography with occasional high grounds. However, the general slope of the area is gentle slopping towards North-East and the highest and lowest elevation of the area is 52 South-East area and 49 M in the North-East area above MSL (Mean Sea Level). The climate is tropical, only one season i.e. in rainy season paddy is cultivated and vegetables cultivated in other season. Yearly rainfall is about 1130 mm. The river Mayurakshi is 3.5 Km away from the lease boundary and a distributary feeder canal is there about 500 M. from the lease hold area.

2.3.2.2 Geology:

A. General Geology

The district has abundant reserve of mineral resources like Fire Clay, China Clay, Stone, Coal, Quartz &-Feldspar resources. Relatively higher grounds towards western and north-west parts are occupied by Granite rocks, the lower Gondwana rocks are concealed by a cover of soil and laterite tertiary rocks. Traps and inter-trappean rocks (Rajmahal Volcanic) and inter-trappean rocks (Dubrajpur Formation). In this narrow strip of sedimentary rocks, 12.7 km. long and 400 m to 2 km wide, trending N NW — S SE Barakar Formation is partly exposed and is partly under a cover of soil, inter-trappean and itra-trappean rocks. Talchir Formation is exposed in the adjoining part of Dumka district. Although thin Coal beds are known exist in Dubrajpur Formation, Barakar Formation serves as the sole repository of Coal in this basin.

From the analysis of sub-surface geological information occurred so far from the western part of Birbhum Coalfield, the explored basin area can be structurally divided into two parts, the narrow western fringe part, which is practically free from trap rocks and contains a total strata thickness of a little, over 50 m to 500 m. the deeper eastern part of Birbhum district appears to be the deepest central part of the basin on the basis of present information.

B. Regional Geology:

Almost entire area of this belt is covered on the surface by trap rock of upper gondwana age or by still younger Tertiary rocks and Laterites and the associated rocks containing clay horizons of the area from the cap rock and rest directly upon the Pre-Cambrian metamorphic. This associated surficial deposit containing Fire Clay and China Clay horizons belongs to Tertiary rock. It is seen from the quarry pits and bore holes that within a single clay horizon, there are different types of clay such as yellowish, reddish and black colored clays.

The stratigraphic sequence of various geological units with their respective rock types are described below: -

Table 2.4: Lithostratigraphy

AGE	Formation	LITHOLOGY
Recent Quaternary /Tertiary	Aluvium Undifferentiated Depth	Boose soil, silt & clay, Laterites, lateritic soil, Lateritic gravel with petrified wood & China clay
Middle Jurassic to Lower Certaceous	Unconformity Rajmahal traps and inter-trappeans	Flows of Basalt and inter-trappean sediments (sandstone shale etc.)
Lower Jurassic (upper Triassic)	Unconformity Dubrajpur	Conglomerates coarse to medium grade sandstone, grey siltstone, molted shale and thin coal bands
Lower Prenican	Unconformity barakar	Course to medium grained sand-stone Carbon ocean shales & coal seam, greenish sandstone, siltstone, trillity, olive, green shale
Upper carboniferous to lower Permian(Perm Carboniferous)	Talchir	Granites and granetoids gneiss, pegmatite quartz veins and metabasic dykes
Pre Cambrian	Metamorphis	-----

C. Geology of the area :

SI.NO	Strata	Thickness
1	Alluvium	4.5 M
2	Fire clay/Sandy Clay	1.5M
3	China Clay	6.0M
4	Hard Sand Bed	Continue
TOTAL		12.0M

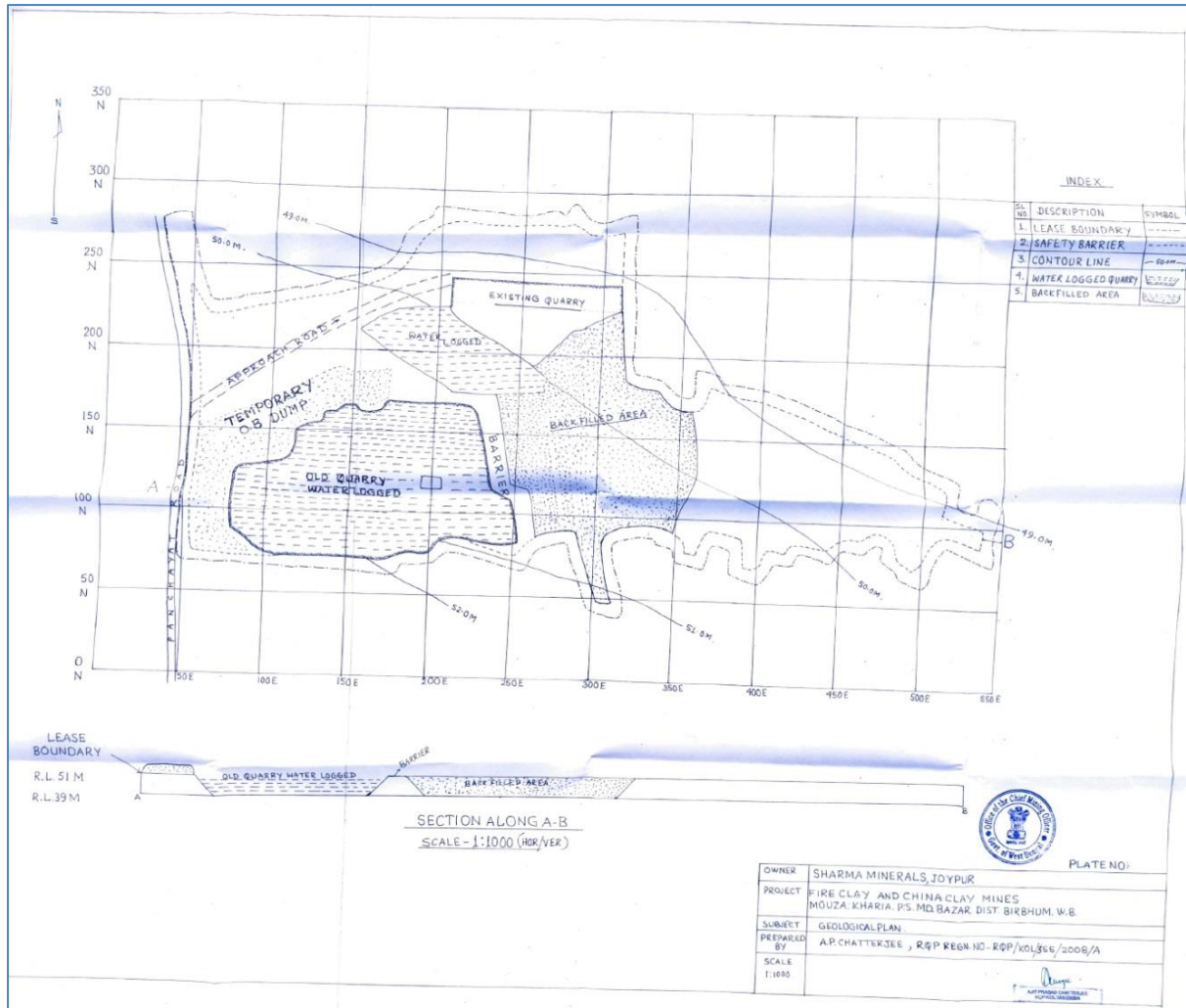


Figure 2.5 : Geological Plan of Kharia Fire clay & China clay Mine

2.4 Project details and activities (As per Approved Mine Plan)

2.4.1 (a) Physical properties

The colour of clay is Buff to white. The inferior grade clay is slightly yellowish white in colour whereas the superior china clay variety is white in colour. The clay is easily dispersible in water but insoluble in acid. It can be powdered to extreme fineness. It has high water retaining capacity, plastic when wet, soft and breaks as lump. When fired at 1200 C, its colour is pale cream with 17-19 per cent shrinkage and slight vitrification.

(B) Chemical Properties

SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	TiO ₂	CaO	MgO	K ₂ O	Na ₂ O
43.70%	38.60%	1.21%	2.50%	0.08%	0.09%	0.12%	0.22%

2.4.2 Salient Feature of the Project

Table 2.5: Salient Feature of the Project

INFORMATION	DETAILS		
Name of Lease holders Address and Contact details of Lease Holders	Md. Golam KibriaMallick Kharia Fire Clay & China Clay Mines M/s. Sharma Minerals Joypore, Vill – Nirbhaypur, P.O –Sewakuri, P.S – Md. Bazar Dist. – Birbhum, West Bengal, PIN - 731127		
Name of the project	Kharia Fire clay & China clay Mine		
Village	Kharia		
Mouza	Kharia		
District	Birbhum		
State	WestBengal		
Toposheet No	73M/5, 73M/9, 72P/8, 72P12		
Name of the Mineral to be mined	Fire clay & China clay		
Type of land	Private Land. There is no Forest land. No human settlement.		
Status of Operation (New Project or Existing Project operating since)	Existing Project		
Mine Area	7.02 ha		
Ultimate depth of mining	6m		
Production Capacity & Minable Reserve	NAME	Production Capacity	Net Minable Reserve
	Kharia Fire Clay & China clay	4763 MTPY	23815 MT
LifeofMine	As per Lease period -20 years		
Quantity of topsoil and Overburden estimated to be removed	Over Burden	4.5 M	
	Fire clay/ sandy clay	1.5M	
	China clay	6.0 M	
Depth of Ground Water Table	Approx. 7- 10 meters of below from the normal surface level		
Method of Mining	Opencast Mining		
No. of working days	300 Days		
SeismicZone	Seismic Zone II		

2.5 Details of Alternate Site Considered and the Basis of Selectingthe Proposed Site

The proposed Kharia Fire clay & China clay mine, which includes the Fire clay & China clay mine of Leases, is owned by one lesse and will be operated within the lease grant area.

So no alternate sites have been assessed. The mining technology is open cast Miningmethod in single shift manual mining without any change in technology.

This project is being granted to the respective project proponents by the Office of Director of Geology & Mining, West Bangal in the approved mineralized zone. This project is far away

from habitation & on maximum non productive land hence this is best suitable for mining activity. For recovery of mineral the procedure used here is the traditional method and as labour intensive, this is adopted for the site proved as the best practice.

2.6 Size or Magnitude of Operation

The proposed area for mining lease is situated at Khariavillage in Birbhum district of West Bengal state. The miningcluster area covers a total applied area of 20.09Ha. The applicant and estimated production are given below in Table 2.6

Table 2.6: Size and magnitude of project area

Kharia Fire clay & China clay	
Mine Area(Ha)	7.02
Production Capacity (MTPY)	4763
Lease Period	20 Years

RESERVE ESTIMATION

The reserve within the lease has been calculated by graphical method. The area is Flat land. The formula adopted for calculation of reserve is graphical method.

Table 2.7: Calculation of Reserve of Kharia Fire clay & China clay Mine

S.N.	Particular of Mine	Details
1	Lease Grant Area	7.02 hect.
2	Fresh Area available for mining	2.83 hect
3	Total area of proposed Mine Boundary	0.75 hect
4	Statutory width of Mine Boundary (Rule 111 (2) of The Metalliferous Mines Regulations, 1961)	7.5 m
5	Proposed depth of excavation below normal surface level	6 m
6	Thickness of Top soil on granted area (Alluvial Soil)	0.5 m
7	Specific Gravity of China clay & Fire Clay	1.3 MT

The formula adopted for calculation of reserve is graphical method and thus geological reserve arrived through graphical method are as under: -

$$\text{Area (m}^2\text{)} \times \text{depth} = \text{Volume (m}^3\text{)} \times \text{specific gravity} = \text{tonnage}$$

$$\text{Lease Area (m}^2\text{)} \times \text{Stone depth (m)} = \text{Geological Reserve (m}^3\text{)}$$

$$\text{Fresh Area} = 10,000.00 \text{ m}^2 \times 6.00 \text{ m} = 60,000.00 \text{ m}^3$$

$$\text{Total Geological Reserve} = 60,000.00 \text{ m}^3 \times 2.40 \text{ t/m}^3 = 1,44,000.00 \text{ tons}$$

Atentative scheme of quarrying, annual program and plan for excavation from year to year for first 5 years. Year wise Production Programme is given below:

Table 2.8: Five Year Production Plan for Kharia Fire clay & China clay Mine

Year	Pit size in (M ³)	OB in (M ³)	Fire clay in (MT)	China clay in (MT)	Ore:OB
2021-22	102m(L)*6.7m(B)*12m(H)=8200m ³	102m(L)*6.7m(B)*4.5m(H)=3,075m ³	88m(L)*6.7m(B)*1.5m(H)*0.855*1.3=983 MT	85m(L)*6.7m(B)*6m(H)*0.855*1.3=3,798 MT	1.2:1
2022-23	8200m ³	3,075m ³	983 M.T.	3,798 M. T.	1.2:1
2023-24	8200m ³	3,075m ³	983 M.T.	3,798 M.T.	1.2:1
2024-25	8200m ³	3,075m ³	983 M.T.	3,798 M.T.	1.2:1
2025-26	8200m ³	3,075m ³	983 M.T.	3,798 M.T.	1.2:1
Grand Total in next five years SOM period (2021-22 to 2025-26)	41,000m ³	15,375 m ³	4915 M.T.	18,990 M.T.	1.2:1

Figure 2.6: Five-year production Plan of Kharia Fire Clay & China clay**2.7 Project Description with Process Detail****2.7.1. Method of Mining**

The method of mining will be applied as semi-mechanized method with JCB make Loader cum Excavators and Tata/Leyland make Dumpers cum Tippers during the SOM, as shown in the earlier Scheme period, i.e. in 2011 -- 12 to 2015 — 16. Proper benches will be maintained at the Over Burden and Mineral Ore at a maximum height of 1.5 m. and width of 2.5 m. The Over Burden & Fire Clay and China Clay are soft enough so, production will be continued with the availability of JCB make loader cum excavator and Tata/Leyland make Dumpers, or with the help of hand tools like Iron Picks, Crowbars Spades Baskets etc. No mechanical drilling or blasting with explosives are required for breaking of over burden or mineral.

❖ During the mining various points will be considered: -

- Yearwise mining is proposed on only limited area arrived by dividing the Bench wise available area for mining in part.
- Various deduction in granted area were considered while measuring to arrive the bench wise available area for mining i.e., area occupied for maintaining statutory boundary etc.
- Area for mining thus arrived is proposed for year wise working.
- Each year of bench wise working is proposed till certain depth which will move & progress towards area measured for next year of mining along with safe operational advancement benches.
- Advancement benches will be maintained sufficiently broad for ease of transportation

with in the mine during mining operation.

❖ **Conceptual quarry plan considerations -**

As the proposed plan of mining is drafted for excavation of Fire clay & China clay ,from surface level for Kharia Fire clay & China clay Minererespectively. Therefore, after reaching that perticular depth in the mine or any time during the balance lease period, if there would be further minerals available as per investigation of district mining auththorities and there is possibility of further exploration of mineralfeasibly, than permission of further excavation of stone might be given as decided by respectlve authorities.

❖ **Exploration and Drilling:**

Afterend of plan period steps will be taken as per instruction of mining authorities as per MCDR 2017.

• **Management, Storage and Preserved of the Top Soild& Waste**

❖ **Dumping of Topsoil:**

Whatsoever qauntity of soil will be generated during the quarring operation will be stacked at the periphery of mine and no mining zone. Plan is given below-

- Total 1,710m³ cum top soil will be generated.
- The Top spoil generated will be used for plantation purpose in future.

Measure to protect quality of top soil :

- 1) 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.
- 2) Soil will be stored in such a manner that the bacterial organism should not die; the best way is to grow grasses / vegitation on the top soil dump.
- 3) Topsoil will be stacked saperately from overburden if any by making retaining walls around the topsoil dump.

❖ **Waste Management**

Type of Overburden and Mineral Rejects:

- **Kharia Fire clay & China clay**
- Total 15,380m³ of overburden will be generated from the mine.
- Overburden will be used for development and maintenance of ramp, haul road till regular road and for development of bund around the lease area.
- Overburden may also be removed from lease area after payment of applicable royalty.

❖ **Blasting:**

Fire clay & China clay are layered deposit which will be excavated by Open cast semi-mechanized method with Loader cum Excavator and Dumper. Therefore, no blasting will be conducted.

Storage of Explosives:

Not Applicable

2.7.2 Machineries utilized for mining

Mining operation will be carried out open cast method with the help of mining machineries such as excavator/Loader and rock breaker etc. Detail of machinery required per day is detailed below -

Table 2.9: Equipment Details for Kharia Fire clay & China clay Mine

S. N.	Name of HEMM	No. of Units
1	Excavator cum Loader	1
2	Dumper cum Tipper	5
3	Submersible Type Diesel Pump	1

2.8 Utilities

2.8.1 Water Requirement

The total water requirement shall be 9.65 KLD for Kharia Fire clay & China clay Mine respectively for domestic, green belt and sprinkling purpose, which will be sourced from Water Tankers from nearby village. Detail of water requirement is given below:

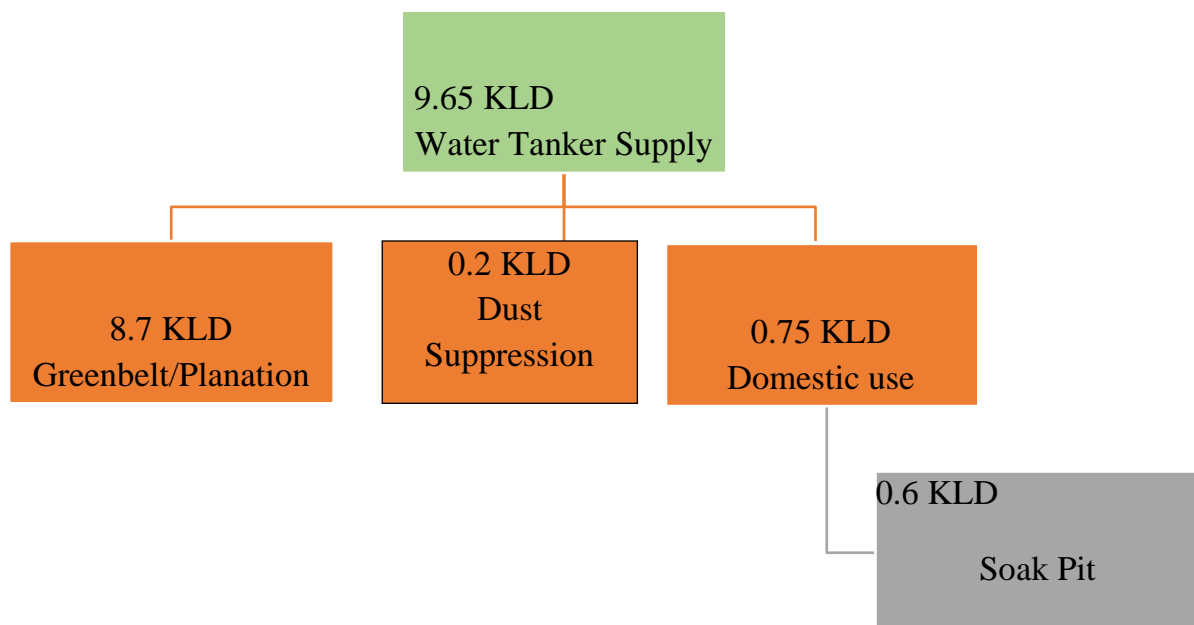


Figure 2.7 Water Demand for Kharia Fire clay & China clay mine

Table 2.10: Water Requirement Details

Sr. No.	Usage	Water Requirement	
1.	Greenbelt Development@ 2.5 L/tree	3480 Trees X 2.5Lit/day =8700.5Lit/day	8.70 KLD
2.	Dust Suppression @ 0.5 L/Sqm (twice a day)	Haul road Area = (50m Length x 4 m width = 200 sqm.) x 0.5 li/sqm = 100 lit /day x 2 time = 200 lit/day	0.2 KLD
3.	Domestic Purpose @25 lpd/worker	30 workers x 25 lit per day = 750 Lit/Day	0.75KLD
Total ::			9.65 KLD

2.8.2 Power Requirement

As it is a Semi-mechanized mine and Diesel operated machines are used, no electricity is required to be used in mine. One 5 KVA D.G. will be required. Diesel used for D.G. sets @ 3 L/hr and for other @10 L/hr.

2.8.3 Manpower Requirement

The mining project will generate direct & indirect employment. Local 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 2.11: Manpower Details

S.No.	Category	
1	1 st class mine manager	1
2.	Mining Foreman	1
3	Mining Mate	1
4	Supervisor cum Office Clerk	1
5	Attendant Cum Peon	1
6	Store cum Godown Keeper	1
7	Miners	8

8	Operator (Skilled)	6
9	Electrician	1
10	Helper (Semi-Skilled)	6
11	Security Guard	2
12	Pump Attendant(un-skilled)	1
Total		30

2.8.4 Proposed Infrastructure(Inserted due to compliance of TOR)

(1) Industrial Area (Processing area)

Not applicable

(2) Residential Area (Non-processing Area)

Not Applicable

(3) Green Belt:

Plantation will be carried out with locally available species as per the norms to compensate the cutting of trees in the mining lease area as per the forest conservation Act 1980.

Table 2.12: Plantation Details

Name of Applicant	PROPOSED SITE	SPECIES	No. OF SAMPLING
Kharia Fire clay & China clay	Plantation area 0.75 Ha in safety area & 200sqm length of proposed road in 3 lines in 2 m gap	Khejur, Babool, Bel , Palash and other local species with consultation of forest department.	3480
Total Plantation Proposed ::			3480

(4) Health & Education:

Education: West Bengal is one of the leading states in terms of labour productivity and a large proportion of the state is engaged in running owned business. The state govt. is committed to providing better education, training and healthcare to the population. Education facility is duly available around the study area.

Education: In West Bengal the literacy rate is increased as per census 2011. It is also home to premier educational and research institutions of India.

Health: Public health services are available to the population in all over the West Bengal state.

(5) **Connectivity** (Traffic and transportation Road/rail/ metro/ water ways etc.)

Project location is well connected with all weatherroads. It is intended to make maximum use of the existing infrastructure and augment / strengthen existing roads, wherever required. Hence no major changes or construction are envisaged due to proposed mining activity.

(6) **Drinking Water management** (Sources & supply of water)

Drinking water will be supplied to the workers by providing water supply through road tankers and available nearby sources.

(7) **Shelters & Sewage System**

Temporary rest shelter along with temporary toilet at certain distance will be arranged. Temporary toilets will be connected to septic tank & soak pits for disposal of human waste during operational phases of the mining.

(8) **Industrial Waste Management**

Not Applicable

(9) **Solid Waste Management**

Solid waste generated from the campsite and other wastes like plastics, papers, cardboards etc. will be properly collected, segregated and reused disposed-off appropriately. Topsoil/Overburden will be collected separately and stored at a designated place with all safety and precautions to avoid any erosion or runoff.

2.9. Progressive Mine Closure Plan

2.9.1. Mined-Out-Land

a) Proposal for reclamation of land affected by mining activities. during end at the end of mining: -

As a result of mining operation, the original ground profile will be altered. After complete extraction of mineral if complete reclamation of land will not be possible due to no sufficient quantity of material available for reclamation, balance unreclaimed pit will be developed as water reservoir.

b) Forest: -

The area does not fall in forest area.

c) Pollution:

Closure activity does not involve such activity in order to generate considerable pollution surrounding the environment.

d) Vegetation:

Though there are little chances of adverse effect on vegetation but new plantation is proposed. It is also proposed to do social forestry before and after mining is completed.

Afforestation will be done in same phased manner in consultation with forest department as mentioned earlier in this report

Since the area is barren and there is no grass etc. cattle grazing in the mining area is not possible. Mined Out land will be converted into water storage tank.

2.9.2 Water Quality Management

a) Surface Water

Surface water source such as rivers Mayarkshi exists in the mining area. Proper maintenance of transport vehicle & prevention of washing of transport vehicle in ponds etc. be helpful to control Water pollution, and it is mandatory for lessee.

Garland drain of appropriate size will be constructed along with settling tank at mine boundary to manage the drainage and run off.

b) 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 the balance unreclaimed pit is proposed to be developed water storage tank.

The project does not consume any process water except for drinking, dust suppression and plantation. Plantation is proposed, which will increase the water holding capacity and help in recharging of ground water.

2.9.3 Air Quality Management

Dust will be generated during loading/unloading, blasting and vehicle movement activity etc. Those impacts are localized, transitory and intermittent in nature and hence their effect on environment is insignificant. However adequate environment protection measure will be taken i.e. water sprinkling on haul roads and during crushing and screening operation, wet drilling etc. Corrective measures are taken wherever necessary.

2.9.10 Top Soil Management

As top soil is proposed to be separated along the statutory boundary for plantation purpose. Therefore, only the balance top soil if any preserved separately will be used to spread over partially reclaimed land.

2.9.11 Waste Management

a) Type of Overburden and Mineral Rejects:

In Fire clay & china clay mines the all ROM is saleable material. Whatever overburden generated from the mine is ultimately sold by lease holder. Therefore, there would not be any unuseful overburden in the mine which requires their due management and proper disposal plan. If any unsold overburden get generated then such OB will be used to construct mine peripheral bund

No subgrade or reject mineral will be generated which requires their due disposal management.

b) Tailing Dam Management

Suitable measures will be taken as per statutory guidelines after consultation with concerned department.

c) Infrastructure

As the mining activity does not require major infrastructure except temp. Rest shelters Therefore, at the time of closure of mine rest shelters will be dismantled.

d) Disposal of Mining Machinery

Vehicles and mining equipment's will be shifted to other quarry mines at MCP stage; no disposal will be needed in the MCP period

e) Safety and Security

All the safety measures will be implemented to prevent access to surface openings, excavations etc. Arrangements are proposed as per Govt. rule during the quarry mine abandonment plan and up to the site being opened for general public.

e) Disaster Management and Risk Assessment

This should deal with action plan for high risk accidents like landslides, subsidence flood, inundation in underground mines, fire, seismic activities, tailing dam failure etc. and emergency plan proposed for quick evacuation, ameliorative measure to be taken etc. the capability of lessee to meet such eventualities and the assistance to be required from the local authority will be as per Govt. rule.

f) Care and Maintenance during temporary discontinuance

For every yearly review (as given in the mining plan), an emergency plan for the situation of temporary discontinuance or incomplete programme due to court order or due to statutory requirements or any other unforeseen circumstances, should include a plan indicating measures of care, maintenance and monitoring of status of unplanned discontinued mining operations expected to re-open in near future. This should detail item wise status monitoring and maintenance with periodicity. When it will require will be maintained as per Govt. rule.

CHAPTER 3. Description of the Environment

3.1 General

This chapter illustrates the description of the environmental status of the study area with reference to the prominent environmental attributes. The study area covers the region falling within 10 km radius around the proposed mining. The environmental setting is considered to adjudge the baseline environmental conditions, which are described with respect to climate, hydro- geological aspects, atmospheric conditions, water quality, soil quality, vegetation pattern, ecology, and socio-economic profiles of people, hydro-geological aspects, land use and archaeological importance.

The present report incorporates the data monitored over a period of three months from **March 2023 to May 2023** and secondary data collected from various government, semi-government and public sector organizations. The primary baseline monitoring consists of meteorology, ambient air quality, noise levels, water quality, soil quality and ecology (aquatic and terrestrial). The land use, geology, demography, is based on the secondary data collected from various Government, semi-Government and public-sector organizations.

Methods of Monitoring and Analysis & Selection of Monitoring Stations

Appropriate methodologies have been followed in developing the EIA/EMP report. The methodology adopted for the study is outlined below:-

Sr. No	Attributes	Sampling	Measurement Method		Procedure	Selection Criteria	Remarks
		Network	Frequency	Method			
1	Air Environment						
(i)	Meteorological Wind Speed Wind Direction Max. Temperature Min. Temperature Relative Humidity Rain fall Solar radiation Cloud cover	1 location at project site	One hourly continuous for one season	Automatic Weather stations with sensor and microprocessor Max/ Min Thermometer Hygrometer Anemometer Rain gauge As per IMD specifications	IS 8829 Site specific primary data is essential Secondary data from IMD, Pune	Site specific primary data	Secondary data IMD Pune for data verification and selection of sampling locations
(ii)	Ambient air quality						
	Pollutants PM ₍₁₀₎	11 locations, at project site and 7 in buffer area (in the project impact area/study area)	24 hourly twice a week	As per CPCB Guidelines Gravimetric	IS: 5182 (Part 23): 2006 (As per CPCB guidelines)	<ul style="list-style-type: none"> • Minimum 2 locations in up wind. • 2 Sites in downwind (based on impact receptor).predominant wind direction • Sensitive receptors. • Transportation route receptors. • Land use pattern 	Interpretation based on CPCB NAAQ standards 2009
	PM _(2.5)		24 hourly twice a week	As per CPCB Guidelines Gravimetric	PM 2.5 gravimetric analysis – revision 9, July 2008 Page 1 of 32(As per CPCB guidelines)		
	SO ₂		8 hourly continuous and averaged for 24	Improved West & Gaeke	IS: 5182 (Part-2)-2001, RA 2006 (As per CPCB		

Sr. No	Attributes	Sampling	Measurement Method		Procedure	Selection Criteria	Remarks
		Network	Frequency	Method			
			hours twice a week		guidelines)		
	NO _x		8 hourly continuous and averaged for 24 hours Twice a week	Modified Jacob Hochheiser	IS: 5182 (Part-6)- 2006 (As per CPCB guidelines)		
	CO		8 hourly continuous and averaged for 24 hours twice a week	NDIR Method	IS: 5182 (Part 10)- 1999 RA-2003 (As per CPCB guidelines)		
2	Noise						
	Hourly equivalent noise levels dB(A)	11 locations, at project site and 7 in buffer area (in the project impact area/study area)	24 hourly Once in season	Noise level meter	IS:9876 2001 (As per CPCB)	<ul style="list-style-type: none"> • Minimum 2 locations in up wind • 2 sites in downwind (based on impact receptor) • sensitive receptors. • Transportation route receptors. • Land use pattern 	CPCB /OSHA
	Day Time Noise Levels (Leq _{day}) dB(A)		Once in season		CPCB/ OSHA		
	Night time Noise Levels (Leq _{night}) dB(A)		Once in season		CPCB		
3	Water Environment						
i	Parameters for water quality Surface water pH; Turbidity;	Set of grab samples during study period at 4 * location	Once in season	Samples for water quality has been collected and analyzed as per Standards methods	As per the CPCB guidelines Test method is given in respective component in,	<ul style="list-style-type: none"> • Based on water utilization • Upstream and downstream based on outlet (if any) 	* Subject to availability of surface water sources

Sr. No	Attributes	Sampling	Measurement Method		Procedure	Selection Criteria	Remarks
		Network	Frequency	Method			
	Total Hardness (as CaCO ₃); Total Alkalinity (as CaCO ₃); Chlorides (as Cl); Sulphate (as SO ₄); Nitrate (as NO ₃); Fluoride (as F); BOD _{3Days} at 27°C; COD; Phenolic Compounds (as C ₆ H ₅ OH); Lead (as Pb); Iron (as Fe); Arsenic (as As); Cadmium (as Cd); Total Chromium (as Cr); Mercury (as Hg); Copper (as Cu); Zinc (as Zn); Selenium (as Se); Oil & grease; Colour; Dissolved solids; Residual free chlorine; Boron (as B); Calcium (as Ca); Magnesium (as Mg); DO;			for examination of water and wastewater analysis published by American Public Health association.	Section-3 of EIA report		

Sr. No	Attributes	Sampling	Measurement Method		Procedure	Selection Criteria	Remarks
		Network	Frequency	Method			
(ii)	Ground water Color; pH; Turbidity; Dissolved solids; Aluminium as Al; Ammonia (, as total ammonia-N); Anionic Detergents as MBAS; Barium as Ba; Boron as B; Calcium as Ca; Chloramines as Cl ₂ ; Chloride as Cl; Copper as Cu; Fluoride as F; Free Residual Chlorine; Iron as Fe; Magnesium as Mg; Manganese as Mn; Nitrate as NO ₃ ; Phenolic Compounds as C ₆ H ₅ OH; Selenium as Se; Sulphate as SO ₄ . Total Alkalinity as CaCO ₃ . Total Hardness as CaCO ₃ .	Set of grab samples during study period at the above mentioned 4 locations for ground water.	Once in season	Samples for water quality has been collected and analyzed as per Standards methods for examination of water and wastewater analysis published by American Public Health association.	As per the CPCB guidelines Test method is given in respective component in, Section-3 of EIA report	<ul style="list-style-type: none"> • Based on water utilization • Ground water flow pattern • Based on impact zone 	

Sr. No	Attributes	Sampling	Measurement Method		Procedure	Selection Criteria	Remarks
		Network	Frequency	Method			
	Zinc as Zn, Cd; Pb; Hg; As;Ni;Cr						
4	Land Environment						
i	Soil Particle size distribution; Texture; pH. Electrical conductivity; Bulk density; Organic carbon; Sodium (Na); Potassium (K); Moisture content; Total Nitrogen; Available phosphorous; organic matter; Total Soluble Chloride; Total Soluble sulphate; Water holding capacity; Porosity;	1 location at project site and 7 locations in buffer area	Once in season	Collected and analyzed as per soil analysis reference book, M.I.Jackson and soil analysis reference book by C.A. Black		Based on Utilization pattern Land use pattern Downwind based on impact receptor due to deposition of dust	<i>Handbook of Agriculture, Indian Council of Agricultural Research</i>
ii	Land use/Landcover Location code Total project area Topography Drainage (natural) Cultivated, forest,	Study area	At least 20 known vectors for geo referencing and verification	Global positioning system Topo sheets Satellite Imageries* (1:50,000) Satellite Imageries*	Digitization of primary data (Toposheet) Superimposing of latest satellite Imageries (cloud free data)	-	-

Sr. No	Attributes	Sampling	Measurement Method		Procedure	Selection Criteria	Remarks
		Network	Frequency	Method			
	plantations, water bodies, roads and settlements				Geo referencing Classification using ERDAS /GIS software		
5	<p>Biological Environment</p> <p>Terrestrial</p> <ul style="list-style-type: none"> • Inventarization of floral and faunal species in core and buffer zone • Density in core zone • Importance value index (IVI) of trees, • Biodiversity index • Identification of rare threatened and endangered species <p>Fauna</p>	Project area and 7 locations in buffer area	Five-Seven days in a season	<ul style="list-style-type: none"> • Quadrata sampling/ Enumeration/ Survey methods. • Transect method/ Visual Encounter Survey • Point Count/ Opportunistic Survey • Tracks and signs, and visual encounter survey 	<ul style="list-style-type: none"> • Land use /Landcover classification • Sensitive area in the vicinity • Land utilization • Downwind based on impact zone 	Preliminary assessment point quarter plot less method for terrestrial vegetation survey	
	<ul style="list-style-type: none"> • Avi fauna • Rare and endangered species • Sanctuaries / National park / Biosphere reserve 					Secondary data to collect from Government offices/forest department, NGOs, published literature	

Sr. No	Attributes	Sampling	Measurement Method		Procedure	Selection Criteria	Remarks
		Network	Frequency	Method			
	<ul style="list-style-type: none"> Migratory routes 						
6	Socio-economic						
	Demographic structure; Infrastructure resource base; Economic resource base; Health status; Morbidity pattern; Working pattern; Cropping pattern	Study area	In two phases of the project	<ul style="list-style-type: none"> Primary data collection through questionnaire proportionate Random sampling method Transect walk 		<ul style="list-style-type: none"> Land utilization pattern Population pattern Gender pattern Working pattern 	Secondary data from census records, statistical hard books, topo sheets, health records and relevant official records available with Govt. agencies

3.2 Methodology

The methodology for conducting the baseline environmental survey is based on the Terms of reference issued by SEIAA for non coal mining projects. Baseline information with respect to air, noise, land and water quality in the study has been collected by primary sampling/field studies during the period of **March 2023 to May 2023**. Baseline statuses of the biological and socio-economic environment were also studied.

3.3 Geology

It is generally known that local soil conditions or subsurface geology play a significant role in amplifying ground motion characteristics such as amplitude, frequency content, and duration during an earthquake. As a result, significant site-specific risk evaluations are required in order to categorise distinct locations into different groups. The project site is in West in Birbhum district of West Bengal state. In Birbhum, Burdwan, and Bankura, there are undulating lateritic and laterite soils with numerous little rivulets that are dry unless during rainy seasons. Soil erosion varies from slight to very high. The honeycomb-structured laterite deposits have been uncovered in certain areas. Terraced paddy fields that descend to the rivulets' bottoms surround them. The granite gneisses concentrated in the upper portion (North to South West) of the area around the project location come under Archaean Eon. Granitic gneisses are rocks consisting of an orthogneiss or paragneiss with a granite composition. Fractures are found in the granite gneiss; in the eastern part, the hard rock is overlain by laterite-capped alluvium. Then there are the Layers of diverse material or color, at least 0.25 inch thick, alternated. Sand is defined as rock particles that can pass through a 0.19 in. (4.75 mm) aperture but cannot pass through a 0.075 mm opening. Silt that can flow through a 0.075 mm aperture yet has little or no strength when air-dried. Clay will flow through a 0.003 in. (0.075 mm) aperture with plasticity (putty-like qualities) throughout a wide range of water contents and substantial strength when air-dried. Then across the alternate layers there is the layer of hard clays impregnated with caliche nodules figure 3.1. Caliche is a common feature of arid or semiarid areas. "Caliche" is a shallow layer of soil or sediment in which the particles have been cemented together by the precipitation of mineral matter in their interstitial spaces. It is from the Geological age of Jurassic to Late Holocene. It has the lithology of sand, silt and clay of flood plain, mature deltaic plain and para-deltaic fan surface and lateritic surface. Then the smallest proportion of the area around the project location is underlain by Rajmahal Trap Basalt situated at the North of the Project Location. It belongs to the Geological age of Jurassic to Late Holocene and comprises of the same lithology as of the Hard clays with caliche nodules, laterite, and alternate layers of sand, silt, and clay.

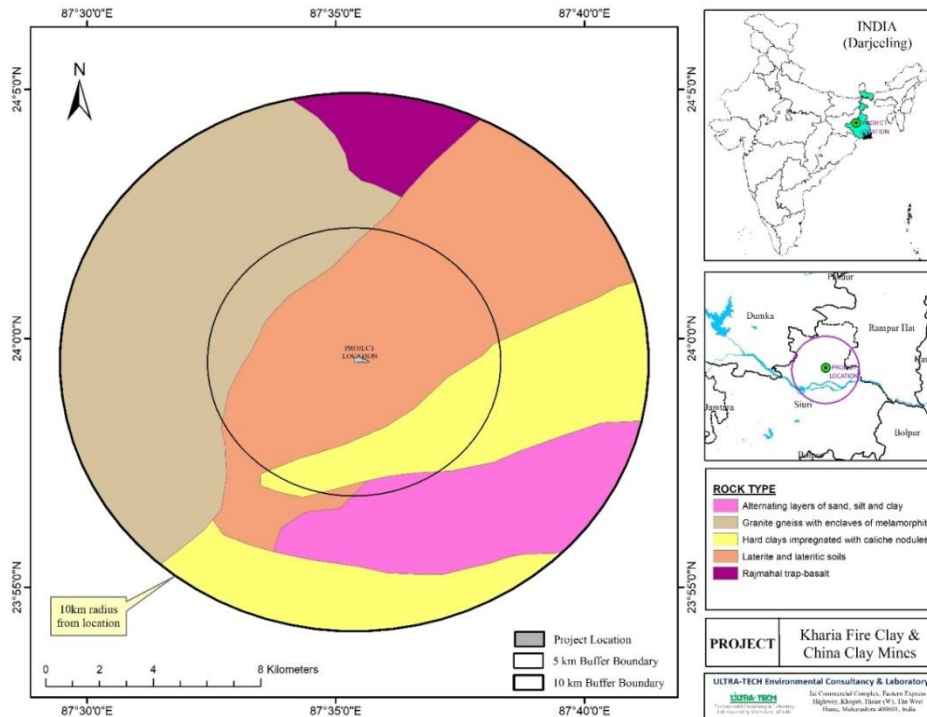


Figure 3.1 Geology of the study area

3.4 Hydrogeology

There are three hydrogeological units existing the project region figure 3.2. Firstly, in case of the layers of Hard clays with caliche nodules, alternate sand, silt, rajmahal trap basalt, and laterite, the yield prospect is 7.2-250 cum/hr. Hence, Low to heavy-duty tube wells are feasible into these layers belonging from Jurassic to Late Holocene. Moreover, within these layers Multiple aquifer systems occur, in general, in the depth of 12-396m b.g.l. Secondly the granite gneiss, and metamorphites has a yield prospect of 0.18-96 cum/hr. Dugwells and borewells or dug-cum-borewells are feasible in the area underlain by granite gneiss, and metamorphites. Moreover, within these layers of, granite gneiss, and metamorphites, ground water occurs, in the weathered residuum within 6-12 m b.g.l.

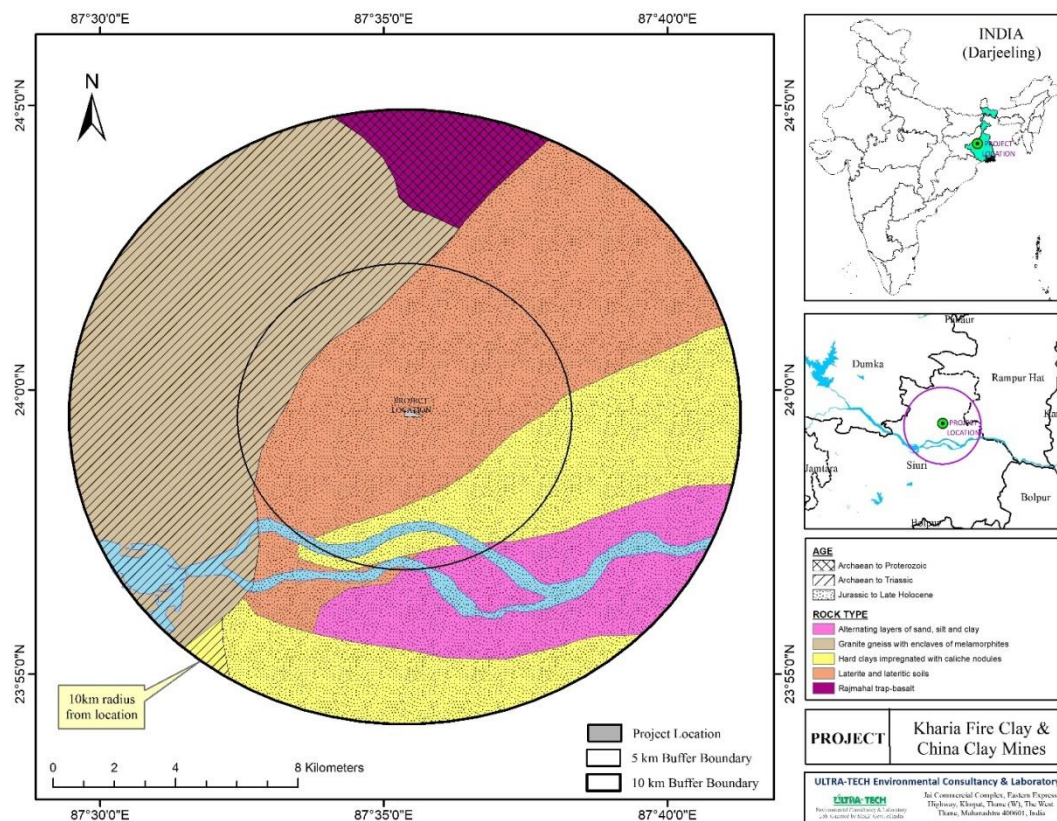


Figure 3.2 Hydrogeology of the study area

Table 3.1 :Hydrological Unit

RockType	Age	Lithology	AquiferDescription	Hydrogeology
Hard clays with calcite nodules, sand, silt, Rajmahal trap basalt, laterite	Jurassic to Late Holocene	Sand, silt and clay of flood plain, matured deltaic plain and para-deltaic fan surface and lateritic surface	Multiple aquifer systems occur, in general, in the depth of 12-396 mb.g.l.	Low to heavy-duty tubewells are feasible. The yield prospect is 7.2-250 cum/hr
Shale, sandstone, siltstone, pegmatite, granite gneiss, metamorphites and quartzite	Archaean to Triassic	Soft to medium hard sedimentary rocks of plain-peneplain. Fractures are found in the granite gneiss and in the eastern part of the hard rock	Ground water occurs, in the weathered residuum within 6-12 mb.g.l.	Dugwells and borewells or dug-cum-borewells are feasible in this area. The yield prospect is 0.18-96 cum/hr

Amphibolite, hornblende schist	Archaean to Proterozoic	is overlain by laterite capped alluvium Exposed hard massive or foliated rock of Rajmahal trap in the western part	Water bearing fractures are encountered within 60m b.g.l.	In the trap hydrogeological formation borewells tapping fractures in the depth span of 10-13, 18-30 and 44-56m b.g.l. can yield 10 cum/hr
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3.4.1 Surface Hydrology

The surface hydrology of the project area is overlain by Mayurakshi river also called as Mor River, which is a major river in Jharkhand and West Bengal. Its source from Trikuthill, from Deoghar in Jharkhand state. Then it flows through Birbhum and Murshidabad of West Bengal before flowing into Hoogly River. The river is extending a distance of about 250 km. Catchment area of Mayurakshi River is 246.27 km². The region overlain by Mayurakshi river composed of Granite gneiss, with enclaves of metamorphites, laterite and lateritic soils, alternating layers of sand, silt and clay

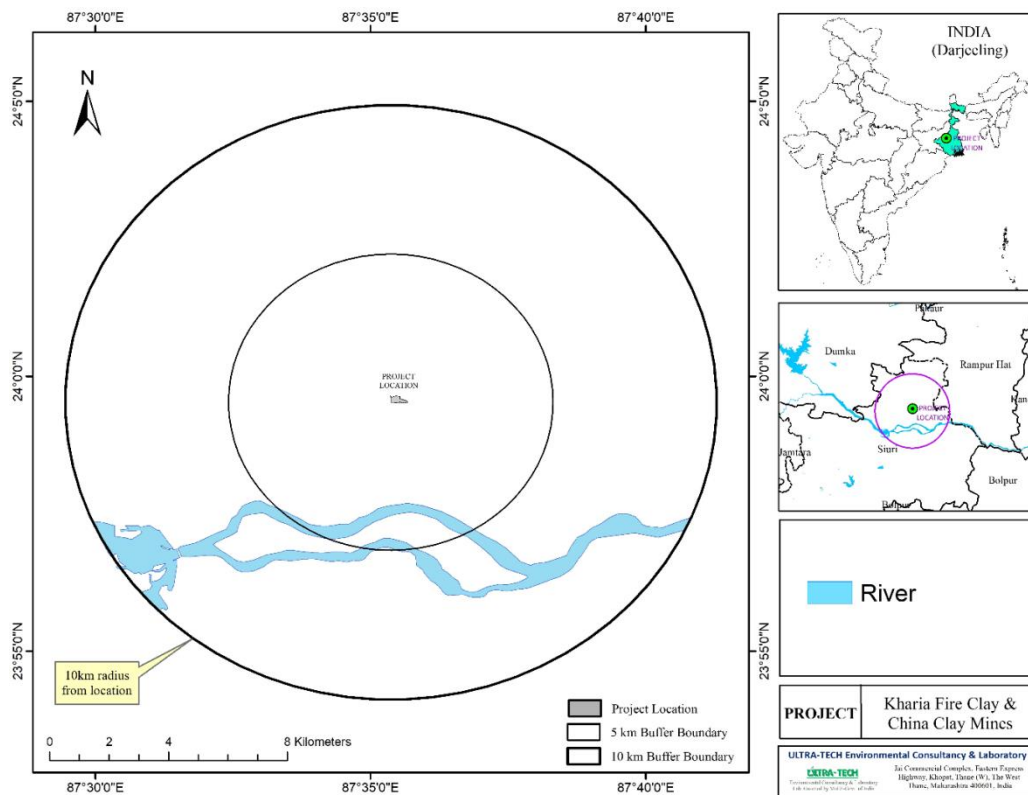


Figure 3.3 Surface Hydrology of the study area

3.4.2 Occurrence of Ground Water

Ground water occurs under unconfined condition in alluvial formation. Under the project location, formations of Granitic gneiss comprising a water level of 5 to 10 m below ground level (bgl) during pre-monsoon (April), which is moderate. ground water occurs under unconfined, semi confined to confined conditions. In major part of the area, ground water occurs under unconfined. In general, ground water exists under the water table in a semi-confined state. The pre-monsoon water level is within 10 to 20 m in the southern margin of the study area, which is high. Then two spots inthe north and north-east of the project location comprise of lower water levels (2-5 bgl).

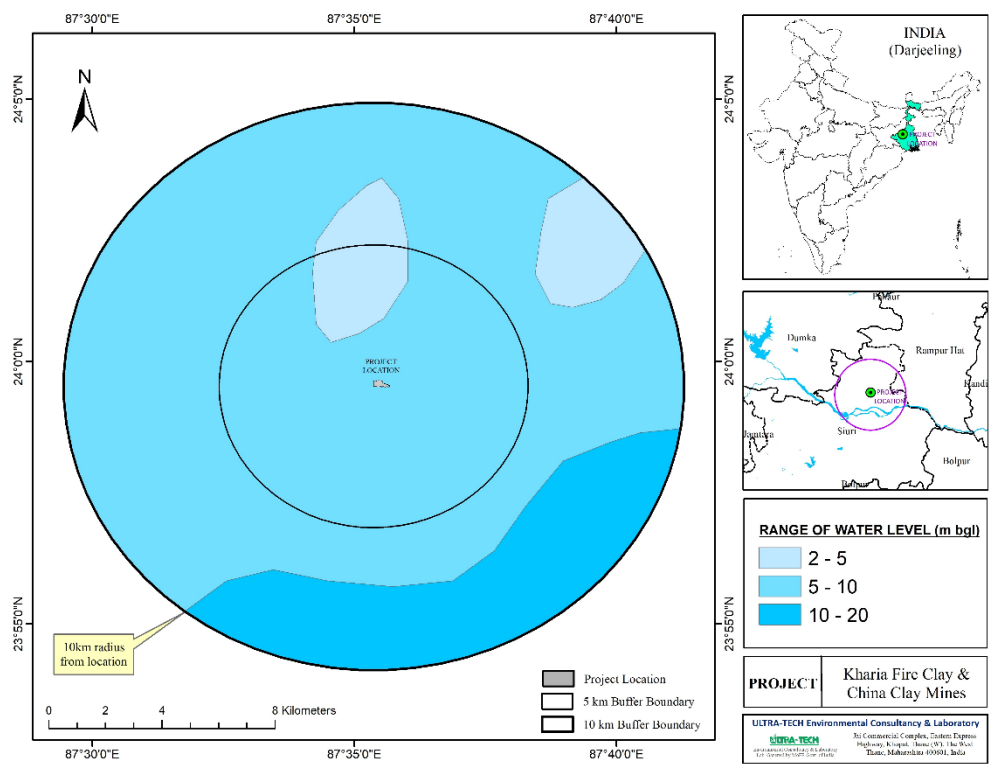


Figure 3.4 Groundwater level trend (Pre-Monsoon)

During the post-monsoon, the water level is lower and 2-5m bgl expands across the north of the project location. The project location is underlain by moderate below ground levels of 5-10. Only the region underlain by hard clays has 2-5 bgl.

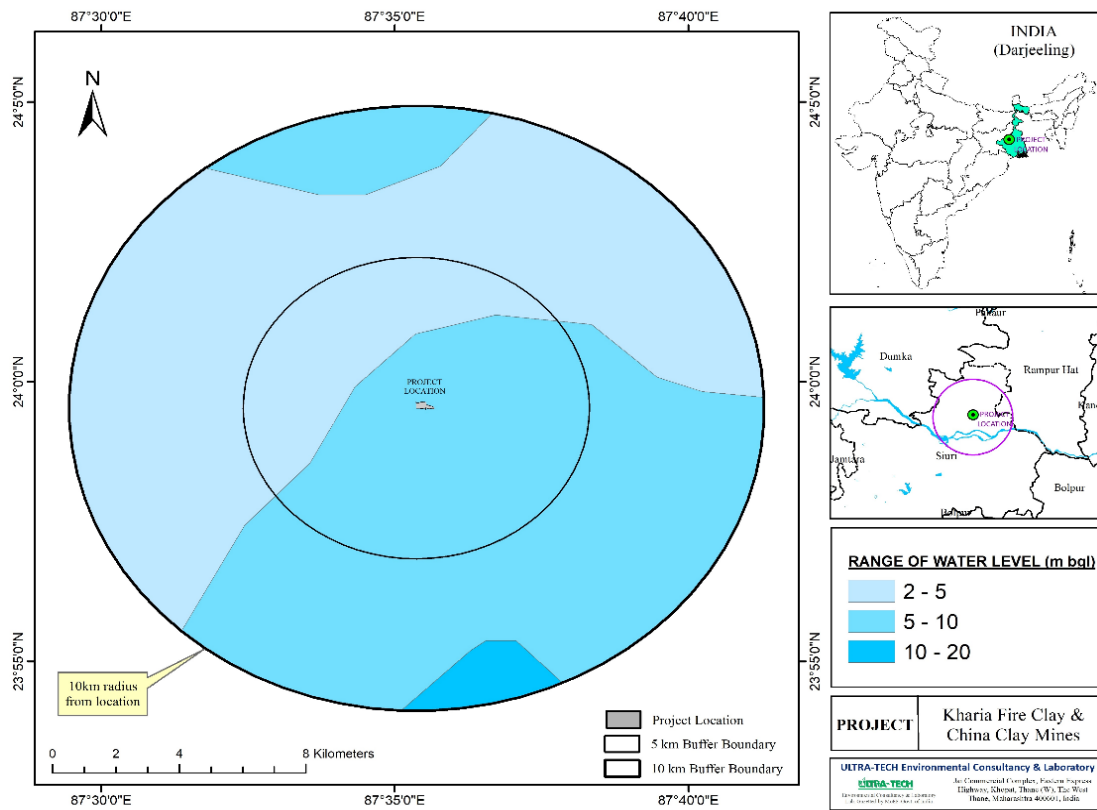


Figure 3.5: Groundwater level trend (Post-Monsoon)

3.4.3 Ground Water Resources & Status of Development

Groundwater formed a dependable, most important source of water in Birbhum till year 1980. Groundwater withdrawal in the area is mainly through large number of tube wells constructed by AMC & other public and private sector primarily for domestic water supply as well as for industrial use. In adjoining rural areas, groundwater is also being used extensively for irrigation both by shallow wells and tube wells. Earlier, groundwater recharge to shallow aquifer was taking place through infiltration from rainfall and seepage from river bed during the monsoon period. In changed scenario development of urban areas, however, there is now considerable reduced groundwater recharge due to paved surface area and other factors like rapid storm runoff through water drains, export of waste water collected by sanitary sewers coupled with high drawl of ground water. Groundwater recharge to sustain pumping from the deeper aquifer system mainly takes place from recharge area in the north east by lateral flow, vertical leakages from shallow aquifer and also reverse leakages from still deeper aquifers whose heads are higher than the aquifers under exploitations

Pre-monsoon season ranges from 8 - 10 mbgl and in post-monsoon season ranges from 5-8 mbgl (As per CGWA data).

3.4.4 Seismicity

As per the Seismic Zone classification by IS 1893 (Part-I): 2002 prepared by Geological Survey of India (G.S.I), the proposed project site falls under Seismic Zone II (Low Hazard Risk Zone), which is shown in the image below (Figure 3.12):.



Figure 3.6: Seismic Zones of India as per IS 1893 (Part-I): 2002 prepared by G.S.I
3.5 Land Use/Land Cover of the Study Area

3.5.1 Introduction

Remote sensing data is a general source of information on natural resources in a region or territory that tracks the state of those resources over time due to its continuous scope. Remote sensing is a powerful and rigorous data collection process. Satellite imaging surveys provide a great way to measure both the quantitative scale of natural vegetation and the changes in conditions brought on by climate change. Understanding the complexities of the earth's surface properties, as well as phenomena such as complex environments, is also fascinating.

3.5.2 Methodology

Land use area and land use classification analysis as follows:

1. Development of an input database.
2. Data processing and analysis.
3. End planning of development.

3.5.3 Data input

3.5.3.1 Toposheet:

Figure 3.7 is showing the project location and its surrounding area on the toposheet of series 72 P/8, 72P/12, 73 M/5, and 73M/9 of SOI (Survey of India)

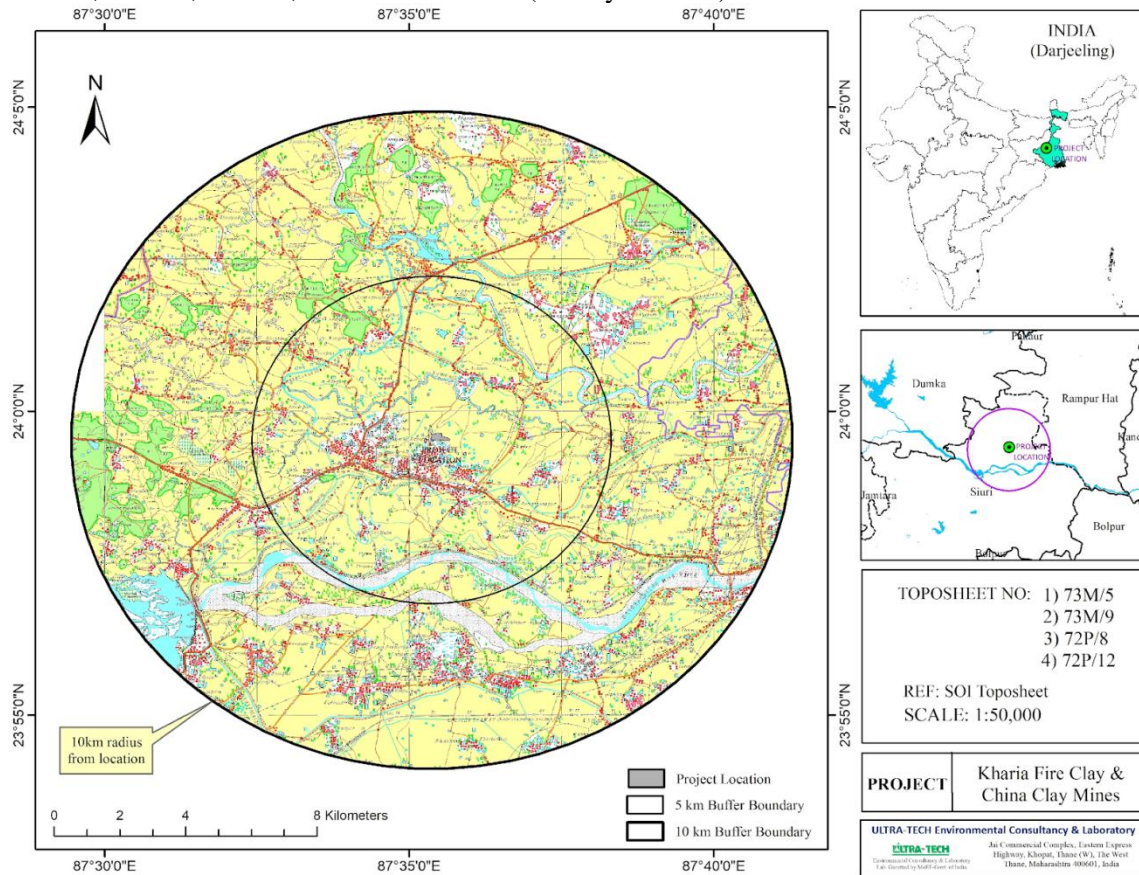


Figure 3.7: Topographical sheet covering the project location and its surroundings

3.5.3.2 Google Earth image

Google Earth images have been analyzed for spatial characteristics, soil sensors, latitude, longitude, and geo-recording of satellite images.

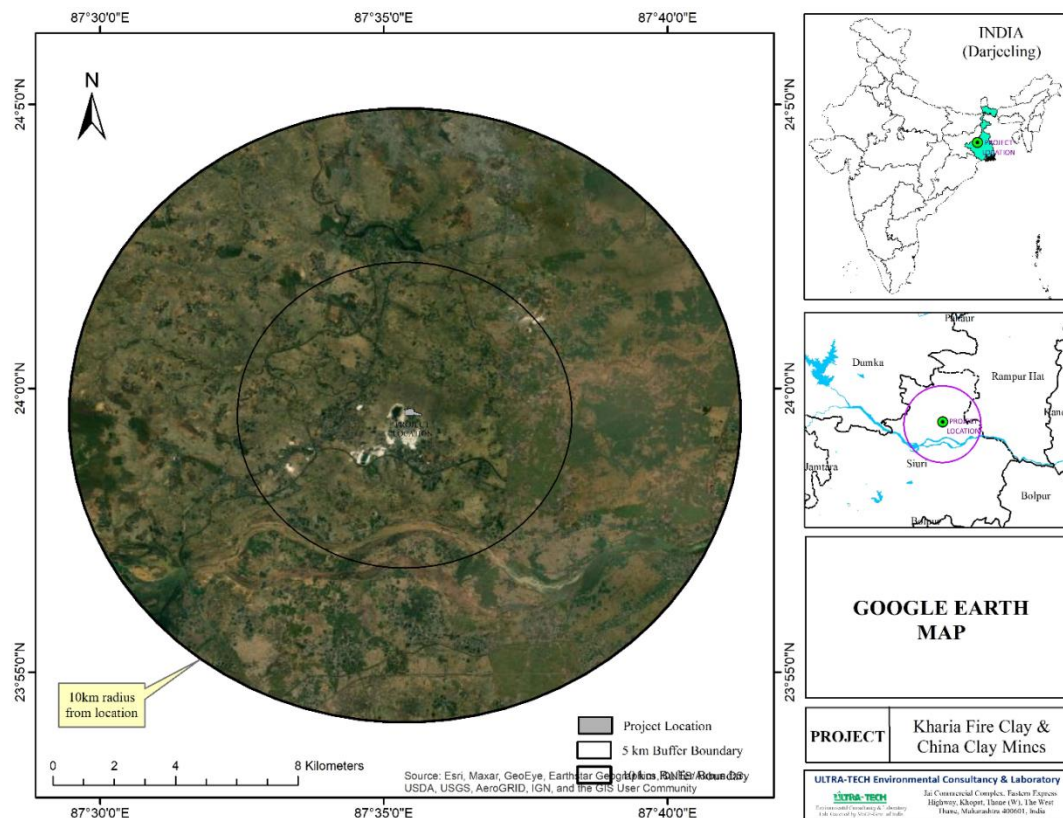


Figure 3.8: Project site on Google Earth Image

3.5.3.3. Satellite Image Analysis

Satellite data or satellite image has been downloaded to the framework and a land-use map has been created from the website of the European Space Agency <https://scihub.copernicus.eu>, information provided in Table 3.2. The first move was the establishment of the FCC standard (using Sentinel 2 bands B2, B3, B4, and B8) and the implementation of the LULC Classification Map of the test site around the site for the project Figure 3.9. Sentinel-2 data from the above source have been downloaded to cover the whole area. Sentinel-2 has a total of 13 bands in it. Both bands vary in their spatial resolution. Radiometric and atmospheric corrections have been used to generate the reflectance file. For Sentinel-2, bands 2, 3, 4, and 8 were selected to prepare the RGB to achieve improved classification accuracy. The RGB of the sample region is prepared using the boundary form file to clip the data. Area of significance to all the adjacent scenes. Mosaicking was carried out to minimize the disparity between the various sensing dates and the impact of color issues.

Table 3.2: Specifics of the Satellite imagery used in this project

Entity ID	L2A_T45QWG_A031948_20230419T044802
Acquisition date	16/05/2023
Tile Number	T45QWG
Agency	ESA
Platform	SENTINEL-2A
Orbit Number	33
Orbit Direction	Descending Orbit
Entity ID	L2A_T45QWG_A031948_20230419T044802
Acquisition date	16/05/2023
Tile Number	T45QWG

Agency	ESA
Platform	SENTINEL-2A
Orbit Number	33
Orbit Direction	Descending Orbit

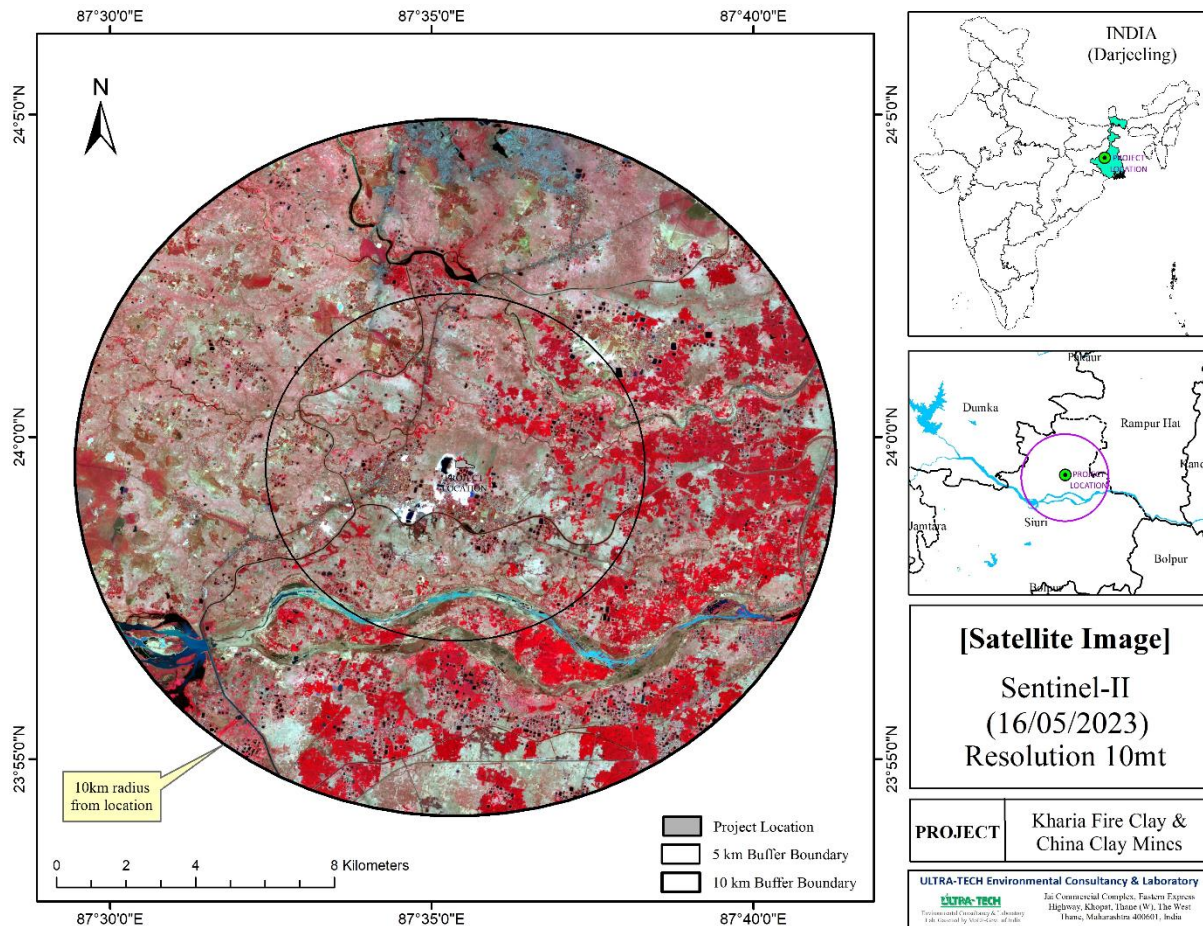


Figure 3.9 Satellite Map of Study area

3.5.4 Processing/Analysis of data

3.5.4.1 Restoration of image Data

Data errors, noise, and geometric distortions are added during scanning, transmitting, and recording operations, and restoration processes are designed to detect and compensate for them. The aim is to make the image resemble the original scenario as closely as possible. Since each band's pixels are stored independently, image restoration is relatively simple. Picture restoration attempts to restore image data that has been blurred or corrupted in order to provide a more precise depiction of the original scene. This usually includes the initial analysis of raw image images to correct geometric distortions and calibrate the data radiometrically. Image correction and restoration procedures are often referred to since retrieval operations since they normally precede the editing and review of image data in order to extract relevant data and information.

3.5.4.2 Radiometric corrections

To calibrate pixel values or fix value errors, radiometric correction is used. The method improves the readability and precision of remote sensing data. When comparing various data sets over time, radiometric calibration and correction are especially important. The difference between the energy emitted or reflected from the surface to the earth as measured by aircraft or satellite instruments and the true energy emitted or reflected from the surface to the earth. This is due to the sun's azimuth, as well as elevation and ambient conditions, which can modify the sensor's capacity. In order to obtain actual or true ground radiance or reflectance values, radiometric errors must also be taken into account.

3.5.4.3 Geometric Correction

Geometric correction is an integral step in the pre-processing of the image since the orientation of the images is calculated. However, the geometric adjustment also requires pixel values in their original location in order to change the original values. Raw digital images usually contain such extreme geometric inconsistencies that they cannot be used as diagrams. The cause of these distortions varies between altitude variance and the velocity of the sensor platform, including panoramic distortion, Earth curve and atmosphere.

3.5.4.4 Ground Truthing

A study of identification was carried out in order to gain a broad understanding of the field of analysis. In order to assess the accessibility of the region as well as the pattern and distribution of vegetation and its composition, it was necessary to have knowledge of current field conditions. Land validation means the formation of a connection between objects and objects observed, labeled, marked, and satellite imagery. In satellite imaging for identification, the appearance of a few species of plants on the field was associated with its tonality.

3.5.5 Final outputs

3.5.5.1 Classification of Land use

The land use classification of Hybrid Level-2 was carried out using the Supervised Classification System. Bands 2, 3, 4, 8 are the most appropriate ones. At the end of the study, 10 classes were derived and the picture was ranked. The pattern for graded land use is seen in Table 3.3 and seen in Figure 3.10 The False Color Composite for the area as seen in Figure 3.11

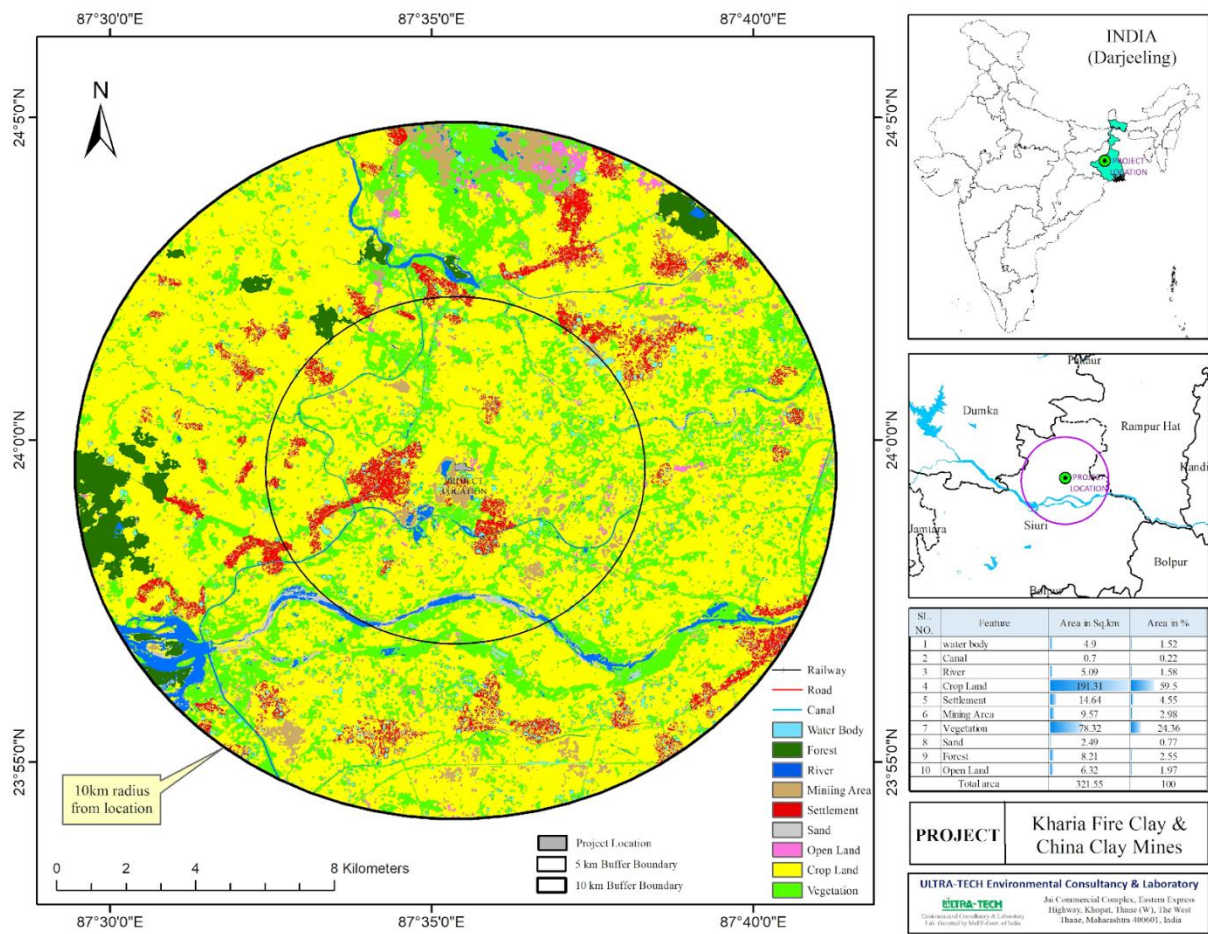


Figure 3.10: Map of LULC Classification (10 Km. Radius)

Table 3.3: Land use/ Land cover Statistics of Area within 10 km Radius

SL. NO.	Feature	Area in Sq.km	Area in %
1	water body	4.9	1.52
2	Canal	0.7	0.22
3	River	5.09	1.58
4	Crop Land	191.31	59.5
5	Settlement	14.64	4.55
6	Mining Area	9.57	2.98
7	Vegetation	78.32	24.36
8	Sand	2.49	0.77
9	Forest	8.21	2.55
10	Open Land	6.32	1.97
Total area		321.55	100

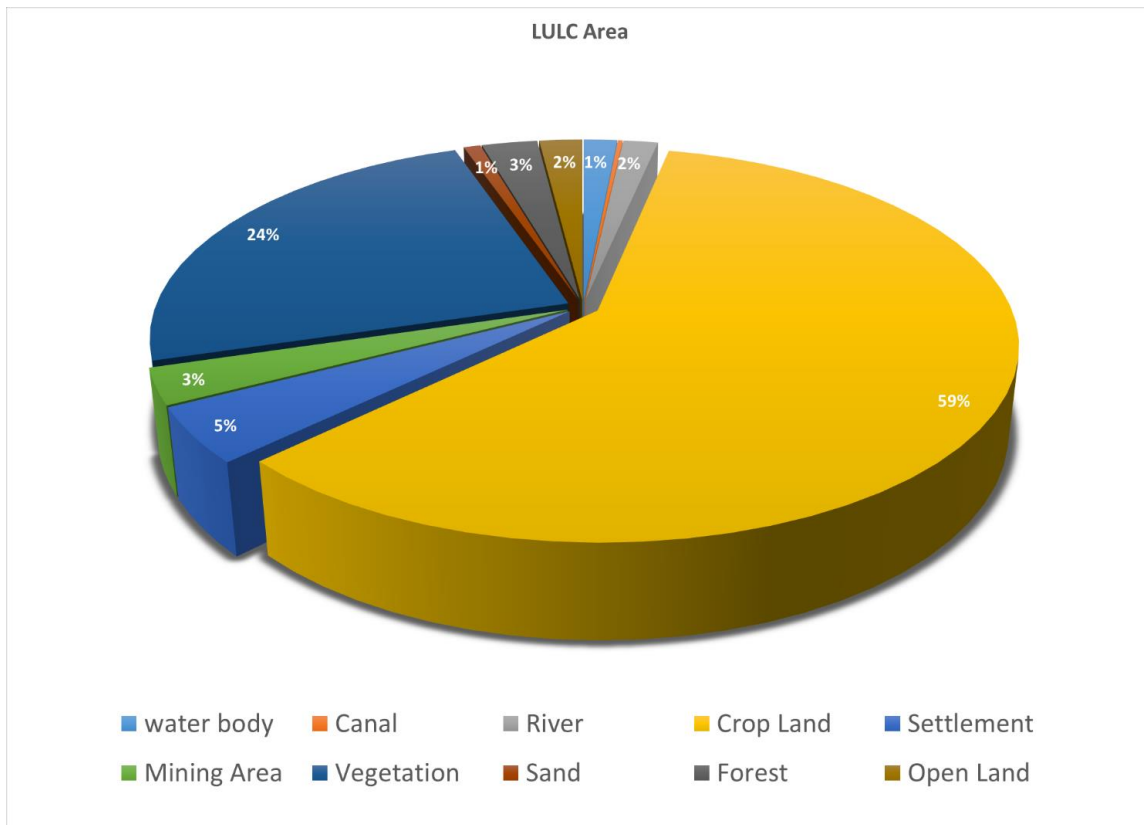


Figure 3.11: LULC Classification (10 km radius)

➤ **Interpretation of the classes of land use**

Kharia village is located in Mohammad Bazar subdivision of Birbhum district in West Bengal, India. It is situated 7.3km away from sub-district headquarter Patalnagar. Suri is the district headquarter of Kharia village. When it comes to administration, Kharia village is administrated by a sarpanch who is elected representative of the village by the local elections. As per 2019 stats, Kharia village comes under Sainthia assembly constituency & Birbhum parliamentary constituency. Sainthia is the nearest located town to kharia for all major economic activities, which is approximately located 9km away.

➤ **Settlement**

Built-up Land: is defined as a human ecosystem created because of non-agricultural use. Built-up land within a distance of 10 Km from the project site, including villages, cities, panchayat, and income settlements, including buildings and industry, factories, roads, communications, water, and vegetation facilities. Out of the total area covered by the settlement and commercial sectors, the area of 14.64 sq. km is part of the built-up area, which is 4.55 % of the total project area figure.3.11. The area around the site of the sand mining project comes under this class.

➤ **Forest and Vegetation:**

The project region is located in Birbhum, which is one of the smallest districts of West Bengal which is floristically very rich. Dry Deciduous Vegetation of Upland cover this region. The important trees of these forests are Sal, Simal, Haldu, Bamboos, Mahogani, Mahua, Palash etc.

These trees shed their leaves in the dry winter. High temperature, dry climate and poor lateritic soil in this region is not favourable for the growth of trees. At present much of the land is used for mango orchards and mulberry cultivation. Forest and vegetation are covering together 86.53 sq.km (26.91%) of the project area figure 3.11.

➤ ***Water Bodies:***

As Inland water bodies, the region's water resources are split into rivers and canals, reservoirs, tanks and ponds, beels, oxbow lakes, derelict water, and brackish water. Aside from rivers and canals, total water bodies cover approximately 4.9 square kilometres, (1.52%) of the project area figure.3.11

➤ ***Rivers and Canals:***

Rivers, streams, and canals serve a variety of agricultural, economic, transportation, environmental, and residential purposes. They also have important aesthetic, recreational, and socio-cultural benefits. The river cover 5.09 square kilometres, (1.58%) of the project's total area. They are given as linear land use and land cover categories for the research region Figure 3.10. They demonstrate the location and density of the drainage system in the research region The major river flowing through the project region is the Mayurakhsi river, which after flowing through Jharkhand and then through the districts Murshidabad, and Birbhum (wherein project location is situated) of West Bengal before flowing into the Hooghly River. The total length of this river is approximately 250 kilometres (160 mi) long. The canals, which are mostly utilised for irrigation, cover 0.7 sq.km (0.22%) of the overall project area figure 3.11

➤ ***Cropland***

In the study region, this land use/land cover is not industrially developed; the agricultural sector dominates the economy. Agriculture in the region is remarkable for its reliance on rainfall, the dominance of seasonal crops, and the use of traditional farming practises. Croplands occupy the most of the project area, accounting for 191.31 square kilometres (59.5%) figure 3.11.

➤ ***Open Land***

Open land refers to the space, that is not intensively developed for residential, commercial, industrial or institutional use. It serves many purposes, whether it is publicly or privately owned. It includes agricultural and forest land, undeveloped shorelines, undeveloped scenic lands, public parks and preserves. These are also called Fallow Lands, wherein the term “fallow” is an agricultural strategy that involves leaving arable land unplanted for one or more vegetative cycles. As a result, the land parcels linked with this approach are referred to as fallow land, and they occupy 6.32 square kilometers (1.97% of the project area).

➤ ***Sand***

In arid-land conditions, erosion processes are frequently juvenile, and soils are composed of coarse-grained particles commonly referred to as sand. Where there is bare terrain or a

steep surface slope, soil erosion rises. When there is significant erosion, dirt particles approach and finally fill the river channel, perhaps to a depth of several meters. Sand rivers are such rivers that are actually full with sand. In the project location, sand covers 2.49 square kilometers, (0.77%) of the project area figure 3.11

➤ **Mining Area**

Mining area refers to the area, on and beneath land, used or disturbed in activity related to the extraction, removal, or recovery of various mineral deposits from its natural deposits. Hence the major activity in the mini area is sand mining, which refers the extraction of sand, mainly through an open pit but also mined from beaches and inland dunes or dredged from ocean and river beds. The mining area is covering 9.57 square kilometers (2.98%) of the project area figure 3.11

3.6 Meteorological Data

The meteorological parameters play a vital role in transport and dispersion of pollutants in the atmosphere. The collection and analysis of meteorological data, therefore, is an essential component of Environmental Impact Assessment Studies. The long term and short-term impact assessment could be made through utilization and interpretation of meteorological data collected over long and short periods.

The year may broadly be divided into four seasons (As per Standard ToR Document by MoEFCC):

- Winter season : December to February
- Summer season : March to May
- Monsoon season : June to August
- Post-Monsoon season : October to December

Since, the meteorological parameters exhibit significant variation in time and space, meaningful interpretation can only be drawn through a careful analysis of reliable data collected very close to the site.

Table 3.4: Meteorological Monitoring at study area

S.N.	Parameter	Instrument	Frequency
1	Wind Speed	Automatic Weather station (Envirotech WM 251)	Continuous Automatic
2	Wind Direction		1 hourly Average
3	Ambient Temperature		
4	Max. & Min Temperature	Wet & Dry Bulb Thermometer	Daily at 08:30 and 17:30 IST
5	Relative Humidity	Hygrometer	Daily at 08:30 and 17:30 IST

S.N.	Parameter	Instrument	Frequency
6	Rainfall	Rain Gauge	Daily

The secondary meteorological data of the study period collected from www.imdpune.gov.in/. The month wise meteorological data is given in Table 3.5. The wind rose during the study period is presented in **Figure 3.12**.

Table 3.5: Meteorological Data of the study area (IMD – West Bengal)

Period	Wind Speed (m/s)		Temp (°C)		Relative Humidity (%)		Rainfall (mm)
	Max	Min	Max	Min	Max	Min	
March-23	6.25	0.11	37	17	100	12.94	0.27
April-23	6.93	0.2	45	18	86	7.5	0.28
May-23	7.05	0.14	44	23	96	7	0.33

Source: Weather Summary for March 2023-May 2023(<https://www.imdpune.gov.in/>)

Temperature

Maximum temperature of 45°C and minimum temperature of 17°C was recorded during the study period. Maximum temperature was observed during April and the minimum temperature was observed during March of the study period.

Relative Humidity

During the period of observation, the relative humidity recorded ranged from 7 to 100.

Rainfall

Total rainfall was observed 0.27 to 0.33 mm during the study period.

Cloud Cover

The clear skies were observed mostly during the study period except during rainy days.

Wnd Speed/Direction

Predominant winds from North- West direction were observed for 2.61 m/s of the total time.

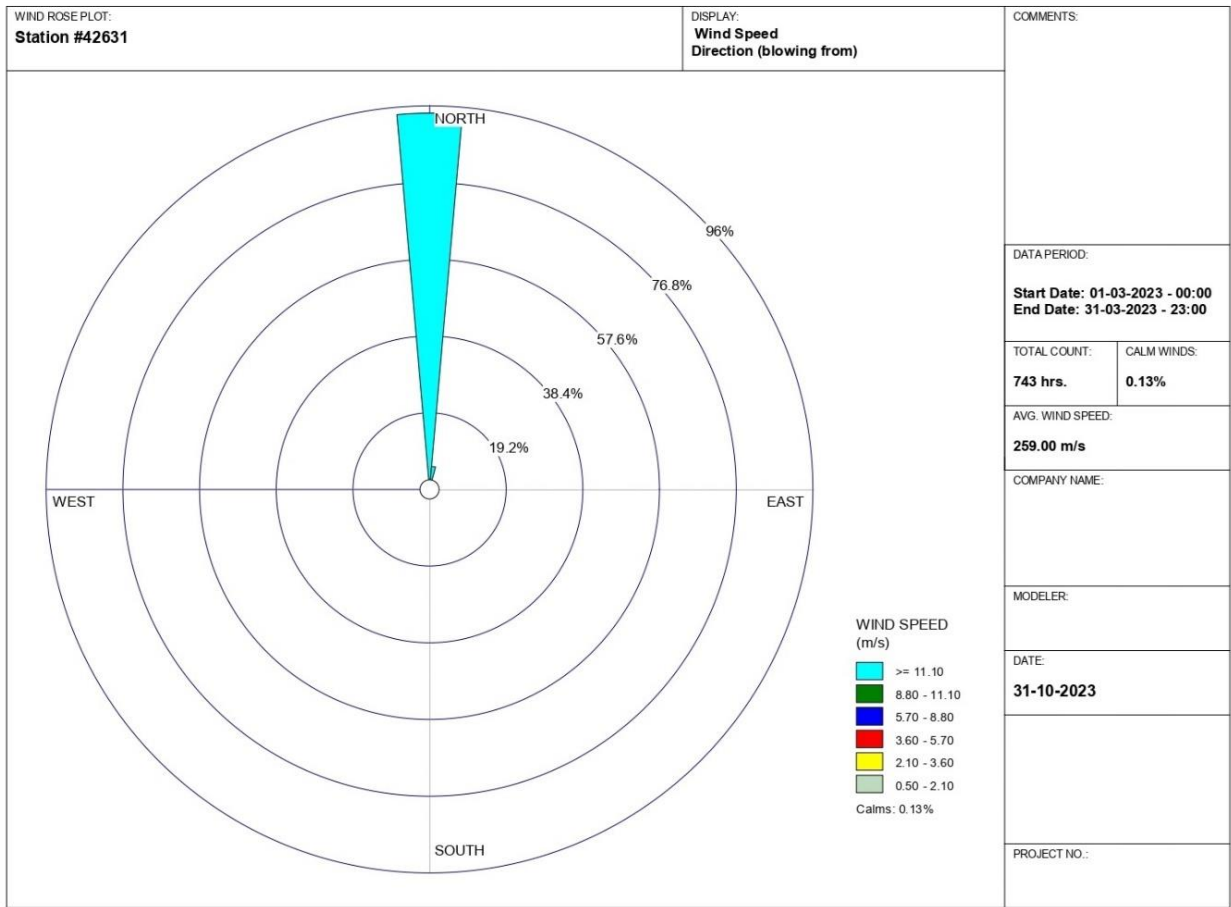


Figure 3.12 (A): Wind rose Summer Season (March 2023) of the project Site

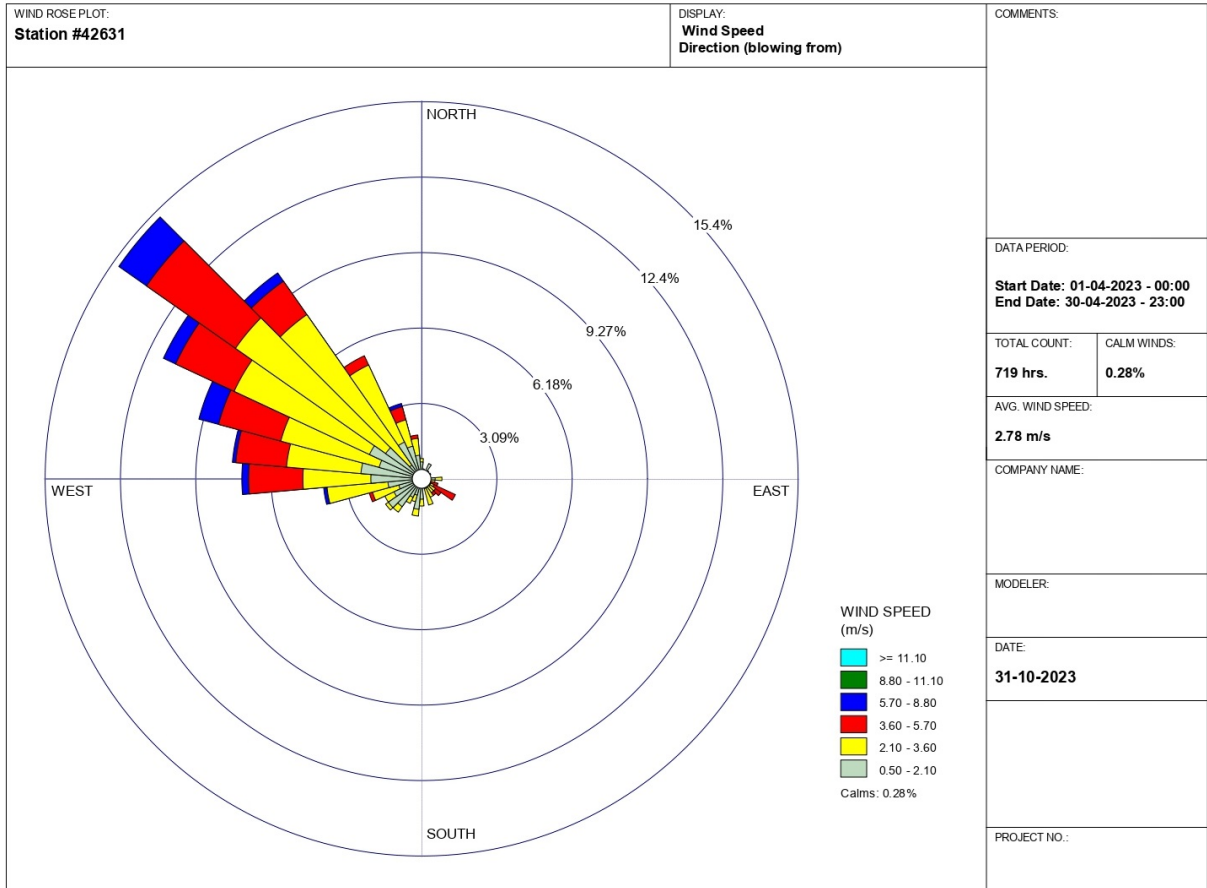
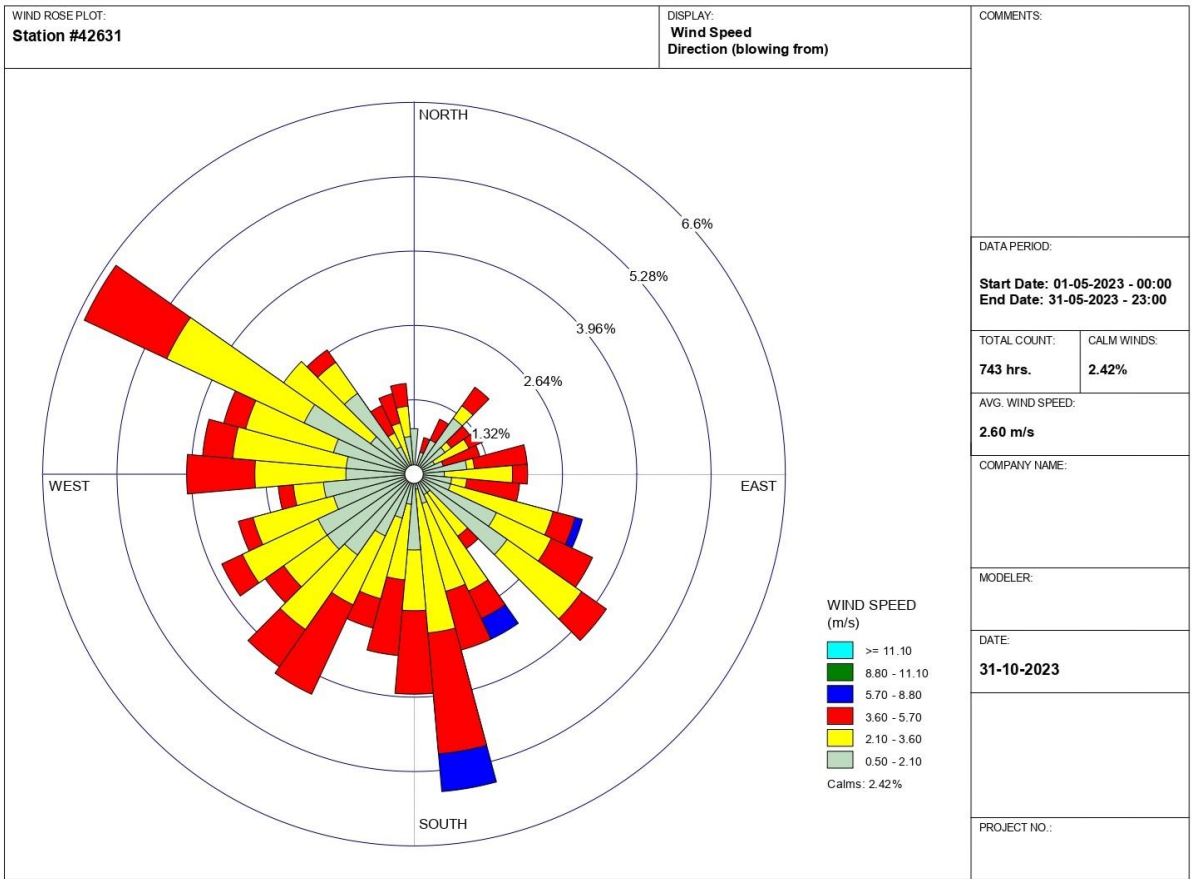


Figure 3.12 (B): Wind rose Summer Season (April 2023) of the project site



WRPLOT View - Lakes Environmental Software

Figure 3.12 (C): Wind rose Summer Season (May2023) of the project site

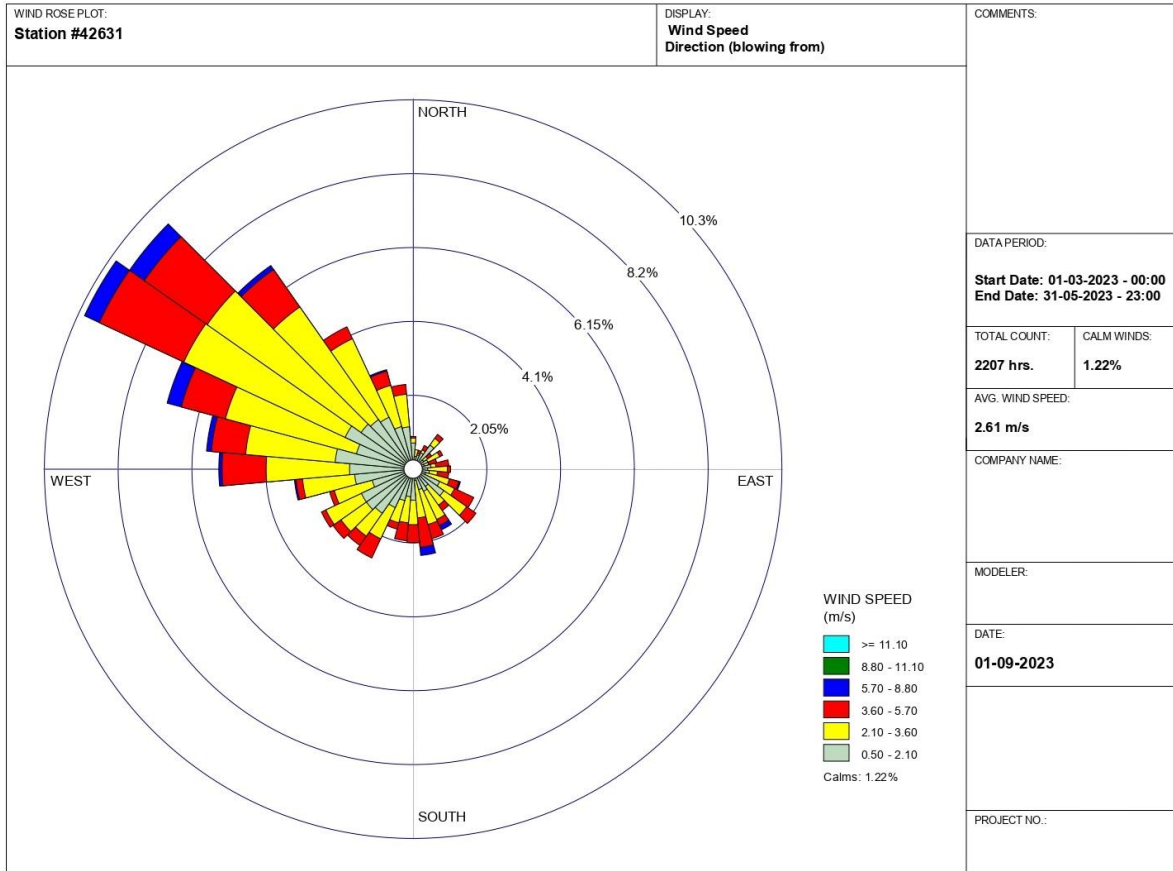


Figure 3.12(D): Wind rose Summer Season (March 2023 to May 2023) of the projectsite

3.6.1 Ambient Air Quality

The ambient air quality with respect to the study zone around the proposed project area forms the baseline information. The various sources of air pollution in the region are traffic, urban rural activities and industrial activities (mining activities). The study area represents mostly rural environment.

Methodology Adopted for Air Quality Survey

Selection of Sampling Locations

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality monitoring network. The designs of monitoring network in the air quality surveillance programme have been based on the following considerations:

- Long term windrose pattern of the study area;
- Locations covering upwind, downwind and all around 120⁰ sector of the project site
- Topography of the study area;
- Representatives of regional background air quality for obtaining baseline status; and

- Representatives of likely impact areas.
- Location covering the sensitive areas, if any

Ambient Air Quality Monitoring (AAQM) stations were set up at 8 (Eight) locations. The location of the selected stations with reference to the project area is given in the *Table 3.6* and shown in *Figure 3.13*.

Frequency and Parameters for Sampling

Ambient air quality monitoring has been carried out with a frequency of two days per week during study period. The baseline data of air environment was monitored for parameters mentioned below as per MoEF notification.

- Particulate Matter (PM₁₀);
- Particulate Matter (PM_{2.5});
- Sulphur Dioxide (SO₂);
- Oxides of Nitrogen (NO_x);
- Carbon Monoxide (CO);

Sampling and Analytical Techniques

Respirable Dust Samplers (RDS) APM-460 & Fine Particulate samplers APM-550 (Make: Envirotech Instruments Pvt Ltd) instruments have been used for sampling of PM₁₀ and PM_{2.5} respectively. Gaseous attachments along with APM 460 have been used for gaseous pollutants like SO₂ and NO_x.

PM₁₀ (<10µm) present in ambient air is drawn through the cyclone of RDS. Coarse and non-respirable dust (>10µm) is separated from the air stream by centrifugal forces acting on the solid particles. These separated particulates fall through the cyclone's conical hopper and collect in the sampling cup placed at the bottom of the cyclone. The dust (<10 microns) forming the respirable fraction passes through the cyclone and is retained by the filter paper.

PM_{2.5} (<2.5µm) present in ambient air is drawn through the cyclone separator and WINS Impactor of FPS. Coarse and non-respirable dust (>10µm) is separated from the air stream by centrifugal forces acting on the solid particles at cyclone separator. These separated air pass through the WINS Impactor and collect particles size between 10µm – 2.5µm. The dust (<2.5µm) passes through the PTFE filter papers and is retained by the filter paper.

A tapping is provided on the suction side of the blower of RDS to provide suction for sampling air through a set of impingers. Samples of gases SO₂ and NO_x are drawn at a flow rate of 1 lpm. The air samples were analysed as per standard methods specified in IS: 5182 and Central Pollution Control Board (CPCB) guidelines.

Non-Dispersive Infra-Red (NDIR) techniques have been used for the monitoring of Carbon Monoxide (CO).

The techniques used for ambient air quality monitoring and minimum detectable levels are given in **Table 3.7**

Table 3.6: Details of AAQM Monitoring Locations

Code	Name of the Location	Latitude	Longitude	Distance & Direction
AAQM – 1	At Project Site	23°59'37.20"N	87°35'31.30"E	---
AAQM – 2	Kedarpur BN High School (Angargaria)	23°58'39.75"N	87°36'9.39"E	2.16 Km , SSE
AAQM – 3	Tentulia Primary School (Tentulia)	24° 1'24.91"N	87°35'54.47"E	3.37Km, NNE
AAQM – 4	Bajitpur High school	24° 0'1.41"N	87°39'45.59"E	7.32Km, E
AAQM – 5	Nischantapur	24° 3'4.06"N	87°34'33.02"E	6.52 Km, NNW
AAQM – 6	Panch Pukhuria Primary school	23°56'5.48"N	87°34'17.96"E	6.84Km, SSW
AAQM – 7	Nirbhayapur	23°59'0.29"N	87°33'22.38"E	3.73Km, WSW
AAQM-8	Lohabazar	23°59'3.99"N	87°34'23.73"E	2.09Km, WSW

Table 3.7: Techniques used For AAQ Analyses

Parameters	Technique	Technical protocol	Detection Limit
Particulate Matter of sizeless than 10 µm (PM ₁₀)	Respirable Dust Sampler (Gravimetric method)	Gravimetric	10.0 µg/m ³
Particulate Matter of sizeless than 2.5 µm (PM _{2.5})	FRM method/ Low volume sampling (Gravimetric)	Gravimetric	5.0µg/m ³
Sulphur Dioxide	Improved West and Gaeke	IS 5182 Part-II	5.0 µg/m ³
Nitrogen Dioxide	Modified Jacob and Hochheiser	IS 5182 Part -VI	5.0 µg/m ³
Carbon Monoxide (8hrs)	Non-DispersiveInfra RedSpectroscopy (NDIR)	IS 5182 Part 10	0.1 mg/m ³
Silica	Visible Absorption Spectrophotometry	7601 ,Issue 3 as per NIOSH Methods	0.01µg/m ³

Duration of Sampling

The duration of sampling of PM₁₀, PM_{2.5}, SO₂, and NO_x was each twenty-four hourly continuous sampling per day and CO was sampled for 8 hours continuous. The monitoring was conducted for twice in a week for three months of post monsoon season. The ambient air quality parameters along with their frequency of sampling are given in Table 3.8

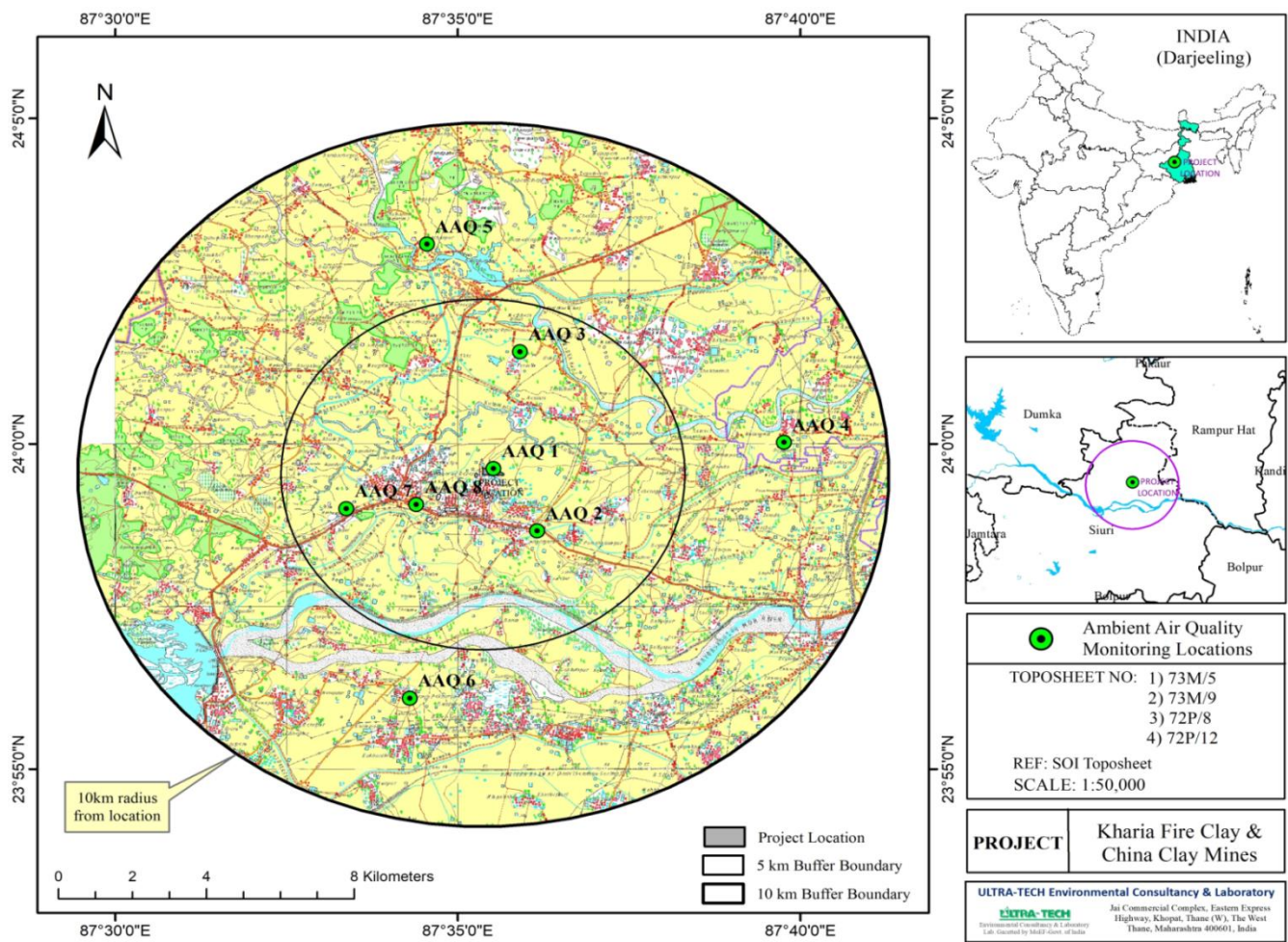


Figure 3.13: Ambient Air Quality Sampling locations

Table 3.8: Parameters and Frequency of Sampling

Parameters	Sampling Frequency
Particulate Matter (PM ₁₀)	24 hourly sample twice a week for three months
Particulate Matter (PM _{2.5})	24 hourly sample twice a week for three months
Sulphur dioxide (SO ₂)	24 hourly samples twice a week for three months
Oxides of Nitrogen (NO _x)	24 hourly samples twice a week for three months
Carbon Monoxide (CO)	8 hourly samples twice a week for three months

3.6.2 Presentation of AAQM Data

Various statistical parameters like 98th percentile, average, maximum and minimum values have been computed from the observed raw data for all the AAQM monitoring stations. The summary of these results for each location are presented in **Table 3.9A** and **Table 3.9 B**. These are compared with the standards prescribed by Central Pollution Control Board (CPCB) for industrial and rural residential zone.

Table 3.9 A: Summary of Ambient Air Quality Results – Summer Season (March 2023- May 2023)

Station Code	Name of the Location	PM ₁₀ (µg/m ³)				PM _{2.5} (µg/m ³)				SO ₂ (µg/m ³)			
		Min	Max	Avg	98 th percentile	Min	Max	Avg	98 th percentile	Min	Max	Avg	98 th percentile
AAQ M - 1	At Project Site	54	61	58	61	19	25	22	25	5	8	6	8
AAQ M - 2	Kedarpur BN High School (Angargari)	55	65	69	65	16	26	22	26	5	7	6	7
AAQ M - 3	Tentulia Primary School (Tentulia)	51	58	54	58	21	25	23	25	5	7	6	7
AAQ M - 4	Bajitpur High	48	56	51	56	15	17	16	17	5	7	6	7
AAQ M - 5	Nischanta pur	54	58	56	58	15	20	18	20	5	6	6	6
AAQ M - 6	Panch Pukhuria	55	59	57	59	18	23	21	23	5	7	6	7
AAQ	Nirbhaya	68	77	73	77	25	31	28	31	5	6	5	6
AAQ	Lohabaza	58	66	63	66	23	29	26	29	5	6	5	6
NAAQ standards		100				60				80			

Table 3.9B: Summary of Ambient Air Quality Results – Summer Season (March 2023- May 2023)

Station Code	Name of the Location	NO _x (µg/m ³)				CO (mg/m ³)			
		Min	Max	Avg	98 th percentile	Min	Max	Avg	98 th percentile
AAQM - 1	At Project Site	20	25	23	25	0.3	0.6	0.5	0.6
AAQM - 2	Kedarpur BN High School (Angargari)	20	25	23	25	0.3	0.6	0.5	0.6
AAQM - 3	Tentulia Primary School (Tentulia)	16	23	19	23	0.5	0.8	0.7	0.8
AAQM - 4	Bajitpur High school	15	20	17	20	0.3	0.7	0.5	0.7

AAQM - 5	Nischantapur	15	19	17	19	0.4	0.8	0.6	0.8
AAQM - 6	Panch Pukhuria	9	12	11	12	0.6	0.8	0.7	0.8
AAQM - 7	Nirbhayapur	21	29	26	29	0.4	0.7	0.6	0.7
AAQM	Lohabazar	22	28	25	28	0.4	0.7	0.6	0.7
NAAQ standards		80				4			

Observations of Primary Data

The observations for summer season -(March 2023 – May 2023) are summarized below

Particulate Matter (PM₁₀):

A maximum concentration of PM₁₀ is 66 µg/m³ was observed at the AAQM-8 and minimum value of 48 µg/m³ was observed at AAQM-4

Respirable Particulate Matter (PM_{2.5}):

A maximum concentration of PM_{2.5} is recorded to be 31 µg/m³ at AAQM-7 and minimum value of 15 µg/m³ was observed at AAQM-4,5.

Sulphur Dioxide (SO₂):

Maximum concentration of SO₂ is observed to be 8 µg/m³ at AAQM -1 and minimum value of 5 µg/m³ observed at AAQM- 1-8.

Oxides of Nitrogen (NO_x):

Maximum concentration of NO_x is observed to be 29 µg/m³ at AAQM –7 & minimum value of 9 µg/m³ observed at AAQM-6

Carbon Monoxide (CO):

Maximum concentrations in the region are observed to be 0.8 mg/m³ at AAQM-3,5,6 and minimum value of 0.3 mg/m³ observed at AAQM-1,2,4

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.

3.6.3 Water Quality

Selected water quality parameters of surface and ground water resources in the study area have been studied for assessing the water environment and evaluate anticipated impact of the quarry. Understanding the water quality is essential in preparation of EIA and to identify critical issues with a view to suggest appropriate mitigation measures for implementation.

The purpose of this study is to:-

- Assess the water quality characteristics for critical parameters;

- Evaluate the impacts on agricultural productivity, habitat conditions, recreational resources and aesthetics in the vicinity; and
- Predict impact on water quality by this project and related activities.

The information required has been collected through primary surveys and secondary sources.

3.6.3.1 Methodology

Reconnaissance survey was undertaken and monitoring locations were finalized based on:-

- Drainage pattern;
- Location of residential areas representing different activities/likely impact areas; and
- Likely areas, which can represent baseline conditions.

Four surface water and Four ground water sources in the study area were examined for physico-chemical and bacteriological parameters in order to assess the effect of quarry and other activities on surface and ground water. The samples were analyzed essential parameters as per the drinking water specification IS 10500: 2012.

Samples for chemical analysis were collected in polyethylene carboys. Samples for bacteriological analysis were collected in sterilized glass bottles. Selected physico-chemical and bacteriological parameters have been analysed for projecting the existing water quality status in the study area.

3.6.3.2 Water Sampling Locations

Water samples were collected from Four surface and Four ground water locations. These samples were taken as grab samples and were analysed for various parameters to compare with the standards for drinking water as per IS: 10500 for ground and surface water sources. The water sampling locations are listed below in *Table 3.10 and Figure 3.14 to 3.15*.

Table 3.10: Water Sampling Locations

SR. NO.	Station Code	Name of The Location	latitude	longitude
Surface Water				
1	SW1	Project Side (Kharia Village)	23°59'34.57"N	87°35'24.93"E
2	SW2	Mayurakshi River	23°56'52.13"N	87°31'28.11"E
3	SW3	Dwaraka River (UP stream)	24° 3'11.19"N	87°34'8.34"E
4	SW4	Dwaraka River (Down stream)	24° 2'32.27"N	87°35'36.38"E
Ground Water				
1	GW1	Fulgoria Primary school	23°59'41.92"N	87°32'17.80"E
2	GW2	Lohabazar	23°59'3.53"N	87°34'23.26"E
3	GW3	Nirbhoypur	23°58'59.56"N	87°33'22.24"E
4	GW4	Dighalgram Primary school	24° 2'49.85"N	87°38'38.00"E

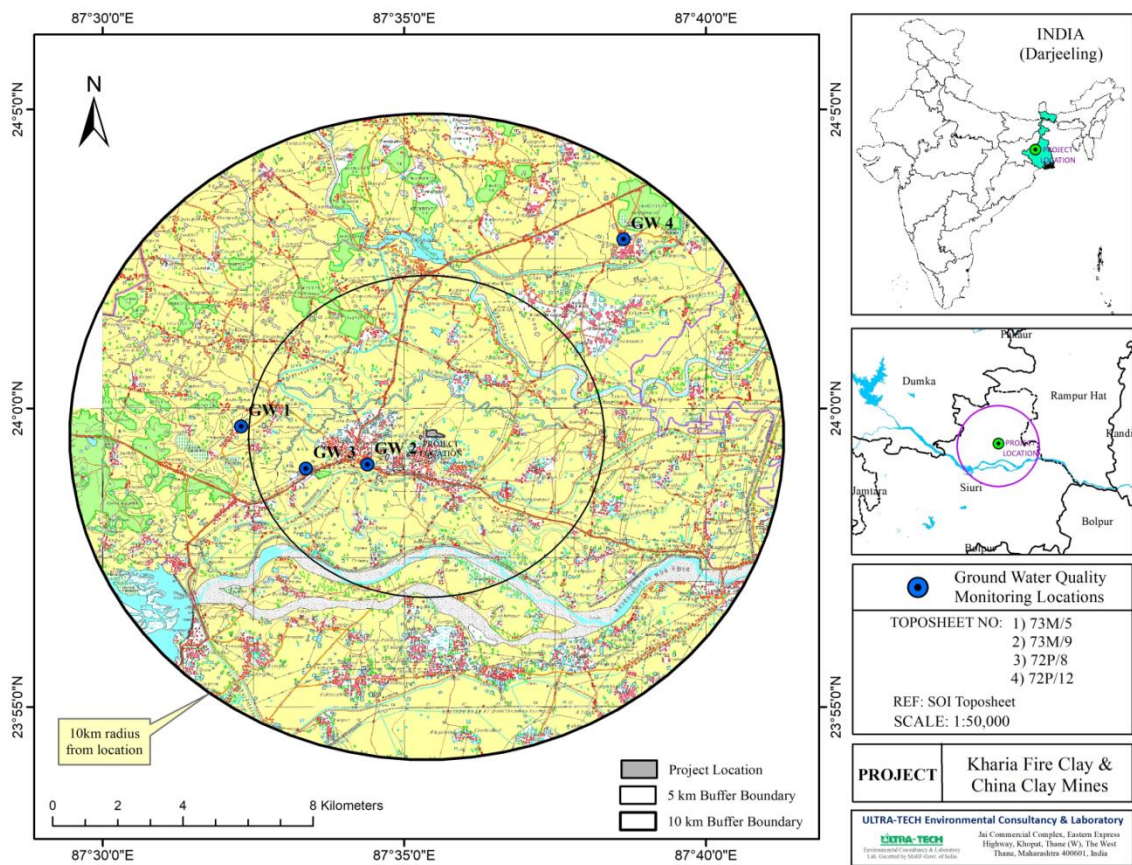


Figure 3.14: Ground Water Monitoring Locations

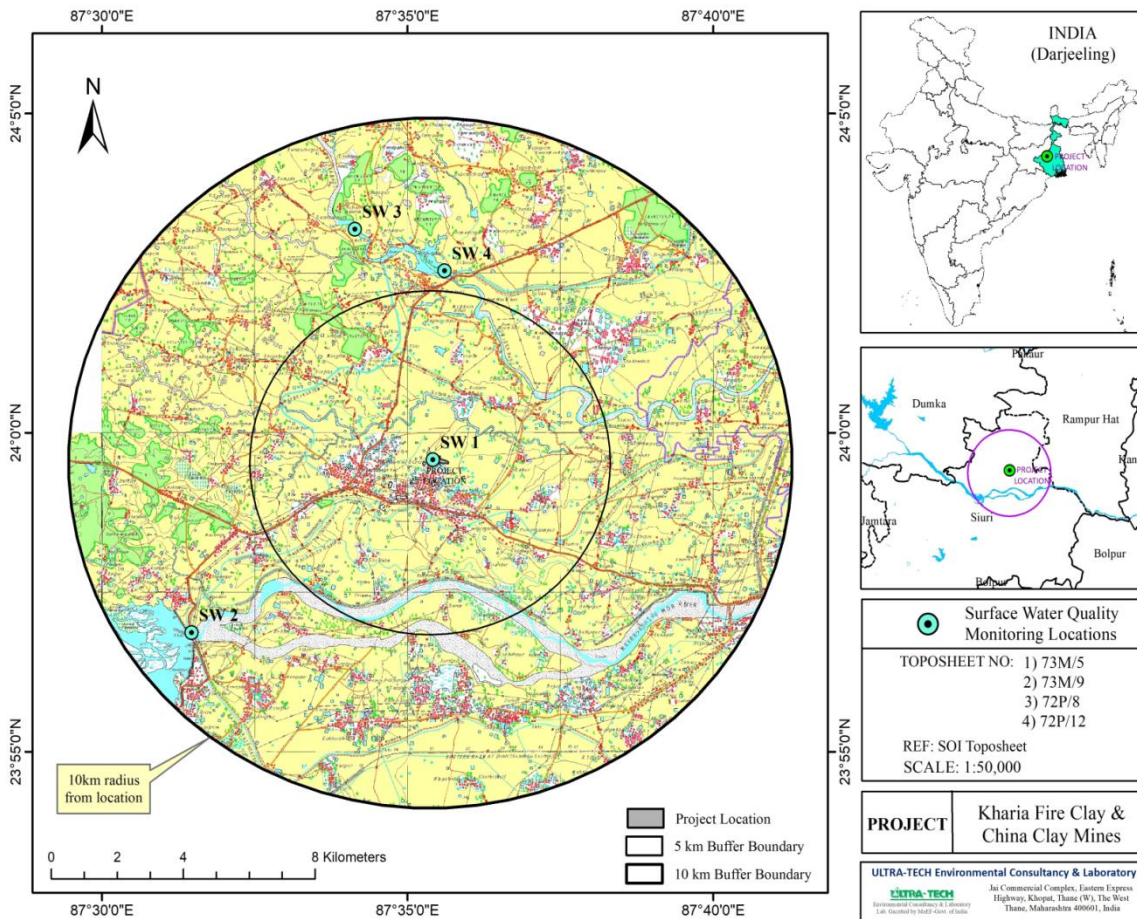


Figure 3.15: Surface water Monitoring Locations

3.6.3.3 Presentation of Results

The analytical results of ground water and surface water samples are given in Table 3.11 and Table 3.12. The quality of surface water samples were compared with surface water specification IS 2296:1982 Class C and ground water samples were compared with drinking water specification IS 10500:2012 standards.

Table 3.11: Ground Water Quality (March 2023-May 2023)

Sl No	Parameters	Unit	GW 1	GW 2	GW 3	GW 4
1.	Color	Hazen	BDL[DL=1]	BDL[DL=1]	BDL[DL=1]	BDL[DL=1]
2.	pH	-	6.8	7.3	6.6	7.2
3.	Total suspended solids	mg/l	2	4	6	5
4.	Ammonical Nitrogen as NH ₃ -N	mg/l	BDL[DL=0.1]	0.53	0.61	0.53
5.	Total Kjeldahl Nitrogen	mg/l	1.9	1.4	2.1	1.6
6.	Biochemical Oxygen Demand (27°C, 3Days)	mg/l	BDL[DL=2]	BDL[DL=2]	BDL[DL=2]	BDL[DL=2]
7.	Chemical Oxygen Demand	mg/L	BDL[DL=2]	BDL[DL=2]	BDL[DL=2]	BDL[DL=2]
8.	Oil & grease	mg/L	BDL[DL=2]	BDL[DL=2]	BDL[DL=2]	BDL[DL=2]
9.	Residual Chlorine	mg/L	BDL[DL=1]	BDL[DL=1]	BDL[DL=1]	BDL[DL=1]
10.	Phosphates as PO ₄ ³⁻	mg/L	0.61	0.59	0.66	0.52

SI No	Parameters	Unit	GW 1	GW 2	GW 3	GW 4
			11.	Nitrates as NO ₃ ⁻ -N	mg/L	0.25
12.	Phenols	mg/L	BDL[DL=1]	BDL[DL=1]	BDL[DL=1]	BDL[DL=1]
13.	Sulfides	mg/L	BDL[DL=0.05]	BDL[DL=0.05]	BDL[DL=0.05]	BDL[DL=0.05]
14.	Arsenic as As *	mg/L	BDL[DL=0.003]	BDL[DL=0.003]	BDL[DL=0.003]	BDL[DL=0.003]
15.	Copper as Cu	mg/L	BDL[DL=0.03]	BDL[DL=0.03]	BDL[DL=0.03]	BDL[DL=0.03]
16.	Chromium as Cr	mg/L	BDL[DL=0.02]	BDL[DL=0.02]	BDL[DL=0.02]	BDL[DL=0.02]
17.	Hexavalent Chromium	mg/L	BDL[DL=0.01]	BDL[DL=0.01]	BDL[DL=0.01]	BDL[DL=0.01]
18.	Iron as Fe	mg/L	0.78	0.72	0.85	0.73
19.	Magnesium as Mn	mg/L	BDL[DL=0.03]	BDL[DL=0.03]	BDL[DL=0.03]	BDL[DL=0.03]
20.	Mercury As Hg	mg/L	BDL[DL=0.006]	BDL[DL=0.006]	BDL[DL=0.006]	BDL[DL=0.006]
21.	Nickel as Ni	mg/L	BDL[DL=0.6]	BDL[DL=0.6]	BDL[DL=0.6]	BDL[DL=0.6]
22.	Selenium as Se	mg/L	BDL[DL=0.003]	BDL[DL=0.003]	BDL[DL=0.003]	BDL[DL=0.003]
23.	Lead as Pb	mg/L	BDL[DL=0.6]	BDL[DL=0.6]	BDL[DL=0.6]	BDL[DL=0.6]

SI No	Parameters	Unit	GW 1	GW 2	GW 3	GW 4
			24.	Fluoride as F ⁻	mg/L	0.4
25.	Boron as B	mg/L	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]
26.	Zinc as Zn	mg/L	BDL[DL=0.02]	BDL[DL=0.02]	BDL[DL=0.02]	BDL[DL=0.02]
27.	Total Coliform Bacteria*	MPN/100 ml	12	2	4	4
28.	<i>Fecal coliform</i> *	MPN/100 ml	BDL[DL=2]	BDL[DL=2]	BDL[DL=2]	BDL[DL=2]
29.	<i>E. Coli</i> *	-	Absent	Absent	Absent	Absent

Table3.12 Surface water Quality (March 2023-May 2023)

SI No	Parameters	Unit	SW 1	SW 2	SW 3	SW 4
			1.	Color	Hazen	BDL[DL=1]
2.	Odor*	-	Agreeable	Agreeable	Agreeable	Agreeable
3.	Temperature	^o C	28.6	27.6	26.6	27.8
4.	Turbidity	NTU	3.4	3.9	3.5	2.6
5.	pH	-	8.1	7.3	7.2	7.5
6.	Electrical Conductivity	μS/cm	458	388	382	404

Sl No	Parameters	Unit	SW 1	SW 2	SW 3	SW 4
			7.	Total Dissolved Solids	mg/L	298
8.	Total suspended solids	mg/L	5	6	4	3
9.	Total Hardness as CaCO ₃	mg/L	210	202	172	180
10.	Ammonical Nitrogen as NH ₃ -N	mg/L	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]
11.	Nitrates as NO ₃ ⁻ -N	mg/L	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]
12.	Nitrite as NO ₂ ⁻ -N	mg/L	0.012	0.008	0.006	0.008
13.	Phosphates as PO ₄ ³⁻	mg/L	0.15	0.12	0.08	0.07
14.	Biochemical Oxygen Demand (27 ^o C, 3Days)	mg/L	4.7	3.6	3.2	3
15.	Chemical Oxygen Demand	mg/L	16	12	16	12
16.	Dissolved Oxygen	mg/L	5.5	5.6	5.7	5.8
17.	Potassium as K	mg/L	1.7	1.5	1.6	1.8
18.	Sodium as Na	mg/L	24	9.3	19	20
19.	Calcium as Ca	mg/L	43	42	36	38
20.	Magnesium as Mg	mg/L	25	24	20	21

Sl No	Parameters	Unit	SW 1	SW 2	SW 3	SW 4
			21.	Carbonates (CO_3^{2-}) as CaCO_3^*	mg/L	BDL[DL=1]
22.	Bicarbonates as (HCO_3^-) as CaCO_3^*	mg/L	200	198	166	174
23.	Chlorides as Cl^-	mg/L	41	15	31	34
24.	Sulphates as SO_4^{2-}	mg/L	39	36	35	34
25.	Fluoride as F^-	mg/L	0.2	0.3	0.4	0.5
26.	Boron as B	mg/L	0.2	0.4	0.2	0.3
27.	Arsenic as As *	mg/L	BDL[DL=0.003]	BDL[DL=0.003]	BDL[DL=0.003]	BDL[DL=0.003]
28.	Iron as Fe	mg/L	0.31	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]
29.	Zinc as Zn	mg/L	BDL[DL=0.02]	BDL[DL=0.02]	BDL[DL=0.02]	BDL[DL=0.02]
30.	Total Coliform Bacteria*	MPN/100 ml	27	22	21	27
31.	<i>Fecal coliform</i> *	MPN/100 ml	11	12	11	12
32.	<i>E. Coli</i> *	-	Present	Present	Present	Present

3.6.3.4 Observations

Groundwater quality:

- The analysis results indicate that the pH ranges in between 6.6 to 7.3, which is well within the specified standard of 6.5 to 8.5. The minimum pH was observed at GW 3; the maximum pH was observed at GW 2.
- TDS was observed to be ranging from 2 to 6 mg/l. The minimum TDS was recorded at GW1 and the maximum was recorded at GW3.
- Fluorides were found to be in the range of 0.3 to 0.5 mg/l, the minimum concentration of Fluorides was observed at GW2, whereas the maximum value was observed at GW4.
- Zinc and iron found below detectable limit

All parameters are within desirable limits as per IS 10500:2012 for all stations.

Surface water quality:

- The analysis results indicate that the pH values in the range of 7.2 to 8.1, the minimum value was observed at SW3 and maximum value was observed at SW1.
- DO was observed to be in the range of 5.5 to 5.8 mg/l. The minimum DO value was observed at SW1 and maximum DO was observed at SW4.
- The TDS was observed in the range of 248 to 298 mg/l, the minimum TDS value was observed at SW3, and where as maximum value was observed at SW1.
- The chlorides and Sulphates were found to be in the range of 15 to 41 mg/l and 34 to 39 mg/l, respectively.
- Total hardness expressed as CaCO₃ ranges between 172 to 210 mg/l.
- The calcium & magnesium were found to be in the range of 36 to 43 mg/l and 20 to 25 mg/l, respectively. Zinc is found below detectable limit.

As per CPCB water quality criteria the class of water comes under Class B for SW4 and Class D for rest of the stations.

3.6.4 Noise Level Survey

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.

3.6.4.1 Identification of Sampling Locations

A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in and around the quarry site area. Noise at different noise generating sources has been identified based on the activities in the village area and ambient noise due to traffic.

The noise monitoring has been conducted for determination of ambient noise levels at eight locations in the study area for summer season (March 2023- May 2023). The noise levels at each location were recorded for 24 hours. The environment setting of noise monitoring locations in Eight areas are given in **Table 3.13 and shown in Figure 3.16**.

3.6.4.2 Method of Monitoring

Sound Pressure Level (SPL) measurements were measured at 8 locations. The readings were taken for every hour for 24 hours. The day noise levels have been monitored during 6 am to 10 pm and night levels during 10 pm to 6 am at all the locations covered in 10 km radius of the study area.

Table 3.13 Details of Noise Monitoring Locations

Code	Location	Latitude	Longitude
ANQM - 1	At Project Site	23°59'33.92"N	87°35'25.25"E
ANQM – 2	Angargaria	23°58'36.67"N	87°36'3.80"E
ANQM - 3	Tentulia	24° 2'11.72"N	87°35'31.49"E
ANQM - 4	Bajitpur	24° 0'3.36"N	87°39'44.97"E
ANQM – 5	Nischantapur	24° 3'4.48"N	87°34'33.95"E
ANQM – 6	Panch Pukhuria	23°56'4.11"N	87°34'16.23"E
ANQM - 7	Nirbhayapur	23°59'0.41"N	87°33'22.39"E
ANQM - 8	Lohabazar	23°59'3.58"N	87°34'23.56"E

3.6.4.3. Methodology of Data Generation

Instrument Used for Monitoring

Noise levels were measured using integrated sound level meter manufactured by Cygnet (Baseline Technology). The integrating sound level meter is an integrating/logging type with Octave filter attachment (model OB-100) with frequency range of 31.5 to 16000 Hz. This instrument is capable of measuring the Sound Pressure Level (SPL), L_{eq} and octave band frequency analysis.

Method of Monitoring

Noise level monitoring was carried out continuously for 24 hours with one hour interval

starting at 06:00 hrs to 06:00 hrs next day. The noise levels were monitored on working days only and not on Saturdays, Sundays and public holidays. During each hour, L_{eq} were directly computed by the instrument based on the sound pressure levels. L_{day} (L_d) and L_{night} (L_n) values were computed using corresponding hourly L_{eq} of day and night respectively. Monitoring was carried out at 'A' response and fast mode.

Equivalent Sound Pressure Level (L_{eq}):

The L_{eq} is the equivalent continuous sound level, which is equivalent to the same sound energy as the actual fluctuating sound measured in the same period. This is necessary because sound from noise source often fluctuates widely during a given period of time. This is calculated from the following equation:

$$L_{eq} = L_{50} + \frac{(L_{10} - L_{90})^2}{60}$$

L_{day} is defined as the equivalent noise level measured over a period of time during day (6 am to 10 pm).

L_{night} is defined as the equivalent noise level measured over a period of time during night (10 pm to 6 am).

Table 3.14 National Ambient Noise Level Standard

Area code	Category of area	Limits in dB(A)	
		Day Time	Night Time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

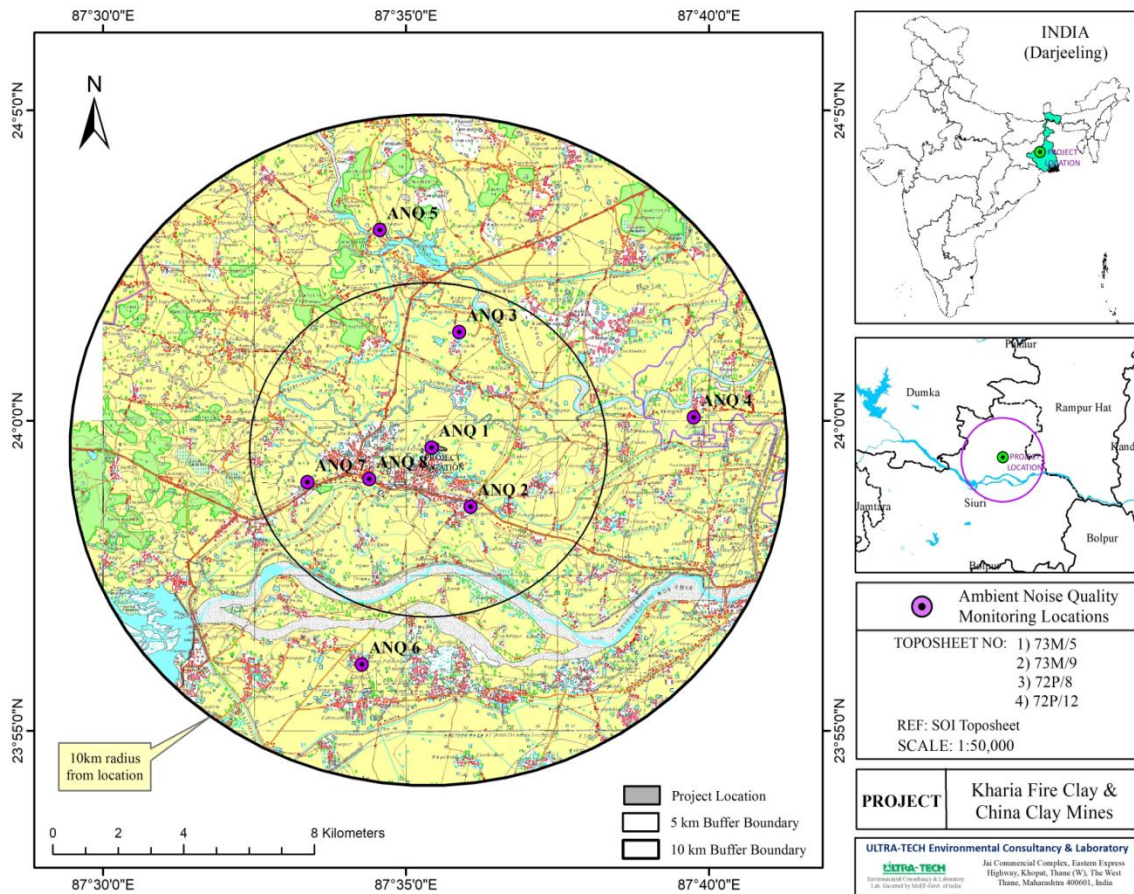


Figure 3.16: Noise Monitoring Locations

3.6.4.4 Presentation of Results

The statistical analysis is done for measured noise levels at eight locations. The parameters are analysed for L_{eq} . The statistical analysis results are given in **Table 3.15**.

Table3.15: Noise Levels [dB (A)] in the Study Area

Station Code	Location	Leq dB (A) Day Time	Leq dB (A) Night Time
ANQM - 1	At Project Site	53.5	43.5
ANQM - 2	Kedarpur	52.4	41.2
ANQM - 3	Tentulia	49.4	40.4
ANQM - 4	Bajitpur	53.2	38.9
ANQM - 5	Nischantapur	51.5	41.3
ANQM - 6	Panch Pukhuria	53.7	40.6
ANQM - 7	Nirbhayapur	51.9	42.3
ANQM - 8	Lohabazar	54.9	43.0

• Noise level-Day time & Night time

Noise levels were monitored in Eight locations including project within the study area. The noise levels ranged between 49.4 to 53.9 dB (A) during day time and noise levels ranged between 38.9 to 43.5 dB (A) during night time. Over all the monitored noise levels are found to be within the stipulated standards set by CPCB.

3.6.5 Soil Characteristics

Soil is generally differentiated into two horizons of minerals and organic constituents of variable depth, which differ from the parent material below in morphology, physical properties, constituents, chemical properties, and composition and biological characteristics. The physico- chemical characteristics of soil have been determined at Eight (8) locations during the monitoring period with respect to colour, texture, cation exchange capacity, pH, N, P, and K etc. The location of sampling was given in **Table 3.16 & Figure 3.17**.

Table3.16: Details of Soil Sampling Locations

Code	Location	Latitude	Longitude
S1	At Project Site	23°59'33.97"N	87°35'25.47"E
S2	Kedarpur	23°58'37.47"N	87°36'2.29"E
S3	Tentulia	24° 1'24.97"N	87°35'51.96"E
S4	Bajitpur	24° 0'3.06"N	87°39'45.74"E
S5	Nischantapur	24° 3'3.78"N	87°34'34.01"E
S6	Panch Pukhuria	23°56'3.50"N	87°34'16.18"E
S7	Nirbhayapur	23°59'0.77"N	87°33'21.13"E
S8	Lohabazar	23°59'3.87"N	87°34'23.47"E

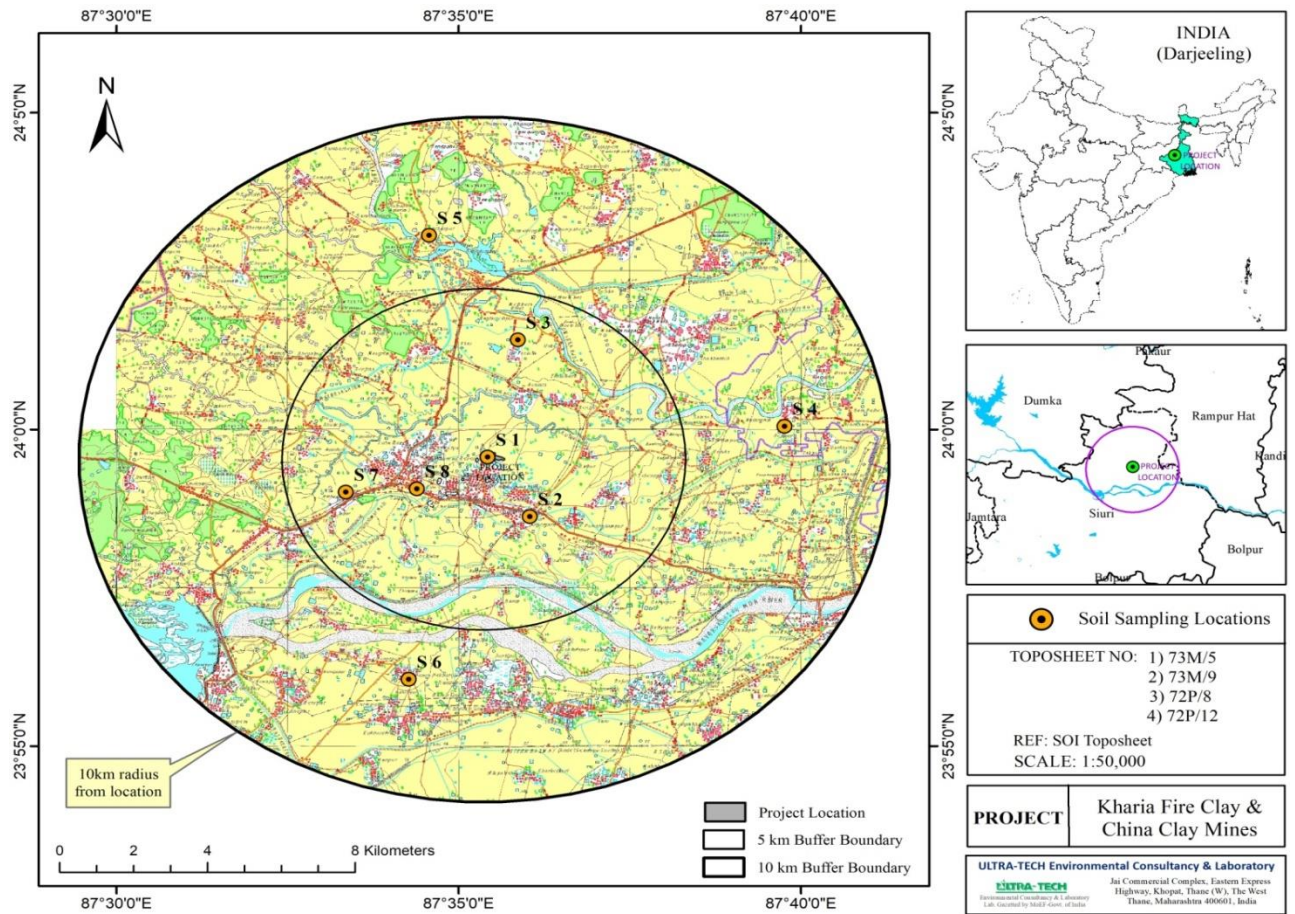


Figure 3.17: Soil Monitoring Locations

3.6.5.1 Soil sampling results

The soil sample was collected in presence of the functional area experts and analysed by NABL accredited laboratory, during the Summerseason, results are given in *Table 3.17*

Table3.17 Soil Characteristics

S. N.	Test Parameter	Unit	Test Method	S1	S2	S3	S4	S5	S6	S7	S8
				Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
1.	Physical State (Texture)*	-	UT/LQM S/SOP/S39	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Clay Loam
2.	pH(1:2.5 Soil: Water)	-	IS 2720 (Part 26) 1987	7.4	7.6	7.7	7.3	8.2	7.2	7.8	7.4
3.	Electrical Conductivity (1:2 Soil: Water Extract)	uS /cm	IS :14767-2000	247	324	377	216	283	353	267	206
4.	Bulk Density	kg /m ³	UT/LQM S/SOP/S03	1084	1102	1125	1155	1093	1089	1157	1149
5.	Porosity	%	UT/LQM	51.1	53.9	51.2	53.6	52.2	52.5	51.7	54.0

S. N.	Test Parameter	Unit	Test Method	S1	S2	S3	S4	S5	S6	S7	S8
			S/SOP/S40								
6.	Organic Matter	%	IS 2720 (Part 22) : 1972	0.5	0.7	0.7	0.5	0.6	0.8	0.6	0.5
7.	Total Organic Carbon	%	IS 2720 (Part 22) : 1972	0.3	0.4	0.4	0.3	0.3	0.4	0.3	0.3
8.	Moisture Content	%	IS 2720(Part 02) 1973	6.2	6.7	6.5	5.9	7.2	6.4	6.7	6.3
9.	n-Hexane Extractable Material (HEM)	%	UT/LQM S/SOP/S09	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]	BDL[DL=0.1]
10.	Water Holding Capacity	%	UT/LQM S/SOP/S12	55.8	57.6	56.9	53.7	54.7	56.6	51.2	55.3
11.	Texture (Sand)	%	UT/LQM S/SOP/S39	56.0	54.6	60.2	58.9	53.6	63.1	57.8	57.6

S. N.	Test Parameter	Unit	Test Method	S1	S2	S3	S4	S5	S6	S7	S8
12.	Texture (Silt)	%	UT/LQM S/SOP/S39	18.0	17.9	19.5	16.8	18.6	16.5	16.4	18.9
13.	Texture (Clay)	%	UT/LQM S/SOP/S39	26.0	26.7	20.3	24.2	27.8	20.4	24.9	23.2
14.	Sodium Adsorption Ratio	(meq/kg) ^{1/2}	UT/LQM S/SOP/S26	1.0	1.1	1.1	1.0	1.0	1.1	1.0	1.0
15.	Cation Exchange Capacity	meq/100g	UT/LQM S/SOP/S18	27.2	27.8	28.2	26.9	27.6	28.0	27.5	26.9
16.	Sodium as Na (Exchangeable)	meq/100g	UT/LQM S/SOP/S13	1.1	1.2	1.2	1.1	1.1	1.2	1.1	1.1

S. N.	Test Parameter	Unit	Test Method	S1	S2	S3	S4	S5	S6	S7	S8
17.	Potassium as K (Exchangeable)	meq / 100 g	UT/LQM S/SOP/S14	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
18.	Calcium as Ca (Exchangeable)	meq / 100 g	UT/LQM S/SOP/S15	12.2	10.2	12.2	10.2	13.3	12.2	12.2	10.2
19.	Magnesium as Mg (Exchangeable)	meq / 100 g	UT/LQM S/SOP/S16	11.4	12.4	12.4	11.4	12.4	11.4	12.4	11.4
20.	Sodium as Na (water Extractable)	mg / kg	UT/LQM S/SOP/S19	51	55	56	49	53	55	52	50
21.	Potassium as K (water Extractable)	mg / kg	UT/LQM S/SOP/S20	24	27	28	21	25	28	24	22

S. N.	Test Parameter	Unit	Test Method	S1	S2	S3	S4	S5	S6	S7	S8
	e)										
22.	Calcium as Ca (water Extractable)	m g/kg	UT/LQM S/SOP/S2 1	98	106	114	90	106	106	98	106
23.	Magnesium as Mg (water Extractable)	m g/kg	UT/LQM S/SOP/S2 2	64	74	74	64	64	79	69	50
24.	Chloride as Cl ⁻ (water Extractable)	m g/kg	UT/LQM S/SOP/S2 3	78	98	108	68	88	108	78	68
25.	Sulfate as SO ₄ ⁻ (water Extractable)	m g/kg	UT/LQM S/SOP/S2 4	106	112	117	102	115	113	111	99
26.	Phosphate as	m g/	UT/LQM S/SOP/S2	85	80	78	76	83	81	80	70

S. N.	Test Parameter	Unit	Test Method	S1	S2	S3	S4	S5	S6	S7	S8
	PO ₄ (water Extractable)	kg	5								
27.	Available Phosphorus as P ₂ O ₅	kg /ha	UT/LQM S/SOP/S28	68	78	89	68	78	79	76	67
28.	Available Potassium as K ₂ O	kg /ha	UT/LQM S/SOP/S29	239	261	271	245	245	259	257	241
29.	Available Nitrogen as N	kg /ha	UT/LQM S/SOP/S30	128	135	142	134	124	142	139	133
	TCLP Metals										
1.	Cadmium as Cd	mg/L	UT/LQM S/SOP/S36 & S37	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]
2.	Total Chromium as Cr	mg/L	UT/LQM S/SOP/S36 & S37	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]
3.	Cobalt as Co	mg/L	UT/LQM S/SOP/S36 & S37	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]

S. N.	Test Parameter	Unit	Test Method	S1	S2	S3	S4	S5	S6	S7	S8
4.	Copper as Cu	m g/L	UT/LQM S/SOP/S36 & S37	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]
5.	Iron as Fe	m g/L	UT/LQM S/SOP/S36 & S37	BDL[DL=0.09]	BDL[DL=0.09]	BDL[DL=0.09]	BDL[DL=0.09]	BDL[DL=0.09]	BDL[DL=0.09]	BDL[DL=0.09]	BDL[DL=0.09]
6.	Lead as Pb	m g/L	UT/LQM S/SOP/S36 & S37	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]
7.	Manganese as Mn	m g/L	UT/LQM S/SOP/S36 & S37	BDL[DL=0.12]	BDL[DL=0.12]	BDL[DL=0.12]	BDL[DL=0.12]	BDL[DL=0.12]	BDL[DL=0.12]	BDL[DL=0.12]	BDL[DL=0.12]
8.	Nickel as Ni	m g/L	UT/LQM S/SOP/S36 & S37	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]	BDL[DL=0.06]
9.	Zinc as Zn	m g/L	UT/LQM S/SOP/S36 & S37	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]	BDL[DL=0.018]

Table 3.18 Standard Soil Classification

Sr. No.	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
2	Salinity Electrical Conductivity ($\mu\text{mhos/cm}$) (1ppm = 640 $\mu\text{mhos/cm}$)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01- 3.00 harmful to crops (sensitive to salts)
3	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
4	Nitrogen (Kg/ha)	Upto 50 very less 51- 100 less 101-150 good 151-300 Better >300 sufficient
5	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
6	Potash (Kg/ha)	0-120 very less 120-180 less 181-240 medium, 241-300 average 301-360 Better >360 more than sufficient

3.6.5.2 Observations

- It has been observed that the pH of the soil in the study area varied from 7.1 to 7.6. The maximum pH value of 8.2 was observed at S5 where as the minimum value of 7.2 was observed at S6
- The electrical conductivity was observed to range from 206 to 353 ms/cm, with the maximum observed at S6 with the minimum observed in S8.
- The available Nitrogen value varies from 124 to 142 kg/ha.
- The available Phosphorus value varies from 68 to 89 kg/ha.
- The available Potassium value varies from 241 to 271 kg/ha.

A total of 8 samples in and around the project site are collected and analysed. It has been observed that the pH of the soil quality ranged from 7.2 (S6) to 8.2 (S5) indicating that the soil is slightly alkaline in nature.

3.7 Biological Environment

3.7.1 Introduction

Study of biological environment is one of the most important aspects for Environmental Impact Assessment. In view of the need for conservation of environmental quality and biodiversity study, biological environment is one of the most important aspects for Environmental Impact Assessment. Ecological systems show complex inter-relationships between biotic and abiotic components including dependence, competition and mutualism. Biotic components comprise of both plant and animal communities, which interact not only within and between them but also with the abiotic components viz. physical and chemical components of the environment. Generally, biological communities are the indicators of climatic and edaphic factors. The biological environment includes mainly terrestrial ecosystem and aquatic ecosystem. The mining activities are one such external influence, which might affect the ecology of an area, if proper management measures are not taken.

3.7.2 Objectives of Ecological Studies

- To evaluate the diversity of local within project site (Core Zone and buffer Zone).
- To enlist the major agricultural crops, plantations and cultivated species.
- To document the major fauna both invertebrate and vertebrate occurring in the selected 10 km study area

3.7.3 Study Area

As per guidelines of MoEF& CC for Environmental Impact Assessment, the study area was restricted up to 10 km radius from the project site. The study area is divided into two parts as core zone and buffer zone. Mining project is located at Village & Mouza - Kharia District –Birbhum, West Bengal. The data was generated with reference to topography, land use, vegetation pattern, animals etc. Core zone has been considered within the cluster area and buffer zone has been considered outside the cluster area up to 10 km from cluster boundary. All observations were generated in March 2023 in the study area Figure 3.18

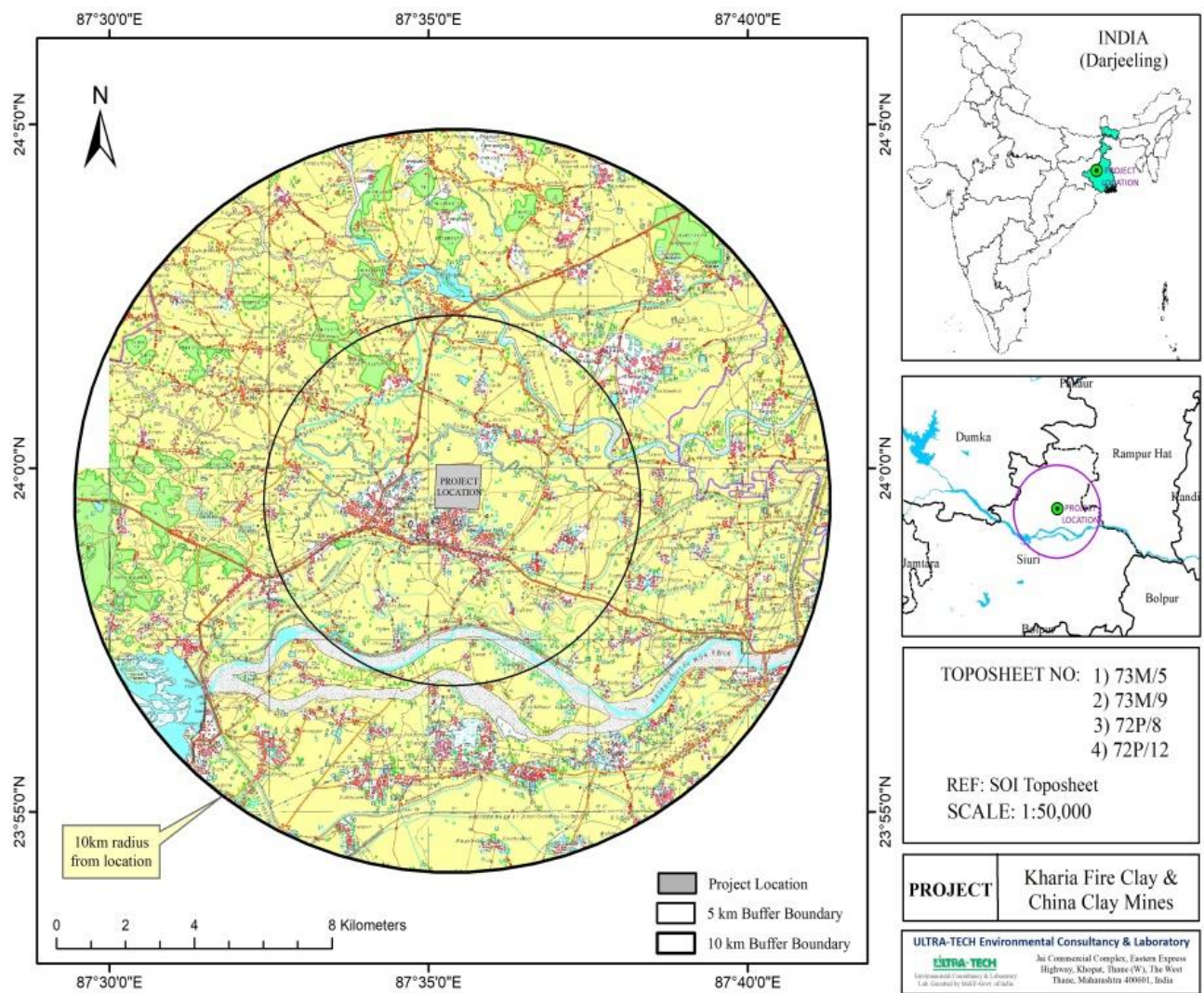


Figure3.18A: Study area for Biological Environment

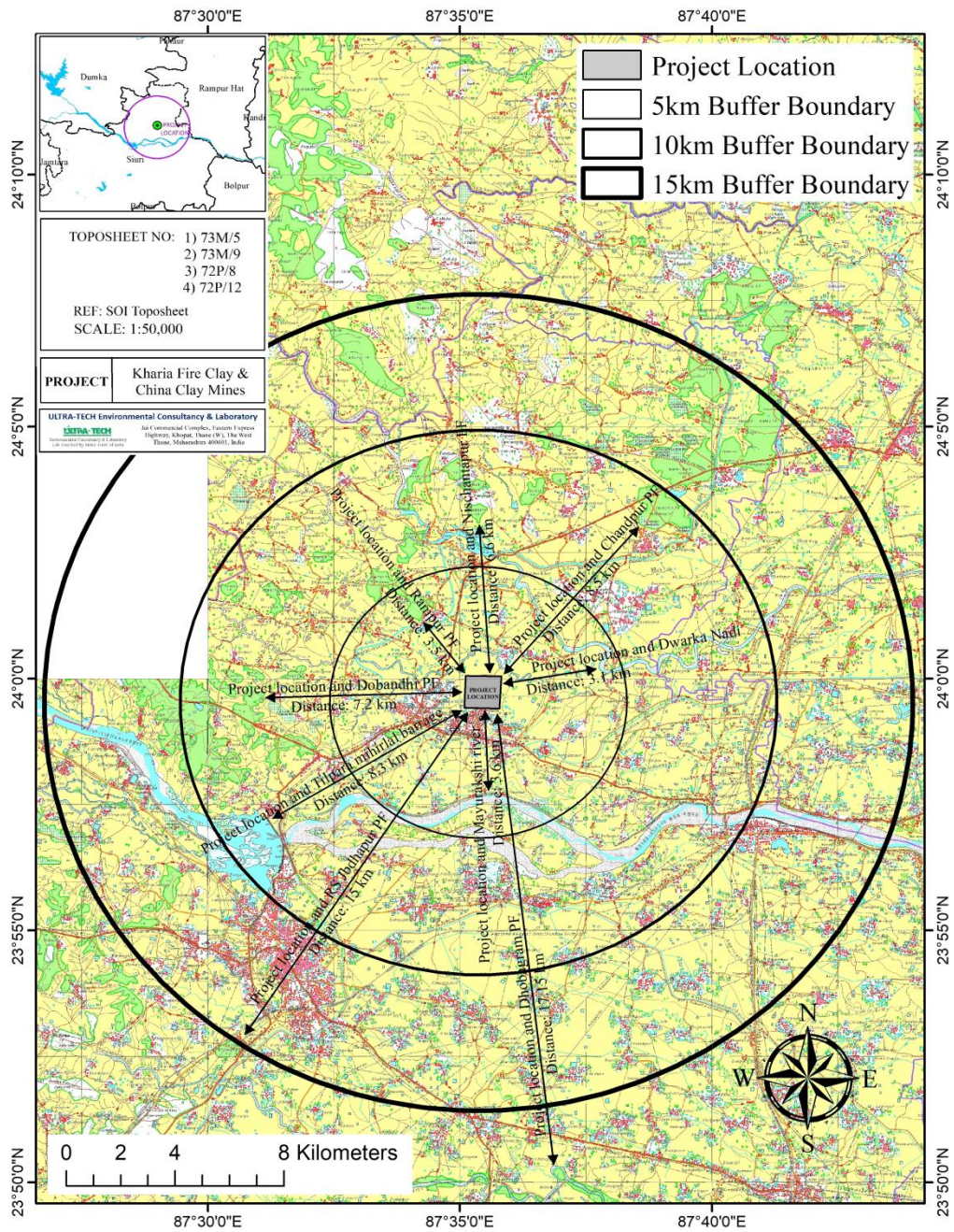


Figure 3.18B : Study area for Biological Environment

3.7.4 Survey Methodology

An ecological survey of the study area was conducted, as per following steps, with reference to listing of species, assessment of the existing baseline ecological conditions and predicting impacts with suggestive mitigation measures. Studies were undertaken in core zone & buffer zone various types of Flora; viz. trees, shrubs, herbs palms including grasses were enumerated in Table 3.19. Fauna like mammals, birds, reptiles, amphibians & butterflies. Were surveyed and enlisted. With reference to avifauna diversity, birds were studied through direct evidence, in the form of visual sightings, and indirect evidence such as calls,

nests, burrows, droppings, scats, tracks etc. All available types of habitats at the site were evaluated and marked.

Identified vegetation patches through GIS map and physically surveyed representative sites

- Different types of animals, including avifauna, available in this area, have been recorded,
- Secondary data, pertaining to flora and fauna within 10 Km boundary from the project site have been collected from literature, forest department, and discussions with local people & NGOs.
- Probable impact, if any, of project activity on biota and mitigation measures have been delineated.

3.7.5 Biodiversity

3.7.5.1 Core Zone



(a) *Phoenix sylvestris* (Khajuri)

(b) *Acacia nilotica* (Babool)

Figure 3.19 : Dominant Vegetation in Buffer Zone

I) Terrestrial Ecology:

➤ Flora

Being a Greenfield project, no mining has taken place in the cluster area. There is very less vegetation within cluster area (core zone). Tree species commonly seen in the core zone of area Sal tree which also has some mixed natural vegetation. *Acacia nilotica* (Bamboo), *Azadirachta indica* (Neem), *Shorea robusta* (Sal), *Terminalia elliptica* (Sahaju), *Tectona grandis* (Sagwan), *Phoenix sylvestris* (Khajuri) While Shrubs like *Lantana camara* (Ganeri), *Calotropis gigantea* (Aak) *Datura stramonium* (Dhanturo) & *Euphorbia Nerifolia* (Indian spurge tree) Herbs: *Jatropha curcas* (Ratanjot), *Tribulus terrestris* (Gokhru) & *Xanthium strumarium* (Gokhru) are dominant in study area. During survey no endangered and endemic fauna or flora were found near the study area.

➤ **Fauna**

Mammals like *Canis lupus familiaris*(Dog) and *Funambulus pennantii* (Squirrel) were observed and within project site (core zone) In avifauna commonly observed local bird species as Myna (*Acridotherestrictis*,)House crow (*Corvus splendens*), Indian Robin (*Saxicoloidesfulvicata*) and Greenbeeater (*Meropsorientalis*) were also found in the core zone.

3.7.5.2 Buffer Zone

In Buffer zone there are water bodies like Canal, Dam, Rivers Lake, Fallow Land, Crop Land, Settlement, Industrial area, Shrub Land, Vegetation and sand in the LULC map. Cropland is the major patch that covers a substantial portion of the project area. Table 3.19

II) Terrestrial Ecology:

➤ **Flora**

Field survey primary data were generated by preparing a general checklist of the plants encountered in this area. The study showed overall 162 trees, from 94 genera and 76 families Table 3.19. West Bengal is enriched with forest and natural vegetation. Birbhum district has rich Sal forests in addition to mixed forests as well as pure bamboo crops. On the other hand, Birbhum district has a higher forest cover area in comparison to the other districts of West Bengal. However, within the district, the maximum forest is nearby the present china clay mine area and is mainly Sal forests. The most dominant and common species in the study area, as well as a forest of the study area, is *Shorea robusta* (Sal), *Diospyros melanoxylon* (Kendu), *Terminalia tomentosa* (Asan), *Terminalia elliptica* (Sahaju), *Tectona grandis* (Sagwan) etc Palms: *Borassus flabellifer* & *Phoenix sylvestris* Grassess: *Cynodon dactylon* (Doob), *Cyperus rotundus* (Motha), *Echinochloa colonum* (samo), *Eleusine indica* (Adhen Nasli) are dominant in study area. Table 3.19



Figure 3.20: Dominant vegetation in Buffer zone

Table 3.19 :Presence of vegetation within Core Zone(Mining lease area) and Buffer zone

SN	Scientific Name	Localname	Family	IUCN Conservation Status	Core Zone	Buffer Zone
Trees						
1	<i>Acacianilotica</i>	Babool	Mimosaceae	Not assessed		+
2	<i>Acacia catechu</i>	Khair	Mimosaceae	Not assessed		+
3	<i>Acaciaauriculiformis</i>	BengaliBaval	Mimosaceae	Not assessed		+
4	<i>Acacia chundra</i>	Kher	Fabaceae	Not assessed		+
5	<i>Acacia leucophloea</i>	Hiwar	Fabaceae	Not assessed		+
6	<i>Aegle marmelos</i>	Bel	Rutaceae	-		+
8	<i>Albizialebbeck</i>	Siris / Kala sirus	Mimosaceae	Not assessed		+
10	<i>Alstoniascholaris</i>	Chhatiana	Apocynaceae	Not assessed		+
11	<i>Anacardiumoccidentale</i>	Cashew tree	Anacardiaceae	Not assessed		+
12	<i>Annona reticulata</i>	Ramphal	Annonaceae	Not assessed		+
13	<i>Annona squamosa</i>	Seetaphal	Annonaceae	Not assessed		+
14	<i>Anogeissuslatifolia</i>	Dhavdo	Combretaceae	Not assessed		+
15	<i>Artocarpusheterophyllus</i>	Panas	Moraceae	Not assessed		+
17	<i>Albiziaprocera</i>	Siris	Fabaceae	Not assessed		+
18	<i>Azadirachtaindica</i>	Neem	Meliaceae	Not assessed	+	+
19	<i>Bauhinia purpurea</i>	Kanchan	Caesalpinaceae	Not evaluated		+
20	<i>Bauhinia racemosa</i>	Ambansia	Caesalpinaceae	Not evaluated		+
21	<i>Buteamonosperma</i>	Palash	Fabaceae	Not assessed		+
22	<i>Bombaxceiba</i>	Sawar	Bombacaceae	Not assessed		+
23	<i>Brideliaretusa</i>	Kaji / Kaja	Euphorbicaeae	Not assessed		+
24	<i>Buchananialanzan</i>	Char / Chironji	Anacardiaceae	Not assessed		+
25	<i>Careyaarborea</i>	Kumbhi	Myrtaceae	Not assessed		+
26	<i>Cassia fistula</i>	Amaltas	Caesalpinaceae	Least concern		+
29	<i>Casuarinaequisetifolia</i>	Junglisaru	Casuarinaceae	Not assessed		+
32	<i>Delonixregia</i>	Gulmohar	Ceasalpinaceae	LeastConcern		+
33	<i>DalbergiaSisoo</i>	Sisoo	Fabaceae	Not assessed		+
34	<i>Diospyrosmelanoxylon</i>	Tendu	Ebenaceae	Not assessed		+
35	<i>Emblicoefficialis</i>	Ambala	Phyllanthaceae	Not assessed		+
38	<i>Eucalyptus sp.</i>	Nilgiri	Myrtaceae	LeastConcern		+
39	<i>Ficusreligiosa</i>	Peepal	Moraceae	Not assessed		+
40	<i>Ficusglomerata</i>	Umero	Moraceae	Not assessed		+

41	<i>Ficus benghalensis</i>	Bargat	Moraceae	Not assessed		+
43	<i>Ficus racemosa</i>	Cluster Fig	Moraceae	Not assessed		+
45	<i>Gmelina arborea</i>	Gambhari	Verbenaceae	Not assessed		+
46	<i>Grewia hirsuta</i>	Kakarundah	Tiliaceae	Not assessed		+
47	<i>Haldinia cordifolia</i>	Haldu	Rubiaceae	Not assessed		+
48	<i>Leucaena leucocephala</i>	Subabul	Fabaceae	Not assessed	+	+
49	<i>Lagerstroemia parviflora</i>	Sidha / Sudha	Lythraceae	Not assessed		+
50	<i>Mangifera indica</i>	Aam	Anacardiaceae	Not assessed		+
51	<i>Madhuca indica</i>	Mahua	Sapotaceae	Not assessed		+
52	<i>Moringa oleifera</i>	Shevha	Moringaceae	Not assessed		+
53	<i>Madhucal longifolia</i>	Mahuva / Mahul	Sapotaceae	Not assessed		+
54	<i>Manilkara zapota</i>	Chikoo	Sapotaceae	Not assessed		+
55	<i>Melia azadirachata</i>	Buckain	Meliaceae	Not assessed		+
57	<i>Morus alba</i>	Mulberry	Moraceae	Not assessed		+
58	<i>Neolamarckia cadamba</i>	Kadamb	Rubiaceae	Not assessed		+
59	<i>Nyctanthes arbor-tristis</i>	Gangasiuli	Oleaceae	Not assessed		+
60	<i>Oroxylum indicum</i>	Indian Trumpet	Bignoniaceae	Not assessed		+
61	<i>Polyalthia longifolia</i>	Debadaru	Annonaceae	Not assessed		+
62	<i>Phyllanthus emblica</i>	Amla	Euphorbiaceae	Not assessed		+
64	<i>Pongamia pinnata</i>	Karanja	Fabaceae	Least		+
65	<i>Prosopis cineraria</i>	Khejri	Fabaceae	Not assessed		+
66	<i>Peltophorum pterocarpum</i>	Coperpod	Caesalpiniaceae	Not		+
67	<i>Pithecellobium dulce</i>	Mithi Amla	Mimosaceae	Not		+
68	<i>Pterocarpus marsupium</i>	Saja	Pterocarpaceae	Not assessed		+
69	<i>Shorea robusta</i>	Sal	Dipterocarpaceae	Not assessed	+	+
70	<i>Syzygium cumini</i>	Jambul	Myrtaceae	Least Concern		+
71	<i>Terminalia arjuna</i>	Arjun	Combretaceae	Not assessed		+
72	<i>Terminalia elliptica</i>	Ain	Combretaceae	Not assessed	+	+
73	<i>Tamarindus indica</i>	Tamarind	Fabaceae	Least Concern		+
74	<i>Tectona grandis</i>	saag	Lamiaceae	Not assessed	+	+
75	<i>Thespesia populnea</i>	Bankapas	Malvaceae	Least Concern		+
76	<i>Ziziphus mauritiana</i>	Ber	Rhamnaceae	Not assessed		+
77	<i>Ziziphus nummularia</i>	Kontikoli	Rhamnaceae	Not assessed		
Shrubs						

1	<i>Annona squamosa</i>	Sirifa	Annonaceae	Not assessed		+
2	<i>Abutilon indicum</i>	Kanghi	Malvaceae	Not assessed		+
3	<i>Agave americana</i>	Kamal Cactus	Agavaceae	Not assessed		+
4	<i>Barleriaprionitis</i>	Porcupine flower	Acanthaceae	Not assessed		+
4	<i>Calotropis gigantean</i>	Bhataya	Asclepiadaceae	Not assessed		+
5	<i>Calotropisprocera</i>	Akdo	Asclepiadaceae	Not assessed	+	+
6	<i>Cassia auriculata</i>	Aval	Caesalpiniaceae	Not assessed		+
7	<i>Carissa carandas</i>	Caranda	Apocynaceae	Not assessed		+
9	<i>Cirtuslimon</i>	Limbu	Rutaceae	Not assessed		+
13	<i>Datura stramonium</i>	Dhanturo	Solanaceae	Not assessed	+	+
14	<i>Euphorbia Neriifolia</i>	Indian spurge tree	Euphorbiaceae	Not assessed	+	+
16	<i>Hibiscus rosa-</i>	Jasud	Malvaceae	Not assessed		+
19	<i>Lawsoniainermis</i>	Mendi	Lythraceae	Not assessed		+
20	<i>Lantana camara</i>	Ganeri	Verbenaceae	Not assessed	+	+
21	<i>Maytenusemarginata</i>	Vico	Celastraceae	Not assessed		+
22	<i>Neriumodorum</i>	Kaner	Apocynaceae	Not assessed		+
23	<i>Opuntia sp.</i>	Cactus	Cactaceae	Not assessed		+
24	<i>Prosopisjuliflora</i>	GandoBaval	Mimosaceae	Not assessed	+	+
25	<i>Riccinuscommunis</i>	Divelo (Erandi)	Lythraceae	Not assessed		+
26	<i>Sidacordifolia</i>	Bala.	Malvaceae	Not assessed		+
27	<i>Solanum melongena</i>	Rigana	Solanaceae	Not assessed		+
28	<i>Salvadorapersica</i>	toothbrush tree	Salvadoraceae	Least		+
29	<i>Solanum nigrum</i>	Regani	Solanaceae	Not assessed		+
30	<i>Vitexnegundo</i>	Nagod	Verbenaceae	Not assessed		+
31	<i>Woodfordia.fruticosa</i>	Dhaori	Lythraceae	Not assessed		+
Herbs						
1	<i>Achyranthesaspera</i>	Anghedi	Amaranthaceae	Not assessed	+	+
2	<i>Andrographispaniculata</i>	Kalmegh	Acanthaceae			+
3	<i>Catharanthusroseus</i>	Barmasi	Apocynaceae	Not assessed		+
4	<i>Cassia tora</i>	Kunvandio	Caesalpinia	Not assessed	+	+
5	<i>Capsicum annum</i>	Marchi	Solanaceae	Not assessed		+
6	<i>Clerodendruminerve</i>	Glory Bower	Verbenaceae	Not assessed		+
1	<i>Indigofera sp.</i>	-	Rhamnaceae	Not assessed		+
1	<i>Jatropha curcas</i>	Ratanjot	Euphorbiaceae	Not assessed	+	
1	<i>Martyniaannua</i>	-	Martyniaceae	Not assessed		+
1	<i>Musa paradisiaca</i>	Kela	Musaceae	Not assessed		+
1	<i>Ocimum sanctum</i>	Tulsi	Lamiaceae	Not assessed		+
1	<i>Ocimumbasilicum</i>	Damro	Lamiaceae	Not assessed		+

1	<i>Tribulus terrestris</i>	Bethu Gokhru	Zygophyllac	Not assessed	+	+
1	<i>Typha angustata</i>	Ghabajariu	Typhaceae	Not assessed		+
1	<i>Medicago sativa</i>	Rajko	Fabaceae	Not assessed		
2	<i>Tephrosia sp.</i>	Sharpunkha	Fabaceae	Not assessed		
2	<i>Xanthium strumarium</i>	Gokhru	Asteraceae	Not assessed	+	+
Palms						
1	<i>Borassus flabellifer</i>	Tad	Arecaceae	Not assessed		+
2	<i>Caryota urens</i>	Sarap (Calap)	Arecaceae	Not assessed		+
3	<i>Cocos nucifera</i>	Naariyal	Arecaceae	Not assessed		+
4	<i>Areca catechu</i>	Beatal palm	Arecaceae	Not assessed		+
5	<i>Roystonea regia</i>	Bottle palm	Arecaceae	Not assessed		+
6	<i>Phoenix sylvestris</i>	Khajuri	Arecaceae	Not assessed	+	+
Grasses						
1	<i>Acrachne racemosa</i>	Jaura	Poaceae	Least Concern		+
2	<i>Apludamutica</i>	Haranto	Poaceae	-		+
3	<i>Chloris barbata</i>	-	Poaceae	Not assessed		+
4	<i>Chrysopogon fulvus</i>	-	Poaceae	Not assessed	+	+
5	<i>Cynodon dactylon</i>	Darb	Poaceae	Not assessed		+
6	<i>Cyperus rotundus</i>	Motha	Cyperaceae	Not assessed		+
7	<i>Dactyl septemnerium</i>	Crow foot grass	Poaceae	Not assessed		+
8	<i>Dendrocalamus strictus</i>	Narvans	Poaceae	Not assessed		+
9	<i>Dichanthium annulatum</i>	-	Poaceae	Not assessed		+
10	<i>Eleusine indica</i>	Adhen Nasli	Poaceae	Least Concern		+
1	<i>Eragrostis japonica</i>	-	Poaceae	Least Concern		+
1	<i>Kyllinga tenuifolia</i>	-	Cyperaceae	Not assessed		+
1	<i>Pennisetum purpureum</i>	Elephant grass	Poaceae	Not assessed		+
1	<i>Saccharum spontaneum</i>	Kans	Poaceae	Not assessed		+
1	<i>Urochordas tetulosus</i>	-	Poaceae	Not assessed		+
Climbers						
1.	<i>Abrus precatorius</i>	Kaincha	Fabaceae	Not assessed		+
2.	<i>Bougainvillea spectabilis</i>	Boganvel	Nyctaginaceae	Not assessed		+
3.	<i>Coccinia grandis</i>	Ghiloda	Cucurbitaceae	Not assessed		+
4.	<i>Coccoloba hirsuta</i>	Vevdi	Menispermaceae	Not assessed		+
5.	<i>Cuscuta reflexa</i>	Amarvel	Cuscutaceae	Not assessed		+
6.	<i>Cucurbita maxima</i>	Kolu	Cucurbitaceae	Not assessed		+
7.	<i>Jasminum auriculatum</i>	Juhi	Oleaceae	Not assessed		+

8.	<i>Luffa acutangula</i>	Turiya	Cucurbitaceae	Not assessed		+
9.	<i>Luffa cylindrica</i>	Galku	Cucurbitaceae	Not assessed		+
10.	<i>Tinosporacordifolia</i>	Galo	Menispermaceae	Not assessed		+
11.	<i>Tylophoraindica</i>	Antamul	Asclepiadaceae	Not assessed		+

Note: Source: Primary data generation by Ultra-Tech team+ Observed in core zone & Buffer Zone Fauna

3.7.6 Methodology

Field observations of fauna were carried out in the study area. The commonly available mammals, reptiles, amphibians, birds and butterflies within 10 km surroundings were enumerated. Availability of fauna in the vicinity of the sites is presented in Table 3.20. None of these animals are endangered (Schedule I) as per Wildlife (Protection) amendment Act, 2022

➤ Vertebrates

a) Mammals

The domestic animals in the study area mostly comprise of Cat, and Cow the survey revealed that 7 species of mammals were recorded in and around the study area while no wild mammal was observed in this area during site visit.

b) Reptiles & Amphibians

Five species of reptiles & 2 species of amphibians were recorded. Availability of fauna in the vicinity of the sites is presented in Table 3.20 & Figure 3.21. None of these animals are endangered (Schedule I) as per Wildlife (Protection) amendment Act, 2022

c) Avifauna

Birds were studied by direct observation with the help of “Olympus 10 x 50 DPS I” binocular and were identified by adopting available literature (Grimmett *et al.* 1998). During the survey 18 species of birds were noticed. The dominant birds were Indian myna, Indian Black Drongo, White Throated Kingfisher, *Pycnonotus cafer* (Redvented bulbul) Figure 3.21. Spotted dove etc. were noticed. It has been observed that the majority of birds were insectivorous in habit preferring insects, worms and arachnids. None of these birds are endangered (Schedule I) as per Wildlife (Protection) amendment Act, 2022 **Table 3.3**



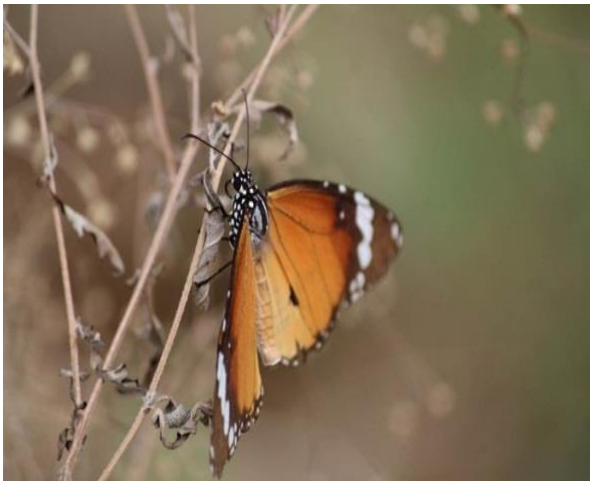
(a) White Throated Kingfisher (*Halcyon smyrnensis*)(b)*Pycronotuscafer* (Redvented bulbul)

Figure 3.21 Common Birds Observed in study area

➤ Invertebrates

a) Butterflies

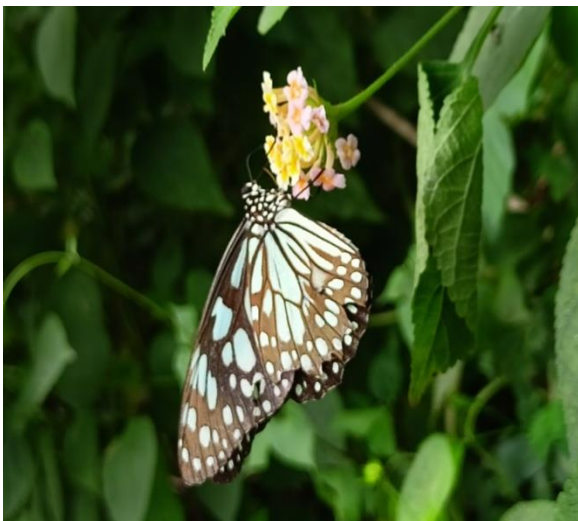
Study area comprises of 10 species of butterflies, dominated by *Euploeacore*, *Danauschrysisippus*, *Papiliodemoleus*, *Euploeacore*, *CatopsiliaPomona*, *Tirumalalimniac* eFigure 3.22 and *Phalantaphalantha*. Butterfly diversity and community composition are dependent on plants, as their caterpillars are highly specific to host plants on which they feed and metamorphose into the adults. Fairly good butterfly diversity in this area is conspicuous due to presence of wide varieties of flowering plants. Therefore, richness of host plant diversity contributes to butterfly diversity. None of these birds are endangered (Schedule I) as per Wildlife (Protection) amendment Act, 2022 Table 3.21



(a) Plain tiger (*Danauschrysisippus*)



(b) Common Indian Crow (*Euploeacore*)



(c) *Catopsiliapomona* (Common emigrant)



(d) *Tirumalalimniac* (Blue tiger)

Figure 3.22 Butterflies in the Study Area

Table 3.20: List of Dominant Fauna Recorded in Study Area

SN	Scientific Name	Common Name	Conservation status as per Wildlife (Protection) Amended Act 2022)	Core Zone	Buffer zone
Mammals					
1	<i>Bostaurus</i>	Cow	-		+
2	<i>Felis domesticus</i>	Cat	Sch. II		+
3	<i>Canis aureus</i>	Jackal	Sch. II		+
4	* <i>Herpestes edwardsii</i>	Common Mongoose	Sch. II		+
5	<i>Pressbytis entellus</i>	Common	Sch. II		+
6	<i>Mus musculus</i>	House	-		+
7	<i>Funambulus palmarum</i>	Squirrel	-	+	+
Reptiles					
1	<i>Calotes versicolor</i>	Common	Not enlisted	+	+
2	<i>Psmmophilus blanfordanus</i>	Rock lizard	Not enlisted		+
3	<i>Hemidactylus brooki</i>	House	Not enlisted		+
4	<i>Bungarus caeruleus</i> Krait	Krait	Sch. II		
5	<i>Ptyas mucosa</i>	Rat Snake	Sch. II		
Amphibians					
1	<i>Bufo stomaticus</i>	Indian	Not enlisted		+
2	<i>Rana tigrinus</i>	Indian Bull	Not enlisted		+
Butterflies					
1	<i>Papilio polytes</i>	Common Mormon	Not enlisted		+
2	<i>Papilio polymnestor</i>	Blue	Not enlisted		+
3	<i>Euploea core</i>	Common Indian	-		+
4	<i>Danaus chrysippus</i>	Plain Tiger	Not enlisted		+
5	<i>Phalanta phalantha</i>	Common	Not enlisted		+
6	<i>Papilio polytes</i>	Common mormon	Not enlisted		+
7	<i>Catopsilia pomona</i>	Common emigrant	Not enlisted		+
8	Tirumala limniace	Blue tiger	Not enlisted		+
9	<i>Junonia atlites</i>	Gray pansy	Not enlisted		+
10	<i>Papilio demoleus</i>	Lime	Not enlisted		+

Note: Source: Primary data generation by Ultra-Tech team+: Observed in Core Zone & Buffer Zone

Table 3.21: List of Dominant Avifauna Recorded in Study Area

S.N	Scientific Name	Common Name	Status according	Core Zone	Buffer zone
1.	<i>Streptopeliachinensis</i>	Spotted dove	Sch – II		+
2.	<i>Columba livia</i>	Rock pigeon	Sch – II		+
3.	<i>Psittaculakrameri</i>	Rose-ringed	Sch – II		+
4.	<i>Corvus splendens</i>	House crow	Sch – II	+	+
5.	<i>Acridothera tristis</i>	Common myna	Sch – II	+	+
6.	<i>Passer domesticus</i>	House sparrow	Sch – II		+
7.	<i>Pycnonotus cafer</i>	Redvented	Sch – II		+
8.	<i>Athenebrama</i>	Spotted owl	Sch – II		+
9.	<i>Alcedo atthis</i>	Small blue	Sch – II		+
10.	<i>Ardeola grayii</i>	Pond Heron	Sch – II		+
11.	<i>Nectarinia asiatica</i>	Purple sunbird	Sch – II		+
12.	<i>Saxicoloides fulicata</i>	Indian Robin	Sch – II	+	+
13.	<i>Halcyon smyrnensis</i>	White throated	Sch – II		+
14.	<i>Merops orientalis</i>	Small green bee eater	Sch – II	+	+
15.	<i>Coracias benghalensis</i>	Indian roller	Sch – II		+
16.	<i>Bubulcus ibis</i>	Cattle egret	Sch – II		+
17.	<i>Ardeola grayii</i>	Indian Pond-	Sch – II		+
18.	<i>Centropus sinensis</i>	Crow-Pheasant	Sch – II		+

Source: Primary data generation by Ultra-Tech team Note: * Also observed in Project site

3.7.7 Agriculture Crop observed in the study area

The common crops in the study area are *Oryza sativa*, *Zeamays* which are mainly dependent on rainwater, while tube well & bore well in non- monsoon seasons. Apart from these, commercial crops like Potato, Onion and several vegetables like chillies, brinjal, leafy vegetable, besides various fruits like mango, Banana, papaya etc. are also grown.

Table 3.22: Agricultural Crops Grown in Study area

SN	Common Name	Scientific Name
CEREALS		
1	Rice	<i>Oryza sativa</i>
2	Wheat	<i>Triticum aestivum</i>
3	Maize	<i>Zeamays</i>
PULSES		
1	Pea	<i>Pisum sativum</i>
2	Mungbean	<i>Vigna radiata</i>
3	Groundnut	<i>Arachis hypogaea</i>
4	Cowpea/Badbati	<i>Vigna unguiculata</i>
5	Pigeonpea	<i>Cajanus cajan</i>
OILSEEDS		
1	Mustard Seed	<i>Brassica nigra</i>

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

Source [https://icarcrida.res.in/CP2012/statewiseplans/West%20Bengal%20\(Pdf\)/BCKVV,%20Kalyani/WestBengal%203-Birbhum-31.12.2011.pdf](https://icarcrida.res.in/CP2012/statewiseplans/West%20Bengal%20(Pdf)/BCKVV,%20Kalyani/WestBengal%203-Birbhum-31.12.2011.pdf)

3.7.8 Macro-phytic Flora

The diversity of aquatic Macrophytes was similar in both the core and buffer zone. Most of the aquatic vegetation was observed growing along the river bank. A total of 11 macrophytes species were recorded from the different water bodies in the study area. The detailed enumeration has been summarized in Table-3.23.

Table-3.23 Checklist of Aquatic Macrophytes & Marshy Plants

SN	Scientific Name	Common Name	Family
1	<i>Alternanthera philoxeroides</i>	Alligatorweed	Amaranthaceae
2	<i>Azolla pinnata</i>	Water velvet	Azollaceae
3	<i>Eichhornia crassipes</i>	Common water hyacinth	Pontederiaceae
4	<i>Ipomoea aquatica</i>	Kalmi	Convolvulaceae
5	<i>Lemna minor</i>	-	Araceae
6	<i>Marsilea quadrifolia</i>	Susni	Marsileaceae
7	<i>Nymphaea nouchali</i>	Blue water lily	Nymphaeaceae
8	<i>Nymphoides aquatic</i>	-	Menyanthaceae
9	<i>Oxalis corniculata</i>	Amrulshak	Oxalidaceae
10	<i>Pistia stratiotes</i>	Water Cabbage	Araceae
11	<i>Typhalatifoli</i>	Bulrush	Typhaceae

3.7.9 Park, Sanctuaries and Reserve Forest

No National Park & wildlife Sanctuary is present within 10 km from the Project site But patches of Protected forest Dobandhi-1 (7.2 km)towards west side & Chandpur (8.5 km) towards North east side from the project site.

3.7.10 Aquatic Ecology

➤ Preamble

- Plankton is an important component of ecosystem, which responds to ecosystem alterations rather rapidly. They are passive drifters with the currents. Phytoplankton can grow rapidly and form massive blooms that can be regulated by environmental factors such as nutrients, availability of light and biotic interaction with grazers.
- Zooplankton, also a very important group in the aquatic ecosystem, act as the primary consumer and ultimately serve as the natural food source for many aquatic organisms, including fishes. Zooplankton show considerable varieties comprising of members of various groups from protozoa to chordate. Depending on seasons and environmental conditions, the plankton community shows pronounced variation in its character and composition.

3.7.10.1 Methodology

Sampling

Water samples within 10 km periphery of project site were collected from Dwarka River (5km) for phytoplankton and zooplankton analyses.

To enumerate phytoplankton, unfiltered surface waters were collected from above water bodies. Phytoplankton samples were immediately fixed in Lugol's iodine solution so as to prevent adverse effects of light and temperature which might cause rapid decay of organisms (APHA 2005). Phytoplankton were identified up to genera level using standard taxonomic keys. For zooplankton, desired volume of water was filtered through plankton net having mesh size of 75µ to 200 µ to represent all the available groups. The samples were fixed immediately with 5 % buffered formalin and subsequently analysed under microscope in the laboratory with the help of Sedgwick rafter cell.

3.7.10.2 Observation

a) Phytoplankton

Phytoplankton counts, were recorded are presented in Table 3.24. Total algal population varied between 632 No/ml to 824 No/ml. Altogether 17 genera of phytoplankton were recorded. Table 25. Amongst 4 groups, chlorophyceae is Dominant followed by Cyanophyceae, Bacillario-phyceae & Euglenophyceae.

Table 3.24: Enumeration of Phytoplankton at Dwarka River

S N	Name of sampling locations	Phyto plankton Density (No/ml)	Percent composition of algal groups				SWI
			Cyano-phyceae	Chloro-phyceae	Bacillario-phyceae	Euglenophyceae	

1	Dwarka River upstream	632	22	42	28	8	2.2
2	Dwarka River downstream	824	24	36	30	10	2.4

Table 3.25: Phytoplankton genera observed at DwarkaRiver

Bacillariophyceae	Cyanophyceae	Chlorophyceae	Euglenophyceae
<i>Navicula sp.</i>	<i>Anabaena sp.</i>	<i>Actinastrum sp.</i>	<i>Euglena sp.</i>
<i>Nitzschiasp</i>	<i>Oscillatoria sp.</i>	<i>Closterium sp.</i>	<i>Phacus sp.</i>
<i>Cymbella sp.</i>	<i>Spirulina sp.</i>	<i>Cosmariumsp.</i>	
<i>Pinnularia sp.</i>	<i>Lyngbya sp.</i>	<i>Chlorella sp.</i>	
<i>Melosira</i>	<i>Merismopedia sp.</i>	<i>Cladophora sp.</i>	
<i>Synedra</i>		<i>Pediastrum sp.</i>	
<i>Fragillaria</i>		<i>Scenedesmus sp.</i>	
		<i>Spirogyra sp.</i>	

b) Zooplankton

Density of zooplankton varied between 776No/m³ to 870No/m³ Table 3.25. Total three groups of zooplankton were recorded. Altogether 8 genera of zooplankton were recorded (Table 3.26) *Copapoda* was dominant followed by *cladocera* & *Rotifer* in river.

Table 3.26: Enumeration of Zooplankton at DwarkaRiver

SN	Sampling locations	Zooplankton (No/m ³)	Percent composition of zooplankton in groups			SWI
			Rotifera	Cladocera	Copepoda	
1	Dwarka River upstream	776	22	36	42	2.6
2	Dwarka River downstream	870	24	34	42	2.8

Table 3.27: Zooplankton Genera at DwarkaRiver

Rotifera	Cladocera	Copepoda
<i>Brachionus sp.</i>	<i>Alonella sp.</i>	<i>Microcyclops sp.</i>
<i>Keratella sp.</i>	<i>Daphnia sp</i>	<i>Diaptomus sp.</i>
<i>Asplanchna sp.</i>	<i>Moinasp.</i>	-

The Values of SWI for Plankton (phytoplankton& Zooplankton) indicate poor to medium productive water

3.7.11 Fish Diversity:

Dwarka is the main river besides there are many inland water bodies like several ponds, jheels, beels, ditches and the important river, so the biodiversity of fish is high. By talking to local fishermen and local people fishes reported in the study area are i.e. Rohu, Silver carp, Silver carp, Mrigal, Tilapia, Chela, Katla et

3.8 Socio Economic Environment

3.8.1 Introduction

An environmental factor is a socioeconomic concern. The emphasis is mostly on the social and economic consequences of the proposed development's construction and operation. It covers characteristics such as demographic composition, access to basic utilities such as housing, education, health and health services, occupation, water supply, sanitation, connectivity, and power, prevalent local diseases, and characteristics such as tourist sites and ancient monuments. The examination of these criteria aids in defining and assessing the potential implications of project activity on the surrounding area. Every development effort has an immediate and indirect, positive and negative impact. Every development activity has an immediate and indirect, good and bad impact on the region's socioeconomic environment.

3.8.2 Objective

Objectives of Socioeconomic study as follows:-

- To investigate the demographic and facility structure available in the field of study.
- Identification and evaluation of the effects on the socioeconomic status of the study area.
- Consider any potential negative and positive social consequences of the initiative.
- We are recommending action to minimize the adverse effects of the project.
- To check that environmental and industrial standards have been complied with.
- To advise the adoption of cost-effective steps to mitigate the expected consequences.

The study area for socio economic assessment defined as an area within 500 m. radius for primary and 10 km radius for secondary data around project site. Designation of impact zone is based on the EIA guidance manual. Primary data and secondary data is use for socio economic study.

3.8.3 Data Collection

The word "data collection" refers to a method of processing and obtaining data. Systematic data compilation from various sources for a particular project, which has been frequently monitored, documented, and coordinated. Data are critical inputs to every phase of the project's decision-making process.

3.8.3.1 Primary Data Collection

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

1. Form of observation
2. Focus group discussion (FGD)
3. Questionnaires and Surveys

3.8.3.2 Secondary Data Collection

Secondary data is acquired and registered by someone else before and with a reason other than the present one. Secondary Information is collected from a variety of other offices such as: Census offices (2011 Indian Census), Statistical, Health Offices, Department of Land and Revenue, local body, ZillaParishad and Non-Governmental Organizations.

3.8.4 Concept & Definitions

- **Study Area:** The study area, also known as the impact area, has been established as the whole core region plus a buffer region 10 kilometres from the core perimeter. The study area includes both natural and man-made features.
- **Quality of Life (QoL):** Quality of Life refers to how much a person may appreciate his or her life's favourable resources. The 'possibilities' that each individual has in his or her life, which represent the combination of personal and environmental variables, are derived from opportunities and limits. Leisure consists of two parts: the sensation of pleasure and the possession or attainment of such attributes.
- **Household:** A household is a group of people who usually live together and dine in shared kitchens. People in the household might be related, unconnected, or a combination of the two. However, if a group of similar or unrelated persons reside in the same house but do not share a kitchen, they do not belong to a shared home. Each individual is regarded as if they were a member of a distinct family. Households might include one man, two, or more people.
- **Sex Ratio:** Sex ratio is the ratio of females to males in a given population. It is expressed as 'number of females per 1000 males'.
- **Literates:** Anyone above the age of seven who can read and write in any language is called literate. There is no formal schooling or minimum educational credentials required for an individual to be considered literate. Blind persons who can read Braille are now considered academics.

- **Literacy Rate:** The literacy rate is defined as the percentage of the Population aged 7 and older who are literate.
- **Labour Force:** the number of employees in a geographical unit is equal to the number of jobs and unemployed persons. The workforce is defined as the number of persons who work and those who are jobless. An individual who is not an employee must be characterized as being actively engaged in work. Those between the ages of 14 and 16 make up the majority of the country's labour force, as do those beyond the retirement age (about 65) who are either employers or job searchers. Students, seniors, home visitors, inmates, persons with permanent impairments, and incentives are not counted as part of the labour force.
- **Work:** Work is defined as participation in any economically productive activity with or without compensation, wages or profit. Such participation may be physical and/or mental in nature. Work involves not only actual work but also includes effective supervision and direction of work. The work may be part time, full time, or unpaid work in a farm, family enterprise or in any other economic activity.
- **Worker:** All personnel are classed as workers. People who produce or prepare milk are typically regarded as employees, even if only for personal consumption.
- **Main Workers:** Individuals who worked the majority of the time (6 months or more for a year of the comparative period) are referred to as Main Workers.
- **Marginalized workers:** These are people who have not served for the majority of their time (i.e., for less than 6 months).
- **The rate of participation in work:** the rate of participation is the ratio of workers to the total size of the cohort (national population of the same age range). The labour participation rate is defined in this study as the total (main and marginal) share of the work force.

3.8.5 Project Location

Kharia village is located in Mohammad Bazar subdivision of Birbhum district in West Bengal, India. It is situated 7.3km away from sub-district headquarter Patalnagar. Suri is the district headquarter of Kharia village.

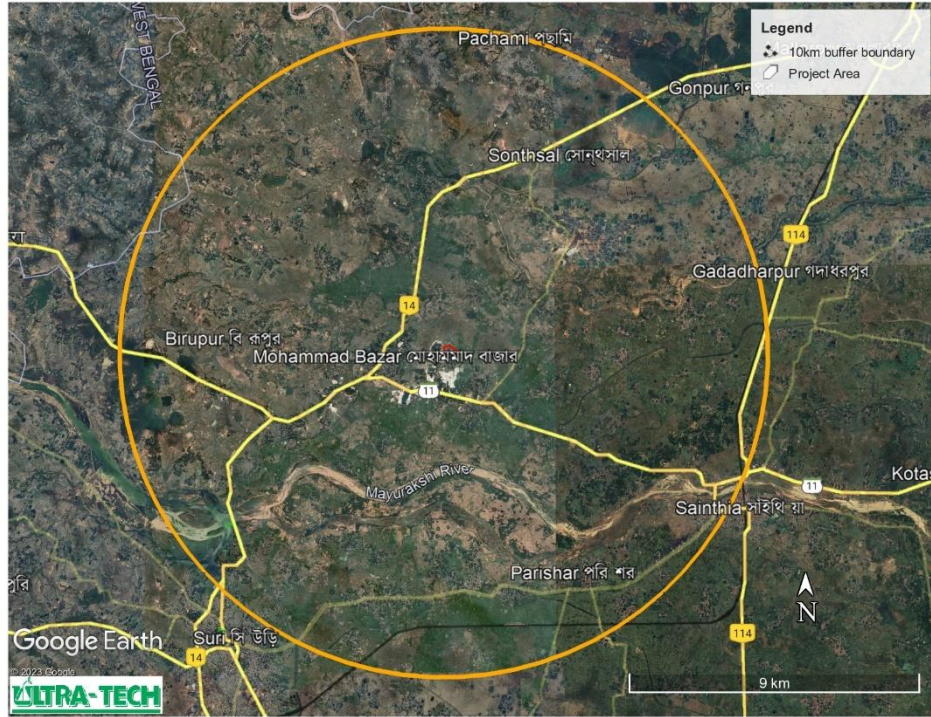


Figure 3.23: Project site and Study area

In the 10 km radius area, settlements are under study during the discussion of the basic socioeconomic environment scenario. Various tables and graphs give detailed descriptions of these settlements.

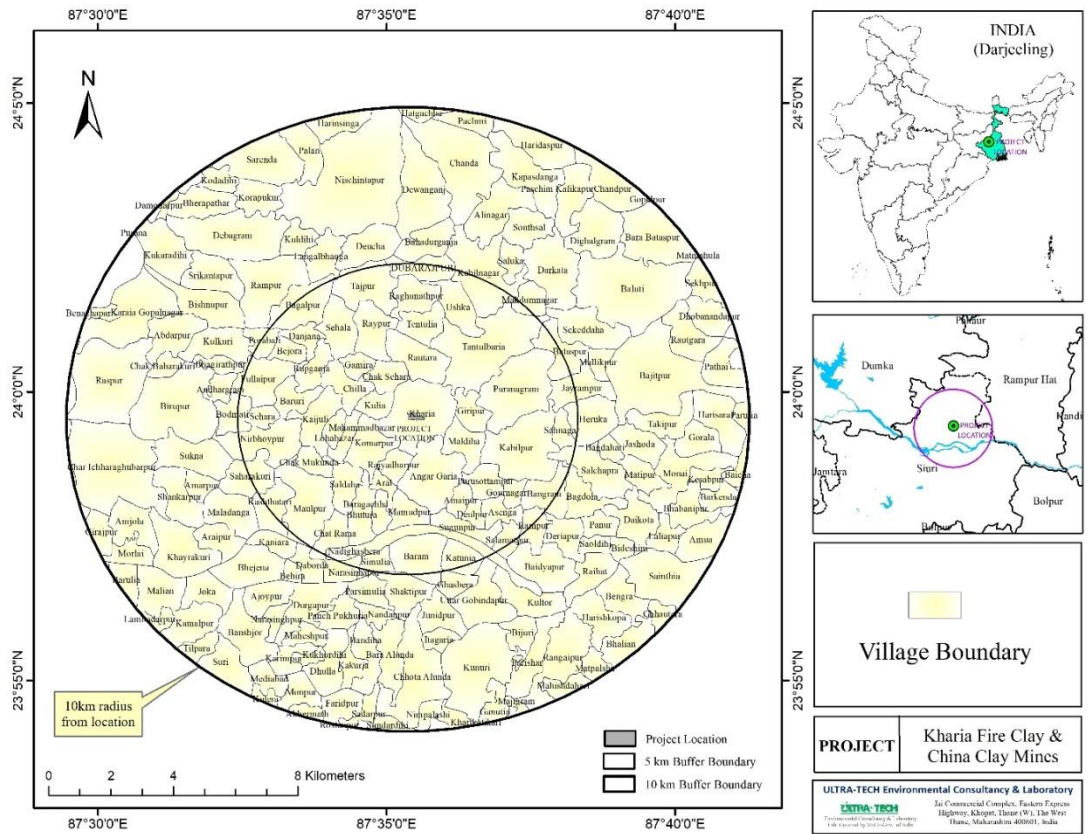


Figure 3.24: Villages within 10 Km. Radius Area from Project Site.

3.8.6 Demography

The project location has a total population of 434262 people, covering an area of sq. km with 88277 number of households.

Table3.28: Demography of study area

Name	No of Households	Total Population		Population in the age group 0-6 Person	Scheduled Castes population		Scheduled Tribes population		Literate Population		Illiterate Population		Working Population		Non Working Population	
		Male	Female		Male	Female	Male	Female	Male	Female	Male	Female	Main Worker	Marginal Worker	Male	Female
Hatgachha	879	2370	2412	899	149	129	1845	1938	1040	406	1330	2006	1796	620	1046	1320
Harisinga	165	416	404	149	21	19	307	310	161	79	255	325	263	159	186	212
Palan	271	723	654	221	278	242	164	162	390	214	333	440	459	141	297	480
Pachmi	39	104	112	49	2	4	102	108	15	7	89	105	45	29	57	85
Nischintapur	569	1429	1446	527	398	394	186	209	673	406	756	1040	877	253	645	1100
Haridaspur	707	1897	1812	716	175	184	149	170	879	651	1018	1161	995	149	947	1618
Chanda	310	844	748	313	75	56	604	563	494	302	350	446	659	140	375	418
Dewanganj	110	289	324	99	43	38	217	259	117	54	172	270	158	102	144	209
Sarenda	209	474	481	173	177	169	0	0	298	221	176	260	229	78	199	449
Kapasdanga	368	949	860	388	160	155	65	65	501	337	448	523	417	110	486	796
Chandpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gopalpur	101	273	245	74	159	148	0	0	172	100	101	145	129	70	131	188
Purana	89	241	255	113	0	0	86	103	105	43	136	212	98	155	117	126
PaschimKalikapur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kodadihi	78	172	200	74	165	190	0	0	85	45	87	155	149	9	62	152
Alinagar	260	714	684	281	103	97	1	0	413	312	301	372	332	35	362	669
Korapukur	112	260	243	76	168	150	37	40	111	55	149	188	154	50	116	183
Matmahula	259	651	625	165	326	305	97	93	395	298	256	327	497	75	268	436

Bherapathar	98	233	236	84	62	57	158	164	110	40	123	196	191	48	98	132
Damodarapur	3	7	6	2	0	0	3	4	3	2	4	4	6	0	4	3
Bara Bataspur	300	765	708	280	158	139	26	32	407	280	358	428	74	385	395	619
Dighalgram	1032	2639	2523	1051	194	194	78	79	1303	894	1336	1629	1008	595	1299	2260
Sonthsal	590	1777	1649	832	0	0	0	0	923	621	854	1028	807	23	967	1629
Debagram	224	564	533	188	65	51	425	418	241	90	323	443	312	202	235	348
Kukaradihi	140	349	307	105	149	128	80	72	182	108	167	199	159	98	158	241
Kuldihi	3	14	8	6	14	8	0	0	2	0	12	8	5	0	9	8
Bahadurganja	292	680	642	231	116	116	86	88	437	318	243	324	362	120	299	541
Deucha	262	622	599	192	238	240	0	0	384	268	238	331	340	65	274	542
Kabilnagar	292	743	692	319	251	234	0	0	318	245	425	447	318	237	379	501
Darkata	364	922	892	388	291	263	59	66	446	285	476	607	479	146	458	731
Langalbhangra	174	486	482	269	0	0	72	78	213	70	273	412	220	67	243	438
Sekhpur	788	2057	1949	566	599	541	170	170	1315	919	742	1030	1071	421	909	1605
Saluka	120	350	355	145	20	15	0	0	226	193	124	162	41	106	203	355
Baluti	596	1816	1657	660	457	411	10	5	1005	690	811	967	841	315	931	1386
Srikantapur	173	453	397	131	123	124	130	107	260	149	193	248	311	32	210	297
DUBARAJPUR	158	365	337	85	110	115	142	134	183	107	182	230	300	59	139	204
Rampur	164	423	382	133	285	248	0	0	217	132	206	250	230	18	191	366
Tajpur	186	448	443	155	189	168	121	135	262	170	186	273	222	114	200	355
Bishnupur	276	635	605	180	300	300	8	4	381	261	254	344	368	13	292	567
KaraiaGopalnagar	182	625	601	233	37	40	84	83	340	157	285	444	313	57	297	559
Bagalpur	187	459	480	191	160	171	133	149	247	149	212	331	243	174	199	323
Raghunathpur	134	315	290	77	207	189	0	0	223	143	92	147	200	19	126	260
Ushka	213	494	463	173	111	97	192	187	261	157	233	306	318	113	204	322
Makdumnagar	248	695	626	244	259	248	0	0	366	227	329	399	174	342	318	487
Sehala	99	223	229	73	37	46	121	123	98	56	125	173	141	19	99	193
Dhobanandapur	77	184	179	67	166	156	0	0	99	58	85	121	140	73	63	87
Rautgara	186	458	449	136	66	69	142	141	290	233	168	216	323	133	176	275

Raypur	185	467	457	114	157	165	1	0	365	276	102	181	263	64	197	400
Tentulia	163	408	405	148	133	113	0	0	236	142	172	263	218	52	205	338
Tantulbaria	489	127 6	1204	464	177	165	77	68	662	490	614	714	556	256	648	1020
Benachapar	19	56	42	18	38	29	18	13	20	5	36	37	32	0	28	38
Sekeddaha	437	116 5	1149	480	206	191	68	75	565	381	600	768	548	114	580	1072
Abdarpur	86	284	239	99	118	107	5	0	182	125	102	114	166	66	125	166
Bajitpur	488	122 1	1173	397	575	546	206	213	633	415	588	758	858	221	516	799
Bataspur	135	401	398	137	243	219	49	55	265	156	136	242	168	128	187	316
Danjana	64	159	153	46	20	21	25	22	102	83	57	70	101	1	69	141
Kulkuri	245	566	526	143	321	292	0	0	287	201	279	325	278	68	250	496
Porabali	63	156	172	67	137	150	0	0	39	24	117	148	99	0	60	169
Rautara	464	123 9	1167	560	26	17	18	16	596	423	643	744	582	142	603	1079
Bejora	35	97	87	32	97	87	0	0	34	18	63	69	52	0	46	86
Pathai	225	550	529	127	260	247	9	8	322	257	228	272	272	103	251	453
Rasipur	170	422	409	163	101	112	175	161	239	149	183	260	288	67	184	292
Rupganja	51	122	103	23	45	34	0	0	70	52	52	51	81	0	45	99
Mallikpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Puranagram	325	825	844	307	321	308	119	137	429	298	396	546	578	100	363	628
ChakBaharakuri	55	150	140	50	107	103	3	2	85	49	65	91	71	44	74	101
Gamira	131	340	338	100	102	111	0	0	246	194	94	144	186	1	158	333
Bhagirathpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fullaipur	189	431	398	122	289	248	0	0	209	158	222	240	254	136	164	275
Chilla	59	176	156	52	95	84	0	0	111	75	65	81	82	3	93	154
Birupur	222	628	567	261	47	56	120	90	386	180	242	387	207	286	318	384
ChakSehara	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jayrampur	153	430	372	137	161	147	99	89	220	130	210	242	291	21	205	285
Parulia	329	873	825	250	600	584	5	0	521	344	352	481	607	169	372	550
Andhargram	49	119	106	32	28	18	27	29	55	52	64	54	81	0	50	94
Baruri	6	11	16	4	9	11	0	0	6	6	5	10	5	5	5	12

Kharia	362	837	818	231	408	412	0	0	548	400	289	418	472	95	352	736
Kaijuli	273	753	723	233	258	269	0	0	446	299	307	424	304	189	368	615
Giripur	59	146	141	38	38	46	36	34	107	78	39	63	57	46	72	112
Kulia	172	418	400	118	311	291	0	0	188	135	230	265	220	111	174	313
Harisara	250	543	563	167	258	273	51	65	311	223	232	340	139	286	269	412
Takipur	123	289	286	85	132	136	0	0	166	103	123	183	136	47	133	259
Bodmati	166	431	421	127	146	138	143	158	227	175	204	246	236	43	198	375
Heruka	380	966	945	348	58	46	21	18	615	459	351	486	441	49	497	924
Kabilpur	441	1010	998	333	494	502	183	177	461	314	549	684	717	128	420	743
Sehara	20	51	44	12	24	14	0	0	33	26	18	18	25	5	23	42
Sahnagar	325	799	770	222	49	50	0	0	530	383	269	387	318	134	392	725
Mahammadbazar	481	1205	1136	348	317	331	14	10	742	527	463	609	558	100	630	1053
Lohabazar	510	1155	1135	312	481	467	30	36	767	575	388	560	670	228	503	889
Komarpur	478	1187	1096	322	400	374	140	121	750	555	437	541	676	79	566	962
Maldiha	180	399	393	104	290	284	0	0	264	137	135	256	181	128	184	299
Jashoda	126	322	305	78	107	99	111	109	184	129	138	176	221	74	126	206
Nirbhoypur	139	335	333	110	81	93	225	216	106	71	229	262	274	6	152	236
Gorala	128	307	274	92	248	216	0	0	201	116	106	158	259	0	153	169
Char Ichharaghubarpur	235	629	631	210	107	115	132	129	380	196	249	435	423	134	238	465
Baicha	105	268	276	92	86	93	102	99	155	120	113	156	163	81	111	189
Sukna	222	583	569	263	36	25	215	209	195	75	388	494	322	79	261	490
Bagdahari	77	160	152	41	94	84	0	0	86	73	74	79	108	55	53	96
Angar Garia	791	1876	1759	552	843	826	280	288	1202	763	674	996	971	351	886	1427
Monai	167	410	398	146	210	203	127	117	163	86	247	312	218	118	178	294
Salchapra	262	603	579	205	274	248	0	0	317	221	286	358	313	162	263	444
Chak Mukunda	2	5	5	3	0	0	2	2	1	0	4	5	6	0	1	3
Rajyadharpur	353	771	745	230	271	234	220	240	408	279	363	466	542	122	349	503

Saharakuri	295	795	750	257	92	100	90	80	547	368	248	382	385	171	381	608
Matipur	154	424	382	132	280	252	0	0	246	183	178	199	245	85	184	292
Maulpur	260	633	580	217	253	233	115	109	309	174	324	406	324	112	292	485
Saldaha	107	281	213	75	192	143	0	0	135	80	146	133	131	13	153	197
Bagdola	124	326	306	91	116	105	106	106	203	133	123	173	135	68	157	272
Bangram	144	330	329	82	0	0	330	329	2	3	328	326	177	190	147	145
Purusottampur	55	142	123	26	47	31	0	0	99	70	43	53	68	21	59	117
Shankarpur	67	188	160	49	80	60	53	58	105	52	83	108	74	24	101	149
Kesabpur	28	69	68	22	36	40	32	28	25	17	44	51	44	24	32	37
Aral	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amarpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bhutura	89	202	191	62	169	159	0	0	73	56	129	135	165	19	82	127
Barkenda	200	448	429	144	180	157	93	113	177	112	271	317	245	141	213	278
Kashthatari	126	319	279	129	250	220	61	53	99	44	220	235	186	116	144	152
Gournagar	83	240	198	58	83	71	0	0	167	98	73	100	131	40	100	167
Bhabanipur	171	442	426	127	89	81	101	94	257	184	185	242	250	49	212	357
Amaipur	43	99	102	46	0	0	99	102	18	4	81	98	58	54	42	47
Daikota	88	190	197	61	47	52	83	82	116	80	74	117	132	35	86	134
Maladanga	340	939	871	302	352	360	161	147	435	257	504	614	349	347	448	666
Mamudpur	29	61	56	18	25	27	11	5	37	25	24	31	26	25	28	38
Baragachha	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asenga	68	163	176	60	129	144	1	2	73	51	90	125	102	66	62	109
Amjola	196	455	437	159	262	224	6	8	281	196	174	241	255	124	211	302
Deulpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ranipur	33	68	72	9	24	22	0	0	53	49	15	23	39	1	30	70
Khayrakuri	406	1013	1000	321	402	386	16	17	627	414	386	586	544	221	438	810
Sugunpur	108	298	264	70	118	99	35	41	192	118	106	146	235	13	120	194
Girajpur	97	241	226	79	54	49	48	56	145	99	96	127	34	136	118	179
Chat Rama	35	75	87	22	19	14	35	48	37	22	38	65	68	18	22	54
Panur	140	333	328	94	162	163	7	8	194	151	139	177	209	3	131	318
Deriapur	236	555	520	157	310	266	56	66	335	212	220	308	302	64	242	467

Amua	723	184 6	1756	570	234	244	193	189	104 2	706	804	1050	1172	128	846	1456
Laliapur	119	302	262	107	241	201	0	0	123	62	179	200	126	80	161	197
Salamatpur	25	67	55	17	27	19	0	0	48	33	19	22	39	18	33	32
Araipur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nadighasbera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kaniara	3	9	6	3	0	0	9	6	0	0	9	6	10	0	3	2
Morlai	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Baram	119	300	282	90	95	90	58	55	178	117	122	165	191	70	119	202
Saoldihi	55	139	128	46	106	91	0	0	87	54	52	74	78	27	58	104
Bideshini	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Katunia	41	78	74	24	41	45	0	0	48	25	30	49	48	14	32	58
Sainthia	36014	900 48	8559 7	26825	309 71	2932 9	105 39	1065 8	568 84	3972 4	331 64	4587 3	47026	20437	403 24	6785 8
Baidyapur	200	464	447	182	169	181	196	184	232	117	232	330	255	2	233	421
Daborda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bhejena	152	377	340	123	116	110	68	57	184	94	193	246	241	44	158	274
Simulia	13	28	28	10	0	0	28	28	10	5	18	23	15	11	14	16
Narasinhapur	21	50	42	10	0	0	30	25	22	8	28	34	44	0	20	28
Raihat	118	269	270	113	0	0	256	258	77	21	192	249	325	7	112	95
Uttar Gobindapur	196	448	447	227	123	127	98	93	202	137	246	310	303	29	216	347
Behira	80	235	226	62	8	13	0	0	184	130	51	96	162	9	97	193
Barulia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bengra	245	600	563	191	223	199	152	131	331	227	269	336	380	82	278	423
Malian	17	31	35	10	0	0	26	32	25	11	6	24	19	12	14	21
Kultor	34	73	72	18	39	38	0	0	42	32	31	40	31	17	30	67
Joka	52	92	102	28	19	20	59	68	58	35	34	67	86	12	42	54
Ghasbera	12	24	25	9	0	0	0	0	8	10	16	15	13	0	12	24
Shaktipur	146	390	368	98	150	140	116	124	231	135	159	233	289	82	168	219
Parsimulia	92	225	204	52	64	46	48	43	170	93	55	111	128	40	94	167
Ajoypur	165	419	417	139	308	307	0	0	272	187	147	230	230	85	188	333
Durgapur	152	398	339	131	125	97	96	86	156	82	242	257	195	179	159	204

Junidpur	451	115 3	1105	498	172	150	0	0	559	329	594	776	566	71	611	1010
Banshgor	724	205 2	1932	851	267	265	0	0	110 5	775	947	1157	1007	430	963	1584
Harishkopa	191	497	443	133	274	239	40	34	289	179	208	264	308	140	186	306
PanchPukhuria	113	299	294	84	128	138	17	13	194	133	105	161	159	103	122	209
Chhautara	118	325	303	99	197	172	48	55	172	98	153	205	138	92	175	223
Narasinghpur	27	67	71	25	0	0	0	0	49	46	18	25	37	0	32	69
Nandanpur	97	221	224	77	143	132	0	0	134	95	87	129	95	90	92	168
Kamalpur	290	111 2	688	209	433	393	17	13	822	314	290	374	571	17	706	506
ChhotaAlunda	424	102 1	951	345	251	238	0	0	547	378	474	573	423	151	550	848
Lambodarpur	283	809	730	153	464	378	0	0	694	546	115	184	391	11	447	690
Rangaipur	460	134 9	1237	456	386	332	74	89	724	519	625	718	668	309	590	1019
Bhalian	278	850	766	279	202	183	16	18	553	401	297	365	425	78	439	674
Parishar	164	393	397	112	233	230	0	0	203	151	190	246	290	20	161	319
Bijuri	126	296	277	90	132	130	127	122	122	55	174	222	34	238	140	161
Bara Alunda	220	557	503	163	329	296	0	0	347	210	210	293	372	90	257	341
Bandiha	66	175	169	80	0	0	0	0	85	69	90	100	83	4	101	156
Maheshpur	44	103	105	48	32	34	0	0	45	24	58	81	45	62	41	60
Kunuri	617	146 3	1399	465	707	671	0	2	815	568	648	831	668	304	681	1209
Kakuria	381	105 1	948	352	125	88	0	0	653	469	398	479	533	174	516	776
Itagaria	355	892	833	279	35	30	12	8	607	414	285	419	452	54	420	799
Tilpara	620	148 6	1376	348	540	536	4	5	109 7	848	389	528	852	80	736	1194
Dhulla	344	845	832	280	377	383	0	0	456	295	389	537	412	359	372	534
Suri	12816	318 01	3000 5	6735	624 5	6010	458	426	248 29	2031 3	697 2	9692	18564	1435	154 65	2634 2
Karimpur	140	347	326	141	90	84	0	0	150	100	197	226	133	196	164	180

Kukhurdihi	415	100 7	989	328	52	56	0	0	707	472	300	517	715	243	460	578
Matpalsha	629	171 5	1518	513	106	91	0	0	113 5	795	580	723	820	121	832	1460
Mediabhad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monpur	187	480	476	152	47	49	0	0	365	267	115	209	249	70	207	430
Mahishdahari	401	110 1	941	369	87	78	0	0	639	382	462	559	425	74	625	918
Ganutia	60	137	144	40	42	52	0	0	93	80	44	64	77	4	63	137
Sadarpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kulera	170	421	382	94	112	98	195	181	311	164	110	218	374	18	149	262
Faridpur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Majigram	338	849	825	246	502	481	0	0	562	420	287	405	471	410	338	455
Kharikatikari	84	240	245	83	109	127	0	0	141	108	99	137	106	157	98	124
Nimpalashi	49	118	118	35	3	2	0	0	84	80	34	38	76	41	57	62
Akhermath	86	217	196	97	67	51	0	0	143	68	74	128	173	2	101	137
Sundardihi	60	167	154	50	46	43	0	0	101	69	66	85	97	20	72	132
Rostanpur	182	507	410	144	211	190	0	0	350	181	157	229	243	237	223	214

Data Source: <http://censusindia.gov.in/pca/SearchDetails.aspx?Id=345721> , <http://censusindia.gov.in/pca/SearchDetails.aspx?Id=346603>

3.8.6.1 Population

Although the study area (10 km radius from the project location) is divided based on secondary data (Population Census 2011), the aforementioned total population of the study area is divided between two villages across the study area.

Table 3.29: Population Statistics of the study area.

Population density	1351/sq.km
Total Population	434262
No of Households	88277
Total area	321.55 sq.km
0-6 age group Population	67275
SC/ ST Population	178835
General Population	255427

The population concentration in communities within a 10-kilometer radius of the project area is depicted in Figure 3.25. A map of the research area was developed based on the concentration of individuals within a 10 km radius of the study area—a total population of 434262people.

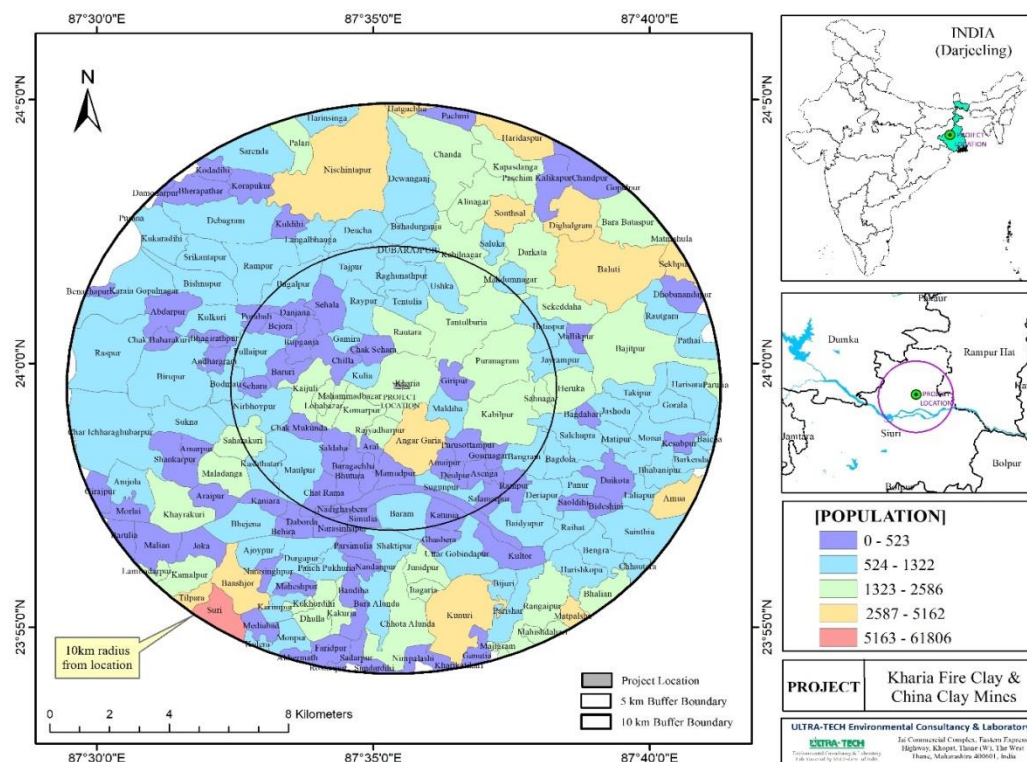


Figure 3.25: Population Concentration Map of the study area.

3.8.6.2 Religion

The major religion in the project area is Hinduism, which accounts for 62.39% of the population. Islam is the second most populous religion in the region, with over 37.06% of the people

practising it. Christianity is followed by 0.31%, Jainism by 0.17%, Sikhism by 0.02 %, Buddhism by 0.01%, and 0.17 % specified 'Other Religion.

Table 3.30: Population Statistics of the study area.

Religion	Percentage
Hindu	62.29
Muslims	37.06
Christian	0.31
Sikh	0.02
Buddhist	0.01
Jain	0.03
Others	0.17
Not Stated	0.11

3.8.6.3 Sex Ratio

The sex ratio is the male to female population ratio. The population share of males and females is 51% and 49%, respectively, according to the bar diagram in figure 3.26. As a consequence, it is possible to determine it from the diagram in figure 3.26. The sex ratio in the study field is not low; rather, it is balanced and favourable. Figure 3.267 illustrates a balanced sex ratio pattern.

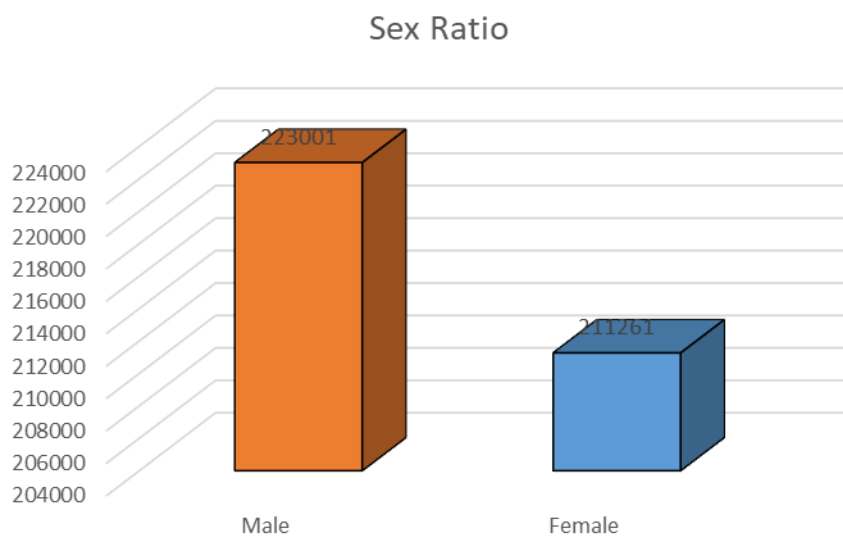


Figure 3.26: Bar-Diagram showing sex ratio of the study area

Figure 3.27 shows the male and female population distributions as comparison bar graphs on a map of the study region's villages, indicating the male and female population share. Figure 3.27 also

illustrates the village-level population concentration and distribution, as well as the population proportion of men and women, in the form of unique comparison bar graphs for each village in the study region, determined by a 10-kilometer radius from the project location. While village population distribution varies. Figure 3.27 shows that the unique percentage of men and females is the same or nearly so, demonstrating a positive and equal sex ratio in the project territory.

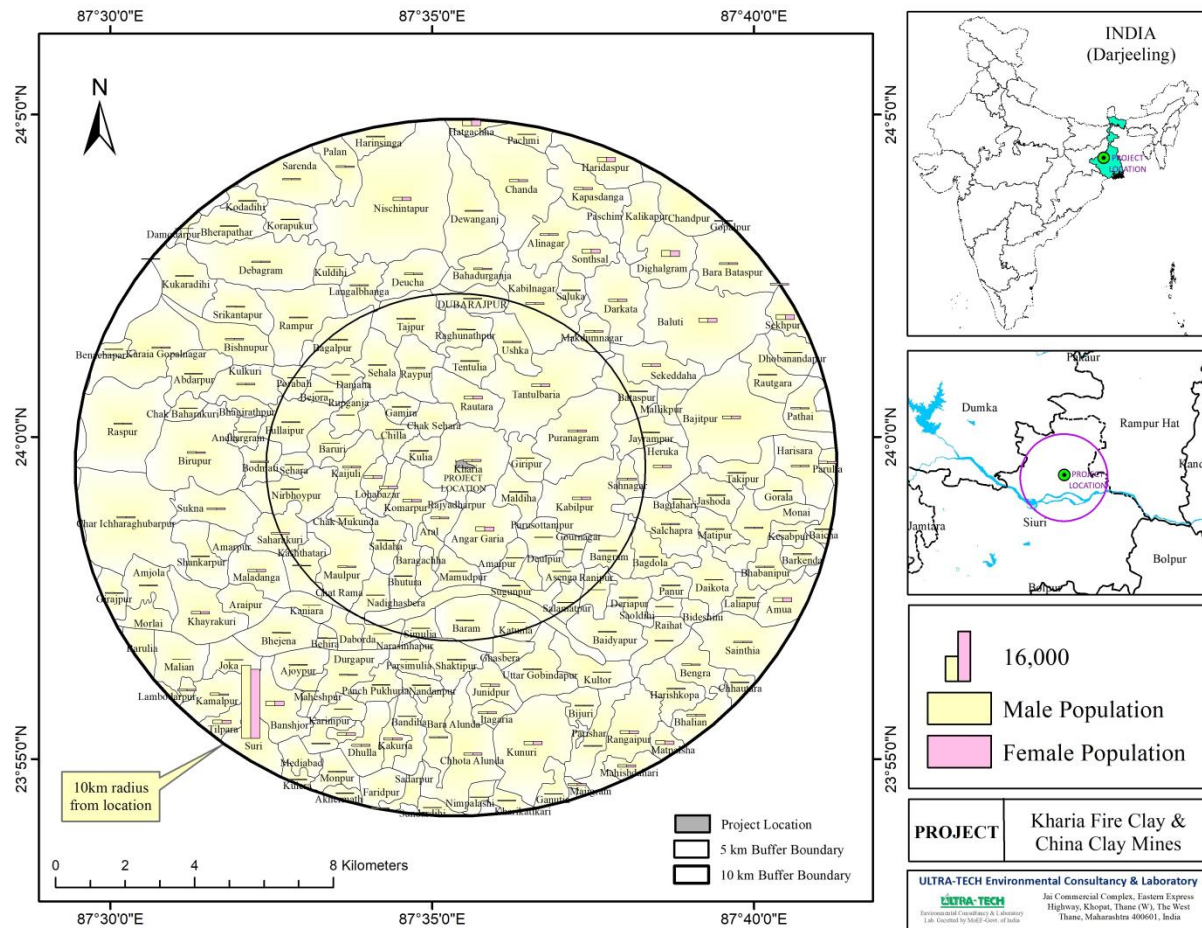


Figure 3.27: Male-Female population share depicting the Sex ratio of the study area.

3.8.6.4 Child Population [0-6 Age Group]

The infant population is the proportion of the world's total population aged 0-6 years, which is a relevant measure because it ignores a vulnerable part of the population. Children's population In comparison to the Indian Census, which defined children aged 0 to 6 years. Because the population of this age group is included in the general population of the country and states, it is critical to provide reliable statistical figures for the population of this age group on policies and services in the education, health, and other sectors. The overall child population has decreased by 5.030.327 from the 2001 Census, with a loss in rural child population of 8.885 compared to a gain in urban child population of 3.855.

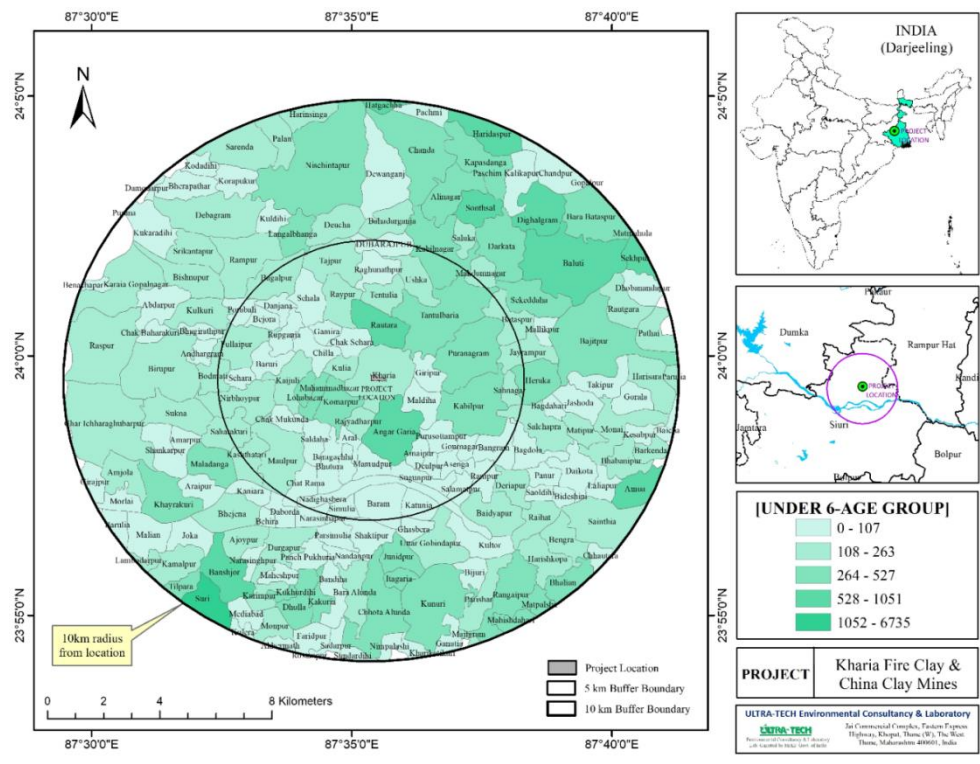


Figure 3.28: Village-wise child population (0-6) concentration across the project area

Figure 3.28 depicts a map of the project area's village-wise concentration population aged 0-6 years. Figure 3.28 shows that the concentration of children aged 0-6 years was divided into five groups, and it also shows that the highest population of children aged 0-6 years is concentrated in the northern, northwestern, and north-eastern sections of the project location. The village Karia, where the project location is situated, the child population is 231.

3.8.6.5 Households

The household consists of one or two people who share meals and live in the same residence. It might be a single family or a distinct group of individuals. Housing is considered to contain several homes if food or living space are not shared. A residence is thought to have many families if food or living space are not shared. Households are the basic unit of study in many social, microeconomic, and political models, and they play an important role in economics and inheritance. Figure 3.29 depicts the village-wise concentration of households in the sample region chosen by a distance of 10 km from the project location. A map of the study area has been developed Figure 3.28. The concentration of residences within a 10-kilometer radius of the research area was used to construct a map of the study area. Figure 3.29 shows that the concentration of households was divided into five categories, with the highest household age located in the northern, north-western, north-eastern, and southern margin portions of the project area. There are 362 households in the project location of Kharia, which is moderate. On the other hand Sainthia has a very high number of households (36014)

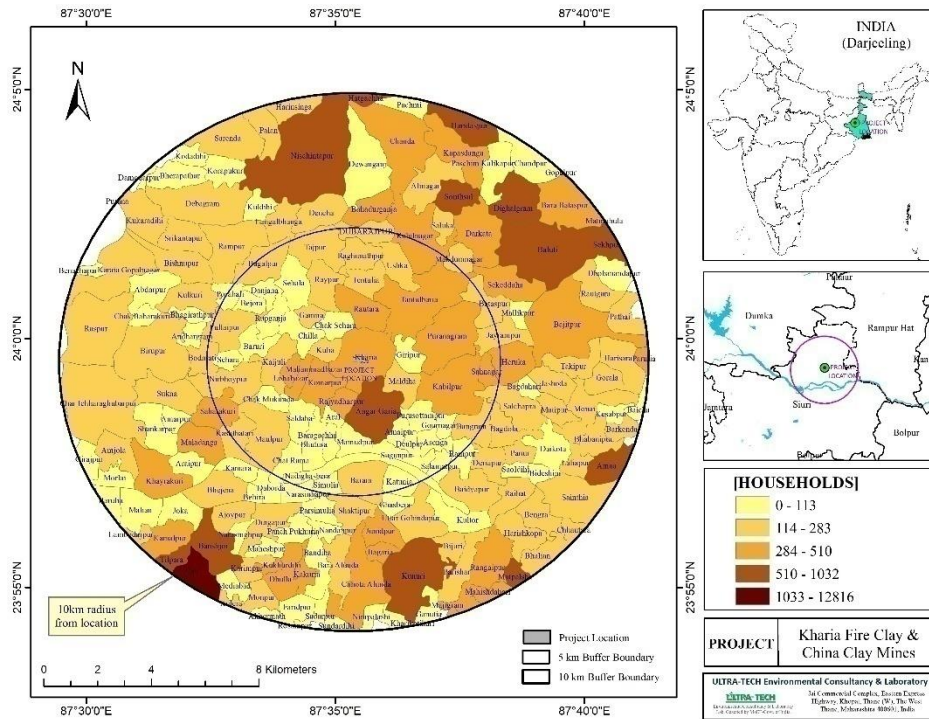


Figure 3.29: Household concentration across the project area

3.8.6.6 Caste Population:

The 2011 Socioeconomic and Caste Census (SECC) was carried out in preparation for the 2011 Indian Census. Following a discussion in both Houses of Parliament in 2010, the Manmohan Singh Government approved the 2011 Socioeconomic and Caste Census. According to the pie diagram in Figure 3.30, 59% of the overall population is in the Unreserved Group. Aside from that, 41% of the entire population was classified as Schedule Castes/Tribes.

Figure 3.30 Pie diagram and Bar-Diagram showing the percentage share of General and SC/ST caste populations

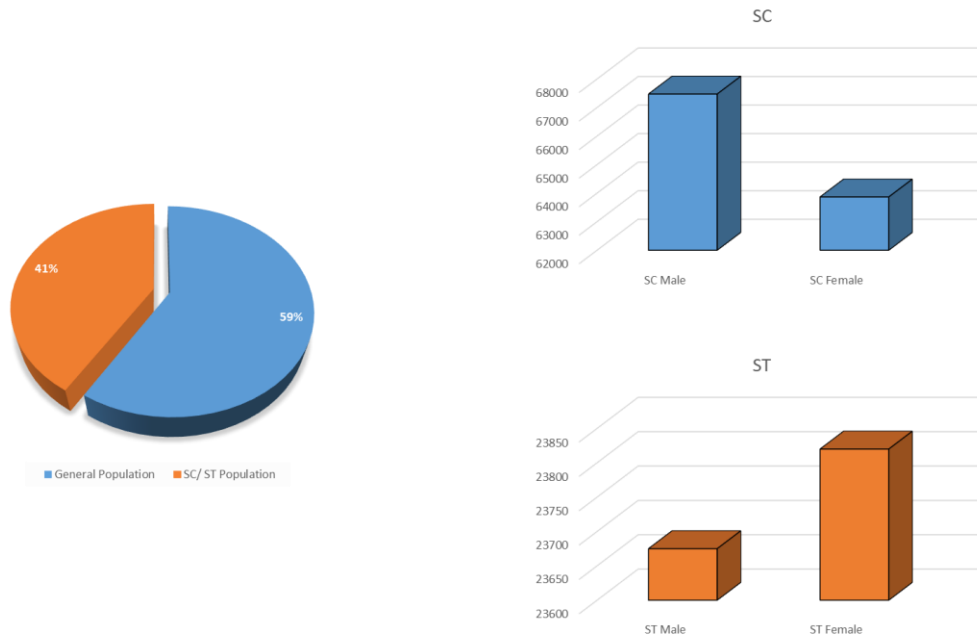


Figure 3.30: Percentage share of General and SC/ST caste populations

The two officially recognised Indian citizen classifications are Scheduled Castes (SC) and Scheduled Tribes (ST). The Indian Constitution recognises words, and classes are divided into two categories. They were known as the Depressed Classes throughout the most of the time that Britain ruled the Indian subcontinent. Based on Indian Census criteria, Figure 3.30 demonstrates the research area's distinct demographic division, notably among the SC and ST communities. Figure 3.31 shows that, while the SC/ST population is distributed unevenly across villages, it is mostly concentrated in Sainthia. In Kharia, wherein the project location is situated has a SC/ST population of 820 people.

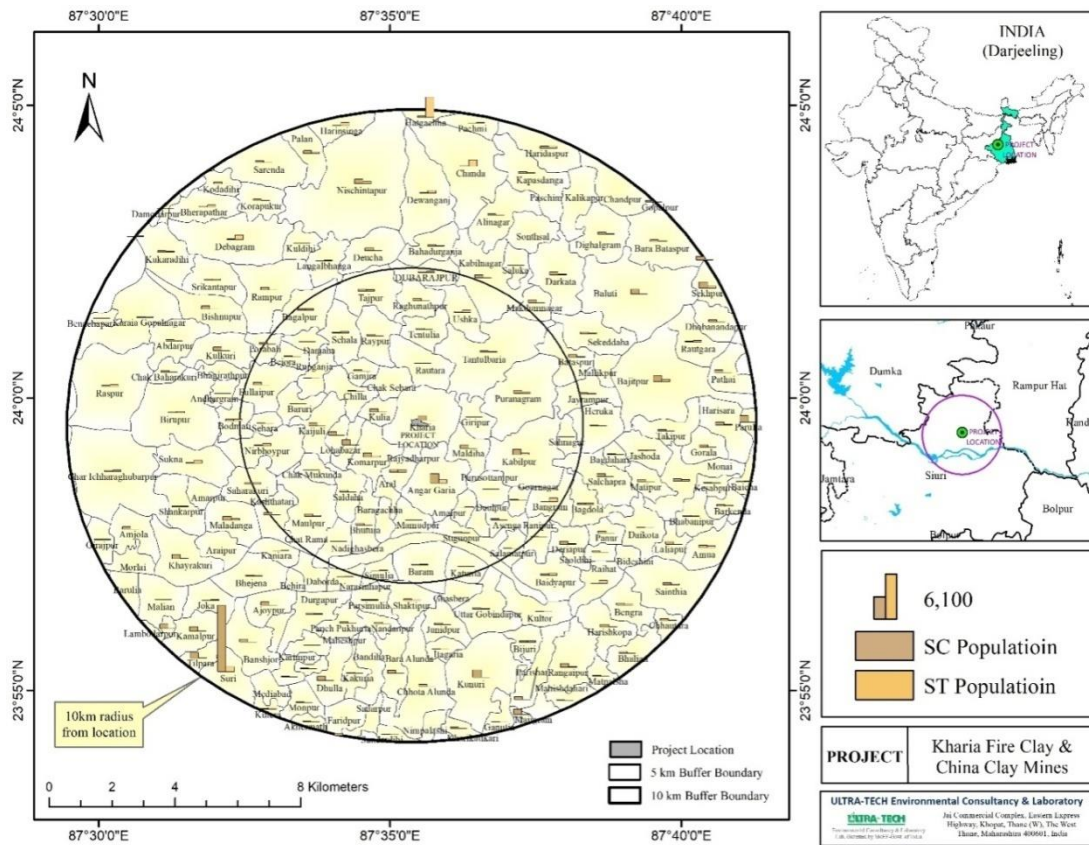


Figure 3.31 :SC/ST Population distribution across the study area

3.8.6.7 Occupational Structure:

The major working population accounts for 75% of the overall working population, the marginal working population accounts for 25%, and the main working population accounts for 80%. The several pie graphs in Figure 3.32 represent further categories beneath the major and marginal employees. In the pie graphs in figure 3.32, the major workers are classified as cultivators, labourers, house workers, and other employees. A pie chart depicting marginal growers, agricultural labourers, home industry employees, and other marginal workers is shown in Figure 3.32

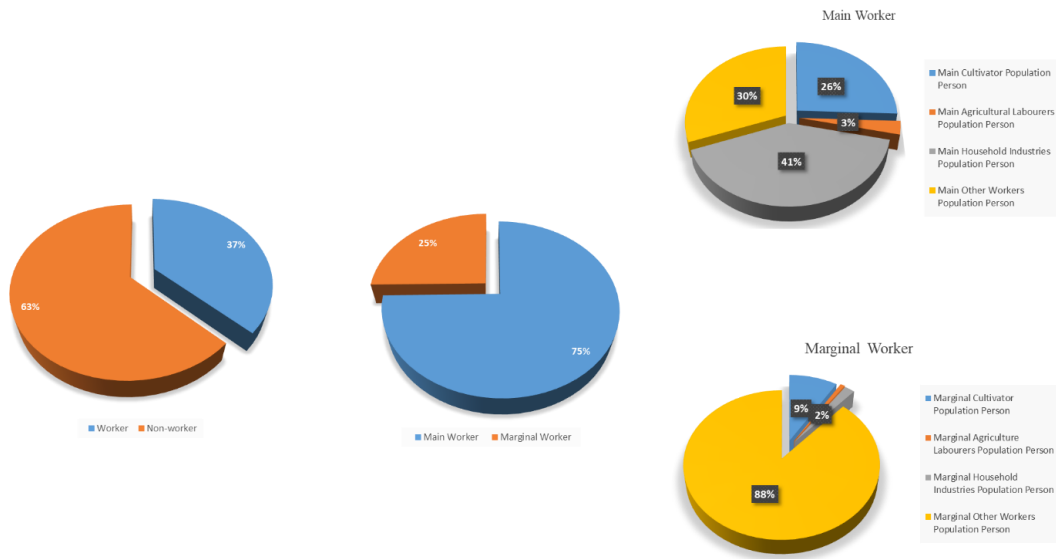


Figure 3.32: Pie diagrams showing Main and Marginal population share and their sub-divisions depicting the occupational structure of the study area.

Figure 7.33 depicts the distribution of employees and non-workers in the population. There are more male workers than female workers within the workforce. In the instance of non-workers, the simple-bar diagrams in figure 7.33 reveal that there are more female non-workers in the study region than male non-workers. As per figure 7.33, in Kharia, the number of working population is 567.

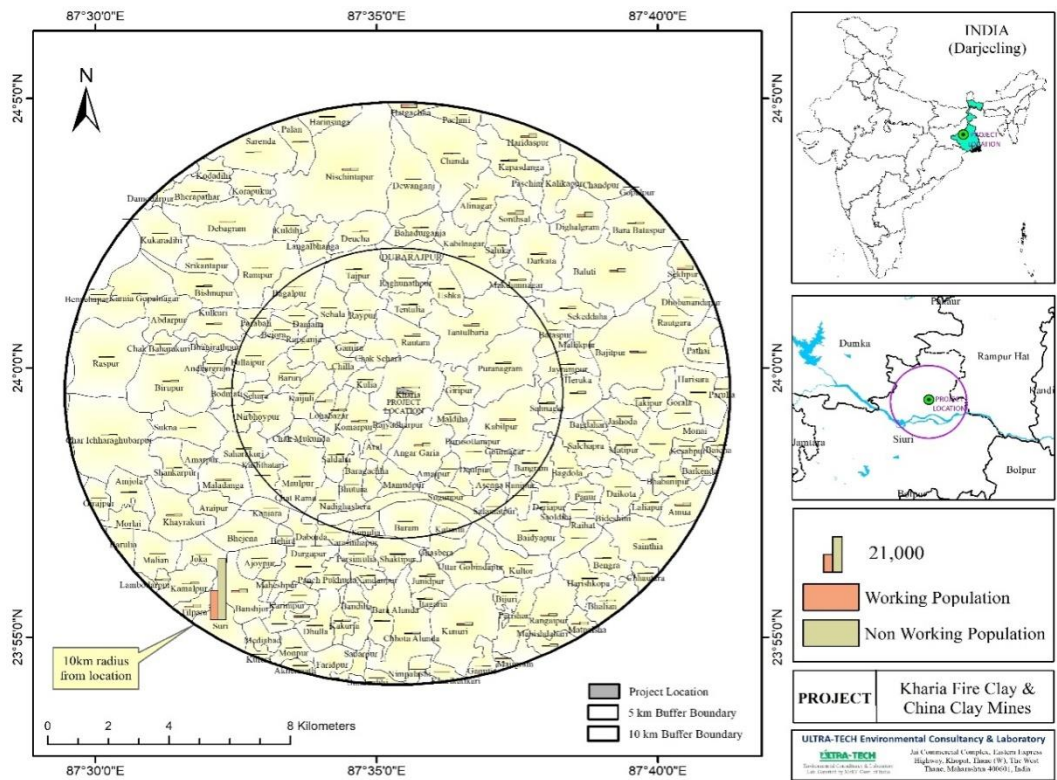


Figure 3.33: Working population distribution across the project area.

3.8.6.8 Educational Status:

The literacy rate is defined as the proportion of a specific age group's population who can read and write. Adult literacy is defined as 15 years and older, adolescent literacy as 15 to 24 years old, and senior literacy as 65 years and older. The ability to comprehend a succinct, basic statement about daily living is sometimes used to assess it. Literacy typically includes numeracy, and a basic assessment of mathematical ability can be included in measuring. Literacy rate and number of literate subjects should be distinguished from functional literacy, a more rigorous literacy indicator assessed on a skill level spectrum.

The percentage of educated and illiterate persons, respectively, within a 10 km radius of the project site is 54% and 46%, according to the pie chart in Figure 3.34, demonstrating that the area around the project is favoured for both educational status and literacy. The percentages of men and women who are literate or uneducated are displayed in the simplest bar-diagram settings. In terms of illiteracy, women outnumber men, as seen by the bar graphs in Figure 3.34

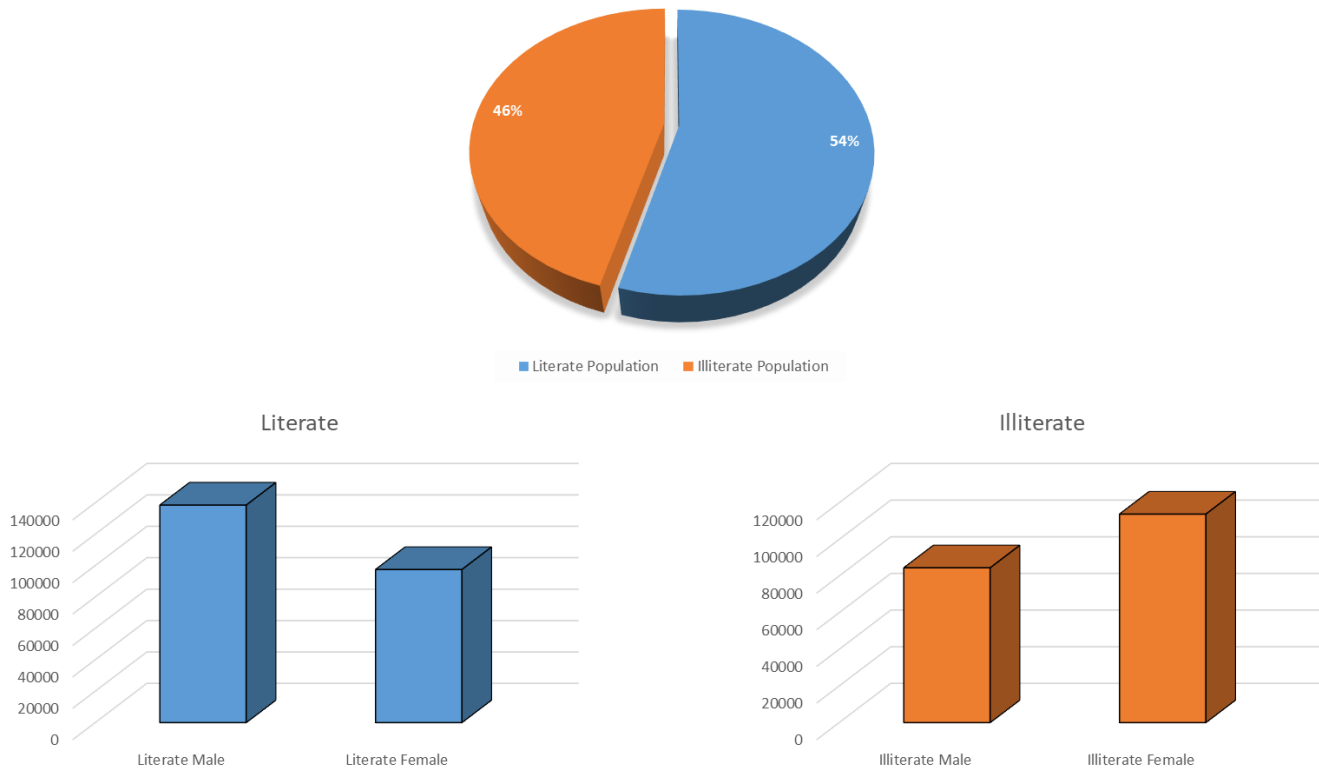


Figure 3.34: Pie diagrams showing Literate and Illiterate population share and the bar diagrams are showing the further male-female share of literacy and illiteracy.

The literacy rate reflects the educational quality of the surrounding study region. The pie diagram in Figure 3.34 reveals that within the 10 km radius research area Figure 3.35 of the project site.

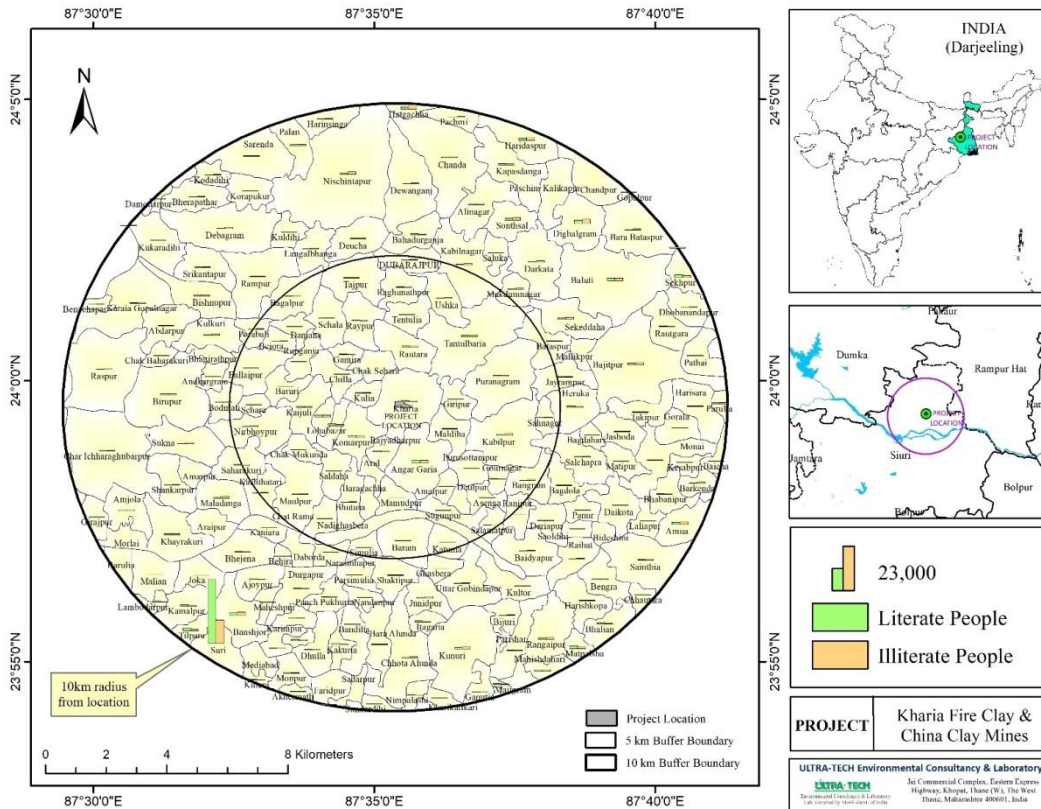


Figure 3.35: Literate and Illiterate population share depicting the Educational status of the study area.

3.8.6.9 Transport

As previously indicated, the project is accessible via public transportation. In this location, a private bus service is offered. The nearest train station is between 5 and 10 kilometres distant. The nearest national highway is around 5 kilometres distant. The State Highway cuts across this neighbourhood. This neighbourhood is traversed by District Road. Kuccha Road and Foot Path are two additional roads and transit alternatives within the village, mostly in the study area's southern half. Figure 3.36 displays the project area's transportation situation, with a focus on the southern part of the project zone.

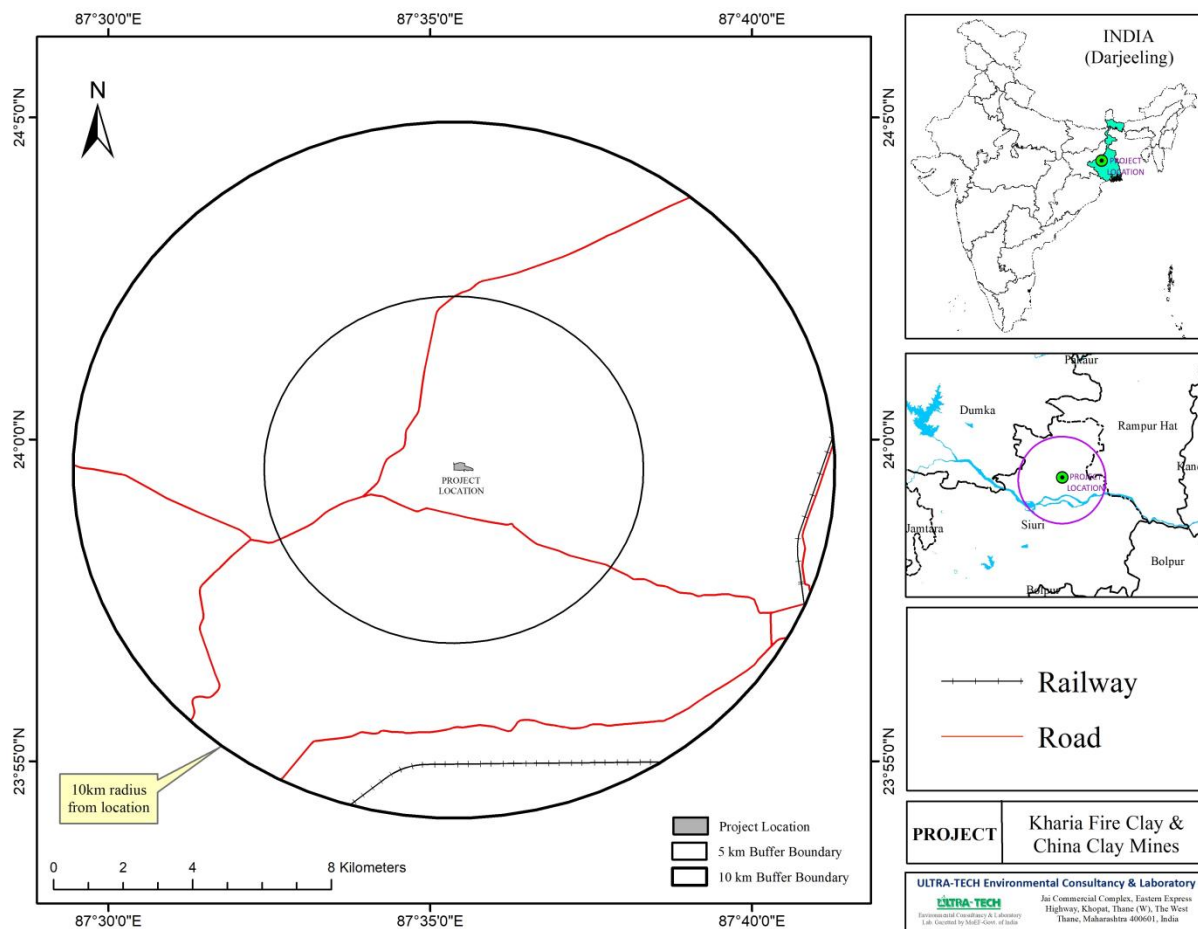


Figure 3.36: Transport and communication scenario of the study area.

➤ **Amenities**

This section analyses the infrastructure facilities like water supply, roads, markets, banks, post offices, schools and electrification in the study area

Table3.31: Infrastructure Amenities and Distances in study area:

Sl. No.	Amenities	Name/ Type	Aerial distance from project (km)
1	Airport	Netaji Subhash Chandra Bose International Airport	172
2	Railway Station	Kunuri - Train station	8.55
		Mahishadahari - Train station	9.43
3	Bus Stop	Patelnagar bus stop	1.3
4	ATM	Axis Bank ATM	2.2
		HDFC Bank ATM	9.26
5	Bank	Bandhan Bank	2.29
		HDFC Bank	9.26
		Axis Bank	2.2
6	Post Station	Mahammad Bazar Sub Post Office	2.21
		Makdamnagar Post Office	5.6
6	Police Station	Mohammad Bazar Police Station	2.2

		Kapasdanga Police Camp	7.87
7	Primary School	Dighalgram Primary School	7.31
		Kulia Primary School	1.12
		Fullaipur primary school	4.3
8	High School	Kedarpur B.N. High School(H.S)	1.92
		Bishnupur High School (H.S)	6.48
		Ajoypur High School	6.89
9	College	Basantika Institute of Engineering & Technology(Polytechnic)	9.81
		Care India Institute	7.45
		Birbhum Mahavidyalaya	9.34
10	Hospital	Patel Nagar Hospita	1.13
		Puratan Gram - General hospital	2.95
		Srikantapur Hospital	6.65
11	Medical Store	Amala Aswini Niketan - Pharmacy	1.72
		R.D.P MEDICINE	1.26

➤ **Administrative offices**

Administrative	Address	Contact
Hinglow Gram Panchayat	Nischintapur, West Bengal	
Mohammad Bazar Gram Panchayat	Lohabazar, Mohammad Bazar, West Bengal 731127	

Police Station	Address	Contact
Mohammad Bazar Police Station	Lohabazar, Mohammad Bazar, West Bengal 731127	3462 260 226
Kapasdanga Police Camp	Kapasdanga, West Bengal 731216	

Post Office	Address	Contact
Mahammad Bazar Sub Post Office	Panagarh - Morgram State Hwy. Mohammad Bazar, West Bengal 731127	
Makdamnagar Post Office	Makdumnagar, West Bengal 731216	
Deriapur Post Office	Deriapur, West Bengal 731234	
Kabilpur Post Office	Kabilpur, West Bengal 731132	
Seherakuri Branch Post Office	Saharakuri, West Bengal 731127	

➤ **Banks**

Bank	Address	Contact
Bandhan Bank	Mohammad Bazar, West Bengal 731127	
HDFC Bank	Ward No 5, Ground Floor, Mayurakshi Sarani Sainthia, West Bengal 731234	94267 92001
Axis Bank	Ground Floor, Mohammad Bazar, West Bengal 731127	
Allahabad Bank	Sonapatty Rd, Sainthia, West Bengal 731234	

UCO Bank	Mohammad Bazar, West Bengal 731127	1800 103 0123
Union Bank of India	Mohammad Bazar, West Bengal 731127	1800 22 2244
Paschim Banga Gramin Bank	Mohammad Bazar, West Bengal 731127	
ATM	Address	
Axis Bank ATM	Ground Floor, Mohammad Bazar, West Bengal 731127	
HDFC Bank ATM	Ward No 5, Ground Floor, Mayurakshi Sarani Sainthia, West Bengal 731234	
Allahabad Bank ATM	Sonapatty Rd, Sainthia, West Bengal 731234	

➤ **School**

School Type	School Name	Address	Contact
Primary School	Dighalgram Primary School	Dighalgram, West Bengal 731216	
	Kulia Primary School	Kulia, West Bengal 731132	
	Fullaipur primary school	Fullaipur, West Bengal 731127	87593 34716
	Tentulia Primary School	Tentulia, West Bengal 731132	
	Deucha CB Primary School	Deucha, West Bengal 731132	
	Rampur Primary School	Rampur, West Bengal 731127	
	Sonthsal primary School	Sonthsal, West Bengal 731216	98005 20097
	Debagram Primary School	Debagram, West Bengal 731127	
School	Murgabuni Junior High School	Raipur to Harinsinga Road Langalbhangra, West Bengal 731127	
	Nirbhoypur Junior High School	Maulpur, West Bengal 731127	
	Bhabanipur Junior High School	Bhabanipur, West Bengal 731234	
	Sahanagar Junior High School	Sahnagar, Post - Bagaikan, P.S - Md Bazar, Dist West Bengal 731234	
High School	Kedarpur B.N. High School(H.S)	Angar Garia, West Bengal 731132	
	Bishnupur High School (H.S)	Bishnupur, West Bengal 731127	
	Ajoypur High School	Ajoypur, West Bengal 731103	
	ITAGARIA HIGH SCHOOL	Itagaria, West Bengal 731103	
	Kapasdanga K.H High School	Kapasdanga, West Bengal 731216	
	Alunda High School	Bara Alunda, West Bengal 731103	
College/ University	Basantika Institute of Engineering & Technology(Polytechnic)	Md Bazar Suri, West Bengal 731216	
	Care India Institute	Kapasdanga, West Bengal 731216	
	Birbhum Mahavidyalaya	Baruipara, Sri Bhumi Pally Suri, West Bengal 731101	
	Gitanjali College of Physical Education	Daikota, Sainthia Deriapur, West Bengal 731234	1800 419 1713
	BVHMC&H - College	Sainthia, West Bengal 731234	
	Begum Rokeya Academy	Md Bazar, Heruka, West Bengal 731132	

Training Center	Md.Bazar Govt. Sponsored ptti School	Patel Nagar, West Bengal 731132	
	A.C.C JAIN COLLEGE OF EDUCATION	Maulpur, West Bengal 732142	

➤ **Hospital**

Hospital Name	Address	Contact
Patel Nagar Hospita	Pattel Nagar, Kharia, West Bengal 731132	
Puratan Gram - General hospital	Puranagram, West Bengal 731132	
Srikantapur Hospital	Bishnupur, West Bengal 731127	
Hospital	Pachami, West Bengal 731216	
Helth Centre - Hospital	Sadanandapur, West Bengal 731127	
Sanjoy Mandal's Home	Maladanga, West Bengal 731127	
Deucha Nursing Home	DUBARAJPUR, West Bengal 731132	
Dr. Deepak Marothi - Nursing home	Sainthia, West Bengal 731234	

➤ **Medical store**

Medical Store	Address	Contact
Amala Aswini Niketan - Pharmacy	Mohammad Bazar, West Bengal 731127	
R.D.P MEDICINE	Rajyadharpur, West Bengal 731132	
Juthika Pharmacy	Puranagram, AngarGaria, West Bengal 731132	
Roy Pharmacy	Mohammad Bazar, West Bengal 731127	

➤ **Transportation**

Rail Station	Address
Kunuri - Train station	Kunuri, West Bengal 731234
Mahishadahari - Train station	Rangaipur, Mahishdahari, West Bengal 731234
Sainthia Junction	Sainthia, West Bengal 731234

Bus Stop	Address
Patelnagar bus stop	SH 11, Pattel Nagar, Rajyadharpur, West Bengal 731132

3.8.7 Socio-Economic Impacts

No doubt setting up a project of some sort will have a significant impact on the socioeconomic and cultural life of the people in the project area. Here an attempt is made to envision and evaluate the tentative results that the project is likely to yield. The possible impacts are described below due to the operation of the project:

Positive Outcomes:

Mining is the foundation of building the country's economy. As given below the proposed project has the following benefits:

- Mining is the basis of the economy of the country. The following benefits are given as set out below for the proposed project.
- Jobs for local persons.
- Punish the tax on the state government. GST, cessation of wages, levies, etc. in the form of excise duty.

- Sand may be used to build roads, bridges, buildings, etc.
- The generation of the market is coming back.
- Appropriate EMF funds will boost the productivity of the environment.
- CSR funds may be used for the welfare of people in villages.
- The new project would contribute to the enhancement of the facilities that will attract the company's houses.
- Mining operations will help to establish a local socioeconomic scenario.

Negative Outcomes:

Due to the planned activity of the project, the population inflow would increase during the construction period. This could lead to a strain on infrastructure resources in the area, as well as an increase in the local population. However, this consequence is of a limited time and a temporary nature only.

- During the construction process, increased levels of dust and other air pollutants can lead to health problems.
- Noise pollution can be caused by vehicle traffic and construction activities.
- Appropriate mining may have detrimental effects on local soil and groundwater.
- Unnaturally high concentrations of chemicals such as arsenic, sulphuric acid, and mercury over a wide area of surface or subsurface water are not taken until sufficient action is taken.
- Runoff containing these chemicals can lead to the destruction of the surrounding vegetation.

3.8.8 Mitigating intervention

To mitigate the adverse impacts likely to occur in the local area due to the proposed and current project activities, an effective mitigation plan must be established. The following recommendations are as follows

○ **Before and after the initial phase:**

- The contact with the local community should be institutionalized and carried out daily. The forum will provide opportunities to address local critical issues and to train programmers for shared benefits.
- Relevant Information on the planned and current development plan, community services, etc should be conveyed to the local community in the form of booklets and audio-visuals.
- According to the expectations of the local citizens, staff, project officials, should carry out CER activities in the local region.

3.9 Traffic Survey

The traffic survey, to ascertain the traffic density in the study area was conducted on the junction of SH 11 connecting to mining site of Kharia China Clay & Fire Clay Mine. The composition of Traffic includes two wheelers, three wheelers, four-wheeler (Passenger Cars) and four-wheeler like heavy vehicles like Trucks, Lorries, and Bus etc. The recommended PCU Factors for various types of vehicles on Urban Roads has been adopted from IRC 106-1990 guidelines as shown in **Table 3.32**.

Table 3.32: Recommended PCU Factors on Urban Roads

Types of Vehicles	Passenger Car Equivalency (PCE)
Motor Cycle or Scooter (2-Wheeled)	0.75
Passenger Car, Pick-up van	1
Auto-rickshaw (3-Wheeled)	2.0
Light Commercial Vehicle	2.0

Truck or Bus	3.7
Bicycle	0.5

Thus, volume of vehicles was estimated as: $PCU \text{ unit} = \text{No of vehicles} * \text{PCE of those particular.}$

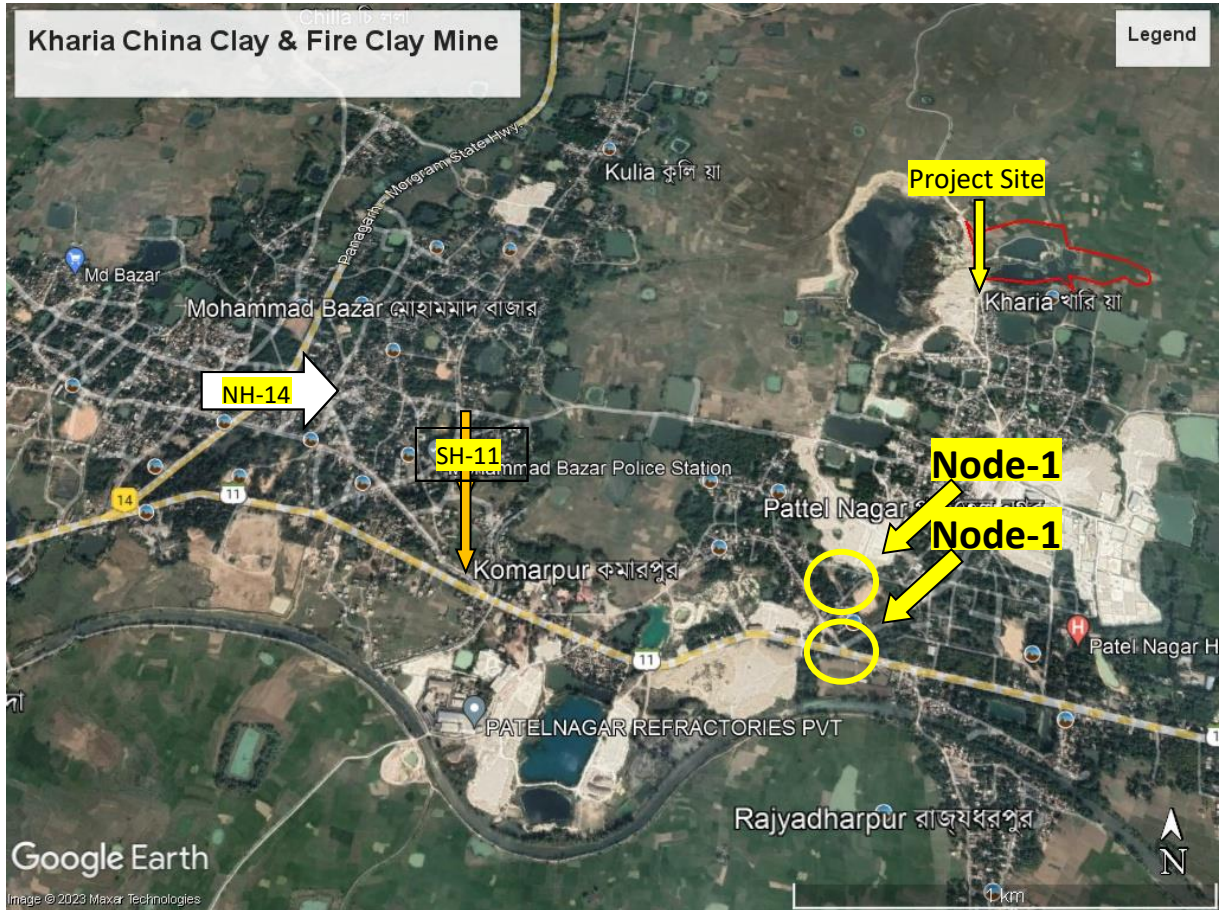


Figure 3.37: Location of the Node for Traffic Survey

Traffic study was carried out at node -1 at the junction of SH 11 and the connecting to mining site of Kharia China Clay & Fire Clay Mine as shown in **Figure 3.37**

3.9.1 Node-1

Data was collected by physically counting the number of vehicles plying in both directions at Node 1. The hourly counts were carried out for the different type/category of vehicles. The variation in the traffic flow at the given road along with the number of vehicles during peak hour & lean hour is presented in the **Table 3.23** and **Figure 3.37**

Table 3.23: Traffic Survey, Node I

	During Lean Hrs.	During Lean Hrs. Vehicles in PCU's	During Peak Hrs.	During Peak Hrs. Vehicles in PCU's
Two Wheelers	65	48.75	120	90
Three Wheelers	10	20	20	40

Car/Jeep	30	30	90	90
Light Commercial Vehicle	14	28	28	56
Bus	7	26	15	56
Trucks/Lorries	50	185	95	351
Total	176	338	368	683

Lean Hrs: Before 8.00 hrs (morning), 13.00 to 17.00 hrs afternoon & after 21.00 hrs (evening)

Peak Hrs: Between 8.00 to 13.00 hrs & 17.00 to 21.00 hrs in the evening

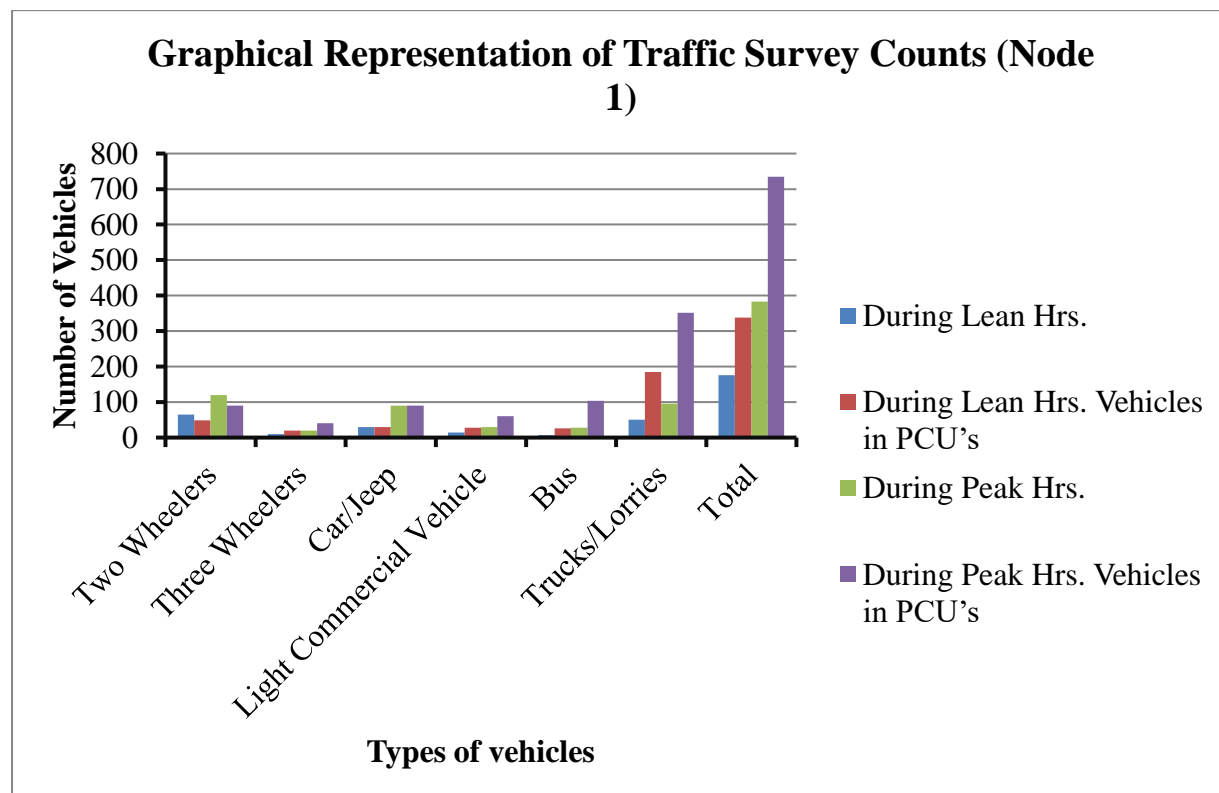


Figure 3.38: No's of vehicles during peak hour & lean hour

3.9.2 Existing Traffic Scenario & Level of Service

Capacity of road as per IRC = 1500 PCU's/hr

Total Volume in PCUs during Peak Hours = 683

Existing Volume/Capacity ratio = $683/1500 = 0.45$

The level of service is "C" that is Good.

Table 3.24: Level of Service

Sl. No.	Existing Volume/Capacity	Level of Services
1	0.0 to 0.2	"A" (Excellent)
2	0.2 to 0.4	"B" (Very Good)
3	0.4 to 0.6	"C" (Good)

Sl. No.	Existing Volume/Capacity	Level of Services
4	0.6 to 0.8	“D” (Fair)
5	0.8 to 1.0	“E” (Poor)

During the proposed project an addition of ~20 trips per day (i.e. 10 trucks per day to and fro) of trucks is envisaged. To understand that impact due this addition the following modified scenarios on the access roads is discussed. The Node I is shown in the figure.

3.9.3 Modified Traffic Scenario & Level of Service

10 additional trucks *i.e.* 20 trips assume to enter and exit during peak hrs for the proposed project (worst case scenario).

Node I: ~10 trucks of 20 additional volume in PCU will be $3.7 \times 20 / 9 = 8.22$ per hour during peak hours.

Traffic Flow at Node I

Total volume during peak hours in PCUs after completion of the project (V) = $683 + 8.22 = 691.22$

Capacity of Road as per IRC (C) = 1500 PCU's/hr

Modified Existing Volume/Capacity ratio will be $(V/C) = 691.22 / 1500 = 0.46$

The level of service of the road will be “C” after the proposed project that is “**Good**”.

The above results indicated that the post project scenarios will contribute to addition in existing traffic, the level of service will continue to be GOOD. Traffic will continue to run smoothly without congestion and no widening of road is anticipated.

CHAPTER 4. Anticipated Impacts and Mitigation Measures

This chapter deals with the expected impacts and the respective mitigation measures of the project on the environment during its lifetime, which has two phases, that is the construction phase and operation phase. It indicates the levels up to which the proposed mining projects will benefit the project site by preventing or minimizing adverse environmental impacts.

4.1 Introduction

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 Fire clay & China clay 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 impact 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. The details on impact of the project activity on each of the above environmental attributes are discussed in the following sections.

4.2 Environmental Impact Assessment

4.2.1 *Impact Assessment during the Construction Phase*

Since the proposed cluster project is Fire clay and China clay mining activity, no major construction activities are proposed. Therefore, there will not be any environmental impact in terms of construction phase.

4.2.2 *Impact Assessment during the Operation Phase*

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

Impact on Land Environment

- **Change in landuse**

At present applied area is fresh barren land. 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 Fire clay and china clay

- **Management, Storage and preserved of the Top Soil**

1. 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.
2. 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.
3. Such separately preserved topsoil will be used for land utilization and for plantation

Impact on Air Environment

This chapter deals with the expected impacts and the respective mitigation measures of the project on the environment during its lifetime, which has two phases, that is the construction phase and operation phase. It indicates the levels up to which the proposed granite mining projects will benefit the project site by preventing or minimizing adverse environmental impact.

Introduction

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 granite 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. The details on impact of the project activity on each of the above environmental attributes are discussed in the following sections.

4.3 Environmental Impact Assessment

4.3.1 Impact Assessment during the Operational Phase

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

4.3.2 Impact on Air Environment

USEPA approved - ISCST3 dispersion model is used for prediction of impact at project site and human settlements in surroundings for the proposed China Clay & Fire Clay mining project of Sharma Minerals Joypore over an area of 7.02 Ha in Mouza Kharia J. L. No. 145 in Birbhum District. at Private Patta Land semi- mechanized method. Total production capacity of the proposed lease in the cluster is 4763MT per annum at maximum capacity.

4.3.3 Anticipated Impacts

Fire clay & china clay mineral 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 CO (Carbon Monoxide) 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 emissions. 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.

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

- ✓ Area sources due to loading & unloading activities
- ✓ Line sources to calculate Emission from Haul Road
- ✓ Movement of vehicles like JCB, Poclain, in transportation of mineral

A. Loading and unloading by various activities in mining area was considered in area sources.

B. 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.

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 mineral will not be piled up at the project site.

In order to assess the impact on Ambient Air Quality due to mining activities of proposed lease 4763 MT per annum capacity. USEPA approved model ISCST3 is used to predict impact over a radial distance of 10000 m. at grid interval of 250 m. GLC is predicted around the proposed site and at various air quality monitoring stations. GLC's are calculated at every grid point over the study area in all directions to predict combined impact of loading, un-loading and transportation.

Cartesian coordinates (X, Y) has been used for prediction of model results at various receptor locations representing project site, human settlements, commercial area and sensitive areas.

4.3.4 Emissions Details

Loading - unloading and transportation of Fire clay & china clay mineral will be the main polluting source in the proposed mining activities releasing PM₁₀, PM_{2.5} SO₂, NO₂ & CO affecting ambient air quality of the surrounding area. Emission during Loading and unloading are calculated by the area sources. Capacity of fire clay and china clay mining is 8920 m³ per annum capacity. Mining is carried out for 240 days in year. Transportation of the fire clay and china clay mineral is carried out by 2 (nos.) trucks/day (considering each truck capacity of 10 Tons) on the haul road. Emission is calculated for line sources with each truck loaded with fire clay and china clay mineral transported over the haul road within the mining area. Details of emission during loading/unloading and transportation on the haul road are discussed.

Loading and Unloading - US EPA, 2008, revision of emission factor for AP-42 is used to calculate emission of particulate matter released into the atmosphere during loading and unloading separately. Emission during loading is found similar to that of during unloading. Emission of PM₁₀ & PM_{2.5} during loading is calculated and found to be 1.16×10^{-1} kg/h based on moisture content 10-20 % in mine. It is assumed that moisture content in mine deposit is 7% and further moisture content will be increased to 10-20% to reduce fugitive emission of PM₁₀ & PM_{2.5} during loading/unloading. Emission value during unloading was 1.16×10^{-1} kg/h based on moisture content 10-20 % in mine and average wind speed 3.64 Km/h (1.01m/s) as observed with site data in pre-monsoon with calm conditions 0.9 % used as shown in wind rose and discussion of local meteorology of the area.

Haul Road - US EPA, 2006, revision of emission factor for AP-42 was used to calculate emission of particulate matter released into the atmosphere during transportation of granite stone mineral by trucks operated on haul road. Emission of PM₁₀ and PM_{2.5} due to transportation of mineral on haul road is 4.1×10^{-1} kg/h per vehicle based on assumption that silt content spread on road surface was 5%, and efficiency of PM₁₀ and PM_{2.5} emission control 50%. Truck will be fully covered with tarpaulin material and emission of PM₁₀ and PM_{2.5} during on the haul road will be insignificant.

Total emission of PM₁₀ and PM_{2.5} will be 6.42×10^{-1} kg/hour, if all the activities such as loading & unloading, movement of vehicle on the haul road will occur simultaneously. Total emission of PM₁₀, PM_{2.5}, SO₂, NO_x, CO and three-month hourly meteorological data from March to May – 2023 are used as input for ISCST3 Dispersion model run developed by USEPA and approved by CPCB/MoEF&CC and SPCBs.

Emission value in each case is discussed as above is given in **Table 4.1**.

Table 4.1: Emission of PM₁₀ in kg/hour in Various Mining Activities

S.No.	Source type	Pollutants	Emission
1	Loading	PM ₁₀	1.16 x 10 ⁻¹ kg/h
	Unloading		1.16 x 10 ⁻¹ kg/h
2	Haul Road	PM ₁₀	4.10 x 10 ⁻¹ kg/h
Total Emission of PM ₁₀ from all activities			6.42 10 ⁻¹ kg/h

4.5 Meteorological Data

The meteorological data recorded at hourly interval during the month of March to May - 2023 on wind speed, wind direction, dry & wet bulb temperature, humidity, cloud cover and rainfall are processed to extract hourly mean meteorological data as per the guidelines of CPCB/MoEF for prediction of impacts from the area source. Stability has been computed by Turner's method and mixing height is obtained from publication of IMD "Atlas of Hourly Mixing Height in India, 2008.

Data recorded from authorized source/Govt. agency are used as meteorological input for Dispersion Model, which is stored in the computer for further analysis and interpretation to study the local meteorology of the study area.

Moderate wind speed and high calm condition are observed during study period at site. Impact of the pollutants is anticipated in the prevailing winds. Ambient air quality locations are selected based on the long- term three month of pre-monsoon season.

4.6 Baseline Data

Eight 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 background concentrations of air quality. Background concentrations are observed to be maximum at the following ambient air quality monitoring locations as shown in Table 4.2

Table 4.2: 24-hrly Baseline Maximum Concentrations (µg/m³) of All Pollutants

Station Code	Location	Maximum Concentrations(µg/m ³)				
		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO
AAQ1	At Project Site	61.00	25.00	8.00	27.00	900
AAQ2	Kedarpur	65.00	26.00	7.00	25.00	600
AAQ3	Tentulia	58.00	25.00	7.00	23.00	800
AAQ4	Bajitpur	56.00	17.00	7.00	20.00	700

AAQ5	Nischantapur	58.00	20.00	6.00	19.00	800
AAQ6	PanchPukhuria	59.00	23.00	7.00	12.00	800
AAQ7	Nirbhayapur	77.00	31.00	6.00	29.00	700
AAQ8	Lohabazar	66.00	29.00	6.00	28.00	700

4.7 Frame work of Computation & Model Details

Local meteorology of the area influences pollutants released in the atmosphere. Air quality modeling is an important tool for prediction, planning and evaluation of Air Pollution Control (APC) equipment and emission control to meet the regulatory standards and to apply mitigation measures to reduce impact caused by mining activities. 24-hourly maximum impacts of PM₁₀, PM_{2.5}, SO₂, NO₂ & CO are envisaged due to low to moderate wind speed at south-west of the site. Pollutants are dispersed from the proposed source but without stack under influence of local meteorology and dispersed on the ground in downwind direction under influence of moderate to low wind speeds. Moderate temperature and low humidity are observed at site with high temperature in day hours and low during night.

PM₁₀ & PM_{2.5} is the major pollutant apart from SO₂, NO₂ & CO occurred during mining activities. Impact of area source and line source emission is considered and prediction of impact is made on various monitoring locations in the study area due to i) loading ii) unloading and iii) transportation on the haul road in the mining area. Impact is predicted in the worst -case scenario due to combined impact of loading and unloading and emission due to transportation of fire clay and china clay on haul road in mining area and other mining activities will occur simultaneously. Combined emission due to all mining activities discussed above is 6.42×10^{-1} kg/hour (**Table 4.1**) and premonsoon hourly meteorological data has been used as input for the dispersion model – ISCST3 developed by U.S. EPA. Impact is predicted over the distance of 10,000 m at 500 m grid intervals in Cartesian coordinates (X,Y) to assess the impact at each receptor location. Maximum incremental GLC's of PM₁₀, PM_{2.5}, SO₂ & NO₂ are observed close to the source. Incremental concentration of all air pollutants are superimposed on the maximum base line data monitored value at the proposed site to predict total GLC of PM₁₀, PM_{2.5}, SO₂, NO₂ & CO due to combined impacts.

4.7.1 Model Results

The Air Quality Impact Prediction has been done by using “Industrial Source Complex Short Term version 3 (ISCST3), of USEPA”. 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 fire clay and china clay mineral
- (ii) Transportation of fire clay and china clay by trucks on the Haul roads from mining benches.
- (iii) Combined impact of PM₁₀, PM_{2.5}, SO₂, NO₂ & CO are considered due to mining activities occurred simultaneously on various sampling locations as given in Table 4.3.

Table -4.3Max.Background, Incremental and Projected GLCs of PM₁₀& PM_{2.5} Conc. due to loading-unloading and Transportation

Sr. No.	Locations	Maximum Monitored Background Conc. ($\mu\text{g}/\text{m}^3$)		Incremental GLC in ($\mu\text{g}/\text{m}^3$)		Total Projected GLC in ($\mu\text{g}/\text{m}^3$)	
		PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
AAQM-1	At Project Site	61.00	25.00	5.36	3.20	66.36	28.2
AAQM-2	Kedarpur	65.00	26.00	0.31	0.16	65.31	26.16
AAQM-3	Tentulia	58.00	25.00	0.33	0.17	58.33	25.17
AAQM-4	Bajitpur	56.00	17.00	0.04	0.02	56.04	17.02
AAQM-5	Nischantapur	58.00	20.00	0.19	0.10	58.19	20.1
AAQM-6	PanchPukhuria	59.00	23.00	0.08	0.04	59.08	23.04
AAQM-7	Nirbhayapur	77.00	31.00	0.26	0.13	77.26	31.13
AAQM-8	Lohabazar	66.00	29.00	0.42	0.16	66.42	29.16
Max. impact of worst case scenario		77.00	29.00	9.22	4.76	86.22	33.76
<i>NAAQS of PM₁₀ and PM_{2.5} as per CPCB in $\mu\text{g}/\text{m}^3$</i>						100	60

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

Maximum background, incremental and projected GLCs of SO₂, NO₂ and CO Conc. due to loading-unloading and transportation are included in the following **Table 4.4**.

Table 4.4: Max.Background, Incremental and Projected GLCs of SO₂ NO₂& CO Conc. due to loading-unloading and Transportation

Sr. No.	Locations	Maximum Monitored Background Conc. ($\mu\text{g}/\text{m}^3$)			Incremental GLC in ($\mu\text{g}/\text{m}^3$)			Total Projected GLC in ($\mu\text{g}/\text{m}^3$)		
		SO ₂	NO ₂	CO	SO ₂	NO ₂	CO	SO ₂	NO ₂	CO
AAQM-1	At Project Site	8.00	27.0 0	0.9	1.53	1.83	22.75	9.53	28.83	23.65
AAQM-2	Kedarpur	7.00	25.0	0.6	0.10	0.13	1.62	7.1	25.13	2.22

Sr. No.	Locations	Maximum Monitored Background Conc. ($\mu\text{g}/\text{m}^3$)			Incremental GLC in ($\mu\text{g}/\text{m}^3$)			Total Projected GLC in ($\mu\text{g}/\text{m}^3$)		
		SO ₂	NO ₂	CO	SO ₂	NO ₂	CO	SO ₂	NO ₂	CO
			0							
AAQM-3	Tentulia	7.00	23.0 0	0.8	0.15	0.18	2.27	7.15	23.18	3.07
AAQM-4	Bajitpur	7.00	20.0 0	0.7	0.02	0.24	0.30	7.02	20.24	1.0
AAQM-5	Nischantapur	6.00	19.0 0	0.8	0.07	0.09	1.17	6.07	19.09	1.97
AAQM-6	PanchPukhuria	7.00	12.0 0	0.8	0.04	0.05	0.35	7.04	12.05	1.15
AAQM-7	Nirbhayapur	6.00	29.0 0	0.7	0.13	0.15	1.92	6.13	29.15	2.62
AAQM-8	Lohabazar	6.00	28.0 0	0.7	0.10	0.13	1.62	6.1	28.13	2.32
Max. impact of worst-case scenario		8.00	29.0 0	0.9	4.36	5.19	64.54	0.9	34.19	65.44
NAAQS of SO₂, NO₂, and CO as per CPCB in $\mu\text{g}/\text{m}^3$								80	80	2000

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

It was observed that GLC's of PM₁₀, PM_{2.5}, SO₂, NO₂ and CO are localized due to low wind speed and high calm conditions. It was observed that maximum GLC's of PM₁₀, PM_{2.5}, SO₂, NO₂ due to impact of all pollutants are found to be below the stipulated standards of CPCB/ MoEF&CC as shown in Table 4.3 and Table 4.4. The isopleths for incremental GLC's of PM₁₀, PM_{2.5}, SO₂, NO₂ and CO are superimposed on 10km radius of the study area are shown in following Figure 4.1, 4.2, 4.3, 4.4 & 4.5.

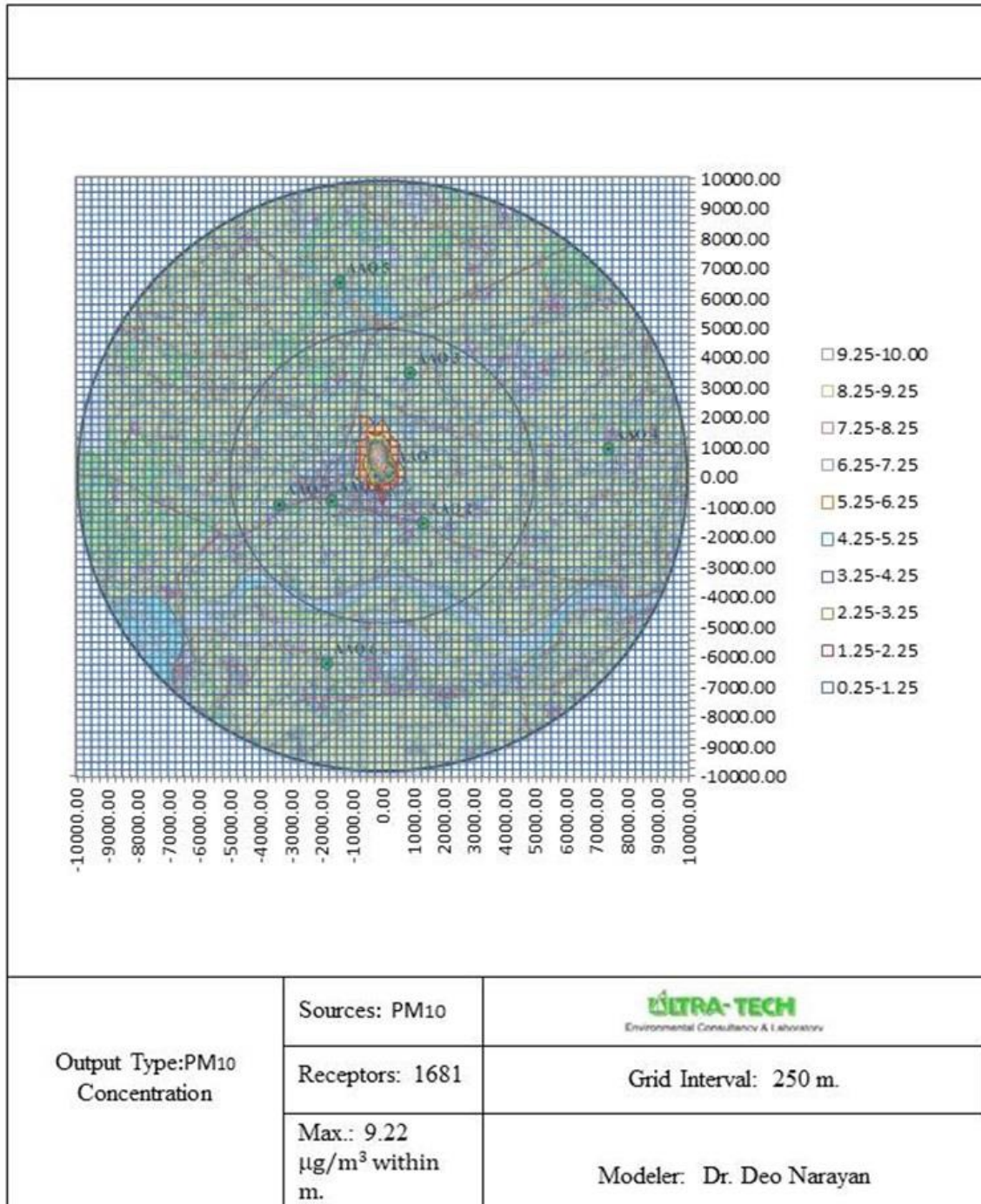


Figure 4.1: Isopleths of GLC's for PM₁₀ (µg/m³) are superimposed on 10km radius of the study area

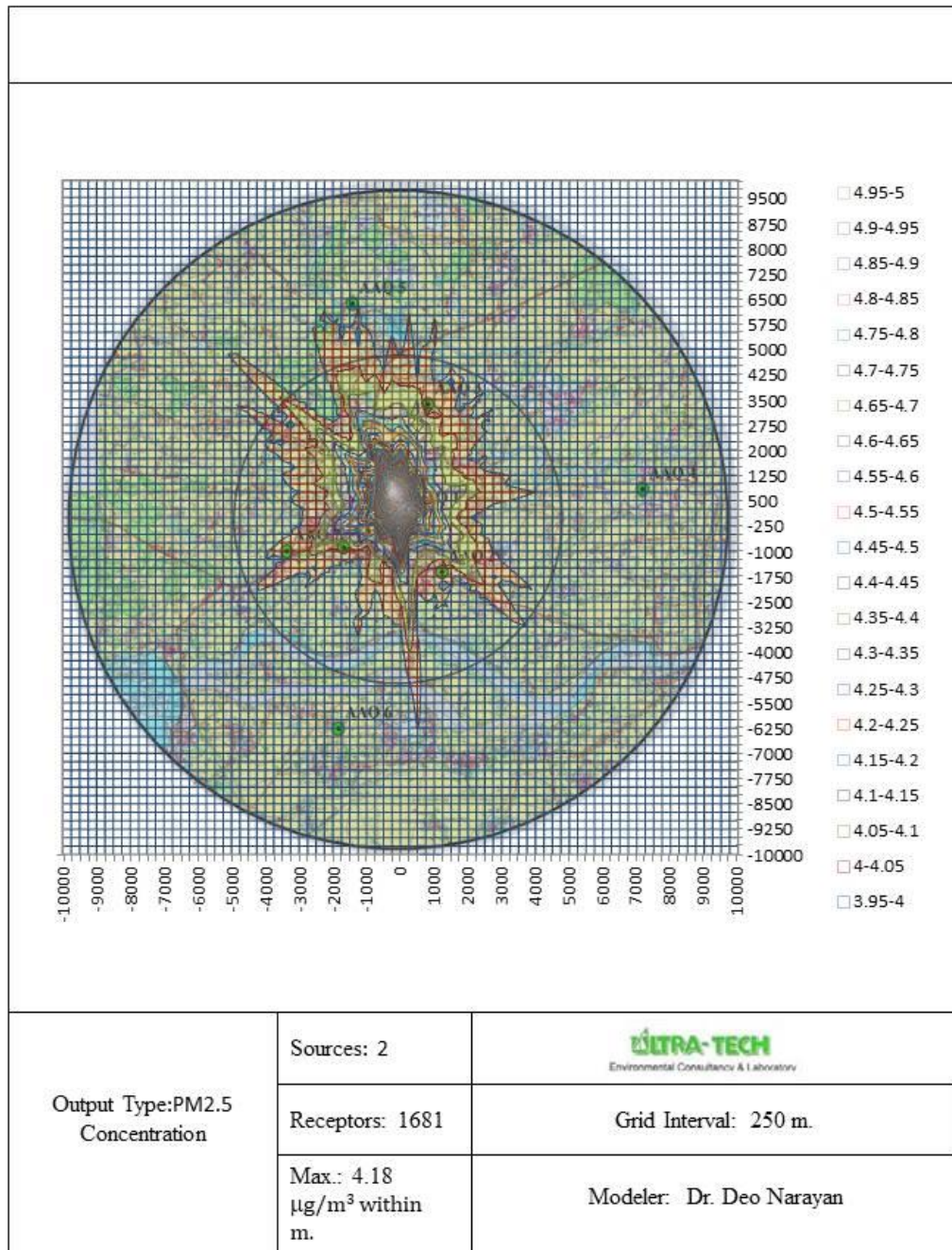


Figure 4.2: Isopleths of GLC's for PM_{2.5}(µg/m³) are superimposed on 10km radius of the study area

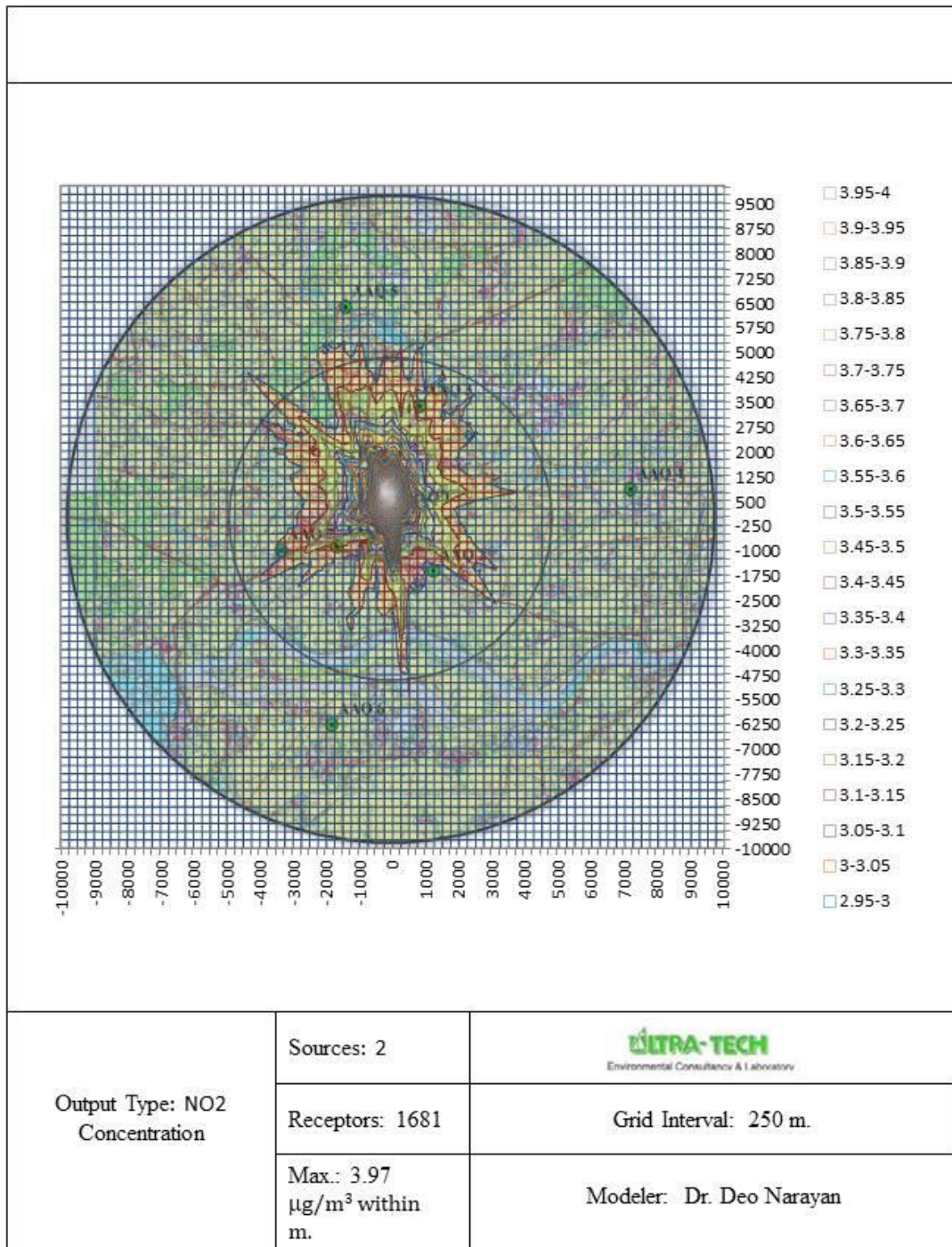


Figure 4.3: Isopleths of GLC's for NO₂(µg/m³) are Superimposed on 10km Radius of the Study Area

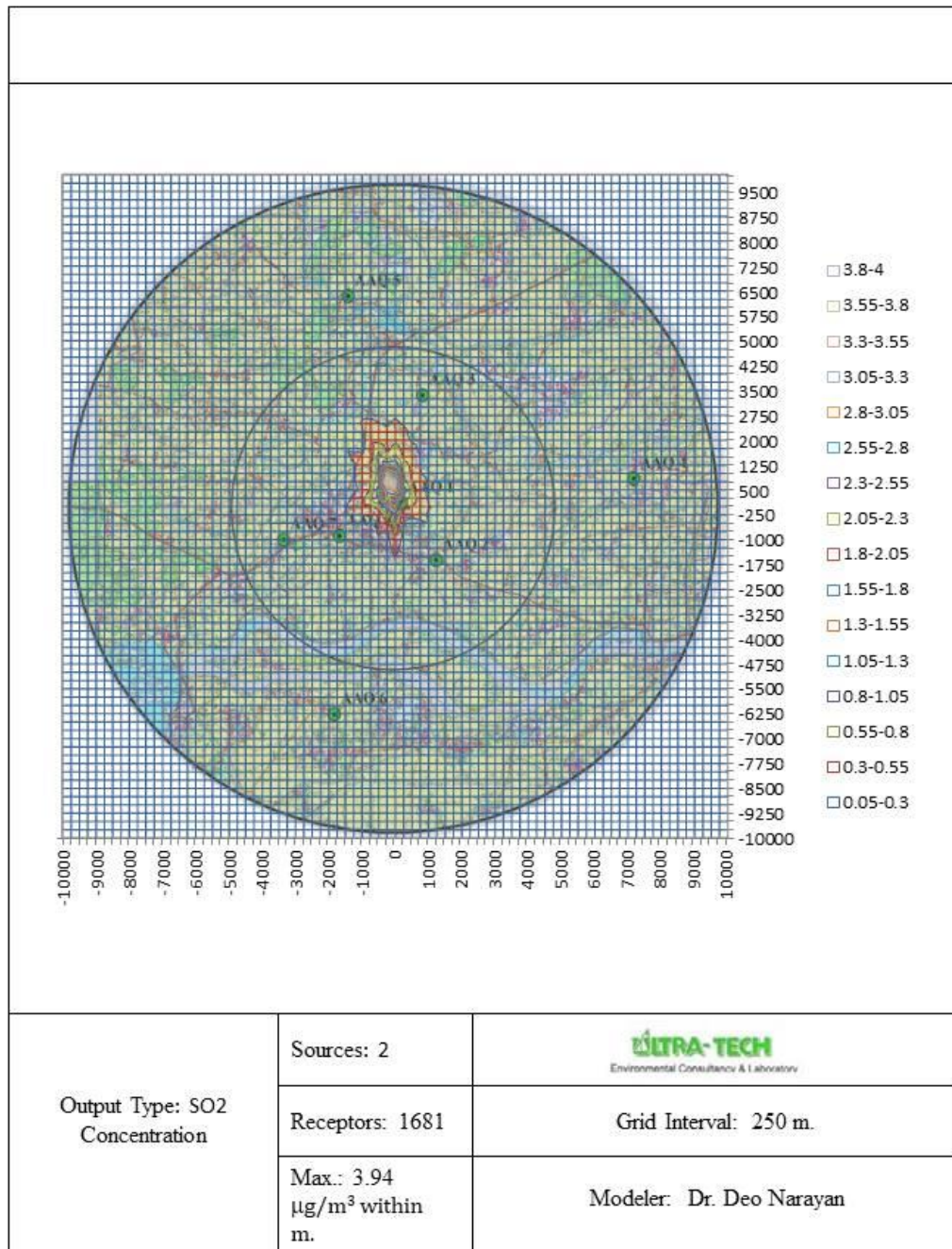


Figure 4.4: Isopleths of GLC's for SO2(µg/m3) are superimposed on 10km radius of the study area

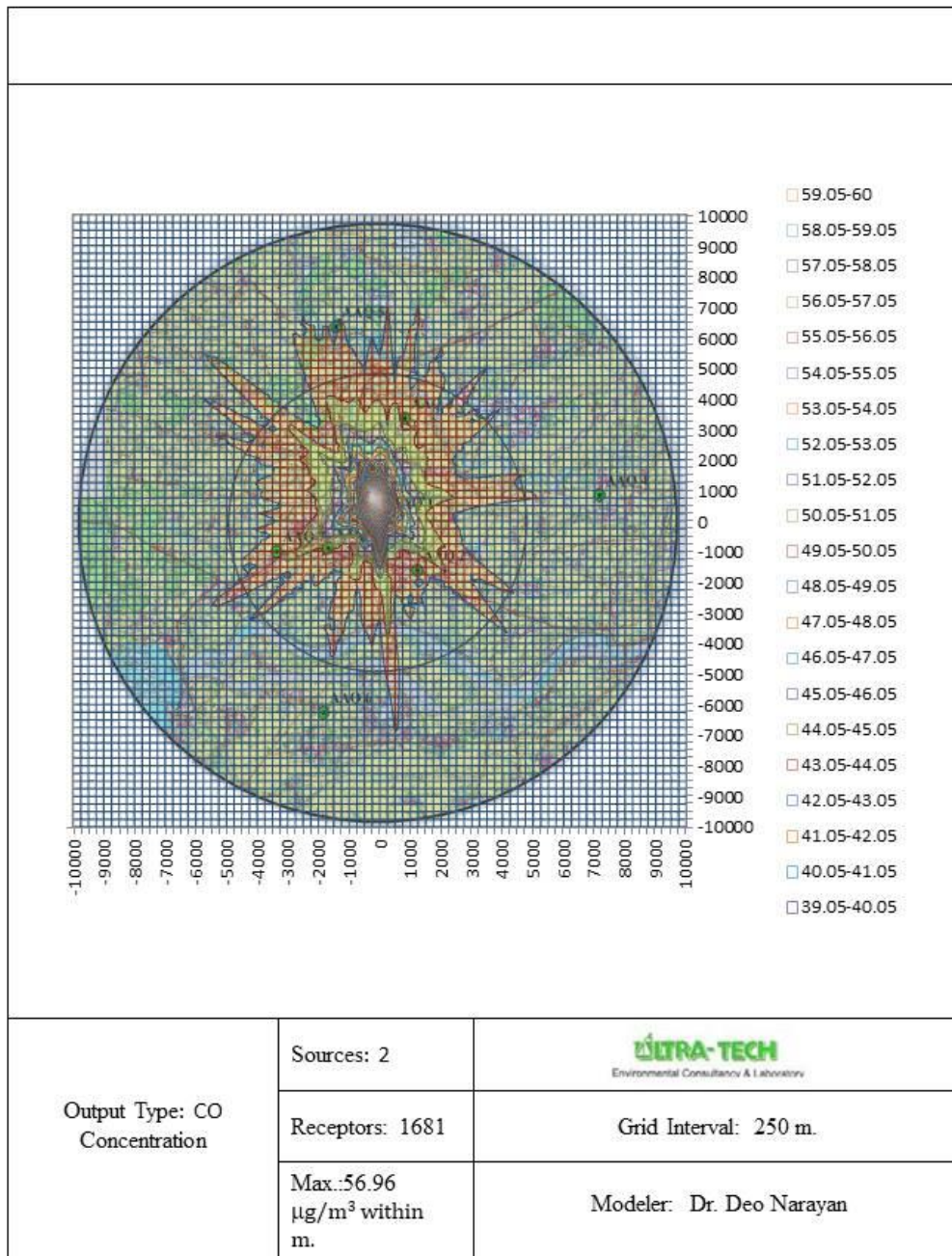


Figure 4.5: Isopleths of GLC's for CO($\mu\text{g}/\text{m}^3$) are superimposed on 10km radius of the study area

4.7.2 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 fire clay and china clay by trucks on Haul roads by using area and line source model 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 mineral by trucks on haul road over the length as discussed in Table 4.1. Total projected 24 hourly maximum GLC's of PM₁₀, PM_{2.5}, SO₂, NO₂ and CO are found to be **86.22 µg/m³, 33.76 µg/m³, 0.9 µg/m³, 34.19 µg/m³ & 65.44 µg/m³**.

These projected background concentrations due to proposed sand mining activities 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 sand mining project will not be degraded

4.8 Impact Mitigation Measures for Air Environment

- Water sprinkling for suppression of dust on road
- Adequately maintained vehicles with PUC certificates should be used for transportation, if required trucks should be covered with tarpaulin.
- Sprinkling of water on road for dust suppression.
- Green belt plantation and other tree plantation will help in reducing the air quality, noise, traffic related pollution and heat island effects.
- Vehicles to be serviced regularly and maintained properly to avoid any unwanted generation of air pollution, noise or vibration from vehicles.
- Regular monitoring of the air quality and noise levels as per the monitoring plan detailed in this EIA report shall be adopted during the operation phase, to ensure that, the noise levels are within the limits prescribed by CPCB.

Table 4.5: Ambient Noise Quality Monitoring Results

Sr.No	Location	Day Leq	Night LEq	Incremental Noise	Projected Noise dBA Day time	Projected NoisedBA Night time
AAQNS -1	At Project Site	53.9	43.5	1.68	55.58	45.18
AAQNS -2	Kedarpur	52.4	41.2	1.34	53.74	42.54
AAQNS -3	Tentulia	49.4	40.4	1.24	50.64	41.64
AAQNS -4	Bajitpur	53.2	38.9	1.04	54.24	39.94
AAQNS -5	Nischantapur	51.5	41.3	1.09	52.59	42.39
AAQNS -6	PanchPukhuri a	53.7	40.6	1.06	54.76	41.66
AAQNS -7	Nirbhayapur	51.9	42.3	1.25	53.15	43.55
AAQNS -8	Lohabazar	54.9	43.0	1.35	56.25	44.35

Trucks carrying china clay and fire clay mineral plying on haul road having the maximum source strength of 75dB(A) has been considered for noise prediction at all ambient noise quality locations.

The projected noise levels as shown in above **Table 4.5** are found to be within the stipulated limits of National Ambient Noise Quality Standards of CPCB, New Delhi.

4.9 Impact 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.
- Regular monitoring of the noise levels as per the monitoring plan detailed in this EIA report shall be adopted during the operation phase, to ensure that, the noise levels are within the limits prescribed by CPCB.

4.10 Impact on water Environment

- **Impact on Surface Water Resources**

Surface water source such as rivers, 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 Fire clay and China clay mining operation water will be mainly used for domestic purpose, dust suppression, plantation and washing of heavy earth moving machineries. Only 47.8 KLD of water will be used for this purpose. The water required for dust suppression and plantation purpose will met through the rain water which will be stored in the exhausted mining pits. Only about 3.70 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 unreclaimed pit is proposed to be developed as per approved final quarry closure plan.

4.11 Impact on Biological Environment

Impact on Flora

- As it is a mining project of fire clay & China clay 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, whereas activities related to mining as transportation of material and passage of workers to and from mining area will have an adverse impact on the road side flora.
- Significant reduction in total chlorophyll content at road side plant species affects the plant species by affecting the plant metabolism. The reduction in chlorophyll concentration corresponds directly to the reduction in plant growth.
- The run-off from the roads may affect the aquatic communities.

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.

- There is no National Park & Sanctuary within the 10 km study but 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.

4.12 Impact on Socio-Economics

No doubt setting up a project of some sort will have a significant impact on the socioeconomic and cultural life of the people in the project area. Here an attempt is made to envision and evaluate the tentative results that the project is likely to yield. The possible impacts are described below due to the operation of the project:

▪ Positive outcomes

Mining is the foundation of building the country's economy. As given below the proposed project has the following benefits:

- Mining is the basis of the economy of the country. The following benefits are given as set out below for the proposed project.
- Jobs for local persons.
- Pay the tax on the state government. GST, cessation of wages, levies, etc. in the form of excise duty.
- Sand may be used to build roads, bridges, buildings, etc.
- The generation of the market is coming back.
- Appropriate EMF funds will boost the productivity of the environment.

- CSR funds may be used for the welfare of people in villages.
- The new project would contribute to the enhancement of the facilities that will attract the company's houses.
- Mining operations will help to establish a local socioeconomic scenario.
 - **Negative outcomes**

Due to the planned activity of the project, the population inflow would increase during the construction period. This could lead to a strain on infrastructure resources in the area, as well as an increase in the local population. However, this consequence is of a limited time and a temporary nature only.

- During the construction process, increased levels of dust and other air pollutants can lead to health problems.
- Noise pollution can be caused by vehicle traffic and construction activities.
- Appropriate mining may have detrimental effects on local soil and groundwater.
- Unnaturally high concentrations of chemicals such as arsenic, sulphuric acid, and mercury over a wide area of surface or subsurface water are not taken until sufficient action is taken.

Runoff containing these chemicals can lead to the destruction of the surrounding vegetation

- **Mitigating intervention**

To mitigate the adverse impacts likely to occur in the local area due to the proposed and current project activities, an effective mitigation plan must be established. The following recommendations are as follows:

- **Before and after the initial phase:**

- The contact with the local community should be institutionalized and carried out daily. The forum will provide opportunities to address local critical issues and to train programmers for shared benefits.
- Relevant Information on the planned and current development plan, community services, etc should be conveyed to the local community in the form of booklets and audio-visuals.
- According to the expectations of the local citizens, staff, project officials, should carry out CER activities in the local region.

- ***Impact Mitigation Measures for Land Environment***

The mitigation measure of the land environment includes:-

- Before the mining activity the top soil 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 be converted into water reservoir to supply water for local use like irrigation and pisciculture.
- Due to manual mining operation emission from the farship patharmines are very less, there will be no impact on the surrounding soil quality and cropping pattern of the area.
- The proposed project falls under the seismic zone –II (Low Hazard Risk Zone). 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 behavior of the area.

➤ ***Impact Mitigation Measures for Air Environment***

The mitigation measures undertaken in the mine for control of air pollution are:

- Water sprinkling for suppression of dust on road
- Adequately maintained vehicles with PUC certificates should be used for transportation, if required trucks should be covered with tarpaulin.
- Sprinkling of water on road for dust suppression.
- Green belt plantation and other tree plantation will help in reducing the air quality, noise, traffic related pollution and heat island effects.
- Vehicles to be serviced regularly and maintained properly to avoid any unwanted generation of air pollution, noise or vibration from vehicles.
- Regular monitoring of the air quality and noise levels as per the monitoring plan detailed in this EIA report shall be adopted during the operation phase, to ensure that, the noise levels are within the limits prescribed by CPCB.

➤ ***Impact 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

➤ ***Impact Mitigation Measures for Biological Environment***

Flora

- Plantation will be carried out on approach roads and nearby vicinity of core zone
- Native plant species which are stress and pollution tolerant and comparatively well acclimatized should be grown along roadsides. for selection of plant species it is necessary to consider certain factors as agro climatic suitability, height and canopy architecture, growth rate and habit and aesthetic effect (foliage, conspicuous and attractive flower color).
- Annual bio-monitoring of roadside plants exposed to vehicular pollution will be done to check the dust load and Air Pollution Tolerance Index (APTI)

Fauna

- All equipment should have sound-control devices no 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 compressor noise.
- As the mining site has no vegetation, thus clearance of vegetation is not required.
- Thus there will be no loss for wildlife.
- Large woody debris in the riparian zone will be left undisturbed or replaced when moved and not be burnt.
- Operation and storage of heavy equipment within riparian habitat will be restricted.

4.13 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 4.5**.

Table 4.5: Summary of Impacts and Mitigation Measures

Activity	Environmental Attributes	Causes	Impact Characteristics			
			Nature	Duration	Reversibility	Significance & Mitigation measures
Transportation of Fire clay & China clay	Air quality (PM and gaseous emissions)	Transportation of Fire clay & China clay in trucks & exhaust emission from vehicles	Direct Negative	Short Term	Reversible	Medium, Regular emission checks will be performed.
	Noise levels	Noise generation from vehicles	Direct Negative	Short Term	Reversible	Insignificant, if regular vehicle maintenance is done.
	Risk	Risk of accidents during transit	Direct Negative	Long Term	Irreversible	Insignificant, if safety measures are taken to prevent accidents
Mining activities / laying of Haulroads	Air quality (PM and gaseous)	Operation of machinery, blasting & others	Direct Negative	Short Term	Reversible	Insignificant, if regular water sprinkling can be done
	Noise levels	Generation from use of machinery, blasting	Direct Negative	Short Term	Reversible	Insignificant, if properly maintained machineries can be used and PPEs to be provided to workers
	Ecology	Loss of vegetation	Direct Negative	Short Term	Reversible	Insignificant, No cutting of trees and green belt development is envisaged.
Waste water discharge	Water	Only Domestic waste water	Direct Negative	Long Term	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	Long Term	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	Long Term	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

Activity	Environmental Attributes	Causes	Impact Characteristics			
			Nature	Duration	Reversibility	Significance & Mitigation measures
						several local conveyance trips and trucks loadings will be handled every day.

4.14 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 4.6** 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 4.6: 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 limestone 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 oppurtunities	√				
14.	Quality of life	√				
15.	Economic output	√				
16.	Occupational health					√

Major activities carried out during proposed project and its interaction with various environmental components and degree of impact it makes on the environment is shown in Table 4.6.

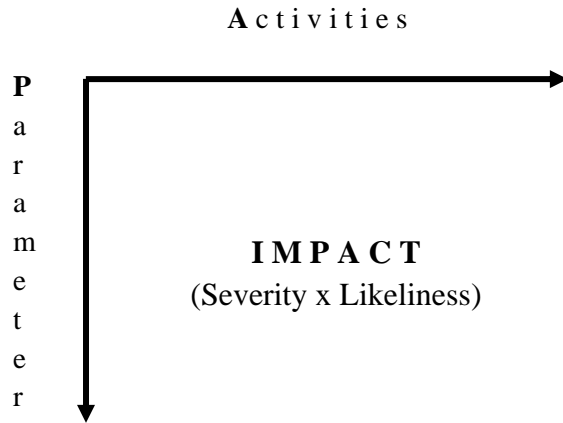


Table 4.7: Environmental Aspect Impact Matrix

Activities/ Parameters	Construction Phase	Operation Phase
Land/Soil	No construction activities are involved in the proposed limestone mining projects	3 x 2
Natural drainage		3 x 1
Air quality		3 x 3
Surface/Ground water		3 x 2
Noise		3 x 3
Terrestrial ecology		3 x 2
Local population		3 x 3
Occupational Health		3 x 2

Likelihood		Severity	
1	Remote	1	Negligible Impact
2	Probable	2	Slight Impact
3	Particular phase	3	Considerable Impact
4	Repetitive	4	Significant Impact
5	Permanent	5	Highly Significant Impact

1 to 5	Insignificant and Reversible
6 to 10	Significant and Reversible
11 to 15	Insignificant and Irreversible
16 to 20	Significant and Irreversible
21 to 25	Highly Significant & Permanent
No Effect	No Effect

Environmental Impact	Environmental			Beneficial	Adverse	Problematic	Short-term	Long-term	Reversible	Irreversible
	No Effect	Positive Effect	Negative Effect							

Environmental Impact	No Effect	Positive Effect	Negative Effect	Beneficial	Adverse	Problematic	Short-term	Long-term	Reversible	Irreversible
Soil characteristics							√			
Natural drainage	√									
Conformity to Regional Plans	√									
Air Quality			√				√		√	
Surface/Ground Water	√									
Noise			√				√		√	
Wild Life	√									
Endangered Species	√									
Natural Vegetation	√									
Exotic Vegetation	√									
Local population		√					√			
Recreation	√									
Health & Safety		√								
Transportation			√				√		√	

4.14.1 The survey and study for conservation of pond canal and other water bodies & action plan

There will be no damage of any kind to the pond and other nearby water bodies during the operation of the mine by us.

- (1) No contaminating water is generated from the applied mine, that is, no contaminating water will flow into any natural water source, drain, pond etc.
- (2) Septic tanks and soak pits will be provided for disposal of domestic waste generated from mine office.
- (3) For the conservation of water, it will be released in other sources only after being treated through garland drain and settling tank around the mine.
- (4) The rain water accumulated inside the mine will be treated and made available to the villagers as per requirement.

- (5) Dense tree plantation will be done all around the mine boundary of the mine.
- (6) As far as possible trees will be planted around the pond.
- (7) Blasting will be done as per scientifically controlled parameter with low intensity for protection against dust, fly rock and bhukampam, so that there is no impact on the pond, canal or human beings.
- (8) Transportation of Minerals from Mines, P.U.C. The received vehicles will be covered by tarpaulin.
- (9) Regular water sprinkling will be arranged to prevent dust etc. from the mine on the way of transportation.

The mine will be operated strictly following all the above points so that there is no impact on the village pond, canal and other nearby water bodies etc.

4.15 Conclusion

From the above, it can be concluded that, the Fire clay & China clay mining activity in the proposed mining lease area will not create any significant negative impact on physical features, water and air environment. Proposed plantation will improve the aesthetic look and ecology of the surrounding environment. The proposed project will generate direct 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.

CHAPTNER 5 .Analysis of Alternatives (Technology & Site)

Selection of suitable site for a project is as important as selecting a technology and suppliers. The proposed cluster area for mining lease area is situated at Khariavillage in Birbhum district of West Bengal state. The proposed mining lease covers an area of 7.20 Ha of M/s. Sharma Minerals Joypore, Fire clay & China clay Mine.

Therefore, alternate sites have not been assessed. The mining technology is Open cast semi-mechanized method of mining with Loader cum Excavator and Dumper.

This project is being granted to the respective project proponents by the Mining Department, Govt. of West Bengal in the approved mineralized zone. This project is away from habitation & located on maximum non productive land, hence this is best suitable for mining activity. For recovery of mineral the procedure used here is the traditional method and as labour intensive, this is adopted for the site proved as the best practice.

CHAPTER 6. Environmental Monitoring Program

6.1 Introduction

This chapter presents the details of environmental monitoring, schedule, institutional arrangements for pollution control and cost for environmental protection measures for the proposed project.

6.2 Environmental monitoring

The environmental monitoring is important in terms of evaluating the performance of pollution control equipments installed in the project. The sampling and analysis of the environmental attributes will be as per the guidelines of Central Pollution Control Board/West Bengal Environment Conservation Board (CECB). The frequency of sampling and location of sampling will be as per the directives of CPCB/CECB.

Environmental monitoring will be conducted on regular basis by the lessees included on the cluster to assess the pollution level in the surrounding area. Usually, as in the case of the study, an impact assessment study is carried over short period of time and the data cannot bring out all variations induced by the natural or human activities. Therefore, regular monitoring programme of the environmental parameters is essential to take into account the changes in the environment.

6.3 Objective of environmental monitoring:

- To verify the result of the impact assessment study in particular with regard to new developments;
- To follow the trend of parameters which have been identified as critical;
- To check or assess the efficacy of the controlling measures
- To ensure that new parameters, other than those identified in the impact assessment study, do not become critical through the commissioning of new installations or through the modification in the operation of existing facilities;
- To check assumptions made with regard to the development and to detect deviations in order to initiate necessary measures; and
- To establish a database for future Impact Assessment Studies for new projects.

The attributes, which require regular monitoring, are specified as mentioned below:

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

6.4 Monitoring Schedule & Parameters

A large part of the sampling and measurement activities will be concerned with long term monitoring aimed at providing an early warning of the undesirable changes or trends in the natural environment that could be associated with mining and allied activities. This is essential to determine whether the changes are a response to a cycle of climatic conditions or due to mining activities.

In particular, a monitoring strategy is required to ensure that all environmental resources, which may be subjected to pollution, are kept under review. Monitoring of the individual elements of the environment is necessary.

To meet the above objectives, an “Environmental Management Cell (EMC)” will be formed, which will be responsible for implementation of EMP and Post operating monitoring. The analysis of the data collected during the preceding month and progress of environmental management system will be reviewed. The following items will be considered under monitoring schedule is given in following Table -6.1

Table 6.1 : Post Project Environmental Monitoring Plan

Attributes	Sampling		Measurement Method	Test Procedure	Responsibility
	Network	Frequency			
Air Environment					
Meteorological Monitoring (Wind Direction , Relative Humidity, Rainfall)	One station at site	Regularly	Mechanical/Automatic Weather Station	Mechanized station	Environmental Officer/ Mines Manager
PM ₁₀ and PM _{2.5}	8 locations in the project impact area (Minimum 4 locations in upwind side, 3 sites in downwind side)	Twice in a year	IS 5182 (Part-23) 2006, Gravimetric CPCB Guidelines For Ambient Air Monitoring	As per CPCB norms	Environmental Officer/ Mines Manager
SO ₂			IS 5182 (Part-II) 2001, Reaff. 2006	As per CPCB norms	
NO ₂			IS 5182 (Part-Vi) 2006	As per CPCB norms	
Water Environment (Surface and Ground Water)					
pH (at 25 ⁰ C), Color, Turbidity, Odour, Taste, Total Dissolved Solid, Alkalinity, Chloride, Total Hardness, Sulphate, Nitrate, Iron, Fluoride, Magnesium,	4 Set of grab Samples for ground and 4 sets of surface water in the vicinity of the project site	Twice in a year	As per IS: 10500: 2012, APHA and IS	As per CPCB norms	Environmental Officer/ Mines Manager

Attributes	Sampling		Measurement Method	Test Procedure	Responsibility
	Network	Frequency			
Boron, Chromium, Copper, Manganese Nitrate, DO, BOD (except GW), Total Coliforms, E Coli					
Noise					
Noise levels at Day & night time - Leq dB (A)	8 locations (1 location within Mine boundary, High noise generating areas within the lease and 7 locations of nearest habitation)	Twice in a year	Using Sound Level Meter (SLM)	As per CPCB norms	Environmental Officer/ Mines Manager
Soil					
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	8 locations in the project impact area	Twice in a year	As per USDAMethod, APHA and IS	As per CPCB norms	Environmental Officer/ Mines Manager
Socioeconomic					
CSR related	In nearby villages	Yearly	Data collection on the amount spent on CSR activities in the villages	Primary (Questionnaires) and Secondary Survey.	Environmental Officer/ Mines Manager
Flora and Fauna					
Inventory of Flora and Fauna in the area	In core zone, afforested area	Yearly	Visual Observation and Log Book of Plantation	Through Monitoring (personal survey)	Environmental Officer/ Mines manager
Occupational Health of Mine Workers					
Periodical Medical Check Up	-	Schedule given in Section 6.4.2	Medical checkup by Doctor	Medical report	Safety Officer/ Mines Manager

6.4.1 Occupational Health Check Up

Medical Examination

The following medical examinations are recommended

- X – Ray of chest to exclude pulmonary TB, Silicosis etc.
- Lung Function test
- Audiometric test to check hearing losses
- Urine test, blood test, blood sugar etc.
- Eye test

6.4.2 Schedule of Health Check Up

The following schedule for medical checkup is recommended:

- Persons working as operators in the mine pit : Once in a Year
- Persons working as worker and supervisory staff: Once in Year
- Persons working outside mine pit: Once in Year

6.5 Monitoring Methods and Data Analysis

All environment monitoring and relevant operational data will be stored in a relational database. Regular data extracts and interpretive reports will be sent to the regulator.

Air Quality Monitoring and Data Analysis

The concentration of air borne pollutants in the workspace / work zone environment will be monitored periodically. If concentrations higher than threshold limit values are observed, the source of fugitive emissions will be identified and necessary measures shall be taken. If the levels are high suitable measures as detailed in EMP shall be initiated. Any abnormal rise will be investigated to identify the causes, and appropriate action will be initiated. Greenbelt shall be developed for minimizing dust propagation.

Water and Wastewater Quality Monitoring and Data Analysis

Methods prescribed in "Standard Methods for Examination of Water and Wastewater" prepared and published jointly by American Public Health Association (APHA), Indian Standards, standards prescribed by CPCB and WBPCB are recommended.

Monitoring Equipment and Consumables

Regular environmental monitoring will be outsourced to a MoEF&CC/NABL recognized laboratory.

Green belt and afforestation areas

Continuous vigilance and monitoring of green belt will be done for its performance and survival rate. Watch and ward personnel will properly guard the plantation. Provision will be made for fertilizers application and watering on schedule.

SOCIO-ECONOMICS

Gravity modeling (traffic density) studies will be done with the objective to know about the interaction of nearby situated towns. Central Place Hierarchization studies (studies related to change in amenities/services etc.) would be conducted to know about the socio-economic status of the villages along with the above-mentioned studies at every five-year interval.

6.6 Cost Provision for Environmental Measures

The total project cost for the proposed project is about Rs. 200 lacs (as per approved mining plan). Total EMP cost is 10 lakhs which is 5% of total project cost. Out of this, Rs 6.50 lakhs as capital cost and 3.50 lakhs as recurring cost will be spent on environment protection, management, pollution control and monitoring systems, appropriate budgetary provision would be made and provision for recurring expenditure for environment management of the project would be made.

The details of budget allocation during functional phase are given in **Table 6.2**.

Table 6.2: Expenditure Proposed for Environmental Protection Activities

S. No.	Particulars		
		Capital Cost in Rs	Recurring Cost in Rs
1.	Environmental Monitoring	-	2,40,000
2.	Green Belt Development	5,50,000	50,000
3.	Maintenance of Road	-	20,000
4.	Sprinking in haul road	50,000	-
5.	Facilities for Mine workers	50,000	40,000
	Total ::	6,50,000	3,50,000
	Total Capital Cost in Rs	6,50,000/-	
	Total Recurring Cost in Rs	3,50,000/-	
	Total Cost of EMP in Rs	10,00,000/-	

Note : Details Budgetry calculation given in Chapter – 10.

CHAPTER 7. Additional Studies

This chapter includes the details of the additional studies such as the Occupational health and safety, Risk Analysis, Emergency Response and Disaster Management Plan.

7.1 Public Consultation

Public consultation refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. All Category 'A' and Category 'B' projects or activities under Schedule II of the EIA Notification, dated 14th September 2006 will undertake public consultation.

The proposed mining project falls under Category 'B', which requires EIA studies as well as public consultation.

The public consultation will ordinarily have two components comprising of public hearing at the site or in its close proximity- district wise, to be carried out in the prescribed manner and obtaining responses in writing from other concerned persons having a possible stake in the environmental aspects of the project or activity.

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

7.2 Occupational Health and Safety

7.2.1. Occupational Health

The occupational health problems envisaged can mainly be due to accident and noise. To overcome these hazards, in addition to arrangements to reduce it within TLV's, necessary protective equipment's will be supplied to workers.

• Operation and Maintenance

The problem of occupational health, in the operation phase is primarily due to noise which could affect hearing. The necessary personal protective equipment will be given to all the workers. The working personnel will be given the following suitable personnel protective equipment:-

- 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.

7.2.2. Safety Plan

Safety of both men and materials during construction and operational phase is of concern. Safety plan is prepared and implemented in the mine. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster is possible due to collapse of structures and fire/explosion etc.

Keeping in view the safety requirement during operation and maintenance phases formulates safety policy with the following regulations:

- To allocate sufficient resources to maintain the safe and healthy condition of work;
- To take steps to ensure that all known safety factors are taken into account in the design, operation and maintenance of machinery and equipment;
- 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 inform employees about materials, equipment or processes used in their work which are known to be potentially hazardous to 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;
- Provision of enclosures and hoods to noise generating equipment wherever possible;
- Controlled blasting techniques with optimum quantity of explosive and 100% use of non-electrical initiation system;
- Secondary blasting will be totally avoided;
- Blasting will be carried out in the afternoon during less human activities;
- A thick tree belt will be provided in phased manner around the periphery of the mine to attenuate noise;
- Trees will be planted on both sides of haul roads;
- Personal Protective Equipment will be provided to the workers;
- Overcharging will be avoided;
- Periodic monitoring of vibration will be carried out; and
- Drilling parameters like burden, depth, diameter and spacing will be suitably designed to give proper blast.

7.2.3. Safety Organization

A qualified and experienced safety officer will be appointed. The responsibilities of the safety officer include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions. In addition to employment of safety officer by industry, every contractor, will also employ one safety officer to ensure safety of the worker, in accordance with the conditions of contract.

- **Operation and Maintenance Phase**

When the construction is completed the posting of safety officers will be in accordance with the requirement of Mines Act and their duties and responsibilities shall be as defined thereof.

7.2.4. Safety Circle

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles are constituted in each area of work. The circle consists of 5-6 employees from that area. The circle normally will meet for about an hour every week.

7.2.5. Safety Training

Safety training will be provided by the Safety Officers with the assistance of faculty members called from Professional Safety Institutions and mines VT center. In addition to regular employees, contractor laborers will also be provided safety training. To create safety awareness safety films shown to workers and leaflets distributed. Some precautions and remedy measures that are proposed to prevent the fire-radiation are:

- Compartmentalization of cable galleries, use of proper sealing techniques of cable passages and Srevicees in all directions would help in localizing and identifying the area of occurrence of fire as well as ensure effective automatic and manual fire-fighting operations;
- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries;
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and fire-fighting; and
- Proper fire watching by all concerned would be ensured.

7.2.6. Health and Safety Monitoring Plan

The health of all employees will be monitored as per provision of mines rules for early detection of any ailment due to exposure to dust, heat and noise.

7.3 Risk Assessment

Risk is the probability of harmful consequences or expected losses resulting from the interaction between natural or human induced hazards and vulnerable conditions. Risk assessment is a methodology to determine the nature and extend of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat or harm to people, livelihood and the environment on which they depends. The objectives of risk assessment are:-

- (i) Assessing risk levels due to the Fire clay & china clay mining
- (ii) Identification of the risk mitigation measures to bring the potential risk within the acceptable range
- (iii) To suggest general safety improvement measures
- (iv) To identify emergency scenarios and suggest mitigation measures

It is necessary to manage the risk to minimize the after effects or losses to be confronted. Risk management refers to the practices, policies and procedures designed to minimize or eliminate the unacceptable risk. It is helpful to think of risk management as being a process of determining the exposure to risk, and the initiating action to either minimize or eliminate the risk. The Risk Assessment and Management Plan are to be implemented to eliminate the risk and its consequences on the proposed Fire clay & china clay mining project.

Objective

The objectives of Disaster Management Plan (DMP) is to describe the emergency preparedness organization, the resource availability and response actions applicable to deal with various types of emergencies that could occur at the mine with organization structure being deployed in shortest time possible during the emergency. Thus, the overall objectives of the emergency plan are summarized as:

- a) Rapid control and containment of hazardous situation;
- b) Minimizing the risk and impact of event/accident; and
- c) Effective prevention of damage to property.

In order to achieve effectively the objectives of emergency planning, the critical elements that form the backbone of Disaster Management Plan (DMP) are:

- Reliable and early detection of an emergency and immediate careful planning;
- The command, co-ordination and response organization structure along with availability of efficient trained personnel;
- The availability of resources for handling emergencies;
- Appropriate emergency response action;
- Effective notification and communication facilities;
- Regular review and updating of DMP; and
- Protect training of the concerned personnel.
- Minimizing the effects may include rescue, first aid, evacuation, rehabilitation and giving information promptly to people living nearby and scrutinized information's to media

7.3.1 Hazard Identification

The following types of hazards are identified at Fire clay & China clay mine:

1. Inundation in rainy season due to seasonal nallas adjacent river and barrier gets breached or when impermeable barriers are removed; and
2. Failure of slope of benches or dumps giving rise to slide of material.

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

Yes, the case of fire in equipment could be a possibility and for which emergency plan must be prepared and this be controlled to quench 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.

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. The identification of various hazards is shown in **Figure-7.1** and the hazards are discussed below:

Blasting

Fire clay & china clay is layered deposit which will be excavated manually with the help of hand tools. Therefore, no blasting will be conducted.

Overburden

The overburden dumps may cause landslides. High overburden dumps created at the quarry edge may cause sliding of the overburden dump or may cause failure of the pit slope due to excessive loading, thereby causing loss of life and property. Siltation of surface water may also cause runoff from the overburden dumps.

Heavy Machinery

Most of the accidents during operation of dumpers, excavators and dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

Water Logging

Water logging in the mine site can be avoided by adopting following measures:

- Position of water body should be correctly known;
- Water from the surface water bodies should not be allowed to enter in the mine;
- Draining of mine water by suitable capacity pumps; and
- Surface water bodies should be correctly marked together with their highest flood level on the mine.

7.3.2 Safety Measures

Safety Measures at the Proposed Opencast Mining Project

- The mine will be fully 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 quarry 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);
- The gradient of the haul road inside the pit, access trench and on the dumps will not be steeper than 1 in 16;

- The ultimate slope of the sides of the OB dump to the horizontal will not exceed 28° , and the height of the OB dumps will be restricted to a max of 1 m height each with proper terracing;
- The quarries will be protected by garland drains around the periphery for storm water drainage and to protect the inundation of mine pit due to external run-off; and
- All mining operations both within the quarry and outside will be conducted as per the conditions laid down by DGMS and under the strict supervision of competent persons appointed under Metaliferous Mines Regulation, 1961.

Measures Suggested to Avoid Accidents due to Blasting- Blasting Not Applicable

Measures to Prevent the Danger of Overburden

- To prevent the failure of overburden slopes, especially during the rainy season, the following precautions will be taken;
 - ✓ 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.

Responsibility

As per the present practice, guidelines as laid down by DGMS and other competent regulatory agencies and the provisions of safety precautions as laid down in Metalliferous Mine Regulation 1961 will be followed while undertaking the mining operations.

Mining equipment, carry on-board fire-fighting devices. A mobile service van will be deployed to take care of maintenance operations and a mobile diesel tanker supplies fuel to machinery. Personal protective equipment like safety helmets, safety shoes, safety belts, goggles, dust masks, gloves, ear muffs, etc. are regularly provided for adequate protection to workers during mining operations. Entry of the unauthorized personnel is completely prohibited.

Infrastructure like first aid room, emergency van will be provided. All other issues like administrative matters will be dealt from the proposed mine.

Personnel are regularly provided adequate training to likely safety hazards in mine. The company will organize and participate in mines safety week, Mines Environment and Mineral Conservation (MEMC) week celebrations from time to time. The latest developments are discussed on such occasions and their implementation programs re chalked out.

Site Emergency Plan to ensure safety measures will be taken for the persons employed in the mine and the general public living in the vicinity of the mine premises.

The proposed onsite emergency plan is given below:

A. Duties and Responsibilities of Mines Manager

He is overall in charge for all operational and administrative functions in case of any major emergency effecting mine. In the absence of Manager or till he arrives on site, Assistant Manager will assume overall responsibility. He will take decisions on all matters as given hereunder and till Mines Manager arrives at the site and shall be responsible for all operations.

- Essential communication and flow of information;
- Emergency control and rescue operation;
- Transportation, evaluation and logistics;
- First aid and medical facility;
- Relief and rehabilitation;
- Security;
- Public relations;
- Accommodation, catering and refreshment; and
- Investigation and statutory requirements.

B. Duties and responsibilities of Safety Officer/Assistant Manager

- Ensure safe working conditions at all times;

- Ensure safety of personnel engaged in emergency and rescue operations;
- Take care that rescue operations are being carried out in a safe manner;
- Isolate and cordon off all hazardous equipment/zones in the affected area;
- Remove effected personnel to first aid centre for medical attention;
- Bring to the notice of Mines Manager/Assistant Manager all unsafe conditions prevailing in the affected area; and
- Extend any other help as and when required.

C. Duties and Responsibilities of Shift-in-charge

- Immediately inform to mines manager, time office, and security officer;
- Inform all persons working in the mines at different locations;
- Ensure facilities like vehicles and ambulance; and
- Try to rescue, maintain order, salvage and contain.

Key Areas of Risk are:

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 signaling 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 contact details of the concerned authorities in case of an emergency are given in Table 7.1 .Also the distance from nearest Fire stations/ Police stations/etc is given in Tabl 7.2.

Table 7.1: Contact Details of the Authorities

Sl No.	Official/Service	Telephone Numbers
1.	Police Station	3462260226
2.	Fire services	101
3.	Emergency (Police, Medical and Fire)	102/108
4.	District Relief Control	03462255100
5.	District Magistrate	03462-255222

To carry out/ implement the above responsibilities the mines department will employ required staff and executives which will be strengthened further. The organizational structure to control emergencies is as follows:

7.3.3 On-Site Emmergency Planning

DMP in case of fire applicability is as under:

- **Code of Practice In Case Of Fire at Mine:**

Objective:-

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.

Line of Action

I. Any person who notices any sign of fire shall start shouting FIRE, FIRE (Aag, Aag) to seek assistance and also immediately take steps to give warning by blowing the siren continuously and take steps to extinguish the fire by using appliances available near the site.

II. Duties of Mine Official: -

The mine officials receiving the warning shall forthwith 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.

III. 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.

IV. 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 center after relieving the site incident controller of the responsibility for overall control.

The specific responsibilities of the site main controller include:

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

- j. To control rehabilitation of affected areas after the emergency.

Apart from the two site controllers, other works personnel will have key roles to play in the implementation of the emergency plan. These will include senior management of project not directly involved in the emergency, first aid, atmospheric monitoring staff, casualty reception staff and public relations staff to liaise with the media. All need to be aware at the emergency pre-planning stage of the precise nature of their roles.

Emergency Control Centers (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.

Emergency control centers will therefore contain the following:

- (a) In-charge of external telephone;
- (b) An adequate of internal telephones;
- (c) A plan of the works, to show:

Areas where there are large inventories of hazardous materials, if any;

- (i) Sources of safety equipment;
- (ii) The fire-fighting system;
- (iii) Site entrance and roadways, including up-to-date information on road works;
- (iv) Assembly points;
- (v) The location of the mine in relation to the surrounding community;
- (vi) Lorry parks and rail sidings.

- (d) Notepads, pens and pencils;
- (e) A nominal roll of employees;
- (f) A list of key personnel, with addresses, telephone numbers, etc.

The emergency control center should be sited in the areas of the minimum risk.

Action on Site

The primary purpose of the on-site emergency plan is to control and contain the incident and to prevent it from spreading to nearby area. It is not possible to cover every eventuality in the plan and the successful handling of the emergency will depend on appropriate action and decisions being taken on the spot. Other important aspects that are needed to be considered includes the following:

(a) Evacuation

Non-essential personnel will be evacuated from the incident area and also from adjacent area. Evacuation should be to a predetermined assembly points in the safe point of the work.

(b) Accounting for Personnel

It is important to be able to account for personnel during an emergency. The number of workers present should always be made available. The area should be properly cordoned and exact record of movement of persons should be made, so as to know the affected persons. No unauthorized persons or visitors are allowed to enter the area.

(c) Access to Records

The time office has to function properly with handy records of persons on duty. This will be necessary in order that relatives of any causality can be quickly informed.

(d) Public Relations

Any incident will attract the interest of the media and a major accident is likely to involve widespread radio and television coverage. Unless appropriate arrangements are made, this can divert personnel from the task of handling the emergency. It is essential to make arrangements for the authoritative release of information during any emergency of significant length and a senior manager or member of the staff should be appointed as the sole source of this information. Inquiries made to other employees should be directed to this appointed person.

(e) Rehabilitation

The emergency will continue until all fires have been extinguished with no risk of re-ignition and gas cloud safety dispersed. Care is required when re-entering the incident area. The inspectorate may wish to initiate an inquiry and should be consulted regarding the collection of evidence before it is disturbed.

(f) Rehearsing Emergency Procedures

To remain in fully prepared all the time and to mock trials should be held at regular intervals. Training if needed must also be imparted to keep persons updated.

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.

7.3.4 Project Risk Assessment

The assessment methodology comprises the following key components:

- a) Identify risks: Identification of potential hazards associated with the China clay and fire clay mining.
- b) Analyze and Evaluate risks: Understand the nature of the harm that could be caused by the hazard, severity of the harm and its probability of happening.
- c) Treat risks: Implementation of the most effective control measures that is reasonably practicable in the circumstances.
- d) Summarize using a hazard and risk assessment in the form of a risk register.

The risk assessment approach is given inbelow :-

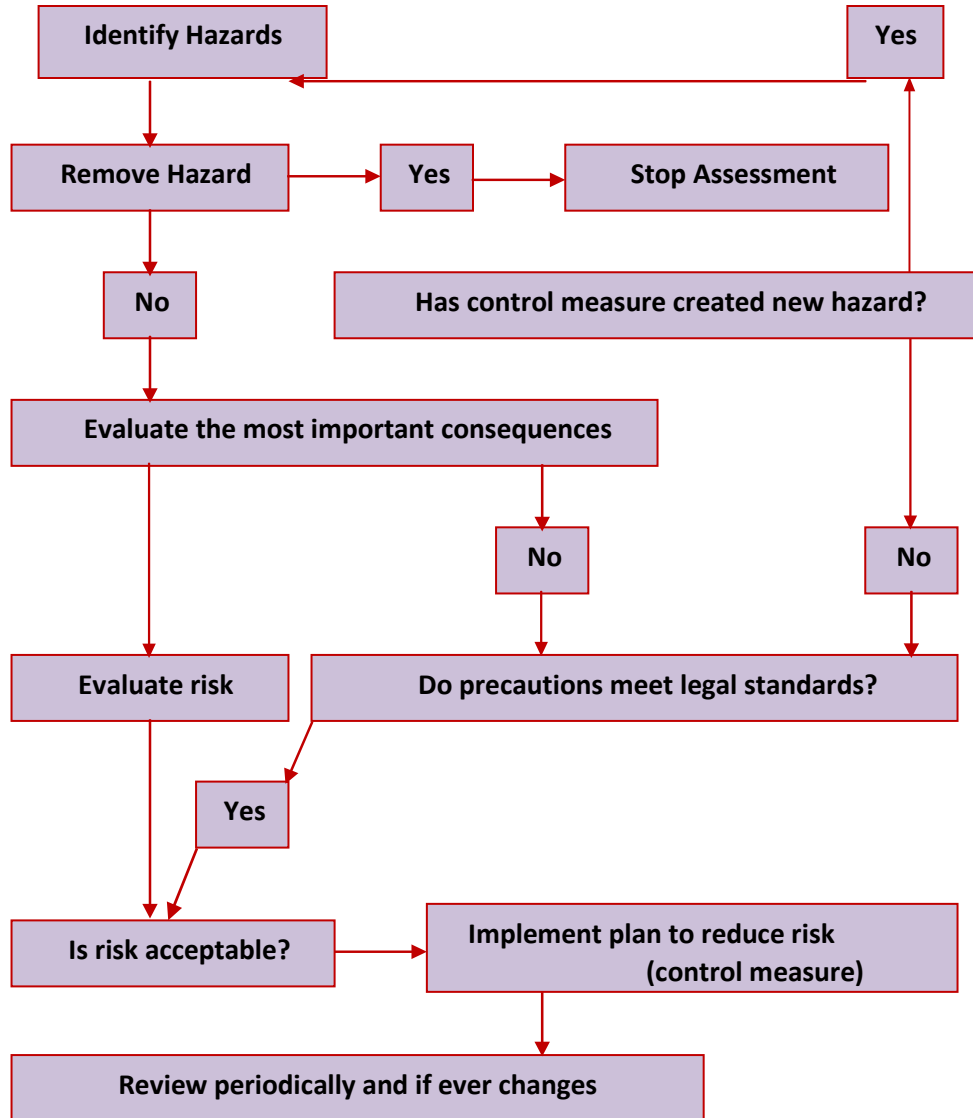


Figure 7.1: Identification of Hazards in Open Cast

7.4 Off-Site Emergency Planning

7.4.1 Introduction

The off-site emergency plan is an integral part of any hazard control system. It should be based on those accidents identified by the mine management, which could affect people and the environment outside the mine. Thus, the off-site plan follows logically from the analysis that took place to provide the basis for the on-site plan and the two plans should therefore complement each other. The key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan. The roles of the various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will be likely to rest either with

the site management or with the local authority. Either way, the plan must identify an emergency coordinating officer who would take overall command of the off-site activities. As with the on-site plan, an emergency control center will be required within which the emergency coordinating officer can operate. An early decision will be required in many cases on the advice to be given to people living “within range” of the accident – in particular whether they should be evacuated or told to go indoors. Consideration of evacuation may include the above factors:

But if the fire is escalating it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people should be advised to stay indoors and shield them from the fire.

Aspects to be included in an Off-Site Emergency Plan

Some of the aspects to be included in off-site emergency plan are as follows:-

Organization

Details of command structure, warning systems, implementation procedures, emergency control centers name and appointments of incident controller, site main controller, their deputies and the other members of the key personnel.

Communications

Identification of personnel involved, communication center, call signs, network, list of telephone numbers.

Special Emergency Equipment

Details of availability and location of heavy lifting gear, bulldozers, specified fire-fighting equipment, fireboats.

Voluntary Organizations

Details of organizers, telephone numbers, resources, etc.

Chemical Information

Details of the hazardous substances, if any, stored or processed on each site and the summary of the risks associated with them.

Meteorological Information

Arrangements for obtaining details of weather conditions prevailing at the time and weather forecasts.

Humanitarian Arrangements

Transport, evacuation centers, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

Public Information

Arrangements for

- (a) Dealing with the media-pressoffice; and
- (b) Informing relatives etc.

Assessment

Arrangements for

- (a) Collecting information on the causes of the emergency;and
- (b) Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

Role of the Emergency Coordinating Officer (ECO)

The various emergency services will be coordinated by an emergency coordinating officer (ECO) who is likely to be a senior police officer but, depending on the circumstances, could be a senior fire officer. The ECO will liaise closely with the site main controller. Again depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control may pass to a senior local authority administrator or even an administrator appointed by the central or the state government.

Roles of Major Hazard Works Managements

Where the local authority has the organization to formulate the plan, the role of works managements in off-site emergency planning will be to establish liaison with those preparing the plans and to provide information appropriate to such plans. This will include a description of possible on-site accidents with potential for off-site harm, together with their consequences and an indication of relative likelihood of the accidents. Advice should be provided by works managements to all the outside organizations which may become involved in handling the emergency offsite and which will need previously to have familiarized themselves with some of the technical aspects of the works activities, e.g. emergency services, medical departments etc.

Role of the Local Authority

In some places the duty to prepare the off-site plan lies with the local authorities. They may have appointed an Emergency Planning Officer (EPO) to carry out all this duty as part of the EPO's roles in preparing for a whole range of different emergencies within the local authority area. The EPO will need to liaise with the works to obtain the information to provide the basis for the plan. Rehearsals for off-site plans are important for the same reasons as on-site plans and are needed to be organized by the EPO.

Role of the Police

The police normally assume the overall control of an emergency, with a senior officer designated as emergency coordinating officer. Formal duties of the police during an emergency include protecting life and property and controlling traffic movements. The functions include controlling bystanders, evacuating the public, identifying the dead and dealing with casualties and informing relatives of dead or injured.

Role of the Fire Authorities

The control of a fire is normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer may also have a similar responsibility for other events, such as explosions and toxic releases. Fire authorities having major hazard works in their area should have familiarized themselves with the location on site of all stores of flammable materials, water and foam supply points of the fire-fighting equipment.

Role of the Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances and so on, have a vital part to play following a major accident and they should form an integral part of any emergency plan. For major fires, injuries will be the result of the effects of thermal radiation to a varying degree and the knowledge and experience to handle this in all, but extreme, cases may be available in all of the general hospitals.

7.5 Disaster Management Plan

7.5.1 Objectives of Disaster Management Plan

To evaluate the effectiveness of environment management programme regular monitoring of the important environmental parameters will be taken up.

A team of qualified and trained personnel will be engaged to carry out the task and be responsible for the following.

Collecting water and air samples, work zone monitoring for air pollutants.

- i) Analyzing the water and air samples;
- ii) Implementing the control and protective measures;
- iii) Coordinating the environment related activities within the mine;
- iv) Green belt development etc.;
- v) Monitoring the progress of the implementation of environmental management programme;
- vi) Good housekeeping will improve the working conditions. Following will be practiced at the mining site;
- vii) Regular cleaning of roads to avoid accumulation of dust /water;
- viii) Regular cleaning / washing of shop floors;
- ix) Maintaining nurseries and development of green belt around the mining site, the plantation of trees is not only for the suppression of dust and pollutant transportation but it is also for enhancing the esthetic values;
- x) Avoiding accumulation and dumping of waste and damaged equipment;

xi) Maintaining hygienic condition in the canteen, drinking water sources and toilets;
xii) Occupational safety and health is another important factor in the mining area and following steps are to be taken:

- 1 Audio visual dissemination of information on safety, embracing risks Associates with their profession, safety regulation will be adopted meticulously;
- 2 Organization of safety weeks;
- 3 Seminars/ workshops related to industrial safety; and
- 4 Mandatory use of personal safety equipment like helmets, goggles, gloves, nose masks, ear plugs etc.

xiii) Non-destructive testing of all equipment and machinery will be carried out at regular intervals. The following points will be followed in the Progressive Mine Closure Plan (PMCP) for disaster management:

- [1] Working of mine as per approved mining plan;
- [2] Working as per Applicable Rules & Regulations;
- [3] Responsibilities from top to bottom line in case of high-risk accidents have been well defined; and
- [4] Action plan has been made for quick evacuation in case of high-risk accident and the natural-disaster.

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of the Disaster Management Plan, it should be widely circulated and personnel training should be conducted.

The objective of the Disaster Management Plan is to make use of the combined resources of the mine and the outside services to achieve the following:

- 1 The objective of onsite disaster management plan for the captive mine is to be a state of perceptual readiness through training, development to immediately control and arrest any emergency situations, so as to avert a full-fledged disaster and the consequence of human and property damage. In the event of a disaster still occurring & to manage the same so that the risk of the damage to life and property is minimized.

The salient features are elaborated as below:-

- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Identify any dead;
- Provide for the needs of relatives;

- Provide authoritative information to the news media;
- Secure the safe rehabilitation of affected area; and
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy.

1. Emergency Organization

It is recommended to setup an Emergency Organization. A senior executive (Mine Manager) who has control over the affairs of the mine would be heading the Emergency Organization. He would be designated as Site Controller. As per the General Organization chart, in the mine, the Assistant Mines Manager would be designated as the Incident Controller. The Incident Controller would be reporting to the Site Controller.

Each Incident Controller, for him self, organizes a team responsible for controlling the incidence with the personnel under his control. Shift In-charge would be the reporting officer, who would bring the incidence to the notice of the Incidence Controller and Site Controller.

Emergency Co-ordinators would be appointed who would undertake the responsibilities like fire-fighting, rescue, rehabilitation, transport and provide essential and support services. For this purposes, Security In-charge, Personnel Department, Essential services personnel would be engaged. All these personnel would be designated as key personnel.

In each shift, electrical supervisor, electrical fitters, pump house in-charge and other maintenance staff would be drafted for emergency operations. In the event of power or communication system failure, some of staff members in the mine offices would be drafted and their services would be utilized as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

Following officers of the mine will be responsible for co-ordination in case of emergency situated in any section of the mine. Emergency responses are given in **Table-7.3**.

Table-7.2 Emergency Responses

Person	Responsibility
Mine Manager	Site Controller
Mine Mate	Accident Controller
Employee who gives the first information about the incident/accident	Primary Controller
P & A Deptt. (HOD)	Liaison officer

2. Emergency Communication

Whoever notices an emergency situation such as fire, growth of fire etc. would inform his immediate superior and Emergency Control Center. The person on duty in the Emergency Control Center would

appraise the Site Controller. Site Controller verifies the situation from the Incident Controller of that area or the Shift In-charge and takes a decision about an impending On Site Emergency. This would be communicated to all the Incident Controllers, Emergency Co-ordinators. Simultaneously, the emergency warning system would be activated on the instructions of the site controller.

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 foolproof 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.

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, neighboring industries and sources of help, outside experts, population details around the mine.

A. Assembly Point

Number of assembly points depending upon the mine location would be identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus, minimum facilities like water etc. would be organized.

In view of the size of mine, different locations should be ear marked as assembly points. Depending upon the location of hazard, the assembly points are to be used.

B. Emergency Power Supply

In the event of any supply failure, Diesel Generator will be provided, which is operated as soon as any power failure occurs. Thus water pumps, mine lighting and emergency control center, administrative building and other auxiliary services are connected to the emergency power-supply.

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

Stretchers, gas masks and general first aid materials for dealing with chemical burns, fire burns etc. would be maintained in the medical center as well as in the emergency control room. Private medical practitioners help would be sought. Government hospital would be approached for the emergency help.

First aid facilities would be augmented. Names of medical personnel, medical facilities in the area would be prepared and updated. Necessary specific medicines for emergency treatment of burns patients and for those affected by toxicity would be maintained.

Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of nearby industrial managements in this regard would be taken on the mutual support basis.

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

Communication of emergency would be made familiar to the personnel inside the mine and people outside. An emergency warning system would be established.

B. Evacuation of Personnel

In the event of an emergency, unconnected personnel have to escape to assembly point. Operators have to take emergency shutdown procedure and escape. Time Office maintains a copy of deployment of employees in each shift. If necessary, persons can be evacuated by all the rescue teams.

C. All Clear Signal

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Site Controller orders an all clear signal. When it becomes essential, the Site Controller communicates to the District Emergency Authority, Police and Fire Service personnel regarding help required or development of the situation into an off-shore emergency.

General

A. Employee Information

During an emergency, employees would be warned by raising siren in specific pattern. Employees would be provided with information related to fire hazards, antidotes and first aid measures. Those who would designate as key personnel and essential employees should be given training to emergency response.

B. Co-ordination with Local Authorities

Keeping in view of the nature of emergency, two levels of coordination are proposed. In the case of an on-site emergency, resources within the organization would be mobilized and, in the event, extreme emergency local authorities help should be sought.

In the event of an emergency developing into an off-site emergency, local authority and district emergency authority (normally the Collector) would be appraised and under his supervision, the Off-Site Disaster Management Plan would be exercised. For this purpose, the facilities that are available locally, i.e. medical, transport, personnel, rescue accommodation, voluntary organizations etc. would be mustered. Necessary rehearsals and training in the form of mock drills should be organized.

C. Mutual Aid

Mutual aid in the form of technical personnel, runners, helpers, special protective equipment, transport vehicles, communication facility etc. should be sought from the neighboring industrial management's.

D. Important Information

Important information such as names and addresses of key personnel, essential employees, medical personnel, transporters address and address of those connected with Off Site Emergency such as Police, Local Authorities, Fire Services, District Emergency Authority should be prepared and maintained. The on-site emergency organization chart for various emergencies is shown in **Figure-7.2**.

The task of preparing the Off-Site Emergency Plan lies with the district collector. However, the off-site plan will be prepared with the help of the local district authorities. The proposed plan will be based on the following guidelines:

E. Aspects Proposed to be considered in the Off-Site Emergency Plan

The main aspects which should be included in the emergency plan are:

- **Organization**

Details of command structure, warning systems, implementation procedures, emergency control centers, names and appointments of incident controller, site main controller, their deputies and the members of the other key personnel.

- **Communications**

Identification of personnel involved, communication center, call signs, network, and the lists of all of the telephone numbers.

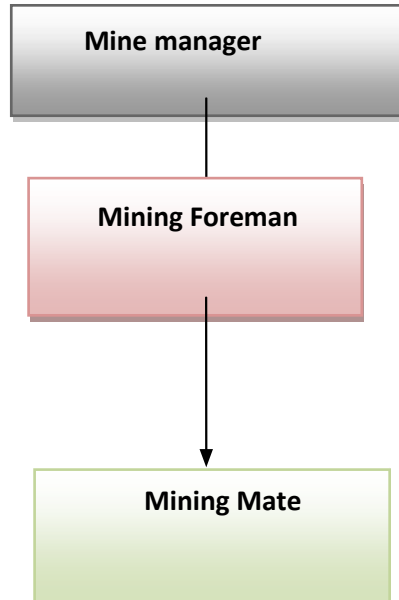


Figure-7.2:On-Site Emergency Chart

Off-Site Emergency Preparedness Plan

- **Specialized Knowledge**

Details of specialist bodies, firms and people upon whom it may be necessary to call e.g. those with specialized knowledge of fire control.

- **Voluntary Organizations**

Details of organizers, telephone numbers, resources etc.

- **Chemical Information**

Details of the hazardous substances stored or procedure on each site and a summary of the risk associated with them.

- **Meteorological Information**

Arrangements for obtaining details of weather conditions prevailing at the time and whether forecasts.

- **Humanitarian Arrangements**

Transport, evacuation centers, emergency feeding treatment of injured, first aid, ambulances, temporary mortuaries.

- **Public Information**

Arrangements for dealing with the media press office and the informing relatives, etc.

- **Assessment**

Arrangements for: (a) collecting information on the causes of the emergency; (b) reviewing the efficiency and effectiveness of all aspects of the emergency plan.

4. Role of the Emergency Coordinating Officer

The various emergency services should be coordinated by an emergency coordinating officer (ECO), who will be designated by the district collector. The ECO should liaise closely with the site main controller. The ECO should inform the DGMS authorities in case of accidents as per the statutory requirement. Again depending on local arrangements, for very severe incidents/accidents with major or prolonged off-site consequences, the external control should be passed to a senior local authority administrator or even an administrator appointed by the central or state government.

5. Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The emergency planning officer (EPO) appointed should carry out his duty in preparing for a whole range of different emergencies within the local authority area. The EPO should liaise with the works, to obtain the information to provide the basis for the plan. This liaison should ensure that the plan is continually kept up to date.

It will be the responsibility of the EPO to ensure that all those organizations which will be involved off site in handling the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for the off-site plans should be organized by the EPO.

6 .Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements. Their functions should include controlling bystanders evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

7. Role of Fire Authorities

The control of a fire should be normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer should also have a similar responsibility for other events, such as explosions. Fire authorities in the region should be apprised about the location of all stores of flammable materials, water supply points and fire-fighting equipment. They should be involved in on-site emergency rehearsals both as participants and, on occasion, as observers of exercises involving only site personnel.

8. Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances, and so on, should have a vital part to play following a major accident, and they should form an integral part of the emergency plan.

For major fires, injuries should be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but extreme cases may be generally available in most hospitals.

Major off-site incidents are likely to require medical equipment and facilities additional to those available locally, and a medical “mutual aid” scheme should exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.

9. Role of Government Safety Authority

This will be the factory inspectorate available in the region. Inspectors are likely to want to satisfy themselves that the organization responsible for producing the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well documented procedures and evidence of exercise undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watching brief to a close involvement in advising on operations in case involvement in advising on the operations.

The off-site emergency organization chart for major disaster is shown in **Figure-7.3**.

As per Risk Assessment studies the possibility of “Off-site” emergency situation is ruled out as this proposed mine is not likely to pose any off-site emergency hence does not call for any preparation of an off-site emergency plan.

Further the residential quarters and living area are far from the mine.

Care and Maintenance during Temporary Discontinuance

When the mine is temporarily discontinued due to any unforeseen circumstances the following care and maintenance shall be carried out

- 1 Notice to be served to all the concerned authority;
- 2 The mining pit area shall be covered by temporary fencing;
- 3 All access roads/ openings to the pit/ face shall be closed by parapet wall as per rule;
- 4 Warning shall be displayed on the “Notice Board” at appropriate places;
- 5 Security personnel shall be posted at every entry point;
- 6 No unauthorized person shall be allowed to enter into the mine without prior permission of the management;
- 7 Mine benches shall be dressed and properly sloped for its stability;
- 8 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.;

- 9 All men and machinery shall be withdrawn from the mine and shall be kept in a compact and safe place; and
- 10 All safety precautions shall be taken care as per the given rules.

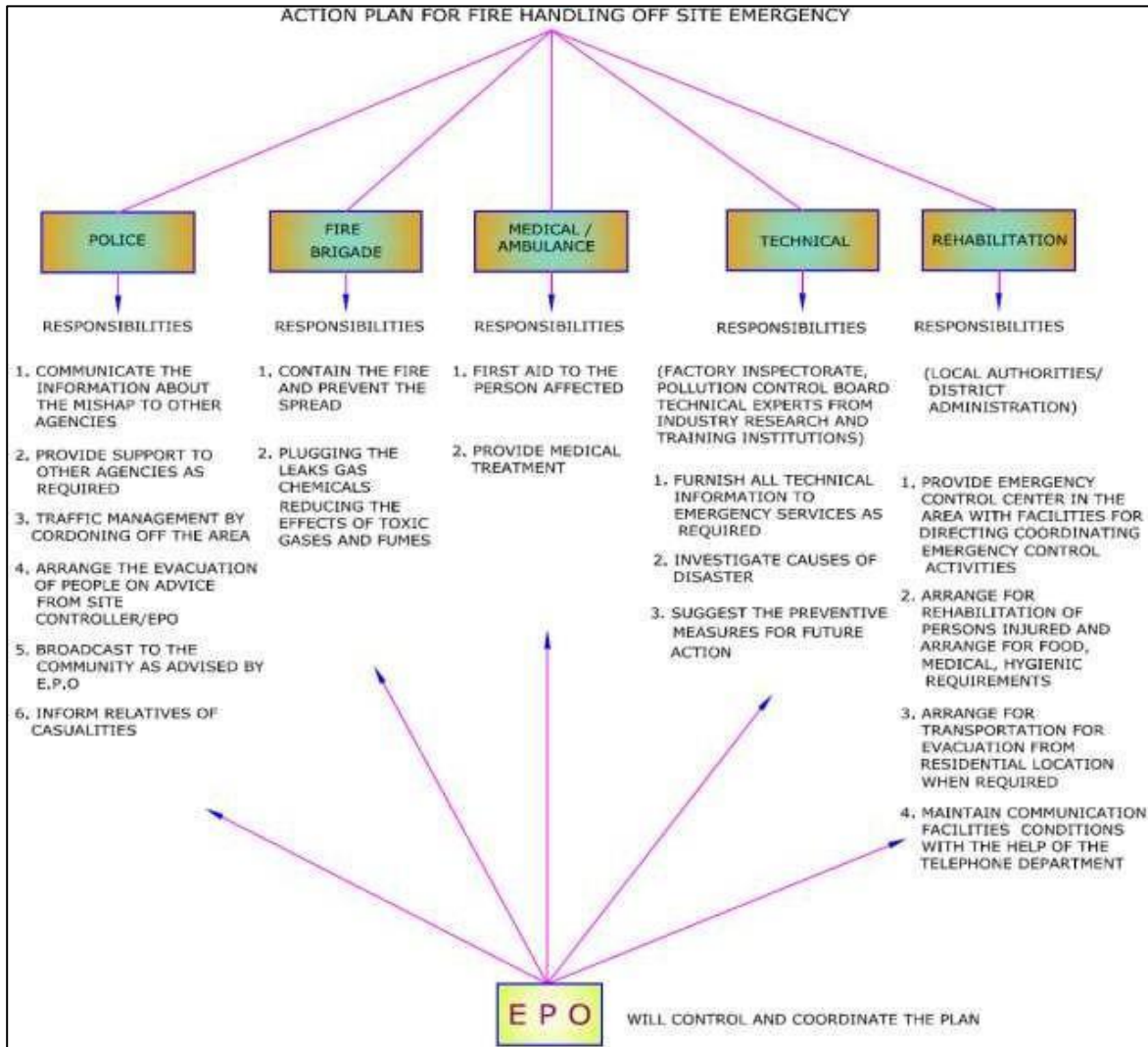


Figure-7.3: Off-Site Emergency Chart

CHAPTER 8. Project Benefits

This chapter gives a comprehensive description of various advantages and improvements anticipated from the proposed project to the locality, neighborhood, region and nation.

8.1 Introduction

There will be no adverse effect of mining on the socio-economic status of the people rather the mining activities helps in improvement in the standard of living of the people. The mining activity creates the employment opportunity for the local people and helps generate revenue and this definitely enhances the economic status of the local people. Apart from overall impact of the project on the local people, it is felt necessary to augment facilities in the fields of education, health and social awareness including concern for environment and eco-system. The various improvements are described below.

8.2 Improvements in the Physical Infrastructure

The applied Mining Lease area is located in the backward region in the district. In this locality a good number of people are engaged in agricultural work. The proposed project will enhance the following physical infrastructure facilities in the adjoining areas.

- a) The proposed mining project will appeal to different entrepreneurs to set up their undertakings in the nearby locations.
- b) Excavated mineral will provide a good market opportunity.
- c) As a part of reclamation plan, plantation will be carried along the river banks or along the road sides or near the civic amenities.
- d) The mining project in the locality helps in improvement of the physical infrastructure like roads, vehicles for public transportation, water and sanitation facility, house and rest shed for the mines worker, safety equipments for the mines workers etc.

8.3 Social benefits

With the commitment of the upcoming mine there will be substantial improvement of economy of the local people. Amenities such as education and healthcare will be developing in and around the lease area, which will be available to the local people also. Development in business activity shall lead to infrastructure development in and around the project site.

- a) A multiplier effect will be felt on the creation of direct and indirect employment through the local community like labor contract, transport suppliers. Local workers will be deployed in both of the mines.
- b) 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
- c) The operation of the Fire clay & China clay mining would help to improve socio-economic condition of people in villages through separate fund allocated for need based fund.

- d) Increased Health related activities: 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.
- e) Educational attainments: Educational activities will be promoted by the proponents by providing scholarships to students annually.

8.4 Environmental benefits

Green belt development will be carried out which will help in arresting dust and minimizing sound level arising from the mining operation

8.5 Employment Potential

The local labour shall be engaged for the purpose of mining of mineral, loading & unloading of mineral besides, watch and ward and plantation activity with proper maintenance. This will help in the improvement of financial condition of the area.

As already stated, the area has less employment potential except agricultural activities. Due to present mining activity, there is generation of employment both skilled and unskilled. Also there is a requirement of statutory person in Mining Mate and foreman cadre. Local youth will be preferred for employment in the mine. The brief details of employment potential which are directly benefited by this project.

The excavation of Fire clay & China clay also attracts levy of royalty and contribution in district mineral fund and cess by the State Government which indirectly used in upliftment of people residing in the area.

There will be no change the present cultural activities, which involves local folk dance, songs and drama etc. Infact due to mining operation there will be improvement in economic condition of the society at large which ultimately helps in improving the overall socio- economic environment.

8.6 Budget for Social Development

The proposed mining project proponent is aware of the obligations towards the society and to fulfill the social obligations unit will employ semi-skilled and unskilled labor from the nearby villages for the proposed project as far as possible. Unit will also try to generate maximum indirect employment in the nearby villages by appointing local contractors during construction phase well as during operation phase. The Project proponents will contribute reasonably as part of social development as a part of EMP and will carry out various activities in nearby villages.

The total estimated cost of the project is 200 lacs & 4lacs(2% of the total project cost) will be allocated for need based activity for causes of development of school under corporate environment responsibility and Social Development activities are shown in **Table 8.1**, 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 Cost of Project

Sr No.	Proposed Programme	Amount (in lacs)			
		1 st Year (in lacs)	2 nd year (in lacs)	3 rd Year (in lacs)	Total (lacs)
1.	Donation for Construction and maintenance of toilets with running water facility	1.40	1.30	1.00	3.70
2.	Free Health Camp & Supply of Medicine to villagers	0.10	0.10	0.10	0.30
	Total	1.50	1.40	1.10	4.00

Note : Details Budgetry calculation given in chapter – 10

8.7 Direct Revenue Earning to the National and State Exchequer

This 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 developing the area.

8.8 Other Intangible Benefits

Apart from overall beneficial impact of the project on the local people, the following measures will be taken up by the mine as periphery development project;

- Planting of economic important trees in the open spaces around the mining lease area which is accessible to the local people
- Encouraging to use boiled /cleaned drinking water and mosquito nets
- Development of socio economic status of the people of the project area
- Decrease in the rate of migration from the project villages as the employment opportunity will be created in the locality.

CHAPTER 9. ENVIRONMENTAL COST BENEFIT ANALYSIS

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

CHAPTER 10. Environment Management Plan (EMP)

EMP (Environmental Management Plan) is a site-specific plan which is designed to ensure that the project is being implemented in an environmentally sustainable manner. The details of the EMP are briefed in this chapter.

10.1 Introduction

The EMP gives the detailed description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA. The EMP provides an essential link between predicted impacts and mitigation measures during the construction operational activities. EMP outlines the mitigation, monitoring and institutional measures to be taken during project construction and operation phases to avoid or mitigate adverse environmental impacts, and the actions needed to implement these measures.

The likely impacts on various components of environment due to the project during developmental activities have been identified and measures for their mitigation are suggested.

The EMP lists all the requirements to ensure effective mitigation of every potential biophysical and socio-economic impact identified in the EIA. For each attribute, or operation, which could otherwise give rise to impact, the following information is presented.

- A comprehensive listing of the mitigation measures.
- Parameters that will be monitored to ensure effective implementation of the action.
- Timing for implementation of the action to ensure that the objectives of mitigation are fully met.

The EMP comprises a series of components covering direct mitigation and environmental monitoring, an outline waste management plan and a project site restoration plan. Therefore, environmental management plan has been prepared for each of the above developmental activities.

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 Environmental Management Plan during the Construction Phase

Since the project Fire clay & China clay mining activity, no major construction activities are proposed. Hence, Environmental Management Plan for Construction Phase is not required.

10.4 Environmental Management Plan during the Operation Phase

10.4.1 Land/Soil Environment

The environmental management measures to be adopted during the operation phase for mitigating any adverse impacts on the land environment are as follows.

- Regular monitoring of the soil quality (once in 6 months) shall be done to ensure that there is no impact on the soil quality from the proposed mining activities.
- The temporary change in the land use due to the excavation process will be naturally reclaimed in the subsequent monsoon seasons
- Necessary storage arrangements and precautions will be taken for the avoidance of spillage of oil, diesel etc. from vehicles and equipments and labeling / handling procedures shall be maintained.

10.4.2 Air Environment

During the operation phase, gaseous emissions are expected from the machinery deployed for mining activities, movement of vehicles. Ambient air quality with respect to PM₁₀, PM_{2.5}, SO₂, NO_x, and CO monitoring will be continued at appropriate locations as per the environmental monitoring plan explained in Chapter 6 of this EIA report.

It is proposed to implement certain generic measures in the project site to reduce the fugitive and gaseous pollutant emissions during the operation phase and they are:

- Dust suppression by water sprinkling in and around the project site
- The barricades which acts as the dust and noise barriers will be provided along the mining activity areas
- A greenbelt development plan is prepared with local species. The greenbelt on the periphery will reduce the dust levels
- All the vehicles for the transportation of minerals should have valid PUC certificate and while transporting the mined minerals, the truck should be covered to prevent fugitive dust emissions
- Minimize idling time for vehicles and adequate parking provision and proper traffic arrangement for smooth traffic flow
- Engines and exhaust systems of all vehicle and equipment will be maintained so that exhaust emissions do not exceed statutory limits and all equipment will be maintained in accordance with manufactures' manuals. Periodic monitoring of this should be undertaken to ensure compliance.
- Sharp drill bits will be used for drilling and regrinding will be done periodically to reduce generation of dust.

10.4.3 Noise Environment

The following environmental management measures are recommended to mitigate adverse impacts on noise levels during operation phase:

- The barricades which acts as the dust and noise barriers will be provided along the mining activity areas
- No noise polluting work shall be carried out in the night hours
- All the vehicles for the transportation of minerals should have valid PUC certificate
- Vehicles to be serviced regularly and maintained properly to avoid any unwanted generation of noise or vibration from them
- Green belt and garden trees reduce noise, traffic related pollution and heat island effect
- 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 will be used instead of secondary blasting.

10.4.4 Water Environment

- Regular monitoring of the water quality is detailed in Chapter 6 of this EIA report.
- The total water requirement for Fire clay & china clay mining project is estimated to be 9.65 KLD
- Sufficient and appropriate sanitary facilities (temporary toilets) shall be provided in order to maintain hygienic conditions at the project site.
- The domestic wastewater will be treated into septic tank followed by soak pit outside of the block area with a safe distance and no wastewater will be allowed to get discharged into the water body.
- Area for maintenance of vehicles will be located such that contamination of water body by accidental spillage of oil can be prevented.

10.4.5 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. Local species will be planted in consultation with Forest Department.
- Green belt is proposed around mining lease and surrounding area.
- 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

10.4.6 Socio-economic Environment

- The construction workers will not be provided with accommodation at the project site, as it is proposed to deploy high skilled labourers from the local population (an average of 30persons per day).
- An effective traffic management scheme shall be developed to avoid congestion on the main roads, though; this traffic is not expected to cause any nuisance in the main access road.
- 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.

10.4.7 Rehabilitation & Resettlement (R&R) Action Plan

Resettlement and Rehabilitation is not applicable as the total mining lease area is a Govt. land and no individuals are residing in the core zone permanently or temporarily.

10.4.8 Occupational Hazards and Safety

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The factors of occupational health in mining of Fire clay & china clay mining project are mainly dust and land degradation. Safety of employees during operation and maintenance etc. shall be as per Mines rules and regulations.

Occupational hazards involved in mines are related to dust pollution, noise pollution and injuries from equipments and fall from high places. DGMS has given necessary guidelines for safety against these occupational hazards. The management will strictly follow these guidelines.

As per the report of Occupational safety and health by GOI, Ministry of Labor and Employment the persons employed in the mines are exposed to a number of hazards at work which adversely affect their health. Some of the important ones are dust, noise, heat, humidity, vibration etc.

Following diseases have been notified as the diseases connected with mining operations for the purpose of sub-section (1) of Section 25 of the Mines Act, 1952:

Table 10.1: The diseases may cause with mining operations

S.R.O. No.	Dated	Type of diseases
S.R.O. 1306	21st July, 1952	1. Silicosis 2. Pneumoconiosis
S.R.O. 3109	18th December, 1956	Manganese Poisoning - Nervous type
S.O. 2521	26th June, 1986	1. Asbestosis 2. Cancer of lung or the stomach or the pleura and peritoneum (i.e. mesothelioma)

S.O. 399(E)	21st February, 2011	1. Noise Induced Hearing Loss 2. Contact Dermatitis caused by direct contact with chemical. 3. Pathological manifestations due to radium or radioactive substances
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Under Occupational Safety and Health Management, project proponent will take all the necessary steps to provide better working environment in both of mines. Occupational health and safety issues occur during all phases of the mine cycle.

These are classified according to the following categories:

- General workplace health and safety
- Use of explosives
- Noise and vibration
- Hazards during mining (Fires, explosions, confined spaces and oxygen deficient atmospheres)

System of Detection of Occupational Diseases in Mines

In order to detect occupational diseases, the industry is required to conduct medical examinations and health surveillance of workers as per the provisions of Mines Act. The essential features of health surveillance programme required to be carried out in mines are:

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

Assessment Occupational Risk and Arrangement

Likely impact on health of mine worker due to Fire clay & china clay mining operation and the suggested mitigation measures are tabulated below:

Table 10.2: Impact on Health of Mine Worker and Mitigation Measure

Type of diseases	Causes	Protective measures
Parkinson's disease	Inhalation of toxic doses through fumes, dust, water, food & soil	Provide all material and monetary resources needed for smooth and efficient execution of safety plans
Lung diseases	Inhalation of dust	Suppression of dust and protective equipment's
Stomach diseases	Water pollution	Proper treatment of water & regular analysis
Night blindness	Bad illumination	Proper lighting

Hearing loss	Working at high noise areas	Measures to suppress noise, and protective equipment's
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As discussed above the occupational risk is identified and the arrangement proposed to mitigate the same are suggested in **Table 10.3& 10.4 -**

Table 10.3: Occupational Risk and Arrangement Proposed

S. No	Source/Location	Provisions proposed	Protective equipment's Proposed
1.	Fall of sides /stones		
a)	At mining faces	Working as per MMR,1957	Use of helmets, shoes, knee caps goggles etc.
b)	Dumps	Proper terracing, stabilization & water drains	N.A.
2.	Movement of trucks & dumpers on road	Proper gradient parapet walls adequate lighting, reversing siren, proper maintenance of trucks etc.	N.A.
3.	Workshop activities	Provisions of MMR,1957	Hand gloves, welding shields etc.
4.	Dust & noxious fumes	Standards as per DGMS & CPCB	Use of dust mask
5.	Noise pollution	Standards as per DGMS & CPCB	Use of ear muff/plug
6.	Water pollution	Standards as per ISI & proper arrangement for water drainage	N.A.

Table 10.4: Possible Impact on Health of Mine Worker due to Fire clay & china clay mining 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. • 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. 	<ul style="list-style-type: none"> • Personal Protective Equipment 1. Eye protection requirements: Safety glasses are recommended. 2. Skin protection requirements: Protective gloves are recommended, to prevent mechanical irritation. 3. Respiratory protection: Not normally required, use an appropriate respirator if airborne dust concentration exceeds the OSHA, standards. 4. Other protective
Skin Diseases	Over expression of LOI can cause Itching Rash or hives		
Stomach diseases	Stomach upset and diarrhea may occur		
Inhalation	Respiratory irritant. Accumulation in lungs may be responsible for benign pneumoconiosis, but is not considered to cause pulmonary functional impairment.		
Eye/Skin -	Eye irritant		

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. 	<p>equipment: Eye wash fountain should be readily available in areas of use or handling.</p> <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 persists obtain medical assistance. 	<p>1. Local Exhaust: Recommended, when excavation or any other operation where dust are created.</p> <ul style="list-style-type: none"> • Environmental Surveillance:
Breathe diseases	Exposure to silicon dioxide has been linked with small vessel vacuities, autoimmune diseases, kidney damage, and rheumatoid arthritis.	<p>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.</p>	<p>1. If the operation generates dust or fumes, exposure to airborne materials should be determined by having air samples taken in the employees breathing zone and work area.</p>

Safety & Mitigation Measures

All necessary first aid and medical facilities will be provided to the workers. Mines will be well equipped with proper fire protection and firefighting equipment. All operators and mechanics will be trained to handle fire-fighting equipments. Further all the necessary protective equipments such as helmets, safety goggles, earplugs, earmuffs, etc. will be provided to persons working in mines.

Initial medical examination will be carried out prior to employment of every person and periodical medical examination will be carried out of persons employed in the mine. Provided that in case any dust related disease needs to be confirmed, the pertaining tests may be conducted more frequently as the examining authority deems necessary.

To avoid any adverse effect on the health of workers due to various pollutants, sufficient measures relating to safety and health will also be practiced-

- All safety measures like use of safety appliances, such as dust masks, helmets, shoes, non breakable goggles, knee pads, as the case may be, shall be ensured. Safety awareness programs, awards, posters, slogans related to safety etc. will be encouraged.
- Regular maintenance and testing of all equipment as per manufacturers' guidelines
- Close surveillance of the factors in working environment and work practices which may affect environment and worker's health
- Working of mine as per approved mining plans and environmental plans.
- Provision of rest shelters for mine workers with amenities like drinking water, portable toilets etc
- Training of employees for use of safety appliances and first aid in vocational training center.

- Periodical Medical Examination of all workers by a Medical Officer.
- First Aid facility will be provided at the mine site.

10.5 Environment Management Cell

Apart from having an Environmental Management Plan, it is also necessary to have a permanent organizational set up charged with the task of ensuring its effective implementation of mitigation measures and to conduct environmental monitoring. In this effect, project proponent will assign responsibilities to officers from various disciplines to co-ordinate the activities concerned with management and implementation of environment control measures. Basically, this department undertakes the monitoring of environmental pollution level by measuring, ambient air quality, water and effluent quality, Noise level, etc., either departmentally or appointing external agency whenever required. The Environmental and Safety department will also be looking after for preparation of environment statement, carrying out environment audit, preparation of Consent to establish & Consent to operate.

Environmental monitoring cell will be established for monitoring of important and crucial environmental parameters which are of immense importance to assess the status of environment during sand mine operation. Proponent will be monitored the Environmental Status with the help of third party and give responsible to Mining or Safety Engineer for compliance and take care the all the things for implementation of EMP as proposed. However, the tentative schematic diagram also shown as follows for the same.

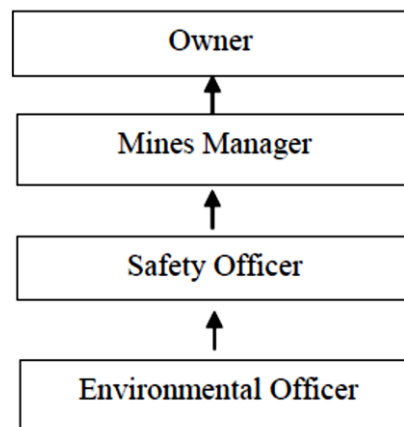


Figure 0-1: Environment Management Cell

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

- EMC will oversee that environmental control measures are implemented as per approved action plan.
- Identify and record the constraints in respect of environmental planning and implementation.
- Systematically document and record keeping w.r.t environmental issues.
- Field monitoring and laboratory analysis.

- Monitoring of plantation development.
- Environmental compliance to the regulatory authorities.
- Communication with the concerned departments on the environmental issues. Interact and liaison with State/ Central Government departments
- To monitor compliance of environmental regulations.
- Continual improvement in environmental performance.
- To follow proper documentation and monitoring procedures, for developing better
- Environmental Management System at the mine site.
- To keep up with regulatory requirements and arrange for the necessary certificates or consents viz., air and water.
- To conduct yearly environmental monitoring and submit the statement to SPCB.

10.6 Greenbelt Development

Greenbelt development programme will be designed within the natural constraints of the Fire clay & china clay mine area and in particular species selection reflects flora known to be resistant to the local 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

It is proposed that statutory boundary area will be used for plantation. As the area calculated for plantation is:

Table 0.5: Greenbelt Development Programme

Name of Applicant	PROPOSED SITE	SPECIES	No. OF SAMPLING
Kharia Fire clay & China clay	Plantation area 0.75 Ha in safety area & 120 sqm length of proposed road in 1 row in 2 m gap which is 33% of the total lease area.	Khejur, Babool, Bel, Palash and other local species with consultation of forest department.	3480
Total Plantation Proposed ::			3480

Vegetation development is also proposed along road sides of approach roads. While selecting plant species preference will be given for planting native species of the area and shall have soil binding capacity.

Greenbelt development as per the scheduled plan will be reviewed every year plantation records will be maintained for period of plantation, area under plantation, length of avenue plantation, type of species density of planted area and survival rate.

10.7 Budgetary Allocation for Environmental Protection Measures

An initial budget of Rs10 lakhs as capital cost and 5.05 lacs as recurring cost will be spent by Hemant Chandrakar, environment protection, management, pollution control and monitoring systems, appropriate budgetary provision would be made and provision for recurring expenditure for environment management of the project would be made.

Table10.6: Cost of Environmental Protection Measures

(1) BUDGETARY ARRANGEMENT FOR INDIVIDUAL ENVIRONMENT MANAGEMENT PLAN for FIVE YEAR OF HEMANT CHANDRAKAR

Sno.	Activity	Details of Expenses	Year 1		Year 2	Year 3	Year 4	Year 5
			Capital Cost in Rs.	Recurring Cost in Rs.	Recurring Cost in Rs.	Recurring Cost in Rs.	Recurring Cost in Rs.	Recurring Cost in Rs.
1	Air Pollution Control	Dust supresion on 200 sqmeter long ramp and haul road Total Area = (50 m length X 4m width = 200 sqm)X 0.50 L/sqm = 100 L/day X 2 time a day = 200 L/day Water cost = @ Rs 500/-water tanker *2 round a day*300 days. Water will be sourced from grampanchayat and water tanker will be provided by project proponent.	-	50,000	50,000	50,000	50,000	50,000

2	Green belt development and maintainance	(a) 3280 saplings will be planted on 7500 mine boundary& also 200 sqmtr in 1 row &2 meter gap	-	-	-	-	-	-
		(b)Total saplings = 3280 saplings						
		1) Chain Link Fencing along with mine boundary- 7500 m X @10 Rs. Per meter	75,000	-	-	-	-	-
		2) Cost of annual maintenance of plantation and chain link fencing till 5 year i.e. care of saplings and maintenance of fencing by 1 labours at the rate of 50,000/-Rs. Per year	-	50,000	50,000	50,000	60,000	60,000
		3) Cost of saplings at 1st year of plantation at the rate of Rs.100/- per saplings	3,28,000	-	-	-	-	-
		2) Additional Plantation till 5 year -Assuming 90% survival of plantation, additional saplings has to be planted i.e. 3280X 10% X Rs. 100/-	-	32,800	32,800	32,800	32,800	32,800
		4) Cost of fertilizer for 5 years 3280 saplings X Rs. 20 per saplings every year for 5 years	-	65,600	65,600	65,600	65,600	65,600
3	Maintenance of Ramp and haul road	Maintenance @Rs. 5,000/quarterly (filling of damage road) (5000 x 4)	-	20,000	20,000	20,000	20,000	20,000
4	Facilities for Mine workers	1) Insurance cover (30 labours x 1500)	-	45,000	45,000	45,000	45,000	45,000
		2) Health Check-up	-	5,000	5,000	5,000	5,000	5,000
		3) Shelter, Safe Drinking water, Sanitation Facility	50,000	10,000	10,000	10,000	10,000	10,000
		4) Personal Protective equipment such as Goggles, Helmet, safety Shoes, Face Mask and Hand Gloves	-	5000	5000	5000	5000	5000
First year cost of Individual EMP to be born by Project Proponent in Rs ::								
Year wise cost of Individual EMP to be born by Project Proponent in Rs. ::			7,28,000					
Five Year cost of Individual EMP to be born by Project Proponent in Rs. ::						10,0000/-		

Environment Management Plan for Cluster :

All members of cluster will undertake the following activities under common responsibility for cluster such as Air Pollution Control, Green Belt Development & Maintainance, Environment Monitoring, Road Maintenance and Health Check-up Camps for Villagers within cluster area. Following image shows plantation route for air pollution control and plantation in cluster area.

Details of work to be Executed and Budget under Common EMP work: -

A budget is proposed for 5 year for execution of C-EMP along with individual contribution by each leaseholder under cluster area for Air Pollution Control along with village road, Green Belt Development & Maintenance along with village road, Environment Monitoring at core and buffer zone of cluster area, Cleaning and Maintenance of village road and Health Check - up Camps for villagers.

Brief description of work performed under common EMP work is as follow –

1) Dust Suppression –

Due to transportation of minerals from cluster and village route, fugitive dust will be generated along the route causes health issue. For minimising dust emission 1 tankers of 1000litre each will sprinkle water along the transportation route within village areas during working hour of mines.

2) Plantation Work –

Extensive plantation on Cluster route will increase the floral diversity of the area; about 200sqm long road of village area will be proposed plantation. About 450sapling of different species such as Khejur, Babool, Bel, Palash etc. will be Planted.

3) Environment Monitoring -

During the operational phase of mines it is necessary to monitor the different data of environment to compare with the base data taken during grant of EC. Therefore Air, Soil, Noise, Surface water and ground water will be monitored twice a year by all cluster Members jointly.

4) Road Maintenance -

When loaded vehicles runs on village road there is chance of development pit, falling of minerals from vehicles which causes accident. Therefore proper maintenance of road is essential. All lease holder falling under common cluster will jointly mainten common road used by them.

5) Health check upCamp -

Impact of mining may raise impact on health of local villagers due to fugitive dust, noise and impact on water etc. Therefore, it is necessary to conduct occupational health check-up of villagers also and to undertake the necessary mitigation measures as and when required. In this line all mines owners are bound to organise occupational health check-up camp for villagers under C-EMP.

10.8 Need Based Acitivity

The proposed mining project is aware of the obligations towards the society and to fulfill the social obligations unit will employ semi-skilled and unskilled labor from the nearby villages for theproposed project as far as possible. Unit will also try to generate maximum indirect employment in the nearby villages by appointing local contractors during construction phase as well as during operation phase. The

Project proponents will contribute reasonably as part of social development as a part of EMP and will carry out various activities in nearby villages.

The total estimated cost of the project is 200lacs .Rs. 4 lacs will be allocated for Need based activity for causes of poor people of nearby villages for drinking water, sanitation, education, health.

Table 10.7: Need Based Acitivityby the proposed mining project

Sr No.	Proposed Programe	Amount (in lacs)			
		1 st Year (in lacs)	2 nd year (in lacs)	3 rd Year (in lacs)	Total (lacs)
1.	Donation for Construction and maintenance of toilets with running water facility	1.40	1.30	1.00	3.70
2.	Free Health Camp & Supply of Medicine to villagers	0.10	0.10	0.10	0.30
	Total	1.50	1.40	1.10	4.00

The proposed Need Based activities are shown in Table 10.7 although the heads can be changed on the basis of local demand analysis at the time of Public Hearing and recommendation of SEAC, West Bengal.

CHAPTER 11. Summary and Conclusion

The proposed Kharia Fire Clay & China Clay mining mineral project of area 7.02 Hectare situated near the Plot no. 425 to 478, 481 to 484, 500 to 540, 543 to 555, 568 to 587 (Md. Golam Kibria Mallick) , of Village & Mouza – Kharia,P.S. - Md. Bazar, P.O - Md. Bazar (T.S.)District-Birbhum The project is issued in favour of Md. Golam Kibria Mallick by Under Secretary, Mineral Resource Department, Govt. of West Bengal, Lease Deed issued by Govt. of West Bengal vide registration no.2617 on dated 08/04/1983.

This mining project comes under Category ‘B1’ (Cluster situation) Project or activity 1(a) as per EIA Notifications 2006, and its subsequent amendments and will be appraised at SEAC, West Bengal. The lease is falling in the cluster as per 15th January 2016 EIA Notification of MoEF&CC and NGT order dated 13th September 2018.

11.1.1 Project Location

The Plot no.425 to 478, 481 to 484, 500 to 540, 543 to 555, 568 to 587 (Md. Golam Kibria Mallick area 7.20 Ha) Survey of Indian Toposheet No. 73M/5, 73M/9, 72P/8,72P/12.

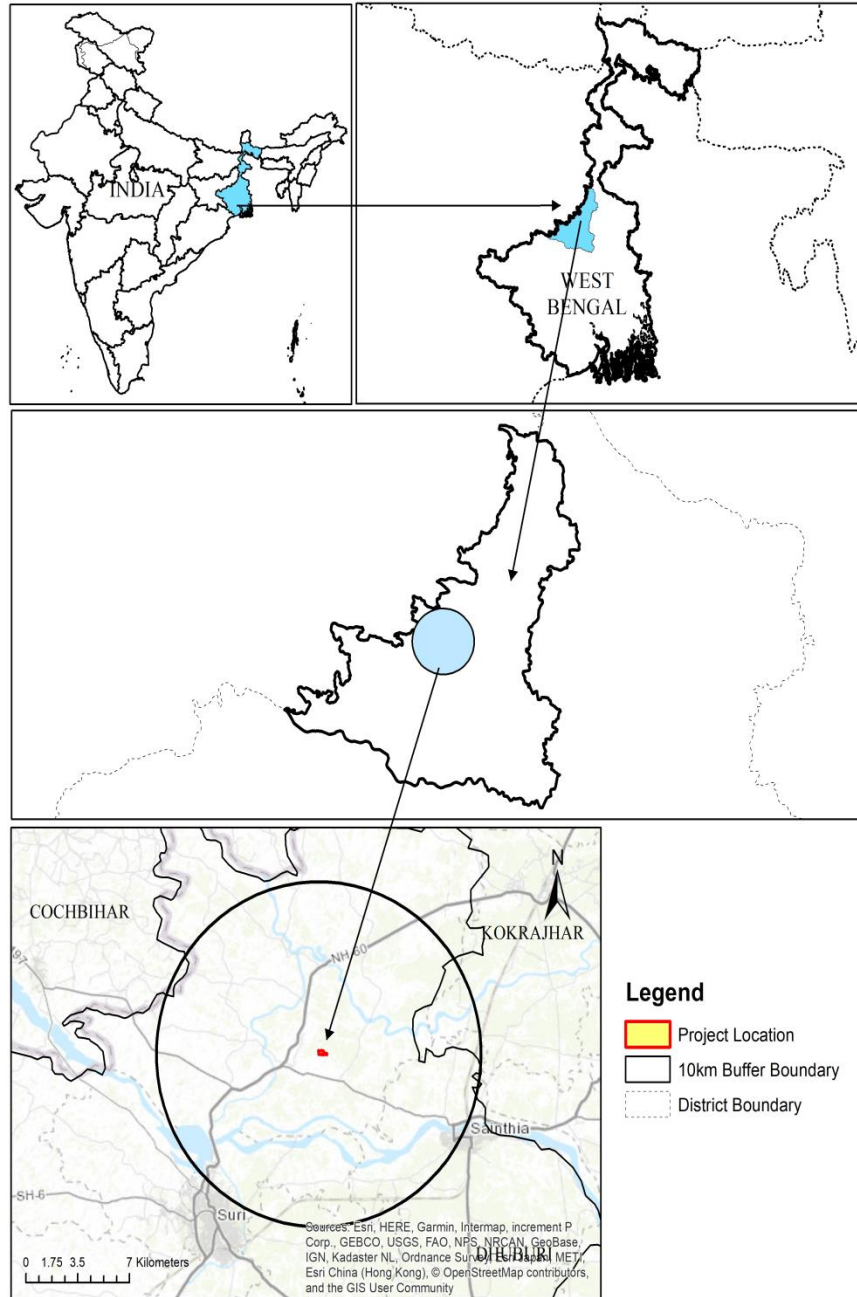


Figure 11.1: Location Map of Proposed Project Site

Table 11.1: Environmental Setting of Proposed Fire clay & China Clay Projects

Particulars	Details		
Name of the Project	Kharia Fire Clay & China Clay Mine		
Location of the Project	Plot No. 425 to 478, 481 to 489, 500 to 540, 543 to 555, 568 to 587 Mouza - Kharia, J.L No. - 145, P.O – Md. Bazar (T.S), P.S – Md. Bazar, PIN – 731132 Dist. – Birbhum, West Bengal		
Geographical Coordinates:	Point	Latitude	Longitude
	A	23°59'38.011" N	87°35'22.183" E
	B	23°59'36.484"N	87°35'21.736" E
	C	23°59'38.207" N	87°35'27.611" E
	D	23°59'38.029"N	87°35'32.019" E
	E	23°59'35.195" N	87°35'32.035" E
	F	23°59'35.132" N	87°35'33.539" E
	G	23°59'33.700" N	87°35'37.827" E
	H	23°59'32.460" N	87°35'40.117" E
	I	23°59'31.328" N	87°35'39.926" E
	J	23°59'30.940" N	87°35'38.431" E
	K	23°59'31.807" N	87°35'37.346" E
	L	23°59'30.869" N	87°35'34.968" E
	M	23°59'32.062" N	87°35'31.570" E
	N	23°59'30.131" N	87°35'31.855" E
O	23°59'31.818" N	87°35'30.630" E	
P	23°59'31.122" N	87°35'27.436" E	
Q	23°59'31.499" N	87°35'24.563" E	
R	23°59'31.619"N	87°35'21.866" E	
S	23°59'35.195" N	87°35'22.104" E	
Maximum Temperature	40°C - 45°C		
Minimum Temperature	6°C – 10°C		
Annual rainfall	1130 mm		
Size of the Project	7.20 ha		
Nearest Highway	NH-14: 1.42 Km, WNW SH-11: 1.3 km, S		
Nearest railway station	Sainthia Junction Railway Station Aerial Distance–9.95 Km, SE		
Nearest water body	Mayurakshi River – 3.53 Km, S		

Particulars	Details
Major water bodies within 10 km radius	Mayurakshi River – 3.53 Km, S
Nearest Airport	Kazi Nazrul Islam Airport Aerial Distance –54.6 Km, SSW Netaji Subhas Chandra Bose International Airport Aerial Distance – 172 Km, SSE
Nearest Town/City	Nearest Town & District Headquarter: Suri 11 Km,SSW (Aerial Distance)
Densely populated or built-up area	Md Bazar – 2.08 , W
Archaeologically important places	None within 10 km radius
Protected areas as per Wildlife Protection Act (Tiger reserve, Elephant reserve, Biospheres, National parks, Wildlife sanctuaries, community reserves and conservation reserves)	None within 10 km radius
Reserved / Protected Forests	Candpur PF Maubela RF Ghaga RF Kalaipahari RF Rampur PF Lungalblanla PF
Defense Installations	None within 10 km radius
Seismicity	Since project site comes under Seismic zone II, which is least active zone for earthquakes as per IS: 1893 (Part 1: 2002).
Wildlife Sanctuary	None within 10 km radius
National Park	None within 10 km radius
Biosphere reserves	None within 10 km radius
Important	None within 10 km radius

Particulars	Details
migration routes of birds	
Ramsar sites (Wetlands of International Importance)	None within 10 km radius
Unique or threatened ecosystems	None within 10 km radius
Important topographical features, including ridges, river valleys, shorelines, and riparian areas	None within 10 km radius
Mangrooves	None within 10 km radius
Physical Sensitive Receptors	None within 10 km radius
Notified Ground Water Zone by CGWA	None within 10 km radius
Critically Environmental polluted Area	None within 10 km radius
Pollution Sources	None within 10 km radius

11.1 Project Description

The proposed project of Kharia Fire Clay & China Clay Mine of 7.02 Ha is situated at Village-Kharia, Mouza- Kharia, District: Birbhum, State: West Bengal. The life span of proposed mine block is 20years. The proposed method of mining is open cast semi mechanized mining.

Table 11.2: Salient Features of the Proposed Mining Project

INFORMATION	DETAILS	
Name of the project	Kharia Fire Clay & China Clay Mine	
Village	Kharia,	
Mouza	Kharia	
District	Birbhum	
State	West Bengal	
Toposheet No	73M/5,73M/9,72P/8,72P/12	
Name of Leaseholder	Md. Golam Kibria Mallick	
Address and Contact details of Lease Holder	M/s. Sharma Minerals, Joypore	
	Vill – Nirbhaypur, P.O – Seweakuri, P.S – Md. Bazar Dist. – Birbhum, West Bengal, PIN – 731127	
Name of the Mineral to be mined	Fire clay & China Clay	
Type of land	Private Land. There is no Forest land. No human settlement.	
Status of Operation (New Project or Existing Project operating since)	Existing Project	
Mine Area	7.20 ha	
Ultimate depth of mining	6 m	
Net Movable Reserve	23815 MT	
Production Capacity	4763 MTPY	
Life of Mine	As per Lease period -20 years	
Quantity of topsoil and Overburden estimated to be removed	Over Burden	4.5 M
	Fire clay/ sandy clay	1.5M
	China clay	6.0 M
Depth of Ground Water Table	approx. >7 meter of below from the normal surface level	
Method of Mining	Opencast Semi-Mechanized	
No.of working days	300 Days	
SeismicZone	SeismicZone II	

11.2.1 Water Requirement

The total water requirement shall be 9.65 KLD respectively for domestic, green belt and sprinkling purpose, which will be sourced from Water Tankers from nearby village. Detail of water requirement is given below:

Dust suppression – 0.2 KLD
 Green Belt –8.70 KLD
 Domestic – 0.75 KLD

Table 11.3: Water Requirement Details for Kharia Fire clay & China clay

Sr. No.	Usage	Water Requirement	
1.	Greenbelt Development@ 2.5 L/tree	3480 Trees X 2.5Lit/day =8700.5Lit/day	8.70 KLD
2.	Dust Suppression @ 0.5 L/Sqm (twice a day)	Haul road Area = (50m Length x 4 m width = 200 sqm.) x 0.5 li/sqm = 100 lit /day x 2 time = 200 lit/day	0.2 KLD
3.	Domestic Purpose @25 lpd/worker	30 workers x 25 lit per day = 750 Lit/Day	0.75KLD
Total ::			9.65 KLD

11.2.4 Manpower Requirement

The mining project will generate direct & indirect employment. Local 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 11.4: Manpower Details of Fire clay & china clay Mine

S.No.	Category	
1	1 st class mine manager	1
2.	Mining Foreman	1
3	Mining Mate	1
4	Supervisor cum Office Clerk	1

5	Attendant Cum Peon	1
6	Store cum Godown Keeper	1
7	Miners	8
8	Operator (Skilled)	6
9	Electrician	1
10	Helper (Semi-Skilled)	6
11	Security Guard	2
12	Pump Attendant(un-skilled)	1
Total		30

11.2 Description of Environment

Air Environment

The ambient air quality is carried out at 8 locations in and around the project site and studies are carried out as per CPCB standards. It is observed that, all the values are within the prescribed limits as per National Ambient Air Quality Standards (NAAQS), 2009.

The area around the proposed mining site has been surveyed for physical features and existing environmental scenario. The field survey and baseline monitoring has been done from the period of **March 2023 to May 2023**(Summer Season).

The observations for Post Summer season-(March 2023 –May 2023) are summarized below:

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

Observations of Primary Data

The observations for summer season -(March 2023 – May 2023) are summarized below

Particulate Matter (PM₁₀):

A maximum concentration of PM₁₀ is 66µg/m³ was observed at the AAQM-8 and minimum value of 48 µg/m³ was observed at AAQM-4

Respirable Particulate Matter (PM_{2.5}):

A maximum concentration of PM_{2.5} is recorded to be 31 µg/m³ at AAQM-7 and minimum value of 15 µg/m³ was observed at AAQM-4,5.

Sulphur Dioxide (SO₂):

Maximum concentration of SO₂ is observed to be 8 µg/m³ at AAQM -1 and minimum value of 5µg/m³ observed at AAQM- 1-8.

Oxides of Nitrogen (NO_x):

Maximum concentration of NO_x is observed to be 29 µg/m³ at AAQM -7 & minimum value of 9µg/m³ observed at AAQM-6

Carbon Monoxide (CO):

Maximum concentrations in the region are observed to be 0.8 mg/m³ at AAQM-3,5,6 and minimum value of 0.3mg/m³ observed at AAQM-1,2,4

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.

11.3.1 Noise Environment

Noise levels were monitored in Eight locations including project within the study area. The noise levels ranged between 49.4 to 53.9 dB (A) during day time and noise levels ranged between 38.9 to 43.5 dB (A) during night time. Over all the monitored noise levels are found to be within the stipulated standards set by CPCB.

11.3.2 Water Environment

In order to establish the baseline water quality, 4 ground water and 4 surface water samples were collected and analyzed in the study area. The quality of surface water samples was compared with surface water specification IS 2296:1982 and the surface water quality comes under Class D (Propagation of wildlife and fisheries). The ground water samples were compared with drinking water specification IS 10500:2012 standards.

11.3.3 Soil Quality

A total of 8 samples in and around the project site are collected and analysed. It has been observed that the pH of the soil quality ranged from 7.1 to 7.6 indicating that the soil is slightly alkaline in nature.

11.3.4 Land Use/Land Cover of the Study Area

Kharia village is located in Mohammad Bazar subdivision of Birbhum district in West Bengal, India. It is situated 7.3km away from sub-district headquarter Patalnagar. Suri is the district headquarter of Kharia village. When it comes to administration, Kharia village is administrated by a sarpanch who is elected

representative of the village by the local elections. As per 2019 stats, Kharia village comes under Sainthia assembly constituency & Birbhum parliamentary constituency. Sainthia is the nearest located town to kharia for all major economic activities, which is approximately located 9km away

Figure 11.2 shows a pie diagram of the 10-kilometer research region's land use and land cover maps. The LULC map, shown in Figure 4, shows that the analysis is separated into nine areal classes: Water body, Canal, River, Crop land, settlement, Mining area, Forest, Open land, Vegetation, sand

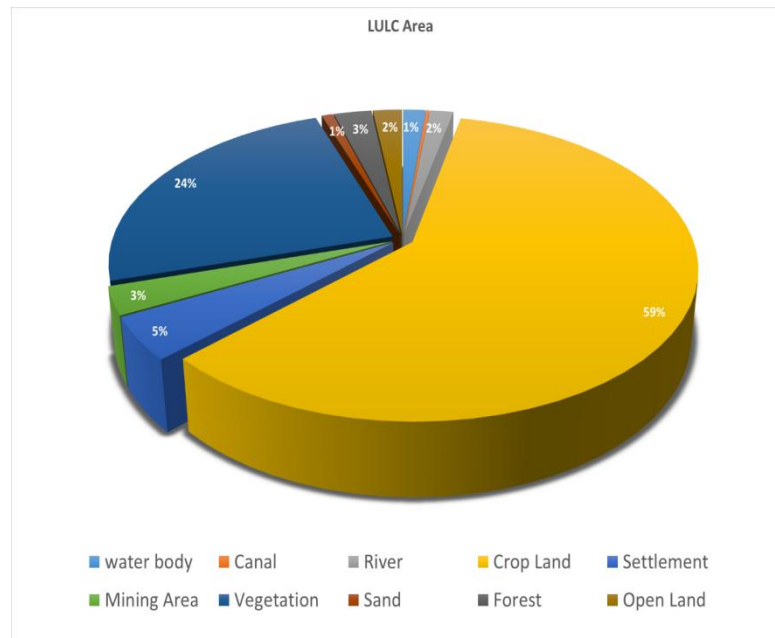


Figure 11.2: LULC Classification (10 km radius Proposed Project Area) of the project site

11.3.5 Biological Environment

The ecological study of the area has been conducted within 10 km radius of the project site in order to understand the existing status of flora and fauna to generate baseline information. Following Rf are being observed within 10 km surrounding from the project site.

SN	Type of Forest	Distance (km)
1	Dewanganj PF	7.83
2	Candpur PF	8.5
3	Lungalblanla PF	5.65
4	Rampur PF	3.47

11.3.6 Socio-economic Environment

Kharia village is located in Mohammad Bazar subdivision of Birbhum district in West Bengal, India. It is situated 7.3km away from sub-district headquarter Patalnagar. Suri is the district headquarter of Kharia village. In the 10 km radius area, settlements are under study during the discussion of the basic socioeconomic environment scenario. Various tables and graphs give detailed descriptions of these settlements.

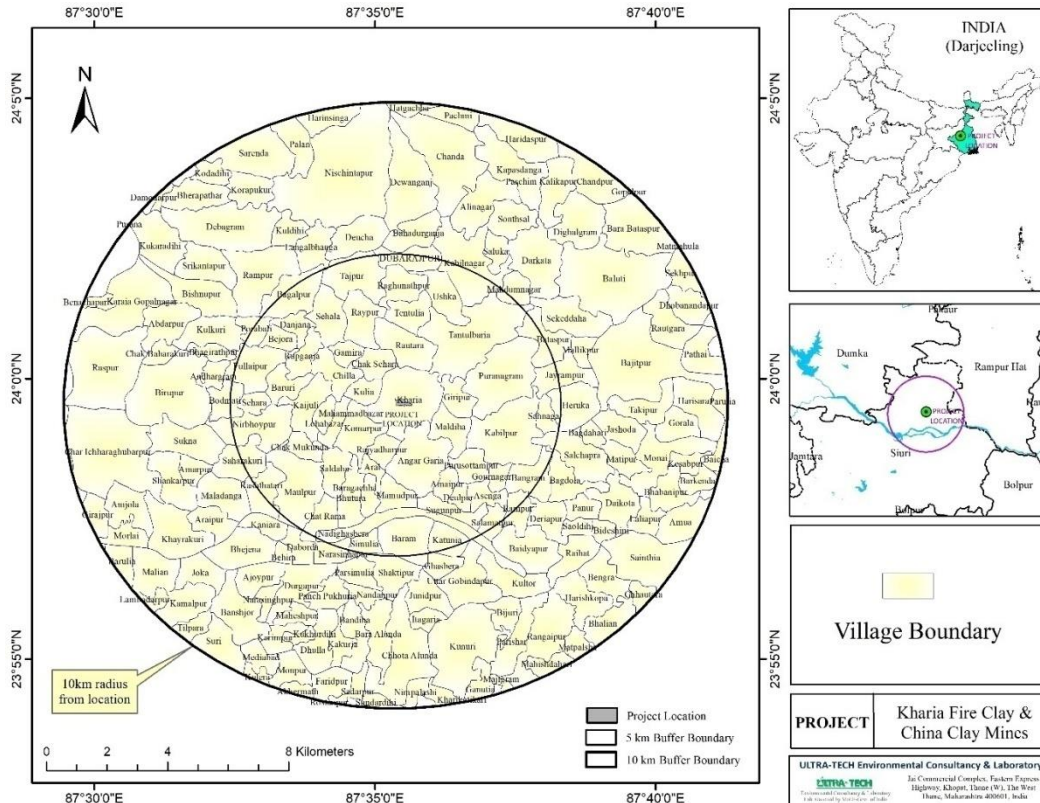


Fig . .11.3: Villages within 10 Km. Radius Area from Project Site.

11.3 Anticipated Environment Impacts and Environment Management Plan

Land/Soil Environment Impact Mitigation

- Before the mining activity the top soil will be scrapped and stored in the lease area, which will be utilized for plantation purpose.
- The Fire clay & China clay excavated from the lease area will be completely sellable resulting no dump within the lease area
- At the end of conceptual period the excavated quarry will converted into water reservoir to supply water for local use like irrigation and pisciculture besides improving the ground water potential.

- Due to semi mechanized mining operation emission from the Fire clay & China clay mines is very less. There will be least impact on the surrounding soil quality and cropping pattern of the area.
- The propose project falls under the seismic zone –II (Low Hazard Risk Zone). 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 behavior of the area.

Air Impact Mitigation

The mitigation measures undertaken in the mine for control of air pollution are:

- Water sprinkling for suppression of dust on road
- Adequately maintained vehicles with PUC certificates should be used for transportation, if required trucks should be covered with tarpaulin.
- Sprinkling of water on road for dust suppression.
- Green belt plantation and other tree plantation will help in reducing the air quality, noise, traffic related pollution and heat island effects.
- Vehicles to be serviced regularly and maintained properly to avoid any unwanted generation of air pollution, noise or vibration from vehicles.
- Regular monitoring of the air quality and noise levels as per the monitoring plan detailed in this EIA report shall be adopted during the operation phase, to ensure that, the noise levels are within the limits prescribed by CPCB.

Water Impact Mitigation

- 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

Ecology and Biodiversity Impact Mitigation

The impact of the mining activity on the biological environment is as follows:

- Plantation will be carried out on approach roads and nearby vicinity of core zone
- Native plant species which are stress and pollution tolerant and comparatively well acclimatized should be grown along roadsides. For selection of plant species it is necessary to consider certain factors as agro climatic suitability, height and canopy architecture, growth rate and habit and aesthetic effect (foliage, conspicuous and attractive flower color).
- Annual bio-monitoring of roadside plants exposed to vehicular pollution will be done to check the dust load and Air Pollution Tolerance Index (APTI)
- All equipment should have sound-control devices no 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 compressor noise.
- As the mining site has no vegetation, thus clearance of vegetation is not required.
- Thus there will be no loss for wildlife.
- Large woody debris in the riparian zone will be left undisturbed or replaced when moved and not be burnt.
- Operation and storage of heavy equipment within riparian habitat will be restricted.

Socio-Economic Environment Impact Mitigation

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 and after the initial phase:
 - The contact with the local community should be institutionalized and carried out daily. The forum will provide opportunities to address local critical issues and to train programmers for shared benefits.
 - Relevant Information on the planned and current development plan, community services, etc should be conveyed to the local community in the form of booklets and audio-visuals.
 - According to the expectations of the local citizens, staff, project officials, should carry out CER activities in the local region.

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.

5.0 Analysis of Alternatives

11.4 Environmental Monitoring Program

Environmental monitoring shall be carried out at the locations to assess the environmental health in the post period. A post study monitoring programme is important as it provides useful information on the following aspects.

- It helps to verify the predictions on environmental impacts presented in this study.
- It helps to indicate warnings of the development of any alarming environmental situations, and thus, provides opportunities for adopting appropriate control measures in advance.

Detailed EMP plan during the operation phase is given chapter 6 of EIA report.

11.5 Risk Assessment

The hazards and its risk assessed during the operation phase of the proposed Fire clay & china clay mining project are low, medium & high. The project proponents are proposed to implement all the mitigation measures to prevent the impact or consequences of the risk expected to be happened in both the project sites. The level of impact after implementing the mitigation measures will be low/medium in all the hazards identified.

11.6 Emergency Response and Disaster Management Plan

Impact of disaster can be significantly reduced through attempts at preparedness, mitigation, and post-event rehabilitation work. Based on hazard identification in the proposed project, an emergency plan has been prepared and the same plan will be implemented by the project implementing agency with the coordination of District Authorities to minimize the damage. The risk assessment and disaster management plan is detailed in Chapter 7 of the EIA report.

11.7 Project Benefits

Mining is back bone of infra-structure development of country. Proposed project has following benefits as given below:

- Employment for local people
- Revenue for the State Government in form of excise duties, GST, taxes, levies etc.
- Generate business opportunity for the people
- Need based funds will be used for welfare of people in villages
- EMP funds will improve environmental quality.
- The operation of the limestone mining would help to improve socio-economic condition of people in

villages through separate fund allocated for Need Based Activity.

11.8 Environment Management Plan (EMP)

The detailed Environment Management Plan has been prepared based on the mining activities and the impacts imparting on land/soil, air, noise, water by the activities. The EMP and the cost for the environment protection measures are detailed in Chapter 10 of EIA report.

Expenditure Proposed for Environmental Protection Activities:

S. No.	Particulars		
		Capital Cost in Rs	Recurring Cost in Rs
1.	Environmental Monitoring	-	2,40,000
2.	Green Belt Development	5,50,000	50,000
3.	Maintenance of Road	-	20,000
4.	Sprinking in haul road	50,000	-
5.	Facilities for Mine workers	50,000	40,000
	Total ::	6,50,000	3,50,000
	Total Capital Cost in Rs	6,50,000/-	
	Total Recurring Cost in Rs	3,50,000/-	
	Total Cost of EMP in Rs	10,00,000/-	

11.8.1 Budget for Social Development

The total estimated cost of the project is 200 lacs., Rs 4lacs will be allocated for Need based activity for causes of village for drinking water, sanitation, education, health.

11.9 Conclusion

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 is and waste generated is non-toxic and does 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. This proposed plantation in the area will improve the aesthetic look along with betterment of ecology and environment of the locality.

CHAPTER 12 : CONSULTANT ENGAGED

12.1 CONSULTANT ENGAGED

This EIA report is prepared on behalf of the proponents, taking inputs from proponent's office staff, Architects, Project Management Professionals etc. by Environmental Consultants **M/s. Ultra-Tech Environmental Consultancy and Laboratory, Thane.**

M/s Ultra-Tech Environmental Consultancy and Laboratory:

Ultra-Tech Environmental Consultancy and Laboratory [Lab Gazetted by MoEFCC – Govt. of India] not only give environmental solutions for sustainable development, but make sure that they are economically feasible. With innovative ideas and impact mitigation measures offered, make them distinguished in environmental consulting business. The completion of tasks in record time is the key feature of Ultra-Tech. A team of more than hundred environmental brigadiers consists of engineers, experts, ecologists, hydrologists, geologists, socio-economic experts, solid waste and hazard waste experts apart from environmental media sampling and monitoring experts and management experts , strive hard to serve the clients with up to mark and best services.



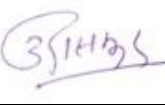
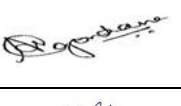
Ultra-Tech offers environmental consultancy services to assist its clients to obtain environmental clearance for their large buildings, construction, CRZ, SEZ, high rise buildings, township projects and industries covering sugar and distilleries from respective authorities.

Ultra-Tech also provide STP/ETP/WTP project consultancy on turn-key basis apart from Operation and Maintenance of these projects on annual contract basis. Also, having MoEFCC approved environmental laboratory, Ultra-Tech provide laboratory services for monitoring and analysis of various environmental media like air, water, waste water, stack, noise and meteorological data to its clients all over India and abroad.

Ownership of organization

Though, Ultra-Tech is a proprietorship firm, actually it is a confluence of environmental engineers, ecologists, geologists, hydrologists, socio-economic and management experts apart from environmental laboratory sampling and monitoring teams. The company is established in 1986 and celebrated 2011 as its silver jubilee year.

Table 12.1 List of EIA Coordinator, Functional Area Experts & Associates:

S.N	Functional Area Experts Involved			Period of Involvement
	FA	Name/s	Signature	
1	AP	Mr. Adhikrao Govind Yewale		March 2023 to till date
2	WP	Mrs. Rekha Margam		
3	AQ	Mr. Deo Narayan		
4	EB	Mrs. Padmini Sindhey		
5	SE	Mr. Yogesh Raskar		
6	SHW	Mrs. Deepa Tamhane (Karnik)		
7	LU	Mr. Yogesh Raskar		
8	RH	Ms. Ashwini Ganvir		
9	Team Members	Ms. Koyel Sarkar		
10		Ms. Susmita Pandit		

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. REPORT NO. : UT/ELS/REPORT/SMJKC/025/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar ISSUE DATE : 21/06/2023
 Dist- Birbhumi, West Bengal ,Pin-731127 YOUR REF. : Work Order Letter
 Project site: " Kharia Fire Clay & China Clay Mine" REF. DATE : 05/08/2023

Sample Particulars : **AMBIENT AIR QUALITY MONITORING**
Location Code : AAQM01 **Sample Location :** At project site ;
Height of Sampler : 1.5 Meter **Co-ordinates:** N-23°59'37.20", E-87°35'31.30"
Sampling Duration : 24 Hours
Sample Collect By : ULTRA-TECH Environmental Consultancy and Laboratory, Thane

Date of Sampling	Date of Sample Registration	Analysis Period		Sample Lab Code	Parameters				
		From	To		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO [*] mg/m ³
01/03/2023	06/03/2023	06/03/2023	11/03/2023	SMJKC/L1-01/24	59	20	5	27	0.7
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08/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L1-03/24	56	23	7	23	0.8
12/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L1-04/24	57	24	6	24	--
15/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L1-05/24	54	23	8	25	0.9
19/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L1-06/24	55	22	6	26	--
22/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L1-07/24	56	21	7	25	0.8
27/03/2023	31/03/2023	31/03/2023	05/04/2023	SMJKC/L1-08/24	57	22	6	27	--
02/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L1-09/24	60	20	5	26	0.6
05/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L1-10/24	61	21	6	22	--
09/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L1-11/24	59	25	8	23	0.7
12/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L1-12/24	58	24	6	24	--
16/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L1-14/24	60	23	8	25	0.8
19/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L1-14/24	59	22	6	24	--
23/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L1-15/24	61	25	5	23	0.7
26/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L1-16/24	60	24	6	25	--
02/05/2023	06/05/2023	06/05/2023	10/05/2023	SMJKC/L1-17/24	54	20	7	26	0.8
07/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L1-18/24	55	19	6	24	--
10/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L1-19/24	57	21	5	23	0.8
14/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L1-20/24	56	22	6	22	--
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21/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L1-22/24	58	24	6	24	--
24/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L1-23/24	59	25	7	26	0.9
28/05/2023	01/06/2023	01/06/2023	07/06/2023	SMJKC/L1-24/24	58	24	6	27	--
Average					58	22	6	25	0.8
Minimum					54	19	5	22	0.6
Maximum					61	25	8	27	0.9
98 Percentile					61	25	8	27	0.9

*Sampling Duration:01:00 Hr

Opinions/Interpretations: National Ambient Air Quality Monitoring Standard, Part III- Section IV is enclosed for your reference.

- Note:**
1. This test report refers only to the sample tested.
 2. This test report may not be reproduced in part, without the permission of this laboratory.
 3. Any correction invalidates this test report.

- END OF REPORT -

For ULTRA TECH,



Meghan Patil
 (Authorized Signatory)

Lab: Survey No. 93/A, Conformity Hissa No.2 G.V.Brothers Bldg., Bata Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India
 Tele: +91 22 2547 49 07 / +91 22 2547 62 17 Email: lab@ultratech.in Visit us at: www.ultratech.in

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. REPORT NO. : UT/ELS/REPORT/SMJKC/026/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar ISSUE DATE : 21/06/2023
 Dist- Birbhum, West Bengal ,Pin-731127 YOUR REF. : Work Order Letter
 Project site: " Kharia Fire Clay & China Clay Mine" REF. DATE : 05/08/2023

Sample Particulars : **AMBIENT AIR QUALITY MONITORING**
Location Code : AAQM02 **Sample Location :** Kedarpur BN High School(Angargaria) ;
Height of Sampler : 1.5 Meter **Co-ordinates:** N-23°58'39.75", E-87°36'9.39"
Sampling Duration : 24 Hours
Sample Collect By : ULTRA-TECH Environmental Consultancy and Laboratory, Thane

Date of Sampling	Date of Sample Registration	Analysis Period		Sample Lab Code	Parameters				
		From	To		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO [#] mg/m ³
01/03/2023	06/03/2023	06/03/2023	11/03/2023	SMJKC/L2-01/24	55	19	6	22	0.4
05/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L2-02/24	58	16	7	23	--
08/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L2-03/24	59	18	6	24	0.4
12/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L2-04/24	59	16	6	23	--
15/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L2-05/24	64	19	5	25	0.5
19/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L2-06/24	63	21	5	24	--
22/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L2-07/24	62	24	6	23	0.3
27/03/2023	31/03/2023	31/03/2023	05/04/2023	SMJKC/L2-08/24	65	26	6	22	--
02/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L2-09/24	61	23	6	21	0.6
05/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L2-10/24	65	24	7	20	--
09/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L2-11/24	58	25	5	23	0.6
12/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L2-12/24	56	23	5	24	--
16/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L2-14/24	58	22	6	24	0.6
19/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L2-14/24	56	24	6	25	--
23/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L2-15/24	57	25	6	22	0.5
26/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L2-16/24	59	23	6	21	--
02/05/2023	06/05/2023	06/05/2023	10/05/2023	SMJKC/L2-17/24	56	22	6	23	0.6
07/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L2-18/24	55	21	6	22	--
10/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L2-19/24	56	25	5	21	0.5
14/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L2-20/24	58	24	6	22	--
17/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L2-21/24	60	23	6	20	0.6
21/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L2-22/24	58	21	6	21	--
24/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L2-23/24	59	20	5	23	0.6
28/05/2023	01/06/2023	01/06/2023	07/06/2023	SMJKC/L2-24/24	55	22	6	22	--
Average					59	22	6	23	0.5
Minimum					55	16	5	20	0.3
Maximum					65	26	7	25	0.6
98 Percentile					65	26	7	25	0.6

#Sampling Duration:01:00 Hr

Opinions/Interpretations: National Ambient Air Quality Monitoring Standard, Part III- Section IV is enclosed for your reference.

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- END OF REPORT



For ULTRA TECH,


 Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. REPORT NO. : UT/ELS/REPORT/SMJKC/027/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar ISSUE DATE : 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 YOUR REF. : Work Order Letter
 Project site: " Kharia Fire Clay & China Clay Mine" REF. DATE : 05/08/2023

Sample Particulars : **AMBIENT AIR QUALITY MONITORING**
Location Code : AAQM03 **Sample Location :** Tentulia Primary School (Tentulia) ;
Height of Sampler : 1.5 Meter **Co-ordinates:** N-24°1'24.91", E-87°35'54.47"
Sampling Duration : 24 Hours
Sample Collect By : ULTRA-TECH Environmental Consultancy and Laboratory, Thane

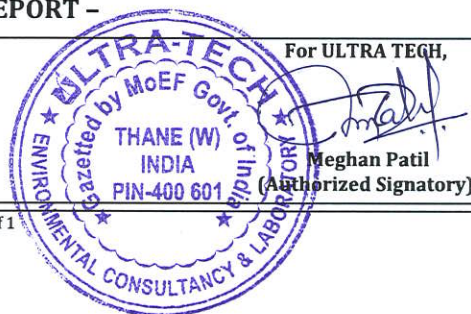
Date of Sampling	Date of Sample Registration	Analysis Period		Sample Lab Code	Parameters				
		From	To		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO [*] mg/m ³
01/03/2023	06/03/2023	06/03/2023	11/03/2023	SMJKC/L3-01/24	58	24	6	22	0.5
05/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L3-02/24	58	23	6	23	--
08/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L3-03/24	54	25	6	21	0.5
12/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L3-04/24	53	22	5	20	--
15/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L3-05/24	55	24	6	19	0.7
19/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L3-06/24	54	25	6	18	--
22/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L3-07/24	52	23	5	16	0.8
27/03/2023	31/03/2023	31/03/2023	05/04/2023	SMJKC/L3-08/24	55	22	5	17	--
02/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L3-09/24	53	21	6	17	0.6
05/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L3-10/24	51	25	6	16	--
09/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L3-11/24	54	23	6	19	0.6
12/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L3-12/24	52	25	5	18	--
16/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L3-14/24	53	24	5	20	0.7
19/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L3-14/24	55	22	6	21	--
23/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L3-15/24	54	23	7	19	0.7
26/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L3-16/24	52	24	6	20	--
02/05/2023	06/05/2023	06/05/2023	10/05/2023	SMJKC/L3-17/24	53	25	5	21	0.7
07/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L3-18/24	54	23	6	22	--
10/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L3-19/24	53	22	6	21	0.6
14/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L3-20/24	52	24	7	20	--
17/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L3-21/24	51	22	6	19	0.7
21/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L3-22/24	55	23	7	20	--
24/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L3-23/24	53	21	6	18	0.8
28/05/2023	01/06/2023	01/06/2023	07/06/2023	SMJKC/L3-24/24	54	22	5	17	--
Average					54	23	6	19	0.7
Minimum					51	21	5	16	0.5
Maximum					58	25	7	23	0.8
98 Percentile					58	25	7	23	0.8

*Sampling Duration:01:00 Hr

Opinions/Interpretations: National Ambient Air Quality Monitoring Standard, Part III- Section IV is enclosed for your reference.

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TEST REPORT

ISSUED TO: **M/s. SHARMA MINERALS JOYPURE.** REPORT NO. : UT/ELS/REPORT/SMJJC/028/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar ISSUE DATE : 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 YOUR REF. : Work Order Letter
 Project site: " Kharia Fire Clay & China Clay Mine" REF. DATE : 05/08/2023

Sample Particulars :
Location Code : AAQM04
Height of Sampler : 1.5 Meter
Sampling Duration : 24 Hours
Sample Collect By : ULTRA-TECH Environmental Consultancy and Laboratory, Thane

AMBIENT AIR QUALITY MONITORING
Sample Location : Bajitpur High School ;
 Co-ordinates: N-24°0'1.41", E-87°39'45.59"

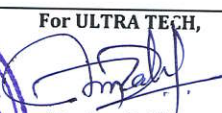
Date of Sampling	Date of Sample Registration	Analysis Period		Sample Lab Code	Parameters				
		From	To		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO [*] mg/m ³
02/03/2023	06/03/2023	06/03/2023	11/03/2023	SMJJC/L4-01/24	52	17	5	16	0.7
06/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJJC/L4-02/24	53	16	6	17	--
09/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJJC/L4-03/24	51	17	7	20	0.4
13/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJJC/L4-04/24	52	16	5	19	--
16/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJJC/L4-05/24	56	15	6	18	0.3
20/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJJC/L4-06/24	55	16	6	17	--
23/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJJC/L4-07/24	49	16	6	16	0.4
28/03/2023	31/03/2023	31/03/2023	05/04/2023	SMJJC/L4-08/24	48	15	6	15	--
03/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJJC/L4-09/24	51	17	6	16	0.4
06/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJJC/L4-10/24	52	17	5	17	--
10/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJJC/L4-11/24	51	16	6	18	0.3
13/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJJC/L4-12/24	52	15	6	19	--
17/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJJC/L4-14/24	50	16	5	18	0.4
20/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJJC/L4-14/24	51	15	5	17	--
24/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJJC/L4-15/24	54	16	7	16	0.6
27/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJJC/L4-16/24	55	17	7	15	--
03/05/2023	06/05/2023	06/05/2023	10/05/2023	SMJJC/L4-17/24	53	16	7	19	0.5
08/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJJC/L4-18/24	54	15	7	18	--
11/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJJC/L4-19/24	50	17	6	17	0.5
15/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJJC/L4-20/24	49	16	7	16	--
18/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJJC/L4-21/24	48	16	6	16	0.5
22/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJJC/L4-22/24	49	15	6	17	--
25/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJJC/L4-23/24	49	15	6	19	0.6
29/05/2023	01/06/2023	01/06/2023	07/06/2023	SMJJC/L4-24/24	48	16	6	18	--
Average					51	16	6	17	0.5
Minimum					48	15	5	15	0.3
Maximum					56	17	7	20	0.7
98 Percentile					56	17	7	20	0.7

*Sampling Duration:01:00 Hr

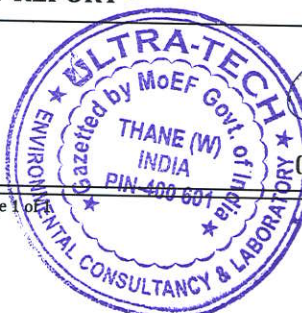
Opinions/Interpretations: National Ambient Air Quality Monitoring Standard, Part III- Section IV is enclosed for your reference.

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- END OF REPORT -

For ULTRA TECH,

Meghan Patil
 (Authorized Signatory)

Page 1 of 1



TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. REPORT NO. : UT/ELS/REPORT/SMJJC/029/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar ISSUE DATE : 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 YOUR REF. : Work Order Letter
 Project site: " Kharia Fire Clay & China Clay Mine" REF. DATE : 05/08/2023

Sample Particulars : **AMBIENT AIR QUALITY MONITORING**
Location Code : AAQM05 **Sample Location :** Nischantapur ;
Height of Sampler : 1.5 Meter **Co-ordinates:** N-24°3'4.06", E-87°34'33.02"
Sampling Duration : 24 Hours
Sample Collect By : ULTRA-TECH Environmental Consultancy and Laboratory, Thane

Date of Sampling	Date of Sample Registration	Analysis Period		Sample Lab Code	Parameters				
		From	To		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO [#] mg/m ³
02/03/2023	06/03/2023	06/03/2023	11/03/2023	SMJJC/LS-01/24	58	20	5	18	0.6
06/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJJC/LS-02/24	57	19	6	17	--
09/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJJC/LS-03/24	56	18	5	16	0.7
13/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJJC/LS-04/24	55	19	6	15	--
16/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJJC/LS-05/24	57	16	6	17	0.8
20/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJJC/LS-06/24	58	17	6	18	--
23/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJJC/LS-07/24	55	15	6	16	0.5
28/03/2023	31/03/2023	31/03/2023	05/04/2023	SMJJC/LS-08/24	56	16	6	17	--
03/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJJC/LS-09/24	54	18	6	18	0.7
06/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJJC/LS-10/24	55	17	6	17	--
10/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJJC/LS-11/24	55	19	5	19	0.4
13/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJJC/LS-12/24	54	18	6	18	--
17/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJJC/LS-14/24	58	17	5	17	0.6
20/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJJC/LS-14/24	57	16	6	16	--
24/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJJC/LS-15/24	55	19	5	18	0.6
27/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJJC/LS-16/24	54	18	6	17	--
03/05/2023	06/05/2023	06/05/2023	10/05/2023	SMJJC/LS-17/24	58	17	6	16	0.7
08/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJJC/LS-18/24	57	18	6	18	--
11/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJJC/LS-19/24	58	17	6	19	0.6
15/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJJC/LS-20/24	57	16	6	18	--
18/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJJC/LS-21/24	56	19	5	17	0.7
22/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJJC/LS-22/24	57	18	6	18	--
25/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJJC/LS-23/24	54	20	5	16	0.7
29/05/2023	01/06/2023	01/06/2023	07/06/2023	SMJJC/LS-24/24	55	19	6	17	--
Average					56	18	6	17	0.6
Minimum					54	15	5	15	0.4
Maximum					58	20	6	19	0.8
98 Percentile					58	20	6	19	0.8

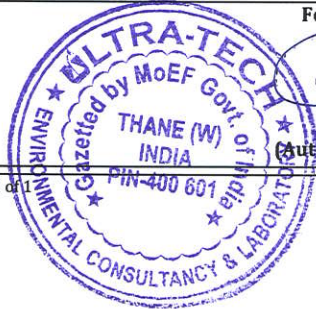
*Sampling Duration:01:00 Hr

Opinions/Interpretations: National Ambient Air Quality Monitoring Standard, Part III- Section IV is enclosed for your reference.

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For ULTRA TECH,



Meghan Patil
 (Authorized Signatory)

Lab: Survey No. 93/A, Conformity Hissa No.2 G.V.Brothers Bldg., Bata Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India
 Tele: +91 22 2547 49 07 / +91 22 2547 62 17 Email: lab@ultratech.in Visit us at: www.ultratech.in

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. REPORT NO. : UT/ELS/REPORT/SMJKC/030/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar ISSUE DATE : 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 YOUR REF. : Work Order Letter
 Project site: " Kharia Fire Clay & China Clay Mine" REF. DATE : 05/08/2023

Sample Particulars : **AMBIENT AIR QUALITY MONITORING**
Location Code : AAQM06 **Sample Location :** Panch Pukhuria Primary School ;
Height of Sampler : 1.5 Meter **Co-ordinates:** N-23°56'5.48", E-87°34'17.96"
Sampling Duration : 24 Hours
Sample Collect By : ULTRA-TECH Environmental Consultancy and Laboratory, Thane

Date of Sampling	Date of Sample Registration	Analysis Period		Sample Lab Code	Parameters				
		From	To		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO [*] mg/m ³
02/03/2023	06/03/2023	06/03/2023	11/03/2023	SMJKC/L6-01/24	59	20	6	11	0.6
06/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L6-02/24	58	21	6	12	--
09/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L6-03/24	57	20	6	11	0.8
13/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L6-04/24	56	19	6	10	--
16/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L6-05/24	58	20	6	12	0.7
20/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L6-06/24	57	19	7	11	--
23/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L6-07/24	56	21	7	10	0.8
28/03/2023	31/03/2023	31/03/2023	05/04/2023	SMJKC/L6-08/24	55	20	6	11	--
03/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L6-09/24	57	22	6	10	0.7
06/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L6-10/24	56	21	7	11	--
10/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L6-11/24	56	19	7	11	0.8
13/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L6-12/24	55	18	5	10	--
17/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L6-14/24	58	23	5	11	0.6
20/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L6-14/24	59	22	5	12	--
24/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L6-15/24	57	21	6	11	0.7
27/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L6-16/24	56	22	5	12	--
03/05/2023	06/05/2023	06/05/2023	10/05/2023	SMJKC/L6-17/24	58	20	5	10	0.6
08/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L6-18/24	59	21	6	9	--
11/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L6-19/24	56	21	6	10	0.6
15/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L6-20/24	57	22	7	11	--
18/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L6-21/24	55	21	6	12	0.7
22/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L6-22/24	56	22	6	11	--
25/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L6-23/24	59	23	7	10	0.6
29/05/2023	01/06/2023	01/06/2023	07/06/2023	SMJKC/L6-24/24	58	22	6	11	--
Average					57	21	6	11	0.7
Minimum					55	18	5	9	0.6
Maximum					59	23	7	12	0.8
98 Percentile					59	23	7	12	0.8

*Sampling Duration:01:00 Hr

Opinions/Interpretations: National Ambient Air Quality Monitoring Standard, Part III- Section IV is enclosed for your reference.

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- END OF REPORT -



For ULTRA-TECH,


 Meghan Patil
 (Authorized Signatory)

Lab: Survey No. 93/A, Conformity Hissa No.2 G.V.Brothers Bldg., Bata Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India
 Tele: +91 22 2547 49 07 / +91 22 2547 62 17 Email: lab@ultratech.in Visit us at: www.ultratech.in

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. REPORT NO. : UT/ELS/REPORT/SMJKC/031/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar ISSUE DATE : 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 YOUR REF. : Work Order Letter
 Project site: " Kharia Fire Clay & China Clay Mine" REF. DATE : 05/08/2023

Sample Particulars : AMBIENT AIR QUALITY MONITORING
Location Code : AAQM07 **Sample Location :** Nirbhayapur ;
Height of Sampler : 1.5 Meter **Co-ordinates:** N-23°59'0.29", E-87°33'22.38"
Sampling Duration : 24 Hours
Sample Collect By : ULTRA-TECH Environmental Consultancy and Laboratory, Thane

Date of Sampling	Date of Sample Registration	Analysis Period		Sample Lab Code	Parameters				
		From	To		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO* mg/m ³
03/03/2023	06/03/2023	06/03/2023	11/03/2023	SMJKC/L7-01/24	72	28	5	21	0.7
07/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L7-02/24	73	29	6	22	--
10/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L7-03/24	69	27	5	25	0.7
14/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L7-04/24	68	26	6	24	--
17/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L7-05/24	72	25	5	23	0.6
21/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L7-06/24	73	26	6	22	--
24/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L7-07/24	75	30	5	24	0.7
29/03/2023	31/03/2023	31/03/2023	05/04/2023	SMJKC/L7-08/24	76	31	6	25	--
04/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L7-09/24	74	29	5	26	0.7
07/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L7-10/24	73	28	6	27	--
11/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L7-11/24	71	27	5	28	0.7
14/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L7-12/24	72	26	6	27	--
18/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L7-14/24	77	31	5	29	0.6
21/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L7-14/24	76	30	5	28	--
25/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L7-15/24	75	27	6	25	0.7
28/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L7-16/24	74	28	5	26	--
04/05/2023	06/05/2023	06/05/2023	10/05/2023	SMJKC/L7-17/24	77	29	6	26	0.5
09/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L7-18/24	76	30	5	25	--
12/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L7-19/24	75	31	6	24	0.7
16/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L7-20/24	74	30	5	25	--
19/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L7-21/24	73	28	6	27	0.6
23/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L7-22/24	72	29	5	28	--
26/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L7-23/24	71	28	6	29	0.4
30/05/2023	01/06/2023	01/06/2023	07/06/2023	SMJKC/L7-24/24	70	27	5	28	--
Average					73	28	5	26	0.6
Minimum					68	25	5	21	0.4
Maximum					77	31	6	29	0.7
98 Percentile					77	31	6	29	0.7

*Sampling Duration:01:00 Hr

Opinions/Interpretations: National Ambient Air Quality Monitoring Standard, Part III- Section IV is enclosed for your reference.

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- END OF REPORT -



For ULTRA TECH,


 Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. REPORT NO. : UT/ELS/REPORT/SMJKC/032/06-2023
 Village- Kharia ,P.O- Md.Bazar, PS -Md. Bazar ISSUE DATE : 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 YOUR REF. : Work Order Letter
 Project site: " Kharia Fire Clay & China Clay Mine" REF. DATE : 05/08/2023

Sample Particulars : **AMBIENT AIR QUALITY MONITORING**
Location Code : AAQM08 **Sample Location :** Lohabazar ;
Height of Sampler : 1.5 Meter **Co-ordinates:** N-23°59'3.99", E-87°34'23.73"
Sampling Duration : 24 Hours
Sample Collect By : ULTRA-TECH Environmental Consultancy and Laboratory, Thane

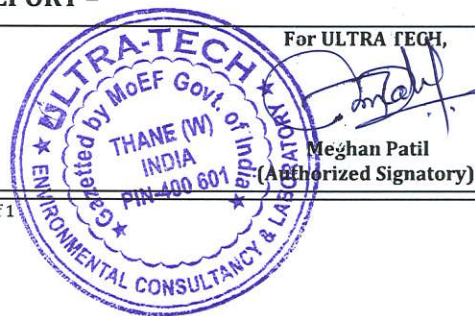
Date of Sampling	Date of Sample Registration	Analysis Period		Sample Lab Code	Parameters				
		From	To		PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	SO ₂ µg/m ³	NO ₂ µg/m ³	CO [*] mg/m ³
03/03/2023	06/03/2023	06/03/2023	11/03/2023	SMJKC/L8-01/24	63	23	6	25	0.4
07/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L8-02/24	62	24	6	26	--
10/03/2023	13/03/2023	13/03/2023	18/03/2023	SMJKC/L8-03/24	64	25	5	24	0.7
14/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L8-04/24	65	26	5	23	--
17/03/2023	20/03/2023	20/03/2023	25/03/2023	SMJKC/L8-05/24	66	24	6	22	0.7
21/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L8-06/24	65	23	5	23	--
24/03/2023	27/03/2023	27/03/2023	01/04/2023	SMJKC/L8-07/24	63	25	5	27	0.7
29/03/2023	31/03/2023	31/03/2023	05/04/2023	SMJKC/L8-08/24	63	26	5	28	--
04/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L8-09/24	62	27	5	26	0.7
07/04/2023	10/04/2023	10/04/2023	15/04/2023	SMJKC/L8-10/24	61	28	5	25	--
11/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L8-11/24	60	26	5	27	0.6
14/04/2023	17/04/2023	17/04/2023	22/04/2023	SMJKC/L8-12/24	59	25	5	28	--
18/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L8-14/24	58	29	5	24	0.6
21/04/2023	24/04/2023	24/04/2023	29/04/2023	SMJKC/L8-14/24	59	28	5	23	--
25/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L8-15/24	60	27	5	25	0.7
28/04/2023	01/05/2023	01/05/2023	06/05/2023	SMJKC/L8-16/24	61	26	5	26	--
04/05/2023	06/05/2023	06/05/2023	10/05/2023	SMJKC/L8-17/24	65	24	5	27	0.5
09/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L8-18/24	66	25	5	28	--
12/05/2023	15/05/2023	15/05/2023	20/05/2023	SMJKC/L8-19/24	64	26	6	26	0.7
16/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L8-20/24	63	27	6	25	--
19/05/2023	22/05/2023	22/05/2023	27/05/2023	SMJKC/L8-21/24	65	29	5	24	0.6
23/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L8-22/24	64	28	5	25	--
26/05/2023	29/05/2023	29/05/2023	04/06/2023	SMJKC/L8-23/24	66	25	5	22	0.7
30/05/2023	01/06/2023	01/06/2023	07/06/2023	SMJKC/L8-24/24	65	26	5	23	--
Average					63	26	5	25	0.6
Minimum					58	23	5	22	0.4
Maximum					66	29	6	28	0.7
98 Percentile					66	29	6	28	0.7

*Sampling Duration:01:00 Hr

Opinions/Interpretations: National Ambient Air Quality Monitoring Standard, Part III- Section IV is enclosed for your reference.

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- END OF REPORT -



TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/001/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS : **AMBIENT NOISE LEVEL MONITORING**

Sampling Plan Ref. No. : SMJKC-03/2023 **Sample Lab Code :** UT/ELS/SMJKC/001/03-2023
Sampling Procedure : UT/LQMS/SOP/N01 **Survey Done By :** ULTRA TECH
Date of Monitoring : 13/03/2023 to 14/03/2023

Sr. No.	Location	Noise Level Reading in dB(A) Leq								
		Time (Hrs)	Day dB(A)			Time (Hrs)	Night dB(A)			
			Leq	Lmin	Lmax		Leq	Lmin	Lmax	
01.	ANQM 01 At Project site Co-ordinates: N-23°59'33.92";E-87°35'25.25"	06:00 to 07:00	45.9	38.9	55.9	22:00 to 23:00	46.1	37.6	56.9	
		07:00 to 08:00	49.6	41.3	59.6	23:00 to 00:00	45.2	36.5	55.3	
		08:00 to 09:00	52.5	43.2	63.2	00:00 to 01:00	44.1	35.3	53.2	
		09:00 to 10:00	55.4	42.6	65.7	01:00 to 02:00	42.6	36.2	52.6	
		10:00 to 11:00	54.9	43.7	63.2	02:00 to 03:00	41.8	36.1	53.2	
		11:00 to 12:00	54.6	42.5	62.5	03:00 to 04:00	42.0	35.2	52.1	
		12:00 to 13:00	55.8	43.2	64.3	04:00 to 05:00	41.5	36.2	51.5	
		13:00 to 14:00	56.5	42.1	63.2	05:00 to 06:00	41.8	36.7	53.2	
		14:00 to 15:00	55.8	41.6	62.5	--	--	--	--	
		15:00 to 16:00	55.9	43.2	64.3	--	--	--	--	
		16:00 to 17:00	54.3	42.1	63.2	--	--	--	--	
		17:00 to 18:00	52.5	41.5	62.5	--	--	--	--	
		18:00 to 19:00	53.4	43.2	63.5	--	--	--	--	
		19:00 to 20:00	52.3	42.0	62.1	--	--	--	--	
		20:00 to 21:00	51.7	41.5	61.5	--	--	--	--	
		21:00 to 22:00	47.8	40.9	58.9	--	--	--	--	
			L ₁₀	55.8			Limits in dB(A) Leq as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (See rule 3(1) and 4(1)) Ambient Air Quality Standards in respect of Noise			
	L ₅₀	52.0								
	L ₉₀	41.9								
	Day Leq	53.9			75					
	Night Leq	43.5			70					

Opinions / Interpretations: The observed values for LeqdB(A) for Day Time & Night Time are Within the standard limits as per Ambient Air Quality Standards in respect of Noise prescribed in The Noise Pollution (Regulation and Control) Rules, 2000 for Industrail Zone.

Note: 1. Monitoring area coming under Industrail Zone.
 2. Day Time - 06:00 Hrs to 22:00 Hrs and Night Time - 22:00 Hrs to 06:00 Hrs.

Sampling Equipment Details	Instrument Used	Make & Model	Calibration Status
	Sound Level Meter	Make -Lutron ; Model - SL4033SD, Sr. No. Q646217	Valid up to - 13/10/2023

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- END OF REPORT



For ULTRA TECH,

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/002/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS : **AMBIENT NOISE LEVEL MONITORING**

Sampling Plan Ref. No. : SMJKC-03/2023 **Sample Lab Code :** UT/ELS/SMJKC/002/03-2023
Sampling Procedure : UT/LQMS/SOP/N01 **Survey Done By :** ULTRA TECH
Date of Monitoring : 14/03/2023 to 15/03/2023

Sr. No.	Location	Noise Level Reading in dB(A) Leq								
		Time (Hrs)	Day dB(A)			Time (Hrs)	Night dB(A)			
			Leq	Lmin	Lmax		Leq	Lmin	Lmax	
01.	ANQM 02 At Angar Garia Co-ordinates: N-23°58'36.67";E-87°36'3.80"	06:00 to 07:00	44.8	37.8	55.9	22:00 to 23:00	43.2	37.6	48.9	
		07:00 to 08:00	48.5	41.3	59.6	23:00 to 00:00	42.1	38.6	49.6	
		08:00 to 09:00	51.4	43.2	63.2	00:00 to 01:00	41.5	36.5	48.6	
		09:00 to 10:00	54.3	42.6	65.4	01:00 to 02:00	41.5	35.6	49.5	
		10:00 to 11:00	53.8	43.5	63.2	02:00 to 03:00	40.7	39.5	49.3	
		11:00 to 12:00	53.5	42.1	62.5	03:00 to 04:00	40.1	37.3	53.2	
		12:00 to 13:00	53.9	41.6	63.5	04:00 to 05:00	39.8	36.2	47.8	
		13:00 to 14:00	52.5	43.2	62.1	05:00 to 06:00	39.7	36.1	46.5	
		14:00 to 15:00	54.7	42.1	61.5	--	--	--	--	
		15:00 to 16:00	54.8	41.6	63.2	--	--	--	--	
		16:00 to 17:00	53.2	43.2	62.5	--	--	--	--	
		17:00 to 18:00	51.4	42.2	61.5	--	--	--	--	
		18:00 to 19:00	52.3	41.6	63.2	--	--	--	--	
		19:00 to 20:00	51.2	43.2	62.4	--	--	--	--	
		20:00 to 21:00	50.6	42.1	61.5	--	--	--	--	
		21:00 to 22:00	46.7	40.6	56.7	--	--	--	--	
			L₁₀	54.2			Limits in dB(A) Leq as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (See rule 3(1) and 4(1)) Ambient Air Quality Standards in respect of Noise			
	L₅₀	50.9								
	L₉₀	40.3								
	Day Leq	52.4			55					
	Night Leq	41.2			45					

Opinions / Interpretations: The observed values for LeqdB(A) for Day Time & Night Time are Within the standard limits as per Ambient Air Quality Standards in respect of Noise prescribed in The Noise Pollution (Regulation and Control) Rules, 2000 for Residential Zone.

Note: 1. Monitoring area coming under Residential Zone.
 2. Day Time - 06:00 Hrs to 22:00 Hrs and Night Time - 22:00 Hrs to 06:00 Hrs.

Sampling Equipment Details	Instrument Used	Make & Model	Calibration Status
	Sound Level Meter	Make - Lutron ; Model - SL4033SD, Sr. No. Q646217	Valid up to - 13/10/2023

Note: 1. This test report refers only to the monitoring conducted.
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- END OF REPORT



For ULTRA TECH,

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/003/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS : **AMBIENT NOISE LEVEL MONITORING**

Sampling Plan Ref. No. : SMJKC-03/2023 **Sample Lab Code :** UT/ELS/SMJKC/003/03-2023
Sampling Procedure : UT/LQMS/SOP/N01 **Survey Done By :** ULTRA TECH
Date of Monitoring : 15/03/2023 to 16/03/2023

Sr. No.	Location	Noise Level Reading in dB(A) Leq							
		Time (Hrs)	Day dB(A)			Time (Hrs)	Night dB(A)		
			Leq	Lmin	Lmax		Leq	Lmin	Lmax
01.	ANQM 03 At Tentulia Co-ordinates: N-24°2'11.72";E-87°35'31.49"	06:00 to 07:00	43.5	38.9	53.2	22:00 to 23:00	40.3	36.2	48.9
		07:00 to 08:00	45.6	39.5	55.6	23:00 to 00:00	40.5	37.2	49.6
		08:00 to 09:00	48.9	41.3	58.9	00:00 to 01:00	41.3	36.2	48.8
		09:00 to 10:00	49.6	43.2	59.6	01:00 to 02:00	41.4	36.5	49.6
		10:00 to 11:00	50.3	42.1	63.2	02:00 to 03:00	40.6	35.3	48.7
		11:00 to 12:00	52.7	43.5	62.5	03:00 to 04:00	40.3	36.1	47.6
		12:00 to 13:00	53.5	42.1	63.2	04:00 to 05:00	39.5	35.6	49.6
		13:00 to 14:00	52.6	41.6	62.1	05:00 to 06:00	38.4	36.0	48.5
		14:00 to 15:00	51.5	43.2	61.5	--	--	--	--
		15:00 to 16:00	49.7	40.6	59.8	--	--	--	--
		16:00 to 17:00	48.5	39.8	58.6	--	--	--	--
		17:00 to 18:00	47.6	38.6	57.6	--	--	--	--
		18:00 to 19:00	46.5	39.5	56.2	--	--	--	--
		19:00 to 20:00	45.3	38.7	53.2	--	--	--	--
		20:00 to 21:00	43.2	39.5	52.1	--	--	--	--
		21:00 to 22:00	42.6	38.7	51.5	--	--	--	--
			L ₁₀	52.3			Limits in dB(A) Leq as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (See rule 3(1) and 4(1)) Ambient Air Quality Standards in respect of Noise		
	L ₅₀	45.5							
	L ₉₀	40.3							
	Day Leq	49.4			55				
	Night Leq	40.4			45				

Opinions / Interpretations: The observed values for LeqdB(A) for Day Time & Night Time are Within the standard limits as per Ambient Air Quality Standards in respect of Noise prescribed in The Noise Pollution (Regulation and Control) Rules, 2000 for Residential Zone.

Note: 1. Monitoring area coming under Residential Zone.
 2. Day Time - 06:00 Hrs to 22:00 Hrs and Night Time - 22:00 Hrs to 06:00 Hrs.

Sampling Equipment Details	Instrument Used	Make & Model	Calibration Status
	Sound Level Meter	Make - Lutron ; Model - SL4033SD, Sr. No. Q646217	Valid up to - 13/10/2023

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- END OF REPORT



For ULTRA TECH,

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. **REPORT NO. :** UT/ELS/REPORT/SMJKC/004/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar **ISSUE DATE. :** 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 **YOUR REF. :** Work Order Letter
Project site: " Kharia Fire Clay & China Clay Mine" **REF. DATE. :** 05/08/2023

SAMPLE PARTICULARS : **AMBIENT NOISE LEVEL MONITORING**
Sampling Plan Ref. No. : SMJKC-03/2023 **Sample Lab Code :** UT/ELS/SMJKC/004/03-2023
Sampling Procedure : UT/LQMS/SOP/N01 **Survey Done By :** ULTRA TECH
Date of Monitoring : 16/03/2023 to 17/03/2023

Sr. No.	Location	Noise Level Reading in dB(A) Leq							
		Time (Hrs)	Day dB(A)			Time (Hrs)	Night dB(A)		
			Leq	Lmin	Lmax		Leq	Lmin	Lmax
01.	ANQM 04 At Bajitpur Co-ordinates: N-24°0'3.36";E-87°39'44.97"	06:00 to 07:00	45.6	38.9	55.6	22:00 to 23:00	42.6	37.6	48.9
		07:00 to 08:00	49.6	41.3	59.6	23:00 to 00:00	39.8	36.5	49.6
		08:00 to 09:00	55.7	43.6	65.3	00:00 to 01:00	38.6	35.3	49.5
		09:00 to 10:00	56.5	45.6	67.3	01:00 to 02:00	38.7	36.2	48.7
		10:00 to 11:00	54.6	43.2	63.2	02:00 to 03:00	37.6	36.2	47.3
		11:00 to 12:00	54.5	42.6	62.5	03:00 to 04:00	36.5	35.2	46.5
		12:00 to 13:00	54.5	43.5	63.5	04:00 to 05:00	37.1	36.1	45.3
		13:00 to 14:00	55.7	42.1	62.5	05:00 to 06:00	36.4	36.1	44.3
		14:00 to 15:00	54.3	41.6	63.2	--	--	--	--
		15:00 to 16:00	53.6	43.2	62.1	--	--	--	--
		16:00 to 17:00	52.8	42.1	61.5	--	--	--	--
		17:00 to 18:00	51.8	41.6	63.2	--	--	--	--
		18:00 to 19:00	50.6	40.3	59.8	--	--	--	--
		19:00 to 20:00	49.5	39.8	59.5	--	--	--	--
		20:00 to 21:00	47.6	38.7	59.8	--	--	--	--
		21:00 to 22:00	45.3	39.5	57.3	--	--	--	--
			L ₁₀	55.4			Limits in dB(A) Leq as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (See rule 3(1) and 4(1)) Ambient Air Quality Standards in respect of Noise		
	L ₅₀	49.6							
	L ₉₀	37.3							
	Day Leq	53.2			55				
	Night Leq	38.9			45				

Opinions / Interpretations: The observed values for LeqdB(A) for Day Time & Night Time are Within the standard limits as per Ambient Air Quality Standards in respect of Noise prescribed in The Noise Pollution (Regulation and Control) Rules, 2000 for Residential Zone.

Note: 1. Monitoring area coming under Residential Zone.
 2. Day Time - 06:00 Hrs to 22:00 Hrs and Night Time - 22:00 Hrs to 06:00 Hrs.

Sampling Equipment Details	Instrument Used	Make & Model	Calibration Status
	Sound Level Meter	Make - Lutron ; Model - SL4033SD, Sr. No. Q646217	Valid up to - 13/10/2023

Note: 1. This test report refers only to the monitoring conducted.
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- END OF REPORT



For ULTRA TECH,

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/005/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS : **AMBIENT NOISE LEVEL MONITORING**

Sampling Plan Ref. No. : SMJKC-03/2023 **Sample Lab Code :** UT/ELS/SMJKC/005/03-2023
Sampling Procedure : UT/LQMS/SOP/N01 **Survey Done By :** ULTRA TECH
Date of Monitoring : 17/03/2023 to 18/03/2023

Sr. No.	Location	Noise Level Reading in dB(A) Leq							
		Time (Hrs)	Day dB(A)			Time (Hrs)	Night dB(A)		
			Leq	Lmin	Lmax		Leq	Lmin	Lmax
01.	ANQM 05 At Nischantapur Co-ordinates: N-24°3'4.48";E-87°34'33.95"	06:00 to 07:00	43.8	37.6	53.6	22:00 to 23:00	41.6	37.6	48.9
		07:00 to 08:00	46.9	39.5	55.6	23:00 to 00:00	40.6	36.5	49.6
		08:00 to 09:00	51.5	43.2	58.9	00:00 to 01:00	42.1	35.6	53.2
		09:00 to 10:00	54.3	42.5	59.6	01:00 to 02:00	40.8	36.2	52.1
		10:00 to 11:00	53.7	43.6	63.2	02:00 to 03:00	40.5	36.1	51.6
		11:00 to 12:00	56.5	42.5	62.5	03:00 to 04:00	40.8	35.3	50.6
		12:00 to 13:00	55.2	43.5	63.4	04:00 to 05:00	41.3	36.0	48.3
		13:00 to 14:00	53.5	42.1	62.5	05:00 to 06:00	42.3	35.2	49.5
		14:00 to 15:00	52.1	41.6	63.2	--	--	--	--
		15:00 to 16:00	51.6	43.2	62.1	--	--	--	--
		16:00 to 17:00	47.6	42.1	58.9	--	--	--	--
		17:00 to 18:00	46.5	40.6	59.6	--	--	--	--
		18:00 to 19:00	45.3	39.8	58.7	--	--	--	--
		19:00 to 20:00	45.3	38.7	57.6	--	--	--	--
		20:00 to 21:00	44.2	39.5	56.5	--	--	--	--
		21:00 to 22:00	43.1	38.5	55.3	--	--	--	--
			L ₁₀	54.1			Limits in dB(A) Leq as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (See rule 3(1) and 4(1)) Ambient Air Quality Standards in respect of Noise		
	L ₅₀	45.3							
	L ₉₀	40.8							
	Day Leq	51.5			55				
	Night Leq	41.3			45				

Opinions / Interpretations: The observed values for LeqdB(A) for Day Time & Night Time are Within the standard limits as per Ambient Air Quality Standards in respect of Noise prescribed in The Noise Pollution (Regulation and Control) Rules, 2000 for Residential Zone.

Note: 1. Monitoring area coming under Residential Zone.
 2. Day Time - 06:00 Hrs to 22:00 Hrs and Night Time - 22:00 Hrs to 06:00 Hrs.

Sampling Equipment Details	Instrument Used	Make & Model	Calibration Status
	Sound Level Meter	Make - Lutron ; Model - SL4033SD, Sr. No. Q646217	Valid up to - 13/10/2023

Note: 1. This test report refers only to the monitoring conducted.
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- END OF REPORT -



For ULTRA TECH,

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. **REPORT NO. :** UT/ELS/REPORT/SMJKC/006/06-2023
Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar **ISSUE DATE. :** 21/06/2023
Dist- Birbhum ,West Bengal ,Pin-731127 **YOUR REF. :** Work Order Letter
Project site: " Kharia Fire Clay & China Clay Mine" **REF. DATE. :** 05/08/2023

SAMPLE PARTICULARS : **AMBIENT NOISE LEVEL MONITORING**
Sampling Plan Ref. No. : SMJKC-03/2023 **Sample Lab Code :** UT/ELS/SMJKC/006/03-2023
Sampling Procedure : UT/LQMS/SOP/N01 **Survey Done By :** ULTRA TECH
Date of Monitoring : 18/03/2023 to 19/03/2023

Sr. No.	Location	Noise Level Reading in dB(A) Leq												
		Time (Hrs)	Day dB(A)			Time (Hrs)	Night dB(A)							
			Leq	Lmin	Lmax		Leq	Lmin	Lmax					
01.	ANQM 06 At Panch Pukhuria Co-ordinates: N-23°56'4.11";E-87°34'16.23"	06:00 to 07:00	44.8	37.8	53.6	22:00 to 23:00	42.1	36.7	48.9					
		07:00 to 08:00	49.6	41.3	55.6	23:00 to 00:00	41.5	37.6	49.6					
		08:00 to 09:00	48.5	43.2	59.6	00:00 to 01:00	40.6	36.5	53.2					
		09:00 to 10:00	49.8	42.1	59.8	01:00 to 02:00	40.2	35.6	52.1					
		10:00 to 11:00	53.7	43.5	63.2	02:00 to 03:00	40.3	36.2	51.6					
		11:00 to 12:00	56.5	44.6	65.4	03:00 to 04:00	40.2	36.5	53.2					
		12:00 to 13:00	55.4	43.2	64.3	04:00 to 05:00	40.1	36.2	52.1					
		13:00 to 14:00	56.5	42.6	63.2	05:00 to 06:00	39.5	35.2	51.5					
		14:00 to 15:00	55.4	43.5	62.5	--	--	--	--					
		15:00 to 16:00	55.7	42.1	63.5	--	--	--	--					
		16:00 to 17:00	54.6	41.8	62.1	--	--	--	--					
		17:00 to 18:00	55.8	43.2	63.5	--	--	--	--					
		18:00 to 19:00	53.6	42.6	62.1	--	--	--	--					
		19:00 to 20:00	52.5	43.0	63.2	--	--	--	--					
		20:00 to 21:00	51.7	42.1	62.1	--	--	--	--					
		21:00 to 22:00	47.9	40.6	58.9	--	--	--	--					
			L₁₀	55.8			<i>Limits in dB(A) Leq as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (See rule 3(1) and 4(1)) Ambient Air Quality Standards in respect of Noise</i>							
			L₅₀	49.7										
			L₉₀	40.2										
			Day Leq	53.7								55		
			Night Leq	40.6								45		

Opinions / Interpretations: The observed values for LeqdB(A) for Day Time & Night Time are Within the standard limits as per Ambient Air Quality Standards in respect of Noise prescribed in The Noise Pollution (Regulation and Control) Rules, 2000 for Residential Zone.

Note: 1. Monitoring area coming under Residential Zone.
 2. Day Time - 06:00 Hrs to 22:00 Hrs and Night Time - 22:00 Hrs to 06:00 Hrs.

Sampling Equipment Details	Instrument Used	Make & Model	Calibration Status
	Sound Level Meter	Make -Lutron ; Model - SL4033SD, Sr. No. Q646217	Valid up to - 13/10/2023

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- END OF REPORT -



For ULTRA TECH,

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/007/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS : **AMBIENT NOISE LEVEL MONITORING**

Sampling Plan Ref. No. : SMJKC-03/2023 **Sample Lab Code :** UT/ELS/SMJKC/007/03-2023
Sampling Procedure : UT/LQMS/SOP/N01 **Survey Done By :** ULTRA TECH
Date of Monitoring : 19/03/2023 to 20/03/2023

Sr. No.	Location	Noise Level Reading in dB(A) Leq							
		Time (Hrs)	Day dB(A)			Time (Hrs)	Night dB(A)		
			Leq	Lmin	Lmax		Leq	Lmin	Lmax
01.	ANQM 07 At Nirbhayapur Co-ordinates: N-23°59'0.41";E-87°33'22.39"	06:00 to 07:00	43.8	38.9	53.6	22:00 to 23:00	44.1	36.5	53.6
		07:00 to 08:00	45.9	39.6	55.6	23:00 to 00:00	43.2	37.6	52.6
		08:00 to 09:00	49.8	41.3	59.6	00:00 to 01:00	42.4	36.5	53.5
		09:00 to 10:00	53.5	43.2	63.2	01:00 to 02:00	41.5	35.6	52.1
		10:00 to 11:00	52.6	42.6	62.5	02:00 to 03:00	41.3	36.1	51.6
		11:00 to 12:00	55.4	43.5	65.4	03:00 to 04:00	42.1	36.4	53.2
		12:00 to 13:00	54.3	42.1	64.2	04:00 to 05:00	41.5	36.2	52.1
		13:00 to 14:00	53.8	41.6	62.5	05:00 to 06:00	41.0	36.1	51.8
		14:00 to 15:00	54.6	43.2	63.2	--	--	--	--
		15:00 to 16:00	53.5	42.6	62.1	--	--	--	--
		16:00 to 17:00	52.7	43.5	61.5	--	--	--	--
		17:00 to 18:00	50.3	42.1	63.2	--	--	--	--
		18:00 to 19:00	49.8	41.6	58.9	--	--	--	--
		19:00 to 20:00	48.7	40.6	59.6	--	--	--	--
		20:00 to 21:00	47.6	39.8	58.7	--	--	--	--
		21:00 to 22:00	46.1	39.7	57.6	--	--	--	--
			L ₁₀	54.2			Limits in dB(A) Leq as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (See rule 3(1) and 4(1)) Ambient Air Quality Standards in respect of Noise		
	L ₅₀	48.2							
	L ₉₀	41.5							
	Day Leq	51.9			55				
	Night Leq	42.3			45				

Opinions / Interpretations: The observed values for LeqdB(A) for Day Time & Night Time are Within the standard limits as per Ambient Air Quality Standards in respect of Noise prescribed in The Noise Pollution (Regulation and Control) Rules, 2000 for Residential Zone.

Note: 1. Monitoring area coming under Residential Zone.
 2. Day Time - 06:00 Hrs to 22:00 Hrs and Night Time - 22:00 Hrs to 06:00 Hrs.

Sampling Equipment Details	Instrument Used	Make & Model	Calibration Status
	Sound Level Meter	Make - Lutron ; Model - SL4033SD, Sr. No. Q646217	Valid up to - 13/10/2023

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- END OF REPORT -



For ULTRA TECH,

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/008/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS : **AMBIENT NOISE LEVEL MONITORING**

Sampling Plan Ref. No. : SMJKC-03/2023 **Sample Lab Code :** UT/ELS/SMJKC/008/03-2023
Sampling Procedure : UT/LQMS/SOP/N01 **Survey Done By :** ULTRA TECH
Date of Monitoring : 20/03/2023 to 21/03/2023

Sr. No.	Location	Noise Level Reading in dB(A) Leq									
		Time (Hrs)	Day dB(A)			Time (Hrs)	Night dB(A)				
			Leq	Lmin	Lmax		Leq	Lmin	Lmax		
01.	ANQM 08 At Lohabazar Co-ordinates: N-23°59'3.58";E-87°34'23.56"	06:00 to 07:00	43.8	37.6	53.6	22:00 to 23:00	46.4	37.8	56.8		
		07:00 to 08:00	49.6	41.3	55.6	23:00 to 00:00	44.2	38.9	55.3		
		08:00 to 09:00	53.8	43.6	63.2	00:00 to 01:00	43.5	39.5	53.2		
		09:00 to 10:00	55.7	42.6	65.8	01:00 to 02:00	42.1	38.5	52.6		
		10:00 to 11:00	56.9	45.7	67.6	02:00 to 03:00	41.4	37.6	53.2		
		11:00 to 12:00	57.8	46.2	68.9	03:00 to 04:00	41.3	36.5	52.1		
		12:00 to 13:00	58.9	51.2	69.5	04:00 to 05:00	41.2	38.6	51.6		
		13:00 to 14:00	55.4	47.3	65.3	05:00 to 06:00	40.8	35.3	50.8		
		14:00 to 15:00	56.2	43.2	64.3	--	--	--	--		
		15:00 to 16:00	56.5	42.1	63.2	--	--	--	--		
		16:00 to 17:00	55.4	41.6	62.5	--	--	--	--		
		17:00 to 18:00	54.3	43.5	63.2	--	--	--	--		
		18:00 to 19:00	53.2	42.7	62.4	--	--	--	--		
		19:00 to 20:00	52.1	43.5	61.5	--	--	--	--		
		20:00 to 21:00	51.5	42.1	60.6	--	--	--	--		
		21:00 to 22:00	47.6	41.6	58.9	--	--	--	--		
			L₁₀	56.8			Limits in dB(A) Leq as per THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 (See rule 3(1) and 4(1)) Ambient Air Quality Standards in respect of Noise				
			L₅₀	51.8							
			L₉₀	41.3							
			Day Leq	54.9							
			Night Leq	43.0			45				

Opinions / Interpretations: The observed values for LeqdB(A) for Day Time & Night Time are Within the standard limits as per Ambient Air Quality Standards in respect of Noise prescribed in The Noise Pollution (Regulation and Control) Rules, 2000 for Residential Zone.

Note: 1. Monitoring area coming under Residential Zone.
 2. Day Time - 06:00 Hrs to 22:00 Hrs and Night Time - 22:00 Hrs to 06:00 Hrs.

Sampling Equipment Details	Instrument Used	Make & Model	Calibration Status
	Sound Level Meter	Make - Lutron ; Model - SL4033SD, Sr. No. Q646217	Valid up to - 13/10/2023

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- END OF REPORT -



For ULTRA TECH,

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.

Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar

Dist- Birbhum ,West Bengal ,Pin-731127

Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/009/06-2023

ISSUE DATE. : 21/06/2023

YOUR REF. : Work Order Letter

REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :

Sampling Plan Ref. No. : SMJKC-03/2023
Sampling Procedure : UT/LQMS/SOP/S01A
Sample Registration Date : 24/03/2023
Date & Time of Sampling : 18/03/2023 at 10:00 Hrs
Analysis Starting Date : 24/03/2023
Analysis Completion Date : 14/04/2023
Sample Collected By : ULTRA TECH
Sample Lab Code : UT/ELS/ SMJKC /009/03-2023

SOIL QUALITY MONITORING

Sample Type : Surface Soil - S1 @ Depth 0.15 m
Sample Location : At project
Coordinates : [N23°59'33.97";E87°35'25.47"]
Sample Quantity & Packing : 2 kg In Plastic Bag Contained in Zip Lock Bag
Details

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color*	Visual Observation	Brown	-
2.	Physical State (Texture)*	UT/LQMS/SOP/S39	Sandy Clay Loam	-
3.	pH(1:2.5 Soil: Water)	IS 2720 (Part 26) 1987	7.4	-
4.	Electrical Conductivity (1:2 Soil: Water Extract)	IS :14767-2000	247	uS/cm
5.	Bulk Density	UT/LQMS/SOP/S03	1084	kg/m ³
6.	Porosity	UT/LQMS/SOP/S40	51.1	%
7.	Organic Matter	IS 2720 (Part 22) : 1972	0.5	%
8.	Total Organic Carbon	IS 2720 (Part 22) : 1972	0.3	%
9.	Moisture Content	IS 2720(Part 02) 1973	6.2	%
10.	n-Hexane Extractable Material (HEM)	UT/LQMS/SOP/S09	BDL[DL=0.1]	%
11.	Water Holding Capacity	UT/LQMS/SOP/S12	55.8	%
12.	Texture (Sand)	UT/LQMS/SOP/S39	56.0	%
13.	Texture (Silt)	UT/LQMS/SOP/S39	18.0	%
14.	Texture (Clay)	UT/LQMS/SOP/S39	26.0	%
15.	Sodium Adsorption Ratio	UT/LQMS/SOP/S26	1.0	(meq/kg) ^{1/2}
16.	Cation Exchange Capacity	UT/LQMS/SOP/S18	27.2	meq/100g
17.	Sodium as Na (Exchangeable)	UT/LQMS/SOP/S13	1.1	meq/100g
18.	Potassium as K (Exchangeable)	UT/LQMS/SOP/S14	0.6	meq/100g
19.	Calcium as Ca (Exchangeable)	UT/LQMS/SOP/S15	12.2	meq/100g
20.	Magnesium as Mg (Exchangeable)	UT/LQMS/SOP/S16	11.4	meq/100g
21.	Sodium as Na (water Extractable)	UT/LQMS/SOP/S19	51	mg/kg
22.	Potassium as K (water Extractable)	UT/LQMS/SOP/S20	24	mg/kg
23.	Calcium as Ca (water Extractable)	UT/LQMS/SOP/S21	98	mg/kg
24.	Magnesium as Mg (water Extractable)	UT/LQMS/SOP/S22	64	mg/kg
25.	Chloride as Cl ⁻ (water Extractable)	UT/LQMS/SOP/S23	78	mg/kg
26.	Sulfate as SO ₄ ⁻² (water Extractable)	UT/LQMS/SOP/S24	106	mg/kg

Page 1 of 2



MJNamjoshi

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
Village- Kharia ,P.O- Md.Bazar ,PS –Md. Bazar
Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/009/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :

SOIL QUALITY MONITORING

Sampling Plan Ref. No. : SMJKC-03/2023
Sampling Procedure : UT/LQMS/SOP/S01A
Sample Registration Date : 24/03/2023
Date & Time of Sampling : 18/03/2023 at 10:00 Hrs
Analysis Starting Date : 24/03/2023
Analysis Completion Date : 14/04/2023
Sample Collected By : ULTRA TECH
Sample Lab Code : UT/ELS/ SMJKC /009/03-2023

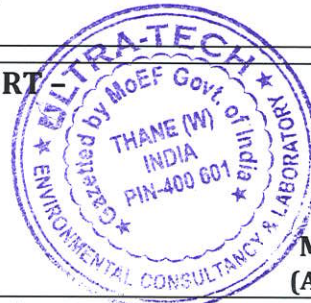
Sample Type : Surface Soil – S1 @ Depth 0.15 m
Sample Location : At project
[N23°59'33.97";E87°35'25.47"]
Sample Quantity & Packing : 2 kg In Plastic Bag Contained in Zip Lock Bag
Details

Sr. No.	Test Parameter	Test Method	Test Result	Unit
27.	Phosphate as PO ₄ (water Extractable)	UT/LQMS/SOP/S25	85	mg/kg
28.	Available Phosphorus as P ₂ O ₅	UT/LQMS/SOP/S28	68	kg/ha
29.	Available Potassium as K ₂ O	UT/LQMS/SOP/S29	239	kg/ha
30.	Available Nitrogen as N	UT/LQMS/SOP/S30	128	kg/ha
TCLP Metals				
1.	Cadmium as Cd	UT/LQMS/SOP/S36& S37	BDL[DL=0.018]	mg/L
2.	Total Chromium as Cr	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
3.	Cobalt as Co	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
4.	Copper as Cu	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
5.	Iron as Fe	UT/LQMS/SOP/S36 & S37	BDL[DL=0.09]	mg/L
6.	Lead as Pb	UT/LQMS/SOP/S36 & S37	BDL[DL=0.6]	mg/L
7.	Manganese as Mn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.12]	mg/L
8.	Nickel as Ni	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
9.	Zinc as Zn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.018]	mg/L
BDL-Below Detection Limit			DL-Detection Limit	

Remark/ Statement of Conformity: NIL

- Note:**
1. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/S01A) based on Methods Manual: Soil Testing in India by DA&FW, MoA, GOI.
 2. This test report refers only to the sample tested.
 3. This test report may not be reproduced in part, without the permission of this laboratory.
 4. Any correction invalidates this test report.
 5. *: Parameters not covered under NABL scope.

- END OF REPORT



For **ULTRA TECH,**

Manasi Namjoshi

Manasi Namjoshi
(Authorized Signatory)

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TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/010/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :

Sampling Plan Ref. No. : SMJKC-03/2023
Sampling Procedure : UT/LQMS/SOP/S01A
Sample Registration Date : 24/03/2023
Date & Time of Sampling : 18/03/2023 at 10:40 Hrs
Analysis Starting Date : 24/03/2023
Analysis Completion Date : 14/04/2023
Sample Collected By : ULTRA TECH
Sample Lab Code : UT/ELS/ SMJKC /010/03-2023

SOIL QUALITY MONITORING

Sample Type : Surface Soil - S2 @ Depth 0.15 m
Sample Location : At Angar Garia
 [N23°58'37.47";E87°36'2.29"]
Sample Quantity & Packing : 2 kg In Plastic Bag Contained in Zip Lock Bag
Details

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color*	Visual Observation	Brown	-
2.	Physical State (Texture)*	UT/LQMS/SOP/S39	Sandy Clay Loam	-
3.	pH(1:2.5 Soil: Water)	IS 2720 (Part 26) 1987	7.6	-
4.	Electrical Conductivity (1:2 Soil: Water Extract)	IS :14767-2000	324	uS/cm
5.	Bulk Density	UT/LQMS/SOP/S03	1102	kg/m ³
6.	Porosity	UT/LQMS/SOP/S40	53.9	%
7.	Organic Matter	IS 2720 (Part 22) : 1972	0.7	%
8.	Total Organic Carbon	IS 2720 (Part 22) : 1972	0.4	%
9.	Moisture Content	IS 2720(Part 02) 1973	6.7	%
10.	n-Hexane Extractable Material (HEM)	UT/LQMS/SOP/S09	BDL[DL=0.1]	%
11.	Water Holding Capacity	UT/LQMS/SOP/S12	57.6	%
12.	Texture (Sand)	UT/LQMS/SOP/S39	54.6	%
13.	Texture (Silt)	UT/LQMS/SOP/S39	17.9	%
14.	Texture (Clay)	UT/LQMS/SOP/S39	26.7	%
15.	Sodium Adsorption Ratio	UT/LQMS/SOP/S26	1.1	(meq/kg) ^{1/2}
16.	Cation Exchange Capacity	UT/LQMS/SOP/S18	27.8	meq/100g
17.	Sodium as Na (Exchangeable)	UT/LQMS/SOP/S13	1.2	meq/100g
18.	Potassium as K (Exchangeable)	UT/LQMS/SOP/S14	0.6	meq/100g
19.	Calcium as Ca (Exchangeable)	UT/LQMS/SOP/S15	10.2	meq/100g
20.	Magnesium as Mg (Exchangeable)	UT/LQMS/SOP/S16	12.4	meq/100g
21.	Sodium as Na (water Extractable)	UT/LQMS/SOP/S19	55	mg/kg
22.	Potassium as K (water Extractable)	UT/LQMS/SOP/S20	27	mg/kg
23.	Calcium as Ca (water Extractable)	UT/LQMS/SOP/S21	106	mg/kg
24.	Magnesium as Mg (water Extractable)	UT/LQMS/SOP/S22	74	mg/kg
25.	Chloride as Cl (water Extractable)	UT/LQMS/SOP/S23	93	mg/kg
26.	Sulfate as SO ₄ ⁻ (water Extractable)	UT/LQMS/SOP/S24	112	mg/kg

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
Village- Kharia ,P.O- Md.Bazar ,PS –Md. Bazar
Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/010/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS	:	SOIL QUALITY MONITORING	:
Sampling Plan Ref. No.	:	Sample Type	:
Sampling Procedure	:	Sample Location	:
Sample Registration Date	:		:
Date & Time of Sampling	:	Sample Quantity & Packing Details	:
Analysis Starting Date	:		:
Analysis Completion Date	:		:
Sample Collected By	:		:
Sample Lab Code	:		:

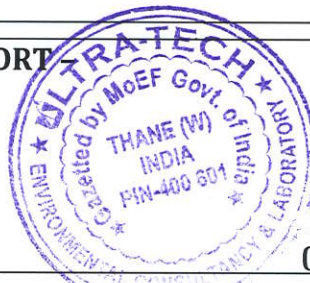
Sr. No.	Test Parameter	Test Method	Test Result	Unit
27.	Phosphate as PO ₄ (water Extractable)	UT/LQMS/SOP/S25	80	mg/kg
28.	Available Phosphorus as P ₂ O ₅	UT/LQMS/SOP/S28	78	kg/ha
29.	Available Potassium as K ₂ O	UT/LQMS/SOP/S29	261	kg/ha
30.	Available Nitrogen as N	UT/LQMS/SOP/S30	135	kg/ha
TCLP Metals				
1.	Cadmium as Cd	UT/LQMS/SOP/S36& S37	BDL[DL=0.018]	mg/L
2.	Total Chromium as Cr	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
3.	Cobalt as Co	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
4.	Copper as Cu	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
5.	Iron as Fe	UT/LQMS/SOP/S36 & S37	BDL[DL=0.09]	mg/L
6.	Lead as Pb	UT/LQMS/SOP/S36 & S37	BDL[DL=0.6]	mg/L
7.	Manganese as Mn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.12]	mg/L
8.	Nickel as Ni	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
9.	Zinc as Zn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.018]	mg/L
BDL-Below Detection Limit			DL-Detection Limit	

Remark/ Statement of Conformity: NIL

Note:

1. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/S01A) based on Methods Manual: Soil Testing in India by DA&FW, MoA, GOI.
2. This test report refers only to the sample tested.
3. This test report may not be reproduced in part, without the permission of this laboratory.
4. Any correction invalidates this test report.
5. *: Parameters not covered under NABL scope.

- END OF REPORT



For ULTRA TECH,

Manasi Namjoshi

Manasi Namjoshi
(Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. **REPORT NO. :** UT/ELS/REPORT/SMJKC/011/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar **ISSUE DATE. :** 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 **YOUR REF. :** Work Order Letter
Project site: " Kharia Fire Clay & China Clay Mine" **REF. DATE. :** 05/08/2023

SAMPLE PARTICULARS :		SOIL QUALITY MONITORING	
Sampling Plan Ref. No.	: SMJKC-03/2023	Sample Type	: Surface Soil - S3 @ Depth 0.15 m
Sampling Procedure	: UT/LQMS/SOP/S01A	Sample Location	: At Tentulia
Sample Registration Date	: 24/03/2023		: [N24°1'24.97";E87°35'51.96"]
Date & Time of Sampling	: 18/03/2023 at 11:50 Hrs	Sample Quantity	: 2 kg In Plastic Bag Contained in Zip
Analysis Starting Date	: 24/03/2023	& Packing	: Lock Bag
Analysis Completion Date	: 14/04/2023	Details	
Sample Collected By	: ULTRA TECH		
Sample Lab Code	: UT/ELS/ SMJKC/011/03-2023		

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color*	Visual Observation	Brown	-
2.	Physical State (Texture)*	UT/LQMS/SOP/S39	Sandy Clay Loam	-
3.	pH(1:2.5 Soil: Water)	IS 2720 (Part 26) 1987	7.7	-
4.	Electrical Conductivity (1:2 Soil: Water Extract)	IS :14767-2000	377	uS/cm
5.	Bulk Density	UT/LQMS/SOP/S03	1125	kg/m ³
6.	Porosity	UT/LQMS/SOP/S40	51.2	%
7.	Organic Matter	IS 2720 (Part 22) : 1972	0.7	%
8.	Total Organic Carbon	IS 2720 (Part 22) : 1972	0.4	%
9.	Moisture Content	IS 2720(Part 02) 1973	6.5	%
10.	n-Hexane Extractable Material (HEM)	UT/LQMS/SOP/S09	BDL[DL=0.1]	%
11.	Water Holding Capacity	UT/LQMS/SOP/S12	56.9	%
12.	Texture (Sand)	UT/LQMS/SOP/S39	60.2	%
13.	Texture (Silt)	UT/LQMS/SOP/S39	19.5	%
14.	Texture (Clay)	UT/LQMS/SOP/S39	20.3	%
15.	Sodium Adsorption Ratio	UT/LQMS/SOP/S26	1.1	(meq/kg) ^{1/2}
16.	Cation Exchange Capacity	UT/LQMS/SOP/S18	28.2	meq/100g
17.	Sodium as Na (Exchangeable)	UT/LQMS/SOP/S13	1.2	meq/100g
18.	Potassium as K (Exchangeable)	UT/LQMS/SOP/S14	0.6	meq/100g
19.	Calcium as Ca (Exchangeable)	UT/LQMS/SOP/S15	12.2	meq/100g
20.	Magnesium as Mg (Exchangeable)	UT/LQMS/SOP/S16	12.4	meq/100g
21.	Sodium as Na (water Extractable)	UT/LQMS/SOP/S19	56	mg/kg
22.	Potassium as K (water Extractable)	UT/LQMS/SOP/S20	28	mg/kg
23.	Calcium as Ca (water Extractable)	UT/LQMS/SOP/S21	114	mg/kg
24.	Magnesium as Mg (water Extractable)	UT/LQMS/SOP/S22	74	mg/kg
25.	Chloride as Cl ⁻ (water Extractable)	UT/LQMS/SOP/S23	108	mg/kg
26.	Sulfate as SO ₄ ⁻ (water Extractable)	UT/LQMS/SOP/S24	117	mg/kg



M. Namjoshi

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. Village- Kharia ,P.O- Md.Bazar ,PS –Md. Bazar Dist- Birbhum ,West Bengal ,Pin-731127 Project site: " Kharia Fire Clay & China Clay Mine"	REPORT NO. : UT/ELS/REPORT/SMJKC/011/06-2023 ISSUE DATE. : 21/06/2023 YOUR REF. : Work Order Letter REF. DATE. : 05/08/2023
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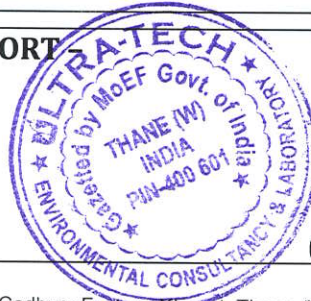
SAMPLE PARTICULARS : Sampling Plan Ref. No. : SMJKC-03/2023 Sampling Procedure : UT/LQMS/SOP/S01A Sample Registration Date : 24/03/2023 Date & Time of Sampling : 18/03/2023 at 11:50 Hrs Analysis Starting Date : 24/03/2023 Analysis Completion Date : 14/04/2023 Sample Collected By : ULTRA TECH Sample Lab Code : UT/ELS/ SMJKC/011/03-2023	SOIL QUALITY MONITORING Sample Type : Surface Soil – S3 @ Depth 0.15 m Sample Location : At Tentulia [N24°1'24.97";E87°35'51.96"] Sample Quantity & Packing : 2 kg In Plastic Bag Contained in Zip Lock Bag Details
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Sr. No.	Test Parameter	Test Method	Test Result	Unit
27.	Phosphate as PO ₄ (water Extractable)	UT/LQMS/SOP/S25	78	mg/kg
28.	Available Phosphorus as P ₂ O ₅	UT/LQMS/SOP/S28	89	kg/ha
29.	Available Potassium as K ₂ O	UT/LQMS/SOP/S29	271	kg/ha
30.	Available Nitrogen as N	UT/LQMS/SOP/S30	142	kg/ha
TCLP Metals				
1.	Cadmium as Cd	UT/LQMS/SOP/S36& S37	BDL[DL=0.018]	mg/L
2.	Total Chromium as Cr	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
3.	Cobalt as Co	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
4.	Copper as Cu	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
5.	Iron as Fe	UT/LQMS/SOP/S36 & S37	BDL[DL=0.09]	mg/L
6.	Lead as Pb	UT/LQMS/SOP/S36 & S37	BDL[DL=0.6]	mg/L
7.	Manganese as Mn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.12]	mg/L
8.	Nickel as Ni	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
9.	Zinc as Zn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.018]	mg/L
BDL-Below Detection Limit			DL-Detection Limit	

Remark/ Statement of Conformity: *NIL*

- Note:**
1. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/S01A) based on Methods Manual: Soil Testing in India by DA&FW, MoA, GOI.
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 4. Any correction invalidates this test report.
 5. *: Parameters not covered under NABL scope.

- END OF REPORT



For **ULTRA TECH,**

Manasi Namjoshi

Manasi Namjoshi
(Authorized Signatory)

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Kolkata: +033-40089145 / +91-9674488198 - kolkata@ultratech.in

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TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/012/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :		SOIL QUALITY MONITORING	
Sampling Plan Ref. No.	: SMJKC-03/2023	Sample Type	: Surface Soil – S4 @ Depth 0.15 m
Sampling Procedure	: UT/LQMS/SOP/S01A	Sample Location	: At Bajitpur
Sample Registration Date	: 24/03/2023		: [N24°0'3.06";E87°39'45.74"]
Date & Time of Sampling	: 18/03/2023 at 12:50 Hrs		
Analysis Starting Date	: 24/03/2023	Sample Quantity	: 2 kg In Plastic Bag Contained in Zip
Analysis Completion Date	: 14/04/2023	& Packing	: Lock Bag
Sample Collected By	: ULTRA TECH	Details	
Sample Lab Code	: UT/ELS/ SMJKC/012/03-2023		

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color*	Visual Observation	Brown	-
2.	Physical State (Texture)*	UT/LQMS/SOP/S39	Sandy Clay Loam	-
3.	pH(1:2.5 Soil: Water)	IS 2720 (Part 26) 1987	7.3	-
4.	Electrical Conductivity (1:2 Soil: Water Extract)	IS :14767-2000	216	uS/cm
5.	Bulk Density	UT/LQMS/SOP/S03	1155	kg/m ³
6.	Porosity	UT/LQMS/SOP/S40	53.6	%
7.	Organic Matter	IS 2720 (Part 22) : 1972	0.5	%
8.	Total Organic Carbon	IS 2720 (Part 22) : 1972	0.3	%
9.	Moisture Content	IS 2720(Part 02) 1973	5.9	%
10.	n-Hexane Extractable Material (HEM)	UT/LQMS/SOP/S09	BDL[DL=0.1]	%
11.	Water Holding Capacity	UT/LQMS/SOP/S12	53.7	%
12.	Texture (Sand)	UT/LQMS/SOP/S39	58.9	%
13.	Texture (Silt)	UT/LQMS/SOP/S39	16.8	%
14.	Texture (Clay)	UT/LQMS/SOP/S39	24.2	%
15.	Sodium Adsorption Ratio	UT/LQMS/SOP/S26	1.0	(meq/kg) ^{1/2}
16.	Cation Exchange Capacity	UT/LQMS/SOP/S18	26.9	meq/100g
17.	Sodium as Na (Exchangeable)	UT/LQMS/SOP/S13	1.1	meq/100g
18.	Potassium as K (Exchangeable)	UT/LQMS/SOP/S14	0.6	meq/100g
19.	Calcium as Ca (Exchangeable)	UT/LQMS/SOP/S15	10.2	meq/100g
20.	Magnesium as Mg (Exchangeable)	UT/LQMS/SOP/S16	11.4	meq/100g
21.	Sodium as Na (water Extractable)	UT/LQMS/SOP/S19	49	mg/kg
22.	Potassium as K (water Extractable)	UT/LQMS/SOP/S20	21	mg/kg
23.	Calcium as Ca (water Extractable)	UT/LQMS/SOP/S21	90	mg/kg
24.	Magnesium as Mg (water Extractable)	UT/LQMS/SOP/S22	64	mg/kg
25.	Chloride as Cl ⁻ (water Extractable)	UT/LQMS/SOP/S23	68	mg/kg
26.	Sulfate as SO ₄ ⁻ (water Extractable)	UT/LQMS/SOP/S24	102	mg/kg

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. Village- Kharia ,P.O- Md.Bazar ,PS –Md. Bazar Dist- Birbhum ,West Bengal ,Pin-731127 Project site: " Kharia Fire Clay & China Clay Mine"	REPORT NO. : UT/ELS/REPORT/SMJKC/012/06-2023 ISSUE DATE. : 21/06/2023 YOUR REF. : Work Order Letter REF. DATE. : 05/08/2023
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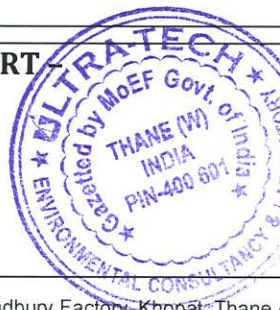
SAMPLE PARTICULARS	SOIL QUALITY MONITORING
Sampling Plan Ref. No. : SMJKC-03/2023	Sample Type : Surface Soil – S4 @ Depth 0.15 m
Sampling Procedure : UT/LQMS/SOP/S01A	Sample Location : At Bajitpur
Sample Registration Date : 24/03/2023	Sample Location : [N24°0'3.06";E87°39'45.74"]
Date & Time of Sampling : 18/03/2023 at 12:50 Hrs	
Analysis Starting Date : 24/03/2023	Sample Quantity : 2 kg In Plastic Bag Contained in Zip
Analysis Completion Date : 14/04/2023	& Packing : Lock Bag
Sample Collected By : ULTRA TECH	Details
Sample Lab Code : UT/ELS/ SMJKC/012/03-2023	

Sr. No.	Test Parameter	Test Method	Test Result	Unit
27.	Phosphate as PO ₄ (water Extractable)	UT/LQMS/SOP/S25	76	mg/kg
28.	Available Phosphorus as P ₂ O ₅	UT/LQMS/SOP/S28	68	kg/ha
29.	Available Potassium as K ₂ O	UT/LQMS/SOP/S29	245	kg/ha
30.	Available Nitrogen as N	UT/LQMS/SOP/S30	134	kg/ha
TCLP Metals				
1.	Cadmium as Cd	UT/LQMS/SOP/S36& S37	BDL[DL=0.018]	mg/L
2.	Total Chromium as Cr	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
3.	Cobalt as Co	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
4.	Copper as Cu	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
5.	Iron as Fe	UT/LQMS/SOP/S36 & S37	BDL[DL=0.09]	mg/L
6.	Lead as Pb	UT/LQMS/SOP/S36 & S37	BDL[DL=0.6]	mg/L
7.	Manganese as Mn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.12]	mg/L
8.	Nickel as Ni	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
9.	Zinc as Zn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.018]	mg/L
BDL-Below Detection Limit			DL-Detection Limit	

Remark/ Statement of Conformity: NIL

- Note:**
1. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/S01A) based on Methods Manual: Soil Testing in India by DA&FW, MoA, GOI.
 2. This test report refers only to the sample tested.
 3. This test report may not be reproduced in part, without the permission of this laboratory.
 4. Any correction invalidates this test report.
 5. *: Parameters not covered under NABL scope.

- END OF REPORT -



For ULTRA TECH,

Manasi Namjoshi

Manasi Namjoshi
(Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS –Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/013/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :

Sampling Plan Ref. No. : SMJKC-03/2023
Sampling Procedure : UT/LQMS/SOP/S01A
Sample Registration Date : 24/03/2023
Date & Time of Sampling : 18/03/2023 at 14:00 Hrs
Analysis Starting Date : 24/03/2023
Analysis Completion Date : 14/04/2023
Sample Collected By : ULTRA TECH
Sample Lab Code : UT/ELS/ SMJKC /013/03-2023

SOIL QUALITY MONITORING

Sample Type : Surface Soil – S5 @ Depth 0.15 m
Sample Location : At Nischantapur
 [N24°3'3.78";E87°34'34.01"]
Sample Quantity & Packing : 2 kg In Plastic Bag Contained in Zip Lock Bag
Details

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color*	Visual Observation	Brown	-
2.	Physical State (Texture)*	UT/LQMS/SOP/S39	Sandy Clay Loam	-
3.	pH(1:2.5 Soil: Water)	IS 2720 (Part 26) 1987	8.2	-
4.	Electrical Conductivity (1:2 Soil: Water Extract)	IS :14767-2000	283	uS/cm
5.	Bulk Density	UT/LQMS/SOP/S03	1093	kg/m ³
6.	Porosity	UT/LQMS/SOP/S40	52.2	%
7.	Organic Matter	IS 2720 (Part 22) : 1972	0.6	%
8.	Total Organic Carbon	IS 2720 (Part 22) : 1972	0.3	%
9.	Moisture Content	IS 2720(Part 02) 1973	7.2	%
10.	n-Hexane Extractable Material (HEM)	UT/LQMS/SOP/S09	BDL[DL=0.1]	%
11.	Water Holding Capacity	UT/LQMS/SOP/S12	54.7	%
12.	Texture (Sand)	UT/LQMS/SOP/S39	53.6	%
13.	Texture (Silt)	UT/LQMS/SOP/S39	18.6	%
14.	Texture (Clay)	UT/LQMS/SOP/S39	27.8	%
15.	Sodium Adsorption Ratio	UT/LQMS/SOP/S26	1.0	(meq/kg) ^{1/2}
16.	Cation Exchange Capacity	UT/LQMS/SOP/S18	27.6	meq/100g
17.	Sodium as Na (Exchangeable)	UT/LQMS/SOP/S13	1.1	meq/100g
18.	Potassium as K (Exchangeable)	UT/LQMS/SOP/S14	0.6	meq/100g
19.	Calcium as Ca (Exchangeable)	UT/LQMS/SOP/S15	13.3	meq/100g
20.	Magnesium as Mg (Exchangeable)	UT/LQMS/SOP/S16	12.4	meq/100g
21.	Sodium as Na (water Extractable)	UT/LQMS/SOP/S19	53	mg/kg
22.	Potassium as K (water Extractable)	UT/LQMS/SOP/S20	25	mg/kg
23.	Calcium as Ca (water Extractable)	UT/LQMS/SOP/S21	106	mg/kg
24.	Magnesium as Mg (water Extractable)	UT/LQMS/SOP/S22	64	mg/kg
25.	Chloride as Cl (water Extractable)	UT/LQMS/SOP/S23	88	mg/kg
26.	Sulfate as SO ₄ ⁻ (water Extractable)	UT/LQMS/SOP/S24	115	mg/kg



TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.

Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar

Dist- Birbhum ,West Bengal ,Pin-731127

Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/013/06-2023

ISSUE DATE. : 21/06/2023

YOUR REF. : Work Order Letter

REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :

Sampling Plan Ref. No. : SMJKC-03/2023

Sampling Procedure : UT/LQMS/SOP/S01A

Sample Registration Date : 24/03/2023

Date & Time of Sampling : 18/03/2023 at 14:00 Hrs

Analysis Starting Date : 24/03/2023

Analysis Completion Date : 14/04/2023

Sample Collected By : ULTRA TECH

Sample Lab Code : UT/ELS/ SMJKC /013/03-2023

SOIL QUALITY MONITORING

Sample Type : Surface Soil – S5 @ Depth 0.15 m

Sample Location : At Nischantapur

Sample Location : [N24°3'3.78";E87°34'34.01"]

Sample Quantity : 2 kg In Plastic Bag Contained in Zip

& Packing : Lock Bag

Details

Sr. No.	Test Parameter	Test Method	Test Result	Unit
27.	Phosphate as PO ₄ (water Extractable)	UT/LQMS/SOP/S25	83	mg/kg
28.	Available Phosphorus as P ₂ O ₅	UT/LQMS/SOP/S28	78	kg/ha
29.	Available Potassium as K ₂ O	UT/LQMS/SOP/S29	245	kg/ha
30.	Available Nitrogen as N	UT/LQMS/SOP/S30	124	kg/ha
TCLP Metals				
1.	Cadmium as Cd	UT/LQMS/SOP/S36& S37	BDL[DL=0.018]	mg/L
2.	Total Chromium as Cr	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
3.	Cobalt as Co	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
4.	Copper as Cu	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
5.	Iron as Fe	UT/LQMS/SOP/S36 & S37	BDL[DL=0.09]	mg/L
6.	Lead as Pb	UT/LQMS/SOP/S36 & S37	BDL[DL=0.6]	mg/L
7.	Manganese as Mn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.12]	mg/L
8.	Nickel as Ni	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
9.	Zinc as Zn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.018]	mg/L
BDL-Below Detection Limit			DL-Detection Limit	

Remark/ Statement of Conformity: NIL

- Note:**
1. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/S01A) based on Methods Manual: Soil Testing in India by DA&FW, MoA, GOI.
 2. This test report refers only to the sample tested.
 3. This test report may not be reproduced in part, without the permission of this laboratory.
 4. Any correction invalidates this test report.
 5. *: Parameters not covered under NABL scope.

- END OF REPORT -



For ULTRA TECH,

Manasi Namjoshi

Manasi Namjoshi
(Authorized Signatory)

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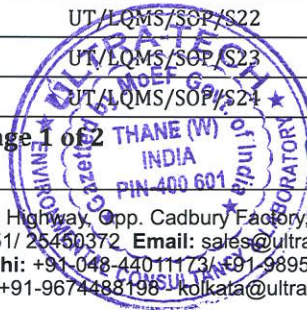
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TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.	REPORT NO. : UT/ELS/REPORT/SMJKC/014/06-2023
Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar	ISSUE DATE. : 21/06/2023
Dist- Birbhum ,West Bengal ,Pin-731127	YOUR REF. : Work Order Letter
Project site: " Kharia Fire Clay & China Clay Mine"	REF. DATE. : 05/08/2023

SAMPLE PARTICULARS	SOIL QUALITY MONITORING
Sampling Plan Ref. No. : SMJKC-03/2023	Sample Type : Surface Soil - S6 @ Depth 0.15 m
Sampling Procedure : UT/LQMS/SOP/S01A	Sample Location : At Panch Pukhuria
Sample Registration Date : 24/03/2023	: [N23°56'3.50";E87°34'16.18"]
Date & Time of Sampling : 18/03/2023 at 14:40 Hrs	
Analysis Starting Date : 24/03/2023	Sample Quantity : 2 kg In Plastic Bag Contained in Zip
Analysis Completion Date : 14/04/2023	& Packing : Lock Bag
Sample Collected By : ULTRA TECH	Details
Sample Lab Code : UT/ELS/ SMJKC /014/03-2023	

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color*	Visual Observation	Brown	-
2.	Physical State (Texture)*	UT/LQMS/SOP/S39	Sandy Clay Loam	-
3.	pH(1:2.5 Soil: Water)	IS 2720 (Part 26) 1987	7.2	-
4.	Electrical Conductivity (1:2 Soil: Water Extract)	IS :14767-2000	353	uS/cm
5.	Bulk Density	UT/LQMS/SOP/S03	1089	kg/m ³
6.	Porosity	UT/LQMS/SOP/S40	52.5	%
7.	Organic Matter	IS 2720 (Part 22) : 1972	0.8	%
8.	Total Organic Carbon	IS 2720 (Part 22) : 1972	0.4	%
9.	Moisture Content	IS 2720(Part 02) 1973	6.4	%
10.	n-Hexane Extractable Material (HEM)	UT/LQMS/SOP/S09	BDL[DL=0.1]	%
11.	Water Holding Capacity	UT/LQMS/SOP/S12	56.6	%
12.	Texture (Sand)	UT/LQMS/SOP/S39	63.1	%
13.	Texture (Silt)	UT/LQMS/SOP/S39	16.5	%
14.	Texture (Clay)	UT/LQMS/SOP/S39	20.4	%
15.	Sodium Adsorption Ratio	UT/LQMS/SOP/S26	1.1	(meq/kg) ^{1/2}
16.	Cation Exchange Capacity	UT/LQMS/SOP/S18	28.0	meq/100g
17.	Sodium as Na (Exchangeable)	UT/LQMS/SOP/S13	1.2	meq/100g
18.	Potassium as K (Exchangeable)	UT/LQMS/SOP/S14	0.6	meq/100g
19.	Calcium as Ca (Exchangeable)	UT/LQMS/SOP/S15	12.2	meq/100g
20.	Magnesium as Mg (Exchangeable)	UT/LQMS/SOP/S16	11.4	meq/100g
21.	Sodium as Na (water Extractable)	UT/LQMS/SOP/S19	55	mg/kg
22.	Potassium as K (water Extractable)	UT/LQMS/SOP/S20	28	mg/kg
23.	Calcium as Ca (water Extractable)	UT/LQMS/SOP/S21	106	mg/kg
24.	Magnesium as Mg (water Extractable)	UT/LQMS/SOP/S22	79	mg/kg
25.	Chloride as Cl ⁻ (water Extractable)	UT/LQMS/SOP/S23	108	mg/kg
26.	Sulfate as SO ₄ ⁻ (water Extractable)	UT/LQMS/SOP/S24	113	mg/kg



TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.

Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar

Dist- Birbhum ,West Bengal ,Pin-731127

Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/014/06-2023

ISSUE DATE. : 21/06/2023

YOUR REF. : Work Order Letter

REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :

Sampling Plan Ref. No. : SMJKC-03/2023

Sampling Procedure : UT/LQMS/SOP/S01A

Sample Registration Date : 24/03/2023

Date & Time of Sampling : 18/03/2023 at 14:40 Hrs

Analysis Starting Date : 24/03/2023

Analysis Completion Date : 14/04/2023

Sample Collected By : ULTRA TECH

Sample Lab Code : UT/ELS/ SMJKC /014/03-2023

SOIL QUALITY MONITORING

Sample Type : Surface Soil - S6 @ Depth 0.15 m

Sample Location : At Panch Pukhuria

Coordinates : [N23°56'3.50";E87°34'16.18"]

Sample Quantity : 2 kg In Plastic Bag Contained in Zip

& Packing : Lock Bag

Details

Sr. No.	Test Parameter	Test Method	Test Result	Unit
27.	Phosphate as PO ₄ (water Extractable)	UT/LQMS/SOP/S25	81	mg/kg
28.	Available Phosphorus as P ₂ O ₅	UT/LQMS/SOP/S28	79	kg/ha
29.	Available Potassium as K ₂ O	UT/LQMS/SOP/S29	259	kg/ha
30.	Available Nitrogen as N	UT/LQMS/SOP/S30	142	kg/ha
TCLP Metals				
1.	Cadmium as Cd	UT/LQMS/SOP/S36& S37	BDL[DL=0.018]	mg/L
2.	Total Chromium as Cr	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
3.	Cobalt as Co	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
4.	Copper as Cu	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
5.	Iron as Fe	UT/LQMS/SOP/S36 & S37	BDL[DL=0.09]	mg/L
6.	Lead as Pb	UT/LQMS/SOP/S36 & S37	BDL[DL=0.6]	mg/L
7.	Manganese as Mn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.12]	mg/L
8.	Nickel as Ni	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
9.	Zinc as Zn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.018]	mg/L
BDL-Below Detection Limit			DL-Detection Limit	

Remark/ Statement of Conformity: NIL

- Note:**
1. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/S01A) based on Methods Manual: Soil Testing in India by DA&FW, MoA, GOI.
 2. This test report refers only to the sample tested.
 3. This test report may not be reproduced in part, without the permission of this laboratory.
 4. Any correction invalidates this test report.
 5. *: Parameters not covered under NABL scope.

- END OF REPORT -



For ULTRA TECH,

Manasi Namjoshi

Manasi Namjoshi
(Authorized Signatory)

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TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/015/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :

Sampling Plan Ref. No. : SMJKC-03/2023
Sampling Procedure : UT/LQMS/SOP/S01A
Sample Registration Date : 24/03/2023
Date & Time of Sampling : 18/03/2023 at 15:10 Hrs
Analysis Starting Date : 24/03/2023
Analysis Completion Date : 14/04/2023
Sample Collected By : ULTRA TECH
Sample Lab Code : UT/ELS/ SMJKC /015/03-2023

SOIL QUALITY MONITORING

Sample Type : Surface Soil - S7 @ Depth 0.15 m
Sample Location : At Nirbhayapur
 : [N23°59'7.92";E87°32'27.63"]
Sample Quantity & Packing : 2 kg In Plastic Bag Contained in Zip Lock Bag
Details

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color*	Visual Observation	Brown	-
2.	Physical State (Texture)*	UT/LQMS/SOP/S39	Sandy Clay Loam	-
3.	pH(1:2.5 Soil: Water)	IS 2720 (Part 26) 1987	7.8	-
4.	Electrical Conductivity (1:2 Soil: Water Extract)	IS :14767-2000	267	uS/cm
5.	Bulk Density	UT/LQMS/SOP/S03	1157	kg/m ³
6.	Porosity	UT/LQMS/SOP/S40	51.7	%
7.	Organic Matter	IS 2720 (Part 22) : 1972	0.6	%
8.	Total Organic Carbon	IS 2720 (Part 22) : 1972	0.3	%
9.	Moisture Content	IS 2720(Part 02) 1973	6.7	%
10.	n-Hexane Extractable Material (HEM)	UT/LQMS/SOP/S09	BDL[DL=0.1]	%
11.	Water Holding Capacity	UT/LQMS/SOP/S12	51.2	%
12.	Texture (Sand)	UT/LQMS/SOP/S39	57.8	%
13.	Texture (Silt)	UT/LQMS/SOP/S39	16.4	%
14.	Texture (Clay)	UT/LQMS/SOP/S39	24.9	%
15.	Sodium Adsorption Ratio	UT/LQMS/SOP/S26	1.0	(meq/kg) ^{1/2}
16.	Cation Exchange Capacity	UT/LQMS/SOP/S18	27.5	meq/100g
17.	Sodium as Na (Exchangeable)	UT/LQMS/SOP/S13	1.1	meq/100g
18.	Potassium as K (Exchangeable)	UT/LQMS/SOP/S14	0.6	meq/100g
19.	Calcium as Ca (Exchangeable)	UT/LQMS/SOP/S15	12.2	meq/100g
20.	Magnesium as Mg (Exchangeable)	UT/LQMS/SOP/S16	12.4	meq/100g
21.	Sodium as Na (water Extractable)	UT/LQMS/SOP/S19	52	mg/kg
22.	Potassium as K (water Extractable)	UT/LQMS/SOP/S20	24	mg/kg
23.	Calcium as Ca (water Extractable)	UT/LQMS/SOP/S21	98	mg/kg
24.	Magnesium as Mg (water Extractable)	UT/LOMS/SOP/S22	69	mg/kg
25.	Chloride as Cl (water Extractable)	UT/LQMS/SOP/S23	78	mg/kg
26.	Sulfate as SO ₄ ⁻ (water Extractable)	UT/LQMS/SOP/S24	111	mg/kg

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar Dist- Birbhum ,West Bengal ,Pin-731127 Project site: " Kharia Fire Clay & China Clay Mine"	REPORT NO. : UT/ELS/REPORT/SMJKC/015/06-2023 ISSUE DATE. : 21/06/2023 YOUR REF. : Work Order Letter REF. DATE. : 05/08/2023
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SAMPLE PARTICULARS	SOIL QUALITY MONITORING
Sampling Plan Ref. No. : SMJKC-03/2023	Sample Type : Surface Soil – S7 @ Depth 0.15 m
Sampling Procedure : UT/LQMS/SOP/S01A	Sample Location : At Nirbhayapur
Sample Registration Date : 24/03/2023	Sample Location : [N23°59'7.92";E87°32'27.63"]
Date & Time of Sampling : 18/03/2023 at 15:10 Hrs	
Analysis Starting Date : 24/03/2023	Sample Quantity : 2 kg In Plastic Bag Contained in Zip
Analysis Completion Date : 14/04/2023	& Packing : Lock Bag
Sample Collected By : ULTRA TECH	Details
Sample Lab Code : UT/ELS/ SMJKC /015/03-2023	

Sr. No.	Test Parameter	Test Method	Test Result	Unit
27.	Phosphate as PO ₄ (water Extractable)	UT/LQMS/SOP/S25	80	mg/kg
28.	Available Phosphorus as P ₂ O ₅	UT/LQMS/SOP/S28	76	kg/ha
29.	Available Potassium as K ₂ O	UT/LQMS/SOP/S29	257	kg/ha
30.	Available Nitrogen as N	UT/LQMS/SOP/S30	139	kg/ha

TCLP Metals				
Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Cadmium as Cd	UT/LQMS/SOP/S36& S37	BDL[DL=0.018]	mg/L
2.	Total Chromium as Cr	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
3.	Cobalt as Co	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
4.	Copper as Cu	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
5.	Iron as Fe	UT/LQMS/SOP/S36 & S37	BDL[DL=0.09]	mg/L
6.	Lead as Pb	UT/LQMS/SOP/S36 & S37	BDL[DL=0.6]	mg/L
7.	Manganese as Mn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.12]	mg/L
8.	Nickel as Ni	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
9.	Zinc as Zn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.018]	mg/L

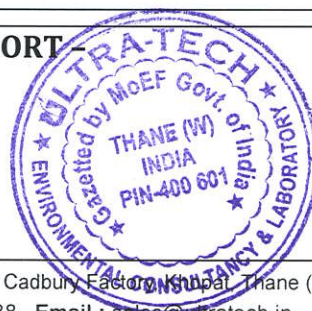
BDL-Below Detection Limit

DL-Detection Limit

Remark/ Statement of Conformity: NIL

- Note:**
1. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/S01A) based on Methods Manual: Soil Testing in India by DA&FW, MoA, GOI.
 2. This test report refers only to the sample tested.
 3. This test report may not be reproduced in part, without the permission of this laboratory.
 4. Any correction invalidates this test report.
 5. *: Parameters not covered under NABL scope.

- END OF REPORT -



For ULTRA TECH,

Manasi Namjoshi

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TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/016/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :

Sampling Plan Ref. No. : SMJKC-03/2023
Sampling Procedure : UT/LQMS/SOP/S01A
Sample Registration Date : 24/03/2023
Date & Time of Sampling : 18/03/2023 at 16:00 Hrs
Analysis Starting Date : 24/03/2023
Analysis Completion Date : 14/04/2023
Sample Collected By : ULTRA TECH
Sample Lab Code : UT/ELS/ SMJKC/016/03-2023

SOIL QUALITY MONITORING

Sample Type : Surface Soil - S8 @ Depth 0.15 m
Sample Location : At Lohabazar
 : [N23°59'3.87";E87°34'23.47"]
Sample Quantity & Packing : 2 kg In Plastic Bag Contained in Zip Lock Bag
Details

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color*	Visual Observation	Brown	-
2.	Physical State (Texture)*	UT/LQMS/SOP/S39	Sandy Clay Loam	-
3.	pH(1:2.5 Soil: Water)	IS 2720 (Part 26) 1987	7.4	-
4.	Electrical Conductivity (1:2 Soil: Water Extract)	IS :14767-2000	206	uS/cm
5.	Bulk Density	UT/LQMS/SOP/S03	1149	kg/m ³
6.	Porosity	UT/LQMS/SOP/S40	54.0	%
7.	Organic Matter	IS 2720 (Part 22) : 1972	0.5	%
8.	Total Organic Carbon	IS 2720 (Part 22) : 1972	0.3	%
9.	Moisture Content	IS 2720(Part 02) 1973	6.3	%
10.	n-Hexane Extractable Material (HEM)	UT/LQMS/SOP/S09	BDL[DL=0.1]	%
11.	Water Holding Capacity	UT/LQMS/SOP/S12	55.3	%
12.	Texture (Sand)	UT/LQMS/SOP/S39	57.6	%
13.	Texture (Silt)	UT/LQMS/SOP/S39	18.9	%
14.	Texture (Clay)	UT/LQMS/SOP/S39	23.2	%
15.	Sodium Adsorption Ratio	UT/LQMS/SOP/S26	1.0	(meq/kg) ^{1/2}
16.	Cation Exchange Capacity	UT/LQMS/SOP/S18	26.9	meq/100g
17.	Sodium as Na (Exchangeable)	UT/LQMS/SOP/S13	1.1	meq/100g
18.	Potassium as K (Exchangeable)	UT/LQMS/SOP/S14	0.6	meq/100g
19.	Calcium as Ca (Exchangeable)	UT/LQMS/SOP/S15	10.2	meq/100g
20.	Magnesium as Mg (Exchangeable)	UT/LQMS/SOP/S16	11.4	meq/100g
21.	Sodium as Na (water Extractable)	UT/LQMS/SOP/S19	50	mg/kg
22.	Potassium as K (water Extractable)	UT/LQMS/SOP/S20	22	mg/kg
23.	Calcium as Ca (water Extractable)	UT/LQMS/SOP/S21	106	mg/kg
24.	Magnesium as Mg (water Extractable)	UT/LQMS/SOP/S22	50	mg/kg
25.	Chloride as Cl ⁻ (water Extractable)	UT/LQMS/SOP/S23	68	mg/kg
26.	Sulfate as SO ₄ ⁻ (water Extractable)	UT/LQMS/SOP/S24	99	mg/kg

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. Village- Kharia ,P.O- Md.Bazar ,PS –Md. Bazar Dist- Birbhum ,West Bengal ,Pin-731127 Project site: " Kharia Fire Clay & China Clay Mine"	REPORT NO. : UT/ELS/REPORT/SMJKC/016/06-2023 ISSUE DATE. : 21/06/2023 YOUR REF. : Work Order Letter REF. DATE. : 05/08/2023
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SAMPLE PARTICULARS		SOIL QUALITY MONITORING	
Sampling Plan Ref. No.	: SMJKC-03/2023	Sample Type	: Surface Soil – S8 @ Depth 0.15 m
Sampling Procedure	: UT/LQMS/SOP/S01A	Sample Location	: At Lohabazar
Sample Registration Date	: 24/03/2023		: [N23°59'3.87";E87°34'23.47"]
Date & Time of Sampling	: 18/03/2023 at 16:00 Hrs		
Analysis Starting Date	: 24/03/2023	Sample Quantity	: 2 kg In Plastic Bag Contained in Zip
Analysis Completion Date	: 14/04/2023	& Packing	: Lock Bag
Sample Collected By	: ULTRA TECH	Details	
Sample Lab Code	: UT/ELS/ SMJKC/016/03-2023		

Sr. No.	Test Parameter	Test Method	Test Result	Unit
27.	Phosphate as PO ₄ (water Extractable)	UT/LQMS/SOP/S25	70	mg/kg
28.	Available Phosphorus as P ₂ O ₅	UT/LQMS/SOP/S28	67	kg/ha
29.	Available Potassium as K ₂ O	UT/LQMS/SOP/S29	241	kg/ha
30.	Available Nitrogen as N	UT/LQMS/SOP/S30	133	kg/ha
TCLP Metals				
1.	Cadmium as Cd	UT/LQMS/SOP/S36& S37	BDL[DL=0.018]	mg/L
2.	Total Chromium as Cr	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
3.	Cobalt as Co	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
4.	Copper as Cu	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
5.	Iron as Fe	UT/LQMS/SOP/S36 & S37	BDL[DL=0.09]	mg/L
6.	Lead as Pb	UT/LQMS/SOP/S36 & S37	BDL[DL=0.6]	mg/L
7.	Manganese as Mn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.12]	mg/L
8.	Nickel as Ni	UT/LQMS/SOP/S36 & S37	BDL[DL=0.06]	mg/L
9.	Zinc as Zn	UT/LQMS/SOP/S36 & S37	BDL[DL=0.018]	mg/L
BDL-Below Detection Limit			DL-Detection Limit	

Remark/ Statement of Conformity: *NIL*

- Note:**
1. Samples were collected by following laboratory's SOP (UT/LQMS/SOP/S01A) based on Methods Manual: Soil Testing in India by DA&FW, MoA, GOI.
 2. This test report refers only to the sample tested.
 3. This test report may not be reproduced in part, without the permission of this laboratory.
 4. Any correction invalidates this test report.
 5. *: Parameters not covered under NABL scope.

- END OF REPORT -



For ULTRA TECH,

MJ Namjoshi

Manasi Namjoshi
(Authorized Signatory)

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Kolkata: +033-40089145 / +91-9674488198 - kolkata@ultratech.in

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TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/017/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :	WATER SAMPLE ANALYSIS
Sampling Plan Ref. No. : SMJKC-03/2023	Sample Type : Ground Water
Sampling Procedure : UT/LQMS/SOP/W01A	Sample Location : Fulgoria Primary School [N-23°59'41.92"; E-87°32'17.80"]
Sample Registration Date : 24/03/2023	Sample Quantity & Packing : Sterilized Bottle For Microbial parameter, & 2L in Plastic Container for other parameters.
Date & Time of Sampling : 19/03/2023 at 11:40 Hrs	Details :
Analysis Starting Date : 24/03/2023	
Analysis Completion Date : 14/04/2023	
Sample Collected By : ULTRA TECH	
Sample Lab Code : UT/ELS/SMJKC/017/03-2023	

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color	APHA 2120 C :2017, 23 rd Ed.	BDL[DL=1]	Hazen
2.	pH	IS 3025 (Part 11) :2022	6.8	-
3.	Total suspended solids	IS 3025 (Part 17) : 1984	2	mg/L
4.	Ammonical Nitrogen as NH ₃ -N	APHA 4500-NH ₃ C :2017, 23 rd Ed.	BDL[DL=0.1]	mg/L
5.	Total Kjeldahl Nitrogen	APHA 4500-Norg B :2017, 23 rd Ed.	1.9	mg/L
6.	Biochemical Oxygen Demand (27°C, 3Days)	IS 3025 (Part 44) : 1993	BDL[DL=2]	mg/L
7.	Chemical Oxygen Demand	IS 3025 (Part 58) : 2006	BDL[DL=2]	mg/L
8.	Oil & grease	IS 3025 (Part 39) : 2021	BDL[DL=2]	mg/L
9.	Residual Chlorine	IS 3025 (Part 26) : 1986	BDL[DL=1]	mg/L
10.	Phosphates as PO ₄ ³⁻	APHA 4500 P E:2017, 23 rd Ed.	0.61	mg/L
11.	Nitrates as NO ₃ ⁻ -N	IS 3025 (Part 34) : 1988	0.25	mg/L
12.	Phenols	APHA 5530 D:2017, 23 rd Ed.	BDL[DL=1]	mg/L
13.	Sulfides	IS 3025 (Part 29) : 1986	BDL[DL=0.05]	mg/L
14.	Arsenic as As *	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
15.	Copper as Cu	IS 3025 (Part 42) : 1992	BDL[DL=0.03]	mg/L
16.	Chromium as Cr	IS 3025 (Part 52) : 2003	BDL[DL=0.02]	mg/L
17.	Hexavalent Chromium	IS 3025 (Part 52) : 2003	BDL[DL=0.01]	mg/L
18.	Iron as Fe	IS 3025 (Part 53) : 2003	0.78	mg/L
19.	Magnesium as Mn	APHA 3111B :2017, 23 rd Ed.	BDL[DL=0.03]	mg/L
20.	Mercury As Hg	APHA 3112 B :2017, 23 rd Ed.	BDL[DL=0.006]	mg/L
21.	Nickel as Ni	IS 3025 (Part 54) : 2003	BDL[DL=0.6]	mg/L
22.	Selenium as Se	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
23.	Lead as Pb	IS 3025 (Part 47) : 1994	BDL[DL=0.6]	mg/L
24.	Fluoride as F ⁻	APHA 4500-F B-D:2017, 23 rd Ed.	0.4	mg/L
25.	Boron as B	APHA 4500-B B:2017, 23 rd Ed.	BDL[DL=0.1]	mg/L
26.	Zinc as Zn	IS 3025 (Part 49) : 1994	BDL[DL=0.02]	mg/L
27.	Total Coliform Bacteria*	IS 1622 : 1981	12	MPN/100 ml
28.	Fecal coliform*	IS 1622 : 1981	BDL[DL=2]	MPN/100 ml
29.	E. Coli*	IS 1622 : 1981	Absent	-

DL - Detection Limit BDL - Below Detection Limit

Remark/ Statement of Conformity: NIL

Note:
 1. Samples were collected using laboratory's SOP (UT/LQMS/SOP/W01A) based on CPCB's Guide Manual: Water & Wastewater Analysis, APHA 23rd Edition and IS3025 (Part 1).
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 5. *: Parameters are not covered under NABL Scope.

- END OF REPORT -



For ULTRA TECH

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. **REPORT NO. :** UT/ELS/REPORT/SMJKC/018/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar **ISSUE DATE. :** 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 **YOUR REF. :** Work Order Letter
Project site: " Kharia Fire Clay & China Clay Mine" **REF. DATE. :** 05/08/2023

SAMPLE PARTICULARS :	WATER SAMPLE ANALYSIS
Sampling Plan Ref. No. : SMJKC-03/2023	Sample Type : Ground Water
Sampling Procedure : UT/LQMS/SOP/W01A	Sample : Lohabazar
Sample Registration Date : 24/03/2023	Location : [N-23°59'3.53"; E-87°34'23.26"]
Date & Time of Sampling : 19/03/2023 at 11:40 Hrs	Sample : Sterilized Bottle For Microbial
Analysis Starting Date : 24/03/2023	Quantity & Packing : parameter, & 2L in Plastic Container for
Analysis Completion Date : 14/04/2023	Details : other parameters.
Sample Collected By : ULTRA TECH	
Sample Lab Code : UT/ELS/SMJKC/018/03-2023	

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color	APHA 2120 C :2017, 23 rd Ed.	BDL[DL=1]	Hazen
2.	pH	IS 3025 (Part 11) :2022	7.3	-
3.	Total suspended solids	IS 3025 (Part 17) :1984	4	mg/L
4.	Ammonical Nitrogen as NH ₃ -N	APHA 4500-NH ₃ C :2017, 23 rd Ed.	0.53	mg/L
5.	Total Kjeldahl Nitrogen	APHA 4500-Norg B :2017, 23 rd Ed.	1.4	mg/L
6.	Biochemical Oxygen Demand (27°C, 3Days)	IS 3025 (Part 44) :1993	BDL[DL=2]	mg/L
7.	Chemical Oxygen Demand	IS 3025 (Part 58) :2006	BDL[DL=2]	mg/L
8.	Oil & grease	IS 3025 (Part 39) :2021	BDL[DL=2]	mg/L
9.	Residual Chlorine	IS 3025 (Part 26) :1986	BDL[DL=1]	mg/L
10.	Phosphates as PO ₄ ³⁻	APHA 4500 P E:2017, 23 rd Ed.	0.59	mg/L
11.	Nitrates as NO ₃ ⁻ -N	IS 3025 (Part 34) :1988	0.23	mg/L
12.	Phenols	APHA 5530 D:2017, 23 rd Ed.	BDL[DL=1]	mg/L
13.	Sulfides	IS 3025 (Part 29) :1986	BDL[DL=0.05]	mg/L
14.	Arsenic as As *	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
15.	Copper as Cu	IS 3025 (Part 42) :1992	BDL[DL=0.03]	mg/L
16.	Chromium as Cr	IS 3025 (Part 52) :2003	BDL[DL=0.02]	mg/L
17.	Hexavalent Chromium	IS 3025 (Part 52) :2003	BDL[DL=0.01]	mg/L
18.	Iron as Fe	IS 3025 (Part 53) :2003	0.72	mg/L
19.	Magnesium as Mn	APHA 3111B :2017, 23 rd Ed.	BDL[DL=0.03]	mg/L
20.	Mercury As Hg	APHA 3112 B :2017, 23 rd Ed.	BDL[DL=0.006]	mg/L
21.	Nickel as Ni	IS 3025 (Part 54) :2003	BDL[DL=0.6]	mg/L
22.	Selenium as Se	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
23.	Lead as Pb	IS 3025 (Part 47) :1994	BDL[DL=0.6]	mg/L
24.	Fluoride as F ⁻	APHA 4500-F B-D:2017, 23 rd Ed.	0.3	mg/L
25.	Boron as B	APHA 4500-B B:2017, 23 rd Ed.	BDL[DL=0.1]	mg/L
26.	Zinc as Zn	IS 3025 (Part 49) :1994	BDL[DL=0.02]	mg/L
27.	Total Coliform Bacteria*	IS 1622 :1981	2	MPN/100 ml
28.	Fecal coliform*	IS 1622 :1981	BDL[DL=2]	MPN/100 ml
29.	E. Coli*	IS 1622 :1981	Absent	-

DL - Detection Limit

BDL - Below Detection Limit

Remark/ Statement of Conformity: NIL

- Note:**
1. Samples were collected using laboratory's SOP (UT/LQMS/SOP/W01A) based on CPCB's Guide Manual: Water & Wastewater Analysis, APHA 23rd Edition and IS3025 (Part 1).
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 5. *: Parameters are not covered under NABL Scope.

- END OF REPORT



For ULTRA TECH

Meghan Patil
 (Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar
 Dist- Birbhum ,West Bengal ,Pin-731127
Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/019/06-2023
ISSUE DATE. : 21/06/2023
YOUR REF. : Work Order Letter
REF. DATE. : 05/08/2023

SAMPLE PARTICULARS :	WATER SAMPLE ANALYSIS
Sampling Plan Ref. No. : SMJKC-03/2023	Sample Type : Ground Water
Sampling Procedure : UT/LQMS/SOP/W01A	Sample : Nirbhoypur
Sample Registration Date : 24/03/2023	Location : [N-23°58'59.56"; E-87°33'22.24"]
Date & Time of Sampling : 19/03/2023 at 11:40 Hrs	Sample : Sterilized Bottle For Microbial
Analysis Starting Date : 24/03/2023	Quantity & Packing : parameter, & 2L in Plastic Container for
Analysis Completion Date : 14/04/2023	Details : other parameters.
Sample Collected By : ULTRA TECH	
Sample Lab Code : UT/ELS/SMJKC/019/03-2023	

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color	APHA 2120 C :2017, 23 rd Ed.	BDL[DL=1]	Hazen
2.	pH	IS 3025 (Part 11) :2022	6.6	-
3.	Total suspended solids	IS 3025 (Part 17) : 1984	6	mg/L
4.	Ammonical Nitrogen as NH ₃ -N	APHA 4500-NH ₃ C :2017, 23 rd Ed.	0.61	mg/L
5.	Total Kjeldahl Nitrogen	APHA 4500-Norg B :2017, 23 rd Ed.	2.1	mg/L
6.	Biochemical Oxygen Demand (27°C, 3Days)	IS 3025 (Part 44) : 1993	BDL[DL=2]	mg/L
7.	Chemical Oxygen Demand	IS 3025 (Part 58) : 2006	BDL[DL=2]	mg/L
8.	Oil & grease	IS 3025 (Part 39) : 2021	BDL[DL=2]	mg/L
9.	Residual Chlorine	IS 3025 (Part 26) : 1986	BDL[DL=1]	mg/L
10.	Phosphates as PO ₄ ³⁻	APHA 4500 P E:2017, 23 rd Ed.	0.66	mg/L
11.	Nitrates as NO ₃ ⁻ -N	IS 3025 (Part 34) : 1988	0.29	mg/L
12.	Phenols	APHA 5530 D:2017, 23 rd Ed.	BDL[DL=1]	mg/L
13.	Sulfides	IS 3025 (Part 29) : 1986	BDL[DL=0.05]	mg/L
14.	Arsenic as As *	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
15.	Copper as Cu	IS 3025 (Part 42) : 1992	BDL[DL=0.03]	mg/L
16.	Chromium as Cr	IS 3025 (Part 52) : 2003	BDL[DL=0.02]	mg/L
17.	Hexavalent Chromium	IS 3025 (Part 52) : 2003	BDL[DL=0.01]	mg/L
18.	Iron as Fe	IS 3025 (Part 53) : 2003	0.85	mg/L
19.	Magnesium as Mn	APHA 3111B :2017, 23 rd Ed.	BDL[DL=0.03]	mg/L
20.	Mercury As Hg	APHA 3112 B :2017, 23 rd Ed.	BDL[DL=0.006]	mg/L
21.	Nickel as Ni	IS 3025 (Part 54) : 2003	BDL[DL=0.6]	mg/L
22.	Selenium as Se	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
23.	Lead as Pb	IS 3025 (Part 47) : 1994	BDL[DL=0.6]	mg/L
24.	Fluoride as F ⁻	APHA 4500-F B-D:2017, 23 rd Ed.	0.4	mg/L
25.	Boron as B	APHA 4500-B B:2017, 23 rd Ed.	BDL[DL=0.1]	mg/L
26.	Zinc as Zn	IS 3025 (Part 49) : 1994	BDL[DL=0.02]	mg/L
27.	Total Coliform Bacteria*	IS 1622 : 1981	4	MPN/100 ml
28.	Fecal coliform*	IS 1622 : 1981	BDL[DL=2]	MPN/100 ml
29.	E. Coli*	IS 1622 : 1981	Absent	-

DL - Detection Limit

BDL - Below Detection Limit

Remark/ Statement of Conformity: NIL

Note:
 1. Samples was collected using laboratory's SOP (UT/LQMS/SOP/W01A) based on CPCB's Guide Manual: Water & Wastewater Analysis, APHA 23rd Edition and IS3025 (Part 1).
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 4. Any correction invalidates this test report.
 5. *: Parameters are not covered under NABL Scope.

- END OF REPORT



For ULTRA TECH

Meghan Patil

(Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. **REPORT NO. :** UT/ELS/REPORT/SMJKC/020/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar **ISSUE DATE. :** 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 **YOUR REF. :** Work Order Letter
Project site: " Kharia Fire Clay & China Clay Mine" **REF. DATE. :** 05/08/2023

SAMPLE PARTICULARS :	WATER SAMPLE ANALYSIS
Sampling Plan Ref. No. : SMJKC-03/2023	Sample Type : Ground Water
Sampling Procedure : UT/LQMS/SOP/W01A	Sample Location : Dighalgram Primary School [N-24°2'49.85"; E-87°38'38.00"]
Sample Registration Date : 24/03/2023	Sample Quantity & Packing : Sterilized Bottle For Microbial parameter, & 2L in Plastic Container for other parameters.
Date & Time of Sampling : 19/03/2023 at 11:40 Hrs	Details :
Analysis Starting Date : 24/03/2023	
Analysis Completion Date : 14/04/2023	
Sample Collected By : ULTRA TECH	
Sample Lab Code : UT/ELS/SMJKC/020/03-2023	

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color	APHA 2120 C :2017, 23 rd Ed.	BDL[DL=1]	Hazen
2.	pH	IS 3025 (Part 11) :2022	7.2	-
3.	Total suspended solids	IS 3025 (Part 17) : 1984	5	mg/L
4.	Ammonical Nitrogen as NH ₃ -N	APHA 4500-NH ₃ C :2017, 23 rd Ed.	0.53	mg/L
5.	Total Kjeldahl Nitrogen	APHA 4500-Norg B :2017, 23 rd Ed.	1.6	mg/L
6.	Biochemical Oxygen Demand (27°C, 3Days)	IS 3025 (Part 44) : 1993	BDL[DL=2]	mg/L
7.	Chemical Oxygen Demand	IS 3025 (Part 58) : 2006	BDL[DL=2]	mg/L
8.	Oil & grease	IS 3025 (Part 39) : 2021	BDL[DL=2]	mg/L
9.	Residual Chlorine	IS 3025 (Part 26) : 1986	BDL[DL=1]	mg/L
10.	Phosphates as PO ₄ ³⁻	APHA 4500 P E:2017, 23 rd Ed.	0.52	mg/L
11.	Nitrates as NO ₃ ⁻ -N	IS 3025 (Part 34) : 1988	0.28	mg/L
12.	Phenols	APHA 5530 D:2017, 23 rd Ed.	BDL[DL=1]	mg/L
13.	Sulfides	IS 3025 (Part 29) : 1986	BDL[DL=0.05]	mg/L
14.	Arsenic as As *	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
15.	Copper as Cu	IS 3025 (Part 42) : 1992	BDL[DL=0.03]	mg/L
16.	Chromium as Cr	IS 3025 (Part 52) : 2003	BDL[DL=0.02]	mg/L
17.	Hexavalent Chromium	IS 3025 (Part 52) : 2003	BDL[DL=0.01]	mg/L
18.	Iron as Fe	IS 3025 (Part 53) : 2003	0.73	mg/L
19.	Magnesium as Mn	APHA 3111B :2017, 23 rd Ed.	BDL[DL=0.03]	mg/L
20.	Mercury As Hg	APHA 3112 B :2017, 23 rd Ed.	BDL[DL=0.006]	mg/L
21.	Nickel as Ni	IS 3025 (Part 54) : 2003	BDL[DL=0.6]	mg/L
22.	Selenium as Se	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
23.	Lead as Pb	IS 3025 (Part 47) : 1994	BDL[DL=0.6]	mg/L
24.	Fluoride as F ⁻	APHA 4500-F B-D:2017, 23 rd Ed.	0.5	mg/L
25.	Boron as B	APHA 4500-B B:2017, 23 rd Ed.	BDL[DL=0.1]	mg/L
26.	Zinc as Zn	IS 3025 (Part 49) : 1994	BDL[DL=0.02]	mg/L
27.	Total Coliform Bacteria*	IS 1622 : 1981	4	MPN/100 ml
28.	Fecal coliform*	IS 1622 : 1981	BDL[DL=2]	MPN/100 ml
29.	E. Coli*	IS 1622 : 1981	Absent	-

DL - Detection Limit

BDL - Below Detection Limit

Remark/ Statement of Conformity: NIL

- Note:**
1. Samples were collected using laboratory's SOP (UT/LQMS/SOP/W01A) based on CPCB's Guide Manual: Water & Wastewater Analysis, APHA 23rd Edition and IS3025 (Part 1).
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- END OF REPORT



For ULTRA TECH

Meghan Patil

(Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. **REPORT NO. :** UT/ELS/REPORT/SMJKC/021/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar **ISSUE DATE. :** 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 **YOUR REF. :** Work Order Letter
Project site: " Kharia Fire Clay & China Clay Mine" **REF. DATE. :** 05/08/2023

SAMPLE PARTICULARS :	WATER SAMPLE ANALYSIS
Sampling Plan Ref. No. : SMJKC-03/2023	Sample Type : Surface Water
Sampling Procedure : UT/LQMS/SOP/W01A	Sample :
Sample Registration Date : 24/03/2023	Location : Project site (Kharia Village)
Date & Time of Sampling : 20/03/2023 at 11:40 Hrs	Location : [N-23°59'34.57"; E-87°35'24.93"]
Analysis Starting Date : 24/03/2023	Sample : Sterilized Bottle For Microbial
Analysis Completion Date : 14/04/2023	Quantity & : parameter, 300 ml in BOD Bottle for DO
Sample Collected By : ULTRA TECH	Packing : & 2L in Plastic Container for other
Sample Lab Code : UT/ELS/SMJKC/0021/03-2023	Details : parameters.

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color	APHA 2120 C :2017, 23 rd Ed.	BDL[DL=1]	Hazen
2.	Odor*	IS 3025 (Part 05) : 1983	Agreeable	-
3.	Temperature	IS 3025 (Part 09) : 1984	28.6	°C
4.	Turbidity	IS 3025 (Part 10) : 1984	3.4	NTU
5.	pH	IS 3025 (Part 11) :2022	8.1	-
6.	Electrical Conductivity	IS 3025 (Part 14) : 1984	458	µS/cm
7.	Total Dissolved Solids	IS 3025 (Part 16) : 1984	298	mg/L
8.	Total suspended solids	IS 3025 (Part 17) : 1984	5	mg/L
9.	Total Hardness as CaCO ₃	IS 3025 (Part 21) : 2009	210	mg/L
10.	Ammonical Nitrogen as NH ₃ -N	APHA 4500-NH ₃ C :2017, 23 rd Ed.	BDL[DL=0.1]	mg/L
11.	Nitrates as NO ₃ ⁻ -N	IS 3025 (Part 34) : 1988	BDL[DL=0.1]	mg/L
12.	Nitrite as NO ₂ ⁻ -N	IS 3025 (Part 34) : 1988	0.012	mg/L
13.	Phosphates as PO ₄ ³⁻	APHA 4500 P E:2017, 23 rd Ed.	0.15	mg/L
14.	Biochemical Oxygen Demand (27°C, 3Days)	IS 3025 (Part 44) : 1993	4.7	mg/L
15.	Chemical Oxygen Demand	IS 3025 (Part 58) : 2006	16	mg/L
16.	Dissolved Oxygen	IS 3025 (Part 38) : 1989	5.5	mg/L
17.	Potassium as K	APHA 3500K:2017, 23 rd Ed.	1.7	mg/L
18.	Sodium as Na	APHA 3500Na:2017, 23 rd Ed.	24	mg/L
19.	Calcium as Ca	IS 3025 (Part 40) : 1991	43	mg/L
20.	Magnesium as Mg	IS 3025 (Part 46) : 1994	25	mg/L
21.	Carbonates (CO ₃ ²⁻) as CaCO ₃ *	IS 3025 (Part 51) : 2001	BDL[DL=1]	mg/L
22.	Bicarbonates as (HCO ₃ ⁻) as CaCO ₃ *	IS 3025 (Part 51) : 2001	200	mg/L
23.	Chlorides as Cl ⁻	IS 3025 (Part 32) : 1988	41	mg/L
24.	Sulphates as SO ₄ ²⁻	APHA 4500- SO ₄ ²⁻ E:2017, 23 rd Ed.	39	mg/L
25.	Fluoride as F ⁻	APHA 4500-F B-D:2017, 23 rd Ed.	0.2	mg/L
26.	Boron as B	APHA 4500-B B:2017, 23 rd Ed.	0.2	mg/L
27.	Arsenic as As *	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
28.	Iron as Fe	IS 3025 (Part 53) : 2003	0.31	mg/L
29.	Zinc as Zn	IS 3025 (Part 49) : 1994	BDL[DL=0.02]	mg/L
30.	Total Coliform Bacteria*	IS 1622 : 1981	27	MPN/100 ml
31.	Fecal coliform*	IS 1622 : 1981	11	MPN/100 ml
32.	E. Coli*	IS 1622 : 1981	Present	-

DL - Detection Limit

BDL - Below Detection Limit

Remark/ Statement of Conformity: NIL

Note: 1. Samples was collected using laboratory's SOP (UT/LQMS/SOP/W01A) based on CPCB's Guide Manual: Water & Wastewater Analysis, APHA 23rd Edition and IS3025 (Part 1).
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- END OF REPORT -



For ULTRA TECH

Meghan Patil

Meghan Patil

(Authorized Signatory)

TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.

Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar

Dist- Birbhum ,West Bengal ,Pin-731127

Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/022/06-2023

ISSUE DATE. : 21/06/2023

YOUR REF. : Work Order Letter

REF. DATE. : 05/08/2023

SAMPLE PARTICULARS

Sampling Plan Ref. No. : SMJKC-03/2023
 Sampling Procedure : UT/LQMS/SOP/W01A
 Sample Registration Date : 24/03/2023
 Date & Time of Sampling : 20/03/2023 at 12:45 Hrs
 Analysis Starting Date : 24/03/2023
 Analysis Completion Date : 14/04/2023
 Sample Collected By : ULTRA TECH
 Sample Lab Code : UT/ELS/SMJKC/0022/03-2023

WATER SAMPLE ANALYSIS

Sample Type : Surface Water
 Sample Location : Mayurakshi River
 [N-23°56'52.13"; E-87°31'28.11"]
 Sample Quantity & Packing : Sterilized Bottle For Microbial parameter, 300 ml in BOD Bottle for DO & 2L in Plastic Container for other parameters.

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color	APHA 2120 C :2017, 23 rd Ed.	BDL[DL=1]	Hazen
2.	Odor*	IS 3025 (Part 05) : 1983	Agreeable	-
3.	Temperature	IS 3025 (Part 09) : 1984	27.6	°C
4.	Turbidity	IS 3025 (Part 10) : 1984	3.9	NTU
5.	pH	IS 3025 (Part 11) :2022	7.3	-
6.	Electrical Conductivity	IS 3025 (Part 14) : 1984	388	µS/cm
7.	Total Dissolved Solids	IS 3025 (Part 16) : 1984	252	mg/L
8.	Total suspended solids	IS 3025 (Part 17) : 1984	6	mg/L
9.	Total Hardness as CaCO ₃	IS 3025 (Part 21) : 2009	202	mg/L
10.	Ammonical Nitrogen as NH ₃ -N	APHA 4500-NH ₃ C :2017, 23 rd Ed.	BDL[DL=0.1]	mg/L
11.	Nitrates as NO ₃ ⁻ -N	IS 3025 (Part 34) : 1988	BDL[DL=0.1]	mg/L
12.	Nitrite as NO ₂ ⁻ -N	IS 3025 (Part 34) : 1988	0.008	mg/L
13.	Phosphates as PO ₄ ³⁻	APHA 4500 P E:2017, 23 rd Ed.	0.12	mg/L
14.	Biochemical Oxygen Demand (27°C, 3Days)	IS 3025 (Part 44) : 1993	3.6	mg/L
15.	Chemical Oxygen Demand	IS 3025 (Part 58) : 2006	12	mg/L
16.	Dissolved Oxygen	IS 3025 (Part 38) : 1989	5.6	mg/L
17.	Potassium as K	APHA 3500K:2017, 23 rd Ed.	1.5	mg/L
18.	Sodium as Na	APHA 3500Na:2017, 23 rd Ed.	9.3	mg/L
19.	Calcium as Ca	IS 3025 (Part 40) : 1991	42	mg/L
20.	Magnesium as Mg	IS 3025 (Part 46) : 1994	24	mg/L
21.	Carbonates (CO ₃ ²⁻) as CaCO ₃ *	IS 3025 (Part 51) : 2001	BDL[DL=1]	mg/L
22.	Bicarbonates as (HCO ₃ ⁻) as CaCO ₃ *	IS 3025 (Part 51) : 2001	198	mg/L
23.	Chlorides as Cl ⁻	IS 3025 (Part 32) : 1988	15	mg/L
24.	Sulphates as SO ₄ ²⁻	APHA 4500- SO ₄ ²⁻ E:2017, 23 rd Ed.	36	mg/L
25.	Fluoride as F ⁻	APHA 4500-F B-D:2017, 23 rd Ed.	0.3	mg/L
26.	Boron as B	APHA 4500-B B:2017, 23 rd Ed.	0.4	mg/L
27.	Arsenic as As *	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
28.	Iron as Fe	IS 3025 (Part 53) : 2003	BDL[DL=0.06]	mg/L
29.	Zinc as Zn	IS 3025 (Part 49) : 1994	BDL[DL=0.02]	mg/L
30.	Total Coliform Bacteria*	IS 1622 : 1981	22	MPN/100 ml
31.	Fecal coliform*	IS 1622 : 1981	12	MPN/100 ml
32.	E. Coli*	IS 1622 : 1981	Present	-

DL - Detection Limit

BDL - Below Detection Limit

Remark/ Statement of Conformity: NIL

Note: 1. Samples was collected using laboratory's SOP (UT/LQMS/SOP/W01A) based on CPCB's Guide Manual: Water & Wastewater Analysis, APHA 23rd Edition and IS3025 (Part 1).
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- END OF REPORT



For ULTRA TECH

Meghan Patil
 (Authorized Signatory)

Environmental Consultancy & Laboratory

Lab Gazetted by MoEF&CC-Govt. of India

Lab. Accredited by NABL ISO/IEC 17025:2017 [TC-5600, Valid until 03.08.2024 in the field of Testing]

QCI-NABET Accredited EIA Consulting Organization

STP/ETP/WTP Project Management Consultants

ISO 9001: 2015

ISO 45001 2018

Lab: Survey No. 93/A, Conformity Hissa No.2 G.V.Brothers Bldg., Bata Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India
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TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE.

Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar

Dist- Birbhum ,West Bengal ,Pin-731127

Project site: " Kharia Fire Clay & China Clay Mine"

REPORT NO. : UT/ELS/REPORT/SMJKC/023/06-2023

ISSUE DATE. : 21/06/2023

YOUR REF. : Work Order Letter

REF. DATE. : 05/08/2023

SAMPLE PARTICULARS

Sampling Plan Ref. No. : SMJKC-03/2023
Sampling Procedure : UT/LQMS/SOP/W01A
Sample Registration Date : 24/03/2023
Date & Time of Sampling : 20/03/2023 at 13:30 Hrs
Analysis Starting Date : 24/03/2023
Analysis Completion Date : 14/04/2023
Sample Collected By : ULTRA TECH
Sample Lab Code : UT/ELS/SMJKC/0023/03-2023

WATER SAMPLE ANALYSIS

Sample Type : Surface Water
Sample Location : Dwaraka River (Up stream)
[N-24°3'11.19"; E-87°34'8.34"]
Sample Quantity & Packing : Sterilized Bottle For Microbial parameter, 300 ml in BOD Bottle for DO & 2L in Plastic Container for other parameters.

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color	APHA 2120 C :2017, 23 rd Ed.	BDL[DL=1]	Hazen
2.	Odor*	IS 3025 (Part 05) : 1983	Agreeable	-
3.	Temperature	IS 3025 (Part 09) : 1984	26.6	°C
4.	Turbidity	IS 3025 (Part 10) : 1984	3.5	NTU
5.	pH	IS 3025 (Part 11) :2022	7.2	-
6.	Electrical Conductivity	IS 3025 (Part 14) : 1984	382	µS/cm
7.	Total Dissolved Solids	IS 3025 (Part 16) : 1984	248	mg/L
8.	Total suspended solids	IS 3025 (Part 17) : 1984	4	mg/L
9.	Total Hardness as CaCO ₃	IS 3025 (Part 21) : 2009	172	mg/L
10.	Ammonical Nitrogen as NH ₃ -N	APHA 4500-NH ₃ C :2017, 23 rd Ed.	BDL[DL=0.1]	mg/L
11.	Nitrates as NO ₃ ⁻ -N	IS 3025 (Part 34) : 1988	BDL[DL=0.1]	mg/L
12.	Nitrite as NO ₂ ⁻ -N	IS 3025 (Part 34) : 1988	0.006	mg/L
13.	Phosphates as PO ₄ ³⁻	APHA 4500 P E:2017, 23 rd Ed.	0.08	mg/L
14.	Biochemical Oxygen Demand (27°C, 3Days)	IS 3025 (Part 44) : 1993	3.2	mg/L
15.	Chemical Oxygen Demand	IS 3025 (Part 58) : 2006	16	mg/L
16.	Dissolved Oxygen	IS 3025 (Part 38) : 1989	5.7	mg/L
17.	Potassium as K	APHA 3500K:2017, 23 rd Ed.	1.6	mg/L
18.	Sodium as Na	APHA 3500Na:2017, 23 rd Ed.	19	mg/L
19.	Calcium as Ca	IS 3025 (Part 40) : 1991	36	mg/L
20.	Magnesium as Mg	IS 3025 (Part 46) : 1994	20	mg/L
21.	Carbonates (CO ₃ ²⁻) as CaCO ₃ *	IS 3025 (Part 51) : 2001	BDL[DL=1]	mg/L
22.	Bicarbonates as (HCO ₃ ⁻) as CaCO ₃ *	IS 3025 (Part 51) : 2001	166	mg/L
23.	Chlorides as Cl ⁻	IS 3025 (Part 32) : 1988	31	mg/L
24.	Sulphates as SO ₄ ²⁻	APHA 4500-SO ₄ ²⁻ E:2017, 23 rd Ed.	35	mg/L
25.	Fluoride as F ⁻	APHA 4500-F B-D:2017, 23 rd Ed.	0.4	mg/L
26.	Boron as B	APHA 4500-B B:2017, 23 rd Ed.	0.2	mg/L
27.	Arsenic as As *	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
28.	Iron as Fe	IS 3025 (Part 53) : 2003	BDL[DL=0.06]	mg/L
29.	Zinc as Zn	IS 3025 (Part 49) : 1994	BDL[DL=0.02]	mg/L
30.	Total Coliform Bacteria*	IS 1622 : 1981	21	MPN/100 ml
31.	Fecal coliform*	IS 1622 : 1981	11	MPN/100 ml
32.	E. Coli*	IS 1622 : 1981	Present	-

DL - Detection Limit

BDL - Below Detection Limit

Remark/ Statement of Conformity: NIL

- Note:**
1. Samples was collected using laboratory's SOP (UT/LQMS/SOP/W01A) based on CPCB's Guide Manual: Water & Wastewater Analysis, APHA 23rd Edition and IS3025 (Part 1).
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- END OF REPORT



For ULTRA TECH

Meghan Patil

(Authorized Signatory)

Lab: Survey No. 93/A, Conformity Hissa No.2 G.V.Brothers Bldg., Bata Compound, Khopat, Near Flower Valley, Thane (West) - 400 601, Maharashtra, India
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TEST REPORT

ISSUED TO: M/s. SHARMA MINERALS JOYPURE. **REPORT NO. :** UT/ELS/REPORT/SMJKC/024/06-2023
 Village- Kharia ,P.O- Md.Bazar ,PS -Md. Bazar **ISSUE DATE. :** 21/06/2023
 Dist- Birbhum ,West Bengal ,Pin-731127 **YOUR REF. :** Work Order Letter
Project site: " Kharia Fire Clay & China Clay Mine" **REF. DATE. :** 05/08/2023

SAMPLE PARTICULARS : **WATER SAMPLE ANALYSIS**
Sampling Plan Ref. No. : SMJKC-03/2023 **Sample Type :** Surface Water
Sampling Procedure : UT/LQMS/SOP/W01A **Sample Location :** Dwaraka River (Down stream)
Sample Registration Date : 24/03/2023 **Location :** [N-24°2'32.27"; E-87°35'36.38"]
Date & Time of Sampling : 20/03/2023 at 14:00 Hrs **Sample :** Sterilized Bottle For Microbial
Analysis Starting Date : 24/03/2023 **Quantity & Packing :** parameter, 300 ml in BOD Bottle for DO
Analysis Completion Date : 14/04/2023 **Details :** & 2L in Plastic Container for other
Sample Collected By : ULTRA TECH parameters.
Sample Lab Code : UT/ELS/SMJKC/0024/03-2023

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Color	APHA 2120 C :2017, 23 rd Ed.	BDL[DL=1]	Hazen
2.	Odor*	IS 3025 (Part 05) : 1983	Agreeable	-
3.	Temperature	IS 3025 (Part 09) : 1984	27.8	°C
4.	Turbidity	IS 3025 (Part 10) : 1984	2.6	NTU
5.	pH	IS 3025 (Part 11) :2022	7.5	-
6.	Electrical Conductivity	IS 3025 (Part 14) : 1984	404	µS/cm
7.	Total Dissolved Solids	IS 3025 (Part 16) : 1984	262	mg/L
8.	Total suspended solids	IS 3025 (Part 17) : 1984	3	mg/L
9.	Total Hardness as CaCO ₃	IS 3025 (Part 21) : 2009	180	mg/L
10.	Ammonical Nitrogen as NH ₃ -N	APHA 4500-NH ₃ C :2017, 23 rd Ed.	BDL[DL=0.1]	mg/L
11.	Nitrates as NO ₃ -N	IS 3025 (Part 34) : 1988	BDL[DL=0.1]	mg/L
12.	Nitrite as NO ₂ -N	IS 3025 (Part 34) : 1988	0.008	mg/L
13.	Phosphates as PO ₄ ³⁻	APHA 4500 P E:2017, 23 rd Ed.	0.07	mg/L
14.	Biochemical Oxygen Demand (27°C, 3Days)	IS 3025 (Part 44) : 1993	3	mg/L
15.	Chemical Oxygen Demand	IS 3025 (Part 58) : 2006	12	mg/L
16.	Dissolved Oxygen	IS 3025 (Part 38) : 1989	5.8	mg/L
17.	Potassium as K	APHA 3500K:D:2017, 23 rd Ed.	1.8	mg/L
18.	Sodium as Na	APHA 3500Na:2017, 23 rd Ed.	20	mg/L
19.	Calcium as Ca	IS 3025 (Part 40) : 1991	38	mg/L
20.	Magnesium as Mg	IS 3025 (Part 46) : 1994	21	mg/L
21.	Carbonates (CO ₃ ²⁻) as CaCO ₃ *	IS 3025 (Part 51) : 2001	BDL[DL=1]	mg/L
22.	Bicarbonates as (HCO ₃ ⁻) as CaCO ₃ *	IS 3025 (Part 51) : 2001	174	mg/L
23.	Chlorides as Cl ⁻	IS 3025 (Part 32) : 1988	34	mg/L
24.	Sulphates as SO ₄ ²⁻	APHA 4500- SO ₄ ²⁻ E:2017, 23 rd Ed.	34	mg/L
25.	Fluoride as F ⁻	APHA 4500-F B-D:2017, 23 rd Ed.	0.5	mg/L
26.	Boron as B	APHA 4500-B B:2017, 23 rd Ed.	0.3	mg/L
27.	Arsenic as As *	APHA 3114 C:2017, 23 rd Ed.	BDL[DL=0.003]	mg/L
28.	Iron as Fe	IS 3025 (Part 53) : 2003	BDL[DL=0.06]	mg/L
29.	Zinc as Zn	IS 3025 (Part 49) : 1994	BDL[DL=0.02]	mg/L
30.	Total Coliform Bacteria*	IS 1622 : 1981	27	MPN/100 ml
31.	Fecal coliform*	IS 1622 : 1981	12	MPN/100 ml
32.	E. Coli*	IS 1622 : 1981	Present	-

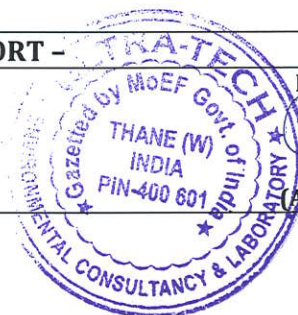
DL - Detection Limit

BDL - Below Detection Limit

Remark/ Statement of Conformity: NIL

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For ULTRA TECH

Meghan Patil
 (Authorized Signatory)