SAND MINING PROJECT

Draft EIA Report
for
Environmental Clearance of the
Proposed "Sand Mining Project"
on Mechi River of Darjeeling District,
Mouza- Antaram, Block - Khoribari,
District-Darjeeling,
State-West Bengal
(Area: 7.31 Ha.)

Submitted By

M/s. West Bengal Mineral Development & Trading Corporation Ltd.
3rd Floor, DJ-10, (WBIIDC Building), DJ Block, Sector II,
Salt Lake City, Kolkata - 700091, West Bengal

Prepared By

RSP GREEN DEVELOPMENT AND LABORATORIES PVT. LTD.
A QCI (NABET) Accredited Organization

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ABBREVIATIONS

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

Chapter-1

INTRODUCTION

1.0. PREAMBLE

The term Environment Impact Assessment (EIA) refers to the anticipation of various impacts a project will have on the environment and the local community. It is a decision-making tool, which guides decision makers in taking appropriate decisions prior to sanctioning clearance. Environmental Impact Assessment (EIA) is a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision- makers. By using EIA both environmental and economic benefits can be achieved, such as reduced cost and time of project implementation and design, avoided treatment/clean-up costs and impacts of laws and regulations.

1.1. GENERAL INFORMATION

The proposed sand mining project on Mechi River at Mouza - Antaram, J.L. No.- 05, P.S. – Khoribari, Block- Khoribari, District - Darjeeling, West Bengal, over Plot No. – 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P).

The LOI was granted in favor of M/s. West Bengal Mineral Development & Trading Corporation Ltd. (WBMDTCL), a Govt. of West Bengal Undertaking company which was formed as a Company as per Companies Act 1956 on 23rd February, 1973 under the direct administrative control of Department of Large Industries & Enterprises. Accordingly, Govt. of West Bengal holds 100% paid up share capital of WBMDTCL with Regd. Office at WBIIDC Building, DJ Block, Sector II, Salt Lake City, Pin Code - 700091 Vide letter No. 689 dated 30-11-2022 for the period of 5 years. (A copy of LOI is attached as **Annexure-II.)**

Mine plan and Progressive Mine Closure Plan: Modified Mining Plan and Progressive Mine Closure Plan of the proposed mine lease area is prepared by RQP Ashok Kumar Sarkar, (RQP Regn. No.: RQP/KOL/377/2013/A). This Mine Plan is approved vide letter No. G.P 10-10A (WBMDTCL)/ 2023/22-A dated 09.03.2023.

Environment Consultant: The lessee has hired an Environment Consultant, RSP Green Development and Laboratories Pvt. Ltd., 7F Dinabondhu Mukherjee Lane, 3rd& 4th Floor, Shibpur, Howrah – 711102 for preparation of Environment Impact Assessment Report for obtaining Environment Clearance from SEIAA/SEAC, West Bengal.

ToR Letter: It is in this context, hard copy of Form-I and Pre-Feasibility Report has been submitted to SEIAA/SEAC, West Bengal on 21.03.2023 requesting for issue of "Terms of Reference" (ToR). The technical presentation for ToR before SEAC, West Bengal was held on 28.03.2023. Subsequently, the ToR Letter has been issued on date 26.07.2023 by SEIAA, (Letter no- 1423/EN/T-II-I/333/2023).

1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1 Identification of Project

River bed Sand mining (BLOCK ID – MIN_DJ_1) on Mechi River Mine Lease Area –7.31 Ha. for production of 1,27,300 TPA on Mechi River, Block- Antaram, District- Darjeeling, State: West Bengal..

1.2.2 Identification of Project Proponent : M/s. West Bengal Mineral Development & Trading Corporation Ltd. 3rd Floor, DJ-10 (WBIIDC Building) DJ Block, Sector II, Salt Lake City, Pin Code - 700091

1.2.3 ENVIRONMENTAL CLEARANCE

The Proposed Sand Mining Project at Khasra No.- 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P), of blockID-MIN_DJ_1 on River Mechi of JL no- 05, Plate no: 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P) District-Darjeeling State-West Bengal As per Ministry of Environment and Forests vide number S.O. 3977 (E) dated 14th August, 2018, the project falls under "B1"Category. Project will be assessed by SEIAA, West Bengal. Lessee will have to take Environmental Clearance from SEIAA,West Bengal as per EIA notification September, 2006 amended in December 2009 and April 2011 and amendment thereof to start the mining operation.

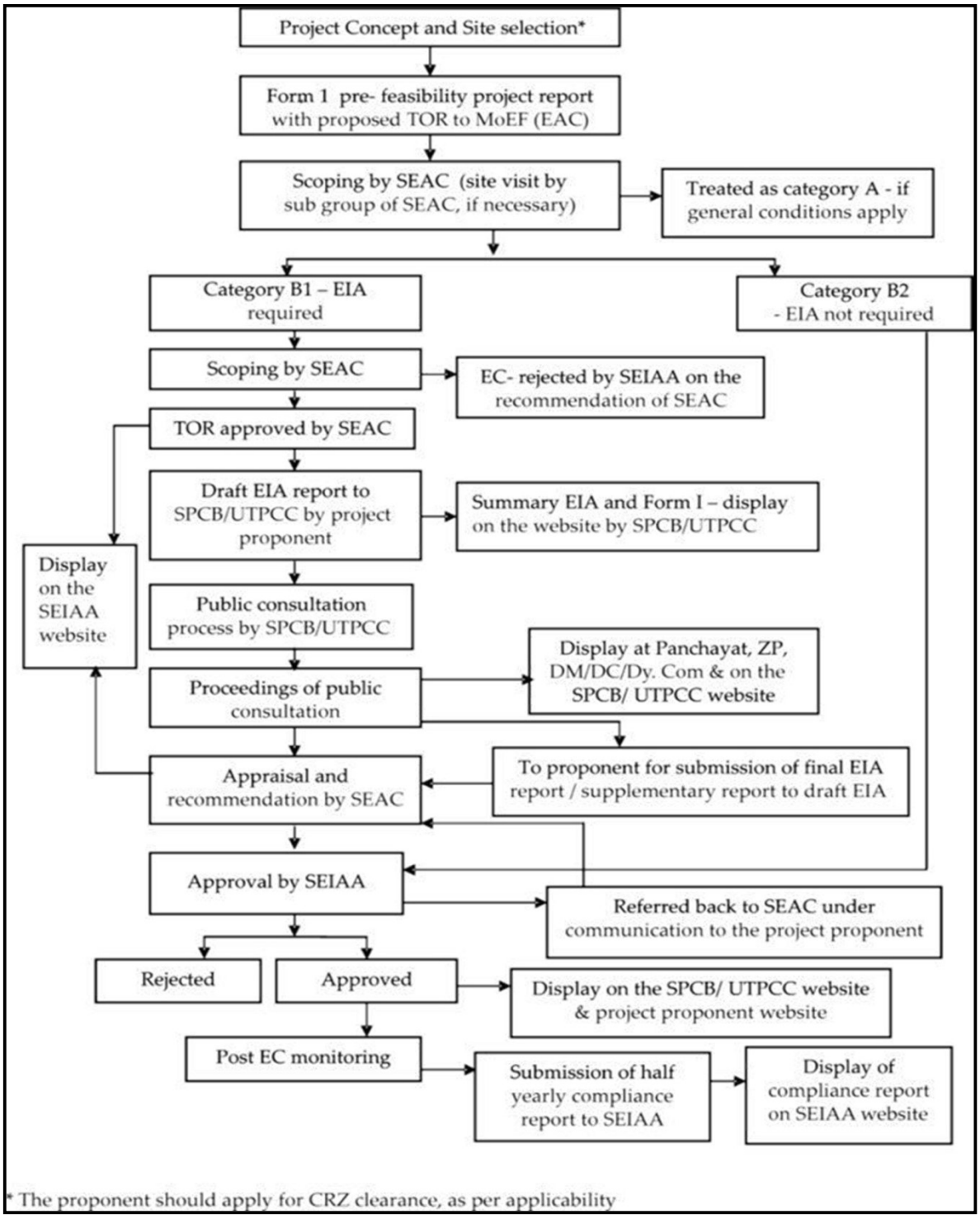


Figure 1.1: Environmental Clearance Process

1.3 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION OF THE PROJECT

<table>
<tr><th>S. No.</th><th>Particulars</th><th colspan="5">Details</th></tr>
<tr><td>1.</td><td>Nature and Sizeof the Project</td><td colspan="5">River bed Sand mining over an area of 7.31 Ha / 18.06 Acres on Mechi river</td></tr>
<tr><td>2.</td><td>Location</td><td colspan="5"></td></tr>
<tr><td></td><td rowspan="2">Plot/Survey/Khasra No.</td><td>River Name</td><td>JL. No.</td><td>Khasra no.</td><td>Name of the bank</td><td>Area (Ha.)</td></tr>
<tr><td>Mechi</td><td>05</td><td>1(P), 8(P), 9(P), 10(P), 11(P), 15(P)</td><td>MIN_DJ_1</td><td>7.31 ha</td></tr>
<tr><td></td><td>Village</td><td colspan="5">Village- Antaram, Block - Khoribari</td></tr>
<tr><td></td><td>Mouza</td><td colspan="5">Antaram</td></tr>
<tr><td></td><td>District</td><td colspan="5">Darjeeling</td></tr>
<tr><td></td><td>State</td><td colspan="5">West Bengal</td></tr>
<tr><td>Geographical Coordinates</td><td>Latitude and Longitude of</td><td colspan="5">Sand Block (MIN_DJ_1):-
A. 26° 37' 20.183" N 88° 08' 45.893" E
B 26° 37' 18.741"N 88° 08' 54.107" E
C. 26° 37' 09.148" N 88° 08' 38.703" E
D. 26° 37' 12.023" N 88° 08' 34.140" E</td></tr>
<tr><td></td><td>Toposheet (OSM) No.</td><td colspan="5">78 B/2</td></tr>
<tr><td>3.</td><td>Lease Area Details</td><td colspan="5"></td></tr>
<tr><td></td><td>Lease Area</td><td colspan="5">7.31 Ha.</td></tr>
<tr><td></td><td>Type of Land</td><td colspan="5">River bed of Mechi</td></tr>
<tr><td></td><td>Topography</td><td colspan="5">Undulated (Riverbed)</td></tr>
<tr><td></td><td>Site Elevation Range</td><td colspan="5">110 m RL to 111 m RL</td></tr>
</table>

4.	**Cost Details**	
	Cost of the project	Rs. 577.27 Lakhs
	Cost for EMP	Rs 12.8 Lakhs
	Cost for CER	Rs 11.5 Lakhs
5.	**Environmental Settings of the area**	
	Ecological Sensitive Areas (National Park, Wild Life Sanctuary, Biosphere Reserve, Reserve/ Protected Forest etc.) within 10 Km radius	There is no any Ecological Sensitive Areas (National Park, Wild Life Sanctuary, Biosphere Reserve, Reserve/ Protected Forest etc.) Within 10Km radius.
	Nearest Town/ Major City with population	Panitanki, Approx. 2.89 Km towards NE.
	Nearest Railway Station	Batasi railway station, which is approx. 2.9 Km in SE direction.
	Nearest National/State Highway	NH-327, approx. 2.60.3 m towards East. SH-12, which is approx. 15.5 km in East
	Nearest Airport	Bagdogra Airport, approx. 20 Km towards NE.
	Nearest Post Office	Khoribari post office
	Medical Facilities	Mechi Netralaya Eye Hospital, Approx. 3.29 Km towards NNE
	Education Facilities	Shyamdhan Jote High School, Approx. 2.55 Km towards SE.
	Seismic Zone	Zone IV (IS 1893: 2002)
	Water Body	Merchi River (Riverbed)

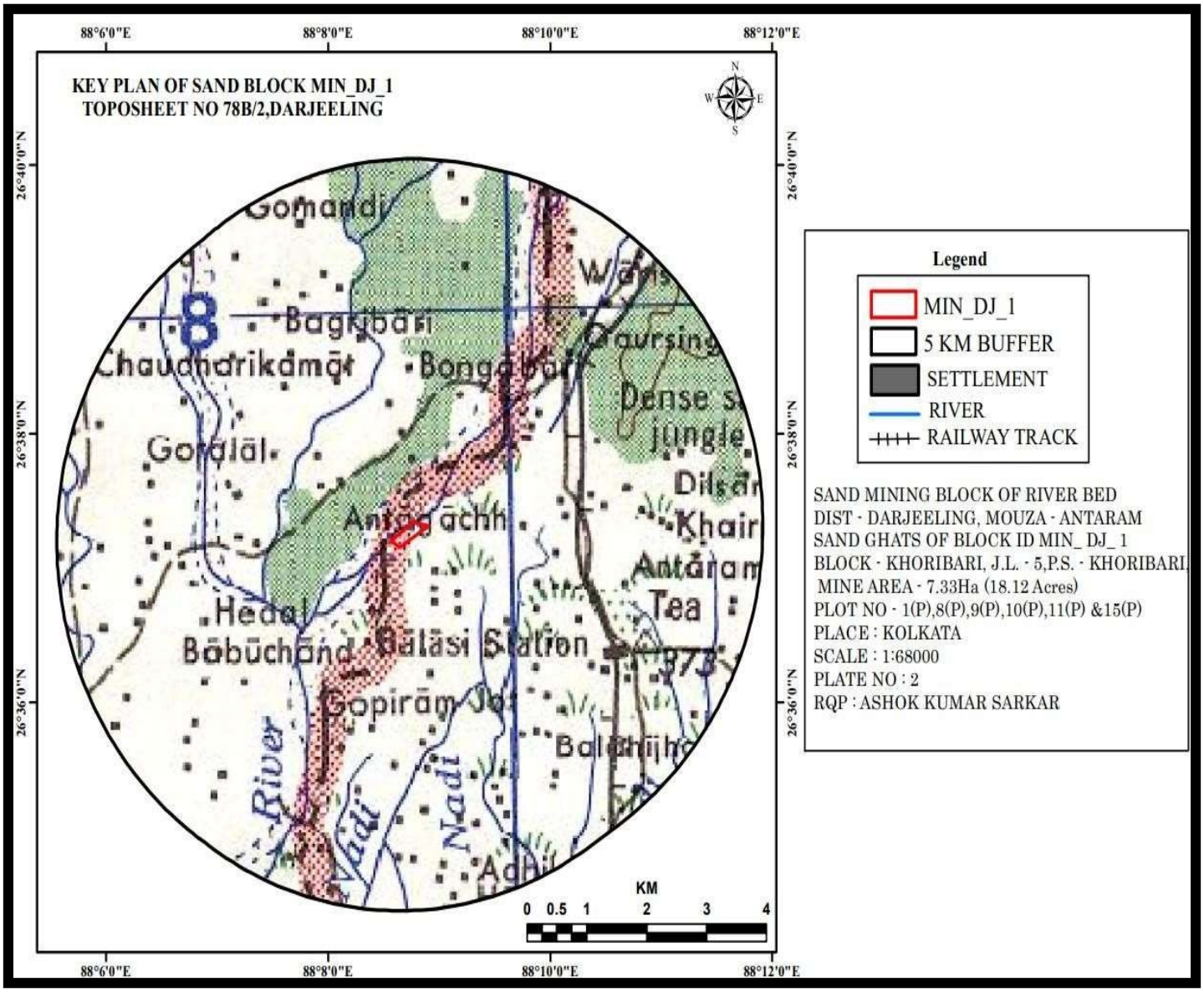


Figure 1.1: Topography Map of 5 km buffer of DJ 01

1.4 SCOPE OF STUDY

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

1.4.1 Preparation of EIA

The EIA includes the following details:

1)Study of the reports like Geological report, Pre-Feasibility Report (PFR) or mining planmade available by the client.

2)Present Environmental Setting

3)Identification, prediction and evaluation of Anticipated Environmental Impact due to theproposed mine and related facilities.

The environmental impacts would be anticipated in core and buffer zone on:

- Topography and drainage,
- Climate,
- Water quality (Surface/Ground),
- Hydro-geological Regime,
- Air quality,
- Noise Levels,
- Soil Quality,
- Flora and Fauna,
- Traffic density survey,
- Land-Use,
- Socio-Economic Conditions,
- Habitat,
- Health, culture, human environment including public health, occupational health andsafety
- Sensitive Places/Historical Monuments.

This EIA Report is prepared in accordance with has been divided into twelve chapters (in addition to Executive Summary) as briefed hereunder:

Chapter 1 – Introduction

The chapter provides description of project background, site and surroundings, objectives, scope and

organization of the study and format of this report as well as Point wise Term of Reference reply (TOR) Replies.

Chapter 2 – Project Description

This chapter provides information on project and capacity; need for the project; location; size or magnitude of operation; technology and process description; maps showing project layout, component of projects etc.

Chapter 3– Description of the Environment

This chapter deals with the methodology and findings of field studies undertaken with respect to ambient air, meteorology, water, soils, noise levels, ecology to define the various existing environmental status in the area of the project. This also deals with the infrastructural developmentas a part of project and sources of pollution from the proposed mining project.

Chapter 4 – Anticipated Environmental Impacts and Mitigation Measures

In this chapter, the potential impacts of the proposed mining and allied activities, which could cause significant environmental concerns, are identified and discussed. This discussion will formthe basis for environmental management activities.

Chapter 5 – Analysis of Alternatives (Technology and Site)

This chapter will include alternatives in this chapter to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost effective options, if any.

Chapter 6 – Environmental Monitoring Program

This chapter will include ascertaining the environmental impacts; state of pollution within the mine lease and in its vicinity; planning for predictive or corrective actions in respect of pollution to keepit within permissible limits.

Chapter 7 – Additional Studies

This chapter will include outcomes of public consultation, risk assessment, social impact assessment, R&R action plan, biodiversity conservation plan, watershed management etc.

Chapter 8 – Project Benefits

This chapter deals with improvements in the physical infrastructure, social infrastructure, employment potential and other tangible benefits due to proposed project activity.

Chapter 9 – Environmental Management Plan

This chapter will include the description of administrative aspects of ensuring that the mitigation measures suggested are implemented and their effectiveness is monitored, after approval of the EIA.

Chapter 10 – Summary

This will constitute the summary of EIA Report.

Chapter 11 – Disclosure of Consultant

This will includes the names of the consultants engaged in preparation of EIA and nature of consultancy rendered.

1.5 LAWS APPLICABLE TO THIS PROJECT

The Acts, Notifications, Rules and Amendments applicable for setting up a new mining industryor its expansion of an existing mine and for operation of a mine include the following:

- West Bengal Sustainable Sand Mining Management Guidelines, 2016, West BengalSand (Mining, Transportation, Storage and Sale) Rule, 2021, Enforcement and Monitoring Guidelines Sand Mining, 2020
- The Mines and Mineral (Development and Regulation) Act, 1957.
- The Mines Act, 1952.
- Mines Rules, 1955.
- Mineral Concession Rules, 1960.
- Mineral Conservation and Development Rules, 1968
- The Water (Prevention & Control of Pollution) Acts1974/ Rules1975
- The Air (Prevention & Control of Pollution) Acts 1981/ Rules1982
- The Environment (Protection) Acts1986/Rules 1986
- The Factory Act 1948 (as amended till 1987) & West Bengal Factory Rules, 1950
- Contract Labor (Regulation & Abolition) Act 1970 & Its Central Rule 1971
- The Central Motor Vehicle Rules 1989(Under Motor Vehicle Act 1988)
- The Workmen's Compensation Act 1923 as amended up to 2000/ Rule 1924, 1935,1991 & 1996.

1.6 TERM OF REFERENCE (TOR)

The project proposal was submitted to State Level Environment Impact Assessment Authority- West Bengal for its appraisal. Based on which, presentation was held on 28.03.2023 for Terms of Reference (TOR). Based on the data provided and presentation made, ToR of proposed Sand mining project has been issued by SEIAA, West Bengal vide File no-1423/EN/T-II-I/333/2023 dated 26-07-2023.The compliance of ToR is described below.

Table 1.1: Point Wise Compliance for ToR

S.No	TOR	Compliance
1	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. lt 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	The mine proposed is a new mine. State Govt. has given its consent to grant mining lease vide letter number which is enclosed as **Annexure No. II**.
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of themine should be given.	The documents including mine plan and Final EIA being submitted are compatible with one another.
3	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and shouldbe in the name of the lessee.	All Corner Coordinates of mining lease area superimposed on Toposheet Map has been incorporated in EIA/EMP Report **Refer Chapter-2, Figure no-2.3** The land-use of the study area with proper demarcated features is enclosed with the report, **Refer Chapter-3, Section-3.4.4**
4	All corner coordinates of the mine lease area, Superimposed on a High Resolution imagery /toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Land Use pattern& land use map is given in chapter 3, Refer Chapter-3,Section-3.4.3 & 3.4.4
5	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	The proposed land is a dry bed of river. The mining process will be done land use policy of the State & there is no land diversion has been proposed.
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.	Yes, the proponent Company has a well laid down Environment Policy. The hierarchical system or administrative order of the company has been given in the EIA report., Refer, Chapter-9, Fig:-9.2
7	It should be clearly stated whether the proponent Company has a well laid down Environment policy approved by its Board of Directors? lf so, it may be spelt out in the EIA Report with description of the prescribed operating process /procedures to bring into focus any infringement /deviation/violation of the environmental or forest norms/	This is a open cast sand mining project, slope of the area is given in mining plan and in EIA Report. Mining will be done by opencast semi mechanized method without adoption

	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.	of drilling & blasting.
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.	The 10 km zone from periphery of the lease has been considered as the study area. The Buffer map of the study area is attached with report. No waste will be generated except small amount of municipal solid waste, which will be managed as per law. All the details in the EIA report are for the life of themine period. Refer Chapter-2.
9	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	Land use pattern of 10 km from the periphery of the lease area has been prepared and incorporated with the report. The study area lies in Son River. No any National parks or WLS is found within 10 km study area, Refer Chapter-3, section-3.4
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	The proposed project lies on Mechi River and as such there is no over burden. No top-soil will be produced as waste material because all the excavated material will be saleable. There is no requirement of R& R Plan as it is ariver bed sand mining project.
11	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	There is no forest land within the lease area.
12	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the	No forest land is involved in the lease area, therefore, deposition of net present value (NPV) and compensated Afforestation is not indicated.

	Expert Appraisal Committees.	
13	Status of forestry clearance for the broken up area and virgin forest land 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.	There is no forest land involved in the leased out area. Hence, this act is not applicable for this project.
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.	No RF/PF is present within the 10 km radius of the lease area. However, the vegetation details of the study area is incorporated with the report, Refer Chapter-3, section 3.6.
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	The details Impacts & there mitigation measures are given in chapter 4 of EIA/EMP Report.
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 and 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.	There is no any National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves are present within 10 km study area. Top Survey of India toposheet has been incorporated in EIA/EMP report. Refer Chapter-1, Fig-1.1
17	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves /(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	Detailed biological study of core zone and buffer zone within 10 km radius of the periphery of the mine lease for flora, fauna, endangered & endemic species has been incorporated in the EIA/EMP report. Refer Chapter-3, Section-3.6 conservation plan not required.
18	A detailed biological study of the study area [core zone and buffer zone (10 km radius of theperiphery 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- fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the sameshould be made as part of the project cost.	This is a River Bed Mining Project. There are no inhabited areas in the allotted mine area which lies on the Mechi River, therefore no R&R Plan isproposed.

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.	Base line study was carried out for one Season Summer (March to May 2023) Details are provided in Chapter-3of EIA report. The locations of the monitoring stations were decided on the basis of prevailing micro - meteorological conditions (Wind direction & wind speed) of the study area. The wind rose has been given in chapter III of EIA/EMP Report. One location has been selected in downwind direction within 500 m from the lease boundary. The location of the monitoring sites has been shown inmap. Refer Chapter-3, Section-3.2
20	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Air quality modeling has been carried out for prediction of impact of the project on the air quality of the area. Air Modeling has been carried out for tracking impact of air pollutant due to mining
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 & ResettlementPolicy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectorial programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed inthe Report.	The water requirement for the project is 11 KLD out of which 3.0 KLD for dust suppression and 5.0 KLD for use for domestic purpose and 3.0 KLD for plantation. Water will be sourced from private tankers and nearest pond. A detailed water balance is being provided in the report. Refer Chapter-2, Table-2.5
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	Water requirement will be fulfilled by private water tanker. So, no clearance is required.

	represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre- dominant downwind direction. The mineralogical composition of PM10, particularlyfor free silica, should be given.	
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 clearlyindicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	The project do not consume any process water except for drinking, dust suppression & plantation. Plantation is proposed, which will increase the water holding capacity & help in recharging of ground water. No artificial rainwater harvesting is proposed for thepresent project in lease area.
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.	Mining activity will be done on Dry Bed of River so there is no impact on surface water. Mining will be up to 2 m below ground level or above the ground water table whichever comes first. This will not intersect the ground water table.
25	Necessary clearance from the Competent Authority for drawl of requisite quantity ofwater for the Project should be provided.	Mining will be up to 2 m below ground level or above theground water table whichever comes first. This mining will not intersect the ground water table, as the ground water level in pre monsoon is 1.4 to 14.2 m bgl & in post monsoonit is 1.1 to 9.6 m bgl. Therefore, Hydro geological Report will not require forthis project.
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.	The project site lies on Mechi river. No diversion isproposed.
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.	The Elevation of the applied area for the block is 110 ASML to 111 ASML in the stretch. Mining will be up to 2m below ground level or above the ground water table whichever comes first.
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	Plantation/afforestation will be done as per program i.e along the road sides and near civic amenities, as per mine plan. Post plantation, the area will be regularly monitored in every

	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.	season for evaluation of success rate. List of plants selected for green belt development if incorporated in **Chapter-4. Section4.5 under table-4.8**
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.	There will be about 50 trucks carrying the minerals per day. The projection has been done based on the mineral transportation. The details of traffic analysis are discussed in the report. Refer Chapter-4 under section 4.6.
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.	A temporary rest shelter will be provided for the workers near to the site with provisions of water, first aid facility, protective equipment's, etc. Details are given in the EIA/EMP Report. Refer Chapter-2, Section-2.15.4
31	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	The proposed mining is a opencast sand mining project, where sand will be naturally replenished during monsoon season, there is no feasibility of reclamation on dry river bed
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.	Occupational health impact mainly is expected due air pollution due to fugitive dust emission because of movement of vehicles. However appropriate mitigation measures for air pollution control have been given in the report, discussed in Chapter-9. Each Labour will undergo pre-placement medical examination. Thereafter periodical heath checkup will bearranged as stated in the report. Refer Chapter-9, Table-9.2 for budgetary allocation.
33	Details of the onsite shelter and facilities to be provided to	The proposed project being a small

	the mine workers should be included in the EIA Report.	scale semi-mechanized mining project, there will be hardly any process related health implication on the population of the nearby villages except fugitive dust emissions due to transportation. Budgetary allocation is given in Chapter-9. However protective equipments will be provided & health camps & awareness programs will be arranged for them. Details are given in report. Refer Chapter-9.
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.	Socio-economic significance provided to the local community i.e. to the nearby villagers is given in the EIA/EMP Report, Refer. Chapter-9, Section- 9.7
35	Occupational Health impacts of the Project should be anticipated and the proposedpreventive 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 detailed environmental management plan to mitigate the environmental impacts has been mentioned in of the EIA/EMP Report. Refer Chapter-9.
36	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluatedand the proposed remedial measures should be detailed along with budgetary allocations.	Public hearing has been conducted on …. The PH Proceedings along with details has been incorporated in Chapter VII of Final EIA/EMP report. Refer Annexure- IV for Public hearing proceeding.
37	Measures of socio-economic significance and influence to the local community proposed to beprovided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	No litigation is pending against the project.
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 otherimpacts specific to the proposed Project.	The capital cost of 5.0 Lakhs for capital and …. Lakhsrecurring cost has been earmarked for EMP. Refer, Chapter-9. Table-9.4
39	Public Hearing points raised and commitment ofthe 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/JEMP Report of the Project.	A Disaster management Plan has been given in EIAreport. Refer Chapter-9, Section 7.4

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.	Benefits of the project is discussed in detail under Chapter -8 2% of the capital cost of the project cost will be used as CER cost, will be used for social welfare in nearby areas. Details of CER activities are given in Chapter-8, Table-8.1
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly speltout.	Discussed in detail under Chapter-9
42	A Disaster management Plan shall be preparedand included in the EIA/EMP Report.	Discussed in detail under Chapter-9
43	Benefits of the Project if the Project is implemented should be spelt out. The benefits ofthe Project shall clearly indicate environmental, social, economic, employment potential, etc.	Discussed in detail under Chapter-2
44	Besides the above, the below mentioned general points are also to be followed:-	
a	Executive Summary of the EIA/EMP Report(enclosed as Annexure — A).	Executive summary of the EIA/EMP Report is beingsubmitted with Final EIA report.
b	All documents to be properly referenced withindex and continuous page numbering.	All documents is properly referenced with index and continuous page numbering.
c	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should beindicated.	Complied
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.	Details of testing reports of air, water, soil & noise have been enclosed in EIA report., **Refer Chapter-3.** Monitoring reports is being submitted along with Final EIA report.
e	Where the documents provided are in a languageother than English, an English translation shouldbe provided.	Executive summary of EIA/EMP Report is being submitted with Final EIA report in English Language.
f	The Questionnaire for environmental appraisalof mining projects as devised earlier by the Ministry shall also be filled and submitted.	The Questionnaire is being submitted along with Final EIA Report.
g	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.11(1) dated 4" August, 2009, which are available on the website of this Ministry, should be followed.	All the instructions for the Proponents and instructions for the Consultants issued by MoEF & CC vide O.M. No. J/11013/41/2006/-IA.II(I) dated 4th August, 2009 are

		being 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 will be no major changes in basic scope and project parameters from Form-1 &PFR, except some changes in water demand. These changes have been done after detailed study of surrounding areas and assessment done by Experts. Therefore water demand for dust suppression decide to be increased. These changes have been included in Final EIA itself.
i	As per the circular no. J-11011/618/2010- 1A.1I(1) 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.	The EC points will be complied after grant of EC.
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.	Surface plan cum geological section, geological has been incorporated in chapter 2 of EIA report. Refer Chapter-2, Figure-2.10
B	Additional Terms of Reference:—	
a.	Means of access and egress between the embankment and the sand quarry may be clearly earmarked. The Project Proponent must commit that no hard toping or paving of any haulage route within the riverbed will be attempted.	Project Proponent commit that no hard toping or paving of any haulage route within the riverbed will be attempted
b.	A plan on the management and handling of sand during the period of intermediate stockpiling should be submitted.	Annexure-V
c.	A Progressive Greenbelt Plan may be prepared. The project area being entirely on the riverbed, afforestation/ vegetation should be attempted alongside the village roads or other public land. This may be done with prior approval of the local self- governing bodies. If no public land is available for the purpose the Project Proponent 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.	Annexure-VI
d.	It appears that the proposed mine falls within 10km from the periphery of a National Park/ Sanctuary/ Eco-Sensitive Zone/ Protected Area. As such the PP shall, — in compliance to the Hon'ble Supreme Court's order in I.A. No. 460 of 2004, obtain a no objection certificate from the	Already Applied

	Standing Committee of National Board of Wild Life (NBWL) and upload a copy of the same.	
e.	A need-based EMP may be prepared in accordance with the MoEF&CC Office Memorandum vide F. No.22-65/2017.1A.11l dated 30.09.2020. Record of communications made in this regard with the identified/intended beneficiaries (schools/ institutions etc.) may also be uploaded.	Annexure-VII
f.	A study report on base flow level measured at 5 points with date and supporting photographs may be submitted. It should be committed i i willbe done at least 1m above the base flow level. Accordingly, if required, the excavation plan may also be revised.	Annexure-VIII
g.	Management plan of haul road to the public road.	Describe Environmental Chapter -9
h.	Spatial year wise progressive plantation programme	Describe Environmental Chapter -9

Chapter 2

PROJECT DESCRIPTION

2.0 GENERAL

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

2.1 TYPE OF THE PROJECT

The proposed project is excavation of Sand from riverbed of Mechi River. It is an open cast semi-mechanized mining project to excavate Sand in its existing form.

2.2 NEED FOR THE PROJECT

Building huge infrastructure such as Road and housing sector requires basic construction raw materials in which sand is one of primary raw material required for the purpose. The mining activities as proposed are the backbone of all construction and infrastructure projects as the raw material for construction is made available only from such mining project. The sand to be excavated is in high demand at the local market for real estate and infrastructure industry. This project will also provide employment to local people helping them earn livelihood. In addition to this, it will further prevent widening of the above mentioned rivers bed due to the deposition of sediments which if not mined out will result in raising of the river bed causing flooding, damage to the adjoining areas, destruction of life and property.

2.3 DESCRIPTION OF THE PROJECT

The Proposed Sand Mining Project at JL No. 05, Mouza.- Antaram, Block – Khoribari, District - Darjeeling on Mechi River for production capacity of 1,27,300 Tonnes/annum over an area of 7.31 Ha.

Table 2.1: Location Details

RiverName	JL No.	Khasra no	Sand BlockID	Area (Ha.)
Mechi	05	1(P), 8(P), 9(P), 10(P), 11(P) & 15(P),	MIN_DJ_1	7.31

Location Details

Table 2.2: Location of the Project

Location	**A 26° 37' 20.183" N 88° 08' 45.893" E** **B 26° 37' 18.741" N 88° 08' 54.107" E** **C 26° 37' 09.148" N 88° 08' 38.703" E** **D 26° 37' 12.023" N 88° 08' 34.140" E** **On Mechi river at JL No-05, Mouza- Antaram, District- Darjeeling, WestBengal**
Toposheet Number	78B/2
Nearest Settlements	Panitanki, Approx. 2.89 Km towards NE.
Nearest Highway	NH-327, which is approx. 2.60 km in E direction from the mine site.SH-12, which is approx. 15.5 km in E direction from the mine site.
Nearest RailwayStation	Batasi railway station, which is approx. 2.9 Km in SE direction.
Nearest Airport	Bagdogra, which is 20 km in NE direction from the mining site.
Nearest River	Mechi River

MIN_DJ_1

SL.NO	LATITUDE	LONGITUDE
A	26°37'20.183"N	88° 8'45.893"E
B	26°37'18.741"N	88° 8'54.107"E
C	26°37'9.148"N	88° 8'38.703"E
D	26°37'12.023"N	88° 8'34.140"E

Figure2.1: Buffer Google Map of Mining Lease DJ 01

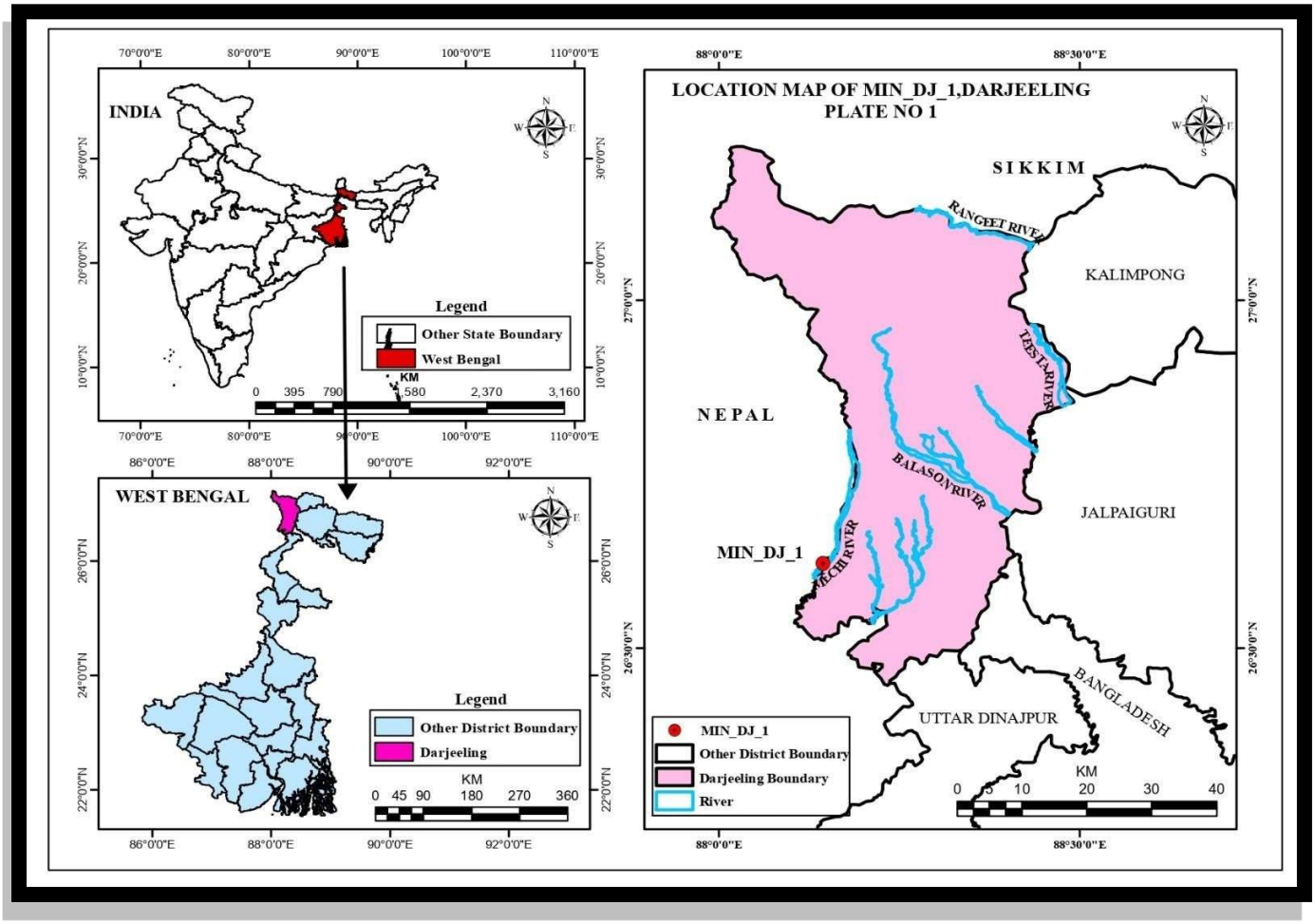


Figure: 2.2 Location Map of the Project Site

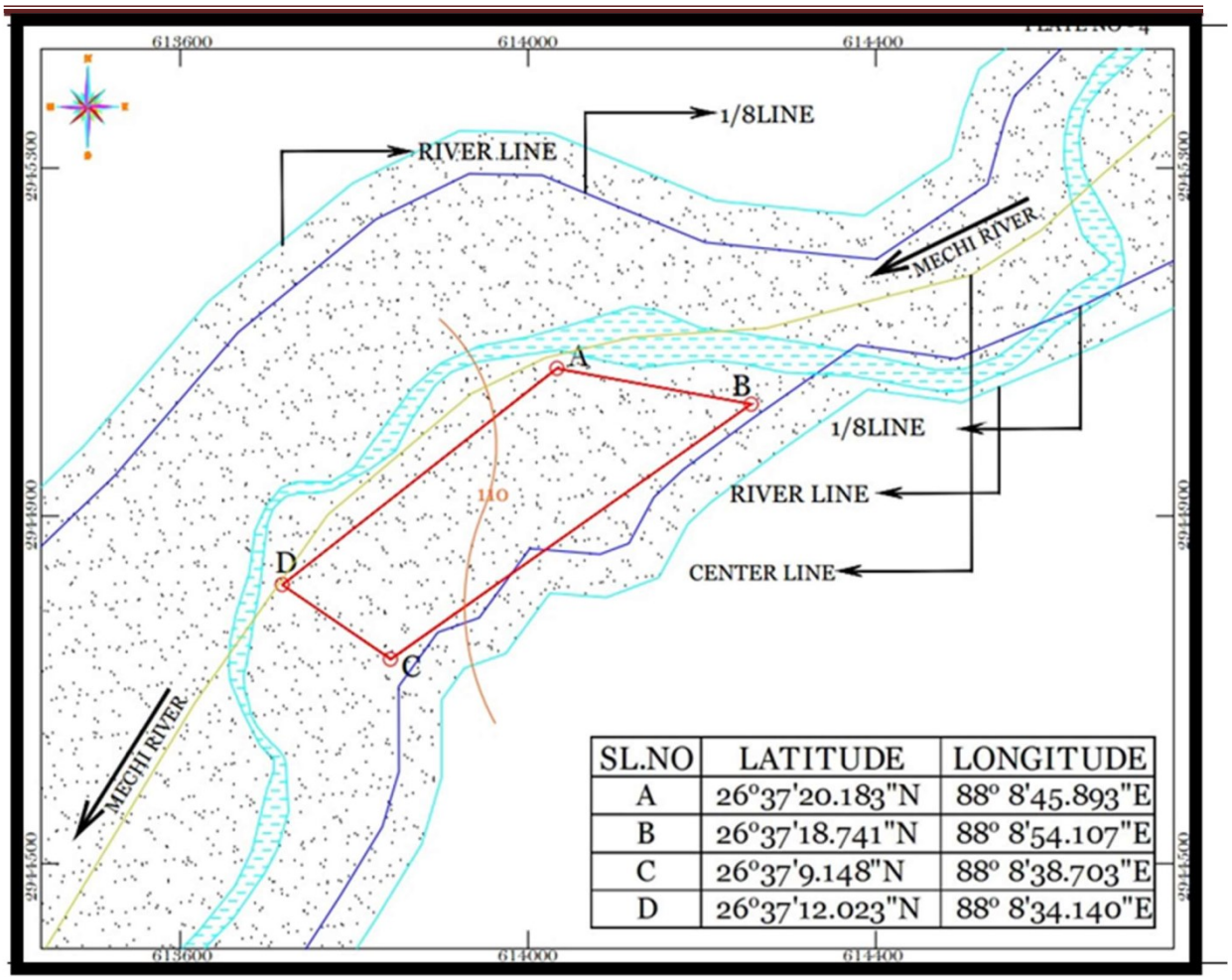


Figure: 2.3, Pillar co-ordinate map of the Project Site

2.4 GEOLOGICAL PROFILE OF THE AREA

2.4.1 Topography of the Area

The Hill areas of Darjeeling District are located within the lesser and Sub - Himalayan belts of the Eastern Himalayas. The general slopes of the hills are from north to south. Narrow ridges separatedby closely-spaced V-shaped valleys, where the slope varies between 150 and 400. The area has steep slopes and loose topsoil, leading to frequent landslides during the monsoons. The region is characterized by a myriad of ridges and valleys because of the spurs ramifying into lateral spurs which give off lesser ones and these in turn cut the terrain into ridges and valleys, creating a mosaicof micro-topographical units (Cajee 2018). The region is divided into three types of hill regions which are as follows:

Lower Hills: This covers central section of the district having a contour height of approximately 200– 800 m. The average slope is 100 – 300. These lower hills are the most dissected and eroded tract in the Darjeeling Himalaya.

Middle Hills: This zone is sandwiched between the upper and lower hills and bounded by 800 m and 1400 m contours. Most of the western and north eastern part of the district falls under this category. This region is mostly use for tea plantation.

Upper hills: This region is identified along the Mahaldiram-Bagora region and above the Ghum-Sonada ridge. It is most prominent along the extreme north-western boundary of the region alongthe Singalila ridges with peaks like Sandhakphu and Phalut towering over the region.

Beside this, "Tarai" or foothills zones are found in South and South-East part of the district. This zone has a wider valley floor which are frequently filled up with large boulders transported by debris flow. A number of rivers, i.e., Teesta, Mahananda, originate in the Darjeeling Himalaya and have formed braided courses on the plains which are overloaded with sediments.

The study area also comprises river bed of Mechi which is a tributary of Mahananda. It is a trans-boundary river flowing through Nepal and India. The rivers originating in the hills attain a braiding character and have well developed alluvial fans.

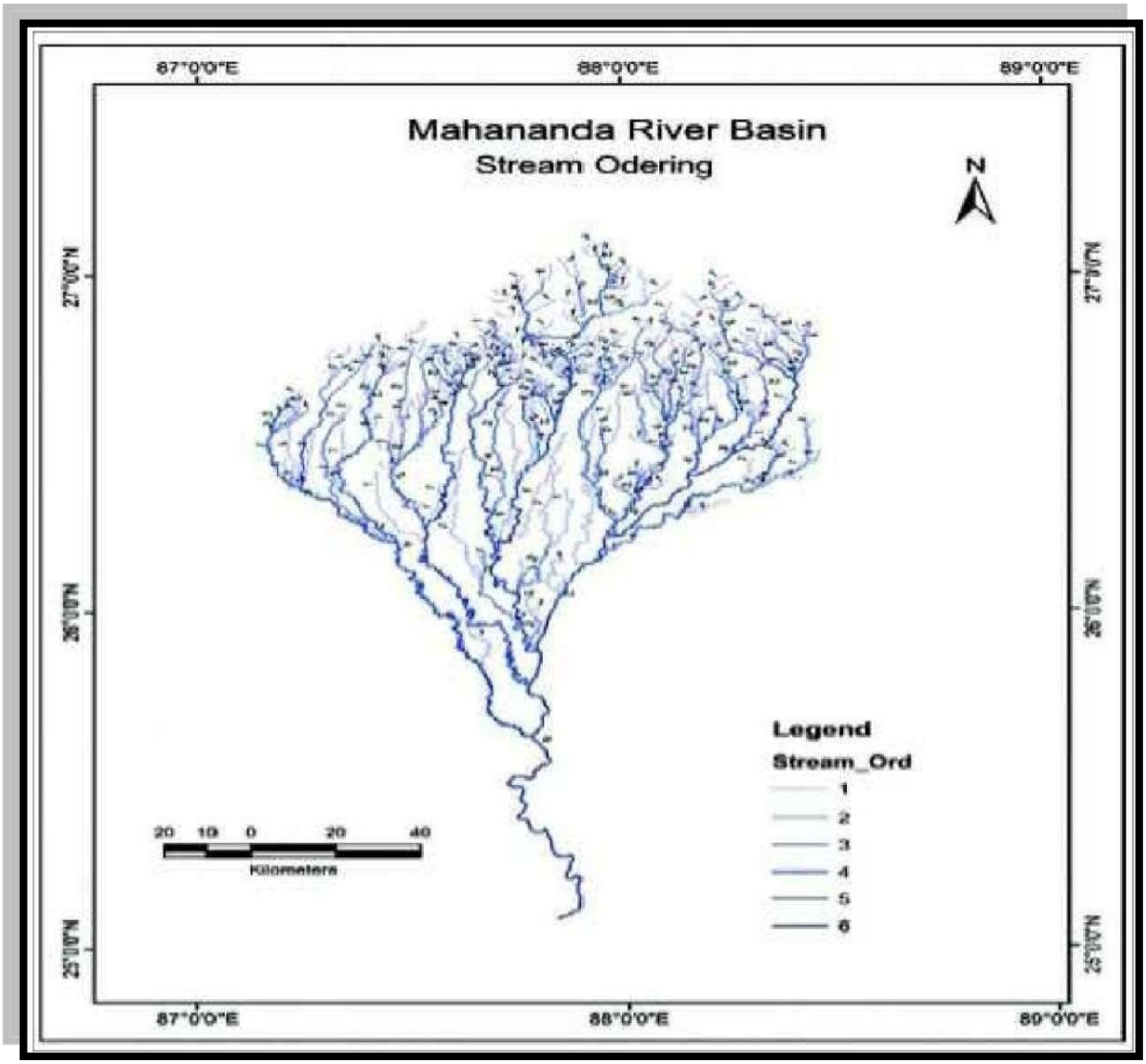


Figure 2.4: Basin Map of the river bed deposits

2.4.2 Geology

The Sikkim-Darjeeling Himalaya contains the stretch of tectonically active Eastern Himalaya. It is composed of three main tectonic units: the Higher Himalaya, the Lower Himalaya and the Siwaliks separated by thrusts, but joined by great fluvial system of the Teesta River. The Higher Himalaya with relief up to 2,000–4,000 m was uplifted by about 2,000 m in the Quaternary rising above the snowline. Its mountain massifs previously had fluvial relief which later had been totally transformed by glacial processes. The Lower Himalaya dissected 1,000–2,000 m locally with remains of mature relief fragments are continuously in the forest belt. The Siwaliks in this part of the Himalayan Range are reduced to a narrow belt, which blend with the Lower Himalaya. Along the Frontal Fault it rises above 1,000 m directly over the alluvial plains of the Sub-Himalayan foredeep, which is still active and split into blocks of various tectonic tendencies (Singh and Keyho, 20014).

Darjeeling-Sikkim Himalaya is one of the important faults thrust belt in the Himalaya covering the rocks of Central Crystalline Gneissic Complex, Daling Phyllite, Gondwana, Buxa and Siwaliks from north to south. Quaternary rock delimits the Himalaya in the southern part. A number of thrust namely MCT, MBT, MFT and also Daling Thrust are reported in this fault thrust belt (Singh and Keyho, 20014).

2.4.3 Local Geology:

The geological formations of the Darjeeling Himalaya consist essentially of unaltered sedimentary rocks. The Sub-Himalaya is made up of Siwalik deposits of the Tertiary age. North of the Siwaliks is the coal-bearing lower Gondwana formations. The Daling series (PreCambrian) follows and is succeeded by the Darjeeling gneiss further north (Cajee L, 2018).

In the studied area, the size of the sediments is variable. The Sand & Boulder is made up of quartz and its microcrystalline cousin, chalcedony because of its resistant to weathering. The grains are rounded in shape. The present deposits are of good quality and can be used for building industries. There are mainly 6 rivers present in the district Darjeeling. Those are Teesta, Mahananda, Rammam, Rangeet, Mechi and Chenga. A brief description of Mechi river courses is given below.

Table No: 2.3: Stratigraphic Sequence

Age	Series	Lithological Characteristics
Recent to Sub-recent	Alluvium	Younger flood plain deposits of rivers consisting ofsands,pebbles, gravels, boulders etc.
Pleistocene to Lower Pleistocene (LowerTertiary)	Siwalik	Micaceous sandstone with siltstone, clay, lignite, lenticles,etc.
Thrust (Main Boundary Fault)		
Permian	Damuda (Lower Gondwana)	Quartzitic sandstone with slaty bands, seams of graphitic coal,lampophyre silt and minor bands of limestone
Thrust (Fault of Nappe Qutliner)		
Precambrian	Daling Series	Slate, chlorite-sericite schist, chlorite- quartzschist
	DarjeelingGneiss	Golden silvery mica-schist, carboniferous mica-schist, coarse grained gneiss.

Mechi River Valley Plains:

River Mechi is originated from Mahabharat range of Nepal at an altitude of about 4000 mt and flows from North to South and enters Darjeeling district at Mirik C.D. Block. The co-ordinates ofthe starting point of the river in this district is 26°48'15.96"N 88°10'54.57"E and ending point of the river in this district is 26°36'2.95"N 88° 7'55.85"E. It is the Western-most tract of Darjeeling district forming the Western boundary (international boundary) with Nepal. River Mechi is a tributary of river Mahananda. The total catchment area of the river is spread over 16.60 sq. km. The river has a steep gradient with quick run-off and ephemeral regimes, becoming a roaring river with the rainwater in the catchment area, but turning quickly into a formidable stream. The river being wide and shallow leaves disconnected pools of water during summer (lean period).

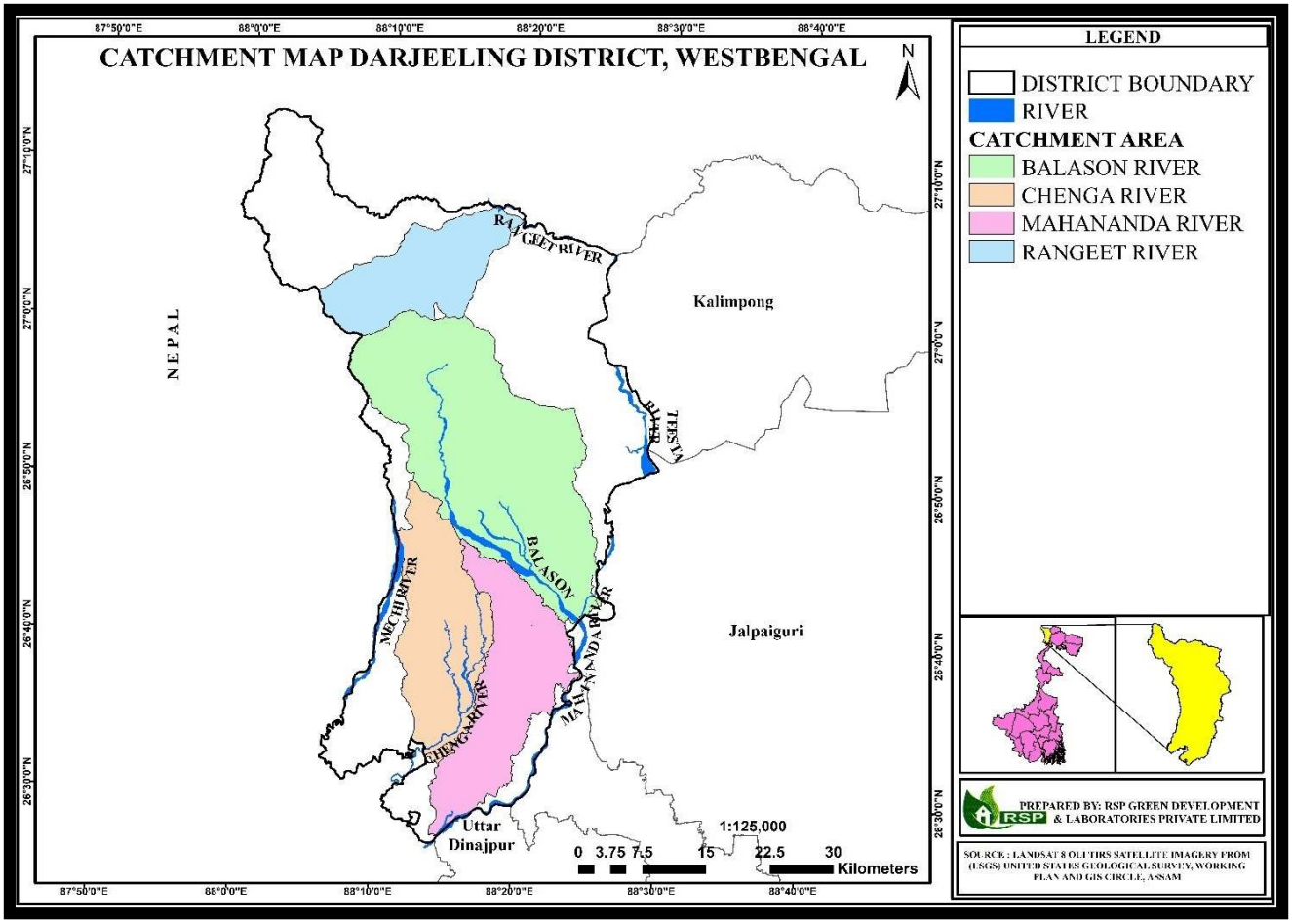


Figure 2.5: River Basins of Darjeeling District

Catchment Area

Among those 6 rivers of the district River Teesta and Mahananda form the main drainage systemof Darjeeling district. Teesta River is a 315 km long river that rises in the eastern Himalayas, flows through the Indian states of Sikkim and West Bengal through Bangladesh and enters the Bay of Bengal. Mahananda River originated from the Mahaldiram Hills at East of Kurseong from an elevation 6,900 ft. and flows in a North-South direction through hilly catchment area of the district up to Siliguri.

General profile of river stream

River profile has been studied along the cross-section lines which was chosen based on the drastic variation of the river widths, proximity of the operating sand 'ghats' and the position of the sand bars. The Drainage Map and Watershed Map of the district area as follows to understand the river profile of the district Darjeeling.

2.4.4 Geomorphology

Darjeeling Himalaya rises abruptly from the North Bengal plain, the elevation changing rapidly from 100-130 m above sea level (a.s.l) to 2000-3000 m a.s.l within a distance of few kilometers. The hilly areas of Darjeeling are a part of the Siwalik Range or Outer Himalayas. The general slopes of the hills are from north to south. Narrow ridges separated by closely-spaced Vshaped valleys, where the slope varies between 15º and 40º. The region is highly prone to landslides, oftencausing disruptions to socio-economic activities as well as destruction of life and properties (Geomorphological Field Guide Book, IGI). The complex landform of the district has been form due to different geomorphic processes, each of which has developed its own characteristic assemblage. The geomorphic configuration of the hilly tract is the joint product of geologic foundation and fluvial processes; although slope-wash, in particular mass-movements and relatedphenomena play a significant role in the final shaping of the landform. The region is characterized by a myriad of ridges and valleys because of the spurs ramifying into lateral spurs which give offlesser ones and these in turn cut the terrain into ridges and valleys, creating a mosaic of micro- topographical units (Cajee, 2018). Lower hills: This region is bounded by contour heights of approximately 200 - 800 m and covers most of the central section of the district. The rivers are mostly south-flowing and cut deep gorges and V-shaped valleys. The landscape is characterized by narrow ridges, deep incisions and numerous mass-movement scars. The average slope in this zone varies between 10° - 30°, with slope length sometimes exceeding 800 m. These lower hills are the most dissected and eroded tract in the Darjeeling Himalaya. Middle hills: This is a rather narrow zone, sandwiched between the upper and lower hills and bounded by 800 m and 1400 m contours. Most of the western and north eastern part of the district falls under this category. Thesehill slopes are mostly used by tea plantations. Upper hills: The upper hills lie above the 1400 m contour line and have been identified along the Mahaldiram-Bagora region and above the Ghum- Sonada ridge. It is most prominent along the extreme north-western boundary of the region alongthe Singalila ridges with peaks like Sandhakphu and Phalut towering over the region. Beyond thehill region in the North, starts the flat plain at South and South-East part of the district. This foothills zone is called the "Terai", where the wider valley floors are frequently filled up with largeboulders transported by debris flow. A number of rivers, i.e., Teesta, Balason, Mahananda originate in the Darjeeling Himalaya, and have formed braided courses on the plains, which are overloaded with sediments .These streams form smaller fans ,the apex part of which could be noticed at the entrance of the mountains. Fragments of higher fan levels

with well-develop soil profile are preserved between the alluvial fans. The shape of the terraces and the fan systems on the Terai piedmont zone is irregular, and are partly controlled by tectonics (Sarkar and De, 2017).

Geomorphologically the Darjeeling district can be broadly divided into Hills and Plain land form.The hilly areas of Darjeeling are a part of the Siwalik Range. Darjeeling Himalayas has an elevation range of 2000-3000 m, and occurs as the foreland of the Kanchenjunga massif. Geological foundations of the Darjeeling hills consist of Precambrian slates, schist, phyllite, quartzite, gneisses, lower Gondwana and Siwalik sandstones and recent to sub-recent alluvium. The foothill of Darjeeling Himalayas, which comes under the Siliguri subdivision, is known as the Terai. This is primarily a plain land having elevation of 100 to 150 meters. Geological formations of these plains are Alluvium, Older Alluvium and Laterite Siwalik System. Figure 4.2 below represent the geomorphological variation of Darjeeling district. Map shows the position of upper hills in the north-western part of the district where Singalila range is situated. Central region of thenorthern hilly area is also part of upper hills. Lower and middle ranges are demarcated by Lower hill region. Southern part of the district fall under Alluvial Plain region. In between Plan and hill, there is Alluvial Fan, characteristic of hilly terrain where river off load sediments from narrow canyon to plan land.

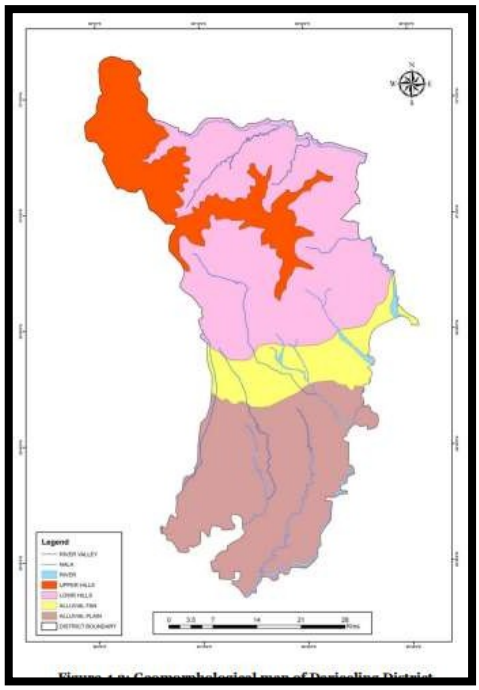


Figure 2.6: Geomorphological map of Darjeeling District

2.4.5 Soil

The soil is generally formed by both fluvial action and lithological disintegration. So, lithology plays an important role for the different types of soils found in Darjeeling. All the soils are definitely acidic in nature with the tendency to increase slightly in depth in most cases indicating the lacking of bases from surface and accumulation in the lower horizons. The basic soil types are yellow soils, red brown soils and brown forest soils. Red and yellow soils have developed on gneiss while brown on schists and shales. Coarse pale yellow to red brown soils is found on the Siwaliks while clayey dark soils are developed on Daling series. The character of the bedrock is reflected only in the grain size composition of the soil. On the Darjeeling gneiss, very coarse-grained (50% -80%) particles are found. In Damuda and Daling series percentage of sandy and coarse particles in the soils are high. On the Siwaliks, silty – clay fraction is higher. The chemical content of the soil over Darjeeling gneiss is characterized by a high proportion of potassium derived from feldspar and muscovite mica. This soil is poor in lime, magnesium, iron oxides, phosphorous and nitrogen.

In the study area, the soil is characterized with very deep, imperfectly drained, coarse loamy soils occurring on nearly level lower piedmont plain with loamy surface associated with very deep, imperfectly drained, fine loamy soils.

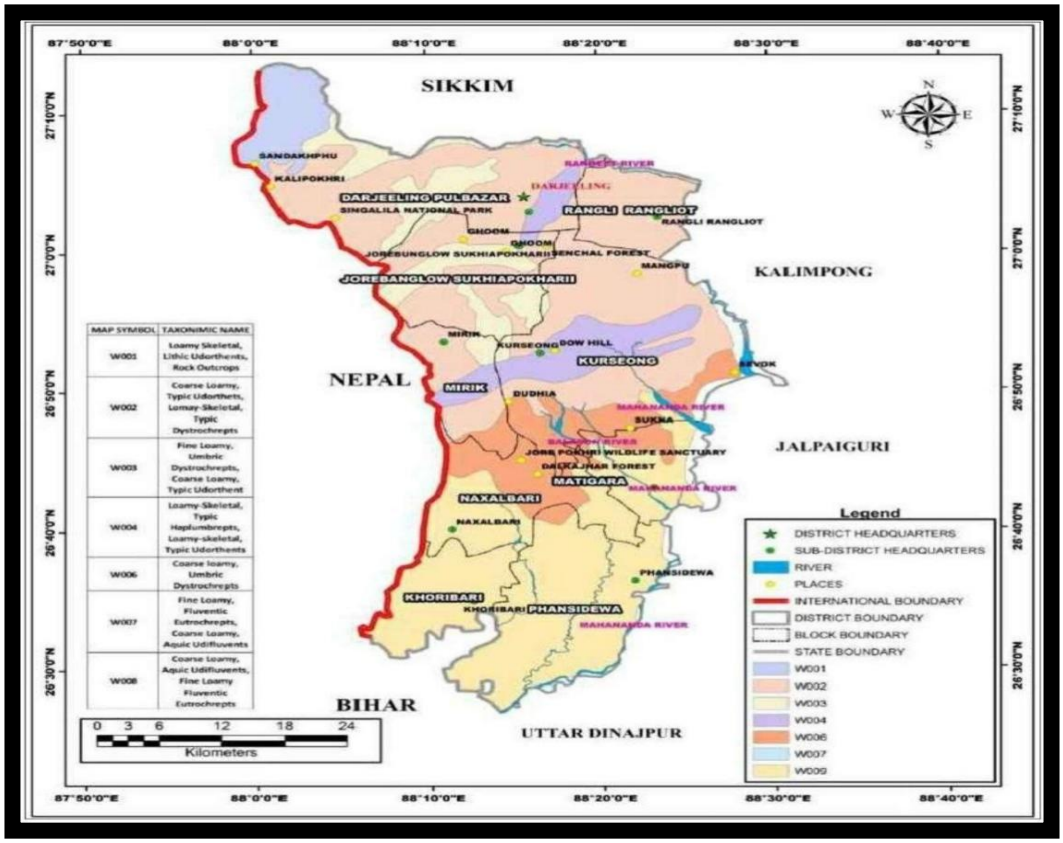


Figure 2.7 Soil Map of the river bed deposits

2.4.6 Drainage

The mining operation is restricted to river bed mining, so the drainage system is not required. However, the main drainage is controlled by the river Mechi itself.

The Mechi River starts from the south of Pashupatinagar from a place called Fakfokthum in Illam district. It is a perennial river that is fed by small streams at different points and also a rivulet coming from Kalingpong and flows through different places of Illam and Jhapa and finally to India as Mahananda River. The river has lower volume of water but has higher velocity at upper portions. Similarly, the volume of water increases while it reaches the lower stream forming many pools that provide good habitat for warm water fish and aquatic fauna. The waterin the Mechi River is crystal clear in most parts, but some parts of the river are muddy due to increased anthropogenic activities near the area of human settlement. Large rocks, boulders andpebbles occupy the river bottom at the upper stream, while Boulders, sand and mud are the bottom substrates in the lower part of the river.

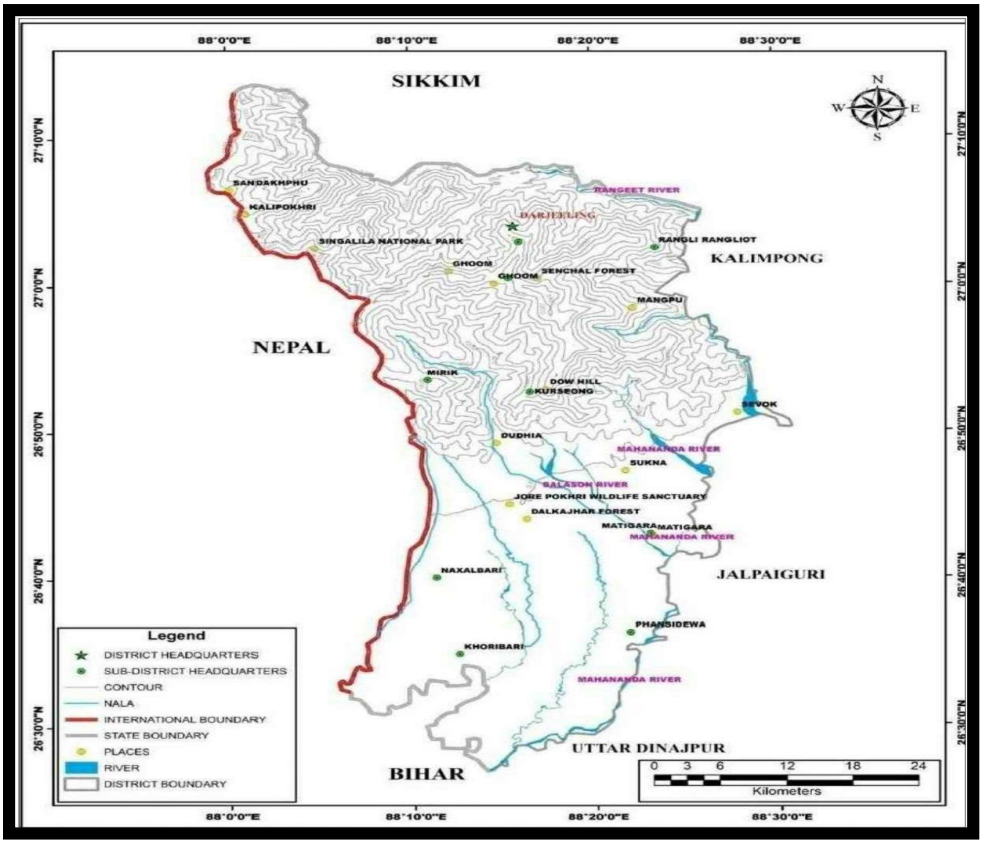


Figure2.8: Drainage map of study area

2.4.7 Climate and Rainfall

The district, Darjeeling, has hills as well as plain-lands of Terai. So, there is two different climatic conditions prevail. In sort, it has a temperate subtropical highland climate (Köppen climate classification: Cwb). The Hills have a temperate weather condition, with pleasant summer and cold winter with occasional snowfall. On the other hand, the marshy tract of Terai is humid and warm, showing typical Tropical and Sub- Tropical climatic conditions depending upon the elevation.

The temperature in the hilly areas of Darjeeling district varies from 250C to near freezing points.The maximum temperature is usually reached during monsoon and the lowest temperature is reached during the cold winter, between Decembers to March. The lowest temperature of the district remains around 100C to (-)30C, depending on elevation (Source: District census handbook2011).

The amount of rainfall plays a very important role in causing instability of slopes. A very high intensity of rainfall within a short span of time is not uncommon in Darjeeling hill areas. The rainy season in the district commence from June and lasts till September. The average annual rainfall is 2973 mm. The isohyets, maps prepared on the basis of average annual rainfall during last 25 yearsin 3subdivisions in Darjeeling hill areas, shows that the value increases from west to east, a maximum concentration of landslides fall between 210 cm and 410 cm of Isohyets.

Another climatic feature in the Darjeeling hills is created by orographic factor; causing the vertical zonation of temperature and decline of precipitation. Thus, the mountain front is exposed to heavy rainfall, especially the middle parts of the southern hills. The mean annual temperature fluctuates from 24º C in the plains and drops below 12º C on the ridge. During summer month the temperature reaches 16º C-17º C on the ridge and during winter drops at 5º C-6º C.

. Source: DSR-Darjeeling

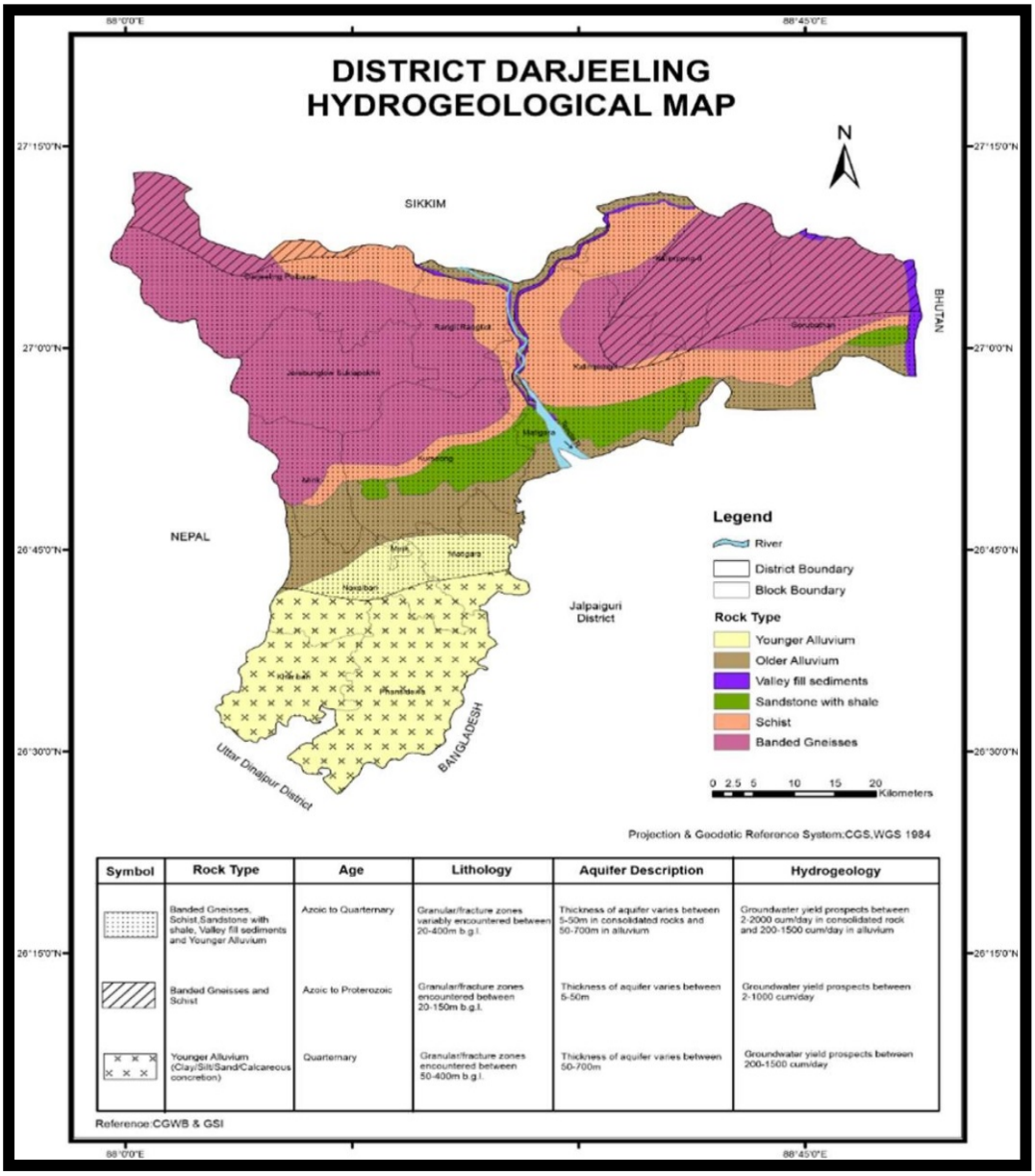
Table 2.4: Year wise rainfall

Month	2016	2017	2018	2019	2020
Rainfall in mm					
Jan	6.5	0.9	0.7	0.4	31.9
Feb	3	4.6	6	26.7	40.9
Mar	46.3	79.1	40.4	46.6	62.2
Apr	34	61.3	79.9	129.1	124
May	191.4	276.1	241.9	141	214.2
Jun	727.9	531	408.2	260.3	693.5
Jul	1168.3	760.2	592.9	1069.2	1065.6
Aug	310.9	767.9	558.7	487.4	644
Sept	535	531	579.7	669.4	827
Oct	306.2	63.8	59.4	74.4	91.2
Nov	0	7.6	1.7	7.7	1.8
Dec	0	0	11.3	2.4	2.8
Yearly Total	**3329.5**	**3083.5**	**2580.8**	**2914.6**	**3799.1**

2.5 HYDROGEOLOGY

The district is covered by three major geological formations viz, the Precambrian crystallines, the Vindhyans and the Gondwanas. Besides, the tertiary laterite and alluvium also covers part of the district. Ground water occurs mostly under phreatic condition in all the lithological units and locally under semi-

confined and confined condition (Census, 2011). Figure 2.6 represents hydrogeological map of the district which includes Kalimpong district. Rock type of the Darjeelingdistrict mainly consist of Banded Gneisses, Schist, Sandstone with shale, valley fill sediments andyounger Alluvium of Azoic to Quaternary age. This rock group chiefly comprises the district profile. Northern hilly and doors region is the part of this. Thickness of the aquifer varies between 5 to 50m in consolidated rocks which poses yield of 2-2000 cum/day and the thickness of alluvium in this part varies between 50-700m. Groundwater yield of the alluvium is 200-1500 cum/day. (http://wbwridd.gov.in/swid/mapimages/DARJEELING.pdf) Sothern flat land of the district comprises mainly of younger Alluvium of Quaternary age. Thickness of the rock type varies between 50 to 700m and having yield value of 200-1500 cum/day.



Symbol	Rock Type	Age	Lithology	Aquifer Description	Hydrogeology
	Banded Gneisses, Schist,Sandstone with shale, Valley fill sediments and Younger Alluvium	Azoic to Quarternary	Granular/fracture zones variably encountered between 20-400m b.g.l.	Thickness of aquifer varies between 5-50m in consolidated rocks and 50-700m in alluvium	Groundwater yield prospects between 2-2000 cum/day in consolidated rock and 200-1500 cum/day in alluvium
	Banded Gneisses and Schist	Azoic to Proterozoic	Granular/fracture zones encountered between 20-150m b.g.l.	Thickness of aquifer varies between 5-50m	Groundwater yield prospects between 2-1000 cum/day
	Younger Alluvium (Clay/Silt/Sand/Calcareous concretion)	Quarternary	Granular/fracture zones encountered between 50-400m b.g.l.	Thickness of aquifer varies between 50-700m	Groundwater yield prospects between 200-1500 cum/day

Figure 2.9: Hydrogeology map of Darjeeling District

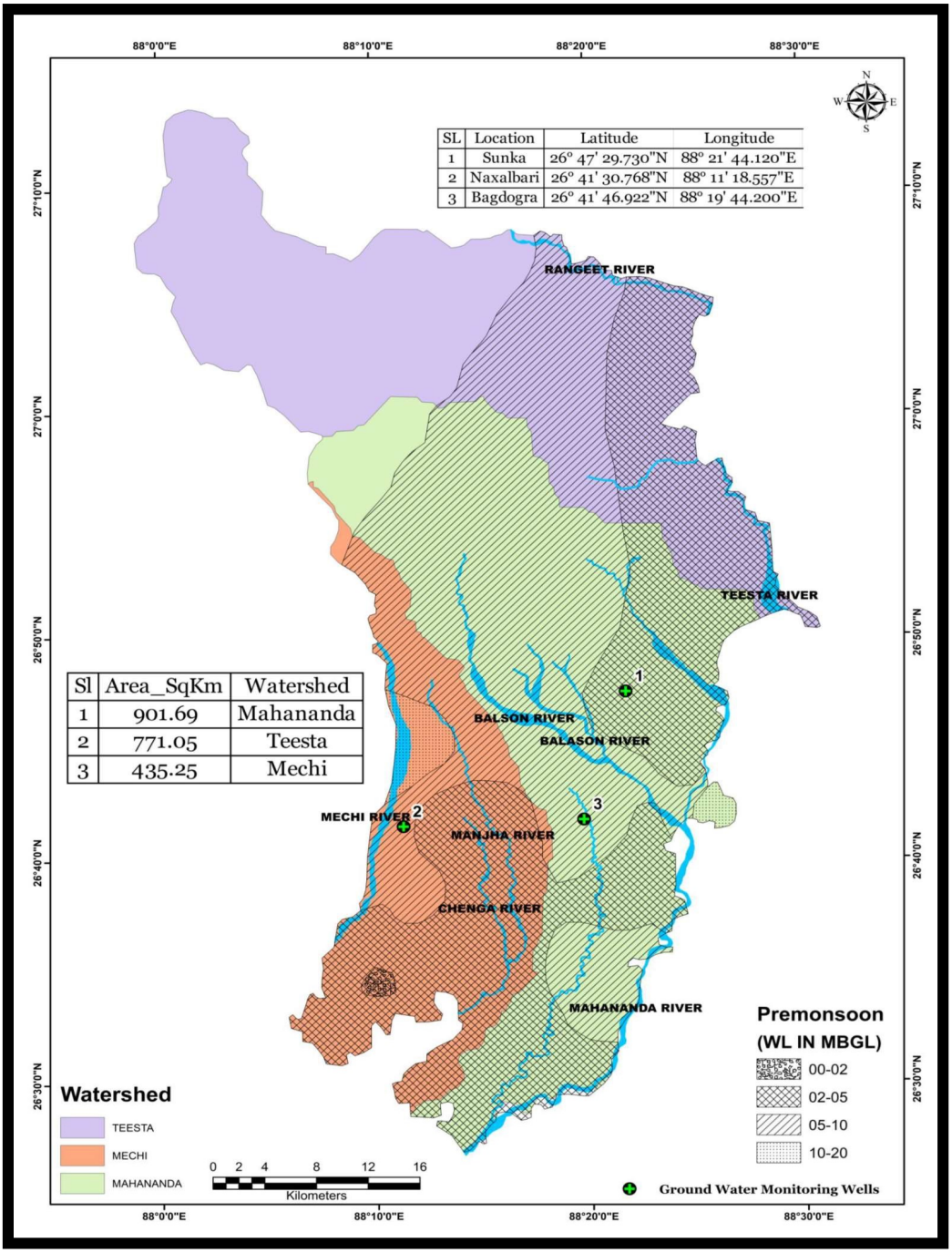


Figure 2.10: District watershed map of pre-monsoon 2020

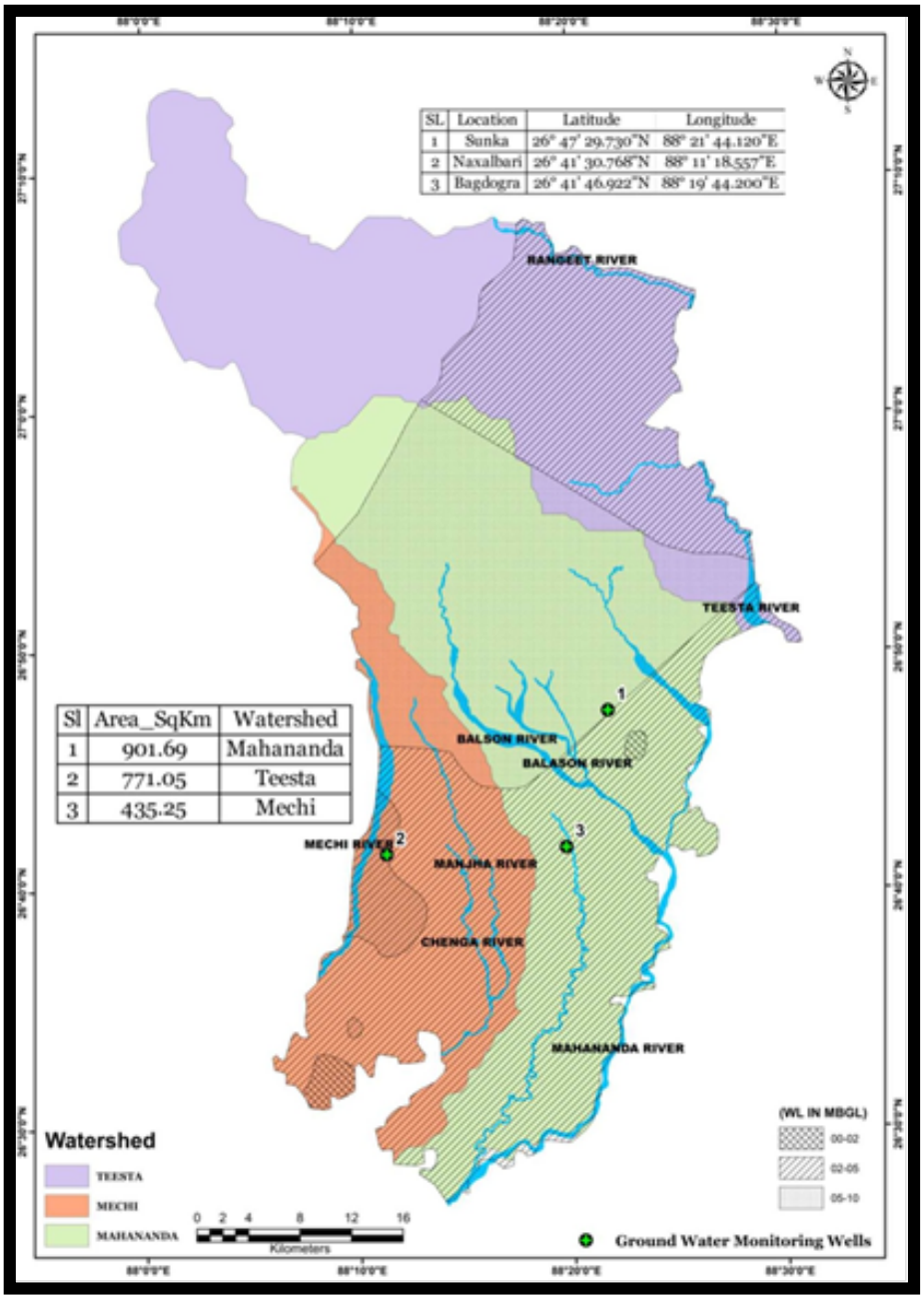


Figure 2.11 : District watershed map of post-monsoon 2020

(Source: DSR of/Darjeeling)

2.6 SEISMICITY OF THE AREA

Darjeeling district is dominated by hilly topography in the north and plain land in the southern part. The hilly region of the district is very prone to landslide due to poor water retention capacity of the soil clubbed with steepland slope (from North to South, and South East). The seismic hazard map of India was updated in 2000 (Figure3.11) by the Bureau of Indian Standards (BIS). There are no major changes in the zones in West Bengal with the exception of the merging of Zones I and II in the 1984 BIS map. Western sections of the northern districts of Jalpaiguri and Coochbehar lie in Zone V. The remaining parts of these two districts, along with the districts of Darjeeling, Uttar Dinajpur, Dakshin Dinajpur, Maldah, 24 North Parganas and 24 South Parganas lie in Zone IV. The rest of the state along with the city of Kolkata lies in Zone III. The whole district falls under the Seismic Zone IV (in a scale of I to V in ascending order of propensity f Seismic Activity), indicating very prone to the earthquakes (Census, 2011). However, no major earth quake event has been recorded with its epicenter in Darjeeling district. Many earthquake shocks experienced in the district have been recorded.

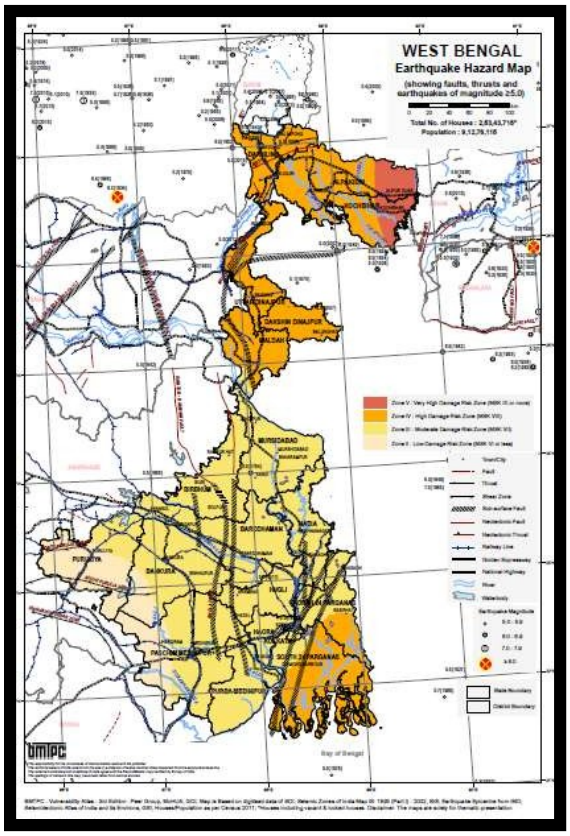


Figure 2.12: Earthquake Hazard Map of West Bengal

2.7 AVAILABLE RESERVES AND PRODUCTION

2.7.1 Geological Reserves

The geological reserve of the sand has been estimated keeping the river water level as ultimate Pit Level where the mining for sand shall cease. Considering 7.5 meter of safety zone all along the lease boundary, effective area for resource calculations has been done. Resources are falling in measured (331) category while, pit slope resources are considered as 221 categories and are termed as blocked

resources. After deductions of the blocked resources, remaining resources are considered as mineable and is categorized as 211 as per UNFC because the feasibility and economic axis are already analyzed prior to auction.

2.7.2 Local Geology

The geological formations of the Darjeeling Himalaya consist essentially of unaltered sedimentary rocks. The Sub-Himalaya is made up of Siwalik deposits of the Tertiary age. North of the Siwaliksis the coal-bearing lower Gondwana formations. The Daling series (PreCambrian) follows and is succeeded by the Darjeeling gneiss further north (Cajee L, 2018).

In the studied area, the size of the sediments is variable. The Sand & Boulder is made up of quartzand its microcrystalline cousin, chalcedony because of its resistant to weathering. The grains are rounded in shape. The present deposits are of good quality and can be used for building industries.

Mandatory distance to be left from both banks of river channel meters is 7.5 m from each of the bank of the river channel which is kept in mind while deriving the mineable reserves from the geological reserves.

Table 2.5: Geological and Minable Reserve Estimation

S. No.	Particulars	Details
1.	**Name of Mine Block**	MIN_DJ_1
2.	**Total ML Area in Hectare**	7.31
3.	**Average Depth (m)**	2
4.	**Sp. gr. of sand**	1.8
5.	**Geological Volume of sand cu. m.**	602344 cu.m.
6.	**Geological reserves (tonnes)**	10,84,219 tonnes
7.	**Composite Mineable Volume cu.m.**	524476 cu.m
8.	**Composite Mineable Reserves with Component of silt (tonnes)**	9,44,057 tonnes

2.7.3 Targeted ProductionYear wise Production

Sand, Pebbles/ Gravel and Boulder will be lifted from the river bed for all the eight months (Including holidays and others) except the monsoon period from June to September at the rate of 127300 Cum in the first year. Replenishment will depend on numerous factors such as capacity of source rock, sedimentation rate, erosion rate, flow velocity etc. So, the actual value of year wise production data will be computed after detail sedimentation study of the river catchment area. Replenishment we assume 78% average replenishment of river Sand, Pebbles/ Gravel & Boulder. Although no one can be sure what will happen in replenishment in next yearend it is an educated guess than actual phenomenon or statistical analysis. Proposed production of Sand, Pebbles /

Gravel & Boulder for next five years is as follows:

Table-2.6: Mineable Reserve and Year wise proposed production details

Year	Area (Ha)	Thickness (m)	Mineable Reserve (Cum)	Sand (Cum)	Pebbles / Gravel (Cum)	Boulder (Cum)
1	6.365	2.0	127300.00	63650.00	38190.00	25460.00
2	6.365	1.56	99294.00	49647.00	29788.20	19858.80
3	6.365	1.56	99294.00	49647.00	29788.20	19858.80
4	6.365	1.56	99294.00	49647.00	29788.20	19858.80
5	6.365	1.56	99294.00	49647.00	29788.20	19858.80
TOTAL			**524476.00**	**262238.00**	**157342.80**	**104895.20**

The river bed material contains Sand- 50 %, Pebbles / Gravel - 30% and Boulder- 20% (As perfield survey report, MIN_DJ_1).

Proposed rate of production of sand will be 63650.00 Cum for the first year and 9647.00 Cum for the last four years at the stage of full development of mine.

2.7.4 Life of Mine

It is presumed that the mineral will be replenished every year during the rainy season. New mineral will be added every year in the river bed. The present reserves are sufficient for the proposed rate of production.

***(Source:** Approved Mine Plan.)*

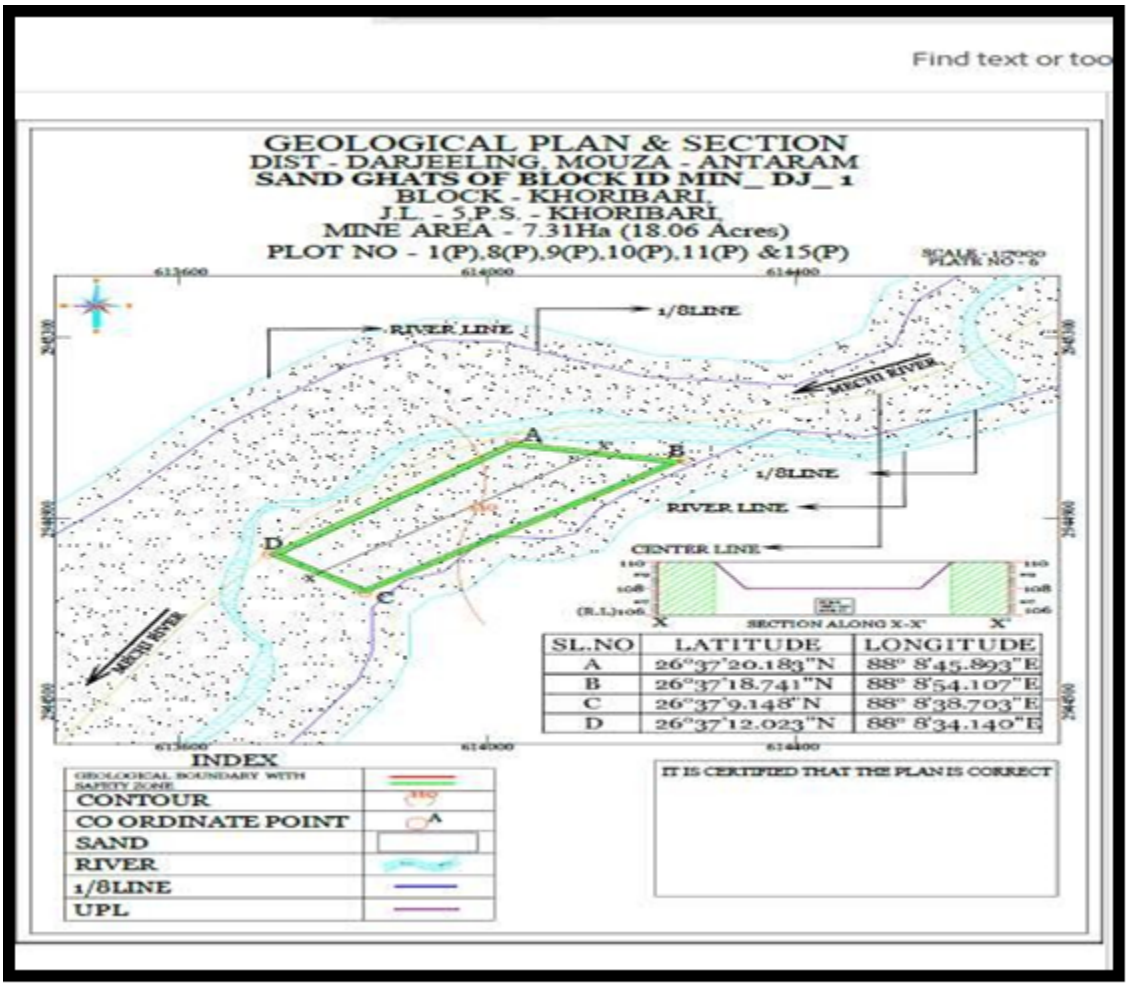


Figure 2.13:- Surface cum Geological Section of Sand Block MIN_DJ_1

2.8 METHOD MINING

2.8.1 Proposed Mining Method –Semi Mechanized Mining.

1. The mining for the entire stretch of proposed sand block (MIN_DJ_1) on river Mechi, using Semi-Mechanized Method comprising use of crawler mounted JCB / Poclain back hoe (bucket capacity varying between 0.9m^3 to 0.3m3 depending upon the quantity of sand reserves) for primary excavation/winning and loading of sand, and JCB loader for secondary loading of sand on the river banks. Trucks or tippers of 10 metric tonne capacity and requisite manpower shall be put to use to support the operating machinery.

2. Mining will be confined to extraction of sand & boulders in its existing form from the allotted plots only withoutinvolving any blasting.

3. Mining of sand & boulders from their allotted plot (s) will be restricted to a maximum depth of 2.0 m from theexisting riverbed level by following dry pit mining.

4. There will be no intersection in the mines. Thus, no alteration of natural drainage pattern of the area envisaged.

5. The operation will Semi-mechanised method in some circumstances.

6. Initially 7.5 meter will be left untouched along the boundary. The manual bench height will be restricted to 1 m, the bench height and width will be restricted as per DGMS approval. The proposed final bench slope will be restricted to 450. To prevent collapse of pit, Sand & Boulders will be removed from 1 m layer from the entire lease area first,before removing the next 1 m layer.

7. Mining will be carried out only during day time and not in nocturnal period.

8.During monsoon, all such mining activity will be stopped.

2.8.2 Conceptual Plan of Mining

Sand mining generally include mining of fluvial deposits, in respective of partial size. In the present context channelincision, bank erosion and deposition in river bed (inferred from the study of pre monsoon river bed mineral deposition , post monsoon river bed mineral deposition and study of replenishment) had been taken into consideration for preparation of the mining plan of MIN_DJ_1 located on the downstream bank of Mechi river.

The mineable reserves of sand, boulder and pebbles/gravel as estimated within the leasehold area are at present approximately 127300 Cum and sand, Boulder and Pebbles/ Gravel will be replenished approx. 78% (As Per District Survey Report, Darjeeling) i.e., 99294 Cum every year after monsoon. To maintain safety and stability ofthe river banks i.e.7.5 m barrier zone and 100 meter or 1/3rd of the width of the river whichever is more will be leftintact as no mining zone.

2.8.3 Machinery Requirement

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

Table 2.7: List of Machinery

S. No.	Name of Machinery	Capacity	Nos.
1.	JCB/Excavator	$0.9m^3$ to $0.3m^3$	3.0 (Approx)
2.	Trucks	10 Tons	360 (Approx)

2.9 TRANSPORTATION OF MINERALS

Mineral Sand will be transported by trucks. Loaded trucks will travel on Kuccha road made for plying of trucks. The temporary road will provide access to the river bed and the movement of loaded trucks. The village has its outlet meeting the tar road on the nearby villages and from where the mineral is sent to various destinations. Similarly, mineral will be transported on the other side through approach roads which finally merge with tar roads for final destinations.

2.10 MINE DRAINAGE

Depth of water in wells measured by CGWB at 32 locations in district varied from 1.46 to 14.24 m bgl during pre-monsoon period with an average of 4.6m and 1.01 to 9.6 m bgl during post-monsoon period with an average of 3.2min the year 1996 to 2018.

During the course of mining, the water table in the river shall not be intercepted. The mining shall be restricted to the top 2 m from the general ground level. Ground water shall not be intercepted during the mining of sand. In view of it, dewatering of sand pits shall notbe required or discharged elsewhere.

2.11 STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE

Since there are no waste or mineral rejects generation in the mine hence no proposal for the stacking is discussedunder this chapter. The entire mineral produced is usable.

2.11.1 Disposal of Waste (Reject) materials Silt

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

2.11.2 Land chosen for disposal of waste with proposed justification

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

2.12 USE OF MINERAL

Sand is said to have more impact on the strength of the construction. Various grading of sand, the size of the particles or granules of sand ranges from 1/16mm to 2mm. Based on the size of the particles, the sand can be classified as fine, medium and coarse. The particles of fine sand are much smaller when compared to the other types. However, each of them has their own purpose in construction. The coarse sand is used for constructing pillars and underground tanks, while the

medium sand is used for the first layer of plastering and other works. The final finish of plastering includes the use of fine sand. Pit coarse sand obtained from quarries is used in the construction of houses in urban areas. It is filtered when required for specific uses in construction such as plastering. Features of good quality sand like any other material, there are certain features that determine the quality of sand. Good quality sand should not possess more than 4% of silt content. It should have natural and crushed stone sand

2.13 UTILITIES AND PROPOSED SITE FACILITIES

2.13.1 Water Requirement

The necessary water requirement for drinking & for water sprinkling will be met from Dugwell/Bore well outside the Sand Ghat area on purchase basis. The water is potable. There are no chances of any contamination as there is no chemical processing etc. are going to be donein the Sand Ghat area. The water analysis report of Dugwell/ Borewell will be submitted to DGM MS every year. The ground water table is at upper level.

The total water requirement will be 11.0 KLD. This water will be supplied by private tankers. Drinking water will be made available at site by the private tankers. Water for dust suppressionand for green belt development will be sourced from nearest pond. The details of Water uses are given below:

Table 2.8: Water Requirement

Activity	Water Requirement (in KLD)
Dust Suppression	3.0
Domestic	5.0
Green Belt Development	3.0
Total	**11.0**

2.13.2 Power

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

2.13.3 Manpower

Local manpower will be used for sand mining in the mine site. Manpower will be depended on the production capacity per day. The capacity of sand handling of man is 5 m^3. But the mining process is mechanized and semi-mechanized. So, Manpower will be less. Therefore, 20 number of men employmentwill be required on the per day production. No. of working days per year is 200 days.

Table No. 2.9: Details of Manpower to be deployed

Sl. No.	Manpower	Numbers
1	Manager/Mining mate/ Supervisors	1
2	Skilled labors	9
3	Non-skilled labors	10
Total		**20**

As per the Mines Act, 1952, no child labor below 18 years old shall be engaged for any type of workin the quarry.

2.13.4 Infrastructure and Site Facilities

2.13.4.1 Temporary Toilets: Portable toilets will be installed at the site to maintain the hygiene of the M.L.area.

2.13.4.2 Rest Shelters: Temporary shelters will be made at the site.

2.13.4.3 First aid: First aid kit will be available at the site.

2.13.4.4 Drinking water: The necessary water requirement for drinking & for water sprinkling will bemet from Dugwell/Bore well outside the Sand Ghat area on purchase basis. The water is potable. There are no chances of any contamination as there is no chemical processing etc. are going to be done in the Sand Ghat area.

Chapter 3

DESCRIPTION OF ENVIRONMENT

3.0 GENERAL

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

Study area

The Hill areas of Darjeeling District are located within the lesser and Sub - Himalayan belts of the Eastern Himalayas. The general slopes of the hills are from north to south. Narrow ridges separatedby closely-spaced V-shaped valleys, where the slope varies between 150 and 400. The area has steep slopes and loose topsoil, leading to frequent landslides during the monsoons. The region is characterized by a myriad of ridges and valleys because of the spurs ramifying into lateral spurs which give off lesser ones and these in turn cut the terrain into ridges and valleys, creating a mosaicof micro-topographical units (Cajee 2018). The region is divided into three types of hill regions which are as follows:

- Lower hills
- Middle hills
- Upper hills

Beside this, "Tarai" or foothills zones are found in South and South-East part of the district. This zone has a wider valley floor which are frequently filled up with large boulders transported by debris flow. A number of rivers, i.e., Teesta, Mahananda, originate in the Darjeeling Himalaya and have formed braided courses on the plains which are overloaded with sediments.

The study area also comprises river bed of Mechi which is a tributary of Mahananda. It is a trans-boundary river flowing through Nepal and India. The rivers originating in the hills attain a braiding character and have well developed alluvial fans.

3.1 LAND ENVIRONMENT

Landcover data highlights the area covered by forests, wetlands, impervious surfaces, agriculture,and other land and water types. Water types include wetlands or open water. Landuse shows how people use the landscape for development, conservation or for other purposes. Therefore its highlights the current scenario as well as predict the impact.

1. Objectives: Main objectives are:

- To prepare the landuse landcover map of study area based on recent satellite imageries.
- To assess the impact of proposed project on existing landuse and landcover
- To suggest mitigations measures

2. Hardware: The equipment used during the present investigation includes ground truth hand held GARMIN 12 GPS receiver for ground truth collection, besides the visual observation and analysis.

3. Software: The following software were applied to extract indicators and maps:

- **ERDAS Imagine:** The Erdas imagine version 2016 is used to process Landsat-8 satellite data and to extract the required indicators through spatial & spectral analysis.
- **ArcGIS:** The ArcGIS version 10.3has been used to prepare the final Maps for indicators through the outcomes of ERDAS software.

4. Methodology: The methodology applied for the study involved obtaining satellite images from open source, and then using a range of software to process the images and also by GPS coordinates (ground trothing) for drawing observations. The detailed methodology is explained as below:

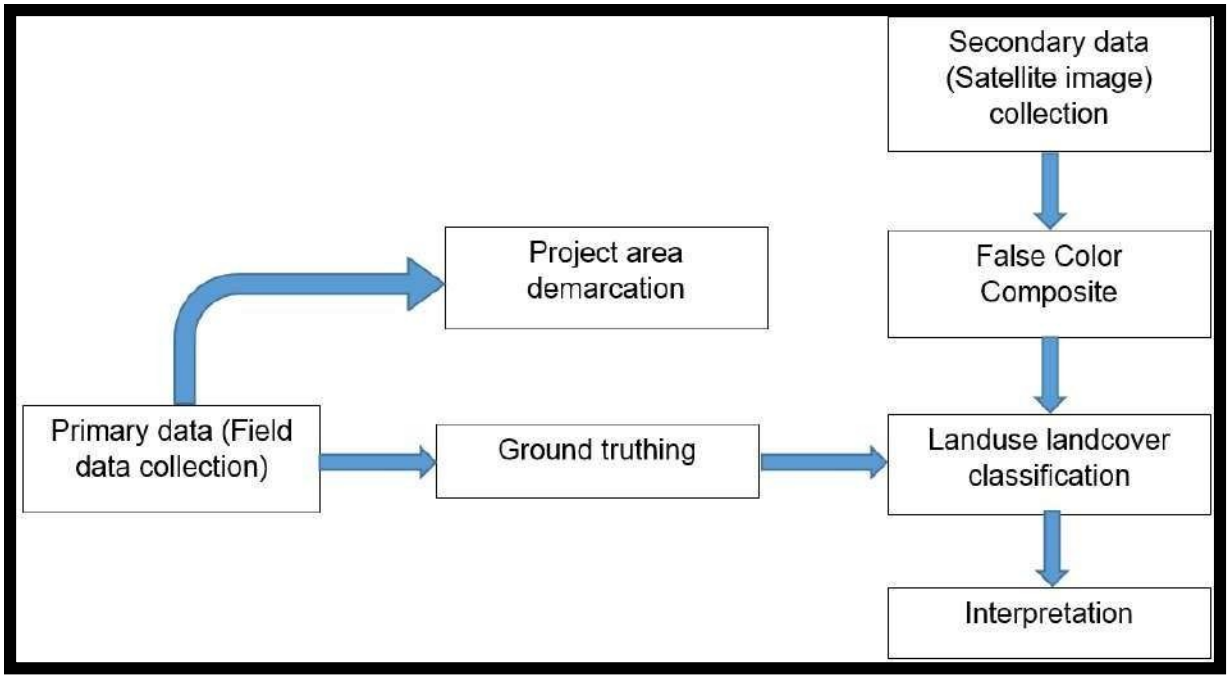


Figure 3.1: Flow Chart Methodology

- **Primary Data:** The coordinates along land features of project area is collected with the help of GPS device for ground truthing. This data is primary data. On the basis of this data, landuselandcover analysis is appropriate.
- **Secondary Data:** Satellite image (secondary data) is required to show the current land featuresof the project area and buffered area (10 km). **Landsat 8** Satellite image is used, which is collected from open source.

Landsat 8 Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS) images consist of nine spectral bands with a spatial resolution of 30 meters for Bands 1 to 7 and 9. The ultra-blue Band 1 is useful for coastal and aerosol studies. Band 9 is useful for cirrus cloud detection.

•**False Color Composite (FCC):** False color (or false colour) refers to a group of color rendering methods used to display images in color which were recorded in the visible or non-visible parts of the electromagnetic spectrum. A false-color image is an image that depicts an object in colors that differ from those a photograph (a true-color image)would show. False-color image sacrifices natural color rendition in order to ease the detection of features. The FCC for 10 km buffer zone of the project area is shown in Figure 3.2.

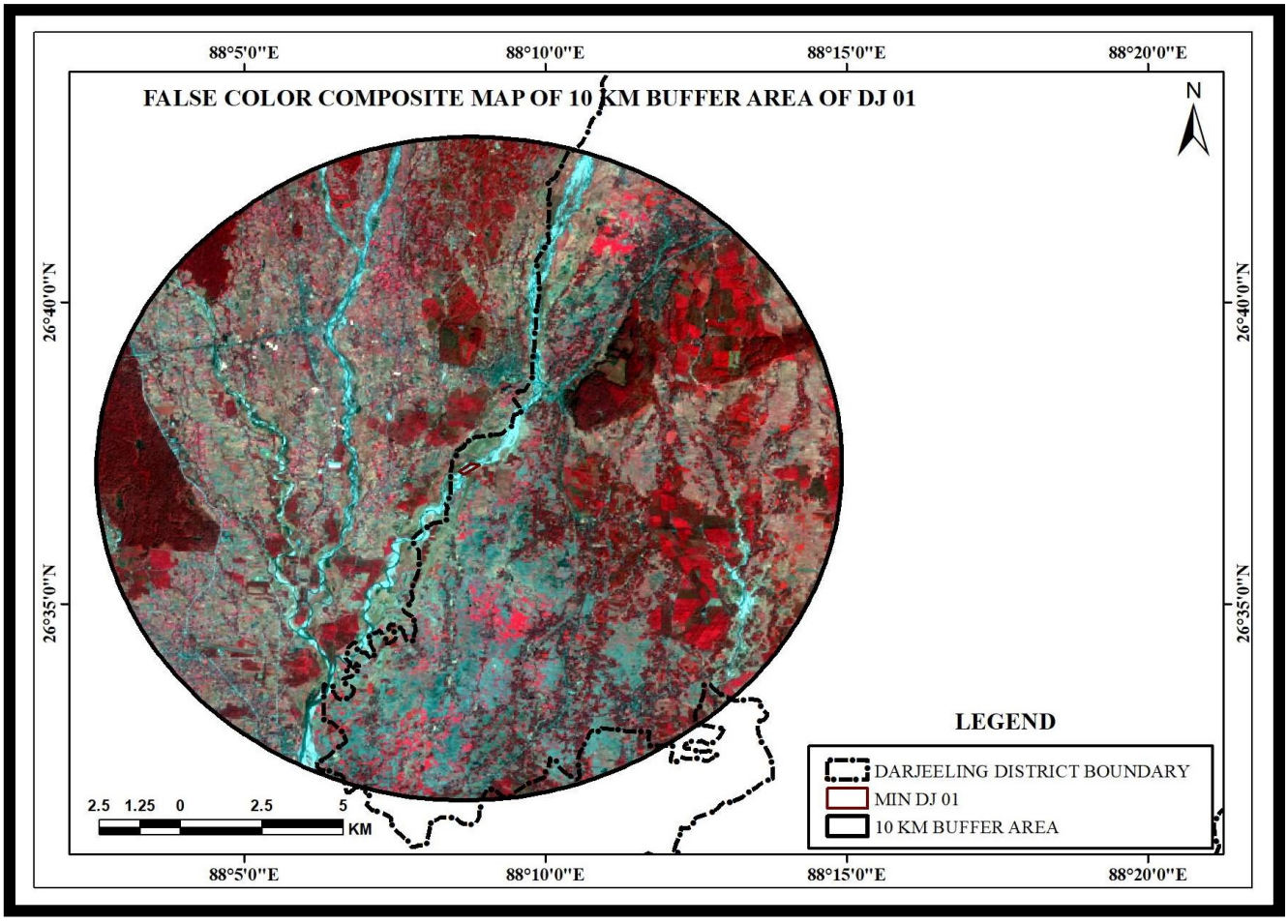


Figure 3.2: Shows the False color Composite Map of the study area

•Landuse landcover classification& Interpretation: The classification approach is applied on the basis of various characteristics like colour, texture, shape, association etc. The Landuse land cover map for 10 km buffer zone of the project area is shown in figure 3.

The unsupervised classification approach was obtained for the Landuse and Landcover classification by using ERDAS Imagine software. In this approach, the pixels of the project area are clustered in several classes on the basis of spatial & spectral variation in pixel value which are following:

I. Built-up land:7.8 per cent of the total project area is covered by built-up land. The entire built-up land comes under rural areas. This area is identified by grey color and square/rectangular shape in the satellite image. Built-up land can be described as an area of intensive use with much of the land covered by structures. Areas included in this category are cities, towns, villages, strip developments along with highways, transportation, power, and communications facilities, and other areas such as those occupied by mills, shopping centers, industrial and commercial complexes, and institutions that may, in some instances, be isolated from built-up areas.

II. Agricultural land: Agriculture not only dominates the economy of Darjeeling District but it is also varied in nature due to variations in altitude, climate and soils. It is imperative to cut terraces for farming due to steep slopes. The steep slope again encourages soil erosion, thereby affecting the cropping pattern. The influence of temperature and heavy rain is also well-marked on the cropping pattern of the district. The M.L. area is non-forest, non-agriculture area situated in Mechi River Bed.

III. Agricultural fallow land: It is the type of cropland which is not seeded for a season so as to allow the fields become fertile again. The practice of allowing fields to remain fallow dates back to ancient times when farmers realized that using soil over and over again depletes its of its nutrients. Agricultural fallow land covers 38.9 per cent of the total project area.

IV. Open Land: Open land is any degraded land or a land which is currently underutilized but can be brought under vegetative cover with reasonable efforts. Thistype of land covers 3.9 per cent of the total project area. This area is identified by off-white color and rough texture in the satellite image.

V. Water Bodies: All natural and man-made ponds, reservoirs, river come under this class. A river is a natural flowing watercourse, usually freshwater, flowing towardsan ocean, sea, lake or another river. In some cases a river flows into the ground and becomes dry at the end of its course without reaching another body of water. This feature is identified by dark blue to black color, fine texture in the satellite image and cover only 1.2 percent of the total project area.

VI. Riverbed: A riverbed or streambed is the channel bottom of a stream or river, the physical confine of the normal water flow. The riverbed of the project area is consist of sand and cover only 5percent of the total project area. This area is identified by white color and fine texture in the satellite image.

VII. Vegetation: This type of land covers 0.13 per cent of the total project area.

VIII. Airport: Netaji Subhash Chandra Bose International Airport, which is 180 km in E direction from the mining site.

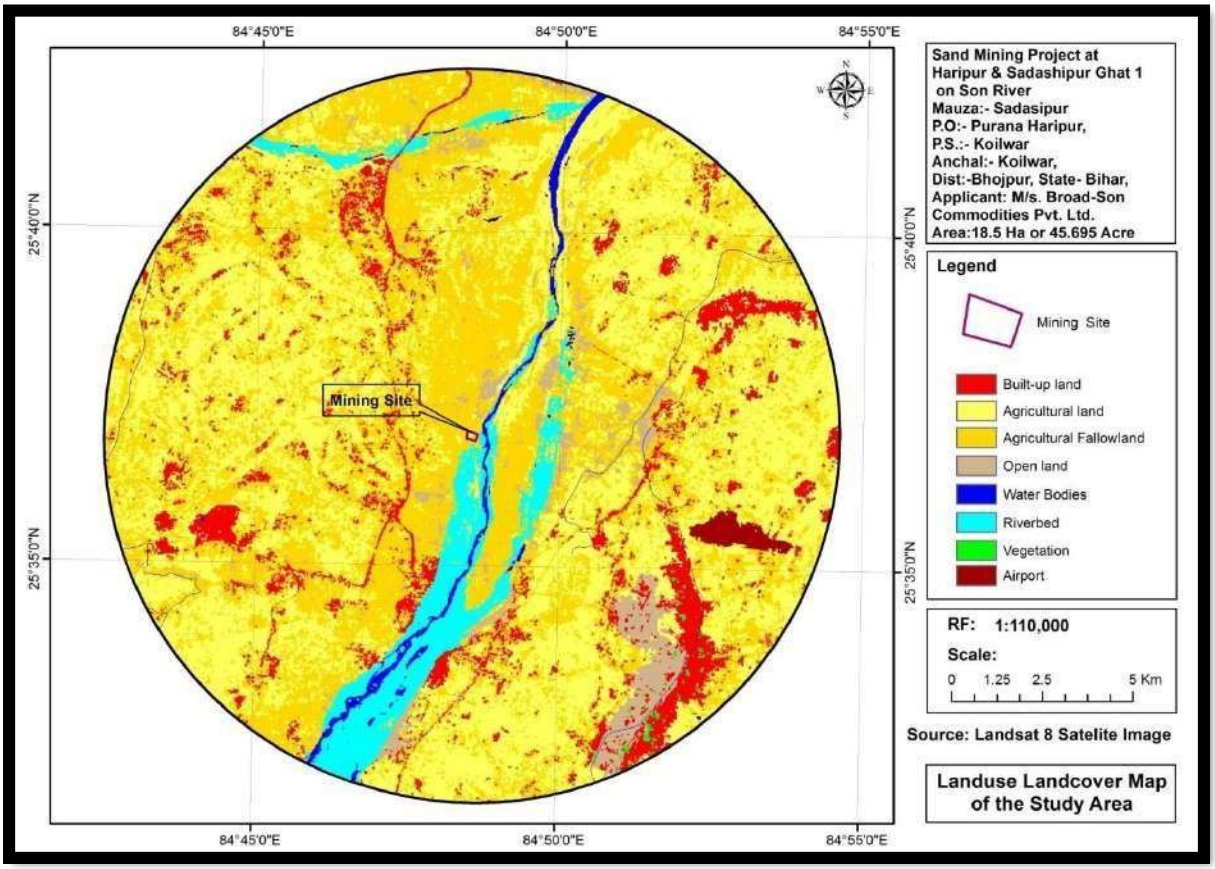


Figure 3.3: shows Landuse land cover classification

On the basis of the landuse landcover classification, the area of different land features are as follows:

Table 3.1 Land use classification

Class Name	Area (Ha)	Area (%)
Built-up land	2543.22	7.84
Agricultural land	13743.90	42.40
Agricultural Fallow land	12622.20	38.94
Open land	1283.56	3.96
Riverbed	1625.47	5.01
Water Bodies	393.17	1.21
Vegetation	43.16	0.13
Airport	163.85	0.51
Total	32418.52	100.00

3.2 SOIL SAMPLING

The soil is generally formed by both fluvial action and lithological disintegration. So, lithology plays an important role for the different types of soils found in Darjeeling. All the soils are definitely acidic in nature with the tendency to increase slightly in depth in most cases indicating the lacking of bases from surface and accumulation in the lower horizons. The basic soil types areyellow soils, red brown soils and brown forest soils. Red and yellow soils have developed on gneiss while brown on schists and shales. Coarse pale yellow to red brown soils is found on the Siwaliks while clayey dark soils are developed on Daling series. The character of the bedrock is reflected only in the grain size composition of the soil. On the Darjeeling gneiss, very coarse-grained (50% -80%) particles are found. In Damuda and Daling series percentage of sandy and coarse particles in the soils are high. On the Siwaliks, silty – clay fraction is higher. The chemical content of the soil over Darjeeling gneiss is characterized by a high proportion of potassium derived from feldspar and muscovite mica. This soil is poor in lime, magnesium, iron oxides, phosphorous andnitrogen.

In the study area, the soil is characterized with very deep, imperfectly drained, coarse loamy soils occurring on nearly level lower piedmont plain with loamy surface associated with very deep, imperfectly drained, fine loamy soils.

3.2.1 Methodology

Soil sample collection was done makinga pit about 15 inches deep and heaping the loose soil dugout. The loose soil is spread up in a circle and divided into 4 quadrants. The opposite quadrants arechosen and again the process is repeated till we get the required quantum of sample for analysis purpose. Collection of samples was done from 5 locations as shown in Table 3.2 & Figure 3.4. Samples were analyzed as per CPCB guidelines.

The physio-chemical characteristics of these soil samples are given in Table No. 3.3.

Table-3.2: Soil Quality monitoring locations

Monitoring Location	Location	Distance From centerof site (km)	Direction	Geo-Coordinate
SQ-1	**Project Site**	0.00	-	26°37'16.26"N & 88° 8'52.15"E
SQ-2	**Saheburam**	2.5	ESE	26°36'42.09"N & 88°10'10.21"E
SQ-3	**Kilaghata Bazar**	6.5	E	26°37'35.07"N & 88°12'58.35"E
SQ-4	**Khoribari**	8.6	SSE	26°33'15.72"N & 88°11'29.46"E
SQ-5	**Nayahat Bazar**	5.7	S	26°34'6.65"N & 88° 8'28.60"E

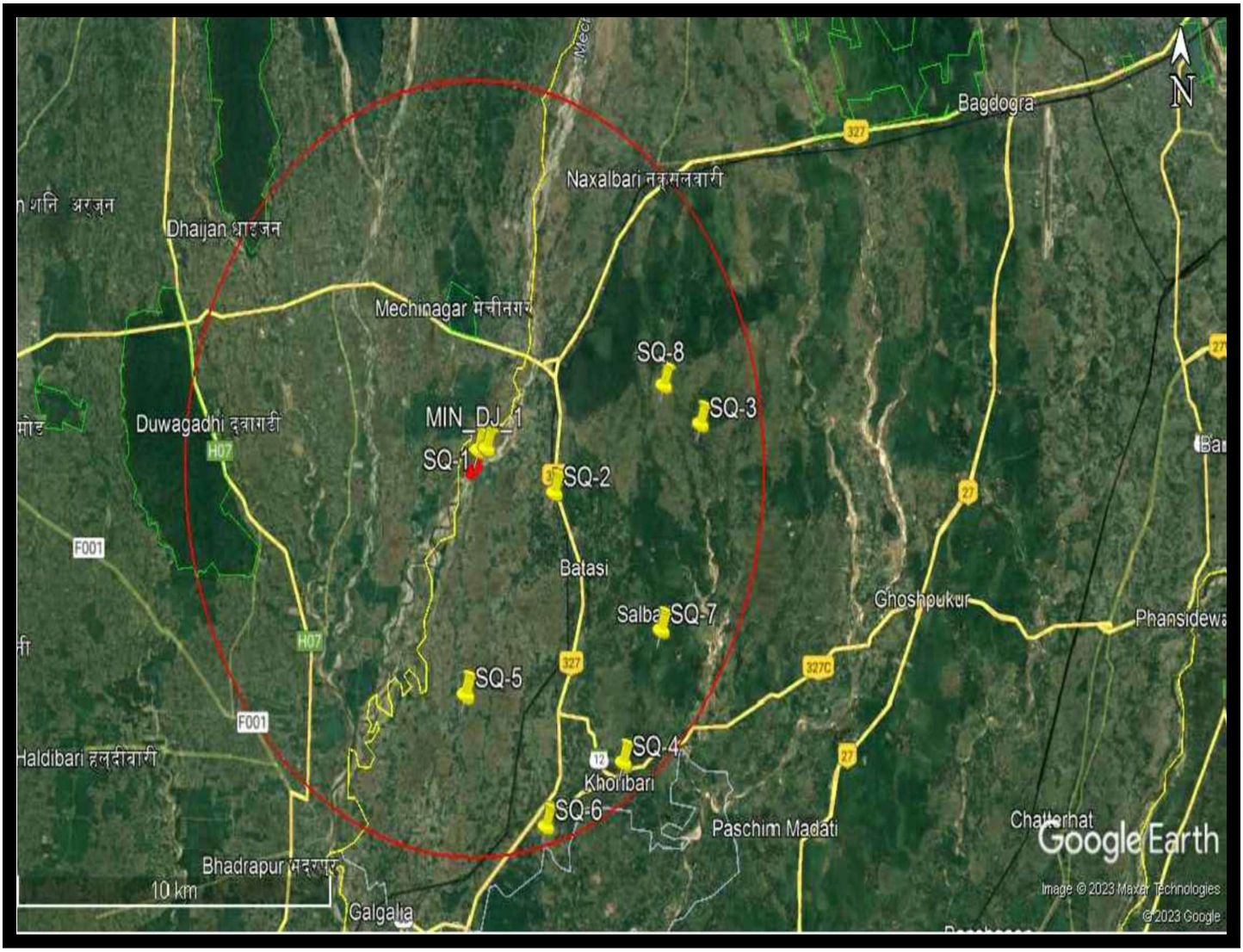


Figure: 3.4: Map showing Soil Quality Monitoring Locations

Table-3.3: Soil Quality Parameters

SL.No	Parameter	Unit	SQ-1	SQ-2	SQ-3	SQ-4	SQ-5
1	pH (1:2)	-	5.83	5.78	5.88	5.56	5.66
6	Water Holding Capacity	%	22.3	21.8	22.9	20.9	22.1
7	Bulk Density	gram/cc	1.08	1.11	1.1	1.06	1.12
8	Moisture Content	%	17.8	18.5	19.4	17.5	18.4
9	Cation Exchange Capacity	meq/100gm	13.8	12.9	11.8	13.2	12.6
10	Phosphorus	kg/ha	126	138	116	123	120
11	Pottasiume (as K)	mg/kg	185	178	163	180	156
12	Calciume	meq/100gm	5.24	5.63	5.38	5.29	5.18
13	Magnesiume(as Mg)	meq/100gm	3.54	3.49	3.23	3.33	2.98
14	Iron(as Fe)	%	3.42	2.89	3.11	3.55	3.12
15	Lead(as Pb)	mg/kg	2.48	2.12	3.3	2.56	3.12
16	Cadmium	mg/kg	BLQ (0.1)	BLQ (0.1)	BLQ (0.1)	BLQ (0.1)	BLQ (0.1)
17	Chromiume	mg/kg	1.26	1.38	2.3	1.44	2.65
18	Zinc	mg/kg	33.5	31.8	32.4	32.9	34.6
22	Organic Carbon	%	1.48	1.38	1.44	1.51	1.65

3.2.2 Results

Samples collected from identified locations indicate pH value ranging from 5.56 to 5.83, which shows that the soil is slightly acidic in nature. Organic Cabone ranges from 1.38 % to 1.65% in the soil samples and, whereas the Potassium is found to be ranging from 156 mg/kg to 185 mg/kg.

3.3 WATER ENVIRONMENT

3.3.1 General

This section describes the prevailing water environment in the study area in terms of water resources i.e. quantitatively and qualitatively. This has been achieved by performing qualitative analysis of watersamples collected from ground water source and surface water body (Mechi river) falling within the study area. Ground & Surface water samples are collected from locations as shown in Figures respectively. Primary objective of the study is to assess the water quality for critical parameters and evaluate its impact on habitat and aesthetics in the surrounding areas of the project. This assessment will be useful in formulating mitigation measures to minimize the impacts of the project on the surrounding environment.

3.3.2 Methodology

Perennial source of Surface water in the study area is Mechi river (a tributary of Mahananda River) which flow from North East to North West direction. Samples were collected from upstream and downstream areas of the project site and third sample was also collected near the project site.

Contour and Drainage pattern are the most important factors governing the choice of sampling locations. It can be assumed that run-off from project site, if any will follow the natural drainage and contour of the landscape. Therefore downstream areas are mostly likely to experience the impacts of the project. On this basis, two surface water and five ground water sampling locationswere chosen for determining quality of water for the category of end use and for parameters as perIS:10500 -2012. Thus, it helps in predicting the entry of potential pollutant or merging tributariesacts as a source of pollution in the river which affects the quality of water. It helps in determining the extent of pollution.

Based on the above factors, sampling locations for Ground and surface water quality have been finalized and shown in Table 3.4 Figure 3.5 & Table 3.6, Figure 3.6, respectively. AIS 10500:2012 (for drinking water) has been used for analysis of the water samples for drinking purpose and for the designated use of water as per the categories of CPCB guidelines.

3.3.3 Groundwater

3.3.3.1 Ground water Potential:-

The district is covered by three major geological formations viz, the Precambrian crystallines, the Vindhyans and the Gondwanas. Besides, the tertiary laterite and alluvium also covers part of the district. Ground water occurs mostly under phreatic condition in all the lithological units and locally under semi-confined and confined condition (Census, 2011).

Rock type of the Darjeeling district mainly consist of Banded Gneisses, Schist, Sandstone with shale, valley fill sediments and younger Alluvium of Azoic to Quaternary age. This rock group chiefly comprises the district profile. Northern hilly and doors region is the part of this. Thicknessof the aquifer varies between 5 to 50m in consolidated rocks which poses yield of 2-2000 cum/dayand the thickness of alluvium in this part varies between 50-700m. Groundwater yield of the alluvium is 200-1500 cum/day.

Sothern flat land of the district comprises mainly of younger Alluvium of Quaternary age. Thickness of the rock type varies between 50 to 700m and having yield value of 200-1500 cum/day.

Depth of water in wells measured by CGWB at 32 locations in district varied from 1.46 to 14.24 m bgl during pre-monsoon period with an average of 4.6m and 1.01 to 9.6 m bgl during post- monsoon period with an average of 3.2m in the year 1996 to 2018. Figure 3.6 represents water level fluctuation graph for two CGWB monitor wells, one from Bagdogra area and another from Phansidewa area.

Table-3.4: Ground water monitoring locations

GW-1	**Project Site**	0.00	-	26°37'16.26"N & 88° 8'52.15"E
GW-2	**Saheburam**	2.5	ESE	26°36'42.09"N & 88°10'10.21"E
Gw-3	**Kilaghata Bazar**	6.5	E	26°37'35.07"N & 88°12'58.35"E
GW-4	**Khoribari**	8.6	SSE	26°33'15.72"N & 88°11'29.46"E
GW-5	**Nayahat Bazar**	5.7	S	26°34'6.65"N & 88° 8'28.60"E

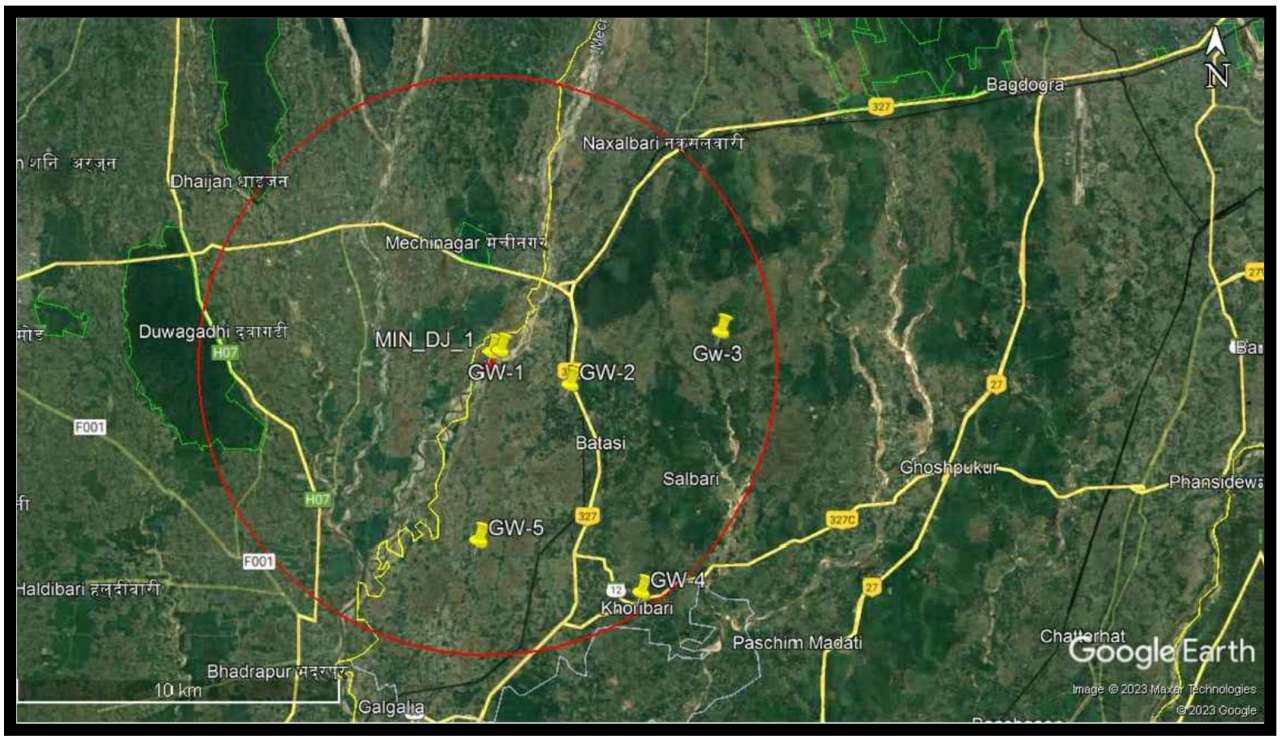


Figure: 3.5: Map showing Ground Water Monitoring Locations

Table-3.5: Ground water quality results

Ground water Quality (May-2023)									
S. No	Parameter		Standard Limit (IS-10500:2012, RA 2018)		GW1	GW2	GW3	GW4	GW5
		Unit	Desirable Limit	Permissible Limit					
1	**pH (at 25°C)**	-	6.5-8.5	No Relaxation	7.91	7.38	7.17	7.63	7.66
2	**Colour**	Hazen	5	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
3	**Turbidity**	NTU	1	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4	**Total Dissolved Solid**	mg/l	500	2000	994	890	910	928	898
5	**Total Hardness (as CaCO3)**	mg/l	200	600	595.6	510	533	541	512
6	**Calcium(as Ca)**	mg/l	75	200	142.8	122.4	128	130	123
7	**Magnesium (as Mg)**	mg/l	30	100	62.8	49.6	52	52.4	49.8
8	**Total Alklinity (as CaCO3)**	mg/l	200	600	448.8	380	412	395	391
9	**Chloride (as Cl)**	mg/l	250	1000	223.4	180.8	187.4	190.4	189
10	**Sulphate (as SO4)**	mg/l	200	400	62.8	54.4	56	57.4	58.5
11	**Nitrate(as NO3)**	mg/l	45	No Relaxation	14.3	11.3	12.1	13.7	12.4
12	**Sodiume(Na)**	mg/l	–	–	19.8	16.6	17.4	18.2	18.5
13	**Pottasiume (K)**	mg/l	75	200	6.28	4.98	5.12	5.81	6.3
14	**Total Residual chlorine (as Cl_2**	mg/l	0.2	1	BLQ(0.1)	BLQ(0.1)	BLQ(0.1)	BLQ(0.1)	BLQ(0.1)
15	**Phenolic Compound(as C_6H_5OH)**	mg/l	0.001	0.002	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)
16	**Iron (asFe)**	mg/l	1	No Relaxation	0.21	0.16	0.15	0.17	0.15
17	**Fluoride (as F)**	mg/l	1	1.5	0.34	0.31	0.32	0.33	0.29
18	**Zinc (as Zn)**	mg/l	5	15	1.26	1.13	1.15	1.45	1.17
19	**Manganese (asMn)**	mg/l	0.1	0.3	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
20	**Cd (Cadmiume)**	mg/l	0.003	No Relaxation	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)

21	**Total Chromium (as Cr)**	mg/l	0.05	No Relaxation	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
22	**Mercury (as Hg)**	mg/l	0.001	No Relaxation	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)
23	**Selenium (as Se)**	mg/l	0.01	No Relaxation	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
	Bacteriological Parameter								
1	**E- Coli**	MPN/100ml	–	–	Absent	Absent	Absent	Absent	Absent
1	**Total Coliform**	MPN/100ml	–	–	Absent	Absent	Absent	Absent	Absent

3.3.3.2 Result& conclusion

The examination of the physicochemical analysis of the ground water shows that the quality of ground water is generally good with respect to the limits laid down in Bureau of India Standards (IS: 10500:2012) for drinking water. Based on the above result it is concluded that the ground water samples are fit for drinking purpose.

3.3.4 Surface water

The surface water parameters have been analyzed as per APHA procedure and compared with CPCB water quality criteria mentioned in Table 3.6 and the Surface water sample results are mentioned in Table-3.8.

Table 3.6: Water Quality Criteria as per Central Pollution Control Board

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventionaltreatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more BiochemicalOxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	Total Coliforms Organism MPN/100ml shall be500 or less; pH between 6.5 and 8.5; Dissolved Oxygen 5mg/l or more BiochemicalOxygen Demand 5 days 20°C 3mg/l or less
Drinking water sourceafter conventionaltreatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be5000 or less; pH between 6 to 9; Dissolved Oxygen 4mg/l or more BiochemicalOxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wildlife and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial	E	pH between 6.0 to 8.5
Cooling,ControlledWaste disposal		Electrical Conductivity at 25°C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

Table-3.7: Surface water monitoring locations

Monitor	Location	Dist. From center of site (km)	Direction	Geo-Coordinate
SW1	Mechi River	0.0	-	26°37'15.52"N 88° 8'44.63"E
SW2	Mechi River	3.0 (K.M) (UP)	NE	26°38'34.17"N 88° 9'53.78"E
SW3	Mechi River	2.6 (K.M) (Down)	SW	26°36'5.08"N 88° 8'0.96"E
SW4	Manza River	8.5 (k.m) (Down)	SE	26°34’56.57”N 88°13’21.38”E

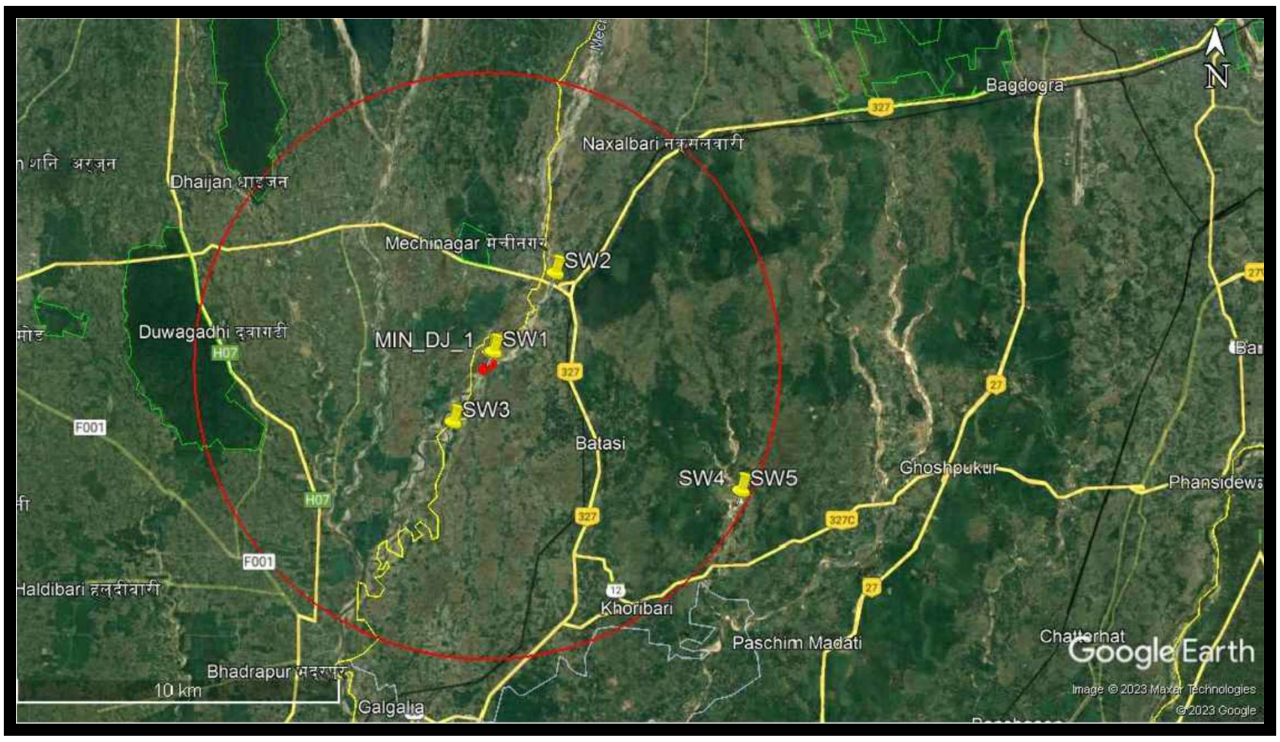


Figure: 3.6: Map showing Surface Water Monitoring Locations

Table-3.8: Surface Water Results

Surface water Quality (May-2023)							
S.No	Parameter	Specification EP Rules,1986		SW-1	SW-2	SW-3	SW-4
		Desirable Limit	**Unit**				
1	pH (at 25°C)	5.5-9.0	-	**7.43**	**7.51**	**7.62**	**7.58**
4	Colour		Hazen	<5.0	<5.0	<5.0	<5.0
5	Turbidity	1	NTU	45	48	38	32
6	Total Hardness (as CaCO3)		mg/l	188	207	150	141
7	Total Alklinity (as CaCO3)		mg/l	209	219	175	168
8	Total Dissolved solid	2100	mg/l	2254	2644	1834	1785
9	Total Suspended Solid	100	mg/l	650	711	620	589
10	Total Residual Chlorineas (Cl2)		mg/l	BLQ(0.1)	BLQ(0.1)	BLQ(0.1)	BLQ(0.1)
11	Biochemical Oxygn Demand	30	mg/l	1.2	2.1	1.5	1.7
12	Chemical Oxygn Demand	250	mg/l	82	87	58	64
13	Sodium (as Na)		mg/l	89	97	72	68
14	Potassium(as K)		mg/l	10.5	11.5	8.5	7.8
15	Calcium(as Ca)		mg/l	45	46	32	30
16	Magnesium (as Mg)		mg/l	18	18.7	17	16
17	Chloride (as Cl)	1000	mg/l	113	119	87	68
18	Sulphate (as SO4)	1000	mg/l	89	97	79	72
19	Nitrate(as NO3)	10	mg/l	73	79	64	60
20	Selenium		mg/l	113			
21	Iron(Fe)	3	mg/l	0.48	0.52	0.46	0.43
22	Manganese (as Mn)	2	mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
23	Cadmium (as Cd)	2	mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
24	Arsenic (as As)	0.2	mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
25	Chromium (as Cr)	2	mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
26	Copper (as Cu)	3	mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
27	Mercury (as Hg)	0.01	mg/l	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)	BLQ(0.001)
28	Lead (as Pb)	0.1	mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
29	Zinc (as Zn)	5	mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
30	Boron (as B)	2	mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
31	Fluoride	2	mg/l	0.57	0.61	0.61	0.58

32	Chlorine		mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
33	Phnollic Compound	1	mg/l	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)	BLQ(0.01)
34	Phoshate(as PO4)	5	mg/l	9.2	9.9	8.5	7.8
Bacteriological Parameter							
1	Total Coliform		MPN/100ml	23	27	22	25
2	E- Coli		MPN/100ml	11	16	15	13

The river water quality parameters are compared with BDU Criteria of CPCB. No metal contamination has been found in surface watersamples. Overall the surface water quality of river is meeting the Class D of DBU Criteria of CPCB for its suitability for wild life and fisheries.

3.4 AIR ENVIRONMENT

3.4.1 General

This section describes the prevailing air environment in the study area for evaluating the impacts of mining activity in surrounding areas. This has been achieved by determining the ambient air quality within the study area, represented by 10 km radius area around the project site, as shown in Figure 3.7. Ambient air quality monitoring stations were selected primarily on the basis of surface influence, demographic influence and meteorological influence. 24 hourly monitoring wascarried out for SO_2, NO_2, PM_{10}& $PM_{2.5}$ twice a week at each station. This study was done during pre-monsoon season for a period of 3 months from March to M a y 2023.The analysis reports areappended below in the Table-3.11.

Table 3.9, Site-specific meteorological data

	March	**April**	**May**
Temperature	Max: 28.0° C Min: 19° C	Max:32.7 ° C Min:25.1 ° C	Max:33.8 ° C Min:27.5 ° C
Humidity	Max: 68.0 Min:57.0	Max:76.0 Min:61.0	Max:78.0 Min:64.0
Rainfall	Ave:155.0 mm	Ave: 170.0 mm	Ave: 582.0 mm
Predominant Wind Direction	N,NE	NE,N	NE,N

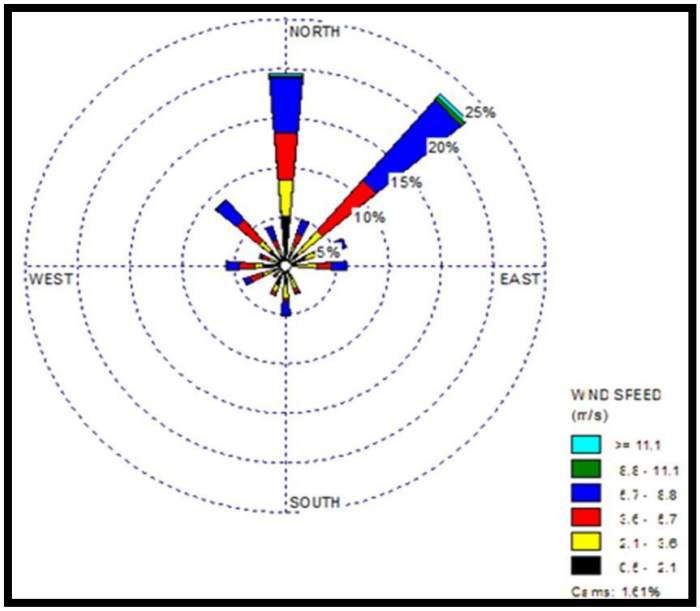


Figure 3.7: Wind Rose Pattern

Observation:

The prominent seasonal wind direction is N & NE contributing approximately 25.0 % &5.7% respectively of the total.

3.4.2 Methodology

The choice of monitoring locations for ambient air quality is based on:

1. Meteorology of the area: From the meteorological data the frequency and duration of wind is preliminary determined, from which the wind rose diagram is first drawn. Seven monitoring stations have been selected to assess the Air quality in study area.

2. The location of nearest human habitation is also considered for selecting the location of air quality monitoring station. The quality of air at this location is important to know the impact of the proposed mining activities .in terms of emission of particulate matter and gaseous emissions.

3. It is equally important to know the accessibility to the selected air quality stations. Therefore the availability of roads along with electricity also plays an important role in finalizing the ambient air quality monitoring locations.

Based on these factors, Seven monitoring locations were identified as shown in Table 3.10 and Figure 3.8.CPCB guidelines for the measurement of ambient air quality on 24 hourly monitoring was carried out for SO_2, NO_2, $PM_{2.5}$& PM_{10} twice a week at each station for a study period of 3 months (March to May 2003).

Table-3.10: Ambient Air monitoring locations

Monitor	Location	Dist. From center of site (km)	Direction	Geo-Coordinate
AAQ-1	Project Site	0.00	-	26°37'16.26"N & 88° 8'52.15"E
AAQ-2	Saheburam	2.5	ESE	26°36'42.09"N & 88°10'10.21"E
AAQ-3	Panitanki	3.1	NNE	26°38'27.13"N & 88°10'10.69"E
AAQ-4	Naxalbari	8.8	`8.8	26°40'57.28"N & 88°12'0.98"E
AAQ-5	Kilaghata Bazar	6.5	E	26°37'35.07"N & 88°12'58.35"E
AAQ-6	Khoribari	8.6	SSE	26°33'15.72"N & 88°11'29.46"E
AAQ-7	Nayahat Bazar	5.7	S	26°34'6.65"N & 88° 8'28.60"E
AAQ-8	Ullajote	8.0	SSW	26°32'58.46"N & 88° 8'14.69"E

3.4.3 Baseline Data

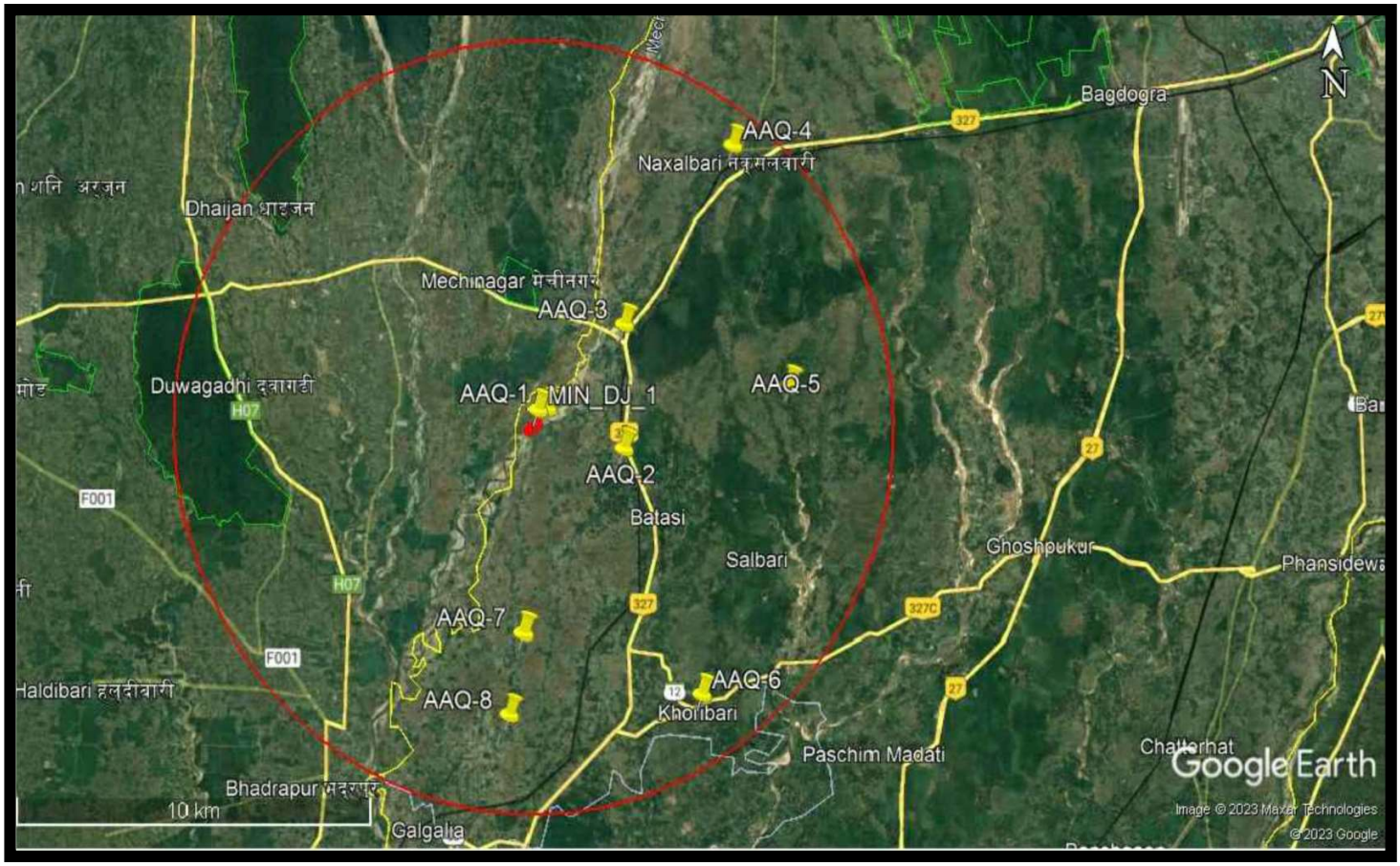


Figure: 3.8: Map showing Ambient Air Quality Monitoring Locations

Table 3.11: Ambient Air Quality Monitoring Results (March, 2023 to May, 2023)

PM2.5,µg/m3 Gravimetric	Min	Max	STDEV	98P	AVERAGE
AQ1	43.6	58.0	4.1	57.6	51.0
AQ2	26.9	39.0	3.4	38.6	33.2
AQ3	27.8	42.0	4.1	41.6	35.4
AQ4	29.0	58.0	10.2	57.6	41.4
AQ5	34.5	59.8	8.2	59.4	47.1
AQ6	31.3	44.6	3.8	44.2	37.7
AQ7	44.4	61.6	5.1	61.2	53.0
AQ8	23.7	38.9	4.2	38.5	32.2

PM210,µg/m3 Gravimetric	Min	Max	STDEV	98P	AVERAGE
AQ1	79.3	115.6	9.3	113.5	99.2
AQ2	86.2	126.8	10.6	125.1	106.5
AQ3	95.7	128.1	8.5	125.8	112.2
AQ4	91.3	132.8	10.6	131.1	112.5
AQ5	90.1	131.0	10.9	128.6	112.3
AQ6	79.3	117.8	9.8	116.1	98.2
AQ7	105.8	150.8	11.4	149.1	127.5
AQ8	79.3	115.6	9.3	113.5	99.2

SOx,µg/m3 Gravimetric	Min	Max	STDEV	98P	AVERAGE
AQ1	9.0	15.0	1.7	14.9	12.2
AQ2	5.4	11.0	1.6	10.9	8.5
AQ3	3.6	11.0	2.3	10.9	6.9
AQ4	4.2	12.0	2.5	11.9	7.8
AQ5	6.7	13.4	1.8	13.3	10.3
AQ6	4.3	10.6	1.8	10.5	7.6
AQ7	8.1	15.0	2.0	14.9	11.4
AQ8	4.8	11.0	1.8	10.9	8.0

NOx,µg/m3 Gravimetric	Min	Max	STDEV	98P	AVERAGE
AQ1	43.6	69.0	8.4	68.6	57.3
AQ2	37.6	55.2	5.4	54.8	45.7
AQ3	31.7	51.0	6.0	50.6	42.3
AQ4	24.8	43.0	5.8	42.6	34.5
AQ5	33.2	47.0	4.0	46.6	40.9
AQ6	37.0	50.4	3.8	50.0	43.4
AQ7	40.9	59.9	5.2	59.1	50.5
AQ8	29.8	43.0	3.8	42.6	37.1

CO,µg/m3 Gravimetric	Min	Max	STDEV	98P	AVERAGE
AQ1	0.574	0.955	0.106	0.946	0.752
AQ2	0.366	0.732	0.101	0.723	0.531
AQ3	0.433	0.832	0.112	0.823	0.617
AQ4	0.540	0.932	0.112	0.923	0.718
AQ5	0.580	0.977	0.108	0.949	0.761
AQ6	0.384	0.752	0.102	0.743	0.554
AQ7	0.459	0.872	0.111	0.858	0.664
AQ8	0.473	0.755	0.081	0.746	0.585

3.4.4 Results

The ambient air quality study for the 8 AAQ monitoring stations shows that the maximum and minimum ground level concentration for PM_{10} is respectively 150.8 µg/m^3at AQ7 and 79.3 µg/m^3at AQ1, AQ6 & AQ8. Whereas the maximum and minimum ground level concentration for $PM_{2.5}$ ranges between 61.7 µg/m^3 at AQ7 and 28.7 µg/m^3 at AQ8 respectively. Similarly for SO_2, the maximumand minimum ground level concenration varies between 15.0 µg/m^3 and 3.6 µg/m^3 for respectively AQ1& AQ7 and AQ3 stations. For NO_2 the maximum and minimum ground level concentration varies between 69.0 µg/m^3 & 29.8 µg/$m^3$for respectively AQ1 & AQ8 stations. For CO Maximum (0.9770 µg/m3) and CO Minimum (0.366 µg/m3).

3.5 NOISE ENVIRONMENT

3.5.1 General

The ambient noise levels within the study area were recorded using Sound Level Meter. Noise level monitoring results were compared with the Ambient Noise Quality Standard notified under Environment Protection Act, 1986 and amended thereof.

3.5.2 Methodology

The proposed project activity is expected to affect ambient noise quality in the surrounding areas. Therefore the choice of monitoring locations is based on human habitation factors. Table 3.12 and Figure 3.9 shows noise quality monitoring locations.

Table-3.12: Noise Quality Monitoring Stations

Monitoring Station	Location	Dist. From center ofsite (km)	Direction	Geo-Coordinate
NQ-1	Project Site	0.00	-	26°37'16.26"N & 88° 8'52.15"E
NQ-2	Saheburam	2.5	ESE	26°36'42.09"N & 88°10'10.21"E
NQ-3	Panitanki	3.1	NNE	26°38'27.13"N & 88°10'10.69"E
NQ-4	Naxalbari	8.8	SE	26°40'57.28"N & 88°12'0.98"E
NQ-5	Kilaghata Bazar	6.5	E	26°37'35.07"N & 88°12'58.35"E
NQ-6	Khoribari	8.6	SSE	26°33'15.72"N & 88°11'29.46"E
NQ-7	Nayahat Bazar	5.7	S	26°34'6.65"N & 88° 8'28.60"E
NQ-8	Ullajote	8.0	SSW	26°32'58.46"N & 88° 8'14.69"E

Table-3.13: Noise Level Status

Sl. No.	Locations		Equivalent Noise Level, dB (A)			
			Limit (as per CPCB Guidelines),Leq, dB(A)		Observed valueLeq, dB(A)	
			DAY*	NIGHT*	DAY*	NIGHT*
1	Mine site	Industrial Zone	75	70	67.1	46.7
2	RurbanVillage	Residential Zone	55	45	56.9	42.3
3	Sukna	Residential Zone	55	45	57.3	43.5
4	Mallaguria	Residential Zone	55	45	66.3	42.5
5	Sevok PetrolPump	Residential Zone	55	45	62.3	48.5
6	Toribari	Residential Zone	55	45	64.2	46.8
7	AshigharBazar	Residential Zone	55	45	66.4	46.8
8	Chakur	Residential Zone	55	45	61.4	44.8

Figure 3.9 : FIELD PHOTOS

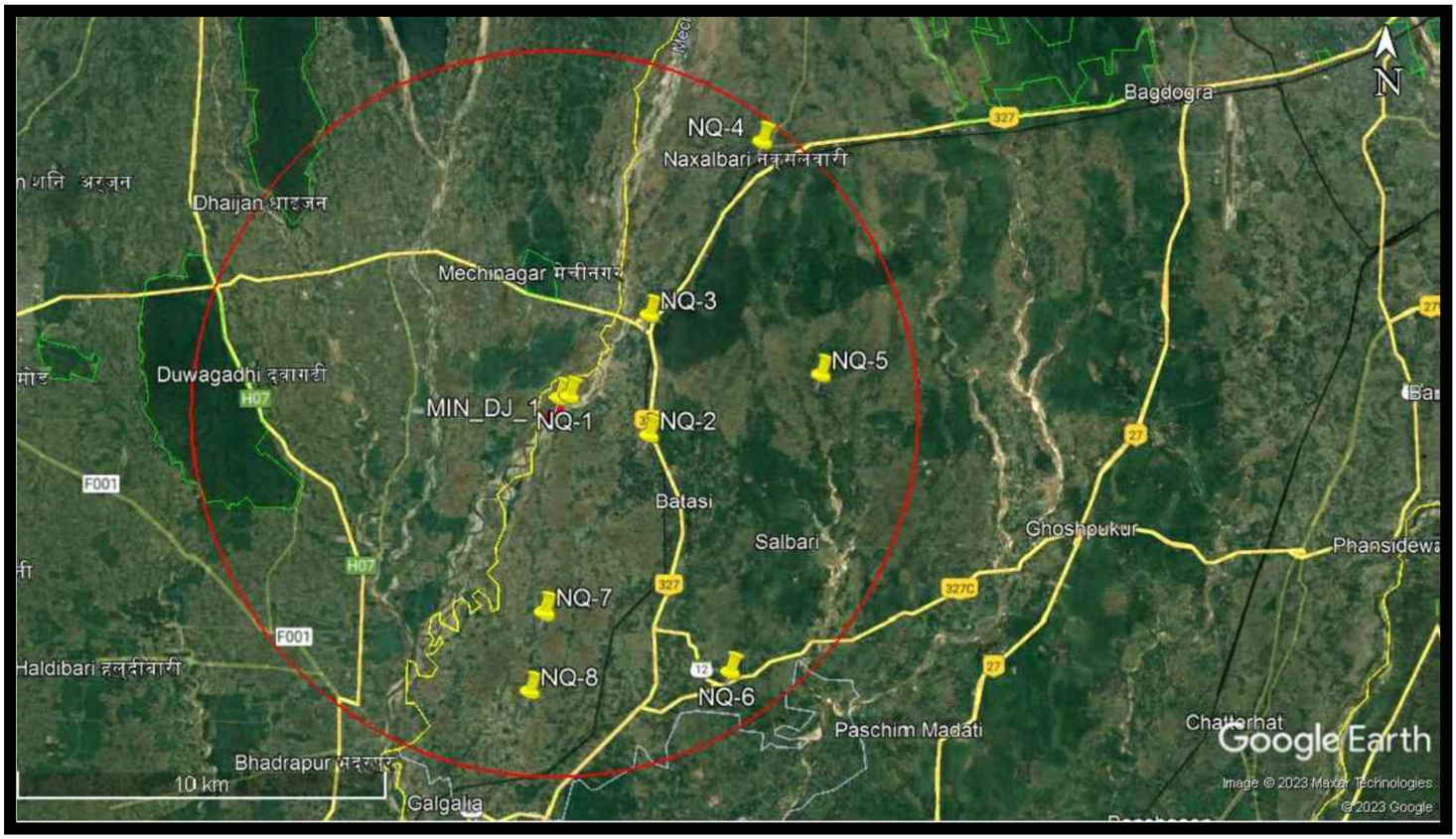


Figure: 3.10: Map showing Noise Quality Monitoring Locations

3.5.3 Results

Noise monitoring study reveals that the minimum & maximum noise levels at day time were recorded as 67.1 dB (A) at NQ1 & 56.9 dB (A) at NQ2. The minimum & maximum noise levels at night time were found to be 48.5 dB (A) at NQ5 & 42.3 dB (A) at NQ2.

There are no other major noise producing sources in the study area except some domestic activities, which contributes to the local noise level of the area. Traffic movements in nearby villages also add to the ambient noise level of the area.

3.6 BIOLOGICAL ENVIRONMENT

3.6.1 INTRODUCTION:

The biological environment is very crucial for living environment of any area. The Biological diversity includes the variation of all of life forms mainly genetic, species and population. However Flora and Fauna diversity is broadly understood type. They are further divided in to terrestrial and aquatic life form. Forests are repository of the bio-diversity, gene pool resources, sequester carbon dioxide and provide lot of other environmental services. They play a very vital role in sustaining the life of people and are crucial for the food and water security. In India, the sustained flow of water in our rivers, streams and rivulets and recharge of ground water is necessary for the food security and drinking water availability. The hydrological functions of forests include interception of rainfall and regulating the stem flows, binding soil to prevent soil erosion and conserving the soil moisture. The Forests are the source of major water resource both surface, subsoil and groundwater in the country. Forests supply nutrients to agriculture crops through runoff water with much other complementariness with agriculture ecosystem. The division of core and buffer zone is the best way to study the pattern of biodiversity for environmental impact assessment.

3.6.2 RESULTS AND DISCUSSION

The primary survey of study area was conducted particularly with reference to habitat types, listing of species and assessment of the existing baseline ecological (terrestrial and aquatic ecosystem) conditions.

National Park, Wildlife Sanctuary, Notified Forest, Ecologically Sensitive area and critically polluted areas in study area:

There is no national park, wildlife sanctuary and critically polluted area in 10km radius from the project site. There are no forests within 15 Km from the boundary of the project site. The area harbours one of the best alluvial soils in India.

3.6.3 Floral biodiversity:

The major portion of the southern plain area is mostly covered by tea gardens with some protected and reserved forests. Hilly terrains toward the north are thickly forested. The forest consists of trees essentially of Sal, Teak, Bamboo, Pine, Cane etc. Moreover, thick under-growth sand plenty of creepers, thorns and bushes make forest difficult to penetrate.

Orchids and medicinal plants are available in this hilly region.

A wide range of vegetation structures with extremely rich plant and animal diversity developed inthe district due to the extreme climatic, edaphic and physiographic variations. Plants of diverse forms, such as trees, shrubs, climbers, lianas, annual and perennial herbs, geophytes, epiphytes, parasites, and saprophytes, are evenly distributed. The estimated vascular flora for Darjeeling district is 2912.

Table-3.14 Vascular flora in Darjeeling

Taxa	Estimated number of Species
Angiosperms (dicots)	1900
Angiosperms (monocots)	750
Gymnosperms	12
Pteridophytes	250

The eastern portion of the district forms the part of the rice plain of West Bengal. The land under rice cultivation contains the usual marsh weeds of Gangetic plain. Aquatic plants and water weeds are found in ponds, ditches and strangnant streams. Around human habitations there are shrub species such as Glycosmis, Polyalthia Suberosa, Clerodenaron infortunatum,Solanum torvum and various other species of the same genus, besides Trema, Streblus and Ficus hispida. The larger trees are Banyan, Red Cotton Tree (Bombax malabaricum), Mango(Mangifera indica), Jiyal (Odina wodier), Phoenix dactylifera and Borassus flabellifer. Other plants found include Jatropha gossypifolia, Urena, Heliotropium and Sida. Forests or scrub jungles contain Wendlandia exserta, Gmelina arborea, Adina cordifolia, Holarrhena antidysenterica, Wrightia tomentosa, Vitex negundo and Stephegyne parvifolia.

The western portion of the district is higher. The uplands are either bare or covered with scrub jungle of Zizyphus and other thorny shrubs. This thorny forest gradually merges into sal (Shorea robusta) forest. Low hills are covered with Miliusa, Schleichera, Diospyros and other trees.Some of the common trees of economic interest found in the district are: Alkushi

(Mucuna pruriens), Amaltas (Cassia fistula), Asan (Terminalia tomentosa), Babul (Acaciaarabica), Bair (Zizyphus jujuba), Bael (Aegle marmelos), Bag Bherenda (Jatropha

curcas), Bichuti (Tragia involucrate), Bahera (Terminalia belerica), Dhatura (Datura stramonium), Dhaman (Cordia macleoidii), Gab (Diospyros embyopteris), Harra (Terminalia chebula), Imli (Tamarindus indica), Kuchila (Strychnos nux vomica), Mahua (Bassia latifolia),Palas (Butea frondosa), Sajina (Moringa pterygosperma), Kend (Diospyros melanoxylon),Mango, Date Palm, Neam, Papal, Banyan, Red Cotton Tree and Jiyal.The important floras of the study area are given in **Table 3.15.**

Table 3 .15: Flora of the Study Area

Flora:

Sl. No.	Scientific Name	Common Name	Family	Habit
1	*Terminalia alata*	Indian laurel	Combretaceae	deciduous tree
2	*Albizia procera*	white siris or karoi tree	Fabaceae	Deciduous tree
3	*Phyllanthus urinaria*	chamber bitter	Phyllanthaceae	Herb
4	*Alstonia scholaris*	Indian Pulai	Apocynaceae	Blackboard tree
5	*Litsea monopetala*	Many-Flowered Litsea	Lauraceae	small tree
6	*Macaranga pustulata*	parasol leaf tree	Euphorbiaceae	small tree
7	*Duabanga grandiflora*	Beremban Bukit, Beremban Darat,	Lythraceae	tree
8	*Schima wallichii*	Needlewood	Theaceae	tree
9	*Magnolia champaca*	Champak	Magnoliaceae	tree
10	*Mallotus philippensis*	red kamala or kumkum tree	Euphorbiaceae	tree,
11	*Quercus glauca*	Bani	Fagaceae	tree
12	*Cinnamomum bejolghota*	Bay Leaf	Lauraceae	tree
13	*Phoebe lanceolata*	Lanceleaf Laurel	Lauraceae	tree
14	*Litsea cubeba*	Mountain Pepper.	Lauraceae	shrub
15	*Pterospermum acerifolum*	Kanak Champa	Sterculiaceae	Tree
16	*Rhododendron arboreum,*	Maha ratmal	Ericaceae	shrub

17	*Rhododendron grande*	azalea	Ericaceae	evergreen shrub
18	*Castanopsis hystrix*	Patle katus	Fagaceae	evergreen Tree
19	*Ilex sikkimensis*	Himalayan Holly	Aquifoliaceae	Tree
20	*Magnolia campbellii*	Kavathi champae	Magnoliaceae	deciduous tree
21	*Allamanda cathartica*	Golden Trumpet Vine	Apocynaceae	shrubs
22	*Rubus paniculatus*	Heart-Leaf Raspberry.	Rosaceae	Woody weeds
23	*Aconogonum molle*	Thrumbula	Polygonaceae	shrub
24.	*Cautleya lutea*	Slender Yellow Ginger	Zingiberaceae	shrub
25	*Artemisia vulgaris*	Mugwort	Asteraceae	shrub
26	*Agapetes serpens*	Himalayan Lantern	Ericaceae	semi-climbing shrub

Source :(i) * Field Observation and discussion with local people in Study Area,

3.6.4 Faunal Biodiversity:

Darjeeling district possess a rich variety of fauna. There are about 90 species of mammals in the Darjeeling District. Among the large carnivores, Wild Leopard, Clouded Leopard, Leopard-Cats are seen both in the hills and jungles of the Terai region. The Jackal,Indian Fox are also normal residentsof the forests. The Himalayan Black Bear, Common Indian Sloth Bear and Malayan Sun-Bear are the species belonging to Ursidae family which can still be found, although in very limited number, in forests. Among the herbivore, Elephant is very common. Several wild Elephants, sometimes in herds, sometimes singly can often be seen mainly near the forest areas in the vicinity of river streams and in the Terai. Among the less challenging smaller herbivore, the Gaur, Sambar, Spotted-Deer, Barking-Deer and Hog-Deer can also be occasionally observed. Among the goats, Serow and Ghoral can still be seen in the forests. The Red-Tailed Rabbit, Hispid Hare, Squirrels, Porcupines, Moles, Rats, Mice, wide variety of poisonous and non-poisonous Snakes, Martens and numerous other small animals are the common residents here (Census, 2011).

Darjeeling District is very rich in Bird life containing about 550 species. Nearly one quarter of the species of birds found in India, is found here. More than half of the species arepasserine birds, the largest families being the Timaliinae (Laughing-Thrushes, Babblers) with 61species; the Sylviinae (Warblers) with 60 species; the Turdinae (Chats, Robins, Thrushes) with56 species; the Muscioa-pmas (Fly-catchers) with 27 species; the Fringillinae (Finches) with 22species. There are plenty of Minivets, Orioles, Sunbirds, Malay Tree Sparrow. The best represented families in the Coraciformes are the Picidae (Woodpeckers) with 15 species; the Cuculidae (cuckoos) with 16 species and

Asionidae (owls) with 14- species. There are five species of King-fisher of which the tiny Indian three-toed Kingfisher (Ceyx e. enthaca) a forest species,is the most beautiful one. Accipitrine birds number about 40 and include the fine Himalayan Lammergeyer (Gypaetus barbatus hemachalanus), Hodgson's Feather-toed Hawk Eagle(Spizaetus n. nipalensis), the Himalayan Rufous bellied Hawk-Eagle (Lophotnorohis k. kienerl and the handsome bold miniature Falcon, the Himalayan Red-legged Falconet (Microphierax c. coerulscens). There are about a dozen species of pigeon and doves, some being only found at high elevations. Only Bengal Green-Pigeon (Crocopus p. phoenicopterus) is found m the plains.The Green-Pigeon (Sphenocercus s. spenurus) and the Himalayan Pintailed Green-Pigeon (Sphenocercus a. apicandus) are common in the hills.

Table 3.16: Fauna of the Study Area

Amphibians

SL NO.	Common Name	Scientific name
1	Indus Valley Toad	*Firouzophrynus stomaticus*
2	Himalayan Toad	*Duttaphrynus himalayanus*
3	Sikkim Lazy Toad	*Scutiger sikimmensis*

Reptiles

SL NO.	Common Name	Scientific name
1	Oriental Garden Lizard	*Calotes versicolor*
2	East Himalayan Mountain Lizard	*Japalura variegata*
3	Himalayan Keelback	*Herpetoreas platyceps*
5	Sikkim Ground Skink	*Ablepharus sikimmensis*

Mammals

SL NO.	Common Names	Scientific name
1	Wild Leopard,	*Panthera pardus*
2	Clouded Leopard	*Neofelis nebulosa*
3	Jackal	*Canis aureus*
4	Himalayan black bear	*Ursus thibetanus laniger*
5	Common Indian Sloth Bear	*Melursus ursinus*
6	Malayan Sun-Bear	*Helarctos malayanus*
7	wild Elephants,	*Elephas maximus indicus*

8	Gaur	*Bos gaurus*
9	Sambar	*Rusa unicolor*
10	Hispid Hare	*Caprolagus hispidus*
11	Himalayan brown goral	*Nemorhaedus goral*
12	Martens	*Martes gwatkinsii*

Aves

SL NO.	Common Names	Scientific name
1	Minivets	*Pericrocotus cinnamomeus*
2	Malay tree sparrow	*Passer montanus*
3	Sunbird	*Nectariniidae*
4	Himalayan Woodpecker	*Dendrocopos himalayensis*
5	Himalayan Cuckoo	*Cuculus saturatus*
6	Himalayan Owl	*Strix nivicolum*
7	Himalayan Lammergeyer	*Gypaetus barbatus*
8	hodgson's feather-toed hawk eagle	*Nisaetus nipalensis*
9	himalayan rufous bellied hawk-eagle	*Lophotriorchis kienerii*
10	himalayan red-legged falconet	*Microhierax caerulescens*
11	Bengal Green-Pigeon	*Crocopus phoenicopterus*
12	Himalayan Pintailed Green- Pigeon	*Treron apicauda*

Most of animals found in the study area are of least concern.

3.6.5 Aquatic life: Along its course river Mechi support rich aquatic habitat. Numerous species of Fishes, planktons & zooplanktons are found in the study area

3.6.6 Fishes: The Mechi River starts from the south of Pashupatinagar from a place called Fakfokthum in Illam district. It is a perennial river that is fed by small streams at different points and also a rivulet coming from Kalingpong and flows through different places of Illam and Jhapa and finally to India as Mahananda River. The river has lower volume of water but has higher velocity at upper portions. Similarly, the volume of water increases while it reaches the lower stream forming many pools that provide good habitat for warm water fish and aquatic fauna Fish species of Mechi

river. Following fishes could be found in the river Mechi –

Table 3.17:- Fish species of Mechi river

SL.No.	Local Name	Scientific Name
1	Boga bata	*Labeo boga*
2	Gardi	*Labeo dero*
3	Kurchi, Goni	*Labeo gonius*
4	Utti	*Labeo pangusia*
5	Gilli-punti	*Puntius gelius*
6	Punti	*Puntius sophore*
7	Teri- punti	*Puntius terio*
8	Boroli	*Barilius vagra*
9	Koksa	*Barilius shacra*
10	Balabotia	*Botia dario*
11	Guntel	*Lepidocephalychthys guntea*
12	Poa,Poia	*Lepidocephalichthys annandalei*
13	Pola	*Acanthocobitis botia*
14	Bot-singhi	*Olyra longicaudata*
15	Kakla	*Xenentodon cancila*
16	Taki	*Channa punctatus*
17	Choak-si, Ghopoia	*Garra annandalei*
18	Budena	*Garra gotyla*
19	Rupali- Khorkey	*Schistura rupecula*
20	Boroli	*Barilius sp*
21	Danrika	*Esomus danricus*

(Source: Site visit and Secondary Data)

3.7 SOCIO-ECONOMIC ENVIRONMENT

Critically analyzing the existing environmental status of the socio-economic profile and visualizing the scenario with the project, the impacts of the project would be varied and may generate positive impacts of the mining of sand quarry in the region that are stated below:

- Direct & indirect employment to local people.
- Improvement in communication facilities.
- Increased facilities in education
- Improvement in medical facilities.
- Overall development in culture and life style.

3.7.1 Methodology

The methodology adopted for impact assessment is as follows:

a) The details of the activities and population structure have been obtained from Census2011 and analyzed.

b) Primary data was collected by a door-to-door survey in urban area and household's living therein. The data collected during the above survey were analyzed to evaluate the prevailing socio-economic profile of the area.

c) Based on the above data, impacts due to construction operation on the community have been assessed and recommendations for further improvement have been made.

3.7.2 Concept & Definition

a) Study Area: The study area, also known as impact area has been defined as the sum total of core area/project area and buffer area with a radius of 10 Kilometers from the periphery of the core area/project is. The study area includes all the land marks both natural and man made ,falling herein.

b) Household: A group of persons who normally live together and take their meals from a common kitchen are called a household. Persons living in a household may be related or unrelatedor a mix of both. However, if a group of related or unrelated persons live in a housebut do not taketheir meals from the common kitchen, then they are not part of a common household.Each such person is treated as a separate household. There may be one member households, two member households or multi-member households.

c) Sex ratio: Sex ratio is the ratio of males to females in a population. It is expressed as number of females per 1000 males.

d) Literates: All persons aged 7 years and above who can both read and write with understandingin any language are taken as literate. It is not necessary for a person to have received any formal education or passed any minimum educational standard for being treated as literate. People who are blind but can read in Braille are also treated as literates.

e) Literacy rate: Literacy rate of population is defined as the percentage of literates to the total

population aged 7 years and above.

f) Labour Force: The labour force is the number of people employed and unemployed in a geographical entity. The size of the labour force is the sum total of persons employed and unemployed. An unemployed person is defined as a person not employed but actively seeking work. Normally, the labour force of a country consists of everyone of working age (around 14to 16) and below retirement (around 65) that are participating workers, that is people actively employed or seeking employment. People not counted under labour force are students, retired persons, stay-at home parents, people in prisons and discouraged workers.

g) 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 or full time Worker: All persons engaged in 'work' are defined as workers. Persons who are engaged in cultivation or milk production even solely for domestic consumption are also treated as workers.

h) Worker: All persons engaged in 'work' are defined as workers. Persons who are engaged in cultivation or milk production even solely for domestic consumption are also treated as workers.

i) Main Workers: Those workers who had worked for the major part of the reference period (i.e. 6 months or more) are termed as Main Workers.

j) Marginal Workers: Those workers who did not work for the major part of the reference period (i.e. less than 6 months) are termed as Marginal Workers

k) Work participation rate: The work participation rate is the ratio between the labour force and the overall size of their cohort (national population of the same age range). In the present study the work participation rate is defined as the percentage of total workers (main and marginal) to total population.

3.7.3 Description of the Study Area:

The study area of Proposed Sand Mining Project of Area: 7.31 Ha / 18.06 Acres, Khasra No.- 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P), of Block Id- MIN_DJ_01 on River – Mechi of JL no- 05 Plate no: 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P) District- Darjeeling State- West Bengal. As per Ministry of Environment and Forests vide number S.O. 3977 (E).

Table 3.18: Demographic Profile of the Villages in the study area

Demographic Profile of the Mouza in the study area (Antaram)

S/n	Demographic Feature	Study area	
		Core zone (Projectarea)	**10 Km Buffer**
1	**Total Population**	0	536
2	**Male**	0	271
3	**Female**	0	265

*Source: Census of India 2011, figures in parenthesis represents percent value

3.7.3.1 Demographic composition:

Antaram village is situated in Teshil Kharibari, District Darjiling and in State of West Bengal India. Villagehas population of 536 as per census data of 2011, in which male population is 271 and female populationis 265. Total geographical area of Antaram village is 245.64 Hectares. Population density of Antaram is 2persons per Hectares. Total number of house hold in village is 113.

As per the Census Data 2011 there are 978 Females per 1000 males out of 536 total population of village.There are 933 girls per 1000 boys under 6 years of age in the village. Demography of Study Area, District: Darjeeling, West Bengal, India

Table-3.19: Population Chart

S/n	Item	Number of Individuals	%	Number of Individuals	%	Number of Individuals	%	Number of Individals	%
1	Name of area	Study areaAntaram		DarjeelingDistrict		West Bengal		India	
2	Total Population	536		1595181		91,276,115		1.2×10^9	
3	Total Male Population	271	50.56	808809	50.70	46,809,027	51.28	6.2×10^8	52
4	Total Female Population	265	49.44	786372	49.30	44,467,088	48.72	5.9×10^8	48

Source: Census of India 2011

3.7.3.2 Comparison: The of total population clears that study area is having total populationvery less than district population due to less population density.

3.7.3.3 Social Infrastructure Available:

The Proposed Sand Mining Project of Area:7.31Ha, Khasra No.- 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P), of Block ID- MIN_DJ_01 on River – Mechi, of JL no- 05 Plate no: 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P), District-Darjeeling, State- West Bengal As per Ministry of Environment and Forests vide number S.O. 3977

3.7.4 Amenities

Education facilities

CSR fund should be implemented for social education. Pre-Matric Coaching/ English Spoken Class, Adult Literacy Programme should be implemented for the area.

Health Facilities:

CSR fund should be implemented for social education. Pre-Matric Coaching/ English Spoken Class, Adult Literacy Programme should be implemented for the area.

Drinking water

Drinking water facility will be provided by the Project proponent. It will be managed by private tankers.

Electricity

All the habitations in the study area are provided with electricity and the same is available for domestic

3.7.5 Social Setup: The study area is dominated by General caste and other backward community, Agriculture is the predominant occupation however currently there is a wave of change of occupation. Thereby other worker are increasing in the study area. The immediate surroundings of the projects lack the amenities. The villagers are very optimist by the proposed opening of proposed sand mining ghat. The major expectations include the solution of drinking water problem, quality education, easy availability of sand etc .

Table 3.20: Demographic particulars of the study area (Antaram)

S.N.	Description	Number	Percentageto Respective total
	Gender wise Total Population of the Study Area	536	100
	Male	271	50.56%
	Female	265	49.44%
	Sex Ratio (No. of females per 1000 males)	978	
	Gender wise Total Population (0-6 age group)	58	100
	Male	30	51.72
	Female	28	48.27
	Sex Ratio of 0-6 age group population (No. of females per1000 males)	933	
	Total number of Households	113	

	Average Household size in the Study Area as a whole		

	Highest Household size in the Study Area		
	Lowest Household size in the Study Area		
	Total no. of villages in the study area		
	Total Population of Schedule Caste Community in theStudy Area	132	
	Male	68	51.51%
	Female	64	48.5
	Sex Ratio of Schedule Caste population in Study Area(No. Of females per 1000 males)	941	
	Total Population of Schedule Tribe Community		
	Male		
	Female		
	Sex Ratio of Schedule Tribe population in Study Area(No. Of females per 1000 males)		
	Total Literates in the Study Area	311	
	Male	173	55.62
	Female	138	44.4
	Overall Literacy Rate in the Study Area	65.06%	
	Male	71.78%	
	Female	58.28%	

Source: Census of India 2011

Chapter 4

ANTICIPATED IMPACTS AND THEIR MITIGATION MEASURES

4.0 GENERAL

All Mining projects, whether existing or new, have positive or negative impacts on the surrounding environment. Depending on the nature of activities and baseline environment status, the impacts are assessed for their importance. The results of these assessments are used to formulate mitigation measures and future methodology for Environmental Monitoring and Environmental Management plan.

The environmental parameters likely to be affected by mining are related to many factors, i.e. physical, social, economic, agriculture and aesthetic. The excavated sand will be transported via trucks to outsiders. The operations may disturb environment of the area in various ways, such as removal of mass, change of landscape, flora and fauna of the area, surface drainage, and change inair, water and soil quality. While for the purpose of development and economic up-liftmen of people, there is need for establishment of mining industries, but these should be environment friendly. Therefore, it is essential to assess the impacts of mining on different environmental parameters, before starting the mining operations, so that abatement measures could be plannedin advance for eco-friendly mining in the area. The likely impacts on different environmental parameters due to this mining project are discussed here.

Several scientific techniques and methodologies are available to predict impacts of physical environment. Mathematical models are the best tools to quantitatively describe the cause and effect relationships between sources of pollution and different components of environment. In cases where it is not possible to identify and validate a model for a particular situation, predictions have been arrived at based on logical reasoning/consultation/extrapolation.

The following parameters are of significance in the Environmental Impact Assessment and are being discussed in detail:

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

Based on the environmental baseline scenario as detailed in Chapter 3 and the proposed mining activity in Chapter 2, this chapter assesses the likely impact and their extent on various environmental parameters along with the mitigation measures.

4.1 LAND ENVIRONMENT

The proposed extraction of stream bed materials, mining below the existing streambed, and alteration of channel-bed form and shape may lead to several impacts such as erosion of channel bed

and banks, increase in channel slope, and change in channel morphology if, the operations are not carried out scientific & systematically.

The mining and allied activities involved due to mining result in creation of temporary haul roads and formation of mined pits, etc. affecting the land use pattern. In this project, silt and clay are also produced as a constituent along with minerals, which are considered to be waste.

Anticipated Impacts:

- Mining activity will impact river bed topography by formation of excavation voids.
- Undercutting and collapse of river banks.
- River bed mining may bring in some change in topography at the nearby area of the mine lease.
- Stacks of solid waste generated from mining activity may hinder the flow of water in monsoon season.

Mitigation measures:

Adopting suitable, site-specific mitigation measures can reduce the degree of impact of mining on land. Some of the land-related mitigation measures are as follows:

- Excavated pits will get replenished annually in monsoon itself & will be restored tooriginal.
- Mineral will be mined out after leaving safety distances from both side from the bank as"No mining zone " for bank stability.
- The mine working will remain confined to allotted river bed only, so it will not disturbany surface area outside the mine lease area which may affect topography or drainage.
- Solid waste will not be stacked on the bank side as it will hinder the flow of water inmonsoon season.

4.2 WATER ENVIRONMENT

Anticipated Impacts:

Mining of sand from within or near *river* has an indirect impact on the physico-chemical habitat characteristics during monsoon season. These characteristics include in stream roughness elements, depth, velocity, turbidity, sediment transport and stream discharge.

The detrimental effects, if any, to biota resulting from bed material mining are caused by following:

- Alteration of flow patterns resulting from modification of the *river*
- An excess of suspended sediment during monsoon season.

Mitigation measures

The necessary water requirement for drinking & for water sprinkling will be met from Dugwell

/Bore well outside the Sand Ghat area on purchase basis. The water is potable. There are no chances of any contamination as there is no chemical processing etc. are going to be done in theSand Ghat area.

4.3 AIR ENVIRONMENT

Anticipated Impacts:

Emission of fugitive dust is envisaged due to:

- Mining Activities includes excavation and lifting of minerals. The whole process will be done by semi-mechanized process without drilling and blasting. Therefore, the dust generated is likely to be insignificant as compared to mining processes involving drilling,blasting, mechanized loading etc.

- Transportation of minerals will be done by road using trucks. Fugitive dust emission is expected from the transportation of trucks on the haul roads. Evaluation of fugitive dust emission has been done by using line source model as given below:

Air Modeling

The proposed project includes various activities like approach roads, haul roads, excavation and transportation of sand. These operations generally result in generation of dust and thereby pose health hazards. However, it is proposed that adequate control measures will be provided at every stage of operation such as, water sprinkling at loading, unloading points and on haul roads before transportation to reduce the fugitive dust emissions.

The mining is proposed to be carried out by opencast Semi- mechanized method. The air borne particulate matter (PM_{10}) generated by transportation of sand is the main respirable air pollutant. The emissions of Sulphur dioxide (SO_2), Nitrogen Oxides (NO_2) contributed by vehicles plying on haul roads will be marginal. Prediction of impacts on air environment has been carried out taking into consideration proposed production and net increase in emissions.

4.3.1 Emissions Details

Loading - unloading and transportation of sand, wind erosion of the exposed area and movement of light vehicles will be the main polluting source in the proposed mining activities releasing Particulate Matter (PM_{10}) affecting Ambient Air of the area. Emission Loading and unloading was calculated by the area sources. Transportation of the sand stone by trucks operated per hour on the haul road was calculated by the area source which was combination of line sources with each truck loaded with sand transported over the haul road of the mining area. It was assumed that truck will carry 10 Tonnes of sand. Details of emission during loading/unloading and transportation on the haul road, wind erosion of the exposed area and road maintenance were discussed and combined impact was predicted in the worst case scenario under worst meteorological condition given as follows:

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 sand by trucks operated on haul road. Emission of PM_{10} due to transportation of sand on haul road was

0.62×10^{-5} g/s/m^2 based on assumption that silt content spread on road surface was 10%, and efficiency of PM_{10} emission control 90%. Truck will be fully covered with tarpaulin material and emission of PM_{10} during on the haul road will be insignificant.

Based on the above consideration that there was low emission of PM_{10} during transportation of sand, however during loading & unloading, transportation of sand over the haul road, emission of PM_{10}

of the exposed area due to wind erosion and movement of light vehicles on the road were not considered and combined with mining activities. US EPA based Dispersion ISCST-3 model was used for prediction of impact with 1-h meteorological data of the study period for the assessment of GLC.

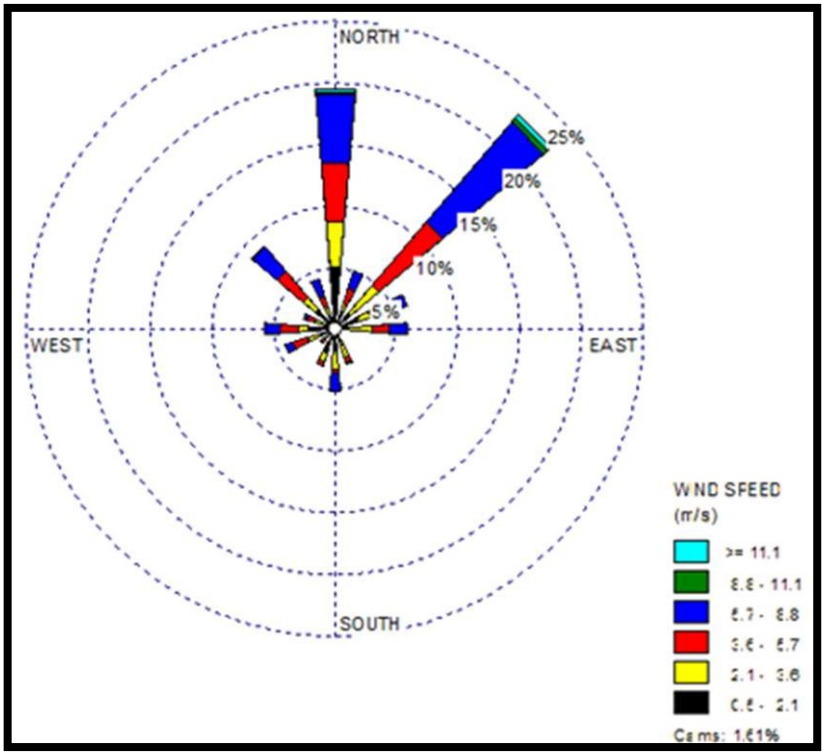


Figure 4.1:-Windrose diagram

The maximum and minimum thermometer, Humidity and Rainfall ran recorded during the study period (March to May - 2023) were max 33.8° C and min 19° C respectively and Humidity max 78 & min 57.

	March	**April**	**May**
Temperature	Max: 28.0° C Min: 19° C	Max:32.7 ° CMin:25.1 ° C	Max:33.8 ° C Min:27.5 ° C
Humidity	Max: 68.0 Min:57.0	Max:76.0 Min:61.0	Max:78.0 Min:64.0
Rainfall	Ave:155.0 mm	Ave: 170.0 mm	Ave: 582.0 mm

4.3.2 Frame work of Computation & Model details

By using the above-mentioned inputs, ground level concentrations due to the mining activities have been estimated to know the incremental rise in ambient air quality and impact in the study area. The effect of air pollutants upon receptors are influenced by concentration of pollutants and their dispersion in the atmosphere. Air quality modeling is an important tool for prediction, planning and

evaluation of air pollution control activities besides identifying the requirements foremission control to meet the regulatory standards and to apply mitigation measures to reduce impact caused by mining activities.

PM_{10} was the major pollutant occurred during mining activities. Impact of area source emission was considered and prediction of impact was made on various monitoring locations in the study area due to loading and unloading and ii) transportation of vehicles on the haul road of the miningarea. Impact was predicted in the worst case scenario due to combined impact of loading and unloading and emission due to transportation of vehicles on Limestone mine on haul road of mining area and other mining activities will occur simultaneously.

Impact was predicted over the distance of 10,000 m and 2,000 m around the source in grids of 200m & 20 m respectively in Cartesian coordinates(X,Y) to assess the impact at each receptor separately at the various locations and maximum incremental GLC value at the project site. Maximum impact of PM_{10} was observed close to the source due to low to moderate wind speeds. Incremental value of PM_{10} was superimposed on the base line data monitored at the proposed siteto predict total GLC of PM_{10} due to combined impacts.

4.3.3 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 project for the purpose of estimation of increase in PM_{10} are identified due to –

(i) Loading/unloading of sand

(ii) Transportation of sand by trucks on the Haul roads from mining benches.

Combined impact of PM_{10} was considered due to mining activities occurred simultaneously on various sampling locations is given in **Table 4.1**

Table-4.1: Impact of PM_{10} due to Loading-unloading and transportation of sand by trucks

Locations	Locations Code & Distance w.r.t. site.	Background value (98 percentile) in $\mu g/m^3$	Increment l GLC in $\mu g/m^3$	Total Predicted GLC in $\mu g/m^3$
Project Site	AAQ-1	86.4	1.5	87.9
Saheburam	AAQ-2	80.6	<0.001	80.6
Panitanki	AAQ-3	79.6	0.1	79.7

Naxalbari	AAQ-4	86.9	<0.001	86.9
Kilaghata Bazar	AAQ-5	85.8	<0.001	85.8
Khoribari	AAQ-6	85.0	<0.001	85.0
Nayahat Bazar	AAQ-7	81.3	0.2	81.5
Ullajote	AAQ-8	82.5	0.2	82.5
National Ambient Air Quality Standards (NAAQS)				**100**

Note – 24-h average incremental value due to proposed project was 1.5 **µg/m^3** occurred project site. 24-h average total predicted maximum GLC at project site is (base-line + incremental) based on the monitored data of various sampling locations of PM_{10} is 89 (86.4 + 1.5) **µg/m^3** occurred at project site.

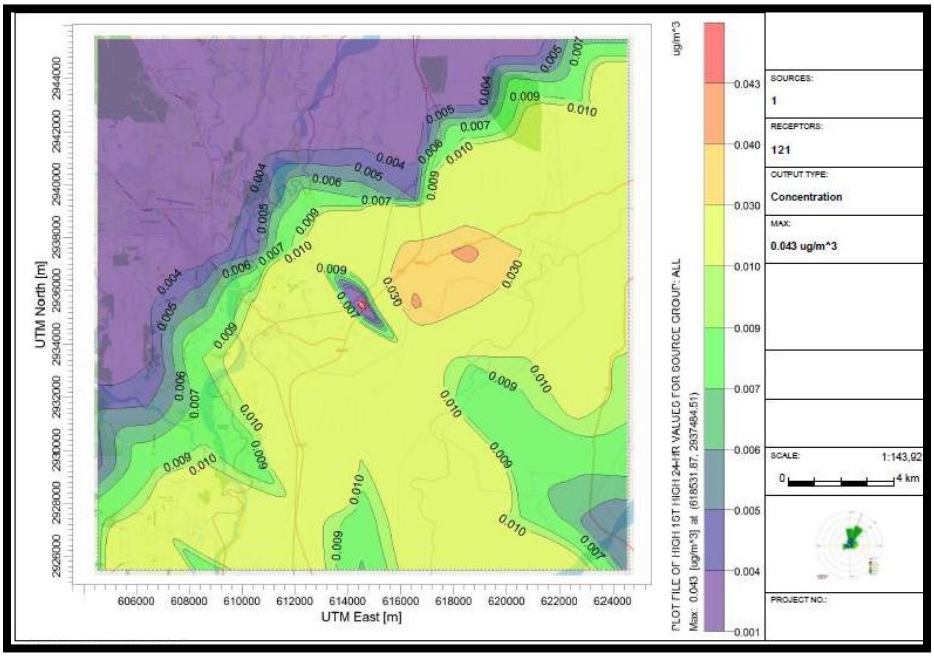


Figure – 4.2, Predicted GLC concentration of PM10

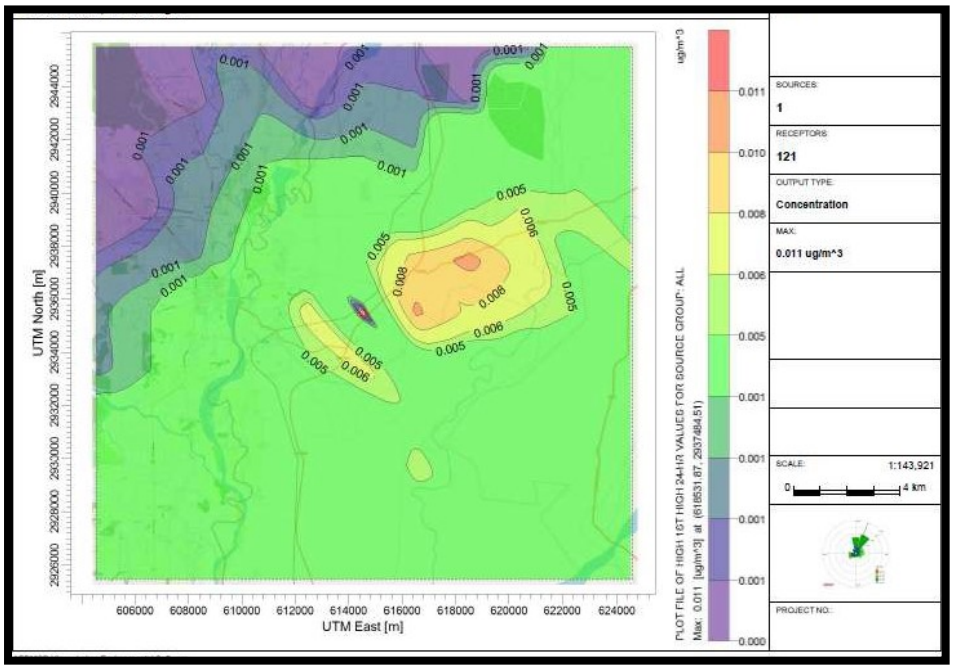


Figure – 4.3, Predicted GLC concentration of SO2

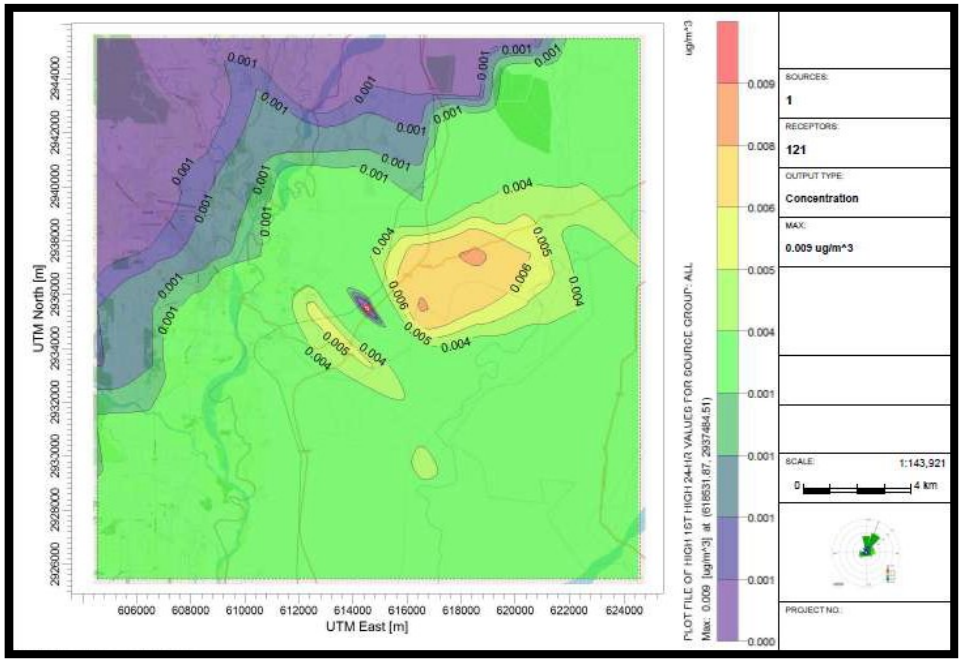


Figure – 4.4, Predicted GLC concentration of NO2

Iso-pleth of PM10 is 1.5 µg/m^3 occurred near the project site at 2000 m x2000 m grid network during i) loading and unloading and iii) transportation of sand over the haul road of the mining area with average wind speed of 1.40 m/s and Calm conditions 42.13 % during summer.

Mitigation measures

The M.L. area is situated in the river bed. The manual mining without drilling and blasting has been proposed. Therefore, the impact on air environment will be negligible. Mining and allied activities are going on a comparatively small scale; the existing air is absolutely clean. However, the dust due to digging, loading and machine movement may form. Following air pollution control measure will be taken to suppress fugitive emission:

✓ All service roads are to be boulder packed.

✓ Dispatch trucks and tractors carrying ore will be covered with tarpaulin.

✓ Haul roads will be compacted and mobile water tanker to suppress fugitive emission will provide water-sprinkling arrangement.

✓ Water sprinkling will be made in ore stack yards; fines stack yard and other potential dust generation points.

4.4 NOISE ENVIRONMENT

The proposed mining activity is semi-mechanized in nature. No drilling & blasting is envisaged for the mining activity. Hence, the only impact is anticipated is due to movement of vehicles deployed for transportation of minerals.

Anticipated Impacts:

- Mental disturbance, stress & impaired hearing.
- Decrease in speech reception & communication.
- Distraction and diminished concentration affecting job performance efficiency.

The noise level in the working environment are compared with the standards prescribed by Occupational Safety and Health Administration (OSHA-USA) which has been adopted andenforced by the Govt. of India through model rules framed under Factories Act, 1980 and CPCB 2000 norms. The summary of the permissible exposures in cases of continuous noise as per above rules is given below:

Table 4.2, Damage risk criteria for hearing loss OSHA regulations

Maximum allowable duration per day in hour	Sound pressure dB(A)	Remarks
(1)	(2)	(3)
8.0	90	1. For any period ofexposure falling in between any figure and lower figure asindicatedin column (1), the permissible sound is to be determined by Extrapolation\ or proportionate
6.0	92	
4.0	95	
3.0	97	

2.0	100	scale. 2. No exposure in excess of115dB(A) is permissible.
1 ½	102	
1	105	
¾	107	determined by extrapolation orproportionate scale. 2. No exposure in excessof 115 dB(A) is permissible.
½	110	
¼	115	

Noise at lower levels (sound pressure) is quite acceptable and does not have any bad effect on human beings, but when it is abnormally high- it incurs some maleficent effects.

a. Mitigation measures

The following measures have been envisaged to reduce the impact from the transportation of minerals:

- The vehicles will be maintained in good running condition so that noise will bereduced to minimum possible level.
- In addition, truck drivers will be instructed to make minimum use of horns in thevillage area and sensitive zones.
- No such machinery is used for mining which will create noise to have ill effects.
- Awareness will be imparted to the workers about the permissible noise levels &maximum exposure to those levels.

4.5 BIOLOGICAL ENVIRONMENT

Mining which leads to the removal of channel substrate, re-suspension of streambed sediment and stockpiling on the streambed, will have ecological impacts. These impacts may have an effect on the direct loss of stream reserve habitat, disturbances of species attached to streambed deposits, reduced light penetration, reduced primary production, and reduced feeding opportunities. Sand mining generates additional traffic, which negatively impairs the environment.

Anticipated Impacts:

Flora

The proposed project of river bed sand mining shall be carried out on the riverbed of Mechi River. There are no trees in the project area. The project shall also not lead to any change in landuse and will be replenished every year after successive rains. The proposed mining activity, whichalthough is

an economically gainful activity, also constitutes river training work. It allows for necessary dredging activity which may otherwise lead to flooding of the valley.

There shall be negligible air emissions or effluents from the project site during loading of the truck.

This shall be a temporary effect and not anticipated to affect the surroundingvegetation significantly.

Fauna

The project shall also not lead to any change in landuse and will be replenished every year after successive rains. The proposed mining activity, which although is an economically gainful activity, also constitutes river training work. It allows for necessary dredging activity which may otherwise lead to flooding of the valley. There shall be negligible air emissions or effluents from the projectsite during loading of the truck. This shall be a temporary effect and not anticipated to affect the surrounding vegetation significantly.

Mitigation measures

As the proposed mining will be carried out in a scientific manner, not much significant impact is anticipated, however, the following mitigation measures will be taken to further minimize it:

- Although, the project will not lead to any tree cutting, plantation activities shall beundertaken to improve the vegetation cover of the area.
- To avoid dust emissions, the mined materials will be covered with tarpaulin during transportation.

The list of plants proposed for green belt is as follows

Table 4.3: List of Trees proposed for Greenbelt (Evergreen, quick growing)

Sl. No.	Scientific Name	Common Name	Family	Height	Habit	Growt hrate	Abateme nt Property
1	*Abutilon indicum*	Jhampi	Malvaceae	5m	Shrub	Quick growing	DC, T
2	*Acacia catechu*	Kuth	Mimoseae	3m	Shrub	Quick growing	DC, T
3	*Acacia dealbata*	Silver wattle	Mimoseae	15m	Tree	Quick growing	DC, T NC
4	*Acacia leucophloea*	Safed Babul	Mimoseae	3m	Shrub	Quick growing	DC, T
5	*Acacia nilotica*	Babul	Mimoseae	8m	Tree	Quick growing	NC
6	*Acacia pennata*	Kuchui	Mimoseae	8m	Shrub	Quick	DC, T NC

Sl. No.	Scientific Name	Common Name	Family	Height	Habit	Growth rate	Abatement Property
7	*Acacia senegal*	Svetakhadira	Mimoseae	5m	Shrub	Quick growing	DC, T NC
8	*Acasia sinuate*	Banritha	Mimoseae	10m	Tree	Quick growing	DC, T NC
9	*Acer campbellii*	Kabashi	Aceraceae	12m	Tree	Quick growing	NC OGE
10	*Acer negunda*	Ash leaved maple	Aceraceae	12m	Tree	Quick growing	NC
11	*Actinodaphn eangustifolia*	Pisa	Lauraceae	13m	Tree	Slow	NC OGE
12	*Aegle marmelos*	Boel	Rutoceae	12m	Tree	Slow	NC T DR
13	*Aesculus indica*	Himalayan Chestnut	Sapindacea e	20m	Tree	Quick growing	NC
14	*Ailanthus altissimo*	Ailanto	Simarubace ae	12m	Tree	Quick growing	DC FR
15	*Albizia chinensis*	Chakua	Mimaseae	10-12m	Tree	Quick growing	DC FR
16	*Albizia lebbeck*	Sirish	Mimoseae	20m	Tree	Quick growing	NC FR DR
17	*Anthocephalu schinensis*	Kadam	Rubiaceae	20m	Tree	Quick growing	NC FR DR
18	*Balanitesroxburghi i*	Hingol	Balanitacea e	9m	Tree	Quick growing	DC, T
19	*Barringtonia acutangular*	Indian Oak	Borringtoni aceae	9-12m	Tree	Quick growing	SR
20	*Bauhiniaacuminata*	Kanchan	Caesalpiba ceae	3m	Shrub	Quick growing	DC, T
21	*Bauhinia purpurea*	Dev Kanchan	Caesalpina ceae	7m	Tree	Quick growing	DC, T
22	*Bauhinia racemose*	Banraj	Caesalpina ceae	5m	Smal lTree	Quick growing	DC, T
23	*Braussaneti apapyrifera*	Paper mulberrys	Maraceae	12m	Tree	Quick growing	NC

24	*Caesalpinia pulcherrima*	White gold mahur	Cesalpinaceae	4m	-	Quick growing	DC, T
25	*Cassia fistula*	Amaltas	Caesalpinaceae	12m	Tree	Quick growing	DC, T
26	*Ceiba pentandra*	Kapok	Bambacaceae	15m	Tree	Quick growing	NC, FR
27	*Dalbergia latifalia*	Indian rose wood	Fabaceae	20m	Tree	Quick growing	NC DR FR

Sl. No.	**Scientific Name**	**Common Name**	**Family**	**Height**	**Habit**	**Growth rate**	**Abatement Property**
28	*Dalbergia sisoo*	Sissu	Fobaceoe	10m	Tree	Moderat eduring 1st year and rapid afterwards	NC, DR FR
29	*Delonix regia*	Gulmohor	Caesalpinaceae	15m	Tree	Quick growing	NC, SR
30	*Emblica officinalis*	Amla	Eupharbiaceae	5m	Tree	Quick growing	NC FR DR
31	*Eucalyptus citriodora*	Lemon scented gum	Myrtaceae	20m	Tree	Quick growing	T SR
32	*Ficus benghalensis*	Banyan tree	Moraceae	20m	Tree	Quick growing	NC DR FR
33	*Ficus benjamina*	Pakur	Moraceae	12m	Tree	Quick growing	NC FR DR
34	*Ficus elastica*	Indian Rubber tree	Moraceae	12m	Tree	Quick growing	NC FR DR
35	*Ficus semicordata*	Jagya Dumur	Moroceae	10m	Tree	Quick growing	NC FR DR
36	*Grevillea robusta*	Silky oak	Proteaceae	20m	Tree	Quick growing	NC

37	*Hibiscus ras a-sinensis*	Jaba	Malvaceae	3m	Shrub	Quick growin g	DC, T
38	*Madhuc a butyrace a*	Indian butter tree	Sopotaceae	15m	Tree	Quick growin g	NC SR
39	*Murraya paniculat e*	Kamini	Rutaceae	5m	Shrub	Quick growin g	NC OGE
40	*Nerium indicum*	Karabi	Apocynace ae	5m	Shrub	Quick growin g	DC, T
41	*Nyctanthus arbo r-tristis*	Harsinghar	Oleaceae	5m	Shrub	Quick growin g	DC, T
42	*Ouginia oojeinensi s*	Tinis	Fabaceae	12m	Tree	Quick growin g	T FR
43	*Pinus wallichiana*	Chir pine	Pinaceae	12m	Tree	Quick growin g	DC, T, NC DR
44	*Quercus palustris*	Oak	Fagaceae	15m	Tree	Quick growin g	DC, T, NC
45	*Ricinus communis*	Bheranda	Euphorbiac eae	6m	Shrub	Quick growin g	DC, T
46	*Salix tetrasperma*	Indian willow	Salicaceae	15m	Tree	Quick growin g	NC DR OGE
47	*Sapindus emaginatus*	Ritha	Sapindacea e	10m	Tree	Quick	DC
48	*Spondias pinnata*	Amra	Anacardiac eae	10m	Tree	Quick growing after 1st year	NC DC SR
49	*Tabernaemantana divaricate*	Tagar	Apacynace ae	3m	Shrub	Quick growing	DC, T
50	*Terminalia arjuna*	Arjun	Combretac eae	15m	Tree	Quick growing	NC DR

51	*Thevetia peruviana*	Yellow oleoner	Apocynoceae	6m	Shrub	Quick growing	DC, T
52	*Thuja plicata*	Western red cedar	Cupressaceae	20m	Tree	Quick growing	NC, DR OGE
53	*Trema orientalis*	Charcoal tree	Ulmaceae	6m	Tree	Quick growing	NC DC T
54	*Zizyphus mauritiana*	Ber	Rhomnoceoe	10m	Tree	Quick growing (Early)	NC, DC FR

Ecological performance: NC- Control Noise level, OGE- Absorb Gas emission (sexena1991) and (Abbasi&Khan2000), DC- Dust Controller (CPCB 2007), Environmental Adaptation (DR- Drought resistance, SR-Salinity resistance, FR-Fire Resistance, T- Tolerant to Air Pollution

Table-4.4 Proposed Green Belt Plantation:

Mine Lease Area (Ha)	7.31
33% Plantation area (Ha)	2.4123
Life of Mine (Yrs.)	Replenish every year
Total number of plants to planted @ 415/Ha	1000
Plantation done on both side of the haul roads, river banks and in and around the area	

Table-4.5 Details of plantation:

Year	No. of Plants
1st Year	210
2nd Year	210
3rd Year	210
4th Year	210
5th Year	210
Total	1050

Fauna

The workers shall be directed to not venture out of the leased area for collecting fuel wood, or hunting. They shall also be trained not to harm any wildlife. No work shall be carried outafter sunset.

4.6 TRAFFIC ANALYSIS

Transportation Route:

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

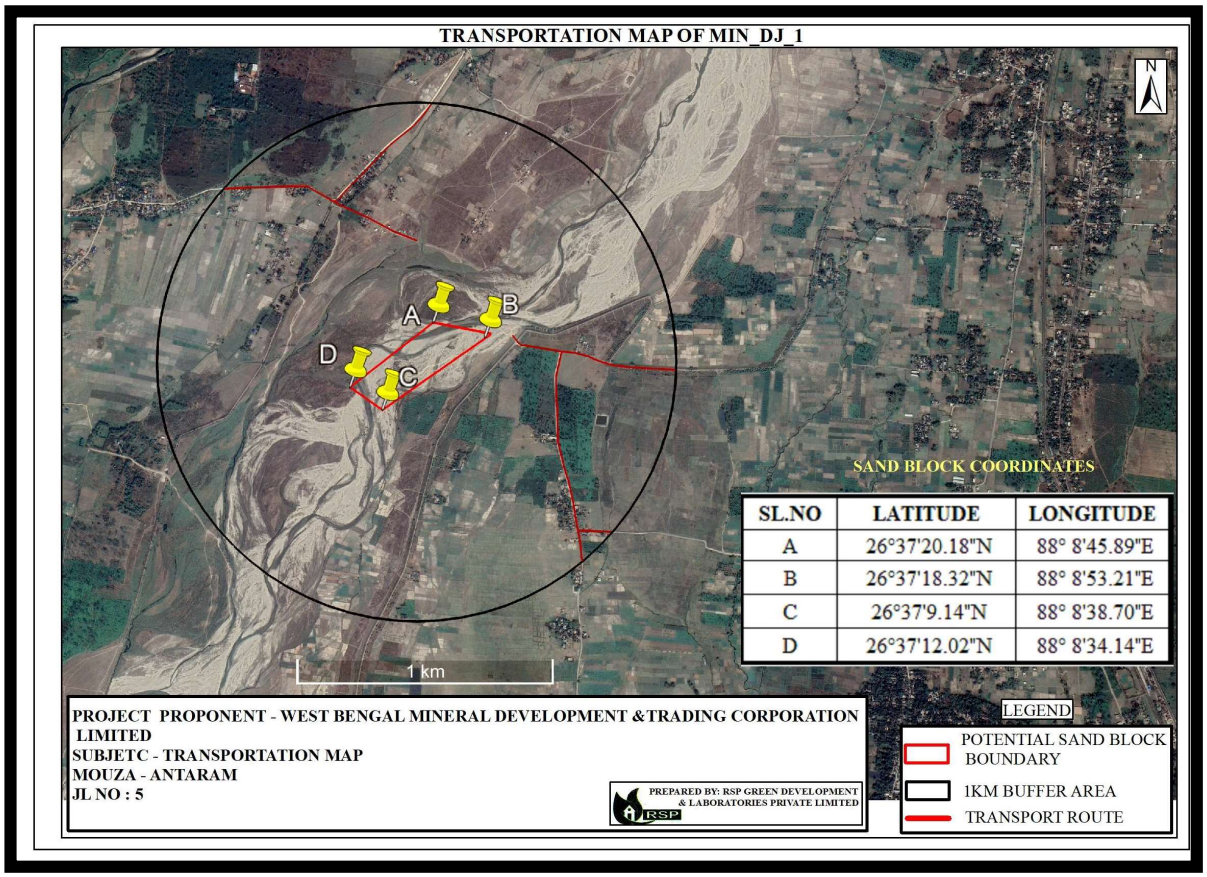


Figure 4.5 Map Showing Evacuation Route

Traffic analysis is carried out by understanding the existing carrying capacity of the roads near to the project site and the connecting main roads in the area. Then depending on the capacity of the mine, the number of trucks that will be added to the present scenario will be compared to the carrying capacity. Traffic density measurement were made continuously for 24 hours by visual observation and counting of vehicles under three categories, viz., heavy motor vehicles, light motor vehicles and two/three wheelers. As the mining site is well connected to the National Highway-327 via kuchha road of 1.5 km and by connecting roads . For that, two skilled persons were deployed near the NH-30 for a day on dated 12.3.2023- 13.03.2023. Total numbers of vehicles per hour hasbeen calculated. The results of measurements are given in the

Table 4.6-: Existing Traffic Scenario & LOS

S. No	Vehicles distribution	NUMBER OF VEHICLES DISTRIBUTION/DAY	PASSENGER CAR UNIT (PCU)	TOTAL NUMBER OF VEHICLE (PCU)/HOUR
		NH-327		**NH-327**
1	Car /Jeep	4434	1.0	4434
2	Buses	1660	3.0	4980
3	2 wheelers	3660	0.5	1830
4	3 wheelers	1866	1.0	1866
5	Truck/tractors	2255	3.0	6765
	Total			**19875/24 =828 PCU/hour**

Table 4.7:-Existing Traffic Scenario & LOS

S. No	ROAD	V (VOLUME IN PCU/HR)	C (CAPACITY IN PCU/HR)	EXISTING V/C RATIO	LOS
1	**NH-30**	**828**	**3000**	**0.27**	**B**

V= Volume of Vehicles in PCU's/Hour& C= Capacity of Road in PCU's/HourThe existing Level of Service (LOS) is ''B'' i.e. very good.

Table 4.8:- Capacity as per IRC: 64-1990

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

During Mine operation

Proposed Capacity of mine/annum -1,27,300 TPA

No. of working days - 250 days

Proposed Capacity of mine/day -509 TPD

Truck Capacity - 10 tonnes

Frequency of trucks deployed/day -51

No. of working hours per days - 10

Frequency of trucks deployed/hour – 6

Increase in PCU's per hour- 33

Table 4.9: Modified Traffic Scenario & LOS

S. No	Road	INCREASED PCUS/ STATE HIGHWAY	V (VOLUMEIN PCU/HR)	C (CAPACITYIN PCU/HR)	Modified V/C Ratio	LOS
1	National Highway-30	33	828 +33= 861	3000	0.28	B

Results

From the above analysis it can be seen that the transportation load on NH-327 will increase butthe LOS will remains same as B ('Very good') after start of mining operation also, Hence, there will not so much adverse affect on the proposed evacuation roads due to additional traffic. However, Traffic management has been proposed as given below.

Traffic Management:

1. Roads will be repaired regularly and maintained in good conditions.
2. Haul roads will be sprinkled with water to keep the dust suppressed.
3. A supervisor will be appointed to regulate the traffic movement near the site.
4. Speed breakers will be constructed near accident prone areas to calm the traffic and its speed.
5. Signage will be erected at the sensitive & precarious places to caution or provide informationto road users.

CHAPTER-5

ANALYSIS OF ALTERNATIVES

(TECHNOLOGY AND SITE)

5.0 INTRODUCTION

Consideration of alternatives to a project proposal is a requirement of EIA process. During the scoping process, alternatives to a proposal can be considered or refined, either directly or by reference to the key issues identified. A comparison of alternatives help to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendlyand cost effective options.

5.1 ALTERNATIVE FOR MINE LEASE

Sand (minor mineral) deposits are site specific. It is present in inside river bed (7.31Ha.). The mining of the material will bed one by opencast semi-mechanized method inside riverbed. Transportation of Minerals and Prevention of Illegal Mining Rules,1972. No overburden from inside riverbed block willbe produced. Therefore, no alternates it e is suggested as the mineral is site specific..

5.2 ALTERNATIVE FOR TECHNOLOGY ANDOTHER PARAMETERS

Some alternatives considered during EIA study are discussed below:

Table 5.1:Alternative for Technology and other Parameters

S. No.	Particular	Alternative Option 1	Alternative Option 2	Remarks
1.	Technology	Opencast Semi mechanized and mechanized mining.	Opencast Mechanized mining.	Opencast semi-mechanized for Riverbed is preferred **Benefits:** • No electric power requirement • Minimal noise will be generated • Minimal air pollution will be generated.
2.	Employment	Local employment	Outsource employment	Local employment is preferred. **Benefits:** • Provides employment to local peoplealong with financial benefits • No residential building/housing isrequired.
3.	Labourer transportation	Public transport	Private transport	Local labours will be deployed so They will either reach mine site by Bicycle or by foot. **Benefits:** Cost of transportation of men will be negligible.

4.	Material transportation	Public transport	Private transport	Material will be transported through trucks/trolleys on the contract basis **Benefits:** • It will give indirect employment.
5.	Water requirement	Tanker supplier	Ground water/surface water supply	Tanker supply will be preferred. **Benefits:** • No change in the surface water orground water quality.
6.	Road	Haul road	Metallic road	Haul road will be considered for Linking mine site from. Minimum distance will bemeasured along with less number oftrees for considering optimum haul roadroots. **Benefits**: Less distance, less fuel used, minimum or negligible no. of trees will be cut in best opted haul road root.

5.3 SUMMARY

We have analyzed all the option for alternative so the proposed mine site. This project is sand specific project and existing landuse of mine lease classified as River Body which will continue to be so even after the current mining project is over, hence no alternate site is suggested for this project.

CHAPTER: 6

ENVIRONMENTAL MONITORING PROGRAM

6.0 INTRODUCTION

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

(i) Environmental surveillance (ii) Analysis and interpretation of data (iii) Preparation of reports to support environmental management system and (iv) Organizational set up responsible for the implementation of the programme. Environmental Monitoring will be taken up for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by MoEF&CC and Consent to Operate issued by the State Pollution Control Board. Compliance of same will be submitted to respective authorities on regular basis.

6.1 ENVIRONMENTAL MANAGEMENT CELL

An Environment Plan of the area of mining lease inclusive of the adjoining area within five hundredmeters of the boundary of the lease area on 1:5000 scale incorporating the boundary of the mining lease, contour lines, roadways, forests, air, noise and water sampling point has been prepared under Rule 28(5)(b) – Plate No. 08.

The project involves collection of river bed material. This will also help to prevent widening of the riverbeds and to prevent flooding off and damage to the adjoining areas. This can only be achieved by maintaining the existing course of the river.

Hierarchy

An EHS Manager will be appointed to look after all environmental issues and ensure compliancewith Environmental Clearance conditions/SPCB norms. An Assistant Manager and Executive Environment Engineer will be appointed under the EHS Manager. EHS Manager will report to the Lessee directly and discuss the non-compliance if so any. An immediate solution will be arrived to ensure compliance with norms.

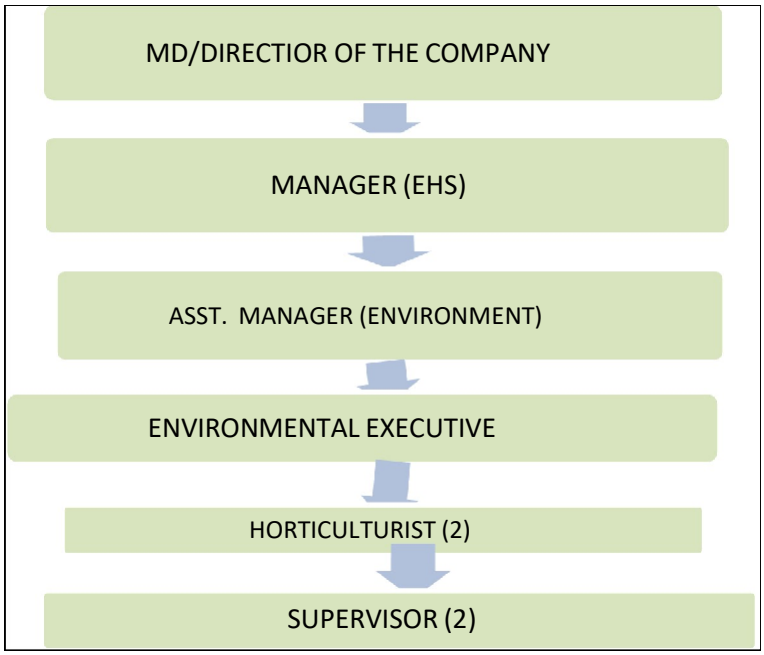


Figure 6.1: Hierarchy of Environment System for Dealing Environmental Issues

6.1.1 Responsibilities for Environmental Management Cell (EMC)

The responsibilities of the EMC include the following:

- Environmental Monitoring of the surrounding area
- Developing the green belt/Plantation
- Ensuring minimal use of water
- Proper implementation of pollution control measures
- Access the risk area
- Implementation of QMS
- Conducting Internal Audits
- Closing of NCs and conduction Management Review Meetings.

6.2 ENVIRONMENTAL MONITORING AND REPORTING PROCEDURE

Monitoring shall confirm that commitments are being met. This may take the form of direct measurement and recording of quantitative information, such as amounts and concentrations of discharges and wastes, for measurement against corporate or statutory standards, consent limits or targets. It may also require measurement of ambient environmental quality in the vicinity of a sit using ecological/biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints.

The key aims of environmental monitoring are:

- To ensure that results/ conditions are as forecast during the planning stage, and where they are not, to pinpoint the cause and implement action to remedy the situation.
- To verify the evaluations made during the planning process, in particular with risk and impactassessments and standards and target setting and to measure operational and process efficiency.
- Monitoring will also be required to meet compliance with statutory and corporate requirements. Finally, monitoring results provide the basis for auditing, *i.e*. to identify unexpected changes.

6.3 MONITORING SCHEDULE

Regular Monitoring of all the environmental parameters *viz.*, air, water, noise and soil as per the formulated program based on CPCB and MoEF&CC guidelines will be carried out every year in orderto detect any changes from the baseline status.

Table 6.1: Monitoring Schedule

S.No.	Description of Parameters	Schedule of Monitoring
1	Air Quality	24 hourly samples twice a week in each season except monsoon
2	Water Quality (Surface &Groundwater)	Once a season for 4 seasons in a year
3	Soil Quality	Once in a year in project area
4	Noise Level	Twice a year for first two years & then once a year
5	Socio-economic Condition	Once in 3 years
6	Plantation Monitoring	Once in a season

6.4 LOCATIONS OF MONITORING STATIONS

The location of the monitoring stations was selected on the basis of prevailing micro meteorological conditions of the area like; wind direction and wind speed, relative humidity, temperature. Locationsfor the post project monitoring shall be as under.

Table 6.2: Locations of Monitoring Stations

S. No.	Description	Location
1	Ambient Air Quality	Lease area, Villages in down Wind direction from the Lease Boundary
2	Noise Level Monitoring	Lease Boundary, High noise generating areas within the lease boundary
3	Water Level and Quality	Nearby Surface and Ground water sources
4	Soil Quality	Lease area and Villages within study area.

Table 6.3-Budget for monitoring

S. No.	Description	Cost to be incurred(in lakhs/annum)
1	Water Quality (Surface & Groundwater)	0.5
2	Air Quality	1.0
3	Noise Level	0.5
	TOTAL	**2.0**

Reporting Schedule during Operation of Mine

After completion of analysis, copies of all the analysis reports will be sent to MoEF&CC Regional Office and SPCB. Copies of the reports will be maintained in the office and will be made available to the concerned inspecting authorities.

6.5 BUDGET ALLOCATION FOR MONITORING

Budget for monitoring of Air, water, Noise and Soil will be **Rs. 2.0 Lakhs** to be incurred by the project proponent for undertaking pollution prevention measures during the mining activity.

6.6 SUMMARY

In order to maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will complied as per conditions. For this lessee has taken decision to formulate an Environment Policy of the mine and constitute an Environmental Management Cell and committed to operate the proposed mine with the objectives mentioned in approved Environment Policy. EMP may also require measurement of ambient environmental quality in the vicinity of a sit using ecological/biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints. Regular Monitoring of all the environmental parameters *viz.*, air, water, noise and soil as per the formulated program based on CPCB and MoEF&CC guidelines will be carried out every year. The location of the monitoring stations was selected on the basis of prevailing micro meteorological conditions of the area like; wind direction and wind speed, relative humidity, temperature. A budget for monitoring of Air, water, Noise will be incurred by the project proponent for undertaking pollution prevention measures during the mining activity.

Chapter 7

ADDITIONAL STUDIES

7.0 GENERAL

This chapter will highlight the additional studies that had been performed based on feedback from internal quality assessment, regulatory authority and stakeholder. Mining operations are associated with several potential hazards that affect adversely the human health and environment. It would normally require the assistance of emergency services to handle it effectively. The miningoperation will be taken up under the supervision and control of qualified staff including Mine Manager (Grade I). Similarly Sand mines also have impending dangers and risk which need to be addressed for which a disaster management plan has been prepared with an aim of taking precautionary steps to avert disasters and also to take such action after the disaster which limits the damage to the minimum.

7.1 ITEMS IDENTIFIED BY PROPONENT

No requirements of additional studies have been identified due to the unique location and proposed method of mining to be adopted.

7.2 ITEMS IDENTIFIED BY REGULATORY AUTHORITY

All studies identified by regulatory authority have been discussed in detail in Chapter 4.

7.3 ITEMS IDENTIFIED BY THE PUBLIC AND OTHER STAKEHOLDERS

7.4 RISK ANALYSIS AND DISASTER MANAGEMENT PLAN

All types of industries face certain types of hazards which can disrupt normal activities abruptly. Similar inside river bed mines also have risks which need to be addressed for which a disaster management plan has been formulated with an aim of taking precautionary steps to avert disastersand also take such action after disasters which limits the damage to minimum. In the sections below, the identification of various hazards, probable risks during the operational phase of the mining, maximum credible accident analysis and consequences analysis are addressed either qualitatively or quantitatively.

Risk assessments will help mine operators to identify high, medium and low risk levels. This is a requirement of the Occupational Health and Safety Act 2000. Risk assessments will help to priorities the risks and provide information on the need to safely control the risks. In this way, mine owners and operators will be able to implement safety improvements. The following natural/industrial problem may be encountered during the mining operation.

- ✓ Inundation: Filling of the mine pit due to excessive rains
- ✓ Slope failures at the mine faces or stacks
- ✓ Accident due to fire (in forested areas)

As per proposal made under the mining plan the area will be developed by means opencast mining

method. Extraction of minerals is to be carried out by open cast semi-mechanized method.Water table will not be touched during the mining process. No high risk accidents like landslides, subsidence flood etc. have been apprehended.

7.4.1 Risks due to Inundation

Mining will be done during the non-monsoon periods (October-June); therefore problem of inundation is not likely to happen.

7.4.2 Risks Due to Failure of Pit Slope

In order to allay dangers due to open cast slope failure, final pit, slope stability estimations will be made for the existing mines. Determining the factor of safety, the slopes should be monitored at regular intervals to check for any possible failure.

7.4.3 Risks due to Failure of Waste Dumps

All the Material excavated during mining will be saleable, therefore no waste dumps are proposed.

7.4.4 Risks of Accidents due to Trucks and Dumpers

Identifying the hazards that come along with the presence of vehicles at the workplace (e.g. reversing operations, loading) can cause harm if not properly handled. Among some of the factorsthat may make vehicle accidents more likely are:

- Rough access roads
- Time pressure
- Inadequate brakes (Possibly from lack of maintenance)
- Carelessly parked vehicles(*e.g.* being parked on aslope without being adequately secured)
- Unsafe coupling and uncoupling of trailers, and
- Untrained drivers
- Overturning vehicles

To avoid such instances we will talk to the workers and their representatives and will involve themin the risk assessment process and tell them what to do, to reduce risk. All transportation within the mine lease area should be carried out directly under the supervision and control of management.

The vehicles will be maintained in good working condition and checked thoroughly at least once a month by the competent person authorized for the purpose by the management.

- Road signs will be provided at each and every turning point upto the main road (wherever required)
- Toavoiddangerwhilereversingthevehiclesespeciallyatworkingplace/loadingpoints,stopper should be posted to properly guide reversing/spotting operating.
- Only trained drivers will be hired.

7.5 DISASTERS AND ITS MANAGEMENT

Mining and allied activities are associated with several potential hazards to both the employees and

the public at large. A worker in a mine will be able to work under conditions, which are adequately safe and healthy. At the same time the environmental conditions also will not impair his working efficiency. This is possible only when there is adequate safety in mines. Hence mine safety is one of the most essential aspects of any working mine. The safety of the mine and the employees is taken care of by the Mines Act1952, which is well defined with laid down procedureto ensure safety and constantly monitored and supervised by Directorate General of Mines Safety

and Department of Mines, State Government.

7.5.1 Identification of Hazards

There are various factors, which can create disaster in sand mine. These hazards are as follows:

- ✓ Inundation / Flooding.
- ✓ Quick Sand Condition.
- ✓ Drowning.
- ✓ Accident due to vehicular movement.
- ✓ Accident during sand loading, transporting and dumping.

7.5.2 Sand Loading

The sand is loaded in the trucks using hand shovels and back-hoe. There are possibilities of injuryin the hands during loading with shovels and staying under bucket movement.

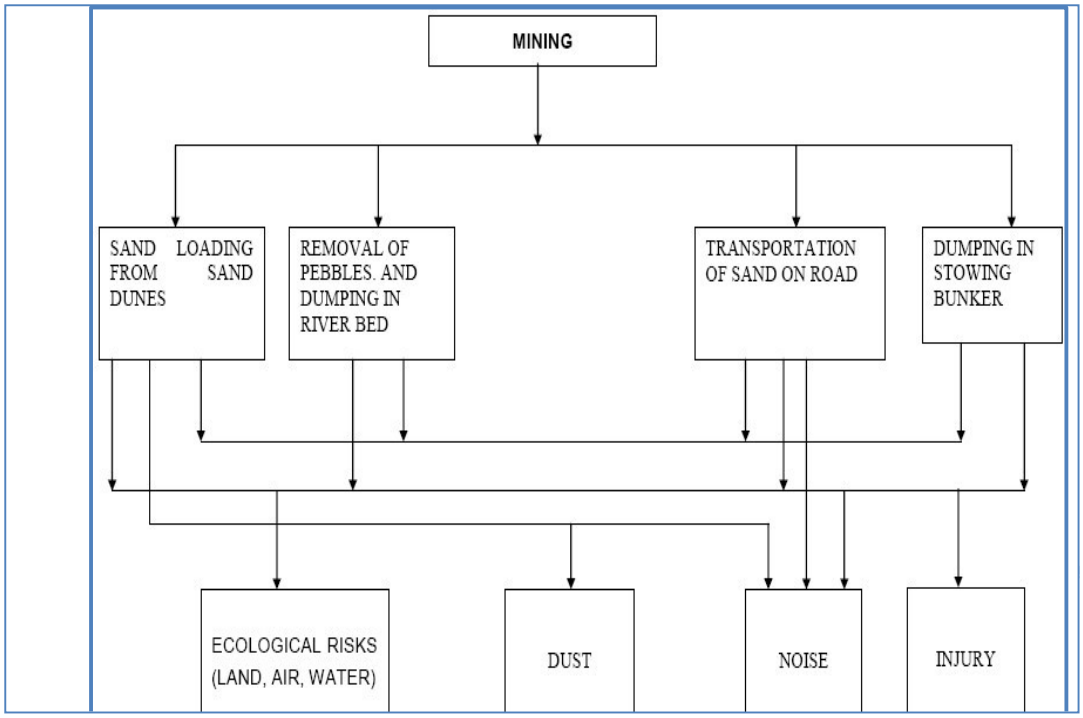
✓ There are possibilities that the workers standing on the other side of loading may getinjury due to over thrown sands with pebbles.

✓ There are possibilities of workers getting injured during opening of side covers of thetrucks to facilitate sand loading.

✓ There are possibilities of riverbank collapse due to close proximity of sand extraction.

✓ There are chances of falling of cattle/children into sand pit in river bed-- instances of deathdue to fall in such pits were reported from other areas to the Department of Mines.

✓ Chance of workers getting injured due to improper balancing of truck while loading.



7.5.3 Heavy Machinery

Most of the accidents occur during transportation by dumpers, trucks and other heavy vehicles andare often attributable to mechanical failures, in which the factor of human errors cannot be ruled out.

7.5.4 Inundation / Flooding

✓ The possibility of inundation/flooding of the sand mines are very high during monsoon orduring heavy rains in lean season as the mine area lies over the sand dunes of a riverbed.

✓ There are dangers to the trucks and other machineries due to flooding.

✓ There are dangers to the workers working in the sand dunes. Inundation or flooding is expected and beneficial for these sand mines as during this time only the sand reserve getsreplenished.

7.5.5 Safety Features Required in Tippers/Trucks

✓ **Rear Vision System:** For assisting operator to have back view during reversing.

✓ **Auto dipping System:** To reduce glaring of eyes of operator during night.

✓ **Load Indicator and Recorder:** Enables management to detect and prevent over loading.

✓ **Global Positioning system:** To prevent illegal transport and selling of sand, restrictingshort-cut routes other than stipulated routes and computerized monitoring.

✓ **Seat belt reminder:** To alert operator for using the seat belt.

7.5.6 Mitigation of Hazards

7.5.6.1 Measures to Prevent Accidents during Sand Loading.

✓ The trucks will be brought to a level so that the sand loading operation suits to the ergonomic Condition of the workers and the back-hoe.

✓ The loading will be done from one side of the truck only.

✓ The workers will be provided with gloves and safety shoes during loading.

✓ Opening of the side covers (pattas) will be done carefully and with warning to prevent injury to the loaders.

✓ No sand will be collected within 7.5m from bank, especially from outer bank of the meandering river. Safe clearance will be mainly determined by the height of the river bank and thickness of sand to be extracted from the close vicinity of that bank.

Ponding in the river bed shall not be allowed.

✓ Operations during daylight only.

✓ No foreign material (garbage's) will be allowed to remain/spill in river bed andcatchment area, or no pits/pockets are allowed to be filled with such material.

✓ Stockpiling of harvested sand on the river bank will be avoided.

✓ For particular operations, approaching river bed from both the banks will be avoided.

7.6 REPLENISHMENT OF SAND DEPOSITS

The rivers are dynamic in nature. The rivers carry Sediment transport is a direct function of water movement. During transport in a water body, sediment particles become separated into three categories: suspended material which includes silt + clay + sand; the coarser, relatively inactive bed load and the saltation load. Suspended load comprises sand + silt + clay-sized particles that are held in suspension because of the turbulence of the water.

The size grades defined in the circular of the Central Water Commission (CWC), Government of India, are coarse (> 0.2 mm), medium (0.2- 0.075 mm) and fine (< 0.075 mm) fractions. They correspond to fine sand; very fine sand and silt-clay on the Udden Went worth scale. The coarse and medium fractions are interpreted as 'temporarily suspended bed load' whereas the fine fractionis the 'wash load' or 'long term suspended load'.

The suspended load is further divided into the wash load which is generally considered to be the silt + clay-sized material (< 62 μm in particle diameter) and is often referred to as "fine-grained sediment". The wash load is mainly controlled by the supply of this material (usually by means of erosion) to the river. The amount of sand (>62 μm in particle size) in the suspended load is directly proportional to the turbulence and mainly originates from erosion of the bed and banks of the river.In many rivers, suspended sediment (i.e. the mineral fraction) forms most of the transported load. Bedload is stony material, such as gravel and cobbles that moves by rolling along the bed of a river because it is too heavy to be lifted into suspension by the current of the river. Bed load is especially important during periods of extremely high discharge and in landscapes of large topographical relief, where the river gradient is steep (such as in mountains). It is rarely important in low-lying

areas.

Table-7.1 :The catchment and other details of Mechi River

River	Total Length In Darjeeling (km)	Total Catchment area(m2)	Average Annual Rainfall, (m)
Mechi	63.21	435250000	3.799 (2020)

(Source: DSR of Darjeeling)

Table-Table-7.2 The tributaries of Damodar River

River	Tributaries	Total Catchment are m^2
Mechi		435250000

7.7 SOCIAL IMPACT ASSESSMENT, REHABILITATION & RESETTLEMENT (R&R)ACTION PLAN

Socio Economic Impact Assessment (SEIA) refers to systematic analysis of various social and economic characteristics of human being living in a given geographical area during a given period. SEIA is carried out separately but concurrently with Environment Impact Assessment (EIA). It focuses the effect of the project on social and economic well-being of the community.

7.7.1 Impact on Demographic Composition

The proposed project will hardly make any difference in the demographic composition of the study area as the additional employment it envisages to create will be met locally to the maximum extent. Hence, the chances of im-migration of people from outside the study area are remote. Accordingly, there will be no variation in the total population of the study area includingthat of sex ratio, when the mine starts operating.

7.7.2 Employment Opportunities

The proposed project will provide employment to the local people. It has been estimated that 41 people will get direct employment in this mining project. It is a positive impact of the project sinceit is providing employment opportunities to the local people.

7.7.3 Increased Supply of Sand in the Market

With the commencement of the proposed mining project the supply of sand will increase and the gap between demand and supply will decrease to some extent, if not fully.

7.7.4 Impact on Agriculture

The entire mining area is part of river bed and the entire land is Government Revenue Land. It is a non forest land and the proposed activity is to take place in the bed of river Son& agriculture field. There will be no negative impact on agriculture because compensation will be made to the land owners and agriculture land is reclaimed & give back to the land owners after the completionof mining contract so

that they will again use the field for cultivation. Scientific mining will be adopted in the proposed mining project the area will be free from annual floods, which destroy standing crops, land and property. This is a positive impact of the proposed mining project.

7.7.5 Impact on Road Development

Movement of tractor-trolleys and other vehicles to and fro the mining site is expected to increase substantially, when mining will start. The existing roads connecting the quarry with the National and State Highways are mostly narrow mud roads. There will be mud slide and traffic bottle neck if these roads are not widened and their conditions are not improved. Hence, there is good scope for road development in the mining area. Further, there are risks of accidents during loadingof extracted minerals into tractor-trolleys and transportation to markets for sell. However,accidents can be avoided by taking due care & precautions.

7.7.6 Income to Government

The proposed mining activity will benefit the State in the form of royalty, dead rent, fees & earningfrom taxes.

7.7.7 Impact on Law and Order

As most of the workers to be employed in the proposed mining project are local residents no law & order problem is envisaged. It is expected that the workers will attend to their duties from their residence and return to their homes after the day's work. There would have been law & order problem if the workers were migrants and lived in shanties closed to the mining area. However, to meet any untoward incident one police post may be set up closed to the mining area.

7.7.8 Impact on Health

There are no chances of occurring diseases, due to manual mining of sand. Sand is non-toxic. However, sand mining activities such as excavation and loading unloading of sand require precautions since it create respiratory problems among mine workers. Excessive inhalation of sand is a serious health concern. To avoid respiratory problem from sand necessary protection should be taken.

Rehabilitation and Resettlement (R&R) action plan is not applicable for this project.

7.8 SUMMARY

Risk assessments will help to priorities the risks and provide information on the need to safely control the risks. In this way, mine owners and operators will be able to implement safety improvements. Mining and allied activities are associated with several potential hazards to both the employees and the public at large. A worker in amine will be able to work under conditions, which are adequately safe and healthy. At the same time the environmental conditions also will not impair his working efficiency. This is possible only when there is adequate safety in mines. Hence mine safety is one of the most essential aspects of any working mine. It is very important to conserve the scheduled fauna in the area by the local authority as well as by the forest officials.People are not aware about the wildlife and protection of wild animals. There is an urgent need ofeducation and awareness to local people about the wild life and their importance. A green belt willbe developed around the core zone. Green belt plantation will best arted with the beginning of the mining and will be completed at the end of mine lease. This mining project has positive impacton social and economic well-being of the community because this project provides employment opportunities to local people and many social welfare works done by project proponent. There is no displacement of the population within the project area and adjacent nearby area.

Chapter-8

PROJECT BENEFITS

8.0 GENERAL

The proposed sand mining project will improve the overall economic and aesthetic scenario of the locality. This will be in form of roads, water supply, employment, living standard and economic growth.

8.1 PHYSICALBENEFITS

- ✓ Generate useful economic resource for construction.
- ✓ Improve Socio-economic conditions of surrounding areas.
- ✓ Protecting river banks.
- ✓ Reduce the probability of submergence of adjoining agricultural lands.
- ✓ Protection of crops being cultivated along the river bank.
- ✓ Reducing aggradations of river level.

✓ **Improvements in the physical infrastructure:-**The proposed Sand mine will havenumerous induced impacts on society such as growth in schools, hospitals, hotels & resorts, transport etc. It will also attract other entrepreneur to establish their venture in the region.

✓ **Improvements in the social infrastructure: -**The social infrastructure like religious places (temple, mosque, church, gurdwara); marriage homes, Bus stations, railway stations, play grounds, stadium will be improved due to the induced impact of the proposed drug manufacturing.

✓ **Employment potential –skilled; semi-skilled and unskilled: -** The present project will provide direct employment i.e. Total worker are 41 in which 10 are Skilled Workers and 31 are Unskilled Workers.

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

8.2 SOCIAL BENEFITS

The mining in the area will create rural employment. It has been observed that conditions of the villages around mining areas are better than that of distant villages. The mining activity in the region will have positive impact on the social economic condition of the area by way ofproviding employment to the local in-habitants; wages paid to them will increase the per capita income, housing, education, medical and transportation facilities, economic status, health and agriculture.

A detailed programme for socio economic development of the area has been framed. The salient features of the programme are as follows:

✓ Social welfare programme like provision of medical facilities educational facilities, watersupply for the employees as well as for nearby villagers will be taken.

✓ A well laid plan for employment of the local people has been prepared by giving priorityto local people.

✓ Supplementing Govt. efforts in health monitoring camps, social welfare and variousawareness programs among the rural population.

✓ Assisting social forestry programme.

✓ Adoption of villages for general development.

✓ Supply of water to village nearby villages.

✓ Development of facilities within villages like roads, etc.

8.3 CORPORATE ENVIRONMETAL RESPONSIBILITIES

A Budget of **Rs. 11.5 Lakhs** *i.e.* 2.0 % of the Project cost is incurred as Corporate Environmental Responsibity **(CER)** and the utilization of this amount will be decided during the time of Public Consultation.

Table 8.1: Budget for CER Rupees (Lakhs)

Sl. No.	**Activity**	**Capital Cost (in Rs. (Lakhs)**
1	Provide Solar LED Street light facility in the village street. & Village Road Reappearing.	8.0
2	Green Plantation of School Premises School Water Supply School Library & Sport facility	3.5
TOTAL (in life time)		**11.5**

8.4 ECOLOGICAL BENEFITS

A green belt will be developed along the boundary of the mining lease area. The area for green belt plantation consists of undisturbed soil; hence plantation could be made as in any garden or road side plantation. Green belt is erected not from biodiversity conservation point of view but is basically developed as a screen to check the spread of dust pollution. It is proposed to plant **1050** Nos. of **native species** along with some fruit bearing and medicinal trees during the plan period and a budget of **Rs. 0.6 Lakh** for plantation is given in **EMP.**

8.5 CONCLUSION

The management will recruit the semi-skilled and unskilled workers from the nearby villages. The project activity and the management will definitely support the local Panchayat and provide other form of assistance for the development of public amenities in this region. The company management will contribute to the local schools, dispensaries for the welfare of the villagers. A suitable combination of trees that can grow fast and also have good leaf cover will be adopted to develop the green belt. It is proposed to plant 1050 Nos. native species per during the mining plan period. The project proponent has allocated Rs. 11.5 Lakhs for CER Activities.

Chapter-9

ENVIRONMENT MANAGEMENT PLAN

9.0 GENERAL

Environmental Management Plan is a guiding document for environmental impacts associated with the proposed projects. It is a guiding document for management of good environmental condition on the site & surrounding of the proposed sand mine. The Environmental ManagementPlan (EMP) has been formulated and integrated with the sand mine planning keeping in view overall scientific development of local habitat and the adverse impact that may be caused due to the sand mining operation. A scientific assessment of these impacts those are likely to influence the existing environmental scenario is needed. This could also facilitate in formulating a suitable environmental management plan depicting all mitigation measures. It can help in implementing the project in an eco-friendly manner. The project activities influencing the following environmental attributes have been studied and their impacts on the following attributes have beenassessed.

The Environment Management Plan (EMP) will outline the measures that will be undertaken to ensure compliance with environmental legislation and recommendations from the EAC / SEAC to minimize adverse impacts on the environment. The environmental management plan consists of the set of mitigation, management, monitoring and institutional measures to be taken during the implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels. The present environmental management plan addresses the componentsof environment, which are likely to be affected by the different operations in a mine area. The environmental management must be integrated into the process of mine planning sothat ecological balance of the area is maintained and adverse effects are minimized. An EnvironmentalManagement Plan (EMP) is a site specific plan developed to ensure that the project is implemented inan environmentally sustainable manner. An effective EMP ensures the application of best practice environment management to a project the purpose of an EMP is to:

I. Assists proponent in the preparation of an effective and user friendly EMP.

II. Improve the contribution that an EMP can make to the effectiveness of the environmental management process.

III. Ensure a minimum standard and consistent approach to the preparation of EMP's.

IV. Ensure that the commitments made as part of the project's EIA are implementedthroughout the project life.

V. Ensure that environment management details is captured and documented at all stages ofa project.

The design of EMP for operational phase has been aimed to achieve the following objectives:

I. To ensure adoption of state of art technological environmental control measures and implementing them satisfactorily.

II. Effectiveness of mitigatory measures in mitigation of impacts.

III. Description of monitoring program of the surrounding environment.

IV. Institution arrangements to monitor effectively and take suitable corrective steps for implementation of proper EMP.

V. An Environmental Management Cell (EMC) should be set up to take care of all environment aspects and to maintain environmental quality in the project area.

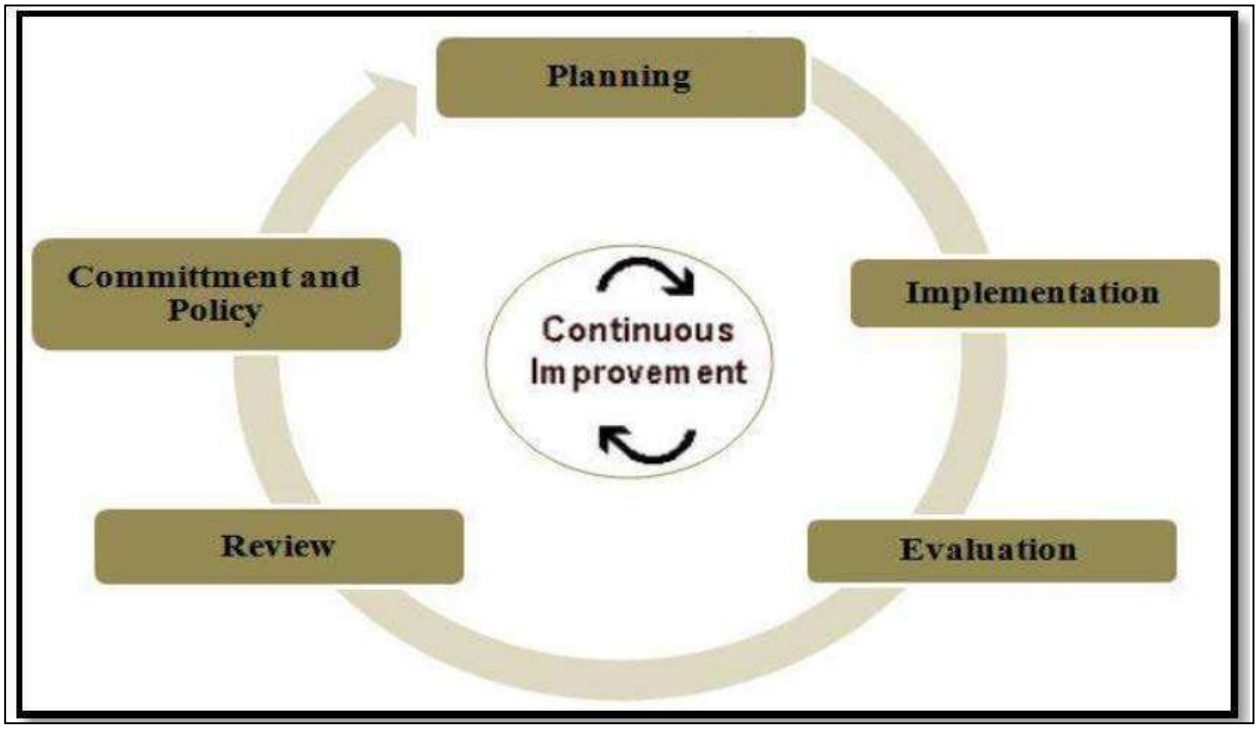


Figure 9.1:Quality Management

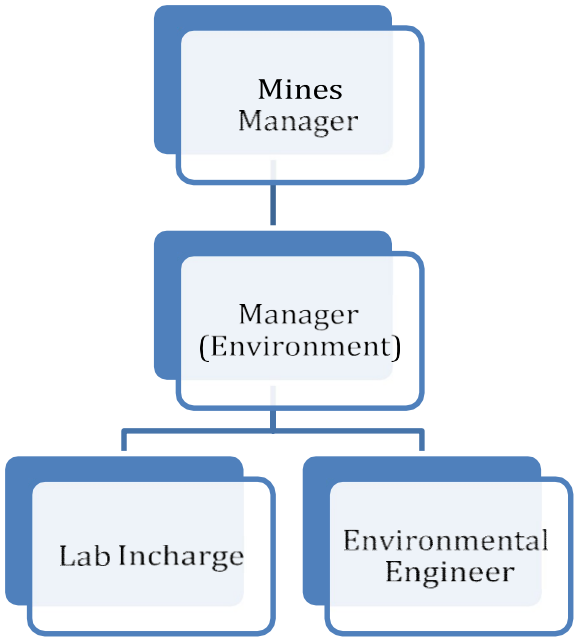


Figure 9.2- Environment Management Cell

9.1 LAND USE PATTERN

The land use of the mine lease area is the river bed of River Mechi and there will be no change in land use after operation. The sand will be replenished every year during the monsoon season.The ultimate land use of the mine lease area will not be change.

Table 9.1:Land use of mine area

Summary	Area (in Ha)
Government Land	7.31

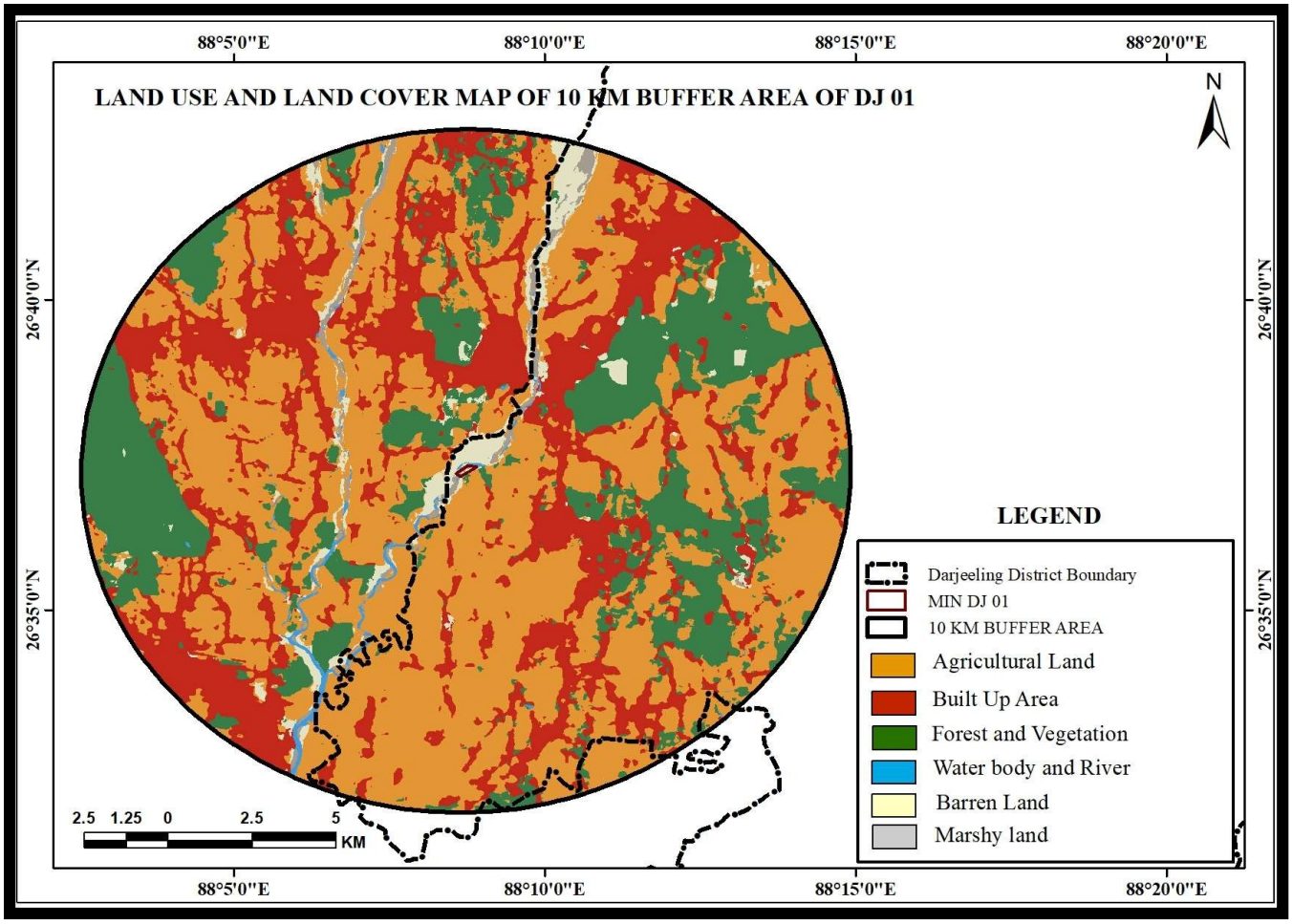


Figure 9.3: Landuse &Landcover Map of 10Km Buffer Area of DJ 01

9.2 AIR ENVIRONMENT MANAGEMENT

Mitigative measures suggested for air emission control will be based on the baseline ambient air Quality monitoring data. From the point of view of maintenance of an acceptable ambient air qualityin the region, it is desirable that the air quality needs to be monitored on a regular basis to check it vis-à-vis the NAAQS prescribed by MoEF&CC and in cases of non-compliance, appropriate mitigative measures will be adopted. In order to minimize impacts of mining on airand to maintain it within the prescribed limits of CPCB/ SPCB, an Environmental Management Plan (EMP) has been prepared. This will help in resolving all environmental and ecological issues likely to cause due to mining in the area.

During the course of mining no toxic substances are released into the atmosphere as such there seems to be no potential threat to health of human beings. In the mining activities, the only sourceof dust emission from loading &gaseous emissions is from the engines of vehicles. The reasons may be quality of fuel, improper operation ofthe engine, etc, proper maintenance of engines will improve combustion process and brings reduction in pollution.

9.2.1 Control of Gaseous Pollution

In mining activities, the only source of gaseous emissions is from the engines of transport vehicles. The emissions from the diesel engines of the machinery can be controlled by proper maintenanceand monitoring of machines.

9.2.2 Control of Dust Pollution

The main pollutant in air is PM10, which is generated due to various mining activities. However to reduce the impact of dust pollution the following steps have been taken during various mining Activities.

a) During loading operation

I. Latest loading equipment like hydraulic excavators will be used with dumpers. This reduces the number of buckets to fill from height and thus have comparatively less dust generation. The propagation of this dust is confined to loading point only and does not affect any person both the operators of excavator and dumpers who will sit in closed chamber and will be equipped with dust mask.

II. Skilled operators will operate excavators.

III. Avoid overloading of dumpers and consequent spillage on the roads.

IV. The operators' cabin in the drills, dumpers will be provided with dust free enclosure and persons working at high dust prone areas will be provided with dust mask.

b) During Transport operation

I. All the haulage roads including the main ramp be kept wide, leveled, compacted and properly maintained and watered regularly during the shift operation to prevent generation of dust due to movement of dumpers, and other vehicles.

II. Mineral carrying trucks will be effectively covered by Tarpaulin to avoid escape of fines to atmosphere.

III. Regular Compaction and grading of haul roads to clear accumulation of loose material.

IV. Air quality will be regularly monitored both in the core zone and the buffer zone.

c) Plantation work carried out

In order to reduce air pollution in the surroundings, green belt will be developed along mine approach road. The plantation will be done along the bank of a river.

d) Monitoring of air pollution

Periodic air quality survey will be carried out to monitor the changes consequent upon mining activities as per the norms of CPCB.

9.3 NOISE AND VIBRATION ENVIRONMENT

The ambient noise level monitoring carried out in and around the proposed mine lease area shows that ambient noise levels are well within the stipulated limits of MoEF&CC. There is no drilling and blasting for mineral extraction. Noise pollution will only be due to loading and transporting equipment. Effective steps will be taken to keep the noise level well below the DGMS prescribed limit of 85 dbA.

9.3.1 Noise Abatement and Control

Proper maintenance of all machines is being carried out, which help in reducing generationof noise during operations.

I. No other equipment's accept the Transportation vehicles and Excavator and Loaders (asand when required) for loading is allowed.

II. Noise generated by this equipment is intermittent and does not cause much adverse impact.

III. Periodical monitoring of noise will be done to adopt corrective actions wherever needed.

IV. Plantation will be taken up along the approach roads. The plantation minimizespropagation of noise and also arrests dust.

V. Mining will be done on day time only.

9.4 SURFACE AND GROUND WATER MANAGEMENT

During the operational phase of mine no waste water or industrial effluent will be generated. The environmental management for water pollution control includes:

I. Mining will neither intersect the ground water table of the area. So not at all disturbing water environment.

II. The mining does not have any impact on topography and natural drainage of surrounding area.

III. Local people will be employed and no permanent housing will be done so no permanent drainage pattern for sewerage system is required as domestic sewage shall be disposedoffinto septic tank followed by soak pits.

IV. Monitoring of water quality of nearby surface water, ground water and domestic water willbe conducted once in every season except monsoon to evaluate the performance of the mitigation measures.

9.4.1 Waste Water Management

No waste water is generated from the mining activity of minor minerals as the project only involves lifting/excavation of Sand and transportation directly to the consumers.

9.4.2 Water Conservation

The necessary water requirement for drinking & for water sprinkling will be met from Dugwell

/Bore well outside the Sand Ghat area on purchase basis. The water is potable. There are no chancesof any contamination as there is no chemical processing etc. are going to be done in the Sand Ghatarea. The water analysis report of Dugwell/ Borewell will be submitted to DGM MS every year. The ground water table is at upper level.

There will not be any waste water discharges to water bodies from the mining operations. As observed in the river bed, the thickness of sand & boulders to be excavated will be 2.5 monthly, so there will not be any intersection with ground water table. Precautionary measures will be initiatedfor closing the operation and shifting the men and transport vehicles prior to onset of monsoon. 2.No oils or lubricants will be discharged in the sand to avoid water pollution.

9.5 SOLID WASTE MANAGEMENT

Waste management is an important facet of environment management. Thus, solid waste management is important from both aesthetics and environment viewpoints.

I. Generated food waste or any other domestic waste will be collected in dustbins and willbe properly disposed off.

II. There are no toxic elements present in the mineral which may contaminate the soil orriver water.

9.6 GREEN BELT DEVELOPMENT

According to the CPCB guide line there are 15 Agro-climatic regions, each of these regions is further divided into 68 sub zones based on annual rain fall, Climatic condition and soil types. The species recommended for the Greenbelt are quite adopted to such Climatic condition and grow wellin the soil types of that zone. The density of trees as specified by CPCB should be around 2500 plants per Ha. the green belt area should be 33% of the total project area.

9.6.1 Plantation Program

The selection of plant species for the green belt development depends on various factors such as climate, elevation, aspect and soil of plantation area. The plants would exhibit the following desirable characteristics in order to be selected for plantation:

- The species should be fast growing and providing optimum penetrability.
- The species should be wind-firm and deep rooted.
- The species should form a dense canopy.
- As far as possible, the species should be indigenous and locally available.

- Species tolerance to air pollution like SO2 and NO2 should be preferred.
- The species should be permeable to help create air turbulence and mixing within the belt.
- There should be no large gaps for the air to spill through.
- Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces.
- Ability to withstand conditions like inundation and drought.
- Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter).
- Attractive appearance with good flowering and fruit bearing.
- Bird and insect attracting tree species.
- Sustainable green cover with minimal maintenance.

The plantation should be a mix of different varieties. A three-tier plantation scheme comprising of:

- Outer ring of tall, thick canopy trees.
- Middle ring of less tall trees.
- Inner core layer of tolerant species

According to Bioclimatic Zones of India, Darjeeling district falls under **Zone** – Eastern Himalayan Region, **Sub Zone** – Himalayan Region, **Rainfall** – 2641, **Climate**–Per humid to humid, **Soils**– Brown hills.Following tree species are recommended for plantation to the district:

Table 9.2 Greenbelt

Sl. No.	Scientific Name	Common Name	Family	Height	Habit	Growth rate	Abatement property
1	*Abutilon indicum*	Jhampi	Malvaceae	5m	Shrub	Quick growing	DC, T
2	*Acacia catechu*	Kuth	Mimoseae	3m	Shrub	Quick growing	DC, T
3	*Acacia dealbata*	Silver wattle	Mimoseae	15m	Tree	Quick growing	DC, T NC
4	*Acacia leucophloea*	Safed Babul	Mimoseae	3m	Shrub	Quick growing	DC, T
5	*Acacia nilotica*	Babul	Mimoseae	8m	Tree	Quick growing	NC
6	*Acacia pennata*	Kuchui	Mimoseae	8m	Shrub	Quick growing	DC, T NC

Sl. No.	Scientific Name	Common Name	Family	Height	Habit	Growth rate	Abatement Property
7	*Acacia senegal*	Svetakhadira	Mimoseae	5m	Shrub	Quick growing	DC, T NC
8	*Acasia sinuate*	Banritha	Mimoseae	10m	Tree	Quick growing	DC, T NC
9	*Acer campbellii*	Kabashi	Aceraceae	12m	Tree	Quick growing	NC OGE
10	*Acer negunda*	Ash leaved maple	Aceraceae	12m	Tree	Quick growing	NC
11	*Actinodaphne angustifolia*	Pisa	Lauraceae	13m	Tree	Slow	NC OGE
12	*Aegle marmelos*	Boel	Rutoceae	12m	Tree	Slow	NC T DR
13	*Aesculus indica*	Himalayan Chestnut	Sapindaceae	20m	Tree	Quick growing	NC
14	*Ailanthus altissimo*	Ailanto	Simarubaceae	12m	Tree	Quick growing	DC FR
15	*Albizia chinensis*	Chakua	Mimaseae	10-12m	Tree	Quick growing	DC FR
16	*Albizia lebbeck*	Sirish	Mimoseae	20m	Tree	Quick growing	NC FR DR
17	*Anthocephalus chinensis*	Kadam	Rubiaceae	20m	Tree	Quick growing	NC FR DR
18	*Balanites roxburghii*	Hingol	Balanitaceae	9m	Tree	Quick growing	DC, T
19	*Barringtonia acutangular*	Indian Oak	Borringtoniaceae	9-12m	Tree	Quick growing	SR
20	*Bauhinia acuminata*	Kanchan	Caesalpibaceae	3m	Shrub	Quick growing	DC, T
21	*Bauhinia purpurea*	Dev Kanchan	Caesalpinaceae	7m	Tree	Quick growing	DC, T
22	*Bauhinia racemose*	Banraj	Caesalpin	5m	Small	Quick	DC, T

			aceae		Tree	growing	
23	*Braussanetia papyrifera*	Paper mulberrys	Maraceae	12m	Tree	Quick growing	NC
24	*Caesalpinia pulcherrima*	White goldmahur	Cesalpinaceae	4m	-	Quick growing	DC, T
25	*Cassia fistula*	Amaltas	Caesalpinaceae	12m	Tree	Quick growing	DC, T
26	*Ceiba pentandra*	Kapok	Bambacaceae	15m	Tree	Quick growing	NC, FR
27	*Dalbergia latifalia*	Indian rose wood	Fabaceae	20m	Tree	Quick growing	NC DR FR
28	*Dalbergia sisoo*	Sissu	Fobaceoe	10m	Tree	Moderate during1st yearand rapid afterwards	NC, DR FR
29	*Delonix regia*	Gulmohor	Caesalpinaceae	15m	Tree	Quick growing	NC, SR
30	*Emblica officinalis*	Amla	Eupharbiaceae	5m	Tree	Quick growing	NC FR DR
31	*Eucalyptus citriodora*	Lemon scentedgum	Myrtaceae	20m	Tree	Quick growing	T SR
32	*Ficus benghalensis*	Banyan tree	Moraceae	20m	Tree	Quick growing	NC DR FR
33	*Ficus benjamina*	Pakur	Moraceae	12m	Tree	Quick growing	NC FR DR
34	*Ficus elastica*	Indian Rubbertree	Moraceae	12m	Tree	Quick growing	NC FR DR
35	*Ficus semicordata*	Jagya Dumur	Moroceae	10m	Tree	Quick growing	NC FR DR
36	*Grevillea robusta*	Silky oak	Proteaceae	20m	Tree	Quick growing	NC
37	*Hibiscus rasasinensis*	Jaba	Malvaceae	3m	Shrub	Quick growing	DC, T
38	*Madhucabutyracea*	Indian bu	Sopotaceae	15m	Tree	Quick growing	NC SR

		tt ertree					
39	*Murraya paniculate*	Kamini	Rutaceae	5m	Shrub	Quick growing	NC OGE
40	*Nerium indicum*	Karabi	Apocynaceae	5m	Shrub	Quick growing	DC, T
41	*Nyctanthus arbor-tristis*	Harsinghar	Oleaceae	5m	Shrub	Quick growing	DC, T
42	*Ouginia oojeinensis*	Tinis	Fabaceae	12m	Tree	Quick growing	T FR
43	*Pinus wallichiana*	Chir pine	Pinaceae	12m	Tree	Quick growing	DC, T, NC DR
44	*Quercus palustris*	Oak	Fagaceae	15m	Tree	Quick growing	DC, T, NC
45	*Ricinus communis*	Bheranda	Euphorbiaceae	6m	Shrub	Quick growing	DC, T
46	*Salix tetrasperma*	Indian willow	Salicaceae	15m	Tree	Quick growing	NC DR OGE
47	*Sapindus emarginatus*	Ritha	Sapindaceae	10m	Tree	Quick growing	DC
48	*Spondias pinnata*	Amra	Anacardiaceae	10m	Tree	Quick growing after 1st year	NC DC SR
49	*Tabernaemantana divaricate*	Tagar	Apacynaceae	3m	Shrub	Quick growing	DC, T
50	*Terminalia arjuna*	Arjun	Combretaceae	15m	Tree	Quick growing	NC DR
51	*Thevetia peruviana*	Yellowoleone r	Apocynoceae	6m	Shrub	Quick growing	DC, T
52	*Thuja plicata*	Western redcedar	Cupressaceaee	20m	Tree	Quick growi	NC, DR OGE

						ng	
53	*Trema orientalis*	Charcoaltree	Ulmaceae	6m	Tree	Quick growi ng	NC DC T
54	*Zizyphus mauritiana*	Ber	Rhomnoc eoe	10m	Tree	Quick growing (Early)	NC, DC FR
Ecological performance: NC- Control Noise level, OGE- Absorb Gas emission (sexena1991) and (Abbasi &Khan 2000), DC- Dust Controller (CPCB 2007), Environmental Adaptation (DR- Drought resistance, SR-Salinity resistance, FR-Fire Resistance, T- Tolerant to Air Pollution							

(Source: Guidelines for development of greenbelt CPCB-2007)

9.7 SOCIO-ECONOMIC ENVIRONMENT

9.7.1 Management Plan for Socio-Economic Environment

I. In general, socio-economic environment will have positive impact due to the miningproject in the area.

II. The deployed laborers will be from nearby villages only as these people are mainlydependent upon such mining activities.

III. In order to further improve the socio-economic conditions of the area, the managementwill contribute for development works in consultation with local bodies.

9.8 OCCUPATIONAL HEALTH AND SAFETY

Occupational Health and Safety professionals develop and coordinate safety and health systems and strategies within organizations. They identify workplace hazards, assess risks to employee health and safety, and recommend solutions. Increasingly, Health and Safety Professionals are also responsible for many of the environmental aspects of their workplace. As this profession matures there is an increased emphasis on risk management strategy and on the development of workplaceculture.

Occupational Health and Safety professionals in the minerals industry may perform theFollowing tasks-

I. The collection of minor minerals from the Sand mine does not cause any occupational ill effects.

II. Except fugitive dust generation there is no source which can show a probability for healthrelated diseases and proper dust suppression will control dust generation and dispersion.

III. Dust masks will be provided to the workers working in the dust prone areas as additional personal protective equipment.

IV. The occupational health hazards have so far not been reported.

V. Awareness program will be conducted about likely occupational health hazards so as tohave preventive action in place.

VI. Any workers health related problem will be properly addressed.

VII. Periodical medical checkup will be conducted.

VIII. Promote occupational health and safety within their organization and develop safer and healthier ways of working;

IX. Help supervise the investigation of accidents and unsafe working conditions, studypossible causes and recommend remedial action;

X. Develop and implement training sessions for management, supervisors and workers onhealth and safety practices and legislation;

XI. Coordinate emergency procedures, mine rescues, firefighting and first aid crews;

XII. Communicate frequently with management to report on the status of the health and safety strategy and risk management strategy, and Develop occupational health and safety strategies and systems, including policies, procedures and manuals.

Table-9.3-Budget for occupational health

S. No.	Activities recommended for communities level services	Tentative cost (Lakh Rs)
1	Awareness campaigns regarding healthissues in the nearby villages.	**0.50**
2	Provide free health checkups & medicines to the nearby villagers of theproject site.	**1.0**
3	Assistance to set up a temporary healthcenter during the lease tenure.	**1.0**

9.9 COST OF EMP MEASURES

Following provisions are proposed to be taken for improving, control and monitoring ofenvironment protection measures.

Table 9.4: Budget for EMP (Lakhs)

Sl. No	Description	Capital Cost (lakh)	Recurring Cost (lakh)
1	Pollution Control & Dust Suppression	**Nil**	**4.5**
2	Pollution Monitoring i) Air pollution ii) Water pollution iv) Noise Pollution	--	2.0
3	Plantation and salary for one gardener (part time basis).	0.6	0.5
4	Haul road Maintenance Cost	3.75	1.6
	TOTAL	**4.35**	**8.45**

Note: *60 plants * 1000 Rs (for each plants including hedges and fences)= 0.6 lakhs

- Salary of Labour for haul road maintenance 2 labor*300=600 per day600* 270= 162000 or 160000/-
- * 2.5 lakh per kilometer (250000 *1.5 km haul road) = 87500/-
- Proponent has its own tanker of capacity 12000 Litre for water sprinkling

9.10 SUMMARY

As per Above discussion there is no measure impact on the environment due to mining except fugitive mission in the form of dust generated during handling of mineral. The adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Plantation development will be carried out in the mine premises, along the approach roads, around Govt. buildings, schools approx. 185 trees during plan period. It will prove an effective pollution mitigate technique, and help avoid soil erosion during monsoon season. Employment opportunities will be provided to the locals only as providing extraction of minerals from the mine site is the only prevailing occupation for them for their livelihood. A budget of Rs. 12.8 Lakhs for EMP is incurred by Project Proponent.

CHAPTER 10

SUMMARY & CONCLUSION

10.0 INTRODUCTION

The Applicant West Bengal Mineral Development & Trading Corporation Ltd. (WBMDTCL) is a Govt. of West Bengal Undertaking company which was formed as a Company as per Companies Act 1956 on 23rd February, 1973 under the direct administrative control of Department of Large Industries & Enterprises.

Accordingly, Govt. of West Bengal holds 100% paid up share capital of WBMDTCL. has obtained sand mining lease by the Govt. of West Bengal over an area of 7.31 Hectare / 18.06 Acres on Mechi River at Mouza- Antaram, J.L. NO.- 05, P.S-Khoribari, Block- Khoribari, District- Darjeeling, State-West Bengal, over Plot No.– 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P).

The Mining Lease was applied for a period of 5 financial years.

This mining and mine closure plan have been prepared per West Bengal Minor Mineral Concession Rules, 2016.Mining plan is an important part for getting Environment Clearance. The Applicant has given task of preparation of Mining Plan to RQP name, for said Lease area.

As per Ministry of Environment and Forests vide number S.O. 3977 (E) dated 14th August, 2018, the project falls under “B1” Category.

10.1 PROJECT DESCRIPTION LOCATION

The proposed mining lease area falls in Survey of India Toposheet 78B/2 The lease area is located in Village: - Antaram, Block- Khoribari , District:- Darjeeling. The mine lease co-ordinates are listed below:

Mine lease Pillar Co-ordinates:

A	26° 37' 20.183" N	88° 08' 45.893" E
B	26° 37' 18.741" N	88° 08' 54.107" E
C	26° 37' 09.148" N	88° 08' 38.703" E
D	26° 37' 12.023" N	88° 08' 34.140" E

Area & production

The total ML area is 7.31 Ha Proposed rate of production will be 524476.00 cum of sand over a period of five years.

Connectivity: Nearest National Highway is NH-327, which is approx. 2.60 km in E direction from the mine site. Nearest National Highway is SH-12, which is approx. 15.5 km in E direction from the mine site. Nearest Railway Station from the mining site is Batasi railway station, which is approx. 2.9 Km in SE direction. Nearest airport is Bagdogra, which is 20 km in NE direction from the mining site.

Salient Features of Project

Name of the applicant	West Bengal Mineral Development & Trading Corporation Ltd. (WBMDTCL)
Applicant Adress	DJ-10, DJ Block, Sector II, Bidhannagar, Kolkata, West Bengal 700091
Address of Lessee	Mouza- Antaram, J.L. NO.- 05, P.S-Khoribari, Block- Khoribari, District- Darjeeling, State-West Bengal, over Plot No.– 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P).
Name of Mine Block ID	MIN_DJ_01
Area	7.31 ha
River	Mechi River
Minerals of the Mine	River bed sand
Life of the Mine	As riverbed sand is replenished every year hence life of mine is not applicable.
Proposed Production of Mine (Cum)	Total 524476 Cum/18521695 Cft over a period of five years.
Method of Mining	Manual and semi-mechanized
Ultimate Depth of the mining	2.5
Water demand	8 Kilo Liter per Day
Number of Warker	20
Project Cost	577.27 Lakh
CER Cost	11.5 Lakh

10.2 ANTI CIPATED IMPACTS AND MITIGATION MEASURES

Based on the Baseline Environment, as determined in Chapter 3, environmental impacts of the mining activity on the surrounding environment are described in following sub-sections.

10.2.1 Impact on Land Use Pattern

Presently there is no activity on the land. The project site is located on bank of river. There is no human settlement in the near vicinity of the project. Restoration of mine lease area is a natural process. There would not be cutting & felling of trees.

10.2.2 Impact on Air Quality

Information on air quality was studied and predicted that the mining activity will not affect theair quality in a significant manner. In mining operations, loading, and transportation operations may cause deterioration in air quality. In the present case, only wet materials will be handled. The collection and lifting of minerals will be done Semi mechanized mining method shall be adopted for the mining of sand. Therefore the dust generated is insignificant. Water sprinkling will be done in regular manner for dust suppression.

10.2.3 Impact of Noise Levels

Noise level will increase due to transportation. The project site away from the villages no major impact of the noise level will be there. Vehicle with low noise level will be preferred for the project.

10.2.4 Impact on Water Quality

More over due to small scale of mining operation using minimum machineries, dust suppression is by water spraying through water sprinkler limited to haulage road. Rainwater flowing through the exposed mine cuts would carry some sediment of soil and rock. These are found to be nontoxic in nature. Surface runoff water from mines has only high turbidity during monsoon. As discussed, the mining activity will require very less quantity of water in comparison to the recharging. Hence,it will not affect the water regime of the area.

10.2.5 Impact on Soil Quality

The soil textures a yellowish, light-coloured variety of red soil. The basin land of the rivers is mostly sandy soil, and the land adjacent to the rivers is sandy loam. It is due to settling of air borne dust or due to wash off of solid particulates by surface or ground water. This may lead to change in porosity, permeability & other such physical characteristics of soil of the area.

10.2.6 Flora & Fauna

Flora

Floral environment is affected by mining activities due to:

- Air Pollution i.e. both dust & gaseous pollution
- Water pollution
- Land Pollution

i) Pollutant like dust, gaseous emanations, solid & liquid effluents will be minimized at the generation point itself and adequate measures will be taken to prevent their impact on environment.

ii) There is no forest in the core zone of mining lease area. So, there will be no deforestation due to mining.

iii)The mining lease area is devoid of vegetation. So, the greenery to be developed under green belt development programme will improve the floral environment of the area.

Fauna

There is no likelihood of any adverse impact on the faunal environment too due to mining activities.

10.2.7 Socio-Economic Profile

The social demographic profile of the area is not likely to be much affected, as there is not much displacement of people due to the project. The mining in the area has created rural employment. The mining activity in the region has positive impact on the social economic condition of the area by providing employment to the local in habitants; wages paid increase the per capita income.

10.3 ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

We have analyzed all the option for alternatives of the proposed mine site. This project is sand specific project and existing land use of mine lease classified as River Body which will continue to be so even after the current mining project is over, hence no alternate site is suggested for this proje

10.4 ENVIRONMENTAL MONITORING PROGRAM

This chapter includes the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules). In order to maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will complied as per conditions. For this lessee **M/s. West Bengal Mineral Development & Trading Corporation Ltd** has taken decision to formulate an Environment Policy of the mine and constitute an Environmental Management Cell and committed to operate the proposed mine with the objectivesmentioned in approved Environment Policy. EMP may also require measurement of ambient environmental quality in the vicinity of a sit using ecological/biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities oreven assessment of complaints. Regular Monitoring of all the environmental parameters *viz.*, air, water, noise and soil as per the formulated program based on CPCB and MoEF&CC guidelines will be carried out every year. The location of the monitoring stations was selected on the basis ofprevailing micro meteorological conditions of the area like; wind direction and wind speed, relativehumidity, temperature. A budget for monitoring of Air, water, Noise will be **Rs. 2.0 Lakhs** to be incurred by the project proponent for undertaking pollution prevention measures during the mining activity.

10.5 ADDITIONAL STUDIES

Risk assessments will help to priorities the risks and provide information on the need to safely control the risks. In this way, mine owners and operators will be able to implement safety improvements. Mining and allied activities are associated with several potential hazards to both the employees and the public at large. A worker in a mine will be able to work under conditions, which are adequately safe and healthy. At the same time the environmental conditions also will

not impair his working efficiency. This is possible only when there is adequate safety in mines. Hence mine safety is one of the most essential aspects of any working mine. It is very important to conserve the scheduled fauna in the area by the local authority as well as by the forest officials. People are not aware about the wildlife and protection of wild animals. There is an urgent need of education and awareness to local people about the wild life and their importance. A green belt will be developed around the core zone. Green belt plantation will be done up to completion of plan period. This mining project has positive impact on social and economic well- being of the community because this project provides employment opportunities to local people and many social welfare works done by project proponent. There is no displacement of the population within the project area and adjacent nearby area.

10.6 PROJECT BENEFITS

The management will recruit the semi-skilled and unskilled workers from the nearby villages. The project activity and the management will definitely support the local Panchayat and provide other form of assistance for the development of public amenities in this region. The company management will contribute to the local schools, dispensaries for the welfare of the villagers. A suitable combination of trees that can grow fast and also have good leaf cover will be adopted to develop the green belt. It is proposed to plant 185 Nos. of native species will be planted during the mining plan period. The project proponent has allocated 2 % of total project cost annum for CER

Activities. Other than this social development of village will be considered as per social activitiesSocio-economic environment will have positive impact due to the mining project in the area. The mining activity will create employment opportunities to local communities. The project will not only improve the living standard of local people but also create an aesthetic value to the river banks where green belt will be developed.

10.7 ENVIRONMENT MANAGEMENT PLAN

As per Above discussion there is no measure impact on the environment due to mining except fugitive emission in the form of dust generated during handling of mineral. The adequatepreventive measures will be adopted to contain the various pollutants within permissible limits. Plantation development will be carried out in the mine premises, along the approach roads, around Govt. buildings, schools approx**. 1050 trees during plan period.**. It will prove an effective pollution mitigate technique, and he provided to the locals only as providing extraction of minerals from the mine site is the only prevailing occupation for them for their livelihood. A budget **of Rs.1.0 Lakhs P**er year for **EMP** is incurred by Project Proponent.

10.7.1 Air Quality Management

The only air pollution sources are the road transport network of the trucks. The dust suppression measures like water spraying will be done on the roads. Utmost care will be taken to prevent spillage from the trucks. Overloading will be prevented. Plantation activities along the roads will also reduce the impact of dust in the nearby villages.

10.7.2 Management for Noise Pollution

As the only impact is due to transportation of sand to the construction though village roads, emphasis will be given on the following points.

- Minimum use of Horns at the village area.
- Timely maintenance of vehicles and their silencers to minimize vibration and sound.
- Phasing out of old and worn out trucks.
- Provision of green belts along the road networks.
- Care will be taken to produce minimum sound during loading.

It was found that the sand mining activity will not have any significant impact on the biological environment of the region. Since mining activity is carried out only during the day time, the movement of animals during the night will not be hindered.

10.7.3 Water Management

The deposits occur in the middle/bottom of the river. During the entire lease period, the deposit will be worked from the top surface to 3 m bgl. The ultimate depth of the open cast pits will be 3 m below ground level.

10.7.4 Soil Management

Topsoil is stored separately and used for plantation work in the mined out area. Green belt development around the area minimizes the impact of mining on soil characteristics like its texture, chemistry & even Soil Erosion in the area.

10.7.5 Green Belt Development

The green belts will be designed to control PM 10, gaseous pollutants, noise, surface run off andsoil erosion etc.

10.8 CONCLUSION

This Project will provide several benefits to the nearby Villages by a proper planning and management. This project will employ most of the worker from nearby villages. Only supervisor Staff will be hired from outside. There will not be any increase in population due to the project. However, few people from other area may migrate in this area for business opportunities. Duringthe operation of this project no adverse impact on the surrounding environment. So project is beneficiary for the surrounding village. From the baseline study and various discussion on probable impacts of all the operational activity, it has been concluded that this project will more positive impact and will generate the revenue and employment in the area. On the above facts and baseline study, the proposed activity is recommended for the commencement with proper mitigation measure as suggested.

CHAPTER - 11

DISCLOSURE OF CONSULTANTS ENGAGED

Declaration by Experts contributing to the Final EIA Report for the Proposed River Bed Mining plan includingMine Closure plan (BLOCK ID- MIN_DJ_01) on Mechi river, Area: 7.31 Ha, Mouza- Antaram, District- Darjeeling West Bengal.

I, hereby, certify that,

I was a part of the Final EIA/EMP team in the following capacity that developed the above Final EIA/EMP.

Table 11.1 EIA Coordianator

	EIA Coordinator
Name	Pinaki Roy
Period of involvement	January to September, 2023
Contact information	proyrsp@gmail.com

Table 11.2: Functional Area Expert:

S. No.	FunctionalAreas	Name of theExpert/s
1.	**LU**	Piya Chowdhury
2.	**WP**	Amit Podder
3.	**AP**	Tanmoy Chakraborty
4.	**EB**	Madhurima Bakshi
5.	**SE**	Monjury Day
6.	**SC**	Jyotirmoy Dey
7.	**HG**	Arijit Saha
8.	**Geo**	Pinaki Roy
9.	**RH**	Pinaki Dasgupta
10.	**SHW**	Somnath Narayan
11	**AQ**	Rakesh Kumar Pandey

Declaration by the Head of the Accredited Consultant Organization

I, RQP name, hereby, confirm that the above mentioned experts prepared the "Final EIA/EMP of Final EIA Report for the proposed River Mining Project at (BLOCK ID- MIN_DJ_01) on Mechi river, Area: 7.31 Hectares, District- Darjeeling, West Bengal. I also confirm that I shall be fully accountable for any mis-leading information mentioned in this statement.

Signature	
Name	Pinaki Roy
Designation	Director

Name of the EIA Consultant Organization	RSP Green Development and Laboratories Pvt.Ltd.

Name of the Consultancy Company	RSP Green Development and Laboratories Pvt.Ltd.
Accreditation Status	Valid – February, 2023
Address	7F, Dinabondhu Mukherjee Lane, 3rd floor, shibpur, howrah-711102, West Bengal
E - mail Address	proyrsp@gmail.com
Website	https://rsp-green-development-and-laboratories-pvt.business.site/
Nature of Services	EIA Consultant

Table-11.3: Expert Name

S No.	Functional Area	Name of the Expert
1.	EIA Coordinator	Pinaki Roy
2.	FAE-WP	Amit Podder
3.	FAE-AP	Tanmoy Chakraborty
4.	FAE-LU	Piya Chowdhury
5.	FAE-EB	Madhurima Bakshi
6.	FAE-SE	Monjury Day
7.	FAE-HG	Arijit Saha
8.	FAE-Geo	Pinaki Roy
9.	FAE-RH	Pinaki Dasgupta
10.	FAE-SC	Jyotirmoy Dey
11.	FAE-SHW	Somnath Narayan
12.	FAE-AQ	Rakesh Kumar Pandey

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY

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

No. 1423 / EN / T – II – 1/ 333/ 2023 Date: 26th July, 2023

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

Sub: ToR for doing EIA for the proposed River Bed Mineral Mining (Block ID - MIN_DJ_1) over an area of 7.31 ha on Mechi River at J.L. No. - 05, Plot No. – 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P), Mouza – Antaram, P.S –Khoribari, Block-Khoribari, Dist. - Darjeeling, West Bengal, (proposal no SIA/WB/MIN/422496/2023)

Sir,

This is to inform you that SEIAA in its meeting on 20.07.2023 considered your online application (vide Proposal No. SIA/WB/MIN/422496/2023) as well as the recommendations of SEAC for issuance of ToR and agreed with the recommendation.

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

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

Enclo: Annexure 1

(K Balamurugan)
Member Secretary, SEIAA

No. 1423 /EN/T-II-1/333/2023 Date: 26th July, 2023

Copy forwarded for the information to:

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

Member Secretary, SEIAA

A. STANDARD TERMS OF REFERENCE

1. Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.
2. A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
3. All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.
4. All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).
5. Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.
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.
7. It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.
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.
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.
10. Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
11. Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
12. A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
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.

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.

15. The vegetation in the RF / PF areas in the study area, with necessary details, should be given.

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.

17. Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.

18. A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.

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.

20. Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).

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 sectorial programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.

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 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.

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 pre-dominant wind direction may also be indicated on the map.

24. The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.

25. Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.

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.

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.

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.

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.

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.

31. A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.

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.

33. Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.

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.

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.

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.

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.

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.

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.

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.

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.

42. A Disaster management Plan shall be prepared and included in the EIA/EMP Report.

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.

44. Besides the above, the below mentioned general points are also to be followed:-

a. Executive Summary of the EIA/EMP Report (enclosed as **Annexure – A**).

b. All documents to be properly referenced with index and continuous page numbering.

c. Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.

d. Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.

e. Where the documents provided are in a language other than English, an English translation should be provided.

f. The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.

g. While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-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.

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.

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.

B. **Additional Terms of Reference:–**

a) Means of access and egress between the embankment and the sand quarry may be clearly earmarked. The Project Proponent must commit that no hard toping or paving of any haulage route within the riverbed will be attempted.

b) A plan on the management and handling of sand during the period of intermediate stockpiling should be submitted.

c) A Progressive Greenbelt Plan may be prepared. The project area being entirely on the riverbed, afforestation/ vegetation should be attempted alongside the village roads or other public land. This may be done with prior approval of the local self-governing bodies. If no public land is available for the purpose the Project Proponent shall arrange for land with his personal means. To enhance

success/ survival rate the plantation shall be attempted during the first two years of the project life and the plantation so done shall be taken care of during the rest of the project life. Species of the plant selected should be self-sustaining in that particular region.

d) It appears that the proposed mine falls within 10 km from the periphery of a National Park/ Sanctuary/ Eco-Sensitive Zone/ Protected Area. As such the PP shall, – in compliance to the Hon'ble Supreme Court's order in I.A. No. 460 of 2004, obtain a no objection certificate from the Standing Committee of National Board of Wild Life (NBWL) and upload a copy of the same.

e) A 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 (schools/ institutions etc) may also be uploaded.

f) A study report on base flow level measured at 5 points with date and supporting photographs may be submitted. It should be committed that mining will be done at least 1m above the base flow level. Accordingly, if required, the excavation plan may also be revised.

g) Management plan of haul road to the public road.

h) Spatial year wise progressive plantation programme.

The project proponent is requested to submit the final EIA/EMP prepared as per the above-mentioned ToRs and incorporating all the issues raised during Public Hearing / Public Consultation to the SEAC for further consideration of the proposal for environmental clearance

The PP shall, – while applying for environmental clearance, upload in the PARIVESH portal, the EIA/EMP report along with the documents/ submissions/ clarifications sought hereinabove.

Executive Summary

The Executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on following points:

1) Project name and location (Village, District, State, Industrial Estate (if applicable).
2) Products and capacities. If expansion proposal, then existing products with capacities and reference to earlier EC.
3) Requirement of land, raw material, water, power, fuel, with source of supply (Quantitative).
4) Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
5) Measures for mitigating the impact on the environment and mode of discharge or disposal.
6) Capital cost of the project, estimated time of completion.
7) Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt./private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km. other industries, forest, eco-sensitive zones, accessibility, (note - in case of industrial estate this information may not be necessary).
8) Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population.
9) Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
10) Likely impact of the project on air, water, land, flora-fauna and nearby population.
11) Emergency preparedness plan in case of natural or in plant emergencies.
12) Issues raised during public hearing (if applicable) and response given.
13) Environment Management Plan (EMP) as per Office Memorandum issued by the MoEF & CC vide F. No. 22-65/2017-IA.III dated 30.09.2020 with proposed expenditure.
14) Occupational Health Measures.
15) Post project monitoring plan.

Government of West Bengal
DEPARTMENT OF INDUSTRY, COMMERCE & ENTERPRISES
Mines Branch
4, Abanindranath Tagore Sarani (Camac Street), Kolkata – 16

Memo No.-689/ICE-12011(99)/68/2022-MINES Date: 30/11/2022

To: Chairman & Managing Director
West Bengal Mineral Development & Trading Corporation Ltd.

Sub: Provisional Grant Order for Sand Blocks
Ref: Your Office Memo No. MDTC/SAND/003/987 dated 27.04.2022

Sir,

With reference to the subject mentioned above, I am directed to inform you that Provisional Grant Order is hereby accorded by this department to the West Bengal Mineral Development & Trading Corporation Ltd. for the sand blocks already auctioned from your end (Annexure attached).

You are requested kindly to arrange to prepare the mining plan for the sand blocks, get them approved by competent authority and also to obtain Environmental Clearance and all other statutory clearances as per norms.

On completion of the above-mentioned process, mining lease shall be executed between this department and the corporation in due course.

This has the approval of the competent authority of this department.

Yours faithfully,

Deputy Secretary

No. 689/1(11)-ICE-12011(99)/68/2022-MINES Date: 30/11/2022

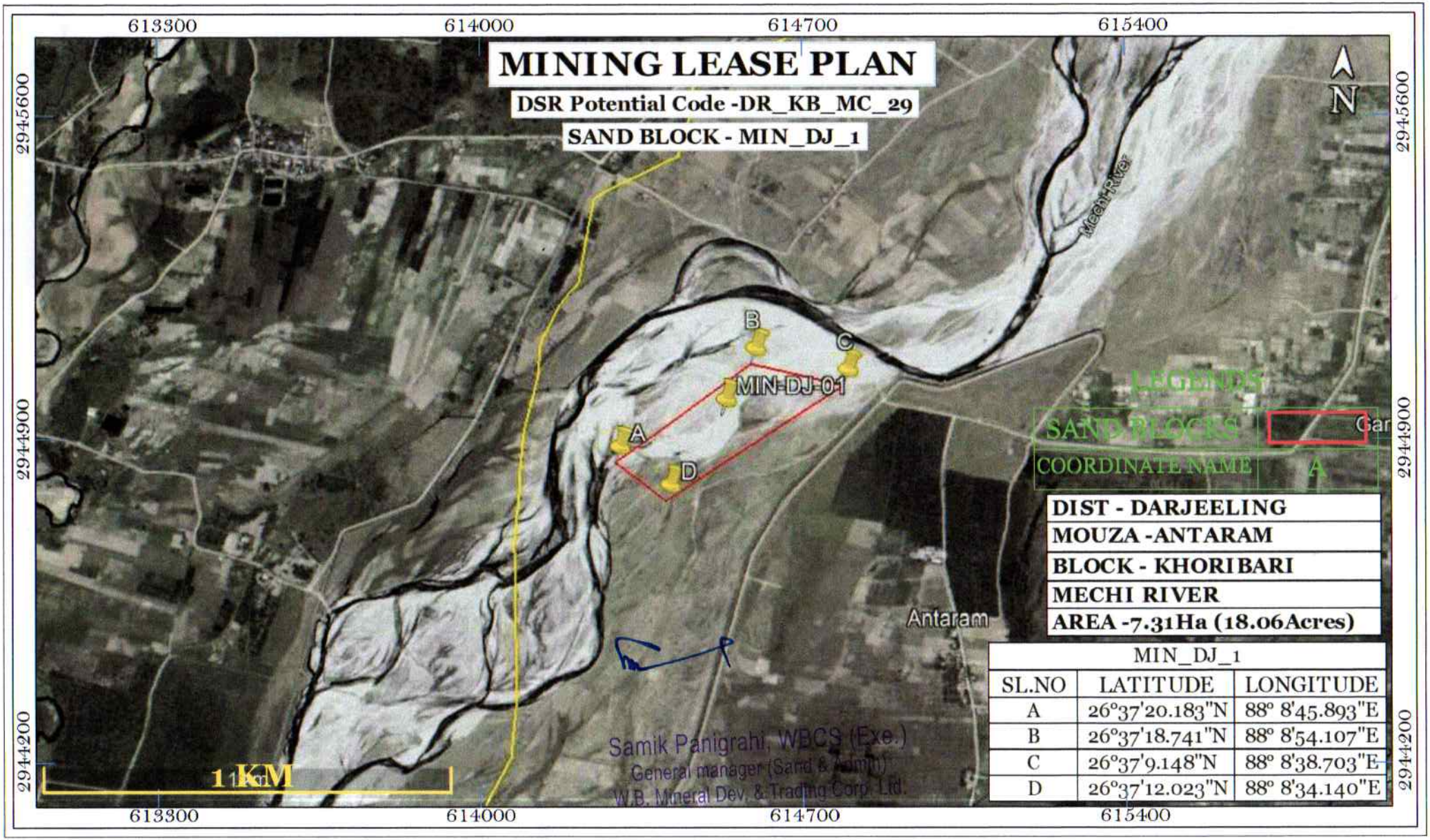
Copy forwarded for kind information and necessary action to :

1. The Director of Mines and Minerals,West Bengal.

2-7. ADM & DL&LRO (Alipurduar, Bankura, Birbhum, Darjeeling, Paschim Bardhaman & Paschim Medinipur).

8. The Chief Mining Officer, West Bengal.
9. PA to Principal Secretary, Dept of Environment with request to place it for the appraisal of the authority.
10. PA to Secretary ,Dept of I, C & E with request to place it for the appraisal of the authority
11. PA to Secretary, Dept. Of L&LR and R&RR with request to place it for the appraisal of the authority

Deputy Secretary



MIN_DJ_1		
SL.NO	LATITUDE	LONGITUDE
A	26°37'20.183"N	88° 8'45.893"E
B	26°37'18.741"N	88° 8'54.107"E
C	26°37'9.148"N	88° 8'38.703"E
D	26°37'12.023"N	88° 8'34.140"E

GOVERNMENT OF WEST BENGAL
OFFICE OF THE SUPERINTENDING GEOLOGIST
GEOLOGICAL PROSPECTING BRANCH,
DIRECTORATE OF MINES AND MINERALS,
KHANIJ SADAN, DESHBANDHU ROAD,
PURULIA – 723101.

No. G.P. 10-10A (WBMDTCL)/2023/22-A Dated: 09/03/2023.

To:
The Chairman & Managing Director,
West Bengal Mineral Development & Trading Corporation Limited,
3rd Floor, DJ-10, WBIIDC Building
DJ Block, Sector II, Salt Lake City
Kolkata – 700091.

Sub.: - Approval of Mining Plan in respect of SAND BLOCK in Darjeeling district, bearing **I.D. MIN_DJ_1 SAND MINE under Mouza: ANTARAM, J.L. No. 05, Plot No.(s) 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P), P.S. KHORIBARI over an Area of 7.31 Hectares**, to be leased out to West Bengal Mineral Development & Trading Corporation Limited.

Ref: IC& E Department's Order No.689/ICE-12011(99)/68/2022-MINES, dated: 30/11/2022, and, submission of 02 (Two) Hard Copy Mining Plan of **MIN_DJ_1 SAND MINE** by Q.P. Mr. Ashok Kumar Sarkar.

Sir,

In exercise of power conferred under **Rule 4(2) b of WBMMC Rules,2016 read with Gazette Notification No. 48-ICE/O/MIN/GEN-MIS/17/2021 dated: 25/01/2022 along with Order No. 456/ 2C-672/2022, dated: 22nd December, 2022. I, the undersigned, am hereby approving the afore-mentioned Mining Plan after their due examination & this approval is subject to the strict compliances of the following conditions, as cited below: -**

1. **(i)** The mining plan is hereby approved without any prejudice to any other law applicable to the mine from time to time whether made by Central Govt. or State Govt. or any other authority.

   (ii) The mining plan is approved without prejudice to any order in direction from any court of competent jurisdiction.

2. The approval of aforesaid mining plan does not in any way imply approval of Govt. in terms of any other law(s) in force. The approval is restricted in respect of proposal given in the said Mining Plan for the period **2022-23** with **validity upto the entire duration of the Mining Lease.**

3. The approval of this mining plan is subject to the provisions of Forest (Conservation) Act.1980& Rules made there under and other statutory orders & guidelines issued by Ministry of Environment, Forest & Climate Change, Govt. of India which may be applicable to the lease area from time to time. Forest growth if any available in the area shall not be cut off or cleared debris quarry operation without prior approval of Forest Authorities.

4. The Mining Plan is applicable for the **area: 7.31 Hectares,** under **Mouza: ANTARAM, J.L. No. 05, Plot No.(s) 1(P), 8(P), 9(P), 10(P), 11(P) & 15(P), P.S. KHORIBARI**, in **Darjeeling district** with respect to Geographical co-ordinates as furnished in the said Mining Plan.

5. It is further clarified that Approval of the aforesaid **Mining Plan is subject to the provisions of the Environment Impact Assessment Notification, 2006, as amended from time to time.**

6. **It shall be ensured that, no Mining Activity shall be carried out during the Monsoon season and the workers should be advised and protected accordingly.**

7. The boundary pillar shall maintain in good order throughout the lease period of mining.

(Continued)

8. The annual production quantity shall be reviewed from time to time **considering replenishment rate of the rivers concerned, which will be assessed periodically on the basis of Replenishment Study. The said Mining Plan shall be reviewed/modified accordingly, if necessary.**

9. The methodology of mining work will be as per the provisions of Sustainable Sand Mining Management Guidelines, 2016 and Enforcement & Monitoring Guidelines for Sand Mining, 2020.

10. A copy of Environmental Clearance against the aforementioned Mining Plan shall be submitted to this office when the same will be issued by **the State Level Environment Impact Assessment Authority (SEIAA), West Bengal.**

Enclosure: Approved Mining Plan.

Yours Faithfully,

07/03/23

Superintending Geologist

NILABJA ROY
Superintending Geologist
Government of West Bengal
Directorate of Mines & Minerals
Geological Prospecting Branch
Purulia

No. G.P. 10-10A(WBMDTCL)/2023/22-A (1/1,1/2,1/3,1/4) Date: 10/03/2023

Copy forwarded for information to: -

1. The Director of Mines & Minerals, Shilpa Sadan, 2nd Floor, 4, Abanindranath Tagore Sarani, Kolkata-700 016.
2. The Deputy Secretary, Dept. of I C & E, Shilpa Sadan, 4, Abanindranath Tagore Sarani, Kolkata-700 016.
3. The Chief Mining Officer, Asansol, Court Road, Asansol, PIN: 713 304.
4. The Senior Geologist, G.P. Branch, North Bengal Unit, Siliguri, PIN: 734 004.

Superintending Geologist.

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

Memo No. : 160(iv)-ICE/O/MIN/GEN-MIS/02/2023 **Date: 06.03.2023**

Non-Cluster Certificate

This is to certify that, Sand Block No. MIN_DJ_1, of M/S West Bengal Mineral Development and Trading Corporation Limited, comprising an area of 7.31 ha, falls in Mechi River and Administratively covered under Khoribari Block in Darjeeling District is "not clustering" with any existing Mining Lease with in 500 meter radius granted by Department of Industry, Commerce and Enterprises, Government of West Bengal. The Geo-coordinates of this Sand Block is furnished below:

Cardinal Point No.	Latitude	Longitude
1	26° 37' 20.183" N	88°08'45.893"E
2	26° 37' 18.741" N	88°08'54.107"E
3	26° 37' 09.148" N	88°08'38.703"E
4	26° 37' 12.023" N	88°08'34.140"E

This is also to be started, that if any Sand Blocks are found in future which may form a cluster situation with the Sand Block MIN_DJ_1, West Bengal Mineral Development and Trading Corporation has to conduct the Cumulative Impact Study as per the prevailing Norms and prepare the EIA-EMP including Sand Block MIN_DJ_1 for processing of Environmental Clearance for the future Sand Mine Block.

Deputy Secretary
to the Govt. of West Bengal

WEST BENGAL MINERAL DEVELOPMENT & TRADING CORPORATION LTD

(A Govt. of West Bengal Undertaking)

CIN : U14219WB1973SGC028707
Regd. Office : WBIIDC Building, 3rd Floor,
DJ-10, Sector-II, Salt Lake, Kol-700091,
Phone : 033-2359-0073
Email : wbmdtcltd.admn@gmail.com
www.mdtcl.wb.gov.in

Memo No.:MDTC/SAND/003/Part-1/1177

Date. 10.05.2023.

Undertaking

Undertaking is hereby provided to incur the expenses towards Corporate Environmental responsibility (CER) as per MOEF & CC's notifications Nos.F-No. 22-65/2017-IA.III dt. 30th September, 2020 and 1st May, 2018 with respect to our Sand Project MIN_DJ_1 comprising an Area of 7.31 Ha, and administratively falls under Mouza-Antaram, Block-Khoribari, District-Darjeeling. The Said sand Block is bounded by following Geo-coordinates.

Point Id	Latitude	Longitude
A	26^{0}37'20.183"N	88^{0}08'45.893"E
B	26^{0}37'18.741"N	88^{0}08'54.107"E
C	26^{0}37'09.148"N	88^{0}08'38.703"E
D	26^{0}37'12.023"N	88^{0}08'34.140"E

WBMDTCL is committed to make the expenses up to a maximum limit of 2% of the total project cost. It is to be noted that, all the expenditure will be made is due consultation with the district authorities and also as per the recommendation of the district authorities. The main objective of this expenses shall be peripheral development and environmental protection. The scope of work shall be followed but no limited to the activities listed below:

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

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

Authorised Signatory

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

QUALITY COUNCIL® OF INDIA
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National Accreditation Board for Education and Training

Certificate of Accreditation

RSP Green Development & Laboratories Pvt. Ltd.,

7F, Dinobandhu Mukherjee Lane, Howrah 711102, West Bengal

*The organization is accredited as **Category-B** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, Version 3: for preparing EIA-EMP reports in the following Sectors –*

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals - opencast mining only	1	1 (a) (i)	B
2	Metallurgical industries (ferrous only)	8	3 (a)	B
3	Distilleries	22	5 (g)	B
4	Aerial ropeways	35	7 (g)	B
5	Common municipal solid waste management facility (CMSWMF)	37	7(i)	B
6	Building and construction projects	38	8 (a)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in SAAC minutes dated May 6, 2022 and supplementary minutes dated July 8, 2022 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/22/2519 dated September 15, 2022. The accreditation needs to be renewed before the expiry date by RSP Green Development & Laboratories Pvt. Ltd, following due process of assessment.

Sr. Director, NABET
Dated: September 15, 2022

Certificate No.
NABET/EIA/2124/SA 0176

Valid up to
Feb 9, 2024

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