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EXECUTIVE SUMMARY

The project has been proposed for the Mining of Sand and Gravel from the Subansiri River bed of Government Forest Land by open cast manual extraction and semi-mechanized method. Mining will be confined to the allotted lease area which lies on the **Subansiri** River bed from which approximately **120000.0 m³** of Sand and **180000.0 m³** of Gravel will be excavated and the estimated project cost is **Rs. 7,62,00,000.00**.

The mining lease (area 24.00 Ha) has been granted in favour of M/S R.J. and Sons Marketing Pvt Ltd over an area of 24.00 Ha with in Village- Thekeraguri, P.O. Pathalipam, P.S. Boginodi, District – Lakhimpur, Assam. Mining will be carried out on the basis of govt. consent order to continue mining operations for 05 years. Total geological reserves as on date as per the mining plan are **1080000.00** cum & with maximum of production of sand **27594** cum/ Annum and Gravel **41391** cum/ Annum with total of **68985** cum/annum.

The proposed project is an opencast manual and semi-mechanized mining project, where mining of sand and gravel will be done through manual as well as by machines approved by the mining department. An Excavator shall be deployed for the removal of overburden & inter burden but its deployment will be rarely & occasionally for 4-5 days in a month. Methods of mining will be open cast, manual and semi-mechanized. Mining will be confined to the allotted lease area which lies on the Subansiri River bed from which approximately **60000.00** cum of Sand and Gravel will be excavated every year and. Drilling and Blasting is not proposed in this mining activity. Terms of Reference (ToR) for the proposed project has been granted by the SEIAA, Assam vide its letter no **SEIAA/923/2019/ToR/8/647** dated 01.01.2020.

Salient features of the project

Project name	Lower Subansiri Sand and Gravel Mining Contract Area (ML Area 24.00 Hactares), District Lakhimpur, Assam.		
Pillar Co-ordinates	S.No.	Latitude, North	Longitude, East
	1	27 ⁰ 27.317' North	94 ⁰ 15.355' East
	2	27 ⁰ 27.432' North	94 ⁰ 15.464' East
	3	27 ⁰ 27.536' North	94 ⁰ 15.631' East

	4	27 ⁰ 27.618' North	94 ⁰ 15.792' East
	5	27 ⁰ 27.721' North	94 ⁰ 15.782' East
	6	27 ⁰ 27.859' North	94 ⁰ 15.778' East
	7	27 ⁰ 27.919' North	94 ⁰ 15.689' East
	8	27 ⁰ 27.731' North	94 ⁰ 15.621' East
	9	27 ⁰ 27.507' North	94 ⁰ 15.481' East
	10	27 ⁰ 27.392' North	94 ⁰ 15.290' East
Total Geological Reserve	1080000 m ³		
Total Mineable Reserve	972000 m ³		
Total Proposed Production in 5 years	Sand : 120000 m ³ Gravel : 180000 m ³		
Proposed Production per year	Sand : 27594 m ³ Gravel : 41391 m ³		
Sanctioned Period of Mining Lease	07 year		
Method of Mining	Opencast Manual and Semi-Mechanized Method		
No. of working days/year	250		
No. of workers	50		
No. of Vehicular Movement	28 Trucks		
Type of land	Forest Land		
Ultimate Depth of Mining	3m		
No. of trees to be planted	500		
Water Requirement	15 KLD		
Proposed CER	38 Lakhs (5% of the Project Cost)		
Proposed EMP Cost	152 Lakhs (20% of the Project Cost)		

Environmental Management Plan (EMP)

Proper environmental management plan is proposed for “Sand and Gravel” mining project to mitigate the impact during the mining operation.

- No labour camps will be established on river bed.
- No cooking, or burning of woods will be allowed in the nearby area.

- Prior to commencement of mining, a short awareness program will be conducted for labours to make them aware of way of working and various precautions to be taken while at work. Such program will be repeated occasionally.
- In the event of any some causality or injury to any animal occurs, proper treatment will be given.
- No tree cutting, chopping, lumbering, uprooting of shrubs and herbs will be allowed.
- Corridor movement of wild animals, if exists mining operations will be avoided in the area.
- It will be ensured that noise produced due to vehicles movement while carrying sand is within the permissible noise level.
- No piling of River Bed Material will be done in adjoining area.
- If wild animals are noticed crossing the river bed, they will not be disturbed or chased away, instead the labors will move away from their path.

Environment Monitoring Program

S.No.	Activity	Schedule
Air Pollution Monitoring		
1.	Ambient air monitoring of parameters specified by MoEF (PM ₁₀ , SO ₂ & NO ₂).	Once in every season except monsoon
Water Quality Monitoring		
2.	Monitoring water quality surface water from the river	Once in every season except monsoon
3.	Monitoring of one sample of tube well and open well at mine / nearby location. Parameters are essential parameters as per IS: 10500:1991.	Once in every season except monsoon
4.	Monitoring of water spray requirements	Log-sheet of water spray will be maintained on daily basis
Noise Quality Monitoring		
5.	Noise in the ambient atmosphere in mining lease	Once in every season except monsoon
Greenbelt Maintenance		
6.	Monitoring schedule for Greenbelt	Yearly

S.No.	Activity	Schedule
	development as per mining plan	
Soil Quality Monitoring		
7.	Soil at two locations	Once in every year

The proposed project is expected to provide employment to local people in different activities such as mining, sizing (sieving) transportation and plantation activities. The revenue generated from the production and sale of mineral will also add to the exchequer of government, which in turn will help in the growth of state economy. Also, as the proposed mine area lies in the Subansiri river flood plain, hence the removal of extracted material will minimize the chances of flood disaster in the area. Land outside the river bed will be made utilizable for the purpose of agriculture; hence the mining will help in improving the fertility of soil. Excavated material will cater the huge increasing demand of mineral in the fast growing construction industry of Assam and nearby states etc. The project is not expected to have any major adverse impact on the environment and whatever impacts are anticipated during the EIA study will be minimized with the help of suitable mitigation measures.

Chapter 1. INTRODUCTION OF THE PROJECT

1.1 Purpose of the Report

The purpose of the Environmental Impact Assessment (EIA) study is to ensure that all impacts whether direct or indirect and particularly environmental, social and economic impacts are fully examined and addressed.

EIA is one of the established management tools for integrating environmental concerns in development process and for improved decision making as there is a need to synchronize the developmental activities with the environmental concerns into the larger interest of society. The growing awareness, over the years, on environmental protection and sustainable development, has given further emphasis to the implementation of sound environmental management practices for mitigating adverse impacts from developmental activities.

EIA systematically examines both beneficial and adverse consequences of the proposed project and ensures that these impacts are taken into account during the project design. By considering environmental effects and mitigation early in the project planning cycle, there are many benefits, such as protection of the environment, optimum utilization of resources and saving overall time and cost of the project. Properly conducted EIA also lessens conflicts by promoting community participation, informs decision-makers, and helps lay the base for environmentally sound projects.

Environmental Management plays a vital role in sustainable development of a country. Recognizing its importance, the Ministry of Environment and Forest, Government of India had formulated policies and procedures governing the industrial and other developmental activities to prevent indiscriminate exploitation of natural resources and to promote integration of environmental concern in project development. The Ministry of Environment, Forest & Climate Change, Govt. of India made environmental clearance (EC) for certain development projects mandatory through its notification of 27/01/1994 under the Environment Protection Act, 1986. Keeping in view of the experience gained in environmental clearance process over a period of one decade, the MoEF&CC came out with Environment Impact Notification, S.O. 1533(E), as dated 14/09/2006 and further various amendments done on 01/12/2009, 04/04/2011, 13/12/2012, 13/03/2013, 09/09/2013, February

2014, October 2014 and also the EIA guidance Manual for Mining of Minerals of MoEF&CC, Govt. of India, for seeking environmental clearance for mining of sand/gravel in the applied mining lease area. It has been made mandatory to obtain environmental clearance for different kinds of developmental projects (Schedule-1 of notification). The notification has classified projects under two categories-A and B. Category-A Projects (including expansion and modernization of existing projects) require clearance from Central Government (Ministry of Environment and Forest, Govt. of India) while category-B projects should be considered by State Level Environmental Impact Assessment Authority (SEIAA), constituted with the approval of MoEF&CC.

The major objectives of the report are:

- To establish the present environmental scenario
- To anticipate the impact of proposed project and
- To suggest preventive and mitigation measures

The present report has been prepared for the purpose of public hearing in order to obtain environmental clearance in compliance to the TOR issued for the Mining of Sand.

1.2 Identification of Project Proponent & Status of Lease

The mining lease over an area of **24.00 Ha** is granted to **LOWER SUBANSIRI SAND AND GRAVEL MINING CONTRACT AREA** for a period of **05 years** as per the **LOI** letter number **GM/MM/86-B (40)/ Guwahati** dated 20/05/2018 (**Annexure-1**).

The excavation of sand is to be done from bed of **Subansiri** River an area of **24 Ha** Village-Village- Thekeraguri, P.O. Pathalipam, P.S. Boginodi, District – Lakhimpur, Assam.

The Address of the proponent is:

M/S R.J. and Sons Marketing Pvt Ltd, R K Path, Itachali, P.O. Amolapatty, District Nagaon, Assam.

1.3 Brief Description of the Project

The project has been proposed for Lower Subansiri Sand and Gravel Mining Contract Area (ML Area 24.00 Hectares), District Lakhimpur, Assam. Mining has been proposed for Sand and Gravel extraction from the Government Forest Land of 24 Ha area by open cast manual extraction and semi-mechanized method. Mining will be confined to the allotted lease area which lies on

the **Subansiri** River bed from which approximately **27594.00 cum** of Sand and **41391 cum** of Gravel will be excavated per annum and the estimated project cost is **Rs. 7,60,00000**.

The Sand will be exploited manually & using semi-mechanized methods. Loading will be done by semi-mechanized method by the loader. The mineral is not meant for captive use. The extracted / collected Sand will be used for different purposes.

As per the EIA notification dated 14.09.2006 published by the MoEF&CC, New Delhi, and the project falls under the B category of Schedule 1 A activities. This is not a cluster situation where no other mine is present in its vicinity. The project area is 24.0 Ha and hence, as per the EIA notification, 2006 and its subsequent amendment dated 15.01.2016, the project is a “**Category B1**” project along with applicability of the preparation of EIA/EMP report and conduction of Public hearing.

1.4 Project Nature, Size & Location

I. Nature

The proposed project is sand mining project. The total lease area considered is **24 Ha** of Govt. land. The method of mining is open cast, manual and semi-mechanized where No drilling or blasting is required. The proposed mining project is categorized as ‘**Category B1**’ project as per EIA notification dated 14th September 2006.

II. Size

The proposed rate of production is **27594.00 cum** of Sand and **41391 cum** of Gravel per year.

III Location

Location	Lower Subansiri Sand and Gravel Mining Contract Area (ML Area 24.00 Hactares), District Lakhimpur, Assam.		
	S.No.	Latitude, North	Longitude, East
	1	27 ⁰ 27.317’ North	94 ⁰ 15.355’ East
	2	27 ⁰ 27.432’ North	94 ⁰ 15.464’ East
	3	27 ⁰ 27.536’ North	94 ⁰ 15.631’ East
	4	27 ⁰ 27.618’ North	94 ⁰ 15.792’ East
	5	27 ⁰ 27.721’ North	94 ⁰ 15.782’ East
	6	27 ⁰ 27.859’ North	94 ⁰ 15.778’ East
	7	27 ⁰ 27.919’ North	94 ⁰ 15.689’ East
8	27 ⁰ 27.731’ North	94 ⁰ 15.621’ East	

	9	27 ⁰ 27.507' North	94 ⁰ 15.481' East
	10	27 ⁰ 27.392' North	94 ⁰ 15.290' East
Village	Thekeraguri village		
District	P.O. Pathaliam, P.S. Boginadi		
State	Assam		

1.5 Project importance to the Country & Region

This project involves collection of Sand due to their most diversified use. It is a basic raw material required for manufacturing industries improving the construction activities like buildings, road, bridges infrastructure etc. The requirement for these minerals is always high in the nearby cities, towns and villages. Also, the project will generate direct and indirect employment opportunities to the nearby villages. Economy of the area will get a boost and there will overall growth of the region. Also the management of Mining will conduct medical camps at regular interval for villagers and labours. The CER activity will improve the overall development of the area such as providing infrastructure like school furniture, water tankers etc.

1.5.1 Statutory Requirements

The entire statutory requirement related to the proposed project is provided as per the chronological sequence in the tables given below:

Table 1-1 : Statutory Requirement

S.No.	Particulars	Details	Issued by / Approved By
1	Letter of Intent (LoI)	O.O.No. 04 dated 08.03.2019	DFO Lakhimpur, Assam
2	Approved Mine Plan	GM/MM/86-B(40)/(A) 722-726 Guwahati dt20.05.2019	DGM Assam
3	Terms of Reference (ToR)	SEIAA. 923/2019/ToR/8/647 dated 10.01.2020	SEIAA, Assam

1.6 Scope of the Study

The State Level Expert Appraisal Committee (SEAC) considered the project during meeting held on 07.09.2019 for grant of ToR. The SEAC recommended the project to SEIAA for

issuing ToR. The later in its meeting dated 22.10.2019 cleared the ToR. Based on the information contained in the documents submitted and the presentation made, SEIAA, Member Secretary, Assam issued the Terms of Reference (TOR) dated 10th Jan 2020. The Points raised by the SEIAA, Assam in the TOR and its compliance are given hereunder:-

Table 1-2: ToR Compliance

S.No	TOR Points	Compliance
Standard ToR		
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.	Given in Chapter 2 under Section 2.7.
2.	A copy of document in support of fact that the proponent is the rightful lessee of the mine should be given.	Land Documents attached as Annexure II
3.	All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of mine lease area, production level, waste generation and its management and mining technology and should be in name of lessee. The mine plan should take into account the conditions of mine lease, if any, in terms of distance to be left un-worked from river flowing	Noted and Complied. Mine plan Is attached as Annexure VIII .

	nearby.	
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).	Attached in Chapter 3. See Fig 3-2.
5.	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	Details are given in Chapter -2. The toposheet map is attached as Annexure IX .
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.	LoI has been issued in favour of Ms R.J & Sons Marketing Pvt Ltd. The LoI is attached as Annexure-1 .
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 Environmental Policy of the company is given in section 10.15 in chapter 10.

	<p>the prescribed operating process/procedures to bring into focus any infringement/deviation/</p> <p>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.</p>	
8.	<p>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.</p>	<p>Blasting and Slope details are given in Chapter 2. Their mitigation measures and safeguards are discussed in chapter 10 of EMP section.</p>
9.	<p>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.</p>	<p>The Study area for collection of baseline data was taken 10 KM. It is also given in the Figures mentioned in chapter 3 for landuse, air and noise monitoring, water and soil sampling sites..</p>
10.	<p>Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park,</p>	<p>Present Landuse pattern of the site is given in table 2.5 and landuse of the study area is in table 3.3.</p>

	<p>migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.</p>	
11.	<p>Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.</p>	<p>Details of waste/overburdens are given in section 2.9.2 in chapter 2. and section 10.12 in chapter 10.</p>
12.	<p>A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.</p>	<p>NOC from the forest department is enclosed as Annexure X.</p>
13.	<p>Status of forestry clearance for the broken up area and virgin forestland</p>	<p>No forest clearance is required as the project does not require forest land</p>

	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.	diversion.
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 forest clearance is required as the project does not require forest land diversion.
15.	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	Details of fauna is given in Table 3.26.
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.	Wildlife Conservation Plan will be prepared for the Wildlife and the same will get approved from the Wildlife department.
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.	No such area identified in 10 Km.

	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 alongwith budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed in Chapter 3.
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	Not Applicable

	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).	Not applicable
21.	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be	No R&R applicable since it fresh mine lease for 07 years. No PAP applicable since area is a barren inhabited land.

	<p>clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.</p>	
22.	<p>One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled pre meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.</p>	<p>One season winter season baseline data was collected for the period of October 19 to December 2019 duration. Detailed are given in Chapter 3.</p>
23.	<p>Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of</p>	<p>Air quality modeling for PM10 and NO2 is given in Chapter 4.</p>

	<p>movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided.</p> <p>The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.</p>	
24.	<p>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.</p>	<p>Total water required is 68.5 KLD .supplied by the Tanker.</p>
25.	<p>Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.</p>	<p>Not applicable as no water withdrawal is envisaged.</p>
26.	<p>Description of water conservation measures proposed to be adopted in the Project should be given.</p> <p>Details of rainwater harvesting proposed in the Project, if any, should be provided.</p>	<p>Since it's a river bed mine. Hence not applicable.</p>
27.	<p>Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary</p>	<p>Impacts on water quality are discussed in chapter 3 and mitigation measures are given in chapter 4.</p>

	safeguard measures, if any required, should be provided.	
28.	<p>Based on actual monitored data, it may clearly be shown whether working will intersect groundwater.</p> <p>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.</p> <p>The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.</p>	Not applicable. As per the approved mine plan, the mining shall be restricted upto 3m bgl however the ground water is found at 10m RL.
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.	Not applicable.
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.	Schematic diagram is given in Figure 3.5.

31.	<p>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</p> <p>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.</p>	<p>The mining lease is valid for 7 years and year wise greenbelt development plan is given in Section 6.3.1 in Chapter 6 and plantation scheme drawings is given in Mine Plan.</p>
32.	<p>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.</p>	<p>Only 25-30 trucks/tippers are to be used. Transportation Plan attached as Plate 3 in Mining Plan</p>

	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.	Only temporary shelter facilities are proposed. No permanent structure will be built as the labours will be hired from the local villages.
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.	Conceptual post mining landuse and Progressive reclamation plan are given in Mining plan.
35.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	The working conditions in the mines are governed by the enactments of the as per the guidelines of the Mines Act, the management will take all necessary precautions. Normal sanitary facilities (Mobile toilet) will be provided within the lease area. The management will carry out periodic health check-up of workers. OHS plan is given in chapter 10.
36.	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Regular health camps will be conducted and the budgetary provision is given in EMP.
37.	Measures of socio economic significance	Labour will be hired from the local

	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.	market and it will enhance their living standard by providing them employment in the vicinity.
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.	Detailed EMP is discussed in Chapter 10.
39.	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Will be added once Public hearing is conducted.
40.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	Not applicable
41.	The cost of the project (Capital and recurring) as well as the cost towards implementation of the EMP Should be clearly Spelt out.	Project Cost is 7.60 Crores, EMP Cost is 1.5 crores, CER Budget is 38.00 Lakhs
42.	A Disaster management Plan shall be prepared and included in the EIA/EMP	DMP is given in Chapter 7

	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.	Project benefits are given in Chapter 8.
44.	<p>Besides the above, the below mentioned general points are also to be followed:-</p> <p>a) All documents to be properly referenced with index and continuous page numbering.</p> <p>b) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.</p> <p>c) 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.</p> <p>d) Where the documents provided are in a language other than English, an English translation should be provided.</p>	Noted and Complied

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

f) 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.

g) 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.

h) As per the circular no. J-

	<p>11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.</p> <p>i) The EIA report should also include (1) surface plan of the area indicating contours of main topographic features, drainage and mining area, (2) geological maps and sections and (3) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.</p>	
48.	<p>The Prescribed TOR would be valid for a period of 3 years for the submission of EIA/EMP reports, as per the O.M No. J-11013/41/2006-IA. II (I) dated 29.08.2017.</p>	noted

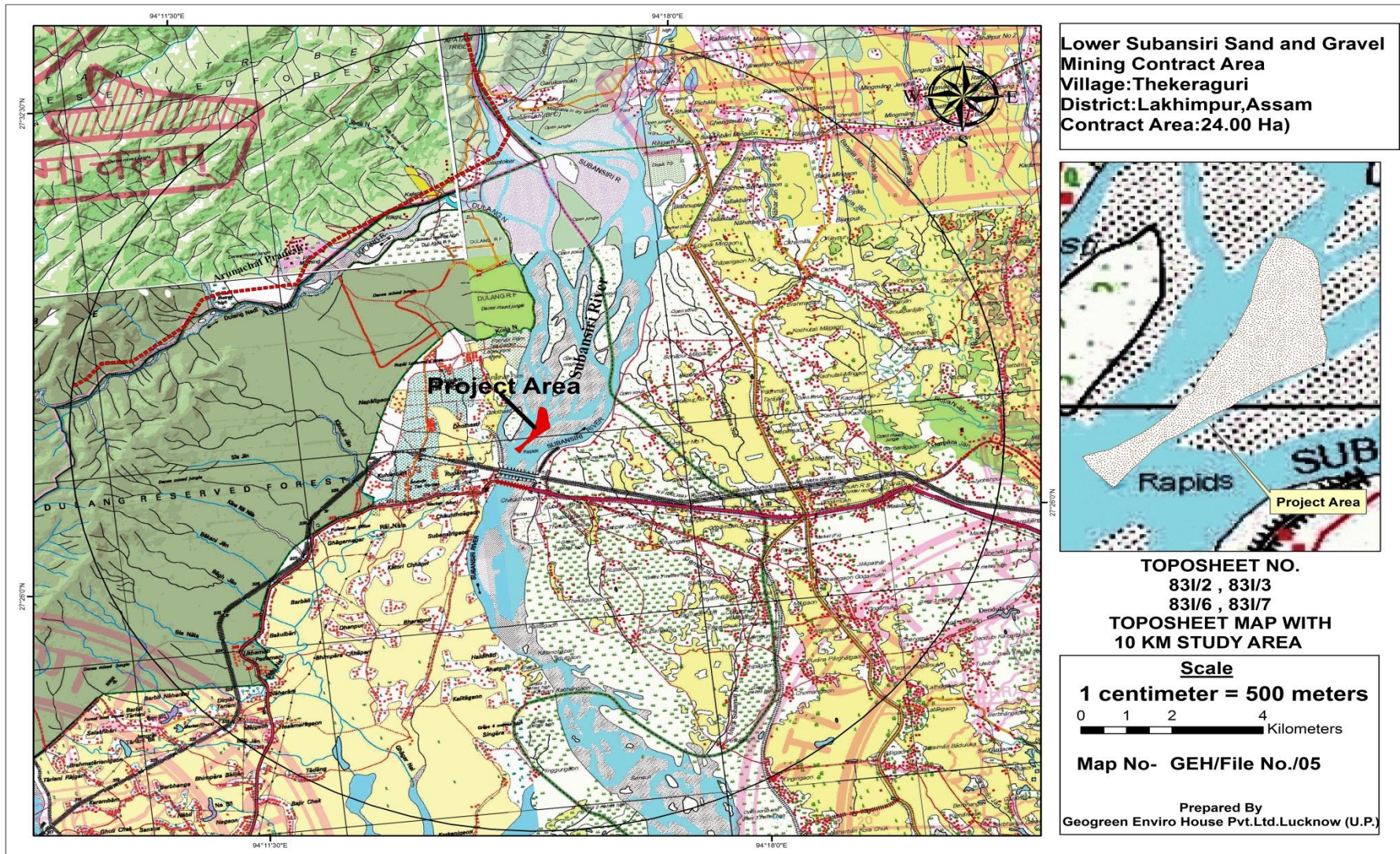


Figure 1-1: Site Map with 10 KM Study Area on Toposheet Map

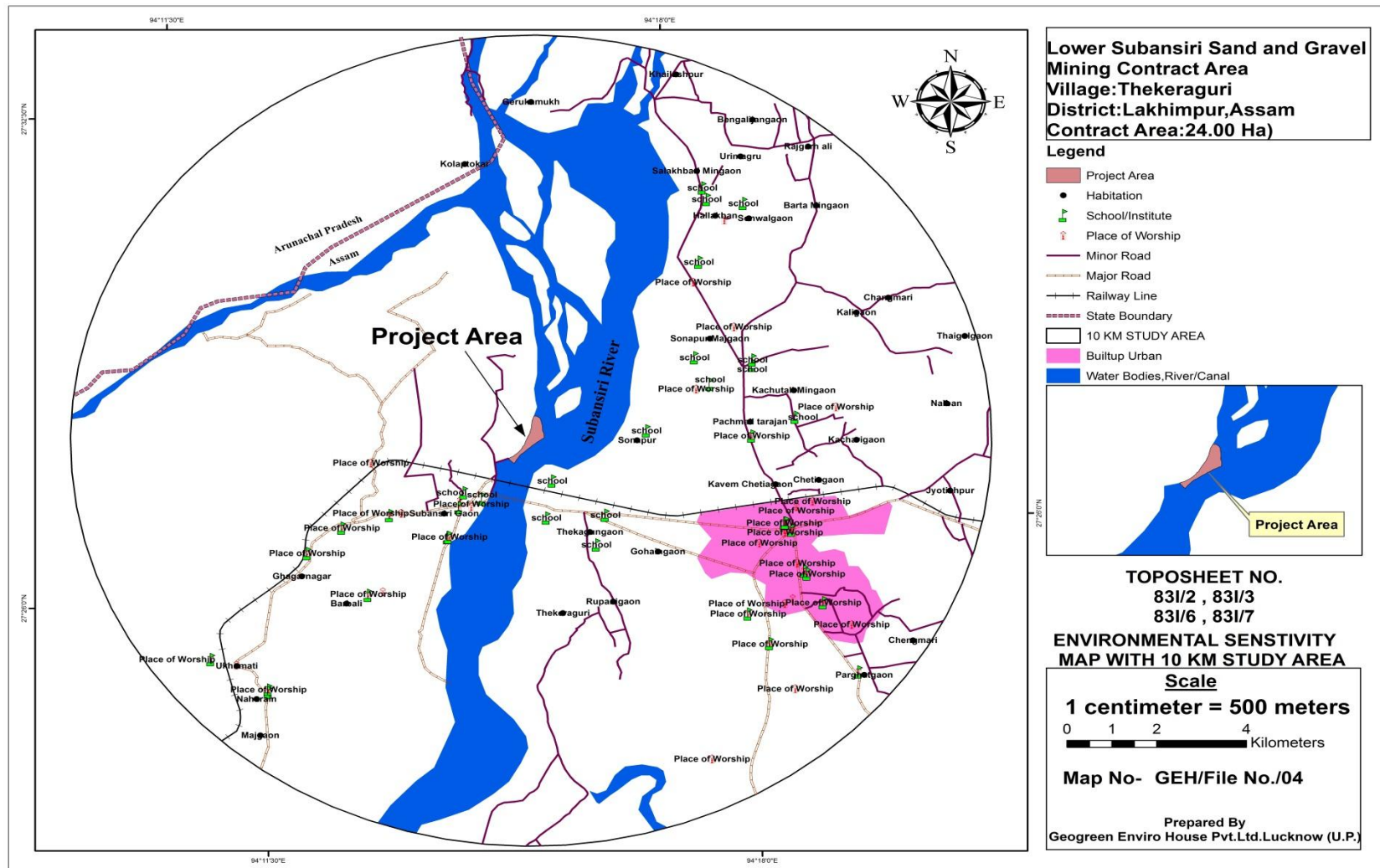


Figure 1-2: Environmental Sensitivity Map for 10 KM Radius

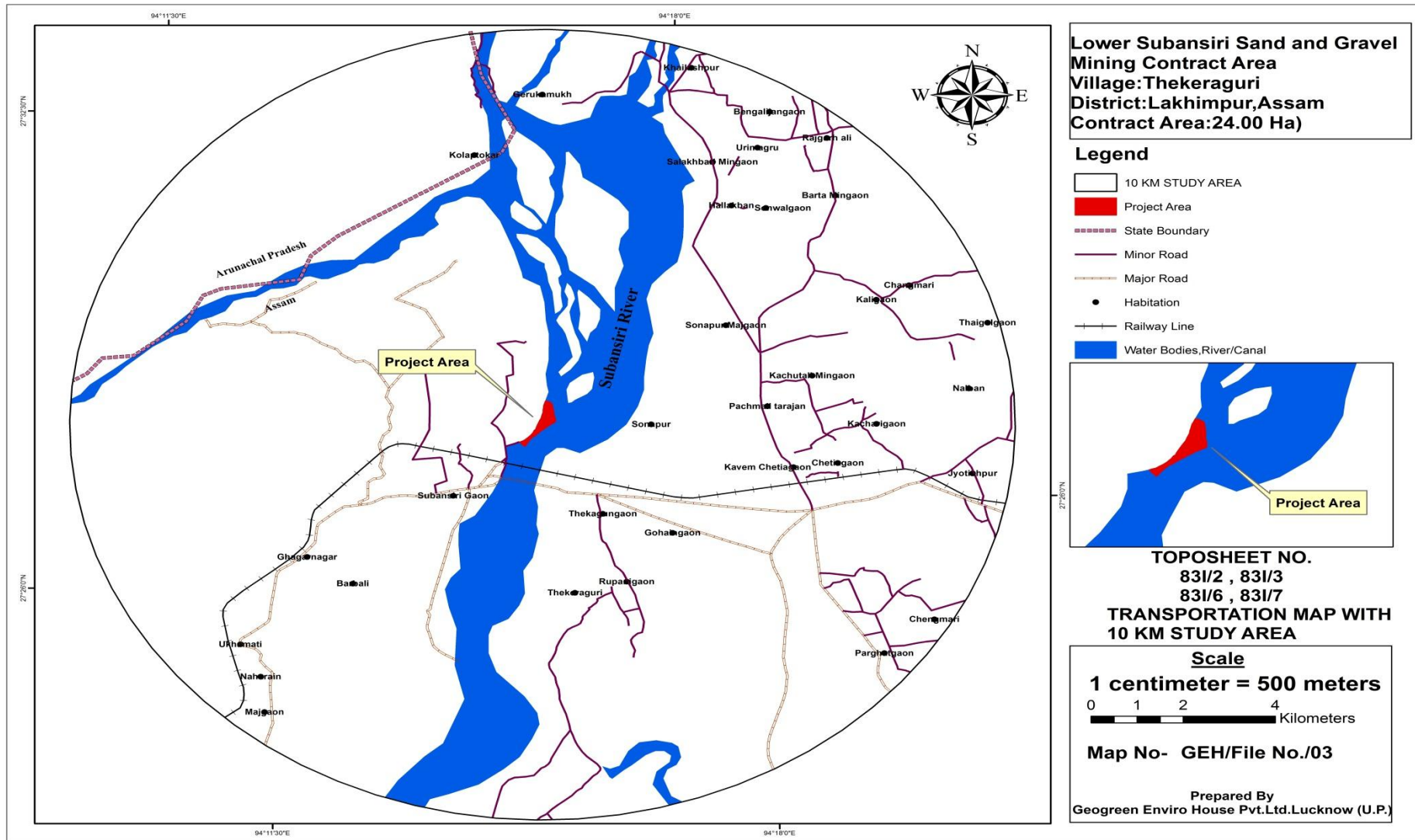


Figure 1-3: Transportation Map of Project Site

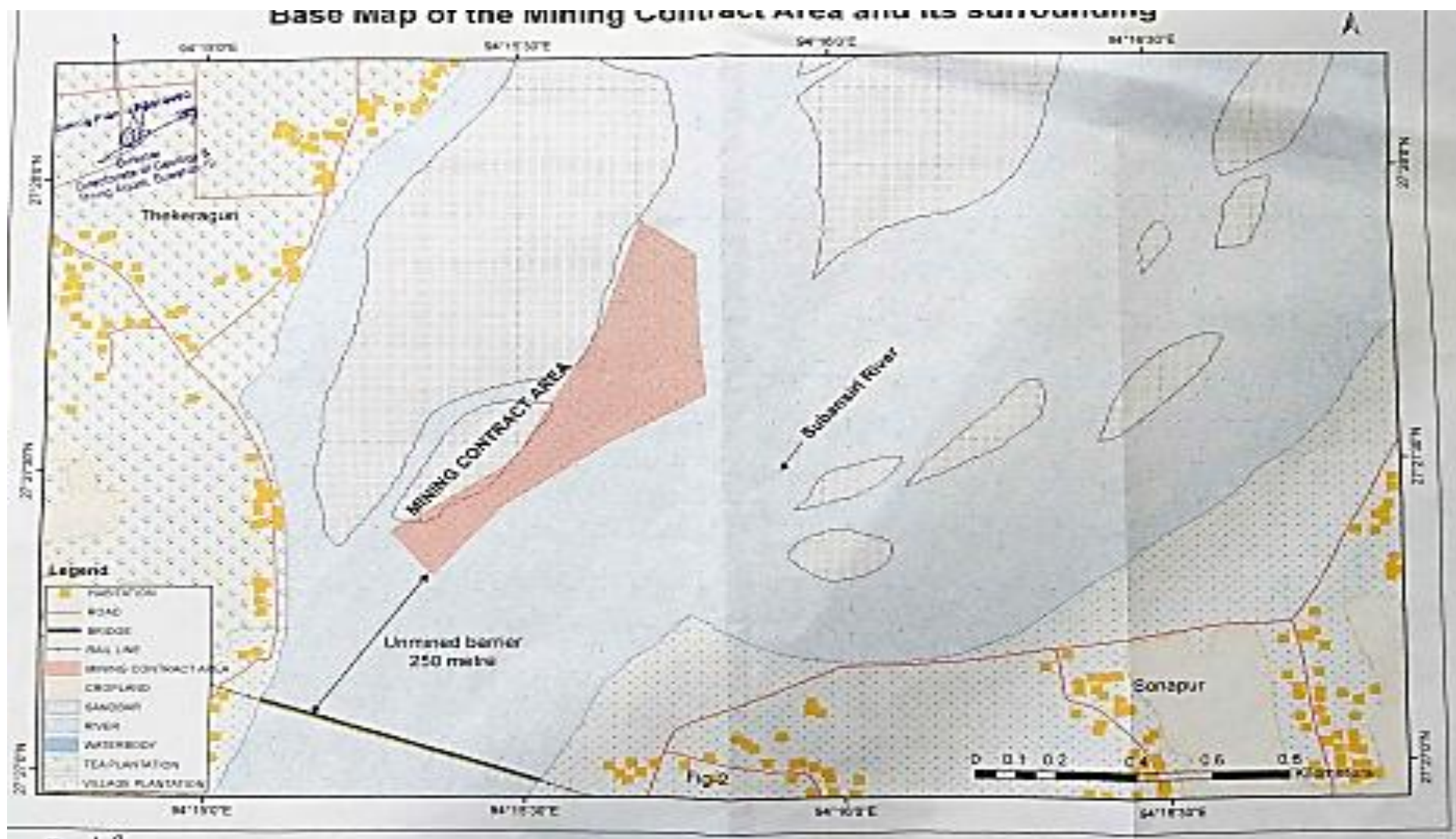


Figure 1-4: Surface and Geological Plan

Chapter 2. PROJECT DESCRIPTION

2.1 Type of Project

The proposed project is a sand and gravel mining project in Subansiri River Bed. The area of the project is 24 Ha situated at Village Thekeraguri, District Lakhimpur Assam.

As per the EIA notification dated 14.09.2006 published by the MoEF&CC, New Delhi, and the project falls under the B category of Schedule 1 A activities. This is not a cluster situation where no mine is present in its vicinity. Since the area of the project is 24 Ha (> 5 Ha), hence as per the EIA notification, 2006 and its subsequent amendment dated 15.01.2006, the project is a “**Category B1**” project along with applicability of the preparation of EIA/EMP report and conduction of Public hearing.

The estimated project cost is Rs. **7.60 Crores**, Total mineable reserves as on date as per the mining plan are **972000.00 cum** & with maximum of production of mineral **69085.00 cum/ Annum**.

2.2 Need of the Project

This project involves collection of Sand and Gravel due to their most diversified use. It is a basic raw material required for manufacturing industries improving the construction activities like buildings, road, bridges infrastructure etc. The demand for the sand and gravel is always high in the nearby cities.

Apart from this, the project will generate direct and indirect employment opportunities to the nearby villages. Economy of the area will get a boost and there will be overall growth of the region in terms of educational & industry. Also, the management of the mine will conduct medical camps at regular interval for villagers and labors.

2.3 Location (Map Showing general location, specific location and project boundary with project layout) with coordinates

The proposed project is a mining project in the Subansiri River Bed at Village Thereraguri, District Lakhimpur, Assam. Location map and Google Earth Map of the project are given as Figure 2.1 and Figure 2.2.

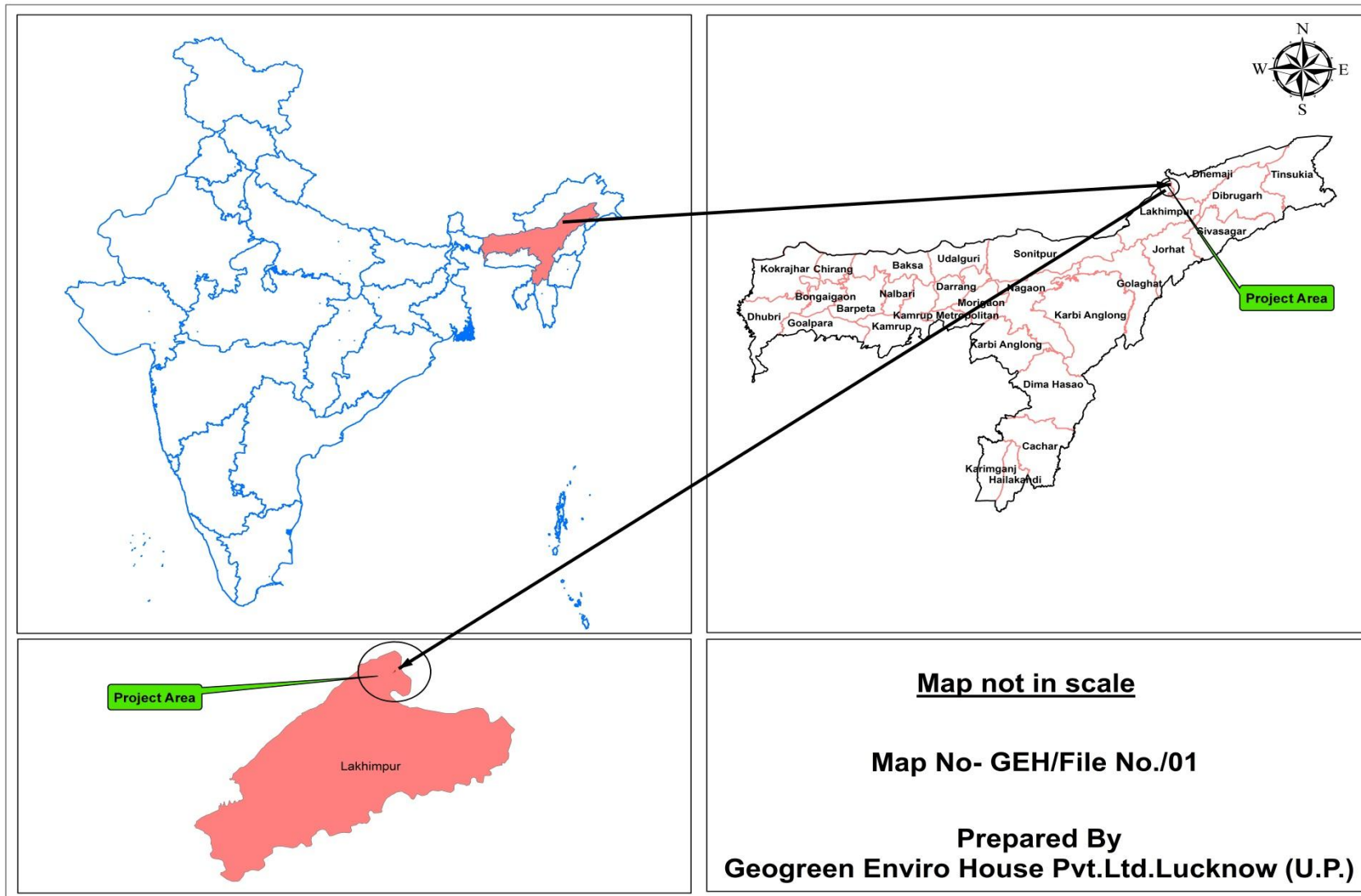


Figure 2-1: Location Map of the Proposed Mining Activity



Figure 2-2: Google Earth Image of the Project

Table 2-1: Location (Coordinates) of the Project

Location	Lower Subansiri Sand and Gravel Mining Contract Area (ML Area 24.00 Hectares), District Lakhimpur, Assam.
Name & Address of Applicant	The Director, M/S R J & Sons Marketing Pvt Ltd, R K Path, Itachali, P.O. Amolapatty, Dist Nagaon, Assam.
Name of the Project	Sand and Gravel Mining at Subansiri River bed
Village	Thekreraguri
District	Lakhimpur
State	Assam
Nearest Railway	Subansiri Railway Station, 1.28 KM, SW
Nearest Airport	Dibrugarh Airport – 74.0 Km, East
Nearest Highway	NH-52 0.91 KM South
Mineral	Sand and Gravel
Area (Ha)	24 Ha
Period of Lease	07 years
Status of Mine	New Project

Table 2-2: Environmental Sensitivity (10 KM)

S.No.	Category	Name	Distance,km	Direction
1	Village	Subansiri	0.97,KM	SE
		Dhalbasti	0.56,Km	SW
		Uttar Rupahi	1.96,Km	SW
		Thekagurigaon	2.06,Km	SE
		Chauldhogaon	1.54,km	SW
		Rupahi Gaon	1.50,KM	SW
		Town	Gogamukh	6.24,KM
2	Bus Stop	Gogamukh	6.24,KM	SE

3	Road	NH-52	0.91,KM	S
		Major Road	0.38,KM	W
4	Airport	Dibrugarh Airport	74.00,KM	E
5	Railway connectivity	Subansiri Railway Station	1.28,KM	SW
		Gogamukh Railway Station	6.33,KM	E
6	river	Subansiri River	0,KM	
7	Bridge	Subansiri River Railway ,Bridge	0.56,KM	S
		Subansiri River (NH-52) ,Bridge	0.92,KM	S
8	Dam/Reservior	Subansiri Dam (Subansiri River)	9.73,Km	N
9	school	Rupahi High school near near Rupahi Gaon	1.11,KM	SW
		Rupahi Adarsha Jatiya Vidyalaya near Rupahi Gaon	1.29,KM	SW
10	hospital	Chauldhuwa State Dispensary near Dhalbasti	0.89,KM	SW
		Gogamukh PHC / CHC - Hospital (Gogamukh)	6.79,KM	SE
11	worship place	Shri Shri Bishnu Mandir near Dhalbasti	1.48,KM	SW
		Hanuman Mandir near Dhalbasti	1.48,KM	SW
12	Inter state Boundary	Arunachal Pradesh	5.27,KM	NW



Plate:1



Plate 1: Site Photographs

2.4 Size or Magnitude of Operation

The entire lease hold area of **24 Ha**, is forest land lies in Govt. land. The land is totally sandy and has sand in large amount. This land is good for mining. There is no agriculture in the mine lease area as well as Sanctuary.

2.5 Physiography

Physiographically the area can broadly be divided into three parts, i.e., the hilly tract, the foothill region and the extensive flood plain created by the river Brahmaputra and its tributaries in southern part. The hilly tracts comprise Siwalik sediments of lesser Himalayas. The southern limit of the sub-Himalaya is marked by Himalayan Frontal Fold (HFF). The foothill region is characterised by older terrace deposit. Two terrace surfaces have been identified as the Harmuti and Joyhing surfaces that represent high and low level terraces. These terrace deposits are characterised by undulating surface comprising boulders, pebbles of quartzitic and gneissic rocks with fine sand, silt and clay act as matrix. The alluvial flood plain consists of younger and older alluvial deposits. It represents various sub-features, viz., palaeochannel, swampy/marshy land, river terraces, flood plains, point bars, channel bar and river channel. The average altitude in the central and southern flood plain varies from 80-85m above MSL with very gentle slope throughout. The 92m contour marks the northern limit of the flood plain area. The slope of the entire the district drops from northern and eastern corners towards south.

2.6 Geology

The State of Assam is occupied by rocks belonging to, (a) Proterozoic Gneissic Complex, (b) Shillong Group of Meso-Palaeo Proterozoic age, (c) Granite Plutons of Neo-Proterozoic-Lower Palaeozoic age, (d) Lower Gondwana sedimentary rocks of Permo-carboniferous age (e) Alkali Complexes of Samchampi, Borpong and volcanic rocks represented by Sylhet Trap of Cretaceous age, (f) Lower Tertiary (Paleocene-Eocene) shelf sediments of the Jaintia Group extending along the southern and eastern flanks of Mikir Hills and geosynclinals sediments of Disang Group in parts of the North Cachar Hills, (g) Upper Tertiary (Oligocene to Pliocene) shelf and geosynclinal sediments covering the southern flanks of Mikir Hills, the North Cachar Hills and the hills of the Cachar district in the Surma valley area. These rocks are also exposed along the northern foothills of Naga-Patkai range bordering the southern margin of Sibsagar,

Jorhat and Dibrugarh districts. Along the southern foothills of Eastern Himalaya facing the northern border of Assam a narrow strip of Siwalik rocks are exposed (h) the Quaternary deposits comprising of Older and Newer Alluvium occur in flood plains and terraces of the Brahmaputra valley, Surma valley and other river basins of Assam.

2.7 Estimation of Reserves

The calculated mineral reserves of the Permit area to be available for extraction are as stated below:

The area of the Permit site = 24.00 Hectares

The Mineable area = 24.00 Hectares = 240000 Sq. M

The maximum depth allowed for extraction of the mineral = 3 M

So the total reserve of the minerals available would be = 240000×3
= 720000 Cu M

The above quantity may be termed as 'Inferred Reserve' of the mineral and the actual mineral reserve will be less than the inferred reserve as a considerable volume of the minerals will have to be left unmined for preparation of the benches/ steps as per opencast mining practice. This has been explained separately in the later chapters.

MINEABLE RESERVE OF THE MINERALS:

Assuming the river bed of the Mining Permit Area to be level area, the reserve of sand and gravel available for extraction can be estimated as stated below:-

The Mineable area = 24.00 Hectares = 240000 Sq. M

Maximum depth allowed for river bed mining = 3M

So, the total reserve of the sand and gravel would be = $240000 \times 3 =$
720000 Cu.M

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

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period of five years, it can be roughly be assed that 1.5 times of the estimated quantity of the minerals, i.e. $720000 \times 1.5 = 1080000$

For extraction of the sand and gravel under the opencast mining method, three numbers of benches each of 1m depth and 1.5M width may be maintained as indicated in Fig. 3. Since the total period of the Mining Permit would be 5 (five) years, the reserve of sand and gravel and gravel available for extraction per year would be about $(1080000 / 5) = 216000$ Cu Metres.

Mining Loss being assumed as 10% during the extraction operation would be :- $(216000 \times 10\%) = 21600$ Cu.M

The mineable reserve of sand and gravel per year =
 $(216000 - 21600) = 194400$ Cu.M

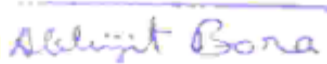
So, mineable reserve of sand and gravel during the awarded Mining Permit period of 5 years = $194400 \times 5 = 972000$ Cu.M

Extraction/ collection work of river sand and gravel is normally carried out for 10 months in a year. The work remains suspended for the rest four months in a year due to seasonal monsoon rainfall and other related problems. Considering the number of working days, in a month to be 25 days, the total working days in a year would be = $(25 \times 10) = 250$ days.


So the extraction of river sand and gravel in a year (i.e. for 250 days) would be about
= $(194400 / 365) \times 250 = 133151$ Cu M.

The aforesaid quantity of 133151 Cu.M of sand and gravel per year has been estimated considering extraction up to the maximum permissible depth of 3 metres in the river bed from the unmined top surface.

But the sand and gravel of the desired quality for the useful purposes may not be available in the Subansiri River bed up to 3 metres depth. Hence, the mineable reserve of sand and gravel available for extraction per year up to different depths is assessed as shown below.


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<u>Depth</u>	<u>Mineable reserve of sand and gravel available per year (Approx)</u>
3 metres	133151 Cu. M
2 metres	88768 Cu. M
1 metre	44384 Cu. M
0.5 metre	22192 Cu. M

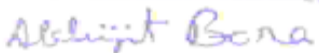
However, the Competent Authority may prescribe the quantity of sand and gravel to be extracted by the Mining Permit Holder as per the terms and conditions of the Permit taking into account the impact on the ecology and environment of the surrounding areas.

However, the quantity of sand and gravel allotted for extraction under the Mining Permit will be within the mineable reserve of sand and gravel available per year as depicted above.

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MINING:

In order to ensure mineral conservation, systematic mining and protection of environment, the Assam Minor Mineral Concession Rules (AMMCR), 1994 has been replaced by AMMCR, 2013 and it has been made mandatory to prepare Mining Plan and progressive Mine Closure Plan for grant of any mineral concessions like "Mining Lease", "Mining Contract" or "Mining Permit" in respect of minor minerals for systematic and scientific development of all mines, quarries as well as river bed mining.

In the present case, it is proposed to allow the Mining Permit holder to extract sand and gravel from the river bed of Subansiri, which is a perennial river. The Mining Permit site on the river bed contains mainly sand and gravel to be extracted as per the terms of the Permit. This may be termed as River Bed Mining.

The Mining Permit area being a compact deposit of river sand and gravel and to extract the same from this deposit, manual opencast method of mining is suggested. The holder will adopt the following:

1. The entire boundary of the Mining Permit area will be marked with boundary lines and pillars in all the corner points. The boundary pillars are to be numbered and marked with GPS coordinate there on. Extraction of sand and gravel and gravel is to be carried out with a bench height of 0.5 metre to 1.0 metre for the whole area. Use of explosives for mining is not required.
2. The sand and gravel extracted and stacked by the Mining Permit Holder will not exceed twice the average monthly production.
3. The extraction of sand and gravel will be restricted within the central 3/4th width of the river. Similar restriction has to be maintained towards the outside from the bank line. The average mineable width of the Permit area

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is to be kept at 1779 metres out of the average width of the river being 2372 metres as per rule 39(iv) of AMMCR, 2013. (Fig.5)

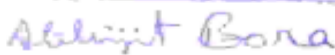
4. The depth of the river bed mining will not in any way exceed 3 metres at any point in the Permit area from the top of the unmined river bed as per rule 39 (iii) of AMMCR 2013.
5. One bridge on Subansiri River are located upstream of the Mining Contract Area. In this case as per rule 39 (i) of AMMRC, 2013, an unmined barrier of 250 metre in the upstream side of the bridge and 500 metre in the downstream has to be maintained, where no mining is permissible (Fig.2).

Mining Plan is Approved

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Checked and found in order

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PRODUCTION OF SAND AND GRAVEL:

The Mining Contract proposed to be granted to the applicant The Divisional Forest Officer (Lakhimpur Division) in the river bed of Subansiri is for extraction of sand and gravel manually. The Subansiri River is a perennial river and hence, during the monsoon rains, considerable amount of transported mineral (sand and gravel) is transported by the flow of river water.

As per the Letter No. FLKT/ B/ Subansiri Mining Area/ 2018/ 6544- 45, dtd. 11.10.2018, of the Divisional Forest Officer of Lakhimpur Forest Division, North Lakhimpur, the total Mining Contract period is five years.

As has been estimated and stated in the chapter at on Mineable Reserve of mineral, the total quantity of the sand and gravel & gravel available for extraction in a year upto a depth of 3 metres would be

= 133151 Cu M.

Considering total working days in a year for transportation of the sand and gravel as 250 days, maximum daily transportation of the minerals would be

= $133151 / 250$ = 533 Cu M (approx)

Considering the carrying capacity of the Trucks/Dumpers to be deployed is of 5 Cu M average, the total trips to be made by the Trucks/Dumpers would be = $533/5$ = Approximately 106 to 107 per day.

Sand and gravel will be transported from the Stacks to various government, semi-government and private consumers mainly for construction purposes.

The quantity of sand and gravel stated above is an estimated quantity that may be available for extraction considering the extent of the area of the Mining Contract Site. However, the competent authority shall decide and fix the quantity of sand and gravel to be lifted by the Mining Contract Holder as per terms and conditions of the Mining Contract with due emphasis on the impact on environment and ecology of the surrounding areas.

Abhijit Bora
Abhijit Bora, Ph D
Regd No GG&MRQP/02/2014

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Mining Plan is Approved

[Signature]
Director,
Directorate of Geology &
Mining Assam, Guwahati-19

PROGRESSIVE MINE CLOSURE PLAN:

The "Assam Minor Mineral Concession Rules 2013" published in March 2013, has made it mandatory to incorporate "Progressive Mine Closure Plan" in the Mining Plan vide Rule 52(5)(VIII) of the said rules. Such a Mine Closure Plan is useful in case of opencast mines or quarries only wherein the question of phased restoration, reclamation and rehabilitation of land affected by mining operation is involved.

The Subansiri river is a perennial river and hence, during the monsoon rains, considerable amount of transported mineral (sand and gravel) is transported by the flow of river water. The instant case of Mining Contract is a river bed mining for sand and gravel only. Sand and gravel is to be extracted from the river bed in a systematic manner as described in earlier chapters. The void created by extraction of sand and gravel from the river bed would gradually be filled up with the sand and gravel carried by the flow of river channel and would be replenished every year. This filling up process is slow in the dry season and rapid during the rainy season. The restoration of the river bed to its original position through natural process is more congenial to the aqua-marine environment than the reclamation with earth/ silt etc. brought from elsewhere. Since the river bed will regain its original position through natural process after closure of the mine on expiry of the Contract Period, a progressive mine closure plan would not be necessary in this case.

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CONCLUSION:

The proposed Mining Contract for river sand and gravel covering an area of 24.00 Hectares allotted to The Divisional Forest Officer (Lakhimpur Division), with his office at Lakhimpur, P.O. North Lakhimpur, District: Lakhimpur, (Assam), is meant for extraction/ collection of sand and gravel from the bed of Subansiri River within a period of five years. The river sand and gravel accumulated during rainy season by the flowing water is to be collected manually during the dry season when water level recedes. River bed mining process is not like other open cast mining operations of minerals, rocks etc. The following conclusions are drawn:

1. The Mining Contract involves collection of sand and gravel from Subansiri River bed within a period of five years at the rate of 27594 Cu. M per year for sand and 41391 Cu. M per year for gravel.
2. The river bed mining does not necessitate any cutting of trees, drilling and blasting etc. As such chances of air pollution would be negligible.
3. Sand and gravel collection at limited quantity through manual means will have least impact on the water quality of the river.
4. Adverse impact on the surrounding environment due to operation of the Mining Contract will be negligible.
5. The extraction of sand and gravel from the river bed will not go beyond the depth of 3.0 metres from the unmined top level of the river bed at any point in no case as stipulated under the provision of rule 39(iii) of AMMCR, 2013.
6. The sand and gravel collection from the river bed would be utilized for various construction and filling purposes.
7. The operation of the Mining Contract would help in upliftment of socio-economic scenario of the locality.


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2.8 Project description including drawings showing project layout, components of project etc.Schematic representations of the feasibility drawings which give information important for EIA purpose.

The project has been proposed for the Mining of Sand and Gravel from the Government Land by open cast manual extraction and semi-mechanized method. Mining will be confined to the allotted lease area which lies on the Subansiri River bed from which approximately 69085.00 cum of Sand and Gravel will be excavated per annum and the estimated project cost is **Rs. 7.60 Crores**.

The Sand and Gravel will be exploited manually & semi-mechanized. Loading will be done by semi-mechanized method by the loader. The mineral is not meant for captive use. The extracted / collected Sand will be used for different purposes.

The schematic presentation of requirements on Environmental Clearance of Sand Mining including cluster situation is detailed as below:-

Area of Lease (Hectare)	Category of Project	Requirement of EIA/ EMP	Requirement of Public Hearing	Requirement of EC	Who can prepare EIA/EMP	Who will apply for EC	Authority to appraise/ grant EC	Authority to monitor EC compliance
EC Proposal of Sand Mining in cluster situation								
Cluster area of mine leases up to 5 ha	'B2'	Form-1M, PFR and Approved Mine Plan	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA/	DEIAA SEIAA SPCB CPCB MoEFCC Agency nominated by MoEFCC
Cluster area of Mine leases > 5 ha and < 25 ha with no individual lease > 5 ha	'B2'	Form-I, PFR and Approved Mine Plan and one EMP for all leases in the Cluster	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA/	
Cluster of mine leases of area > 25 hectares with individual lease size < 50ha	'B1'	Yes	Yes	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	SEAC/ SEIAA	

(Adopted from SSMMG, 2016 issued by MoE&CC, New Delhi)

2.8.1 Land Use Pattern

The land is totally sandy and has sand and gravel in large amount. This land is good for mining. There is no agriculture in the mine lease area.

2.8.2 Nature of Waste Generated

Very small amount of municipal waste will be generated; however collection bins will be provided for the same and will be dumped in a proper way.

2.9 Utilities

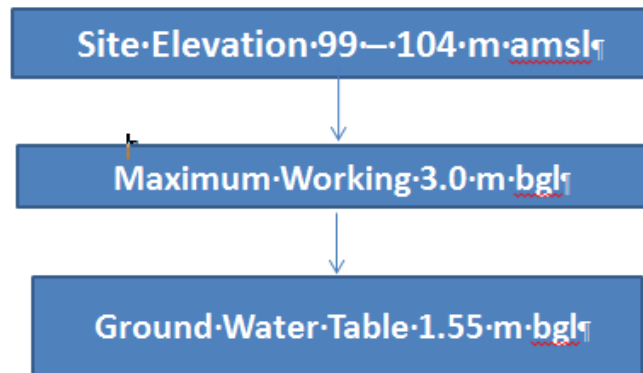
2.9.1 Water Supply & Requirement

The water for drinking and sprinkling purposes will be supplied from the nearby area through tankers.

Table 2-3: Water Demand

Water Demand					
S.No.	Particulars	Value	Water Demand per Unit		Total
1	Drinking Water for Workers	50	10	LPD	500
	Drinking Water for Floating Population	50	10	LPD	500
2	Water for Planation along Road (500m x 2m) 2 Times per day	2000	1	LPM2	2000
	Water for Plantation on Other area	1000	1	LPM2	1000
3	Dust Suppression on Road (500m * 6m)	3000	1.5	LPM2	4500
	Dust Suppression on the Mine Site (4 Ha pr Year)	40000	1.5	LPM2	60000
Total					68500

2.9.2 Schematic Diagram of Water Levels



2.9.3 Power

No power consumption will be there, as mine will work only in day time.

2.9.4 Manpower

About 50 manpower shall be engaged through project proponent for Extraction / Collection, handling and loading of Sand and Gravel in mining area, besides plantation activity with proper maintenance.

2.9.5 Use of Mineral

Diversified use of Sand is emerging as important mineral. It is a basic raw material required for manufacturing industries improving the construction activities like buildings, road, bridges infrastructure etc. The requirement for these minerals is always high in the nearby cities, towns and villages. This will bridge the gap between supply and demand of sand not only in the region but also State. Sand mineral demand has been on an upsurge in India due to the high-rise demand in the Industry. Demand in this region is being driven by mega infrastructure and new industries projects.

2.9.6 Mineral Benefaction

There will be no mineral beneficiation required for river sand. The excavated mineral will be directly loaded into the truck and trolley.

2.9.7 Green Belt Development

The implementation for development of green belt will be of paramount importance as it will not only add up as an aesthetic feature, but also act as a pollution sink. The species to be grown in the area should be dust tolerant and fast growing species so that permanent green belt is created. To stabilize the river bank erosion the plants having good growth will be planted along the river bank. Apart from the green belt and aesthetic plantation for elimination fugitive of emission and noise control, all other plantation efforts shall be decided and executed with the assistance and co-operation of the local community. The lessee will plant 100 saplings with their 100% survival.

Table 2-4: Trees proposed for Greenbelt Development

	Agro-climatic zone & Sub zone	Middle Genetic Plains, North west alluvial sub zone	
S/n	Scientific name	Common Name	Pollution control features
1	<i>Acacia nilotica</i>	Babul	Tolerant to SO ₂

2	<i>Azadirachta indica</i>	Neem	Tolerant to SO ₂
3	<i>Pithecolibium dulce</i>	Jungle jalebi	Tolerant to SO ₂ and Dust control
4	<i>Mangifera indica</i>	Aam	Tolerant to Dust control
5	<i>Tectona grandis</i>	Sagon	Tolerant to Dust control
6	<i>Ficus benghalensis</i>	Bargad	Tolerant to Dust control
7	<i>Scigium cumuni</i>	Jamun	To stop river bank erosion
8	<i>Terminalia arjuna</i>	Arjun	To stop river bank erosion
9	<i>Populus ciliate</i>	Popular	Fast growing, broad leaf
10	<i>Ficus religiosa</i>	Peepal	Dust particles absorbance

2.10 Description of mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements

2.10.1 Wastewater Generation and Treatment

There is no waste water generation during the process.

2.10.2 Air Pollution

The study area represents mostly rural environment. The sources of air pollution in the region are vehicular traffic, dust arising from unpaved village roads and domestic fuel burning. The major sources of air pollution in the proposed mine is dust generation due to extraction, loading and haulage of mineral (sand) and wind erosion of exposed material. In this present study, United States Environmental Protection Agency (USEPA-42 series) approved mathematical equations have been used to predict concentrations for different operations in mining including the mineral transportation. The operations considered for determining source strength for dispersion modeling are as follows:

- Excavation,
- Loading, and
- Haulage.

Mitigation Measures

A. Haul Road: -The long life WBM (Water Bound Macadam) haul roads will be constructed and maintained for traffic movement.

B. Transport: - The speed of dumpers/ trucks on haul road will be controlled as increased speed increases dust emissions. Overloading of transport vehicles will be avoided. The trucks/ tippers will have sufficient free board. Spillage of ore on public roads will be cleared immediately and vehicles will play in safe speed.

C. Green Belt: - Planting of trees all along main mine haul road and regular grading of haul roads will be practiced to prevent the generation of dust due to movement of dumpers/trucks. Green belt of adequate width will be developed around the lease area. Plantation will also be done in dumping area, mineral stockyard.

2.10.3 Noise Environment

The area in general represents calm surroundings. There is no heavy traffic, industry or noisy habitation in the area except the existing mine. As the project is proposed for open cast manual mining method there will be no blasting or drilling activities.

Mitigation Measures

- Proper maintenance of all transportation vehicles will be carried out which helps in reducing noise during operations. No other equipment except the transportation vehicles will be allowed.
- Noise generated by hand equipment shall be intermittent and does not cause much adverse impact.

2.10.4 Biological Environment

There is no forest area diversion required for the project. No plant will be cut during operational phase of the mine. The nearby area of project is moderately populated with a number of villages. The fauna in the vicinity of the mine is restricted to few common small species. There will be no impact on fauna due to this mining project.

Anticipated Impact

Flora

Impact: No tree cutting is proposed in the project. Transportation of mined sand will also cause dust deposition on the agricultural fields and vegetation along the transportation routes.

Mitigation Measures: Plantation proposed along approach roads and other areas in the vicinity will improve the vegetation cover of the study area over a period of time. The trucks carrying sand shall be covered with tarpaulin to avoid dust generation during transportation.

Fauna

Impact: The project site is essentially riverbed of River Subansiri. The banks are flooded during the peak seasons and the river reduces to a thin stream during the rest of the year. The river in the project stretch is not identified as a drinking water source to wild animals. Hence, very few animals are spotted in the project site. It is further proposed to restrict mining to small identified areas at a time to minimize disturbance to any incidental fauna.

Mitigation measures: All workers and drivers involved in the project will be trained to avoid harming any animal spotted. No mining activity shall be carried out at night. Proposed progressive plantation activity over a period of time will create conditions conducive for faunal habitat.

Aquatic ecology

During river bed mining of the flowing river, the water at the site will have increased turbidity owing to high TDS from mining. Increased turbidity decreases the productivity of an aquatic ecosystem as the sunlight availability under water reduces. However, the river is not very deep in the mining stretches owing to sand depositions. Hence, no significant adverse impact is anticipated.

2.10.5 Socio-Economic Environment

Impacts of a mine project may be positive or negative on the socio-economic environment. The adverse impacts attribute to physical displacement due to land acquisition, which is

followed by loss of livelihood, mental agony, changes in social structure, and risk to food security etc. People are also directly affected due to pollution.

Anticipated Impact

There is no habitation in the mining lease area. Therefore, neither villages nor any part of villages will be disturbed during the entire life of the mine.

Mining in this lease will give job opportunities to the local people. Thus, mining will create beneficial effect on local people. With the operation of mining lease, various indirect employment opportunities will also be generated. Several persons of the neighboring villages have been benefited with contract works, employment through contractors, running jeeps, trucks, tractors and buses on hire, running canteens, different kinds of shops and transport related business avenues.

Villagers have been provided with either direct employment or indirect employment such as business, contract works and development work like roads etc. Villagers also get access to the other welfare amenities such as drinking water, foods and provisions, shed.

2.10.6 Solid waste

Anticipated Impact

This river bed mining project does not involve any waste generation Thus, no waste dump sites are needed for the project.

2.11 Assessment of New & untested technology for the risk of technological failure

The proposed project is a river bed mining activity which will be done by open caste manual and semi-mechanized method as per the Sustainable Sand Mining Management Guidelines 2016 issued by MoEF&CC, New Dehi. Hence, no new technology is assessed.

Chapter 3. DESCRIPTION OF ENVIRONMENT

3.1 Study area, period, components & methodology

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project environment is described section wise for better understanding of the broad spectrum conditions. The baseline environment quality represents the background environmental scenario of various environmental components such as Land, Water, Air, Noise, Biological and Socio-economic status of the study area. Field monitoring studies to evaluate the base line status of the project site were carried out for the post-monsoon season covering October-December 2019.

Data generation with respect to air, water, soil quality, noise status, meteorology etc. was carried out by *M/s Geogreen Testing Laboratory* an ISO9001:2008, OHSAS 18001:2007, 14001:2015(EMS) Certified &by National Accreditation Board for Testing & Calibration Laboratories (NABL) Certificate No. TC 8121. All the field studies for baseline data generation were carried out during October-December 2019.

3.1.1 Components & Methodology

Baseline study is conducted in order to identify the changes to the natural and socioeconomic environments, or any potential impact and to have a thorough understanding of the nature of those existing environments prior to commencement of the proposed mining activity, it is necessary to study the present scenario of the area by collecting information on the following parameters / components:

- 1. Land**
- 2. Water (Surface & Ground)**
- 3. Air**
- 4. Noise**
- 5. Biological (Flora & Fauna)**
- 6. Socio-economic status**

Study Area

Study area for baseline data collection covers a 10 Km radius from the mine lease periphery. Further, the study area has been divided into two zones namely “Core Zone” and “Buffer Zone”. Core zone comprises of the mine lease area within the mine lease boundary while the area around the mine lease periphery covering 10 Km radius area constitutes the Buffer Zone. Map showing study area of the proposed project in Figure 1.1 & 1.2 in Chapter-1.

Location of the project

The mining lease has been granted in favour of M/S R J & Sons Industries Pvt Ltd over an area of **24.0** Ha in Village- Thekeraguri, District Lakhimpur, Assam. It is located at the distance of 6 Km from Gogamukh Town. Geographical location of mine lease area is covered under Survey of India Toposheet No. 83I/2, 83I/2, 83I/6 and 83I/7.

Methodology adopted for Baseline Study

The methodology for conducting the baseline data collection was adopted from Technical Guidance Manual of Mining Project available on the MoEF&CC website. Baseline information with respect to Land, Water, Air, Noise, Biological and Socio-economic quality status in the study area were collected by conducting primary sampling / field studies during postmonsoon season October-December 2019. The characteristics of baseline status of study area with respect to the parameters are discussed.

3.2 Land Environment

Studies on land environment of eco-system play an imperative role in identifying susceptible issues and taking appropriate action to uphold ecological equilibrium in the region. The main objective of this section is to provide a baseline status of the study area covering 10km radius around the proposed mine site so that changes due to the mining activities on the surroundings can be assessed in future.

Land use / Land cover map preparation, Base map creation; Geometric and Radiometric correction of satellite image has been processed using ERDAS Imagine 9.2 Software. The

methodology used for present LU/LC of study area is shown in Figure 3 1: Methodology use for landuse classification and mapping and detailed below:

Land Use Pattern: The land use relates to the human activity or economic function associated with a specific piece of land, while the term land cover relates to the type of feature present on the surface of the earth (Lillesand and Kiefer, 2000). Land use/ Land cover (LULC) maps are presently being developed for various purposes. Moreover it is being used for planning and management activities. Since the industrialization is taken place, LULC changes have been studied such as deforestation, urban sprawl, etc. In the LULC mapping the use of multi-spectral bands and panchromatic band are being widely used since the emergence of satellite imageries in early 1970s. More recently, high spatial and spectral resolution satellite imageries such as quick bird sensors with spatial resolution of 0.50 meters are being utilized for more detail LULC mapping. Therefore, the satellite remote sensing technology has been widely accepted for rapid resource assessment and monitoring, particularly in the Developing World. National Aeronautical and Space Administration (NASA) of USA has made most significant contributions with satellite based remote sensing techniques. Identification and periodic surveillance of land uses and vegetation covers, in the vicinity of any developmental activity is one of the most important components for an environmental impact assessment, which would help determine the impact of the project development activity on the land use pattern.

3.2.1 Data Products Used

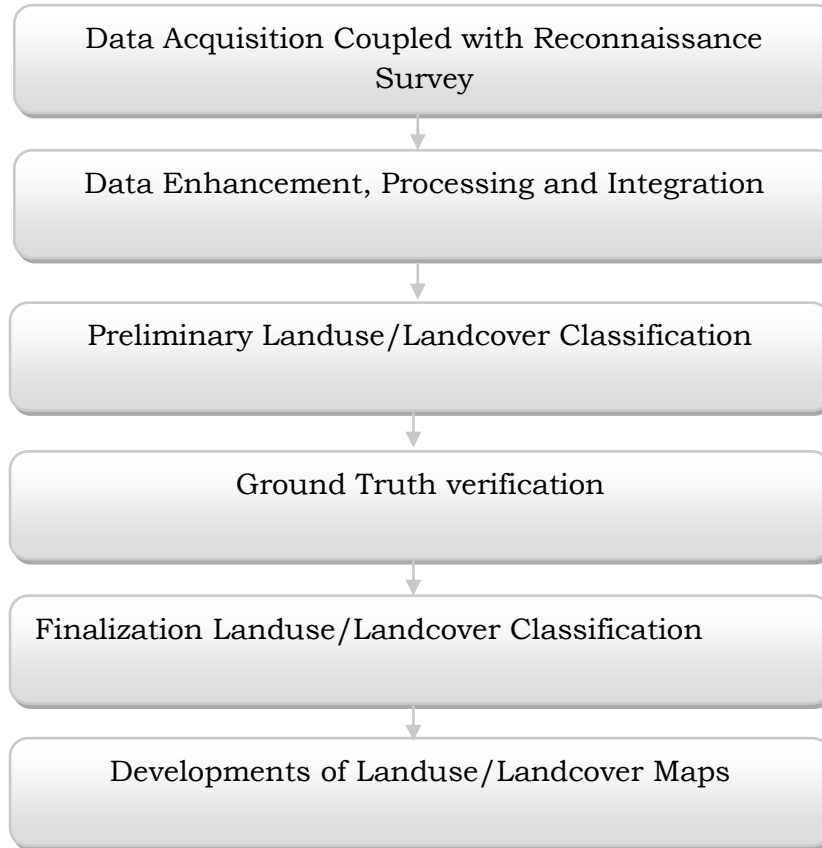
Remote Sensing Data

The detail of primary data in the form of digital data for interpretation and analysis of the study area within 10 km from the project site was generated from the IRS P6 LISS-IV MX digital. FCC (False Color Composite) has been used for preparation of Land use/ Land cover thematic map of study area.

Survey of India Toposheet

In addition to the above, Survey of India (SOI) toposheet Toposheet No. 83I/2, 83I/2, 83I/6 and 83I/7.with 1:50,000 scale were used for the preparation of base and drainage maps.

Methodology



Preliminary / primary data collection of the study area

- 1.Data from NRSC Hyderabad

Secondary data collection from authorized bodies

- 1.Google Map
- 2.Layout
- 3.Cadastral / Khasra map
- 4.GPS Coordinates of Plant Boundary

Steps taken for Processing of satellite data using ERDAS Imagine 9.2 and to prepare the Land use & Land cover maps (e.g. Forest, agriculture, settlements, wasteland, water bodies etc.) by digital image processing (DIP) technique.

1. Enhancement of the Satellite Imagery
2. Base Map layer creation (Roads, Railway, Village Names and others Secondary data etc.)

3. Data analysis and Classification using Digital interpretation techniques.
4. Ground Truth studies or field verification
5. Error fixing / Reclassification
6. Final Map Generation

3.2.2 Land Use & Land Cover Classes

Water Bodies, Crop land, Fallow Land, Human Settlement, Industrial Area, Mine Quarry, Scrub Land, Plantation, Railway Line, Road Network, Forest Land, Stony Waste Land, Open Land etc. as per NRSC Guide Line.

Definitions of LULC Classes

(Reference- National Remote Sensing Centre Guideline)

Agriculture Land: These are the lands primarily used for farming and for production of food, fiber, and other commercial and horticultural crops. It includes land under crops (Irrigated and non-irrigated, Fallow, Plantation etc.)

Crop Land: These are the areas with standing crop as on date of satellite overpass. Cropped areas appear in bright red to red in color with varying shape and size in a contiguous to noncontiguous pattern. Three cropping seasons exist in India viz., Kharif (June/July-September/October), Rabi (November-December-February-March) and Zaid (April-May).

Fallow Land: These are the lands, which are taken up for cultivation but are temporarily allowed to rest, un-cropped for one or more seasons.

Fallow land is categorized in two classes which Current Fallow and Long Fallow.

Current Fallow Land: These are the cropland areas, which are un-cropped during the agriculture year under consideration as on the date of satellite overpass.

Land Use / Land Cover Interpretation:

Land use Buffer zone:

The land use/ land cover map has been generated on 1:50,000 scale using topographical maps, Survey of India and ground truth information. Based on the methodology developed

for the present land use/ land cover, categories have been grouped under the following major land use/land cover categories.

The land use distribution in the buffer zone of 10Km radius (from periphery) is given in the table given ahead. The land use & land cover details of the buffer zone is given Table - 3.1 and LULC map is given as Figure 3.1 and Figure 3.2.

Table 3-1: Land use pattern of the study area

S No.	Category	Area in Ha	Percentage
1	Agriculture Land	12858.74	39.09
2	Builtup Urban	941.52	2.86
3	Builtup Rural	2596.49	7.89
4	Scrub Land	1581.55	4.81
5	Forest	10205.44	31.02
6	Water Body / River / Canal	4713.21	14.33
	Total	32896.95	

Settlement:

Settlement land includes the urban or rural settlements. The village locations and their area extent have been extracted from the satellite Imagery & topographical maps. The major Settlement area is about 3538.01 Ha which is 10.75 percent of the total 10 km radius study area.

Agricultural land:

Based on satellite imagery, topographical maps and ground truth. The land use is mainly agricultural. The total agricultural area is about 128.58 Ha which is 39.09 percent of the total study area.

Forest land:

Based on satellite imagery, topographical maps and ground truth. Forest land their area extent has been extracted. The Forest area is about 10205.5 Ha which is 31 percent of the total 10 km radius study area.

Scrub land:

Based on satellite imagery, topographical maps and ground truth. Waste/ Barren land their area extent have been extracted. The Barren land area is about 1581.55 hectares which is 4.81 percent of the total 10 km radius study area.

Water Bodies:

Based on satellite imagery, topographical maps and ground truth. Water bodies their area extent have been extracted. This area is about 4713.21 Ha which is 14.33 percent of the total 10 km radius study area.

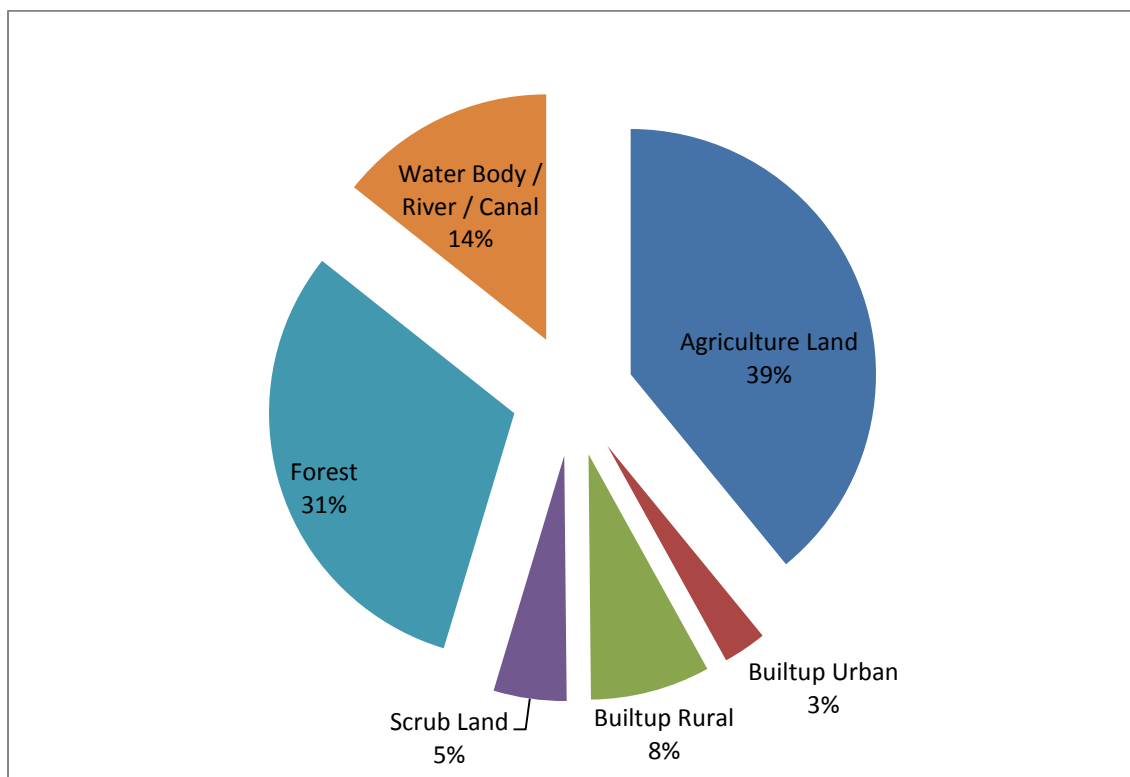


Figure 3-1:Landuse Breakup Distribution of Buffer Zone (10KM)

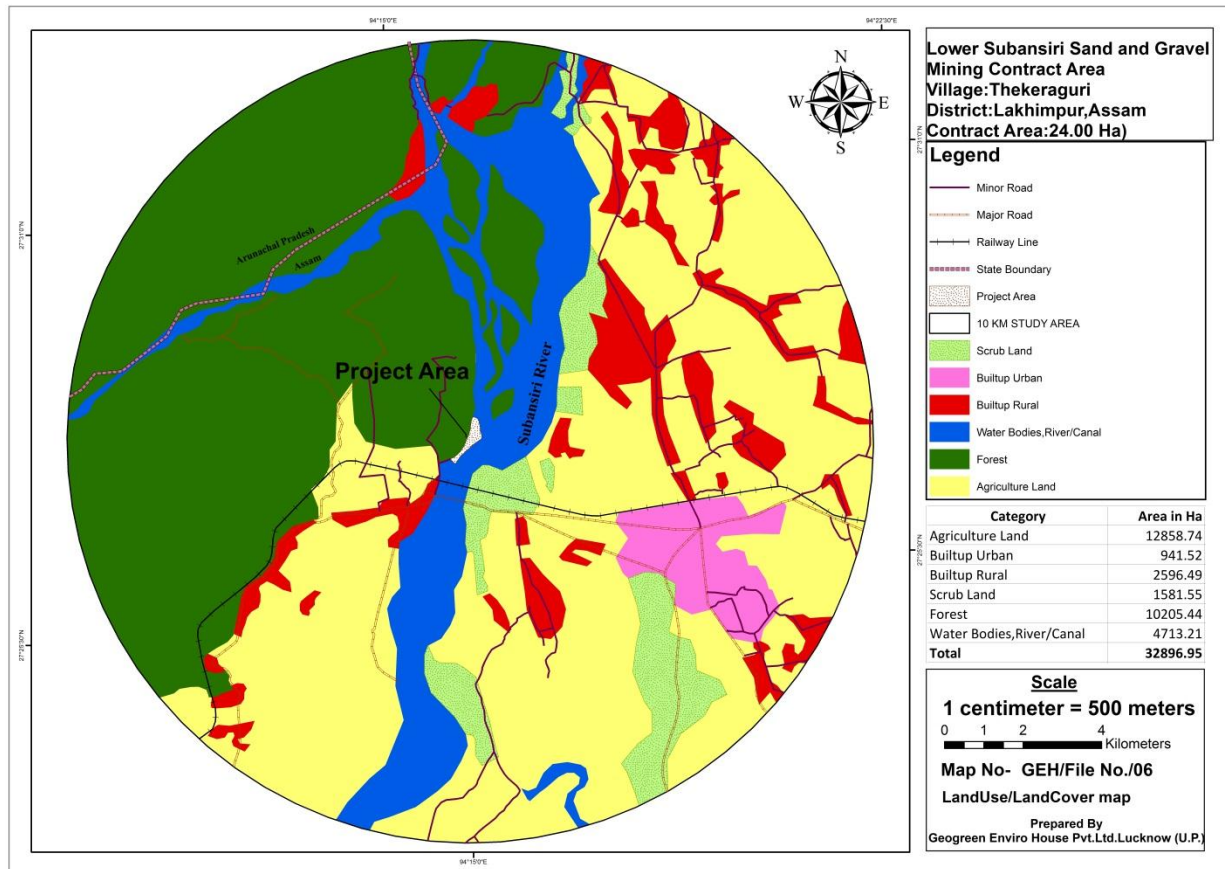


Figure 3-2: Landuse Breakup of Buffer Zone (10KM)

3.2.3 Drainage Pattern

The Brahmaputra river controls the main drainage system in the district. The Subansiri–Ranganadi–Dikrong–System that debouches in Brahmaputra forms an intricate drainage network in the district. The Subansiri the largest tributary of river Brahmaputra is a Trans-Himalayan river originating from the Western part of Mount Pororu (5059 m) in the Tibetan Himalaya. The tributaries are in general meandering as well as braided in nature. Peak discharge observed during monsoon and generally perennial in nature. However, near the foothills small streams generally dry up during the month of March/April. The riverbed and the bank materials are boulders, cobbles, pebbles and sands of various grades with very low clay materials concentration.

3.2.4 Seismicity of the area

Many parts of the Indian subcontinent have historically high Seismicity. Seven catastrophic earthquakes of magnitude greater than 8 (Richter scale) have occurred in the western, northern and eastern parts of India and adjacent countries in the past 100 years. By contrast, peninsular India is relatively less seismic, having suffered only infrequent earthquakes of moderate strength. The main seismogenic belts are associated with the collision plate boundary between the Indian and Eurasian plates. The project site as well as study area lies in Zone-V of Seismic Zoning Map, and thus can be said to be located in an area of high seismic damage risk zone by national standards. Hence, the risk of earthquake at the site persists though there has to be no incident in the near past.

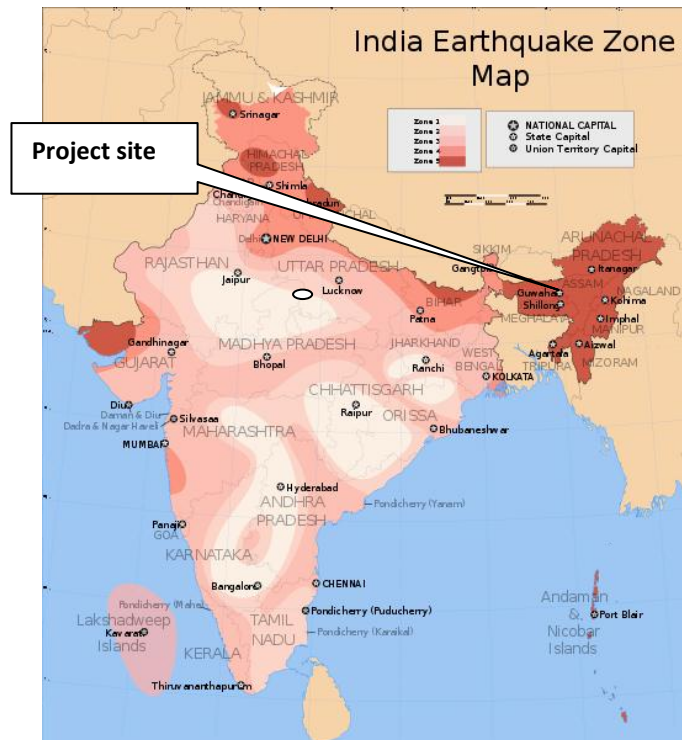


Figure 3-3: Seismic Zone map of India

Major Environmental features in the study area

Details of the important features along with other sensitive ecological locations in the study area are provided in Table 3-2.

Table 3-2: Environmental Sensitivity of study area

S.No.	Category	Name	Distance,km	Direction
1	River	Subansiri River	0,KM	
2	Bridge	Subansiri River Railway ,Bridge	0.56,KM	S
		Subansiri River (NH-52) ,Bridge	0.92,KM	S
3	Dam/Reservoir	Subansiri Dam (Subansiri River)	9.73,Km	N
4	School	Rupahi High school near near Rupahi Gaon	1.11,KM	SW
		Rupahi Adarsha Jatiya Vidyalaya near Rupahi Gaon	1.29,KM	SW
5	Hospital	Chauldhuwa State Dispensary near Dhalbasti	0.89,KM	SW
		Gogamukh PHC / CHC - Hospital (Gogamukh)	6.79,KM	SE
6	Worship place	Shri Shri Bishnu Mandir near Dhalbasti	1.48,KM	SW
		Hanuman Mandir near Dhalbasti	1.48,KM	SW
7	Inter state Boundary	Arunachal Pradesh	5.27,KM	NW

3.3 Soil Environment

Soil Characteristic in the District

The soils of the district can broadly be classified into the following groups:

1. Red Loamy soils: These are found in the northern border of the district. This soil type develops in the hill slopes under high rainfall condition. This soil is characterized by low nitrogen, low phosphate and medium to high potash. PH is acidic.
2. Lateritic Soil: The lateritic soils are the product of high leaching and found in hilly region. Soil pH is acidic due to intensive leaching of bases and formation of clay minerals and ferric hydroxides. The lateritic soils are characterized by brick red to brownish red colour and poor plant nutrient.
3. New Alluvial Soils: The new alluvial soils are found in the flood plain area and are subjected to occasional floods and consequently receive considerable silt deposit after the flood recedes. These are yellow to yellowish grey in colour and are admixtures of sand, silt and clay in varying proportions. Minerals weathering and geo-chemical changes are nominal. But incipient changes in the top layer have been noticed due to biological activity. Soil PH is feebly alkaline and moderately rich in plant nutrient.
4. Older Alluvial Soil: It develops at higher levels and practically unaltered alluvium representing a broad spectrum of sand, silt and humus rich clay depending on landform. The soils are comparatively more acidic than the newer alluvial soil and hence more crop sensitive. The soils of the district as classified by NBSS and ICAR Nagpur are: UdalfsOrchapt-Acquents, Fluvent-Aquepts, Aquepts-Aqualfs-Fluvent..

The soils of the area are young stratified with no profile development. They are sandy to fine sandy loams. Details of Soil monitoring locations are given in Table 3.3 and Location Map is given in Figure 3.4.

Table 3-3: Soil Monitoring Stations

<u>S.No.</u>	<u>Code</u>	<u>Location</u>	<u>Direction</u>	<u>Distance</u>
1	SL-1	Dhal Basti (Near Project Site)	South	0.75 KM
2	SL-2	Dulung	West	2.70 KM
3	SL-3	Sigia	North	3.66 KM
4	SL-4	Chapri	East	4.63 KM
5	SL-5	Balijan Bangali	South	2.35 KM

The sample was collected by driving an auger into the soil up to the depth of 90 cm. The present study on the soil quality establishes the baseline characteristics and identifies the incremental concentrations if any, due to the proposed project. The objective of the sampling is:-

- To determine the baseline soil characteristics of the study area;
- To determine the impact of proposed activity on soil characteristics and;
- To determine the impact on soil more importantly agriculture production point of view.

The soil sample is collected from three different depths viz. 30cm, 60cm and 90cm. The sample was then packed in polythene plastic bags and sealed. The sample from three different depths is homogenized and is then analyzed. Main test methodologies used for analysis of Soil are given in Table 3-4.

Table 3-4: Methodologies used for Soil Analysis

Sampling Parameters	Sample collection and Frequency	Sample Analysis		Methodology
		Analytical Equipment	Sensitivity / Detection Limit	
Texture	Manual sample collection using hammer and container tube for collecting	As per	As per	IS: 2720 Part 4
Water holding capacity		As per HMSO, UK	As per HMSO, UK	HMSO, UK
Porosity		As per IS: 2720	As per IS: 2720	IS: 2720 Part VII

Sampling Parameters	Sample collection and Frequency	Sample Analysis		Methodology
		Analytical Equipment	Sensitivity / Detection Limit	
Permeability	undisturbed top soil and will be collected once in season	Falling Head Method		IS: 2720 Part XVII
Moisture		Electronic Balance	0.001 mg	IS: 2720 Part 2
Particle size distribution		As per IS: 2720	As per IS: 2720	IS: 2720 part 4
Cation Exchange Capacity		As per IS: 2720	As per IS: 2720	IS: 2720 part 24
Electrical Conductivity		As per IS: 14767-2000	As per IS: 14767-2000	IS: 14767-2000
pH		pH Meter		4500 H+B
Calcium		EDTA Titration	-	3500 Ca B
Magnesium		EDTA Titration	-	3500 Mg B
Sodium (Na)		Flame Photometer	100 µg/l	3500 Na B
Potassium		Flame Photometer	100 µg/l	3500 K B

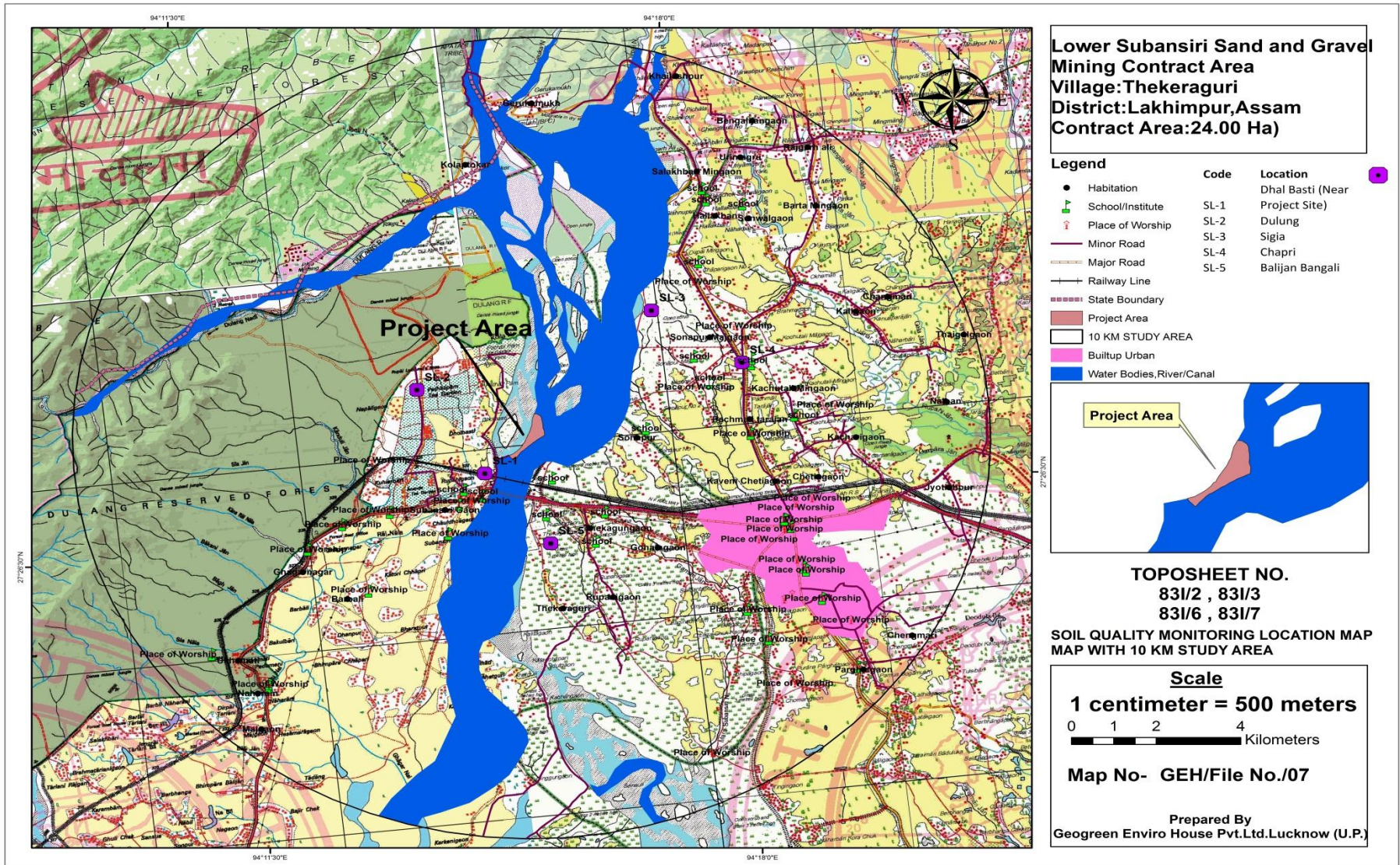


Figure 3-4: Monitoring Location Map of Soil Sampling

3.3.1 Soil Sampling Analysis

The results of soil analysis are given below in **Table 3-5** collected from 5 different locations as shown in Figure: 3.4.

Monitoring data shows that the texture of soil at all the locations is sandy clay. The monitoring sites have sand ranging from 68% to 71% in soil samples. Silt content varies from 14% to 17%, while Clay content varies from 14% to 19% in the soil samples.

1. The data shows that value of pH ranges from 7.22 at Dulung to 7.94 in Sigia indicating that soil samples vary from neutral in nature.
2. The conductivity at village Chapri is minimum 320 $\mu\text{mhos/cm}$, while in the village Dulung it is maximum of 416 $\mu\text{mhos/cm}$.
3. Magnesium value ranges from 4.5 mg/100gm in Dulung village to 6.7 mg/100gm in Chapri.
4. The average concentration of Nitrogen, Phosphorus and Potassium in the soil samples varies from 6.2 to 11.3 mg/100gm, 10.4 to 24.1 mg/100gm, 3.2 to 23.4 mg/100gm respectively.

Source: M/s GTL Lucknow.

Table 3-5: Soil Quality Analysis Results

		Location	Dhal Basti (Near Project Site)	Dulung	Sigia	Chapri	Balijan Bangali
Sr. No.	Parameters	Units	Value	Value	Value	Value	Value
1	pH		7.62	7.84	7.9	7.71	7.69
2	Bulk Density	gm/cm ³	1.38	1.52	1.42	1.31	1.55
3	Conductivity	μS/cm	128.4	133.4	129.6	136.4	130.4
4	% Moisture	%	3.24	2.84	1.86	2.22	1.9
5	Texture	-	Silt Clay	Silt Clay	Silt Clay	Silt Clay	Silt Clay
6	Sand	%	16	17	13	10	11
7	Clay	%	56	58	62	63	68
8	Silt	%	28	25	25	27	21
9	Sodium	meq /100gm	4.19	3.52	5.11	3.86	4.08
10	Potassium	mg/100gm	2.8	3.8	4.2	3.6	2.8
11	CEC	meq/100gm	28.32	24.84	21.86	34.22	27.22
12	Nitrogen	mg/100gm	5.84	7.12	6.84	7.26	5.68
13	Organic Matter	%	0.64	0.56	0.66	0.57	0.63
14	Phosphorous	mg/100gm	72.22	76.24	63.84	73.46	69.22
15	Ca	meq /100gm	1.84	1.46	1.1	1.11	1.22
16	SAR	meq /100gm	3.22	2.82	4.82	2.66	3.22
17	Mg	meq /100gm	0.76	1.04	1.02	1.79	1.31

Source: M/s GTL Lucknow.

3.4 Water Environment

Mining and associated activities may affect the water quality of the region through run-off, extraction of minerals, water pollution, by increased suspended solid etc. Therefore, baseline information on water regime is very important. Water availability and water quality are two major aspects considered for baseline status of water environment.

3.4.1 Ground water

Ground water occurs in the pore spaces of the unconsolidated alluvial sediments in the zone of saturation. The near surface sediments are dominantly sandy clays and clays which grade into sediments having varied proportions of sand and clays. These sediments occur as inter layered sequence and pockets. Kankar is generally present in clay in the form of lenses and layers as well as interspersed. These mixed sediments occur down to 20 m and support large number of dug wells. The depth of dug wells range between 6 to 20 m. Below the top 4 to 10 m silty clays and clays, there occurs the sand formations which form a part of aquifer system. This aquifer is largely unconfined to semi-confined and supports a large number of cavity/shallow tube wells.

Two ground water samples were taken from hand pump during the period of October 19 to December 19. The locations of sampling stations for ground water and surface water are shown in map Figure: 3.4 and details are given in Table 3-6.

Table 3-6: Water Sampling Locations

<u>S.No.</u>	<u>Code</u>	<u>Location</u>	<u>Direction</u>	<u>Distance</u>
1	SW-1	Near Project Site in River Subansiri	East	0.20 KM
2	SW-2	River Subansiri Sunapur Manjhi, Subansiri (U/S)	East	1.85KM
3	SW-3	Near Chaoldhowa Ghat, Subansiri (D/S)	South	0.95 KM
4	GW-1	Ananda Bagan	South West	3.00 KM
5	GW-2	Sports Stadium near Dirpai Chaprai No 2	East	4.50 KM
6	GW-3	Subansiri College Gogamukh near NH 52	South East	4.10 KM

Methodology of Baseline data generation

Water samples were collected from all the sampling locations and analyzed for relevant physical, chemical and bacteriological parameters. Collection and analysis of the samples was carried out as per established standard methods and procedures, prescribed by CPCB, relevant IS Codes and Standard Methods of Examination of Water. This report presents data for the months of October to December 2019.

Analyses of the parameters like temperature; pH, dissolved oxygen and alkalinity were carried out at the sampling stations immediately after collection of samples with the help of Field Analysis Kits. For analysis of other parameters, the samples were preserved and brought to laboratory at Noida. The metallic constituents like arsenic, mercury, lead, cadmium, chromium, copper, zinc, selenium, iron and manganese were analyzed with Atomic Absorption Spectroscope.

Ground water Quality

The study area has a very good aquifer source. The entire area falls on River Subansiri. Ground water from Hand pumps, Open dug wells and Tube wells is abstracted for both irrigation purposes as well as for meeting various domestic needs. Drinking water requirement is principally met from borewells & Tube wells.

The ground water analysis data for the monitoring period i.e. October to December 2019 is presented in Table no.3-7. The physico-chemical characteristics of Ground water are analyzed with the drinking water standards, prescribed in IS: 10500 (Test Characteristics for Drinking Water).

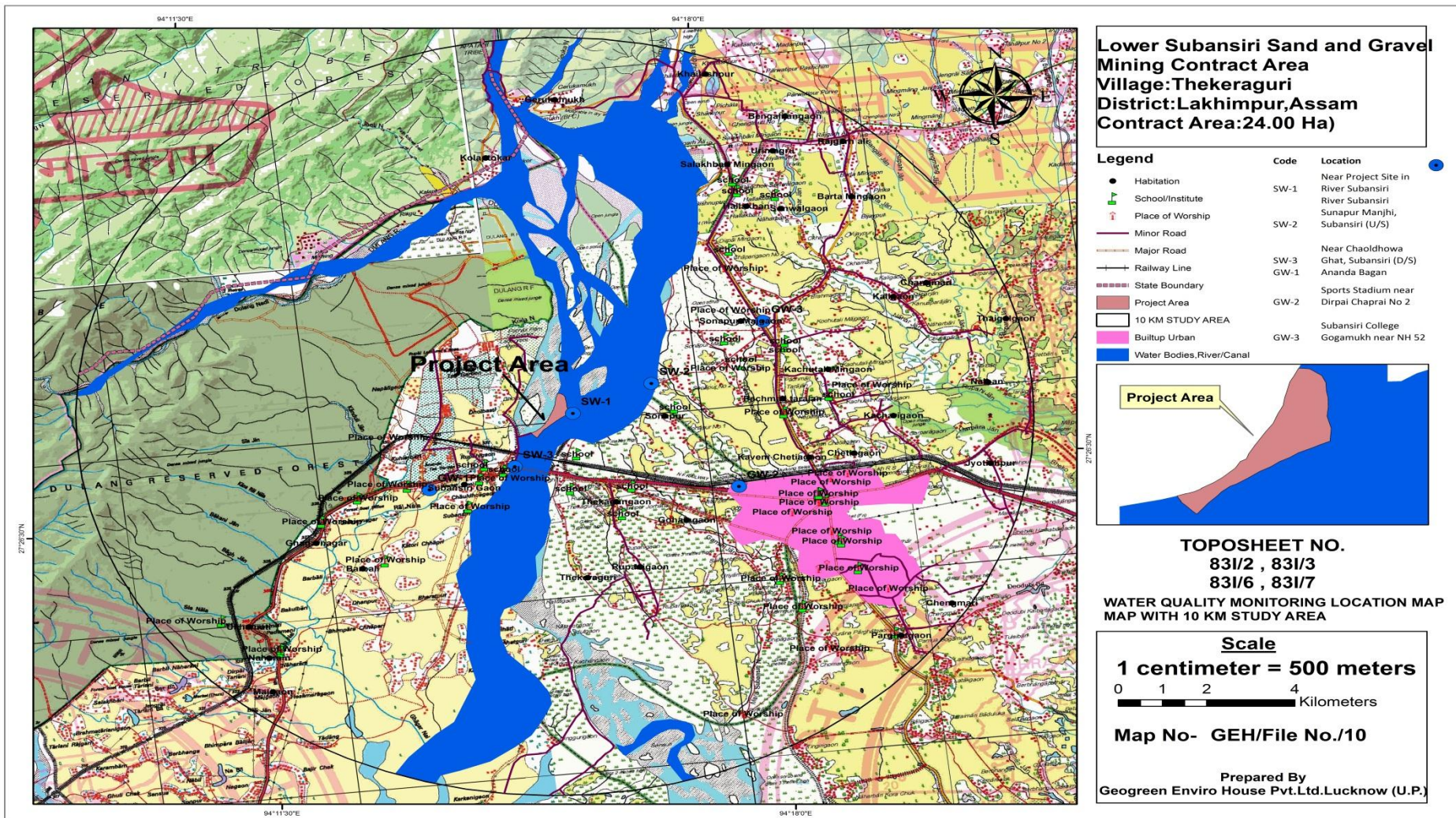


Figure 3-5: Water Sampling Locations

Table 3-7: Ground Water Quality Analysis

Sl. No.	Parameters	Units	Near Project Site in River Subansiri			River Subansiri Sunapur Manjhi, Subansiri (U/S)			Near Chaoldhowa Ghat, Subansiri (D/S)		
			Oct-19	Nov-19	Dec-19	Oct-19	Nov-19	Dec-19	Oct-19	Nov-19	Dec-19
1	Turbidity	NTU	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2	pH	-	7.27	7.35	7.42	7.31	7.45	7.37	7.26	7.33	7.41
3	Total Dissolved Solids	mg/L	427.00	456	473.00	407.00	438.00	451.00	412.00	422.00	434.00
4	Temperature	°C	29.20	30.4	32.60	28.90	30.10	31.90	29.60	30.40	32.20
5	Conductivity	µs/cm	722.00	764	792.00	702.00	684.00	736.00	713.00	736.00	754.00
6	Total Hardness as CaCO ₃	mg/L	152.00	178	194.00	168.00	174.00	192.00	168.00	176.00	188.00
7	Calcium as Ca	mg/L	46.00	34	50.84	34.00	42.00	54.20	36.20	42.40	52.80
8	Chloride as Cl	mg/L	78.28	89	97.00	67.00	76.00	87.00	64.22	68.36	78.86
9	Copper as Cu	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
10	Fluoride (as F)	mg/L	0.41	0.52	0.66	0.48	0.52	0.62	0.46	0.52	0.66
11	Free Residual Chlorine	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
12	Iron as Fe	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
13	Magnesium as Mg	mg/L	15.00	19	21.30	13.60	14.00	20.60	12.86	15.00	17.26
	Manganese (as Mn)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
14	Nitrate as NO ₃	mg/L	4.72	5.16	6.82	5.38	4.35	6.30	3.84	4.22	5.36
15	Phosphate as PO ₄	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
16	COD	mg/L	8.88	9.2	9.44	7.20	8.40	9.60	7.60	8.20	9.40
17	Sulphate as SO ₄	mg/L	64.00	71.2	78.00	53.00	64.20	72.20	64.00	72.22	80.20
18	Potassium as K	mg/L	6.72	7.3	8.36	5.90	6.24	7.10	5.36	6.28	7.22
19	Sodium as Na	mg/L	38.60	34.6	42.24	43.20	41.60	46.30	39.40	42.66	43.20
20	CO ₃	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
21	Bi carbonate (as HCO ₃)	mg/L	152.00	198	210.00	144.00	176.00	220.00	162.00	178.00	196.00
22	Boron	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
23	Alkalinity as CaCO ₃	mg/L	124.00	164	172.00	118.00	146.00	176.00	112.40	128.40	156.00
24	Cadmium	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
25	Lead as Pb	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

26	Mercury as Hg	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Chromium as Cr ⁺⁶	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Zinc as Zn, Max	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
29	Nickel(as Ni)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
30	Total Arsenic as As	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
31	E.Coli	MPN/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
32	Coli form	MPN/100ml	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Interpretation of the ground water samples analysis results:

1. During the monitoring period analysis of ground water shows that pH ranges from 7.48 to 7.64.
2. The Total dissolve solid (TDS) concentration was found to be ranging in between 844 mg/l to 886 mg/l.
3. Total Hardness as CaCO₃ was observed to the ranging from 326 mg/l to 350 mg/l.
4. Bacteriological studies revealed the absence of E.Coli & Coliforms.
5. The ground water quality at the study area is found under the limits of drinking water standards.

3.4.2 Surface Water

The samples of surface water have been collected from Subansiri River (Project Site, Upstream & downstream). The locations of sampling stations for surface water are shown in **Figure 3-4** and details are given in **Table 3-6** and analyzed for parameters prescribed as per CPCB Guideline for Inland Surface Water.

Surface water Quality

The surface water analysis data for the monitoring period i.e. October to December 2019 is presented in **Table 3-8**. The physico-chemical characteristics of Surface water are found within the limits, prescribed by CPCB.

Table 3-8: Surface water quality Analysis results

Sl. No.	Parameters	Units	Ananda Bagan			Sports Stadium near Dirpai Chaprai No 2			Subansiri College Gogamukh near NH 52		
			Oct-19	Nov-19	Dec-19	Oct-19	Nov-19	Dec-19	Oct-19	Nov-19	Dec-19
1	pH	–	7.29	7.32	7.4	7.39	7.45	7.51	7.39	7.45	7.51
2	Temperature	°C	28.60	30.4	32.4	29.40	30.3	32.2	29.40	30.3	32.2
3	Conductivity	µs/cm	472.40	482.8	520	480.00	493.4	511.4	480.00	493.4	511.4
4	Turbidity	NTU	2.2	2.8	3.2	3.2	2.8	3.8	3.2	2.8	3.8
5	Dissolved Oxygen	mg/L	6.9	6.6	7.2	6.4	7.8	8.4	6.4	7.8	8.4
6	BOD	mg/L	7	8.2	9.5	5.6	6.8	9	5.6	6.8	9
7	COD	mg/L	30	42	56	30.66	41.2	48.6	30.66	41.2	48.6
8	Chloride as Cl	mg/L	59.92	85.66	78	58.2	75.88	81.96	58.2	75.88	81.96
9	Sulphate as SO ₄	mg/L	32	38.3	47	24	36.2	42	24	36.2	42
10	Nitrate as NO ₃	mg/L	3.17	4.7	5.16	3.24	2.86	4.86	3.24	2.86	4.86
11	Ammonical Nitrogen	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
12	Phosphate as PO ₄	mg/L	0.53	0.68	0.72	0.44	0.72	0.68	0.44	0.72	0.68
13	Sodium as Na	mg/L	26.28	28.4	33.6	18.8	25.4	28.66	18.8	25.4	28.66
14	Potassium as K	mg/L	4.16	5.36	6.12	4.44	5.84	6.28	4.44	5.84	6.28
15	Carbonate	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
16	Bicarbonate	mg/L	120	126	144	128	132	138	128	132	138
17	Iron as Fe	mg/L	0.15	0.17	0.21	0.28	0.22	0.32	0.28	0.22	0.32
18	Fluoride(as F)	mg/L	0.38	0.43	0.52	0.42	0.44	0.54	0.42	0.44	0.54
19	Boron	mg/L	0.27	0.33	0.4	0.33	0.42	0.38	0.33	0.42	0.38
20	Total Dissolved Solids	mg/L	365	354	384	338	362	348	338	362	348
21	Phenolic Compound	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
22	Anionic Detergents	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
23	Nickel(as Ni)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
24	Zinc as Zn, Max	mg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
25	Mercury as Hg	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
26	Cadmium	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
27	Lead as Pb	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
28	Chromium as Cr ⁺⁶	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

29	Total Hardness as CaCO ₃	mg/L	170.00	178	186	168.00	182	190	168.00	182	190
30	Calcium as CaCO ₃	mg/L	48.40	50.4	58.6	44.28	48.68	52.32	44.28	48.68	52.32
31	Magnesium as CaCO ₃	mg/L	11.14	13.2	12.6	13.28	11.44	12.68	13.28	11.44	12.68
32	Total Arsenic as As	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
33	Copper (as Cu)	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
34	Total Coliform	MPN/100ml	70.00	120	90	50.00	84	102	50.00	84	102
35	Faecal Coliform	MPN/100ml	26.00	50	33	32.00	28	40	32.00	28	40

Interpretation of Surface Water Quality:

1. Analysis of the result indicates that the *pH ranges* in between 7.32 to 7.41 which are well within the prescribed standard of 6.5 to 8.5 of CPCB. The maximum pH of 7.41 was observed at the project site (SW1).
2. Dissolve oxygen varies from 7.4 to 7.6 mg/l. The maximum value D.O. was observed at Upstream (SW1) and minimum D.O. was observed at Downstream (SW2).
3. BOD was observed between the ranges of 7.5 mg/l to 9.25 mg/l in the monitoring period.
4. COD in surface water samples collected in study period was varies in range 39.4 mg/l to 35.2 mg/l.

The surface water quality in the study area does not indicate any industrial contamination.

Note: For in details, Monitoring report is attached as Annexure with this report.

3.5 Air Environment

3.5.1 Climate and Meteorology

The meteorological data helps for appropriate interpretation of the baseline status of the study area as well as for input into prediction models to evaluate air quality dispersion. Chronological data on meteorological parameters also plays an important role in identifying the general meteorological regime of the region.

The climate in the region shows broadly four seasonal variations, namely:

Winter	:	December - February
Summer	:	March – Mid June
Monsoon	:	Mid June – September
Post-monsoon	:	October - November

On-site monitoring was undertaken for various metrological variables in order to generate the site-specific data. Data was collected at site every hour continuously from October to December 2019 covering post monsoon season.

3.5.2 Methodology

The metrological parameter were recorded on hourly basis during the study period and comprises of parameter like wind speed, wind direction, (from 0 to 360 degree), temperature, rainfall & relative humidity.

Climate:

The climate of the study area is influenced by its inland position and the prevalence of air of the continental type during the major part of the year. Extreme dryness with an intensely hot summer and cold winter are the characteristics of the climate. Only during the three monsoon months July, August and September does air of oceanic origin penetrate to the area and causes increased humidity, cloudiness and precipitation. The year can broadly be divided into four seasons. The cold season starts in December and extends to about the beginning of March. This is followed by the hot season, which lasts till about the end of June when the monsoon arrives. The monsoon continues to the last week of September. The two post monsoon months October and November constitute a transition period from monsoon to winter conditions.

Long-term Meteorology

The nearest meteorological observatory of Indian Meteorological Department is located at Ayodhya (erstwhile Faizabad), approximately 20 km from the proposed site. Climatological normal data for Ayodhya (erstwhile Faizabad). Observatory for the period 1961-1990 have been considered as the long-term meteorology of the study area, and a summary of the same has been provided in Table 3.9 and Table-3-10.

Temperature

Mean values of monthly highest and lowest temperatures are reported as 43.9⁰C and 5.5⁰C. The lowest temperature recorded was 2.4⁰C and the highest recorded was 47.6⁰C. The annual mean of maximum and minimum temperature was 28.7⁰C and 21.7 °C respectively.

Table 3-9: Climatological Normal Data for North Lakhimpur Observatory, Assam (1961-1990)

STATION : North Lakhimpur		अक्षांश LAT. 27° 14' N		देशान्तर LONG. 94° 07' E		समुद्र तल माथे स ऊंचाई 102 METRES		पूरुषणा पर आधारित 1961-1990																		
माह	स्टेशन का सतह दाब	वायु तापमान						आर्द्रता		मेघ की मात्रा		वर्षा														
		माध्य		अधिकतम		अधिकतम		औसत		अधिकतम		मासिक योग	वर्षा के दिनों की संख्या	नर्षागहित सबसे न्य. पछिने का योग	नर्षागहित शुष्कतम पछिने का योग	24 घंटी की सबसे धारी वर्षा	दिनांक और वर्ष	माध्य पवन गति								
MONTH	STATION LEVEL PRESSURE	AIR TEMPERATURE						HUMIDITY		CLOUD AMOUNTS									RAINFALL							
		MEAN		EXTREMES		HIGHEST		DATE AND YEAR		RELATIVE HUMIDITY		VAPOUR PRESSURE		ALL CLOUDS		LOW CLOUDS		MONTHLY TOTAL	NO. OF RAINY DAYS	TOTAL IN WETTEST MONTH WITH YEAR	TOTAL IN DRIEST MONTH WITH YEAR	HEAVIEST FALL IN 24 HOURS	DATE AND YEAR	MEAN WIND SPEED		
	एच.से.ए. hPa	दि. से °C	रा. से °C	दि. से °C	रा. से °C	दि. से °C	रा. से °C	दि. से °C	रा. से °C	प्रशितान %	एच.से.ए. hPa	अधिकात के अधिकात Oktas of sky	दि.दि. mm		दि.दि. mm	दि.दि. mm	दि.दि. mm	दि.दि. mm			दि.दि. mm	दि.दि. mm	दि.दि. mm	दि.दि. mm	दि.दि. mm	कि.मी. इ. घं. Km/h
जनवरी	I	1006.3	15.5	13.6	23.1	8.8	26.0	5.3	29.8	22	2.7	04	80	14.1	3.0	1.2	35.3	3.2	89.2	0.0	49.2	24	1980	2.9		
फरवरी	I	1004.2	17.5	15.2	23.9	11.8	28.3	7.2	30.2 ⁸	28	4.3	11	77	15.4	4.3	1.9	51.7	4.8	134.4	3.4	55.4	05	1989	4.0		
मार्च	I	1001.8	21.0	17.9	26.8	15.3	31.4	11.2	33.9	30	8.1	02	73	17.9	4.5	2.0	81.0	6.8	267.1	8.5	74.2	28	1955	5.1		
अप्रैल	I	999.2	23.4	20.5	28.1	18.7	32.9	14.8	35.6	29	11.1	01	76	21.7	5.5	2.8	206.5	12.7	371.2	38.1	99.6	14	1954	6.1		
मई	I	996.1	25.7	23.1	29.7	21.5	34.9	18.3	37.0	25	15.1	01	80	26.1	6.1	3.3	378.1	14.4	702.9	85.2	178.3	25	1958	5.5		
जून	I	991.7	27.0	25.2	31.1	23.9	35.6	21.8	37.6	28	19.9	11	86	30.6	6.8	4.1	624.6	19.4	1021.4	217.4	183.0	22	1990	5.9		
जुलाई	I	991.4	26.9	25.5	31.1	24.4	35.6	22.6	37.5	22	20.5	21	89	31.6	7.2	4.5	708.1	21.8	1148.8	425.3	261.6	12	1971	6.0		
अगस्त	I	992.7	27.3	25.7	31.7	24.5	35.8	22.5	37.3	11	20.8	14	87	31.7	6.8	4.0	514.4	17.8	933.5	253.1	170.6	15	1978	4.9		
सितम्बर	I	996.6	26.7	24.9	30.7	23.5	35.2	21.4	36.5	11	19.3	29	86	30.1	6.5	3.8	452.7	16.5	816.0	138.4	170.4	29	1954	4.5		
अक्टूबर	I	1001.4	25.3	22.6	29.8	20.3	33.1	16.3	35.5	06	10.6	31	79	25.4	4.6	2.3	160.4	7.7	396.3	35.6	115.1	07	1956	3.2		
नवम्बर	I	1005.0	21.5	18.5	27.5	14.2	30.3	10.1	32.0	10	6.3	30	74	19.0	3.0	1.1	34.0	2.5	159.9	0.0	74.0	05	1965	2.5		
दिसम्बर	I	1006.7	17.2	14.9	24.5	9.5	27.4	6.0	29.5 ⁸	25	3.1	29	77	15.2	2.5	0.9	28.9	2.2	116.4	0.0	59.4	27	1983	2.4		
वार्षिक योग या मासिक ANNUAL TOTAL OR MEAN	I	999.4	22.9	20.6	28.2	18.0	36.5	4.9	37.6		2.7		80	23.2	5.1	2.7	3275.7	129.8	3991.6	2604.3	261.6			4.4		
	II	995.5	24.2	21.6									78	24.4	4.6	2.2			1984	1967						
वर्षों की संख्या NUMBER OF YEARS	I	30	30	30	30	30	30	30	37	37			30	30	30	30	30	30	30	37	37	37			30	
	II	30	30	30									30	30	30	30										

Wind Speed and Direction

Analysis of wind records during 1961 – 1990 shows that the winds are generally light to moderate in this area. It can be seen that the monthly mean values of wind speed varies from 1.1 to 4.0 Km/h, with the mean value at 2.6 km/h. The higher wind speeds are observed during April to July. The dominant wind directions are western during the non-monsoon months. However, during monsoon months, the dominant wind direction is eastern. Calm wind conditions are more frequent during the months of October to February.

Rainfall

Normal annual total rainfall reported for the station is 3275 mm. Approx. 75% (2526 mm) of the total annual rain fall is received during the months of July to September, august being the wettest month of the year. On an average, there are 80 days in a year with rainfall.

Site Meteorology

To determine the meteorological data in the project area during the study period, the meteorological parameters were at the station located near the site. The recorded during the study period is used for interpretation of the baseline information as well as input for air quality simulation models. Meteorological data was collected during pre-monsoon (March – May) of 2019. A fully instrumented continuous recording meteorological observatory was established and operated near the project site during the study periods. The summary of met-data observed during October to December 2019 is presented in Table-3-11.

Table 3-11: Meteorological Data Recorded at Site

Month	Temperature (°C)			Relative Humidity (%)		Rainfall (mm)		Wind Speed (km/hr)
	Min	Max	Monthly average	At 08:30	At 17:30	Rainy Days	Monthly Total, mm	Mean
October 19	10.0	35.0	26.5	70	35	7	20.0	9.5
November 19	08.0	34.0	22.3	61	19	6	32.0	10.2
December 19	05.0	25.0	19.5	65	39	4	19.0	13.5

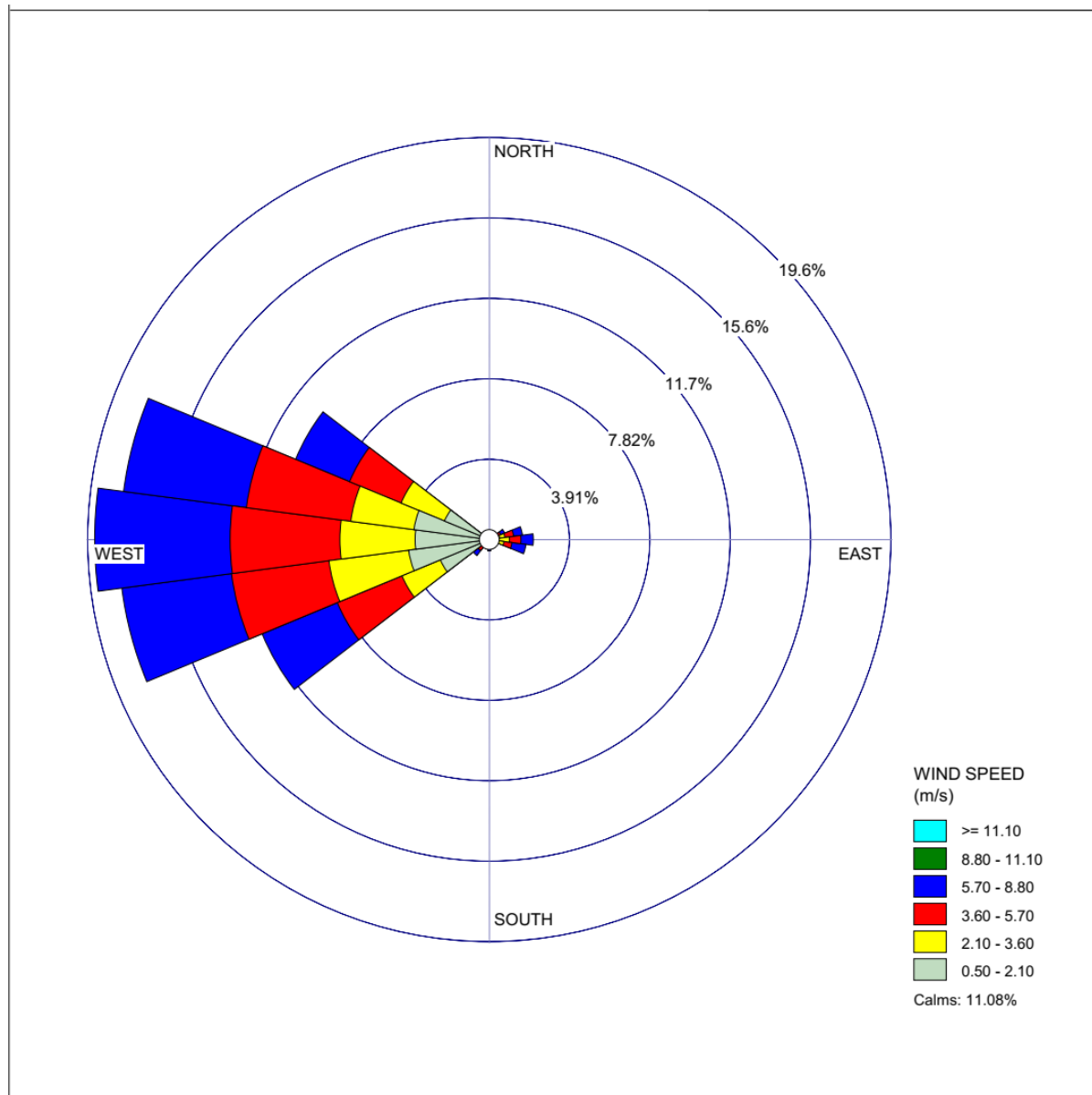


Figure 3-6: Windrose Diagram

3.5.3 Ambient Air Quality

The prime objective of the baseline study with respect to ambient air quality is to establish the present air quality and its conformity to ambient air quality standards. This section describes the sampling locations, frequency of sampling and methodology adopted for monitoring ambient air quality. The results of monitoring during the study period (October to December 2019) are presented in the report.

The study area represents mostly rural environment. The sources of air pollution in the region are vehicular traffic, dust arising from unpaved village roads and domestic fuel burning.

Methodology Adopted for the Study

Sampling Locations, Parameters and Frequency

Calibrated Respirable Dust Samplers were used for the sampling of PM₁₀, SO₂ and NO_x. Ambient air sampling for PM₁₀, SO₂, and NO_x was performed continuously for 24 hours to determine 24-hour average concentrations. Ambient air quality monitoring was carried out with a frequency of two days per week at all nine locations. The sampling was performed at a height of 1.5 m (approximately) from the ground level. Standard methods specified under "National Ambient Air Quality Standards" notification G.S.R. 176(E) were adopted for sampling and analysis. Five locations within the study area were scientifically selected and are based on the following considerations:

1. Meteorological conditions;
2. Topography of the study area;
3. The direction of the wind;
4. Representation of the region for establishing baseline status; and
5. Representation with respect to likely impact areas.

The location of the monitoring stations with reference to the proposed site is given in Table 3-16 & shown in Figure 3.6 above.

Table 3-12: Ambient Air Monitoring Location

S.No.	Code	Location	Direction	Distance
1	AQ-1	Near Project Site	0.90 KM	West
2	AQ-2	Chetry Hotel	1.00 KM	South
3	AQ-3	Ananda Bagan	3.19 KM	West
4	AQ-4	Tarajan NC	4.80 KM	North East
5	AQ-5	Subansiri College Gogamukh near NH 52	South East	4.10 KM
6	AQ-6	Balijan Bangali	South	2.50 KM
7	AQ-7	Uttar Rupahi	South	2.37 KM
8	AQ-8	Dulung	West	3.30 KM

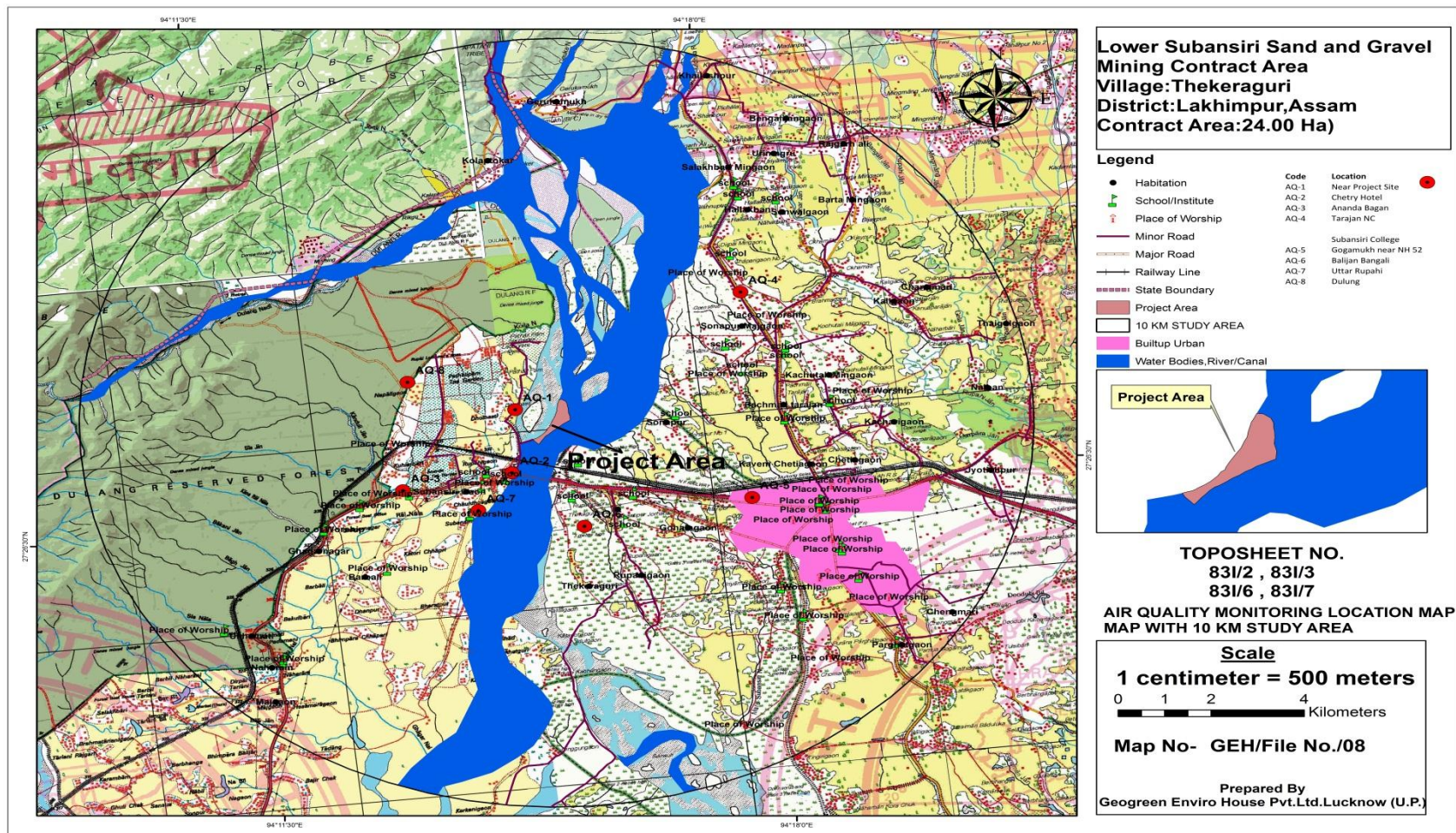


Figure 3-7: Ambient Air Monitoring Locations

Sampling and Analytical Techniques

Particulate Matter (10)

Calibrated 'Respirable Dust Samplers' with Whatman GF/A microfibre filter paper (size: 8" X 10") was used for the collection of PM (10) APM- 151 air sampler of Latest Envirotech instrument. A known volume of ambient air is passed through the cyclone to the initially preprocessed filter paper. The centrifugal force in cyclone acts on particulate matter to separate them into two parts and collected as followings: -

- i. Particles <10 μ size (Respirable) : GF/A Filter Paper
- ii. Particles >10 μ size (Non Respirable) : Cyclone Cup

The differences in final and initial weight of filter paper and cyclone cup are used in estimation of particulate matter. The mass of particulates collected on the GF filter, divided by the volume of sampled air, gives the concentration of PM (10).

Sulphur Dioxide

Sampling and analysis of ambient SO₂ was performed by adopting the 'Improved West and Gaeke Method'. The ambient air, drawn through the draft created by the RDS, is passed through an impinger, containing a known volume of absorbing solution of *sodium tetrachloromercurate*, at a pre-determined and measured flow rate of 1 liter/minute (L/min). SO₂ in ambient air reacts with the *tetrachloromercurate* to form a stable complex, *dichloro-sulphito mercurate*. On reacting with *formaldehyde* and *p-rosaniline hydrochloride*, the sulphite ion forms an intensely coloured compound, *p-rosanilinemethyle sulphonic acid*. The intensity of the colour developed is estimated by spectrophotometer at 560 nm wave length. The measured Optical Density (OD) is used to determine the concentration of SO₂ from the calibration curve already prepared against known concentrations of sulphite ion. The mass of SO₂ in the absorbing reagent, divided by the volume of sampled air provides the concentration of SO₂, which is expressed as $\mu\text{g}/\text{m}^3$.

Nitrogen Oxides

Sampling and analysis of ambient NO_x was performed by adopting the 'Jacob Hochheiser Modified' (Na arsenite) method. Ambient air is drawn through an impinger at a pre-determined flow rate of 1 ppm. The impinger contains known volume of absorbing solution of *sodium arsenite* and *sodium hydroxide*. Oxides

of nitrogen react with the absorbing reagent to form a stable solution of *sodium nitrite*. The nitrate ion produced during the sampling is estimated calorimetrically, after reacting with *phosphoric acid*, *sulphanilamide* and *naphthyl ethylenediamine dihydrochloride* (NEDA), using spectrophotometer at 540 nm wavelength. The measured Optical Density is used to determine the concentration of NO_x from the calibration curve already prepared against known concentrations of nitrite ion. The mass of NO_x in the absorbing reagent, divided by the volume of sampled air provides the concentration of NO_x, which is expressed as µg/m³.

Table 3-13: Techniques Used for Ambient Air Quality Monitoring

Parameters	Technique	Technical Protocol	Minimum Detectable Limit (µg/m ³)
PM _{2.5}	CPCB Guideline (Gravimetric method)	CPCB Volume – 1 / Gravimetric	
PM ₁₀	CPCB Guideline (Gravimetric method)	IS:5182(Part-23)	1.0
Sulphur Dioxide	West and Gaeke (Modified)	IS:5182(Part-2)	5.0
Nitrogen Oxide	Jacob & Hochheiser (Improved)	IS:5182(Part-6)	9.0

Air Quality Standards

National Ambient Air quality standards (18 June 2009) along with the prescribed method of measurement is given in **Table 3-14**.

Table 3-14: National Ambient Air Quality Standards

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of measurement
		Industrial Areas, residential, rural and other area	Ecologically Sensitive Areas (notified by Central Government)	
Sulphur Dioxide (SO ₂)	Annual Average*	50 µg/m ³	20 µg/m ³	- Improved West and Geake Method -Ultraviolet fluorescence
	24 hours**	80 µg/m ³	80 µg/m ³	
Oxides of Nitrogen as (NO ₂)	Annual Average*	40 µg/m ³	30 µg/m ³	- Modified Jacob & Hochheiser (Na-

*Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals. **24 hourly or 08 hourly or 01

	24 hours**	80 µg/m ³	80 µg/m ³	Arsenite) Method - Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM ₁₀ µg/m ³	Annual Average*	60 µg/m ³	60 µg/m ³	- Gravimetric -TOEM -Beta attenuation
	24 hours**	100 µg/m ³	100 µg/m ³	
Particulate Matter 2.5 or PM _{2.5} µg/m ³	Annual Average*	40 µg/m ³	40 µg/m ³	- Gravimetric -TOEM -Beta attenuation
	24 hours**	60 µg/m ³	60 µg/m ³	

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

Ambient Air Quality Results

Ambient air quality monitoring results are given from Table 3.15 to Table 3.19.

Table 3-15: Ambient Air Quality at A1- Near Project Site

1	Near Project Site						
	MONTH	DATE	PM2.5 (µg/m ³)	PM10 (µg/m ³)	SO ₂ (µg/m ³)	CO (µg/m ³)	NO ₂ (µg/m ³)
Oct-19		10/4/2019	37.8	84.0	16.0	480.0	21.6
		10/8/2019	38.4	91.6	13.8	458.0	26.0
		10/12/2019	42.2	82.0	14.8	462.0	25.2
		10/16/2019	43.4	88.0	15.2	484.0	23.8
		10/23/2019	39.6	80.0	14.8	490.0	24.0
		10/27/2019	37.8	91.2	13.8	464.0	21.8
		10/31/2019	38.6	93.2	14.8	472.0	25.2
Nov-19		11/4/2019	40.2	92.6	15.2	488.0	27.2
		11/8/2019	43.4	80.4	14.4	490.0	28.0
		11/12/2019	42.8	91.6	13.6	464.0	22.2
		11/16/2019	34.6	86.8	13.4	472.0	23.6
		11/20/2019	38.6	88.0	14.4	492.0	22.8
		11/24/2019	37.8	87.8	13.8	482.0	24.0
		11/28/2019	40.2	92.2	13.6	484.0	28.0
Dec-19		12/2/2019	38.2	90.0	14.2	480.0	26.2
		12/6/2019	36.8	92.8	15.4	490.0	27.2
		12/10/2019	41.2	88.8	14.6	466.0	23.8
		12/14/2019	36.8	82.8	13.8	478.0	24.0
	12/18/2019	40.2	85.6	15.2	482.0	25.6	
	12/22/2019	39.6	87.2	14.8	460.0	23.8	

	12/26/2019	40.2	90.0	13.8	490.0	21.8
	12/30/2019	39.6	93.2	14.0	468.0	26.0
	1/3/2020	38.4	86.8	13.8	482.0	27.2
	1/6/2020	39.2	81.5	14.0	486.0	26.8
	Max	43	93	16.0	492	28.0
	Min	35	80	13.4	458	21.6
	Avg	39.40	87.84	14.38	477.67	24.83
	98 percentile	43.40	93.20	15.72	491.08	28.00

Table 3-16: Ambient Air Quality at A2- Chetry Hotel

2	Chetry Hotel					
MONTH	DATE	PM2.5 ($\mu\text{g}/\text{m}^3$)	PM10 ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	CO ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)
Oct-19	10/4/2019	41.2	86.2	13.6	496.0	25.4
	10/8/2019	40.2	81	12.8	480.0	23.6
	10/12/2019	39.2	88.4	12.2	462.0	26.8
	10/16/2019	37.2	84.2	14.8	468.0	24.2
	10/23/2019	37.6	90.0	13.1	458.0	26.2
	10/27/2019	37.2	89.6	12.5	502.0	22.8
	10/31/2019	39.0	87.8	13.6	466.0	28.6
	11/4/2019	38.6	91.2	14.0	482.0	24.6
Nov-19	11/8/2019	41.0	82	15.2	484.0	25.2
	11/12/2019	40.2	84	16.2	468.0	23.8
	11/16/2019	39.8	89.2	14.2	492.0	29.4
	11/20/2019	38.2	88	13.4	490.0	26.8
	11/24/2019	39.6	86	15.8	484.0	24.6
	11/28/2019	39.2	90	12.2	472.0	25.8
	12/2/2019	40.2	91.4	14.6	480.0	28.4
	12/6/2019	38.4	88.6	13.3	474.0	29.2
Dec-19	12/10/2019	37.6	80.2	12.6	490.0	22.8
	12/14/2019	38.2	84.6	13.2	486.0	24.1
	12/18/2019	38.8	87.2	12.6	468.0	25.2
	12/22/2019	37.2	83.6	15.0	456.0	28.2
	12/26/2019	40.4	86.2	14.6	488.0	26.2
	12/30/2019	38.6	82.4	12.6	468.0	25.8
	1/3/2020	39.2	81.2	13.8	482.0	26.2
	1/6/2020	38.2	85.2	12.4	480.0	27.1

	Max	41	91	16.2	502	29.4
	Min	37	80	12.2	456	22.8
	Avg	38.96	86.18	13.68	478.17	25.88
	98 percentile	41.11	91.31	16.02	499.24	29.31

Table 3-17: Ambient Air Quality at A3- Village Ananda Bagan

3	Ananda Bagan					
MONTH	DATE	PM2.5 (µg/m³)	PM10 (µg/m³)	SO₂ (µg/m³)	CO (µg/m³)	NO₂ (µg/m³)
Oct-19	10/4/2019	42.2	87.2	14.8	490.0	26.2
	10/8/2019	39.8	82.8	13.4	482.0	24.8
	10/12/2019	40.2	86.4	15.8	474.0	25.0
	10/16/2019	36.8	81.4	14.0	496.0	26.8
	10/23/2019	38.6	88.2	15.0	484.0	24.2
	10/27/2019	39.2	84.0	16.2	498.0	26.5
	10/31/2019	38.4	82.6	13.6	470.0	24.8
Nov-19	11/4/2019	40.0	92.2	14.2	478.0	25.8
	11/8/2019	40.2	83.0	13.6	480.0	23.4
	11/12/2019	41.4	80.3	15.8	486.0	27.2
	11/16/2019	40.8	81.6	16.8	494.0	27.6
	11/20/2019	39.2	86.2	13.8	452.0	26.2
	11/24/2019	40.2	88.0	14.2	448.0	24.4
	11/28/2019	41.6	89.2	17.2	468.0	24.7
Dec-19	12/2/2019	37.2	90.0	15.8	458.0	24.8
	12/6/2019	39.6	76.2	14.2	466.0	25.2
	12/10/2019	40.2	76.5	13.2	492.0	23.4
	12/14/2019	39.2	80.3	13.8	468.0	24.2
	12/18/2019	42.6	78.4	14.2	486.0	24.8
	12/22/2019	38.8	76.9	15.0	448.0	25.2
	12/26/2019	41.2	78.2	13.6	482.0	24.7
	12/30/2019	40.8	76.2	13.4	460.0	26.3
	1/3/2020	38.6	82.3	14.0	472.0	28.1
	1/6/2020	37.2	80.2	15.8	484.0	26.8
	Max	43	92.2	17.2	498	28.1
	Min	37	76.2	13.2	448	23.4
	Avg	39.75	82.8	14.64	475.67	25.46
	98 percentile	42.42	91.19	17.02	497.08	27.88

Table 3-18: Ambient Air Quality at A4- Village Tarajan NC

4	Tarajan NC					
MONTH	DATE	PM2.5 (µg/m ³)	PM10 (µg/m ³)	SO ₂ (µg/m ³)	CO (µg/m ³)	NO ₂ (µg/m ³)
Oct-19	10/4/2019	41.8	82.6	14.0	446.0	24.4
	10/8/2019	39.6	80.24	12.2	472.0	22.5
	10/12/2019	41.2	88.4	13.2	482.0	24.9
	10/16/2019	38.6	90	15.0	468.0	23.7
	10/23/2019	38.2	82	13.4	448.0	24.2
	10/27/2019	36.8	86	12.4	488.0	27.2
	10/31/2019	35.8	90	13.6	444.0	26.8
	11/4/2019	39.4	84.6	14.2	486.0	24.9
Nov-19	11/8/2019	41.2	83.4	14.8	462.0	25.8
	11/12/2019	39.2	81.7	12.6	468.0	24.6
	11/16/2019	39.8	80	15.2	448.0	23.2
	11/20/2019	38.8	85.2	14.2	458.0	25.2
	11/24/2019	41.6	88	13.6	484.0	24.4
	11/28/2019	39.4	87.2	12.2	472.0	23.9
	12/2/2019	36.8	86	12.6	484.0	26.5
	12/6/2019	35.6	88	13.4	460.0	24.7
Dec-19	12/10/2019	41.2	89.2	12.2	472.0	25.2
	12/14/2019	40.8	88.4	13.4	486.0	26.2
	12/18/2019	36.0	87.2	12.6	490.0	25.8
	12/22/2019	39.2	89.2	14.2	484.0	24.2
	12/26/2019	40.4	88	12.3	474.0	25.2
	12/30/2019	36.8	91.2	14.2	470.0	26.3
	1/3/2020	40.3	90.2	12.5	482.0	27.2
	1/6/2020	38.8	81.4	13.4	448.0	25.8
	Max	42	91	15.2	490	27
	Min	36	80	12.2	444	23
	Avg	39.06	86.17	13.40	469.83	25.12
	98 percentile	41.71	90.74	15.11	489.08	27.20

Table 3-19: Ambient Air Quality at A5- Subansiri College Gogamukh near NH 52

5	Subansiri College Gogamukh near NH 52					
MONTH	DATE	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	SO ₂ (µg/m ³)	CO (µg/m ³)	NO ₂ (µg/m ³)
Oct-19	10/4/2019	39.4	78.2	13.6	464.0	26.8
	10/8/2019	36.2	80.3	14.8	456.0	23.5
	10/12/2019	37.4	86.0	18.2	478.0	24.9
	10/16/2019	39.2	84.0	14.8	486.0	25.2
	10/23/2019	35.2	88.4	14.2	484.0	26.8
	10/27/2019	37.8	82.0	13.8	500.0	28.3
	10/31/2019	39.4	80.5	14.2	456.0	28.5
	11/4/2019	42.2	88.4	15.6	468.0	24.1
Nov-19	11/8/2019	40.2	87.6	13.7	442.0	26.2
	11/12/2019	42.8	83.2	14.6	470.0	28.6
	11/16/2019	43.6	79.2	14.5	452.0	22.2
	11/20/2019	40.2	82.0	13.5	460.0	23.8
	11/24/2019	39.8	84.0	14.2	480.0	26.8
	11/28/2019	40.6	86.0	13.2	478.0	23.8
	12/2/2019	38.8	83.2	15.2	482.0	26.4
	12/6/2019	37.8	81.4	14.5	472.0	24.7
Dec-19	12/10/2019	41.2	89.2	18.0	480.0	23.5
	12/14/2019	36.4	81.2	16.2	498.0	23.8
	12/18/2019	42.2	88.0	17.6	484.0	27.2
	12/22/2019	43.6	86.0	14.5	458.0	28.2
	12/26/2019	39.6	84.0	13.6	468.0	26.8
	12/30/2019	37.2	89.2	14.5	472.0	27.2
	1/3/2020	41.2	80.8	13.8	480.0	25.8
	1/6/2020	43.2	86.2	14.7	468.0	28.4
	Max	44	89	18.2	500	28.6
	Min	35	78	13.2	442	22.2
	Avg	39.80	84.13	14.81	472.33	25.90
	98 percentile	43.60	89.20	18.11	499.08	28.55

Table 3-20: Ambient Air Quality at A6- Village Balijan Bangali

6	Balijan Bangali					
MONTH	DATE	PM2.5 (µg/m ³)	PM10 (µg/m ³)	SO ₂ (µg/m ³)	CO (µg/m ³)	NO ₂ (µg/m ³)
Oct-19	10/4/2019	40.2	78.2	15.2	470.0	25.2
	10/8/2019	39.8	81.4	12.8	440.0	24.0
	10/12/2019	35.2	89.4	13.2	482.0	25.6
	10/16/2019	36.8	90.8	14.0	486.0	20.0
	10/23/2019	38.0	91.2	13.6	492.0	22.4
	10/27/2019	40.2	76.8	13.2	484.0	25.6
	10/31/2019	39.8	88.4	14.2	472.0	24.0
	11/4/2019	40.2	77.4	13.6	446.0	26.4
Nov-19	11/8/2019	39.6	82.8	14.0	486.0	27.2
	11/12/2019	35.8	83.2	13.8	452.0	21.2
	11/16/2019	40.2	90	12.8	488.0	20.6
	11/20/2019	39.8	78.4	14.0	476.0	23.2
	11/24/2019	36.0	76.2	14.8	448.0	24.0
	11/28/2019	37.8	91.4	13.2	496.0	26.0
	12/2/2019	36.0	92	13.8	464.0	27.2
	12/6/2019	39.8	79.4	14.6	472.0	25.8
Dec-19	12/10/2019	37.2	88	15.0	486.0	24.0
	12/14/2019	38.2	87.2	13.6	484.0	27.2
	12/18/2019	39.8	85.8	12.8	476.0	25.6
	12/22/2019	40.2	89.2	14.2	480.0	24.2
	12/26/2019	35.8	87.8	14.6	446.0	25.2
	12/30/2019	38.8	90	13.8	492.0	23.2
	1/3/2020	36.8	83.2	14.8	484.0	21.8
	1/6/2020	40.2	89.8	15.0	472.0	20.6
	Max	40	92	15.2	496	27.2
	Min	35	76	12.8	440	20.0
	Avg	38.43	85.33	13.94	473.92	24.18
	98 percentile	40.22	91.72	15.11	494.16	27.20

Table 3-21: Ambient Air Quality at A7- Village Uttar Rupahi

7	Uttar Rupahi					
MONTH	DATE	PM2.5 (µg/m ³)	PM10 (µg/m ³)	SO ₂ (µg/m ³)	CO (µg/m ³)	NO ₂ (µg/m ³)

Oct-19	10/4/2019	42.2	88.0	14.0	486.0	23.4
	10/8/2019	38.2	81.4	13.8	452.0	24.2
	10/12/2019	34.8	89.4	16.8	480.0	25.6
	10/16/2019	36.8	90.0	15.2	466.0	27.2
	10/23/2019	40.8	86.4	13.2	458.0	26.0
	10/27/2019	39.8	83.6	14.0	466.0	28.2
	10/31/2019	40.0	82.4	16.8	488.0	26.2
	11/4/2019	39.2	91.2	17.2	492.0	27.6
Nov-19	11/8/2019	34.0	83.0	14.0	486.0	23.4
	11/12/2019	38.2	80.3	15.2	450.0	26.0
	11/16/2019	37.8	81.6	16.4	466.0	24.2
	11/20/2019	37.2	86.2	13.2	472.0	25.8
	11/24/2019	40.2	88.0	14.0	484.0	27.2
	11/28/2019	33.8	89.2	13.8	496.0	28.0
	12/2/2019	36.2	90.0	17.2	458.0	25.8
	12/6/2019	38.2	77.8	14.6	492.0	27.2
Dec-19	12/10/2019	40.8	78.0	15.2	496.0	26.4
	12/14/2019	39.6	80.3	16.0	480.0	25.8
	12/18/2019	41.2	79.2	15.4	472.0	24.0
	12/22/2019	40.8	78.6	17.6	458.0	23.6
	12/26/2019	39.6	80.4	14.8	466.0	25.8
	12/30/2019	36.6	84.2	15.2	478.0	26.2
	1/3/2020	33.8	86.8	14.8	462.0	27.8
	1/6/2020	37.2	88.0	13.2	482.0	26.4
	Max	42	91.2	17.6	496	28.2
	Min	34	77.8	13.2	450	23.4
	Avg	38.21	84.3	15.07	474.42	25.92
	98 percentile	41.74	90.65	17.42	496.00	28.11

Table 3-22: Ambient Air Quality at A8- Village Dulung

8	Dulung					
MONTH	DATE	PM2.5 (µg/m ³)	PM10 (µg/m ³)	SO ₂ (µg/m ³)	CO (µg/m ³)	NO ₂ (µg/m ³)
Oct-19	10/4/2019	38.4	82.4	13.2	490.0	27.4
	10/8/2019	42.8	78.8	12.8	480.0	23.8
	10/12/2019	39.6	83.2	13.6	478.0	26.8
	10/16/2019	38.8	85.2	12.5	490.0	22.6

	10/23/2019	35.2	88.0	14.2	484.0	24.2
	10/27/2019	33.6	86.0	13.6	498.0	29.2
	10/31/2019	38.6	87.2	13.8	472.0	28.8
	11/4/2019	40.2	88.0	12.9	488.0	24.4
Nov-19	11/8/2019	39.6	79.6	13.6	480.0	22.2
	11/12/2019	37.8	89.0	13.1	482.0	25.2
	11/16/2019	39.4	88.0	14.2	494.0	29.6
	11/20/2019	33.4	84.2	13.2	462.0	22.6
	11/24/2019	37.8	88.0	13.8	450.0	26.8
	11/28/2019	39.2	86.0	14.5	470.0	24.8
	12/2/2019	38.4	89.2	13.6	458.0	29.2
	12/6/2019	40.4	87.2	13.2	468.0	27.8
Dec-19	12/10/2019	42.8	88.0	14.8	492.0	25.2
	12/14/2019	39.4	84.0	13.8	470.0	23.8
	12/18/2019	41.8	89.2	12.3	488.0	24.8
	12/22/2019	39.4	88.0	12.8	450.0	26.8
	12/26/2019	40.4	85.4	14.5	484.0	27.2
	12/30/2019	38.6	87.2	13.8	466.0	24.8
	1/3/2020	40.2	84.2	12.4	474.0	27.2
	1/6/2020	41.8	86.2	14.7	486.0	28.5
	Max	43	89	14.8	498	29.6
	Min	33	79	12.3	450	22.2
	Avg	39.07	85.93	13.54	477.25	25.99
	98 percentile	42.80	89.20	14.75	496.16	29.42

PARTICULATE MATTER 2.5 (PM 2.5):

The maximum value for PM_{2.5} was observed, as 43.00 µg/m³ at the project site (A1) while 24 hours applicable limit is 60 µg/m³ for industrial and mixed use areas. The area observes average PM_{2.5} concentration in the range of 34.00 – 41.2 µg/m³ with the lowest concentration of 33 µg/m³ recorded at Village Dulung (A8).

PARTICULATE MATTER 10 (PM₁₀):

The maximum value for PM₁₀ was observed as 93.00 µg/m³ at project site (A1) while 24 hours applicable limit is 100 µg/m³ for industrial and mixed use areas. The area observes average PM₁₀ concentration in the range of 80.00-88.50 µg/m³ with the lowest concentration of 76.00 µg/m³ recorded at Village Balijan Bangali (A6).

SULPHUR DIOXIDE (SO₂):

The maximum value for SO₂ was observed, as 18.60 µg/m³ at Subansiri College Gogamukh near NH 52 (A7) while 24 hours applicable limit is 80.00 µg/m³ for industrial and mixed use areas. The area observes average SO₂ concentration in the range of 13.5-11.5 µg/m³ with the lowest concentration of 9.2 µg/m³ recorded at Vill. Dulung (A8). All the villages have observed value well under the prescribed limit.

NITROGEN OXIDES (NO₂):

The maximum value for NO₂ was observed as 29.60 µg/m³ at Dulung site (A8) while 24 hours applicable limit is 80 µg/m³ for industrial and mixed use areas. The area observes average NO₂ concentration in the range of 22.8 – 25.3 µg/m³ with the lowest concentration of 20.00 µg /m³ recorded at Balijan Bangali site (A6). All the villages have observed value well under the prescribed limit.

3.6 Noise Environment

Noise is said to be defined as an unwanted sound. It is, therefore, necessary to measure both the quality as well as the quantity of environment noise in and around the mining site.

Types of Sound Fields

Based on the distance from the source of sound generation, the types of sound field are identified. They are of three type's viz. (i) Free Field (ii) Near Field and (iii) Far Field.

i. Free Field

The sound waves that propagate without obstruction from source to the receiver are free field. The sound waves obey the inverse square law so that sound pressure level decreases by 6 dB (A) as the distance is doubled. Such a field is known as free field.

ii. Near Field

This field is located within a few wavelengths of the source and it is also influenced by the dimensions of the source. The inverse square law does not apply in this field.

iii. Far Field

The far field has two parts one is known as free part and the other as reverberation part. In the free part of the far field, the sound pressures level obeys the inverse square law and propagate without obstruction from source to the receiver. The reverberant part of the field exists for enclosed situation where the reflected sound waves are superimposed on the incident sound waves. If there are many reflected waves from all possible direction, a diffuse sound field exists.

The intensity of sound energy in the environment is measured in a logarithmic scale and is expressed in a decibel (dB) scale. Ordinary sound level meter measures the sound energy that reaches the microphone by converting it into electrical energy and then measures the magnitude in dB. In a sophisticated type of sound level meter, an additional circuit (filters) is provided, which modifies the received signal in such a way that it replicates the sound signal as received by the human ear and the magnitude of sound level in this scale is denoted as dB (A). The sound levels are expressed in dB (A) scale for the purpose of comparison of noise levels, which is universally accepted by the international community.

Noise levels were measured using an Integrating sound level meter manufactured by Cygnet (Model No. 2031). It has an indicating mode of Lp and Leq. Keeping the mode in Lp for few minutes and setting the corresponding range and the weighting network in “A” weighting set the sound level meter was run for one hour time and Leq was measured at all locations.

The day noise levels have been monitored during 6.00am to 10.00pm and night noise levels, during 10.00pm to 6.00am at all the twelve locations covered in 10 km radius of the study area.

Noise Level Survey

A preliminary reconnaissance survey was undertaken to identify the major noise generating sources in the area. The noise survey was conducted in the month of October 2019 to assess the background noise levels in different zones viz. industrial, commercial, and residential and silence zones.

The sampling locations for noise are confined to residential, commercial and sensitive areas; however, no industrial area is present within the 10 km radius of the project site. 8 sampling locations were selected for the sampling of noise and are shown in **Figure3-6 and Figure 3.7** and also given in **Table3-20**.

Table 3-23: Details of Noise Monitoring Locations

S.No.	Code	Location	Direction	Distance
1	NQ-1	Near Project Site	0.90 KM	West
2	NQ-2	Chetry Hotel	1.00 KM	South
3	NQ-3	Ananda Bagan	3.19 KM	West
4	NQ-4	Tarajan NC	4.80 KM	North East
5	NQ-5	Subansiri College Gogamukh near NH 52	South East	4.10 KM
6	NQ-6	Balijan Bangali	South	2.50 KM
7	NQ-7	Uttar Rupahi	South	2.37 KM
8	NQ-8	Dulung	West	3.30 KM

3.6.1 Ambient Noise Standards

Ministry of Environment & Forests (MoEF) has notified the noise standards vide gazette notification dated February 14, 2000 for different zones under the Environment Protection Act (1986). These standards are given in **Table 3-21**.

Table 3-24: Ambient Noise Quality Standards in respect of Noise

Area Code	Category of Area	Noise dB (A) L_{eq}	
		Daytime*	Night time*
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

Daytime from 6.00am to 10.00pm and Night time from 10.00pm to 6.00a m.

Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicle hours, loud speakers and bursting of crackers are banned in these zones

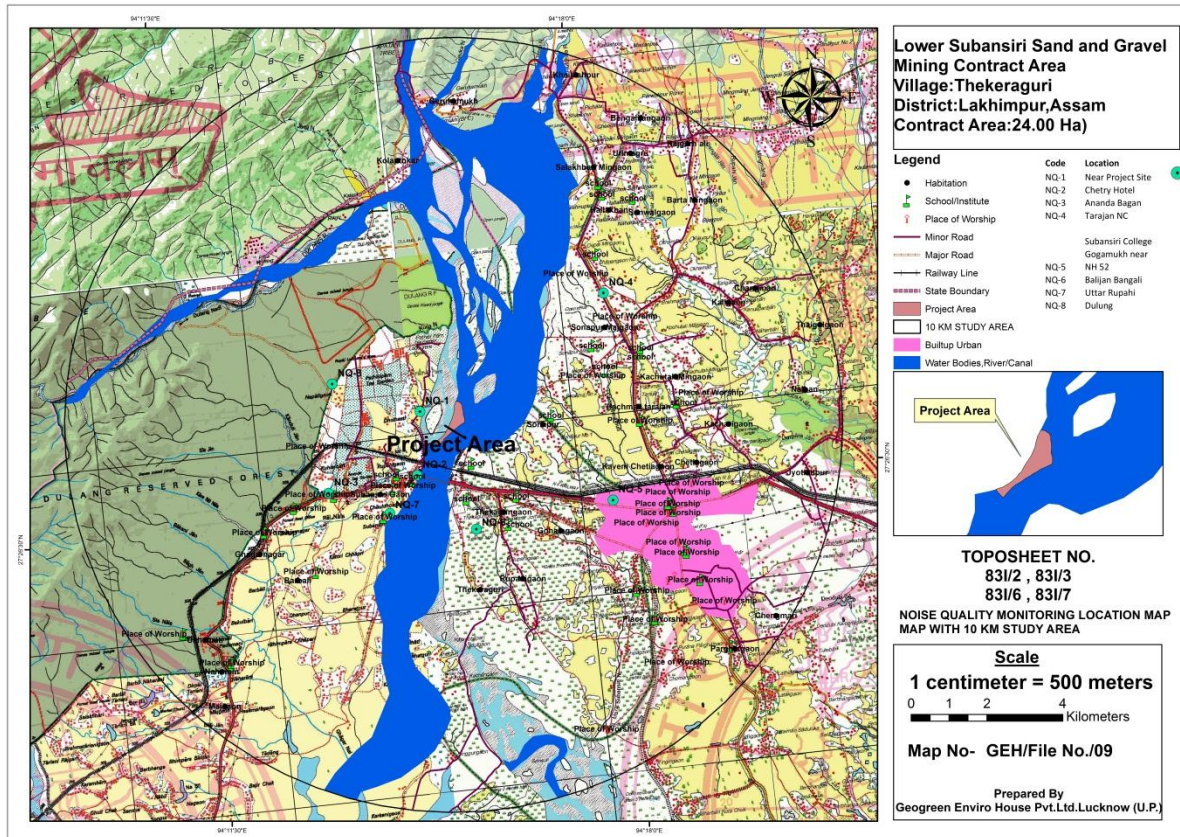


Figure 3-8: Noise Monitoring Locations

Table 3-25: Noise Quality Results of the Study Area

Sr.No.	Noise Location	DOS	Standards of Noise Level			Noise Level db(A)	
			Category of Area	Day dB (A)	Night dB (A)	Day (Ld)	Night (Ln)
1	Near Project Site	16.10.2019	Residential	55	45	46.1	37.2
2	Chetry Hotel	17.10.2019	Residential	55	45	47.2	37.5
3	Ananda Bagan	18.10.2019	Residential	55	45	46.3	36.8
4	Tarajan NC	19.10.2019	Residential	55	45	48.5	38.6
5	Subansiri College Gogamukh near NH 52	22.10.2019	Residential	55	45	46.6	37.1
6	Balijan Bangali	23.10.2019	Residential	55	45	50.1	40
7	Uttar Rupahi	24.10.2019	Residential	55	45	48.6	38.4
8	Dulung	25.10.2019	Residential	55	45	49.7	40.1

From the above study and discussion it can be concluded that noise levels in the study area are well within the prescribed limits as prescribed by CPCB.

3.7 Biological Environment

Ecology is the study of the relation and interactions between organisms and their environment. It comprises the floral and faunal communities of an area. With changes in environmental conditions, structure, density and composition of plants, animals also undergo changes.

3.7.1 Methodology for Baseline Data Generation

The ecological information has been collected through field studies, consultation with various government departments and collection of available literature with relevant institutions/ organizations.

Objective

The ecological study of the area has been conducted in order to understand the existing status of flora and fauna to generate baseline information and evaluate the possible impacts on biological environment. The present study highlights the various issues pertaining to floristic diversity and faunal wealth in the surrounding area upto 10 km radius of the proposed project site.

Methodology of the Study

The baseline study for existing ecological environment was carried out during October to December 2019. A participatory and consultative approach was followed. Field visits were undertaken for survey of the vegetation and animals in the study area. The study area has been divided in to two parts as core area consisting of project site and the buffer area as the 10 km radius of the project site.

For the purpose of surveying the vegetation quadrates were laid to record phyto-sociological features of the vegetation. Detailed notes on ecological features, including the habitat types were also taken along the selected locations. The flora and fauna in the study area were inventorised.

Besides measuring these parameters, other biodiversity aspects in the form of endemic status, conservation status and life form have been enumerated. For all the plant species found in the area during ecological survey, Red Data Books of the Botanical survey of India have been screened to verify their conservation status. For wild animal species schedule 1 of the Wildlife Protection Act (1972) has been screened. The information was also collected from secondary sources for authentication of the data from divisional forest office, Lakhimpur.

Terrestrial Ecology

The proposed project lies in the Brahmpura plain of Assam in district Lakhimpur. The area enjoys tropical monsoonal condition; elevation from sea level varies from 140 -150 m and the district is within the Terai lowlands at the base of the Himalayas, with several rivers and lush green vegetation.

The terrestrial ecological study of the area can be categorized into two groups based on the ecological components i.e. Flora and Fauna. Therefore, to assess the exact ecological status of area inventory of flora & fauna is prepared during the study period on the basis of primary data as well as secondary data collected.

Ecological Quality

Result& Analysis

3.7.2 Faunal Community

Mammals: No wild mammalian species was directly sighted during the field survey. Dialogue with local villagers located around the study area also could not confirm presence of any wild animal in that area. Rhesus Monkey, common mongoose, Common otter, Indian rat, Small Indian civet, Common five Stripped Squirrel were observed during primary survey.

Avifauna: From the primary survey, a total of 47 species of avifauna were identified and recorded in the study area. The diversity of avifauna from this region was found to be quite high and encouraging. The list of fauna species found in the study area are mentioned in **Table 3.30**. The tree lizard and common garden lizards are also seen. Variety of butterflies (like common grass yellow, Common Mormon, plain tiger) and insects (such as beetles, spiders, red ants, and flies) are spotted in abundance in the study zone.

Table 3-26: Flora in the Study Area

S No.	Scientific Name	Common Name	Family	IUCN Conservation Status
Tree				
1	<i>Lagerstroemia flos reginae</i>	Ajhar	Lythraceae	Not yet Assessed
2	<i>Spondias pinnata</i>	Amra	Anacardiaceae	Not yet Assessed
3	<i>Cassia fistula</i>	Sonal	Leguminosae	Not yet Assessed

4	<i>Embllica officinalis</i>	Amlokhi	Phyllanthaceae	Not yet Assessed
5	<i>Ficus elastica</i>	Atha bor	Moraceae	Not yet Assessed
6	<i>Ficus bengalensis</i>	Bot	Moraceae	Not yet Assessed
7	<i>Psidium guajava</i>	Guava	Myrtaceae	Not yet Assessed
8	<i>Aegle marnelos</i>	Bel	Rutaceae	Not yet Assessed
9	<i>Mangifera indica</i>	Aam	Anacardiaceae	Not yet Assessed
10	<i>Delonix regia</i>	Gulmohar	caesalpiniaceae	Least concern
11	<i>Terminalia belerica</i>	Bahera	Combretaceae	Not yet Assessed
12	<i>Cocos nucifera</i>	Coconut	Arecaceae	Not yet Assessed
13	<i>Ficus hispida</i>	Dimaru	Moraceae	Not yet Assessed
14	<i>Azadirachta indica</i>	Neem	Meliaceae	Not yet Assessed
15	<i>Butea monosperma</i>	Palas	Fabaceae	Not yet Assessed
16	<i>Adina cordifolia</i>	Haldu	Rubiaceae	Not yet Assessed
17	<i>Elaeocarpus robustus</i>	Helok	Elaeocarpaceae	Not yet Assessed
18	<i>Terminalia chebula</i>	Harida	Combretaceae	Not yet Assessed
19	<i>Syzygium cumini</i>	Jamun	Myrtaceae	Not yet Assessed
20	<i>Macaranga indica</i>	Juglo	Euphorbiaceae	Not yet Assessed
21	<i>Saraca indica</i>	Asoka	Leguminosae	Not yet Assessed
22	<i>Ficus gibbosa</i>	Jaribar	Moraceae	Not yet Assessed
23	<i>Anthocephalus cadambe</i>	Kadam	Rubiacea	Not yet Assessed
24	<i>Ficus racemosa</i>	Umber	Moraceae	Not yet Assessed
25	<i>Aquilaria agallocha</i>	Agar	Thymeleaceae	Not yet Assessed
26	<i>Bauhinia sp.</i>	Kanchan	Fabaceae	Not yet Assessed
27	<i>Artocarpus heterophyllus</i>	Kanthal	Moraceae	Not yet Assessed
28	<i>Bauhinia purpurea</i>	Kurial	Fabaceae	Least concern
29	<i>Schima wallichii</i>	Makri	Theaceae	Not yet Assessed
30	<i>Bischofia javanica</i>	Uriam	Phyllanthaceae	Not yet Assessed
31	<i>Tamarindus indica</i>	Tetul	Leguminosae	Not yet Assessed
32	<i>Tectona grandis</i>	Segun	Verbenaceae	Not yet Assessed
33	<i>Shorea robusta</i>	Sal	Dipterocarpaceae	Least concern
34	<i>Borassus flabellifer</i>	Taal	Arecaceae	Least concern
35	<i>Acacia auriculoformis</i>	Setbabul	Mimosaceae	Not yet Assessed
36	<i>Zizyphus jujuba</i>	Kul	Rhamnaceae	Not yet Assessed
37	<i>Bursera serrata</i>	Nour	Burseraceae	Not yet Assessed
38	<i>Alstonia scholaris</i>	Satiana	Apocynaceae	Least concern
39	<i>Acacia nilotica</i>	Babla	Mimosaceae	Not yet Assessed
40	<i>Pterocarpus indicus</i>	Padauk	Leguminosae	Vulnerable
41	<i>Bombax malabaricum</i>	Simul	Malvaceae	Not yet Assessed
42	<i>Albizzia chinensis</i>	Siris	Fabaceae	Not yet Assessed
43	<i>Pongamia pinnata</i>	Karanj	Fabaceae	Least concern
44	<i>Polyalthia longifolia</i>	Debdaru	Anonaceae	Not yet Assessed
45	<i>Diospyros melanoxylon</i>	Kendu	Ebenaceae	Not yet Assessed
46	<i>Dalbergia sissoo</i>	Shishoo	Fabaceae	Not yet Assessed

Shrubs				
2	<i>Solanum indicum</i>	Bhokuri	Solanaceae	Not yet Assessed
3	<i>Clerodendrum indicum</i>	Akalbih	Lamiaceae	Not yet Assessed
4	<i>Calotropis procera</i>	Aakanda	Asclepiadaceae	Not yet Assessed
5	<i>Xanthium stromarium</i>	Gokru	Tiliaceae	Not yet Assessed
6	<i>Desmodium laburnifolium</i>	Biyonihaputa	Fabaceae	Not yet Assessed
7	<i>Hyptis suaveolens</i>	Buno tulsi	Lamiaceae	Not yet Assessed
8	<i>Ipomoea fistulosa</i>	Morning Glory	Convolvulaceae	Not yet Assessed
9	<i>Hymenodictyon excelsum</i>	Ban kadam	Rubiaceae	Not yet Assessed
10	<i>Cassia tora</i>	Bonmedelua	Leguminosae	Not yet Assessed
11	<i>Mimosa himalayana</i>	Karuikata	Fabaceae	Not yet Assessed
12	<i>Murraya koenigii</i>	Narasimha	Rutaceae	Not yet Assessed
13	<i>Musa paradisiaca</i>	Kela	Musaceae	Not yet Assessed
14	<i>Viburnum colebrookianum</i>	Paniphuti	Adoxaceae	Not yet Assessed
15	<i>Bambusa offinis</i>	Kaich Bans	Poaceae	Not yet Assessed
16	<i>Bambusa tulda</i>	Gati Bans	Poaceae	Not yet Assessed
17	<i>Bambusa balcooa</i>	Bhaluka bamboo	Poaceae	Not yet Assessed
18	<i>Bambusa pallida</i>	Bans	Poaceae	Not yet Assessed
19	<i>Hibiscus rosa-sinensis</i>	Jaba Phool	Malvaceae	Not yet Assessed
Herbs & Grasses				
1	<i>Datura metal</i>	Dhutra	Solanaceae	Not yet Assessed
2	<i>Cynodon dactylon</i>	Bermuda grass	Poaceae	Not yet Assessed
3	<i>Mimosa pudica</i>	Lajjabati	Fabaceae	Least Concern
4	<i>Sesamum indicum</i>	Til	Pedaliaceae	Not yet Assessed
5	<i>Catharanthus roseus</i>	Nayantara	Apocynaceae	Not yet Assessed
6	<i>Curcuma spp</i>	Sunti	Scitamineae	Not yet Assessed
7	<i>Saccharum spontaneum</i>	Khagra	Coramineae	Least Concern
8	<i>Andropegon squarrouis</i>	Binna	Coramineae	Not yet Assessed
9	<i>Tridax procumbens</i>	Tridax Daisy	Asteraceae	Not yet Assessed
10	<i>Imperate arundinacea</i>	Chhan	Coramineae	Not yet Assessed
11	<i>Alysicarpus vaginalis</i>	Alyce Clover	Fabaceae	Not yet Assessed
12	<i>Desmodium triflorum</i>	Creeping Tickfoil	Fabaceae	Least Concern
13	<i>Microlepia speluncae</i>	Lace Fern	Dennstaedtiaceae	Not yet Assessed

The buffer area of the project i.e. 10km radius of the proposed project site includes the agricultural land, villages, and the part of reserved forest. In village areas only domesticated animals were seen, however some rodents and mammals were also noticed roaming in the area. The RF area is the main habitat supporting the faunal diversity of this area. The inventory of the animal species present in and around the area was prepared and cross checked with the schedules of Wildlife acts, 1972. No schedule I animal is reported. List of faunal species reported from the area is tabulated under Table-3-30 to 3-33.

Table 3-27: List of Fauna in 10km Radius of the Project Site

Sl.No	Scientific name	English Name	Schedule of Wildlife Protection Act	Status as per IUCN Red Data List	Method
Mammals					
1	<i>Macaca mulatta</i>	Rhesus Monkey	II	Least Concern	DS
2	<i>Herpestes edwardsii</i>	Common Indian Mongoose	II	Least Concern	DS
3	<i>Macaca assamensis</i>	Assamese macaque	II	Near Threatened	NS
4	<i>Viverricula indica</i>	Small Indian Civet	I	Least Concern	NS
5	<i>Canis bengalensis</i>	Indian fox	-	Not assessed	NS
6	<i>Mus musculus</i>	Common mouse	V	Least Concern	DS
7	<i>Lutra lutra</i>	Common otter	II	Near Threatened	DS
8	<i>Cannomys badius</i>	Bay bamboo rat	V	Least Concern	DS
9	<i>Lepus nigricollis</i>	Indian rabbit	IV	Least Concern	DS
10	<i>Mus rattus</i>	Indian rat	V	Not assessed	DS
11	<i>Bandicoota bengalensis</i>	Common Indian Rat	V	Not assessed	DS
12	<i>Funambulus pennanti</i>	Common five Stripped Squirrel	IV	Not assessed	DS
13	<i>Felis bengalensis</i>	Leopard cat	I	Not assessed	NS
14	<i>Axis axis</i>	Spotted deer	II	Least Concern	NS
15	<i>Platanista gangetica</i>	Ganges river dolphin	I	Endangered	NS
16	<i>Felis chaus</i>	Jungle cat	II	Least Concern	NS
Birds					
1	<i>Corvus splendens</i>	House crow	V	Least Concern	DS
2	<i>Corvus macrorhynchos</i>	Jungle crow	-	Least Concern	NS
3	<i>Aerodotheres tristis</i>	Common Maina	IV	Not assessed	DS
4	<i>Milvus migrans</i>	Common kite	IV	Least Concern	DS
5	<i>Anas poecilorhyncha</i>	Eastern Spot billed duck	IV	Least Concern	DS

6	<i>Ardea alba</i>	Great Egret	IV	Least Concern	DS
7	<i>Vanellus cinereus</i>	Grey Headed Lapwing	IV	Least Concern	DS
8	<i>Anas strepera</i>	Gadwall	IV	Least Concern	DS
9	<i>Himantopus himantopus</i>	Black winged Stilt	IV	Least Concern	DS
10	<i>Actitis hypoleucos</i>	Common sandpiper	IV	Least Concern	DS
11	<i>Leptoptilos javanicus</i>	Lesser Adjutant	IV	Vulnerable	DS
12	<i>Dicrurus macrocercus</i>	Black Drongo	IV	Least Concern	DS
13	<i>Nettapus coromandelianus</i>	Cotton pigmy goose	IV	Least Concern	DS
14	<i>Tringa glareola</i>	Wood Sandpiper	IV	Least Concern	DS
15	<i>Streptopelia chinensis</i>	Indian Spotted Dove	IV	Not assessed	DS
16	<i>Psittacula krameri</i>	Rose ringed parakeet	IV	Least Concern	DS
17	<i>Halcyon smyrnensis</i>	White breasted king fisher	IV	Not assessed	DS
18	<i>Alcedo atthis</i>	Common kingfisher	IV	Least Concern	DS
19	<i>Eudynamys scolopceae</i>	Koel	IV	Not assessed	DS
20	<i>Grus grus</i>	Common crane	IV	Least Concern	DS
21	<i>Columba livia</i>	Blue rock pigeon	IV	Least Concern	DS
22	<i>Vanellus indicus</i>	Redwattled lapping	-	Least Concern	DS
23	<i>Dicrurus macrocercus</i>	Black Drongo	IV	Least Concern	DS
24	<i>Dicrurus leucophaeus</i>	Ashy Drngo	IV	Least Concern	DS
25	<i>Cypsiurus balasiensis</i>	Asian palm swift	IV	Least Concern	DS
26	<i>Merops orientalis</i>	Common bee eaters	IV	Least Concern	DS
27	<i>Actitis hypoleucos</i>	Common sandpiper	IV	Least Concern	DS
28	<i>Ocyrceros birostris</i>	Indian Grey hornbill	IV	Least Concern	DS
29	<i>Anthus rufulus</i>	Paddyfield pipit	IV	Least Concern	DS
30	<i>Psittacula alexandri</i>	Indian Red breasted Parakeet	IV	Near Threatened	DS
31	<i>Ceryle rudis</i>	Pied kingfisher	IV	Least Concern	DS
32	<i>Acrocephalus agricola</i>	Paddy field warbler	-	Least Concern	NS

33	<i>Coracias benghalensis</i>	Indian Roller	IV	Least Concern	DS
34	<i>Ardeo grayeli</i>	Pond heron	IV	Not assessed	DS
35	<i>Egretta garzetta</i>	Little egret	IV	Least Concern	DS
36	<i>Anas creaca</i>	Common Teal	IV	Not assessed	DS
37	<i>Pelargopsis capensis</i>	Brown headed storkbilled	IV	Least Concern	DS
38	<i>Bubulcus ibis</i>	Cattle egret	IV	Least Concern	DS
39	<i>Cotuenix coturnix</i>	Common or grey quail	IV	Not assessed	DS
40	<i>Ciconia epsioopus</i>	White necked stork	IV	Not assessed	DS
41	<i>Turdoides striata</i>	Jungle babbler	IV	Least Concern	DS
42	<i>Motacilla alba</i>	White Wagtail	-	Least Concern	DS
43	<i>Gallus gallus</i>	Red jungle fowl	IV	Least Concern	NS
44	<i>Burhinus oedicenemus</i>	Stone curlew	IV	Not assessed	DS
45	<i>Copsychus saularis</i>	Southern magpie robin	IV	Least Concern	DS
46	<i>Dendrocopas mahrattensis</i>	Yellow wood pecker	IV	Not assessed	DS
47	<i>Coracias benhalensis</i>	Indian Roller	IV	Not assessed	DS
48	<i>Pericrocotus cinnamomaus</i>	Small minivet	IV	Not assessed	DS
49	<i>Lonchura punctulata</i>	Spotted Munia	IV	Least Concern	NS
50	<i>Dendrocitta vagabunda</i>	Indian Tree pie	IV	Least Concern	DS
51	<i>Turdus ruficollis</i>	Dark throated thrush	IV	Least Concern	DS
52	<i>Passer domesticus</i>	Indian house sparrow	V	Least Concern	DS
53	<i>Turdoides caudatus</i>	Common Babbler	IV	Least Concern	DS
54	<i>Pycnonotus cafer</i>	Red vented Bulbul	IV	Least Concern	NS
55	<i>Motacilla cinerea</i>	Grey wagtail	IV	Least Concern	DS
56	<i>Phalacrocorax sulcirostris</i>	Black cormorant	IV	Least Concern	DS

Reptiles					
1	<i>Dryophis species</i>	Green tree Snake	IV	Not assessed	NS
2	<i>Hemidactylus gleadoviimaculatus</i>	Common house gecko	IV	Not assessed	DS
3	<i>Ptyas mucosas</i>	Yellow rat snake	II	Not assessed	NS
4	<i>Calotes versicolor</i>	Common Garden Lizard	-	Not assessed	DS
5	<i>Varanus varanus</i>	Tree lizard	II	Not assessed	DS
Amphibians					
1	<i>Rana tigrina</i>	Common yellow frog	IV	Least Concern	NS
2	<i>Bufo melanostictus</i>	Toad	IV	Least Concern	NS
3	<i>Hoplobatrachus tigerinus</i>	Indian bull frog	-	Least Concern	DS
Butterfly					
1	<i>Eurema hecabe</i>	Common Grass Yellow	IV	Not assessed	DS
2	<i>Graphium cloanthus</i>	Glassy bluebottle	IV	Not assessed	DS
3	<i>Papilio demoleus</i>	Lime	IV	Not assessed	DS
4	<i>Papilio polytes</i>	Common Mormon	IV	Not assessed	DS
5	<i>Appias albina</i>	Common Albatross	IV	Not assessed	DS
6	<i>Eurema libythea</i>	Small Grass Yellow	IV	Not assessed	DS
7	<i>Junonia atlites</i>	Grey pansy	IV	Not assessed	DS
8	<i>Pantoporia perius</i>	Common Sergeant	IV	Not assessed	DS
9	<i>Danaus chrysippus</i>	plain tiger	IV	Not assessed	DS
10	<i>Precis iphita</i>	Chocolate Pansy	IV	Not assessed	DS
11	<i>Neptis hylas</i>	Common Sailer	IV	Not assessed	DS
12	<i>Junonia hierta</i>	Yellow pansy	IV	Least Concern	DS
13	<i>Junonia lemonias</i>	Lemon pansy	IV	Not assessed	DS
14	<i>Junonia orithya</i>	Blue Pansy	IV	Not assessed	DS

N.B: NS= Not sighted but included as per the information provided by villagers, DS = Direct Sighting

Livestock like cattle, buffalo, goat, poultry, duck, and pig are reared for dairy products, meat, egg and for agriculture purpose. Majority of cattle and buffalo are of local variety. Backyard poultry farms are mostly common in this area; however, some commercial poultry farms are also recorded in the study area.

The study area is marked with moderate population of flora and fauna.

No Schedule I species was found in the core as well as buffer zone. No endangered or endemic species (as notified in IUCN Red Data Book) are located within the study area. No migratory birds breed in the study area. No Tiger Reserve / Elephant Corridor / Turtle breeding place is located Within 10 km radius of the study area.

Aquatic Ecology

The most dominant macrophytes are *Phragmites karka*, *Arundo donax*, *Alternanthera sessilis*, *Cyperus iria*, *Hydrilla verticillata* and *Nymphoides cristat*. A total of 21 species of aquatic macrophytes were recorded from these aquatic ecosystems. Lists of Macrophytes recorded within the study area are given in **Table 3.31**.

Table-3-31 List of Macrophytes Recorded Within the Study Area

Sl.No	Scientific name	Common Name	Local Status
1	<i>Polygonum barbatum</i>	Panimarich	Common
2	<i>Cyperus iria</i>	Jal Mutha	Common
3	<i>Exacum tetragonum</i>	Kuchri	Common
4	<i>Hydrilla verticillata</i>	Jhangi	Common
5	<i>Alternanthera sessilis</i>	Haycha	Common
6	<i>Eclipta alba</i>	Kesut	Common
7	<i>Canna indica</i>	Parijat	Common
8	<i>Arundo donax</i>	Gaha nal	Common
9	<i>Phragmites karka</i>	Nal	Common
10	<i>Lemna perpusilla</i>	Khudi Pana	Common
11	<i>Ipomea aquatica</i>	Kalmi	Common
12	<i>Ceratophyllum demersum</i>	Jhanji	Common
13	<i>Nymphaea lotus</i>	Shalook	Common

14	<i>Monochoria vaginles</i>	Kachar	Common
15	<i>Nelumbo nucifera</i>	Padma	Common
16	<i>Wolffia arrhiza</i>	Sujipana	Common
17	<i>Pistia stratiotes</i>	Toka Pana	Common
18	<i>Nymphaea rubra</i>	Lal Shalook	Common
19	<i>Neptunia oleracea</i>	Pani Lajuk	Common
20	<i>Vallisneria spiralis</i>	Baicha	Common
21	<i>Salvinia cucullata</i>	Watermoss	Common

Freshwater fish species within the 10 km radius study area has been identified. Major fish fauna of fresh water bodies include catla, rohu, mrigala, Cat fish, Prawn, Murrel, etc. A total of 17 species of fishes were recorded from these aquatic ecosystems. The list of fish species recorded within the study area is given in **Table 3.32.**

Table-3-32 List of Fish species Recorded within the Study Area

Sl.No	Scientific Name	English Name
1	<i>Catla catla</i>	Katla
2	<i>Channa punctatus</i>	Lata
3	<i>Channa striatus</i>	Sole
4	<i>Channa gachua</i>	Chang
5	<i>Labeo rohita</i>	Rohu
6	<i>Cirrhinus mrigala</i>	Mrigal

Domestic Animals:

As the buffer area is mainly consisting of villages, various domestic animals are reported from these villages. The domestic animals are mainly mammals. The domestic animals found in the study area are listed in the Table-3-33.

Table 3-33: Domestic Animals found in the Study Area

Zoological Name	Common Name
Bos indicus	Cow
Bubalus indicus	Buffalo
Canis lupus familiaris	Dog
Capra hircus	Goat
Equus ferus caballus	Horse
Equus hermionus	Ass
Felis domesticus	Cat
Ovis polie	Sheep
Sus scrofa domesticus	Pig

3.8 Socio-Economic Environment

The following section presents the socio-economic profile of the village falling in the study area (demography, literacy, occupation, etc) based on secondary data available from primary census abstract, census of India 2011, village directory.

3.8.1 Approach & Methodology Adopted

Study has been conducted based on the primary as well as Secondary Data: Socio-economic profile has been compiled from census data (2001 & 2011), while primary verification has been carried out by using sample site survey. As the study area is too large so the study has been carried out at district level representing the whole study area for detailed socio-economic analysis.

The socio-economic study report, presented hereunder, is based on the primary as well as secondary data. Socio-economic profile has been compiled from census data (2011), while primary verification has been carried out by using sample survey in the study are. This is then compared with the Primary Census Abstract, 2001 to establish trends for the period of two decades. Other source of Secondary data used for the study are; Village Directory of Assam, Census 2011; Statistical Abstract of Assam, 2011.

Concepts & Definition

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

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 unrelated or a mix of both. However, if a group of related or unrelated persons live in a house but do not take their 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 females to males in a given 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 understanding in 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 14 to 16 years) and below retirement (around 65 years) that are participating workers, that is people actively employed or seeking employment. People not counted under labour force are

students, retired persons, and stay-at home people, people in prisons, permanently disabled persons 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, full time, or unpaid work in a farm, family enterprise or in any other economic activity.

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 in the case of a year) 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.

3.8.2 The Study Area

There are total 18 villages are coming under the 10 km study area. Name of them are given below:

Table 3-28: Villages in 10 KM Study Area

S. No.	Name of the Village	S. No.	Name of the Village
1	No.1 Borbali	10	Kathalguri Miri
2	Chutiagaon	11	No.2 Parghat
3	Majgaon	12	Subansiri (Pt)
4	Bangali Gaon	13	Sonari Gaon

5	Uriumguri	14	No.1 Sonapur
6	Chandmari	15	Rajgorh
7	Chengamari Miri	16	Rupahi
8	Thekeraguri	17	Naharani
9	Bagalijan	18	Sonapur Gaon

(Source: Census 2011)

3.8.3 Population

The total population of study area is 88461 the percentages of male & female population are 52.84% & 47.16% respectively. Breakup of the population for male and female is given in following Table 3.32 consisting of gender-wise details of population.

3.8.4 Social Structure

The Schedule Caste (SC) population within the study area is 4.50% of the total population with 52.46 % Male and 47.53% are female. The Schedule Caste (SC) population within the study area is 4.50 % of the total population with a sex ratio of 906 female/1000 males. Schedule Tribe (ST) population in the study area is 41.2 % out of a sex ratio of 971 female/ 1000 male.

3.8.5 Literacy

The total number of literate within the study area is 58344 which are 42.8% of total population. Male literacy rate of the study area is 63.33% and female literacy rate is 36.67%.

3.8.6 Occupation Pattern

The occupational structure of the population in the study area has been studied with reference to the total workers and non-workers. Further total workers grouped into two categories main workers and marginal workers. Main workers have been grouped into four categories namely: Cultivators, agricultural labourers, household workers and other workers. The details of these groups are discussed given below in Table 3.32.

3.8.6.1 Total workers

Work is defined as participation in any economically productive activity with or without compensation, wage. Such participation may be physical and/ or mental in nature. Work involves not only actual work but also include supervision and direction of work. It even

includes part time help or unpaid work on farm, family enterprise or its economic activity. All persons engaged in 'work' as defined above are workers.

The number of total workers in the study area is 39634 which is 34.32% of total population. Out of which 77.63% is male and only 22.37% is female. Total workers further divided into main workers and marginal workers.

3.8.6.2 Main workers

Those workers who had worked for the major part of the reference period (i.e. 6 months or more) are term main workers. Total number of main workers in the study area is 23188 which are 51.7% of total workers and 16.84% of total population.

3.8.6.3 Marginal Workers

The marginal workers are those workers, who are engaged in some work for a period of less than six months, during the reference year prior to the census survey. Total number of marginal workers in study area is 16446 which is approx. 49.30% of the total workers.

3.8.6.4 Cultivators

A person is classified as cultivator if he or she is engaged in cultivation of land own or from government or held from private persons or institutions for payment in money, kind or share. Cultivation work includes effective supervision or direction in cultivation. A person who has given out her/his land to another person or institution(s) for cultivation for money, kind or share of crop and who does not even supervise or direct cultivation process is not treated as cultivator. Similarly, a person working on another person's land for wages in cash or kind or combination of both is not treated as cultivator.

Total main worker-cultivators in study area are 17982 and marginal worker cultivators are 4117 which are 40.66% and 6.6% of the total work force.

3.8.6.5 Household Worker

Persons working in others household for wages are treated as household worker. The total workers (main) of this category are about 411 (1.19% of total workers) and total marginal workers of this category are 194 which is 1.34% of the total work force.

3.8.6.6 Non Workers

The non-workers include those engaged in unpaid household duties, students, retired persons, dependants, beggars etc. The total number of non-workers population is 48827 which are 65.67% of the total population. Out of which 26.19% is male and 73.81% is female.

3.8.6.7 Agricultural Laborers

Persons working on the land of others for wages or share in the yield have been treated as agricultural laborers. The total workers of this category are about 7305 which are 40.33% of the total workers.

3.8.6.8 Other Workers

All workers, i.e., those who have been engaged in some economic activity during the last one-year are other workers. The type of workers that come under this category is government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trading, transport, banking, mining, construction, political or social work, priests, entertainment artist, etc. In effect, all workers except cultivators or agricultural laborers or household industry workers are other workers. The total workers of this category are about 6688 (9.87% of total workers) in which 55.26 are male and 44.74% are female.

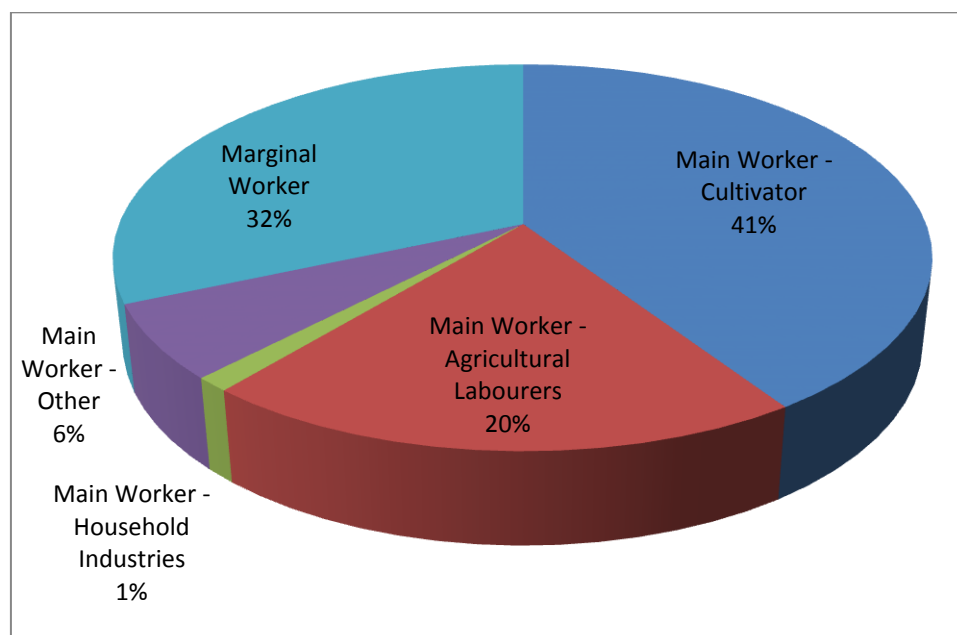


Figure 3-9: Main Workers in the Study Area

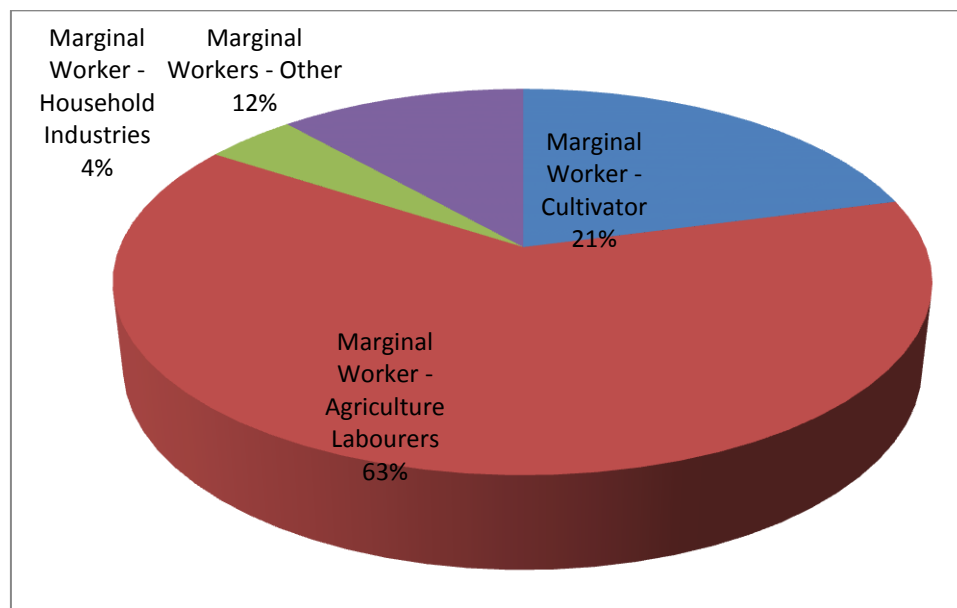


Figure 3-10: Marginal Workers in the Study Area

Table 3-29: Demographic Profile of the Study Area

Total Number of Households : 16812			
Population	Persons	Males	Females
Total	88461	44889	43572
In the age group 0-6 years	13398	6897	6501
Scheduled Castes (SC)	4016	2040	1976
Scheduled Tribes (ST)	36867	18697	18170
Literates	58344	32479	25865
Illiterate	30117	12410	17707
Total Worker	39634	23251	16383
Main Worker	23188	17526	5662
Main Worker - Cultivator	17982	13628	4354
Main Worker - Agricultural Labourers	583	409	174
Main Worker - Household Industries	411	190	221
Main Worker - Other	4212	3299	913
Marginal Worker	16446	5725	10721
Marginal Worker - Cultivator	11945	4117	7828

Marginal Worker - Agriculture Labourers	2447	713	1734
Marginal Worker - Household Industries	925	288	637
Marginal Workers - Other	1129	607	522
Marginal Worker (3-6 Months)	12729	4250	8479
Marginal Worker - Cultivator (3-6 Months)	9615	3061	6554
Marginal Worker - Agriculture Labourers (3-6 Months)	1471	447	1024
Marginal Worker - Household Industries (3-6 Months)	613	194	419
Marginal Worker - Other (3-6 Months)	1030	548	482
Marginal Worker (0-3 Months)	3717	1475	2242
Marginal Worker - Cultivator (0-3 Months)	2330	1056	1274
Marginal Worker - Agriculture Labourers (0-3 Months)	976	266	710
Marginal Worker - Household Industries (0-3 Months)	312	94	218
Marginal Worker - Other Workers (0-3 Months)	99	59	40
Non Worker	48827	21638	27189

(Source: Census 2011)

Chapter 4. ANTICIPATED ENVIRONMENT IMPACTS AND

MITIGATION MEASURES

Environmental impacts both direct and indirect on various environmental attributes due to proposed mining activity will be created in the surrounding environment, during the preoperational, operational and post–operational phases.

The occurrence of mineral deposits, being site specific, their exploitation, often, does not allow for any choice except adoption of eco-friendly operation. The methods are required to be selected in such a manner, so as to maintain environmental equilibrium ensuring sustainable development.

The impacts due to mining operations commence from the exploration activities, extend through extraction and processing of minerals, may continue up to post closure of the operation, with the nature and extent of impacts varying throughout the stages of project development.

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. This would help in formulating suitable management plans sustainable resource extraction.

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.

1. Land Environment
2. Water Environment
3. Air Environment
4. Noise Environment
5. Solid waste

6. Biological

7. Socio-Economic

4.1 Impacts on Land Environment

Mining is essentially an excavation of mineral. The land environment is greatly affected by it. Specially, in case of mining which is being carried out by opencast method / semi-mechanized where No drilling or blasting is required, it is expected to affect the land environment essentially. Impact assessment study on land environment can be done by considering land use pattern/ land cover, Topography, Drainage pattern and geological features of the mine site as well as the study area.

In present case, extraction of sand minerals (minor) is proposed from the Subansiri River Bed as part of Village Thekeraguri, Tehsil and District Lakhimpur. Mining activity in river bed of River Subansiri will be open and semi mechanized. The proposed volume of scrapping of sand and gravel is 69085.0 cum upto the depth of 3.0 m. the maximum depth of mining will not be more than 3.0 m. The mining method will be bar scalping/scrapping using bar scrapper for sand scrapping from the lease area and collecting in designated area. In such activities cases, mining below the existing land may leads to several impacts such as erosion of Channel Bed and banks of river, increment in channel slope, change in channel morphology due to mining of river bed. Mining outside of river may lead the soil erosion due to unsafe soil stacking nearby for backfilling purpose, Water logging due to the pits or unfilled area after soil backfilling.

4.1.1 Anticipated Impacts

Land Use /Land Cover

The land is totally sandy and has sand/gravel in large amount. This land is good for mining. There is no agriculture in the mine lease area.

Land use pattern for preoperational, operational & conceptual stage of the mining as per mine plan for the proposed mine site is given below in Table 4-1: The existing land use / land cover pattern within the study area (10 Km, Buffer including core Area) as studied through Site survey & satellite imagery is given as follows:

Table 4-1: Present land Use Pattern

S No.	Category	Area in Ha	Percentage
1	Agriculture Land	12858.74	39.09
2	Builtup Urban	941.52	2.86
3	Builtup Rural	2596.49	7.89
4	Scrub Land	1581.55	4.81
5	Forest	10205.44	31.02
6	Water Body / River / Canal	4713.21	14.33
	Total	32896.95	

Table 4-2: The Existing Landuse of the Study Area

Sl. No.	Type of Land Use	In River bed Value (in Hectares)	Outside River bed Value (in Hectares)	Total Value (in Hectares)
1	Mining Pits	0.00	0.00	0.0
2	Top Soil Dumps	0.00	0.00	0.00
3	Waste Dumps	0.00	0.00	0.00
4	Excavation	25	0.00	24.00
5	Backfilled Area	0.00	0.00	0.00
6	Soil dump	0.00	0.00	0.00
7	OB dump	0.00	0.00	0.00
8	Drainage	0.00	0.00	0.00
9	Food Track	0.00	0.00	0.00
10	Retaining wall	0.00	0.00	0.00
11	Road	0.00	0.00	0.00
12	Build up area	0.00	0.00	0.00
13	Township area	0.00	0.00	0.00
14	Green Area	0.00	0.00	0.00
15	Reclamation	0.00	0.00	0.00
16	Mineral storage	0.00	0.00	0.00
	Total			24.00

As per the mine plan the river bed area will be replenished by sediments during rainy season. The same will be utilized for reclamation once the mining of mineral in one hectare area is over. This practice will continuous and simultaneous.

Anticipated impact due to River Bed mining

- Excessive and unscientific riverbed material mining may impact to nearby structures.
- River bank cutting and erosion of river bed.
- Waste water, heavy metal, stack emissions and fugitive emission may leads the soil pollution
- Damage of river bank due to access ramps to river bed, causing damage to vegetation, soil erosion, micro disturbance to ground water, possible inducement of charged river course.
- Loss of riparian vegetation standing along the bank due to making roads connecting successive access to river bed.
- Contamination of sand aquifer water due to ponding: Due to uneven rocky bed of river, sand bed thickness vary considerably and digging more sand from a pocket where thickness of sand is more may cause ponding. In this stagnant water, bio-degradable materials especially flora waste gets accumulated causing contamination and inducing an unhealthy environment.
- Surface degradation due to stockpiling and road network.

Mitigation Measures

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

- Present land use pattern of the lease area is riverbed and at the conceptual stage the land use pattern will remain the same, hence will not be changed.
- Mining activity will be carried out in dry bed only.
- There will be no mining near the banks. This is to protect the bank erosion and river migration
- There will be no mining activity when there is a flow of water
- Mining on the concave side of bank shall be avoid to prevent the bank erosion

- The proposed volume of scrapping of sand is 69085.0 cum upto the depth of 1.5 m, the maximum depth of mining will not be more than 3.0 m. The mining method will be bar scalping/scrapping using bar scrapper for sand scrapping from the lease area and collecting in designated area.
- There is no generation of waste material in case of River Bed mining. No back filling is proposed as river Bed will be replenished by sediments during rainy season.
- Minimum number of access roads to river bed for which cutting of river banks will be avoided and ramps are to be maintained.
- Access points to the river bed will be decided based on least steepness of river bank and least human activity.
- Mining is avoided during the monsoon season and at the time of floods.
- Mining schedule is synchronized with the river flow direction and the gradient of the land. Haulage roads parallel to the river bank and roads connecting access to river bed will be made away from the bank.
- Care will be taken to ensure that ponds are not formed in the river bed.
- Access roads from public roads and up to river bank will be aligned in such a way that it would cause least environmental damage.
- Vegetation development is proposed along the road sides of the approach roads, to arrest soil erosion. While selecting the plant species, preference will be given for planting native species of the area.

4.2 Impacts on Water Environment

The mining process will not divert and utilize the surface & ground water. Quantity of water will remain the same. The existing background level of water quality as indicated by the baseline data revealed that impact on water environment will be insignificant in this project.

4.2.1 Anticipated Impacts

Because of the manual & semi mechanization method in the mining activity, the impact of mining operations on water quality is also expected to be insignificant. There would be no impact on the quality/quantity of ground water as existing ground water level in study area is deep. Surface water is also not diverted or disturbed. Therefore, there would not be any impact on surface water and ground water quality. There is only one river (Subansiri river) existing in the core and adjoining to the lease area zone. The lease area is almost flat where

only direct precipitation flows down the slope during rains. During rains the rainwater flow on natural slope of the surface, which flows during rains only in north direction.

Since the mining process is totally dry, no effluent will be generated hence no adverse impact on water is anticipated. Mining activity in river bed of River Subansiri will be open and semi mechanized. The proposed volume of scrapping of sand is 69085.0 cum upto the depth of 1.5 m., the maximum depth of mining will not be more than 3.0 m. and during the entire lease period, the deposit will be worked from the top surface up to 3.0 m bgl or above ground water table, whichever comes first neither water table (aquifer) will be intersected by the mining activities. Hence there will not be any adverse impact either on the quality or quantity of ground water.

Domestic Effluent

No domestic effluent is generated at the mine site due to absence of any colony in the mining area. Hence the question of contamination of ground water does not arise. Any adverse impact on the ground water regime is not expected from the domestic effluent.

Surface Run-Off

The land of the study area is semi-arid and the percentage of the sand is very high, which does not allow any surface water to accumulate. The threat of pollution of due to surface run-off is also not possible as because entire study area does have any natural surface water course.

Mitigation Measures

Ground water table will not be intersected during the mining activity. During the entire lease period, the deposit will be worked from the top surface up to 3 m bgl or above ground water table, whichever comes first.

4.3 Impacts on Air Environment

Mining Operation carried out by opencast manual & semi mechanized method generate dust particles due to various activities like Loading & Unloading of sand, and Transportation. The impact on ambient air quality in the area surrounding the mining area depends upon the pollutant emission rate and prevailing meteorological conditions. As it is an open cast semi-mechanized mine, particulate Matter (Dust) of various sizes is the only pollutant of any significance.

4.4 Impacts on Air Environment

Air quality modeling has been carried out using ISCST3 Software and isopleths are made by using ISCST3 software and Aermol View.

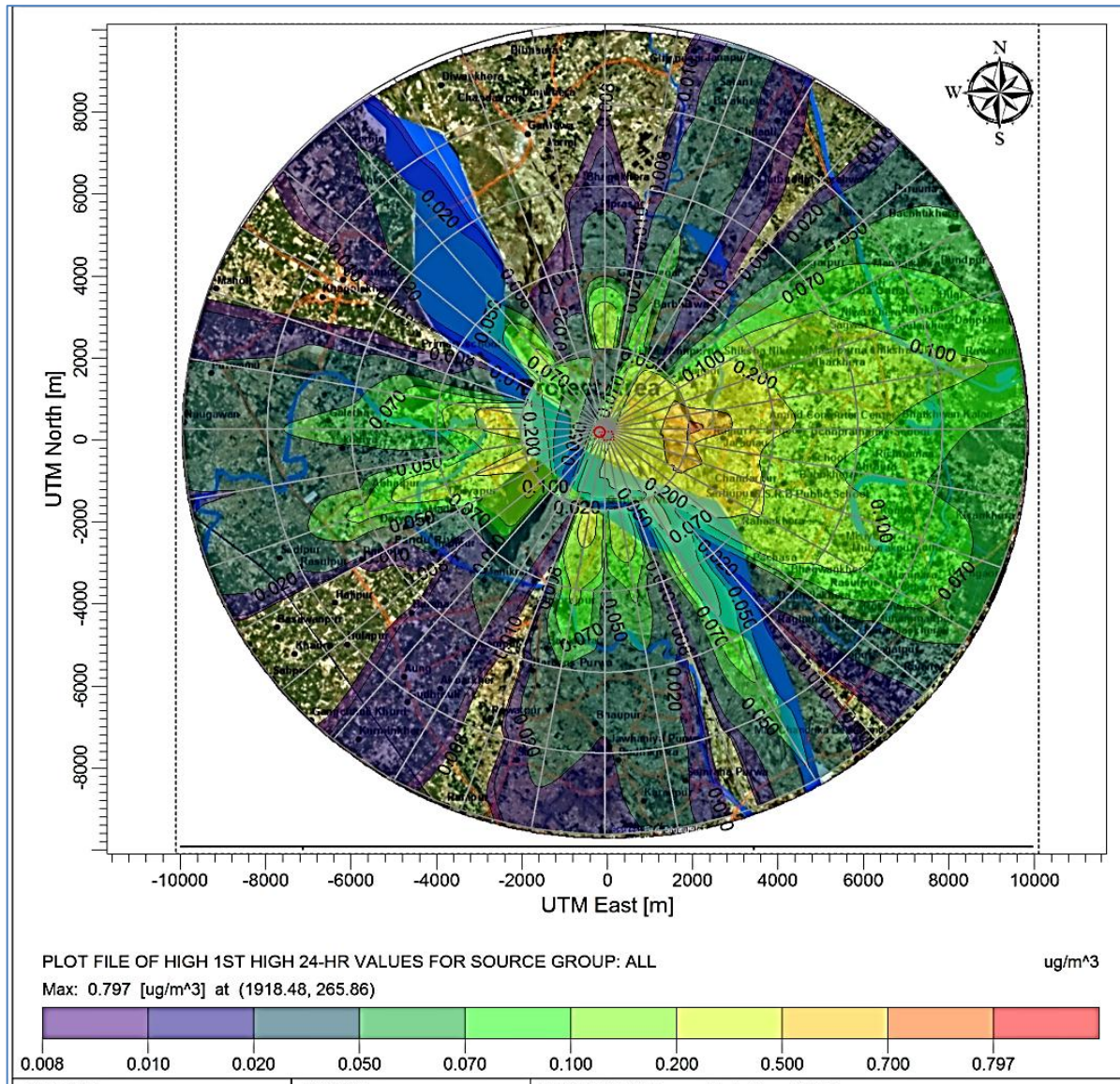


Plate 2: PM 10 Isopleth

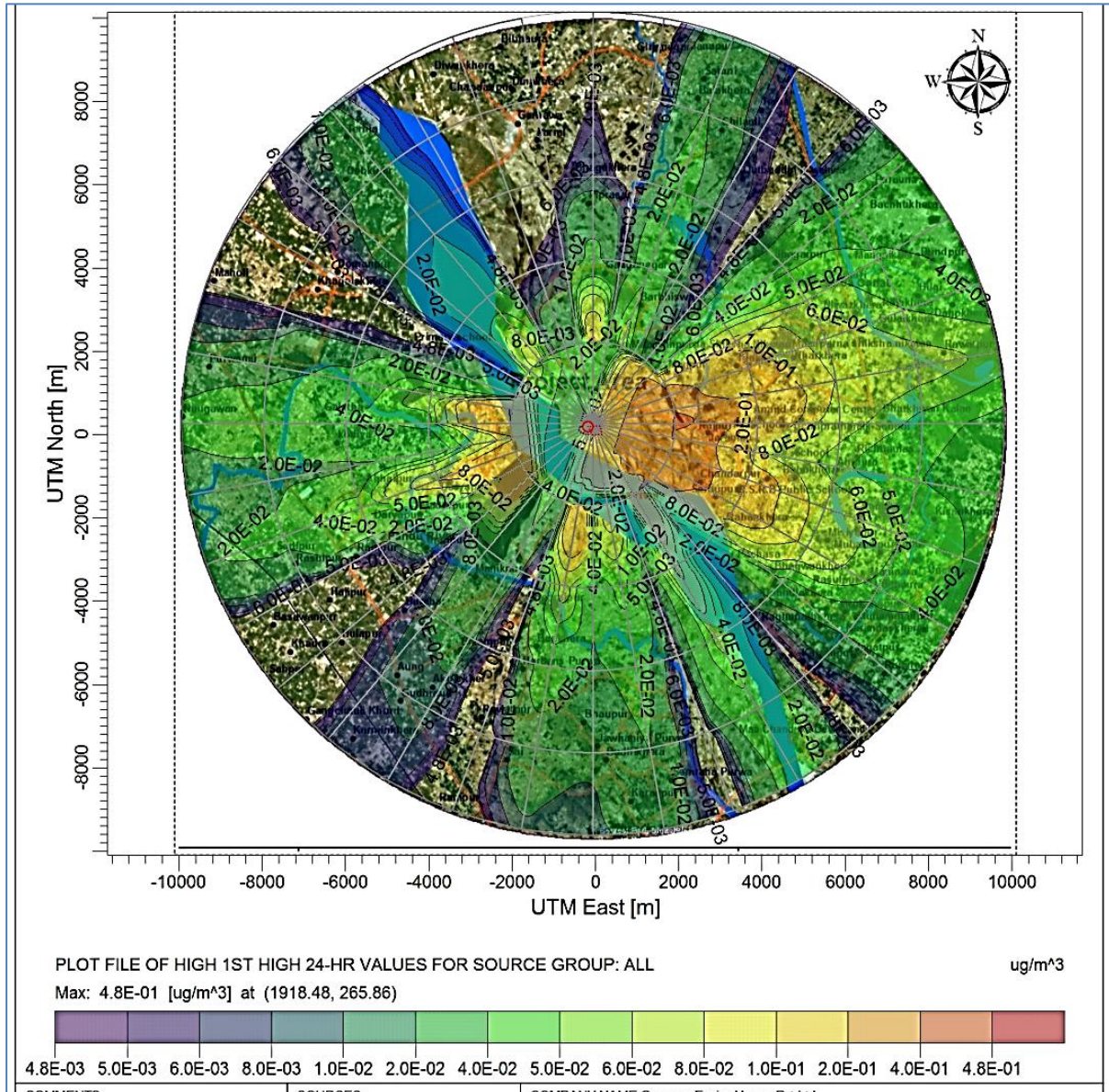


Plate 3: PM 2.5 Isopleth

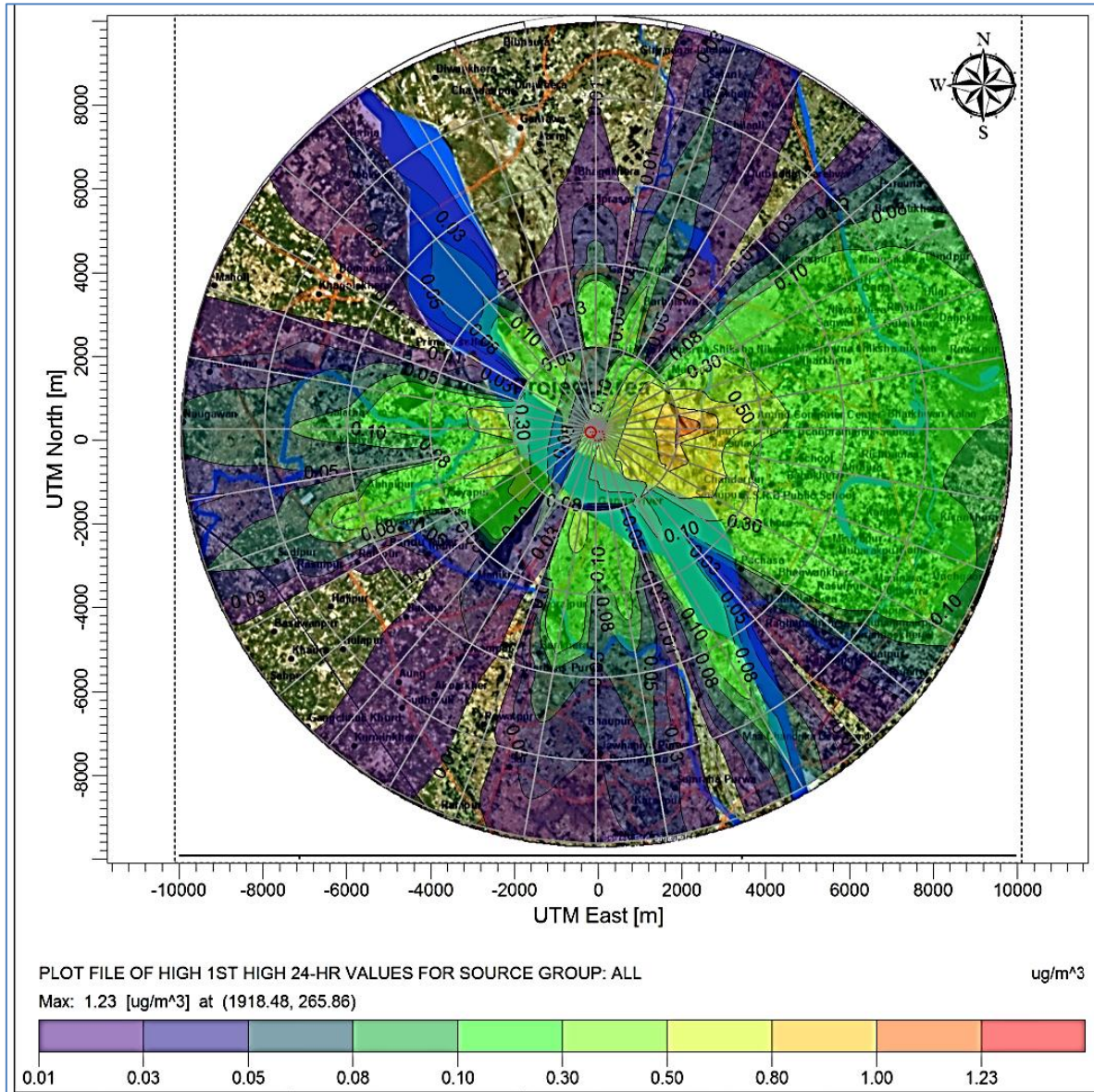


Plate 4: SO2 Isopleth

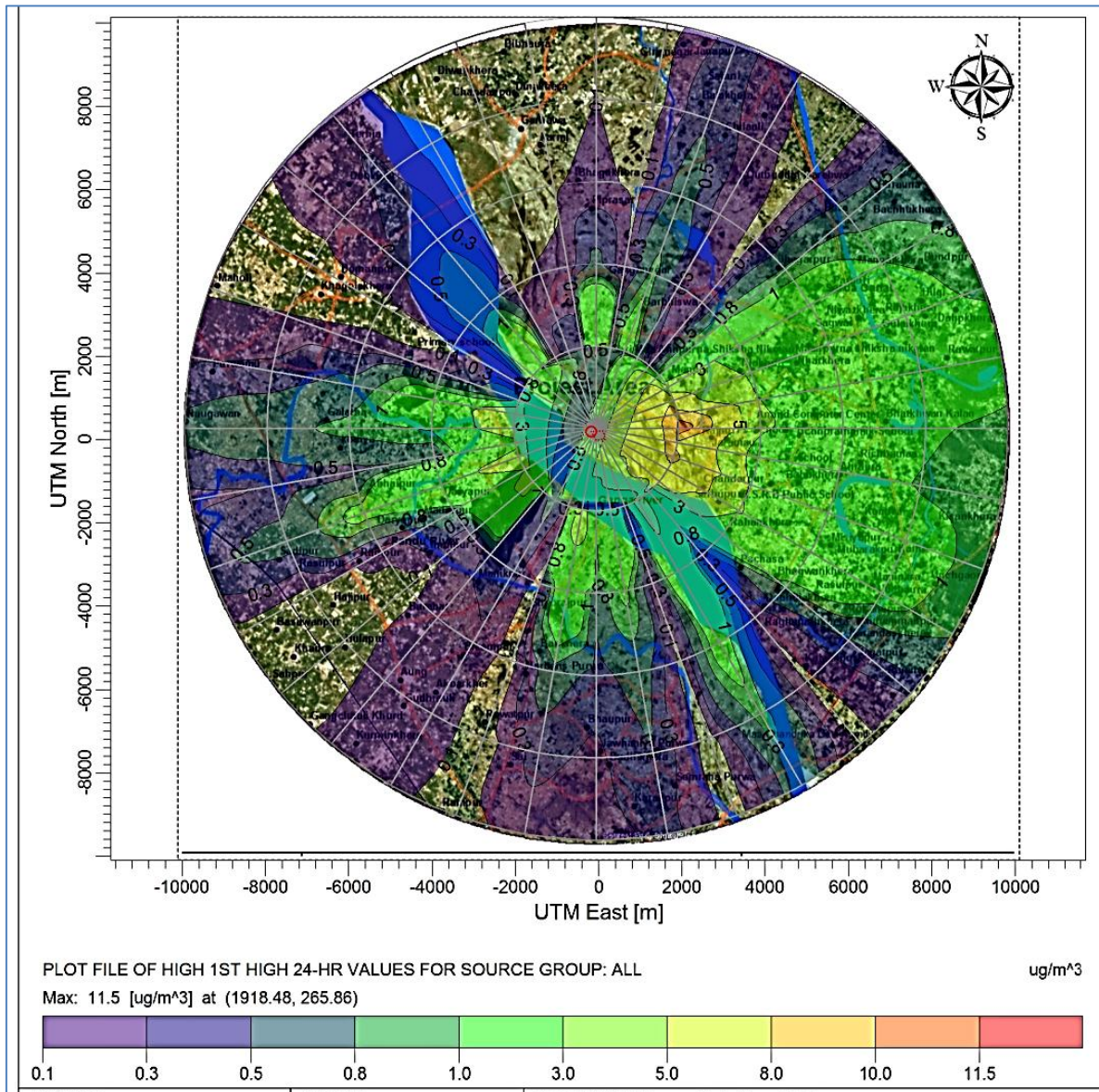


Plate 5: NO2 Isopleth

Table 4-3: GLC Prediction

Criteria Pollutants	Unit	Baseline Concentration	Incremental Concentration	Total GLC	Prescribed standard
PM ₁₀	µg/m ³	93.6	0.80	994.4	100
PM _{2.5}	µg/m ³	47.1	0.48	47.58	60
NO ₂	µg/m ³	28.5	11.5	40.0	80
SO ₂	µg/m ³	18.6	1.23	19.83	80

Mining Operation carried out by opencast manual & semi mechanized method generate dust particles due to various activities like Loading & Unloading of sand, and Transportation. The

impact on ambient air quality in the area surrounding the mining area depends upon the pollutant emission rate and prevailing meteorological conditions. As it is an open cast semi-mechanized mine, particulate Matter (Dust) of various sizes is the only pollutant of any significance.

4.4.1 Anticipated impacts

The major sources of air pollution in the proposed mine is dust generation due to extraction, loading and haulage of mineral (sand) and wind erosion of exposed material. In this present study, United States Environmental Protection Agency (USEPA-42 series) approved mathematical equations have been used to predict concentrations for different operations in mining including the mineral transportation. The operations considered for determining source strength for dispersion modeling are as follows:

- Excavation,
- Loading, and
- Haulage.

Mitigation Measures

- A. Haul Road:** -The long life WBM (Water Bound Macadam) haul roads will be constructed and maintained for traffic movement.
- B. Transport:** - The speed of dumpers/ trucks on haul road will be controlled as increased speed increases dust emissions. Overloading of transport vehicles will be avoided. The trucks/ tippers will have sufficient free board. Spillage of ore on public roads will be cleared immediately and vehicles will play in safe speed.
- C. Green Belt:** - Planting of trees all along main mine haul road and regular grading of haul roads will be practiced to prevent the generation of dust due to movement of dumpers/trucks.

Other Mitigation Measures

- Water sprinkling will be done on the roads regularly.
- Care will be taken to prevent spillage by covering the carrying vehicles with tarpaulin and sprinkling of water, if dry.

- Fortnightly scraping of road in order to keep the roads almost leveled. This will ensure smooth flow of vehicles and also prevent spillage.
- Proper tuning of vehicles to keep the gas emissions under check.
- Plantation of trees along the roads to help reduce the impact of dust in the nearby villages.

4.5 Impacts on Noise Environment

The area general represents calm surroundings. There is no heavy traffic, industry or noisy habitation in the area except the existing mine. As the project is proposed for open cast manual mining method there will be no blasting or drilling activities.

4.5.1 Anticipated Impact

- The source of Noise pollution will be the vehicular movements.
- Noise will be generated by the digging of mine area using shovels, crowbars etc.

Mitigation Measures

Proper maintenance of all transportation vehicles will be carried out which help in reducing noise during operations. No other equipment except the transportation vehicles will be allowed.

- Noise generated by hand equipment shall be intermittent and does not cause much adverse impact.
- 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.

4.6 Impacts on Biological Environment

There is no forest area diversion required for the project. No plant will be cut during operational phase of the mine. The nearby area of project is moderately populated with a number of villages. The fauna in the vicinity of the mine is restricted to few common small species. There will be no impact on fauna due to this mining project.

4.6.1 Anticipated Impact

Flora

Impact: No tree cutting is proposed in the project. Transportation of mined sand will also cause dust deposition on the agricultural fields and vegetation along the transportation routes.

Mitigation Measures: Plantation proposed along approach roads and other areas in the vicinity will improve the vegetation cover of the study area over a period of time. At the start of mining, the topsoil shall be stripped and stored. As sand/gravel in the River Bed is replenished every year by river stream so, site is adequate for Sand mining. The trucks carrying sand shall be covered with tarpaulin to avoid dust generation during transportation.

Fauna

Impact: The project site is essentially riverbed of River Subansiri. The banks are flooded during the peak seasons and the river reduces to a thin stream during the rest of the year. The river in the project stretch is not identified as a drinking water source to wild animals. Hence, very few animals are spotted in the project site. It is further proposed to restrict mining to small identified areas at a time to minimise disturbance to any incidental fauna.

- **Mitigation measures:** All workers and drivers involved in the project will be trained to avoid harming any animal spotted. No mining activity shall be carried out at night.
- Mining will be carried out on the dry part of the lease area to avoid disturbance to the aquatic habitat and movement of fish species.
- No discard of food, polythene waste etc will be allowed in the lease area which would distract/attract the wildlife
- No night time mining will be allowed which may catch the attention of wild life.
- Workers will be made aware of the importance of the wildlife and signage will be displayed at the sensitive areas to caution the workers & other passerby.
- Access roads will not encroach into the riparian zones and if any riparian vegetation cleared off for the mining activity will be restored at the end of closure of mine

4.7 Impacts on Aquatic Ecology

During river bed mining of the flowing river, the water at the site will have increased turbidity owing to high TDS from mining. Increased turbidity decreases the productivity of an aquatic ecosystem as the sunlight availability under water reduces. However, the

river is not very deep in the mining stretches owing to sand depositions. Hence, no significant adverse impact is anticipated.

The project will also cause the aquatic faunal species and fishes to move away from the project stretches. However, the same species of fishes and zooplankton have been encountered and/or reported both upstream and downstream of the project stretch. Hence, no loss of species is anticipated at a local level.

4.8 Impacts on Socio-Economic Environment

The implementation of the Sand mining project will generate both direct and indirect employment. Besides, it will provide a check on existing system of mining operation.

The project will also provide impetus to industrialization of the area. With the implementation of the proposed mining project the occupational pattern of the people in the area will change making more people engaged in industrial and business activities. Further, the mining and industrial activities in the area may lead to rapid increase in population and thereby urbanization. Due to urbanization of the area, employment opportunities will further increase.

Anticipated Impacts

From the primary Socio-economic survey & through secondary data available from established literature and census data 2011, it is found that there would be positive impact on Socio-economic condition of the nearby area. There is no habitation in the mining lease area. Therefore, neither villages nor any part of villages will be disturbed during the entire life of the mine.

Mitigation Measures

Mining in this lease will give job opportunities to the local people. Thus, mining will create beneficial effect on local people. With the operation of mining lease, various indirect employment opportunities will also be generated. Several persons of the neighboring villages have been benefited with contract works, employment through contractors, running jeeps, trucks, tractors and buses on hire, running canteens, different kinds of shops and transport related business avenues.

Villagers have been provided with either direct employment or indirect employment such as business, contract works and development work like roads etc. Villagers also get access to the other welfare amenities such as drinking water, foods and provisions, shed.

4.9 Solid Waste

4.9.1 Anticipated Impact

This river bed mining project does not involve any waste generation. Thus, no waste dump sites are needed for the project. However, there will be about 50 workers on site. While cooking on site will not be allowed, some food wastes are expected to be generated which if not disposed appropriately will render the site dirty. During rains, the same shall find their way into the river and pollute the same.

Mitigation Measures

The river bed mining process will not lead to any waste generation. Solid wastes generated from the personal habits of people such as *bidis*, waste paper, food residues etc. cannot be ruled out. Dustbins shall be provided at the rest places.

4.10 Mine closer

At the end of lease period, sufficient un-worked area would be left available for continuing production activities due to yearly replenishment of river sand in river bed. Hence, no closure is planned. Local villagers will have an option either to be available for employment for next contract/lease or do agriculture in their fields.

4.10.1 Anticipated Impact

- Increase in traffic density will lead to air pollution.
- Movement of vehicles will cause noise pollution.
- Increased traffic may cause accidental incidences.

Mitigation Measures

- Vehicles with PUC Certificate will be hired. Regular maintenance of vehicles will be done to ensure smooth running of vehicle.
- Un- necessary blowing of horn will be avoided.
- To avoid accidents the speed of vehicles will be low near habitation areas.

Chapter 5. ANALYSIS OF ALTERNATIVES

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 friendly and cost effective options.

5.1 Alternative for Mine Lease

During monsoon season, when rivers reach high stage, Subansiri River also bears significant catchment area and it transports river bed material (sand) which gets accumulated at such stretch which widens river width and concave banks. Thus, it is evident that the proposed site shall be mined for the purpose of preventing land cutting during heavy rainfall and floods.

Sand (minor mineral) deposits are site specific and in Subansiri river bed, mining of the material will be done by open cast manual method. No new technology is involved. The mining shall be done as per SSMMG Guidelines 2016. The mined out in river bed area will get replenished annually after monsoon.

Therefore, no alternate site is suggested as existing land use of mine lease classified as “River body” and shall continue to be so even after the current mining project is over.

5.2 Alternative for Technology and other Parameters

Some alternatives considered during EIA study are discussed below:

S. No	Particular	Alternative Option 1	Alternative Option 2	Remarks
1	Technology	Open-cast manual & Semi mechanized mining	Open-cast mechanized mining	Open-cast Semi mechanized Mining is preferred. Benefits No electrical power requirement Minimal noise will be

				<p>generated</p> <p>Minimal air pollution will be generated</p> <p>Overburden will not be generated</p>
2	Employment	Local Employment	Outsource Employment	<p>Local Employment is preferred.</p> <p>Benefits</p> <p>Provides employment to local people along with Financial Benefits</p> <p>No residential building/housing is required</p>
3	Laborer Transportation	Public Transport	Private Transport	<p>Local labours will be deployed so they will either reach mine site by bicycle or by foot.</p> <p>Benefits</p> <p>Cost of transportation of men will be negligible</p>
4	Material Transportation	Public Transport	Private Transport	<p>Material will be transported through truck/trolley on the contract basis</p> <p>Benefits</p> <p>It will give indirect employment</p>
5	Water Requirement	Tanker Supply	Groundwater /Surface water supply	<p>Tanker supply will be preferred</p> <p>Benefits</p> <p>No change in the surface water or ground</p>

				water quality
6	Road	Haul Road	Metallic Road	<p>Haul road will be considered for linking mine site from metallic road for transportation purpose.</p> <p>Minimum distance will be measured along with less number of trees for considering optimum haul road route.</p> <p>Benefits</p> <p>Less distance; less fuel used</p> <p>Minimum or negligible number of trees will be cut in best opted haul road route</p>

Chapter 6. ENVIRONMENT MONITORING PROGRAM

Regular monitoring of environmental parameters is of immense importance to assess the status of environment during project operation. With the knowledge of baseline conditions, the monitoring programme will serve as an indicator for any deterioration in environmental conditions due to operation of the project, to enable taking up suitable mitigatory steps in time to safeguard the environment. Monitoring is important to measure the efficiency of control measures. An environmental impact assessment study is carried over for a specified period of time and the data cannot bring out all variations induced by the natural or human activities. Therefore, regular monitoring programme of the environmental parameters is essential to take into account the changes in the environmental quality. The objectives of monitoring are to:-

- Verify effectiveness of planning decisions;
- Measure effectiveness of operational procedures;
- Conform statutory and corporate compliance; and
- Identify unexpected changes

6.1 Environmental Monitoring & Reporting Procedure

Monitoring will conform that commitments are being met with. This will take the form of direct measurement and recording of quantitative information, such as quantity and concentrations of discharges, emissions 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 site using ecological/ biological, physical and chemical indicators. Monitoring may include socioeconomic interaction, through local liaison activities or even assessment of complaints.

The preventive approach by management may also require monitoring of process inputs, for example, type and method used, resource consumption, equipment and pollution control performance etc. The key aims of monitoring are, first to ensure that results/ conditions are as per prediction during the planning stage and where they are or not, to pinpoint the cause and implement action to remedy the situation. A second objective is to verify the evaluations made during the planning process, in particular with risk and

impact assessments and standard & 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.

6.1.1 Monitoring Schedule

Details of the Environmental Monitoring schedule, which will be undertaken for various environmental components, are detailed below in Table 6-1.

Table 6-1: Environment Monitoring Schedule

S.No.	Activity	Schedule
Air Pollution Monitoring		
1.	Ambient air monitoring of parameters specified by MoEF (PM ₁₀ , SO ₂ & NO ₂).	Once in every season except monsoon
Water Quality Monitoring		
2.	Monitoring water quality surface water from the river	Once in every season except monsoon
3.	Monitoring of one sample of tube well and open well at mine / nearby location. Parameters are essential parameters as per IS: 10500:1991.	Once in every season except monsoon
4.	Monitoring of water spray requirements	Log-sheet of water spray will be maintained on daily basis
Noise Quality Monitoring		
5.	Noise in the ambient atmosphere in mining lease	Once in every season except monsoon
Greenbelt Maintenance		
6.	Monitoring schedule for Greenbelt development as per mining plan	Yearly
Soil Quality Monitoring		
7.	Soil at nearby villages	Once in every year

6.2 Environmental monitoring Cell

In order to maintain the environmental quality within the standards, regular monitoring of various environmental components is necessary. The company will have a full-fledged environmental management cell (EMC) which will report directly to Functional Head for environmental monitoring and control. The EMC team will take care of pollution monitoring aspects and implementation of control measures.

A group of qualified and efficient engineers with technicians will be deputed for maintenance, up keep and monitoring the pollution control equipment to keep them in working at the best of their efficiencies.

Responsibilities of EMC

The generalized responsibilities of the EMC will be as follows:

- a) Conducting Environmental monitoring of the surrounding area.
- b) Carrying out the Environmental Management Plan.
- c) Organizing meetings of the Environmental Management Committee and reporting to the committee.
- d) Ensuring that prescribed environmental standards are maintained.
- e) Ensure that all different types of statutory returns / compliance report to be submitted to relevant regulatory bodies.
- f) Commissioning of pollution control equipment/ measures.
- g) Specification and regulation of maintenance schedules for pollution control equipment.
- h) Developing the green belt.
- i) Ensuring water use is minimized.

The composition of the Environment Management Cell along with the responsibilities of respective members is given as follows:

Table 6-2: Environmental management Cell

S. No.	Designation	Proposed responsibility
1	Management	Overall in-charge of operation of environment management facilities; Ensuring legal compliance by properly undertaking activities as laid down by various regulatory agencies from time to time and interacting with the same
2	General Manager – Environnent Management System	Secondary responsibility for environment management and decision making for all environmental issues & ensure environmental monitoring as per appropriate procedures.
3	Assistant Manager – Environnent	<ul style="list-style-type: none"> • Implementation of EMP • Allotment of daily job • Field visit • Liaison with MOEF/SPCB

6.3 Activities to be monitored

Post project monitoring will be carried out as per conditions stipulated in Environmental Clearance Letter issued by MoEF, Consent issued by SPCB as well as according to CPCB guidelines. The Mine site is considered as core zone and the area lying within 10 km radius from the mine site is considered as buffer zone.

Slope Failure

Mining will be carried out by opencast semi-mechanize as per mine plan. Drilling/ blasting are not required as the material is loose in nature. The proposed volume of scrapping of sand is 69085.0 cum upto the depth of 3.0 m, the maximum depth of mining will not be more than 3.0 m. The mining method will be bar scalping/scrapping using bar scrapper for sand scrapping from the lease area and collecting in designated area.

Drainage

The general topography of the area around the mine site is general plan agricultural land along the river Subansiri. The area constitutes almost alluvial plain without any conspicuous topographical features and forms a part of the vast Brahmaputra plain. The proposed area is undulating. The difference of the highest 140 mRL & the lowest 150 mRL elevation of the area is about 4 to 5 meter. The flow rate of the river varies with the quantity of precipitation in the catchment area. The lease area surrounded mostly with agricultural lands. There is no major impact of mining on the topography of the area. The mining lease area in river bed will be replenished with sediments after monsoon and the area which in agriculture field will be reclaimed after mining.

Blasting effects

Drilling & blasting is not applicable as the mineral is available loose in nature and will be extracted with the help of light machine.

Re-vegetation & Green Belt Development

During first five years, about 500 saplings of local varieties of trees will be planted along the roads, in schools and public building and other social forestry programme. Plant species act as bio-monitoring agent to monitor the air environment as well as to keep and maintain the project environ healthy. Trees have substantial inter-specific as well as intra-specific variation in air pollution tolerance. Green Belt development / tree plantation in organized manner will be carried out around the existing mine site by the end of the mining activity. The species suggested are Local tree species in the mine area and nearby villages, to reduce the impact of expansion activities in the surroundings of the existing mine site. The suggested plants are suitable for green belt development have characteristics like, fast growing, thick canopy cover, perennial and evergreen large leaf area, naturally growing, efficient in absorbing pollutants without major effects on natural growth.

On the basis of the general principles mentioned and as per the CPCB guidelines for the development of Greenbelts following species are recommended:

- *Azadirachta indica*,
- *Ficus religiosa*

- *Mangifera indica*
- *Dalbergia sissoo*
- *Vachellia nilotica*
- *Delonix regia*

The year-wise afforestation programme under the green belt (safety zone) and non-mineralized area for five years will be as under:-

Table 6-3: Greenbelt Development Program

Year	Saplins to be planted	Survival 80 %	Species	Place of Plantation
I	500	400	Neem, Peepal, Mango, Shisham, Sirish, Babool, Gulmohar	Along the roads, in schools and public building and other social forestry programme.
II	500	400		
III	500	400		
IV	500	400		
V	500	400		
Total	2500	2000		

6.3.1 Air quality Monitoring

The concentration of air borne pollutants in the workspace/ work zone environment will be monitored periodically as per Table 6-3. If concentration is higher than threshold limit values are observed, the source of fugitive emissions will be identified and necessary measures taken. If the levels are high, suitable measures as detailed in Environment Management Plan will be taken. The ambient air concentrations of PM₁₀, SO₂ and NO_x will be monitored as per frequency given in Table 6-4. Any abnormal rise will be investigated to identify the causes and appropriate action will be initiated. Greenbelt will be developed for minimizing dust propagation.

Table 6-4: Air Quality Monitoring

Potential Impact	Action	Parameters for Monitoring	Timing
Air Emissions	All equipment are operated within specified design parameters.	Random checks of equipment logs/ manuals	During site clearing
	Vehicle trips to be minimized to the extent possible	Vehicle logs / Increase the capacity of vehicle	During site clearing, transportation of minerals
	Topsoil must be removed from the entire area to be mined and stored from where it can be recovered and utilized immediately after mining for reclamation	Absence of stockpiles	During site clearing
	Regular water spraying shall be done	Quantity of water requirement shall be monitored	During site clearing, transportation etc.
	Ambient air quality within the premises of the proposed unit to be monitored.	The ambient air quality will conform to the standards for PM ₁₀ , SO ₂ and NO ₂	As per GPCB requirement.

6.3.2 Water Quality Monitoring

Surface water quality of the river will be monitored regularly basis as per the scheduled given in Table 6-5. Analysis will be carried out as per CPCB guideline. Record of analysis shall be maintained.

Table 6-5: Water Quality Monitoring

Potential Impact	Action	Parameters for Monitoring	Timing
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Water Quality	During extraction of mineral proper care should be taken such that it does not disturb the ground water table.	No discharge of waste water from mining operation	During mining operation
	After extraction of mineral, river water will be maintained their natural course	No exploitation of the river water	During mining operation.

6.3.3 Noise level Monitoring

Noise levels will be monitored in the mine area as per the frequency given in Table 6-6.

Table 6-6: Noise Monitoring Program

Potential Impact	Action	Parameters for Monitoring	Timing
Noise	List of all noise generating machinery onsite along with age to be prepared. Equipment to be maintained in good working order.	Equipment logs, noise reading	During mining operation.
	Generation of vehicular noise	Maintenance records of vehicles	During transportation.
	The Noise level should not exceed the permissible limit both during day and night times.	Noise reading	As per UPPCB requirement or quarterly whichever is lesser.
	All equipment operated within specified design parameters.	Random checks of equipment logs/manuals	During mining operation
	Vehicle trips to be minimized to the extent possible	Vehicle logs	During mining operation
	Plantation of dense hedges on the boundary of lease area, these will reduce dust and noise in the vicinity.	Adhere to mine closure plan	

6.3.4 Occupational Health & Safety

The working conditions in the mines are governed by the enactments of the as per the guidelines of the Mines Act, the management will take all necessary precautions. Normal sanitary facilities (Mobile toilet) will be provided within the lease area. The management will carry out periodic health check-up of workers.

Occupational hazards involved in mines are related to dust pollution, concern officer given necessary guidelines for safety against these occupational hazards. The management will strictly follow these guidelines.

All necessary first aid and medical facilities will be provided to the workers. The mine will be well equipped with proper fire protection and firefighting equipment. All operators and mechanics will be trained to handle fire-fighting equipments. Further all the necessary protective equipments such as helmets, safety goggles, earplugs, earmuffs, etc. will be provided to persons working in mines as per Mines Rules, 1955.

Reporting schedule of monitored data

It is proposed that voluntary reporting of environmental performance with reference to the EMP. The Environmental Monitoring Cell will co-ordinate all monitoring programmes at site and data thus generated will be furnished as per statutory requirements.

The frequency of reporting will be on six monthly bases to the State PCB and to Regional Office of MoEF&CC, New Delhi. The Environmental statement will be prepared for the entire year of operations and will be regularly submitted to regulatory authorities.

Chapter 7. ADDITIONAL STUDIES

7.1 Public Consultation

“Public Consultation” or “Public Hearing” refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate.

In view of the above and as compliance to TOR issued by SEAC, Assam, Draft EIA report is being submitted for Public hearing/consultation.

7.2 Rehabilitation and Resettlement Plan

The R&R plan is not required since the lease is a Government land lying in the Subansiri River Bed. Hence, no land acquisition is required.

7.2.1 Corporate Environmental Responsibility

In order to improve the quality of life of nearby villagers of the proposed project area, amount of Rs.3800000.0 which is more than 5% of the total cost of project shall be spent under the guidance of District /Local authorities.(MoEF&CC Notification for CER activity dated 01.05.2018)

As a corporate responsibility following measures along with budget provision is proposed for improving the conditions of persons in and around the project area:

Table 7-1: CER provision of the project

Corporate Social Responsibility Budget				
S.No.	Activity	No.	Unit Cost, INR	Total Cost, INR
1	Provision of 5 Computers in village Schools	5	50000	250000
2	Energy Conservation i.e. Distribution of LED Bulbs	1000	200	200000
3	Installation of Solar Lamps	100	25000	2500000
4	Provision of Toilets in the nearby villages	10	40000	400000
5	Organization of Health Camps	2	100000	200000
6	Distribution of Sanitary Napkins, Contraceptives etc.			250000
			Total	3800000

7.3 Risk Assessment

The risk assessment portion of the process involves three levels of site evaluation:

- (a) Initial Site Evaluation,
- (b) Detailed Site Evaluation,
- (c) Priority Site Investigations and Recommendations.

The risk assessment criteria used for all levels of site evaluation take into account two basic factors:

- The existing site conditions
- The level of the travelling public's exposure to those conditions.

The Initial Site Evaluation and Detailed Site Evaluation both apply weighted criteria to the existing information and information obtained from one site visit. The Initial Site Evaluation subdivides the initial inventory listing of sites into 5 risk assessment site groups.

The Detailed Site Evaluation risk assessment is then performed on each of the three highest risk site groups in order of the group priority level of risk. The result of the Detailed Site Evaluation process is a prioritized listing of the sites within each of the three highest risk site groups.

Risk analysis is done for:

- Forecasting any unwanted situation
- Estimating damage potential of such situation
- Decision making to control such situation
- Evaluating effectiveness of control measures

Acceptable Risk

Risk that is acceptable to regulatory agency and also to the public is called acceptable risk. There are no formally recognized regulatory criteria for risk to personnel in the mining industry. Individual organizations have developed criteria for employee risk and the concepts originally arising from chemical process industries and oil and gas industries. Because of the uncertainties linked with probabilistic risk analysis used for quantification of the risk levels the general guiding principle is that the risk be reduced to a level considered As Low as Reasonably Practicable (ALARP). The risk acceptability criteria are given in following Table. It can be seen that there are three tiers:

a. A tolerable region where risk has been shown to be negligible and comparable with everyday risks such as travel to work.

b. A middle level where it is shown the risk has been reduced to As Low As Reasonably Practicable level and that further risk reduction is either impracticable or the cost is grossly disproportionate to the improvement gained. This is referred as the ALARP region.

c. An intolerable region where risk cannot be justified on any grounds. The ALARP region is kept sufficiently extensive to allow for flexibility in decision making and allow for the positive management initiatives which may not be quantifiable in terms of risk reduction.

There are various factors, which can create unsafe working conditions/hazards in mining of minor minerals from river bed.

Inundation/Flooding

The risk rating assigned to this activity is assigned as '4' i.e., it is possible and will have catastrophic with major consequences, if work started without assessment of the river bed condition especially during monsoon season. Inundation or flooding is expected and beneficial for these mines as during this time only the mineral reserve gets replenished.

Measures to prevent consequences of Inundation/Flooding

Inundation of flooding is expected and beneficial for these mines as during this time only the mineral reserve gets replenished.

1. During monsoon months and heavy rains the mining operations are ceased.
2. There should be mechanism/warning system of heavy rains and discharges from the upstream dams.

Accident Due To Vehicular Movement

The risk rating assigned to this activity is assigned as '13' i.e., it is possible event with moderate consequences as frequency of this operation is more but the predicted/assumed intensity is less like minor cuts, bodily injury. The possibilities of road accidents are due to reckless or untrained driver or overloading of trucks or in case pathway is not compacted suitably, etc.

Measures to Prevent Accidents during Transportation

1. All transportation within the main working should be carried out directly under the supervision and control of the management.

2. The Vehicles will be maintained/ repaired and checked thoroughly by the competent person.
3. A statutory provision of constant education, training etc. will go a long way in reducing the incidents of such accidents.
4. Overloading will not be permitted and will be covered with tarpaulin.
5. The maximum permissible speed limit will be ensured.
6. The truck drivers will have valid driving license.

Drowning

The risk rating assigned to this activity is assigned as ‘16’ i.e., it is a rare accident but will have major consequences, if occurred. This may occur due to flash floods etc due to which the workers at the site may get seriously injured or drowned.

Measure to Prevent Drowning

1. The mining will be done under strict supervision and only in the dry part of the river.
2. Mining will be completely stopped in monsoon season to avoid such accidents.
3. Deep water areas will be identified and ‘No Go Zones’ will be clearly marked and made aware to the mine workers.

Accident during Material Handling & Loading

The risk rating assigned to this activity is assigned as ‘18’ i.e. it is possible event with minor consequences”, as frequency of this operation is more but the predicted/assumed intensity is less like minor cuts, abrasion, etc. may be due to river bank collapse, over thrown boulders/pebbles, injuries due to carelessness use of hand tools, etc.

Measures to Prevent Accidents during material handling & loading

The truck should be brought to a lower level so that the loading operation suits to the ergonomic condition of the workers.

1. The loading should be done from one side of the truck only to avoid over throw of materials.
2. The workers should be provided with gloves and safety shoes during loading.

All the activities will be done under strict supervision/control to avoid anticipated accidents so that the risk is reduced to a level considered As Low as Reasonably Practicable (ALARP) conditions which are adequately safe and healthy

Disaster and its Management

Anticipated Disasters & its Mitigation Measures

1. **Floods:** The area is prone to floods. However bank protection has been taken care by the govt. by constructing of flood embankments/retaining walls/check dams, etc. Precautionary measures will be taken to avoid the effects on the workers at the site if the disaster occurs.

2. **Earth Quake:** The lease area falls in seismic zone II which is moderate intensity zone. However there will be no impact as there is no built-in structure at the site.

Few safety measures are outlined below:

a) **Safe Working Environment:** The project proponent shall ensure health and safety of all the employees at work. Efforts will be made to provide and maintain a safe work environment and ensure that the machinery and equipment in use is safe for employees. Further, it will be ensured that working arrangements are not hazardous to employees.

b) **Provision of First Aid:** The first aid treatment reflects the hazards associated with the mining of Sand. The first-aiders will be well trained in handling patients working in the above Mining Project.

c) **Regular Health Examination:** For all mine workers regular health examination will be made compulsory. Treatment for respiratory diseases or asthma, skin diseases, lung function test (pre and post ventolin), Audiograms, Chest X- ray etc., as required will be given.

d) **No work for Temporal Disabilities:** The workers having temporary disability will be asked to stop doing the job till he/she recovers from disabilities.

e) **Health Education:** Adequate health education and information related to the job will be provided to the workers. Baseline health information will be recorded for future references.

f) **Tie-up with the Nearest Hospital for Medical Assistance:** To meet the medical needs of the mine workers tie-up with nearest hospitals will be made. Efforts will be made to reserve few beds in the above hospitals for the workers of the mining project. This will ensure timely medical aid to the affected persons.

g) **Supply of Mask and Gloves:** The workers in the project are subject to respiratory diseases. For protection from dust it will be made compulsory for all workers to wear masks and gloves, while working in the mine.

h) **Special Telephone Number:** A special telephone number will be made available to the workers in case of emergency so that they can dial the same for–medical assistances. Further, efforts will be made to provide vehicles to the patients in short duration for shifting to a hospital.

Chapter 8. PROJECT BENEFITS

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

Sand and Gravel has become a very important mineral for our society due to its many uses. It can be used for making concrete, filling roads, building sites, brick-making, making glass, sandpapers, reclamations, and etc. The role of sand is very vital with regards to the protection of the coastal environment. It acts as a buffer against strong tidal waves and storm surges by reducing their impacts as they reach the shoreline. Sand is also a habitat for crustacean species and other related marine organisms. Sand also plays an important role in our tourism industry as it is an integral part of our beach attractions. Each has its own requirements in respect of the quality of the sand. On average, people 'use' over 200kg of sand per person per year. This sand is taken from what are essentially non-renewable resources.

The mined out material from this mine can be good source of construction material to nearby market. Provide gainful employment generation through development of the associated down-stream industry i.e. stone-crushers, screening plants, sand-washeries, transport services etc. Serve as source of revenue for the State.

8.1 Improvements in Physical Infrastructure

This project will provide various improvements in the physical infrastructure of adjoining area such as:-

- The proposed mine area lies in the flood plain, hence the removal of extracted material will minimize the chances of flood disaster in the area.
- .Improved road communication system in villages in adjoining area.
- Strengthening of existing community facilities through the existing Community Development Programme;
- Outside river bed area will be reclaimed and converted to agricultural field.

- Awareness program and community activities, like health camps, medical aids, family welfare programs, immunization camp sports & cultural activities, plantation etc.

8.2 Improvements in Social Infrastructure

The proposed project is expected to provide employment to local people in different activities such as Mining, sizing, transportation and plantation activities. The project activity will not have any major impact on the environment. At Post mining stage of proposed project, the existing waste land shall be converted to water harvesting bodies and green belts.

Also the project proponent have Corporate Environmental Responsibility initiatives will have a positive impact on socio economic fabric of the region.

Employment Potential

The local labour shall be engaged for the purpose of mining of mineral, loading & unloading of mineral besides, watch and ward and plantation activity with proper maintenance On assumption that one man on and average can extract load & unload 5 to 6 tonnes of material per man-day and the same amount will be handled through machines. The total manpower required for mining works out to 50. This will help in the improvement of financial condition of the area.

Tangible social benefits

There will be positive impact in socio-economic area due to increased economic activities, creation of new employment opportunities, infrastructural development and better educational and health facilities.

Health

Company will undertake awareness program and community activities like health, camps, medical aids, family welfare camps, AIDS awareness program etc.

Periodic medical checkups as per Mines Act/ Rules and other social development and promotional activities will be undertaken. All this will assist to lift the general health status of the residents of the area around mines.

Plantation

Plantation will be done near mine surrounding area so far and lot many are proposed to mitigate the ill-effects of mining and to improve the vicinity and environment of mine and it surrounding area. The management will give emphasis on plantation and will also motivate local persons for plantation during rainy season. This will also increase the consciousness in workers and nearby villagers for greenery. Fruit trees can contribute towards their financial gains.

Other Benefits

Apart from all the above mentioned benefits there will be other benefits to the region in terms of upgradation of lifestyle, overall area development etc.

Chapter 9. ENVIRONMENTAL COST BENEFIT ANALYSIS

As per EIA Notification vide Gazette Notification No. S.O. 1533 Dt: 14thSept., 2006 and amendments thereof, Appendix III, Generic Structure of EIA, SL. No. 9, “Environmental Cost Benefit Analysis” is applicable only, if the same is recommended at the Scoping stage.

As per the ToR points issued by SEAC/SEIAA, Assam, for the proposed project, the Environmental Cost Benefit Analysis is not mentioned.

Chapter 10. ENVIRONMENTAL MANAGEMENT PLAN

General

The environmental management plan consists of a set of mitigation, management, monitoring and institutional measures to be taken during implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels. The present environmental management plan addresses, the components of environment, which are likely to be affected by the different operations in a sand mine.

Objectives of EMP:

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

10.1 Environment Management System

Proper environmental management plan is proposed for “Sand mining” project to mitigate the impact during the mining operations.

- No labour camps will be established on river bed.
- No cooking, or burning of woods will be allowed in the nearby area.
- Prior to commencement of mining, a short awareness program will be conducted for labours to make them aware of way of working and various precautions to be taken while at work. Such program will be repeated occasionally.

- In the event of any some causality or injury to any worker occurs, proper treatment will be given.
- No tree cutting, chopping, lumbering, uprooting of shrubs and herbs will be allowed.
- It will be ensured that noise produced due to vehicles movement while carrying sand is within the permissible noise level.
- No piling of River Bed Material will be done in adjoining area.
- If wild animals are noticed crossing the river bed, they will not be disturbed or chased away, instead the labours will move away from their path.

10.2 Environmental Management Plan Implementation

Environmental Management Plan serves no purpose if it is not implemented with true spirit. Some loopholes in the EMP can also be detected afterwards when it is implemented and monitored. Thus, an implementation and monitoring programme has to be prepared. The major attributes of environment are not confined to the mining site alone. Implementation of proposed control measures and monitoring programme has an implication on the surrounding area as well as for the region. Therefore, mine management should strengthen the existing control measures as elaborated earlier in this report and monitor the efficacy of the control measures implemented within the mining area relating to the following specific areas for eco-friendly mining plan:

- Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.
- Collection of soil samples at strategic locations once in every two years and analysis thereof with regard to deleterious constituents, if any.
- Measurement of water level fluctuations in the nearby ponds dug wells and bore wells.
- Regular visual examination will be carried out to look for erosion of river banks. Any abnormal condition, if observed will be taken care of. The banks will be restored before the monsoon during the suspension of mining activity.

- Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done twice a year for the first two years and thereafter once a year.
- Plantation will be done as per program i.e along the road sides and near civic amenities, which will be allotted by Government, Post plantation, the area will be regularly monitored in every two years for evaluation of success rate. For selection of plant species local people should also be involved.
- Mine management will be in regular touch with local surrounding villages to update the various developmental schemes made for or by them. It will also consider any immediate requirement, which could be taken care of in near future.
- An Environmental Management Cell (EMC) is envisaged which will be responsible for monitoring EMP and its implementation. EMC members shall meet periodically to assess the progress and analyze the data collected within the month. The EMC function is given in detail in Chapter 5.
- EMC will be in regular touch with State Pollution Control Board and send them regular progress report. Any new regulations considered by State/Central Pollution Control Board for the mining industry will be taken care of by it.

Proposed set up

Keeping the utility of monitoring results in the implementation of the environmental management program in view, an environmental management cell headed by management and followed by General Manager Environment and assistant manager environment

The said team will be responsible for:

- a. Collecting water and air samples from surrounding area and work zone monitoring for pollutants.
- b. Analyzing the water and air samples from authorized Lab from SPCB
- c. Implementing the control and protective measures.

- d. Co-coordinating the environment related activities within the project as well as with outside agencies.
- e. Collecting statistics of health of workers and population of surrounding villages.
- f. Monitoring the progress of implementation of environmental management program. Greenbelt development, etc

10.3 Budget allocation for EMP implementation

Annual budget for EMP is very essential for successful implementation of EMP. As there are no pollution control systems, no capital cost of Pollution Control systems are envisaged. Costs will be annual operating costs as given below. The fund allocated will not be diverted for any other purposes and the top management will be responsible for this. The budget will take into consideration the following expenses:

- Field cost for monitoring of parameters.
- Cost of any defined outsourcing
- Cost of chemicals, consumables and transport for data generation
- Man power cost for environmental cell
- Any other cost as per EC condition

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

Table 10-1: EMP Budget

S.No.	Activity	Measures	No.	Unit Rate, INR	Frequency	Cost, INR	Remark
1	Green Belt	No. of Saplings	500	500	1	250000	Assuming 80 % survival
		Tree Guard	500	500	1	250000	
		Barbed Wire in RM	100	250	1	25000	
		Tanker for Watering Plant	1	2000	300	600000	
Sub Total (A)						1125000	
2	Dust Suppression through Sprinkling	No. of Tankers Required of 3000 Liter Capacity	22	2000	270	11880000	
3	Road Maintenance	Maintenance of Approach Road				1700000	
4	Monitoring Program	Ambient Air Quality	5	2000	2	20000	Core Area:1, Buffer Area: 4
		Water Quality	5	2500	2	25000	Surface Water : 2, Ground Water :3
		Ambient Noise	5	1000	2	10000	Core Area:1, Buffer Area: 4
		Soil Quality	5	1500	2	15000	Core Area:2, Buffer Area: 3
5	Occupational Health & Safety	Health Camps	1	100000	2	200000	One Health Camp in every six months
6	Skill Development	Training Camps for 50 Workers	1	100000	2	200000	One Training Camp in every six months
Sub Total (B)						14050000	
Grand Total (A+B)						15175000	

10.3.1 Monitoring schedule and activities

To evaluate the effectiveness of environmental management program regular monitoring of the important environmental activities to be monitored as per schedule is shown in Table 6-1 Environmental Monitoring schedule.

10.4 Occupational Safety and Health

Occupational hazards in mines are mainly anticipated due to dust pollution injures from equipment and fall from high place etc. DGMS has given necessary guidelines for the safety and surveillance against these occupational hazards wise prevention measures are given in Chapter-6 of EIA report. Initial &periodical examination will be conducted FORM-O prescribed from for Medical examination for every employee as per Rules-1955.Details of tests are given in the form. The medical examination required to carry out at the time of appointment of every employee and periodically ones in a 5-year.

Provided that in case any dust related disease, health check-ups will be conducted more frequently as the examination authority deems necessary.

10.5 Environment Policy

The environment policy right from mine preparation to its operations will be based on:

- Compliance of applicable regulatory requirements;
- Conservation of natural resources;
- Maintaining a safe working environment;
- Providing high environmental expertise and know-how; and
- Regular training and refresher courses so as to achieve continuous improvement of environment.

In fulfillment of this commitment, they shall maintain continuing efforts to:

- Comply with all applicable safety, health and environment laws and regulations
- Enhance Safety, Health and Environment (SHE) awareness among employees and associated stakeholders through effective communication and training
- Investigate all workplace incidents and illness in order to promptly correct any unsafe conditions or practices
- Integrate SHE considerations into business planning and decision making

- SHE responsibility among our employees in their practices, and promote andvalue their involvement in achieving the goals of this policy
- Increase shareholder value through SHE excellence

Chapter 11. SUMMARY AND CONCLUSION

The Environmental Impact Assessment report has been prepared in terms of EIA notification of the MoEF dated 14-9-2006 & its subsequent amendments, the EIA guideline Manual for mining of Minerals (Feb, 2010), of MoEF, Govt. of India for seeking environmental clearance for Sand and Gravel mining at Subansiri river, District Lakhimpur, Assam with total mining area of 24 Ha falling under Category B1.

The mining lease has been granted in favour of M/S R.J and Sons Industries Pvt Ltd over an area of 24 Ha with in District Lakhimpur. Mining shall be carried out on the basis of govt. consent order to continue mining operations for 07 years.

The estimated project cost is Rs. 7.60 Crores. Total mineable reserves as on date as per the mining plan are 300000.00 cum & with maximum of production of mineral 69085.0 cum/ Annum.

The proposed project is an opencast manual and semi-mechanized mining project, where mining of sand and gravel will be done. An Excavator shall be deployed for the removal of overburden & inter burden but its deployment will be rarely & occasionally for 4-5 days in a month. Methods of mining will be open cast, manual and semi-mechanized. Mining will be confined to the allotted lease area which lies on the Subansiri River bed from which approximately **69085.00** cum of Sand and Gravel will be excavated every year and. Drilling and Blasting is not proposed in this mining activity.

The water for drinking and sprinkling purposes will be supplied from the nearby area through tankers. Total water requirement for the project is 68.50 KLD which can further be divided in to drinking water requirement (1.00 KLD), water for dust suppression (64.50 KLD) and water for plantation purpose (3.00 KLD).

The baseline data was collected from October 2019 to December 2019 for post-monsoon season. Results of the baseline data show that the area is free from any form of pollution and this activity will not create any negative impact on the existing environment.

Attribute	Baseline status
Ambient Air Quality	PARTICULATE MATTER 2.5 (PM 2.5):

	<p>The maximum value for PM_{2.5} was observed, as 43.00 µg/m³ at the project site (A1) while 24 hours applicable limit is 60 µg/m³ for industrial and mixed use areas. The area observes average PM_{2.5} concentration in the range of 34.00 – 41.2 µg/m³ with the lowest concentration of 33 µg/m³ recorded at Village Dulung (A8).</p> <p>PARTICULATE MATTER₁₀ (PM₁₀):</p> <p>The maximum value for PM₁₀ was observed as 93.00 µg/m³ at project site (A1) while 24 hours applicable limit is 100 µg/m³ for industrial and mixed use areas. The area observes average PM₁₀ concentration in the range of 80.00-88.50 µg/m³ with the lowest concentration of 76.00 µg/m³ recorded at Village Balijan Bangali (A6).</p> <p>SULPHUR DIOXIDE (SO₂):</p> <p>The maximum value for SO₂ was observed, as 18.60 µg/m³ at Subansiri College Gogamukh near NH 52 (A7) while 24 hours applicable limit is 80.00 µg/m³ for industrial and mixed use areas. The area observes average SO₂ concentration in the range of 13.5-11.5 µg/m³ with the lowest concentration of 9.2 µg/m³ recorded at Vill. Dulung (A8). All the villages have observed value well under the prescribed limit.</p> <p>NITROGEN OXIDES (NO₂):</p> <p>The maximum value for NO₂ was observed as 29.60 µg/m³ at Dulung site (A8) while 24 hours applicable limit is 80 µg/m³ for industrial and mixed use areas. The area observes average NO₂ concentration in the range of 22.8 – 25.3 µg/m³ with the lowest concentration of 20.00 µg /m³ recorded at Balijan Bangali site (A6). All the villages have observed value well under the prescribed limit.</p>
<p>Noise Levels</p>	<p>Noise monitoring was carried out at 8 locations. The results of the monitoring program indicated that both the day time and</p>

	<p>night time levels of noise were well within the prescribed limits of NAAQS, at all the five locations monitored.</p> <p>Noise levels in the study area are well within the prescribed limits as prescribed by CPCB</p>
Water Quality	<p>4 Groundwater samples and 3 surface water samples were analyzed and concluded that: The ground water from all sources remains suitable for domestic purposes as all the constituents are within the limits prescribed by drinking water standards by Indian Standards IS: 10500. From the Surface water analysis it is evident that most of the parameters of the samples comply with ‘Category C’ standards of CPCB, indicating their suitability for Drinking water source after conventional treatment and disinfection.</p>
Soil Quality	<p>Samples collected from identified locations indicate the soil is Sandy Clay type and the pH value ranging from 7.64 to 7.89, which indicating that soil samples vary from neutral to alkaline in nature.</p>
Ecology and Biodiversity	<p>There are no Ecologically Sensitive Areas present in the study area but some Reserved Forests are present in the core and buffer area of the project site.</p>
Socio-economy	<p>The implementation of the Sand and gravel mining project at Subansiri River Bed over an area of 24 Ha situated in Lakhimpur district, Assam. will throw opportunities to local people for both direct and indirect employment. The study area is slightly lacking in housing, water, electricity etc. It is expected that same will improve to a great extent due to proposed mining project and associated activities.</p>

Biological Environment

Flora

During the ecological survey only shrubby vegetation was found in dominance at the project site like *Apluda* sp., *Imperata* Sp., *Cassiasp.*etc. besides some tree species like *Acacia catechu*, *Mangifera indica* etc. were also seen growing in the area. The project site is surrounded by forest area, the river and agricultural area where various crops like wheat, rice, maize, sugarcane, etc. are cultivated.

Vegetation in surrounding area including agricultural land: The buffer area of the proposed project consists of villages, agricultural land, orchards, ponds and waste land. Mostly tree species found in the area are cultivated due to their economic and food values. Some dominant tree species of the area are *Mangifera indica*, *Acacia catechu*, *Ficus benghalensis*, *Ficus glomerata*, , etc. Most of the land is under cultivation by the villagers. Wheat, maize, rice, sugar cane, pulses, cotton, turmeric, etc. are cultivated in these fields.

Fauna

Field survey of the proposed project site was carried out for identification of fauna present in the core area. The proposed site is River bed area. Some tree and shrub species of *Acacia*, *Cyndon*, *Cenchrus*, *Balanites* etc. are seen in the areas which are supporting few faunal species like *Rattus rattus*, *Lepus nigricollis*, *Funambulus palmarum* etc.

No Schedule I species was found in the core as well as buffer zone. No endangered or endemic species (as notified in IUCN Red Data Book) are located within the study area. No migratory birds breed in the study area. No Tiger Reserve / Elephant Corridor / Turtle breeding place is located Within 10 km radius of the study area

Anticipated Impacts:

- Excessive and unscientific riverbed sand mining results in the destruction of aquatic and riparian habitat through large changes in the channel morphology.
- Access roads crossing the riparian areas will have impact on the species disturbing the ecosystem.
- Mining may drive away the wild life from their habitat, and significantly affect wildlife and nearby residents.
- Diminution of the quality and quantity of habitat essential for aquatic and riparian species.
- Reduction in the yield of agriculture due to deposition of dust on the leaves, etc. of the crops.
- Fragmentation of wildlife habitat and blocking of migratory paths/corridors. Isolation may lead to local decline of species, or genetic.

- Mining on the streambed, braided flow or subsurface inter-sand flow may hinder the movement of fishes between pools.

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:

- No mining will be carried out during the monsoon season to minimize impact on aquatic life which is mainly breeding season for many of the species.
- As the mining site has no vegetation, no clearance of vegetation will be done.
- Prior to closure of mining operations / during the rainy season the eroded area will be restored / replenished every year by river stream so, there is no negative impacts on aquatic habitats.
- Haul roads will be sprinkled with water which would reduce the dust emission, thus avoiding damage to the crops.
- Mining will be carried out on the dry part of the lease area to avoid disturbance to the aquatic habitat and movement of fish species.
- No discard of food, polythene waste etc will be allowed in the lease area which would distract/attract the wildlife.
- No night time mining will be allowed which may catch the attention of wild life.
- Workers will be made aware of the importance of the wildlife and signage will be displayed at the sensitive areas to caution the workers & other passerby.
- Access roads will not encroach into the riparian zones and if any riparian vegetation cleared off for the mining activity will be restored at the end of closure of mine.

Mitigation measures for the Land Environment

- Minimum number of access roads to river bed for which cutting of river banks will be avoided and ramps are to be maintained.
- Access points to the river bed will be decided based on least steepness of river bank and least human activity.
- Mining is avoided during the monsoon season and at the time of floods.

- Mining schedule is synchronized with the river flow direction and the gradient of the land. Haulage roads parallel to the river bank and roads connecting access to river bed will be made away from the bank.
- Care will be taken to ensure that ponds are not formed in the river bed.
- Access roads from public roads and up to river bank will be aligned in such a way that it would cause least environmental damage.
- Vegetation development is proposed along the road sides of the approach roads, to arrest soil erosion. While selecting the plant species, preference will be given for planting native species of the area.

Air Environment

In mining operations, loading, transportation and unloading operations may cause deterioration in air quality due to handling dry materials. In the present case, only sand of the river bed will be handled which must have some moisture in it, thus eliminating problems of fugitive dust. Also, the collection and lifting of minerals will be done manually.

Therefore the dust generated is insignificant as compared to mining process of other hard minerals like the process of drilling, blasting, mechanized loading etc.

Mitigation measures

The only air pollution sources are the road transport network of the trucks.

- i. Water sprinkling will be done on the roads regularly.
- ii. Care will be taken to prevent spillage by covering the carrying vehicles with tarpaulin and sprinkling of water, if dry.
- iii. Fortnightly scraping of road in order to keep the roads almost leveled. This will ensure smooth flow of vehicles and also prevent spillage.
- iv. Overloading will be kept under check by giving prior awareness.
- v. Proper tuning of vehicles to keep the gas emissions under check.

- vi. Plantation of trees along the roads to help reduce the impact of dust in the nearby villages.

Water Environment

Mining of sand from within or near a riverbed has a direct impact on the stream's physical habitat characteristics. These characteristics include geometry, bed evaluation, substrate composition and stability, in stream roughness elements, depth, velocity, turbidity, sediment transport, stream discharge and temperature. Altering these habitat characteristics can have deleterious impacts on both in stream biota and associated riparian habitat.

The detrimental effects to biota resulting from bed material mining are caused by three main processes:

- i. Alteration of flow patterns resulting from modification of the river bed
- ii. An excess of suspended sediment
- iii. Damage to riparian vegetation and in stream habitat.

Mitigation measures

During the entire lease period, the deposit will be worked from the top surface up to 1.67 m bgl or above ground water table, whichever comes first. No mineral will be mined from the river bed filled with water.

Noise Environment

Anticipated Impacts:

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

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 be reduced to minimum possible level.

- In addition, truck drivers will be instructed to make minimum use of horns in the village 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

Socio-Economic Environment

The implementation of the Sand mining project will generate both direct and indirect employment. Besides, it will provide a check on existing system of mining operation.

It will also reduce flooding of river banks. The project will also provide impetus to industrialization of the area. With the implementation of the proposed mining project the occupational pattern of the people in the area will change making more people engaged in industrial and business activities. Further, the mining and industrial activities in the area may lead to rapid increase in population and thereby urbanization. Due to urbanization of the area, employment opportunities will further increase.

Environmental Management Plan (EMP)

Proper environmental management plan is proposed for “Sand and Gravel” mining project to mitigate the impact during the mining operation.

- No labour camps will be established on river bed.
- No cooking, or burning of woods will be allowed in the nearby area.
- Prior to commencement of mining, a short awareness program will be conducted for labours to make them aware of way of working and various precautions to be taken while at work. Such program will be repeated occasionally.
- In the event of any some causality or injury to any animal occurs, proper treatment will be given.
- No tree cutting, chopping, lumbering, uprooting of shrubs and herbs will be allowed.
- Corridor movement of wild animals, if exists mining operations will be avoided in the area.
- It will be ensured that noise produced due to vehicles movement while carrying sand is within the permissible noise level.

- No piling of River Bed Material will be done in adjoining area.
- If wild animals are noticed crossing the river bed, they will not be disturbed or chased away, instead the labors will move away from their path.

The estimated cost of the project is 7.60 Crores and provision of Rs 1.55 Crores has been kept of the EMP. Also, a budget of Rs 38.0 Lakhs has been earmarked for the CER activity.

The proposed project is expected to provide employment to local people in different activities such as mining, sizing (sieving) transportation and plantation activities. The revenue generated from the production and sale of mineral will also add to the exchequer of government, which in turn will help in the growth of state economy. Also, as the proposed mine area lies in the flood plain, hence the removal of extracted material will minimize the chances of flood disaster in the area. Land outside the river bed will be made utilizable for the purpose of agriculture; hence the mining will help in improving the fertility of soil. Excavated material will cater the huge increasing demand of mineral in the fast growing construction industry of Assam and nearby areas etc. The project is not expected to have any major adverse impact on the environment and whatever impacts are anticipated during the EIA study will be minimized with the help of suitable mitigation measures. Hence it is concluded that the project is economically feasible and financially beneficial to the local people as well as to the country.

Chapter 12. DISCLOSURE OF THE CONSULTANT

GEOGREEN ENVIRO HOUSE PVT. LTD.




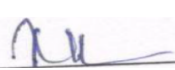



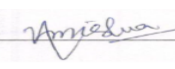

(An ISO 9001: 2008 Certified and QCI/ NABET Accredited Co.)
403, Aimen Apartment 29, Chandralok Colony, Aliganj, Lucknow , U.P. – 226024,
MOB:9415215163, 9161202020.
Email ID: vkm.geo@gmail.com, Website: www.geogreen.in

Project Name: EIA Report of EIA Report of Lower Subansiri Sand and Gravel Mining Contract Area (ML Area 24.00 Hactares), District Lakhimpur, Assam.by R J & Sons Marketing Pvt Ltd.

Name and Address of the EIA Cordinator: Dr. Vijay Kumar Mishra, 403, Aimen Apartment,29 Chandralok Colony, Aliganj, Lucknow.U.P- 226006RQP/DGMMP/182/2017, ISO 9001:2008 Certified, QCI-NABET Accredited Consultant.

Under the guidance of following Coordinators & Functional Area Experts

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and date
1	AP*	PawanSut Sharma	March 2019-Present	
2	WP*	Saroj Singh	March 2019-Present	
		Dr. B.P Giri	March 2019-Present	
		Mr.Sumit Verma	March 2019-Present	
3	SHW*	Partho S. Mukherjee	March 2019-Present	
		Dr. B.P Giri	March 2019-Present	
		Mr.Sumit Verma	March 2019-Present	
4	SE*	Dr. V.K.Mishra	March 2019-Present	
5	EB*	Dr. FauziaSiddiqui	March 2019-Present	
6	HG*	Dr. V.K.Mishra	March 2019-Present	

7	GEO*	Dr. V.K.Mishra	March 2019-Present	
8	SC*	Dr. Tulsi Ram Rathore	March 2019-Present	
9	AQ*	Partho S. Mukherjee	March 2019-Present	
		Mr.Sumit Verma	March 2019-Present	
10	NV*	PawanSut Sharma	March 2019-Present	
11	LU*	Dr. Ajay Mishra	March 2019-Present	
12	RH*	PawanSut Sharma	March 2019-Present	

*One TM against each FAE may be shown

**Please attach additional sheet if required

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

I, Dr. Vijay Kumar Mishra, hereby, confirm that the above mentioned experts prepared the EIA Report of Lower Subansiri Sand and Gravel Mining Contract Area (ML Area 24.00 Hactares), District Lakhimpur, Assam proposed by M/S R J & Sons Marketing Pvt Ltd, Nagaon.

I also confirm that EIA Coordinator (EC) has gone through the report, and the consultant organization shall be fully accountable for any misleading information.

It is certified that no unethical practices, plagiarism involved in carrying out the work and external data / text has not been used without proper acknowledgement while preparing this EIA report.

Signature: 

Name: Dr. Vijay Kumar Mishra

Designation: Director

Name of the EIA consultant organization: Geogreen Enviro House Pvt Ltd, Lucknow.

NABET Certificate No. & Issue Date: NABET/EIA/1720/IA0023 dated May 31, 2017.