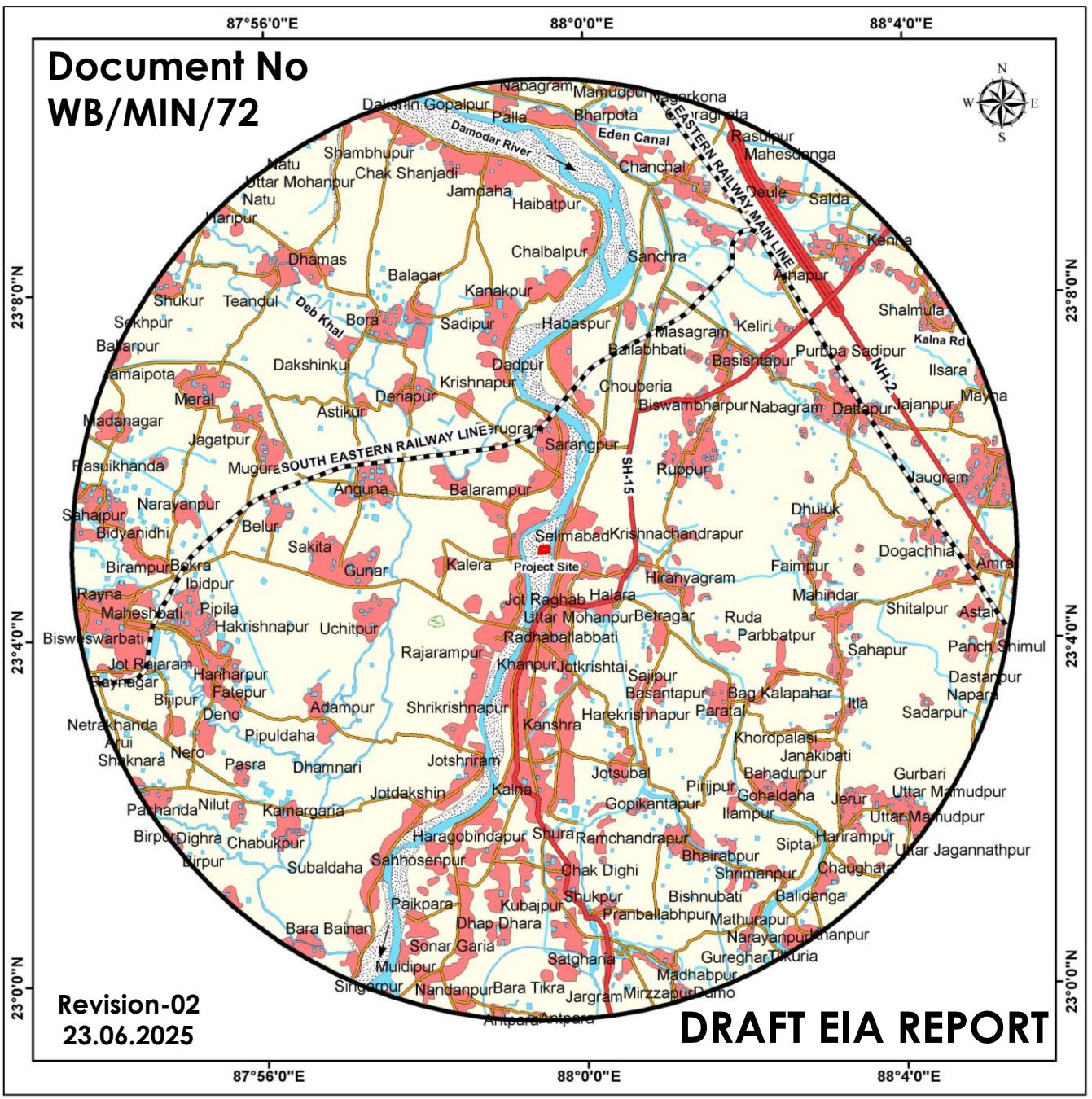
ENVIRONMENTAL IMPACT ASSESSMENT

FOR SELIMABAD SAND MINE ON DAMODAR RIVER, LOCATED AT SELIMABAD P.S.- JAMALPUR, DISTRICT- PURBA BARDHAMAN, STATE- WEST BENGAL (TOTAL AREA- 2.18HA), AREA AFTER SURRENDER- 1.92HA



MAA DURGA COAL TRADERS
(AUTHORISED SIGNATORY- JITENDRA KUMAR MISHRA)

MEMARI, MASZID PARA,
KRISHNA BAZAR,
PURBA BARDHAMAN,
PIN-713146

ENVIRONMENT CONSULTANT

NOVOMINE INDIA PRIVATE LIMITED

4th FLOOR, BUILDING NO. 65, OPP- THE CHILDREN'S HOSPITAL, POHKSEH, SHILLONG, EAST KHASI HILLS, MEGHALAYA-793006

June, 2025

TOR COMPLIANCE

Sl. No.	ToR Condition	Compliances
A. STANDARD TERMS OF REFERENCE		
1.	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994.It may also be categorically informed whether there had been any increase in production after the EIA notification 1994 came into force, w.r.t the highest production achieved prior to 1994.	Letter of Intent was granted to **Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra)** for sand mining from the Govt. of West Bengal vide letter no. **355/1220/MM/Auction27/2018,** dated **12.11.2018** over an area of **2.18 Hectare/5.39 Acres** on Damodar River (**Refer Annex 1.2**).
2.	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Letter of Intent was granted to **Maa Durga Coal Traders** for sand mining from the Govt. of West Bengal vide letter no. **355/1220/MM/Auction27/2018,** dated **12.11.2018** over an area of **2.18 Hectare/5.39 Acres** on Damodar River (**Refer Annex 1.2**). Due to falling under non-potential zone, **0.26ha** is surrendered. So, Project area after surrender is **1.92 Ha/4.74 Acres**. Further, LoI vide no. **893/67/MM/2022** was extended by the office of the District Land & Land Reforms Officer, Purba Bardhaman **dated 14.11.2022 (Refer Annex 1.3).**
3.	All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	All the documents including approved Mine plan, draft EIA and all others documents are compatible with one another in terms of the mine lease area (1.92 Ha), where production level is **44,688 m^3/year** (1st Year) and **33,962.88 m^3/year** (2nd year onwards) and there is no waste generation.
4.	All corner coordinates of the mine lease area, superimposed on a high-Resolution Imagery/ Topo-sheet, 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).	Coordinates of the corners of the lease area is attached in **Chapter 1 Figure-1.3** and Geomorphology of the site area along with the land use and other ecological features is attached in the Toposheet map in **Chapter 1, Figure-1.2** and details are discussed in **chapter 3**.
5.	Information should be provided in survey of India Toposheet in 1:50,000 scale indicating geological map of the area,	Land use map of the study area and Mine Lease area is attached in **Chapter 3, Table no.-3.3, Figure no.**

Sl. No.	ToR Condition	Compliances
	Geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	**3.3**
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.	This project does not involve any concerns related to R&R, forest land, roads, or transmission lines, thereby eliminating the need for any diversions in these aspects. The Land environment is well discussed in **Ch- 3 section 3.2**.
7.	It should be clearly stated whether the proponent company has a well laid down Environment Policy approved by its Board of Directors? if so, it may be spelt out in the EIA report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliance /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.	Here Lessee is Private Individual and Environmental Management will be developed at the time of excavation.
8.	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Mining will be done through manual mining method if sufficient manpower will be available or through semi-mechanized method. This is River bed sand mining Project so there is no need of blasting study or underground mining. Details on the issues related to mine Safety and risk assessments are discussed in **chapter 7, section 7.3.**
9.	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine /lease period.	The study area comprises of 10 km zone around the mine lease periphery as shown in the study area Map which is enclosed as **Figure 2.1** in **Chapter 2**. During the five-year plan period, no

Sl. No.	ToR Condition	Compliances
		waste will be generated.
10.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	A map delineating all the features such as Forests, Agricultural Land, Grazing Land, Water bodies, Build up area etc. (**Chapter 3, Section 3.2.2)** has been prepared as Land use map of the Study area is provided in the **Chapter-3; Figure-3.3.**
11.	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, it's land use, R&R issues, if any, should be given.	No overburden is generated as it is a Riverbed Sand mine project. There is no human habitation at the project site. So, there will be no R&R (rehabilitation and resettlement) issue.
12.	A certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the forest 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.	No forest land is involved in this proposed project area. The applicant has obtained Sand mining lease area through e-tendering from the Govt. of West Bengal.
13.	Status of forestry clearance for the broken-up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	No forest land is involved in this proposed project area.
14.	Implementation status of recognition of forest rights under the Schedule Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not applicable
15.	The vegetation in the RF / PF areas in the	Details of the Environment Sensitive

Sl. No.	ToR Condition	Compliances
	study area, with necessary details, should be given.	Locations has been provided in **Chapter-3; table 3-2.**
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.	Impact on the biological environment including wildlife and other protected areas has been thoroughly discussed in **Chapter 3; Section 3.5** of EIA report. Mitigation measures have been proposed in **Chapter 4**.
17.	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/ (existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	There is no National Parks, Sanctuaries, Biosphere Reserves, wildlife corridors, Ramsar site within 10 km from the study area. Details are given in **Chater-3; Table 3-2**.
18.	A detailed biological study of the study area (core zone and buffer zone _ 10 km radius of the periphery of the mine lease) shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any schedule-1fauna found in the study area, the necessary plan along – with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study has been carried out up to 10km from the study area and the same has been given in **Chapter-3, section-3.5** of the draft EIA report.
19.	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravalli Range', (attracting court restrictions for mining operations), should	The proposed mining project does not fall under the ‘Critically Polluted’ area or ‘Aravali Range’ so clearance certificate from the Competent

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	also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered.	Authority is not required. Environment Sensitive location map has attached in **Chapter-3; Figure-3.2**
20.	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not applicable. This proposed project is located very far away from coastal zone.
21.	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need-based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	Not applicable. There is no human habitation at the project site. So, there will be no rehabilitation and resettlement issue.
22.	One season (non-monsoon) [i.e., March-May (Summer Season), October-December (post monsoon season); December February (winter season) primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report Sites specific meteorological data should also be	Primary baseline data has been generated for the Post Monsoon Season (October to December) of 2024 for a period of Three months. The samples collected are analyzed at NABL accredited laboratory and analysis results are given in **Annexure 3.2**. The results of same have been incorporated in the tabular form in **Chapter-3**. Results and details of Monitoring is given at the

<table>
<tr><th>Sl. No.</th><th>ToR Condition</th><th>Compliances</th></tr>
<tr><td></td><td>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.</td><td>following places in EIA Report:
<table><tr><th>Particulars</th><th>Section no</th></tr><tr><td>Land Environment</td><td>3.2</td></tr><tr><td>Soil Quality</td><td>3.2.5</td></tr><tr><td>Air Environment</td><td>3.3</td></tr><tr><td>Water Environment</td><td>3.4</td></tr><tr><td>Ecological Environment</td><td>3.5</td></tr><tr><td>Social Environment</td><td>3.6</td></tr><tr><td>Noise Level</td><td>3.3.5</td></tr></table></td></tr>
<tr><td>23.</td><td>Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles, for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.</td><td>Will be done at the time of final EIA submission.</td></tr>
<tr><td>24.</td><td>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.</td><td>Total water requirement is about 4.96 KLD for the proposed project. Details are given in Chapter 2 (Table 2.1 & 2-7)</td></tr>
<tr><td>25.</td><td>Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.</td><td>Not Required</td></tr>
<tr><td>26.</td><td>Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be Provided.</td><td>As it is a river bed sand mining project, there is no need of water conservation.</td></tr>
<tr><td>27.</td><td>Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.</td><td>The impact on water quality on both surface and ground water is negligible. The details of Anticipated Impacts on water environment are detailed in Chapter 4 Section 4.2 in draft EIA</td></tr>
</table>

Sl. No.	ToR Condition	Compliances
		report.
28.	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The mining activities will be carried out up to depth of 2.94 m. The water table will not be intersected. So hydrogeological study is not required. Details of Mining method attached in **Chapter 11, Section-11.1**
29.	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	The proposed lease area is on the Damodar River bed and the impact of the mining on hydrology given in **Chapter 4; Section 4.2; Table 4.3**. No modification / diversion required for any stream.
30.	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSI, and bgl. A schematic diagram may also be provided for the same.	Systematic diagram of site elevation, working depth is provided C**hapter 2** as Development plan and Conceptual plan & Section.**Figure-2.2, 2.3 & figure-2.4.**
31.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted. Keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to	A green belt development programme will be covering an area of **0.63ha** utilizing local species for plantation. A total of 1,576 trees will be planted over a span of first 2 years, averaging 788 plants per year. Details are given in **Chapter 8, Section 8.5.**

Sl. No.	ToR Condition	Compliances
	Pollution.	
32.	Impact on local transport infrastructure due to the Project should be indicated Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct impact of Transportation study as per Indian Road Congress Guidelines.	All details regarding impact on local transportation routes Furnished in **Chapter 4**, **Table no.4.3**
33.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Rest shelters for mine workers with amenities like drinking water, toilets will be made by Project proponent as per approved mine plan.
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 ElA report.	It is a river bed sand mining project. So mined out area will be restored naturally (replenished in monsoon season).
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.	Project proponent has concern and will take full responsibility for the protection of the workers against sickness, disease and injury arising out of their employment and have adopted certain principles with regard to occupational health services, like establishing and maintaining a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work. **Chapter 7, Section 7.3.2**
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.	Public health issues and remedial measures are discussed in **Chapter 7 & Chapter 10, section 10.2.1.**
37.	Measures of socio-economic significance and influence to the local community	The socio-economic profile will provide the insight to population

Sl. No.	ToR Condition	Compliances
	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.	growth rate; population density, gender ratio, work participation rate and description of the vulnerable population in the study area. Furnished in **Chapter 3; Section 3.6**.
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.	Furnished 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.	Public hearing will be arranged by concern authority after submission of Draft EIA.
40.	Details of litigation pending against the Project, if any, with direction /order passed by any Court of Law against the Project should be given	There is no litigation pending against this project.
41.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Discussed in Chapter-10, Section 10.3 & 10.4.
42.	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	A Disaster management Plan has discussed briefly in **Chapter-7 section 7.3.1.**
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.	Benefits of the project are discussed in **chapter 8** in draft EIA Report.
44.	Besides the above, the below mentioned general points are also to be followed: -	
a.	Executive Summary of the EIA/EMP Report.	Attached along with Draft EIA report.
b.	All documents to be properly referenced with index and continuous Page numbering	All documents attached in Draft EIA Report and properly referenced with index and continuous page numbering.
c.	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources, should be indicated.	The period and source of the collected data presented in the report especially in tables, are given in the draft EIA Report.

Sl. No.	ToR Condition	Compliances
d.	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.	All the analysis/testing reports of water, air, soil, noise are acquired from MoEF&CC/NABL accredited laboratories and compiled in the EIA Report, **Chapter 3.**
e.	Where the documents provided are in a language other than English, an English translation should be provided	All documents provided in the EIA Report are in English Language.
f.	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Compiled
g.	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF 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.	EIA Report has been prepared according to the instruction issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009.
h.	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of the SEIAA, Meghalaya 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.	No such changes have been done.
i.	As per the circular no. J-11011/618/2010-IA.II(I) dated 30.05.2012 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 of the of Ministry of Environment, Forest and climate change, as may be applicable	It is a new project. Hence, not applicable.
j.	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and Mining area, (ii)geological	Details of Surface Plan has been given in Chapter 2 and map.

Sl. No.	ToR Condition	Compliances
	maps and. Sections and(iii)sections of the Mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	

B.	ADDITIONAL TERMS OF REFERENCE	
1.	Revised cluster certificate from the competent authority.	Will be submitted at the time of Final EIA submission.
2.	The potential impact study in the EIA should be done considering the cumulative effect of all the mines in the cluster situation, if any.	Impact of the project site or in any cluster situation have been discussed in Chapter 4, Table 4.4 & Table 4.5.
3.	Surface and ground water hydrology should be included in the EIA report.	Surface and ground water hydrology has been discussed in Chapter 3 of the draft EIA report.
4.	Drone videography of the entire project area explicitly showing the entire project site along with the existing tree plantation/green belt. Minimum 2 minute video to be submitted.	Drone videography of the entire project area will be provide at the time of Final EIA submission.
5.	Photographs of the site mentioning the geo-coordinates.	Photographs of the site mentioning the geo-coordinates will be provided at the time of Final EIA submission.
6.	Standard practice of management of the intermediate storage area should be submitted.	Not required for storage of minerals, it is transported directly from mine site.
7.	Means of access and egress between the embankment and the sand quarry may be clearly earmarked. The Project Proponent must commit that no hard toping or paving of any haulage route within the riverbed will be attempted.	No hard toping or paving of any haulage route within the riverbed will be done and embankment and the sand quarry clearly earmarked in **Chapter 4; Fig: 4.1.**
8.	A plan on the management and handling of sand during the period of intermediate stockpiling should be submitted.	There will not be any stockpile of sand, whatever sand will be generated; same will be transported to end user via trucks/Tipper with covered tarpaulin sheet.
9.	**The PP has to do tree plantation in an area equivalent to 33% of the lease area @2500 trees/ha within first two years from the starting of the mining operation.** A Progressive Greenbelt Plan may be prepared. The project area being entirely on the riverbed, afforestation/	Noted. Details of plantation is given in Chapter 8.

	vegetation should be attempted alongside the village roads or other public land. This may be done with prior approval of the local self-governing bodies. If no public land is available for the purpose the Project Proponent shall arrange for land with his personal means. To enhance success/ survival rate the plantation shall be completed during the first two years of the project life and the plantation so done shall be taken care of during the rest of the project life. Species of the plant selected should be local and self-sustaining in that particular region. Spatial year wise progressive plantation programme to be submitted.	
10.	Plan showing spatial year wise distribution of the proposed greenbelt has to be submitted along with supporting documents of administrative approval/s.	Plan of year wise distribution of the proposed greenbelt has been mentioned in **Chapter 10; Table No.: 10.1**
11.	EIA should also include detailed study of the baseline condition and impact on aquatic flora and fauna.	Detailed study of the baseline condition and impact on aquatic flora and fauna is enclosed in **Chapter 3 and 4.**
12.	The project cost may include the auction bid value, estimated royalty to be paid, cost of any infrastructure built like office space, stockyard, etc. The calculation/documents to estimate the project cost should be submitted. The planned expenditure for components like need-based activities may be derived based on the project cost.	The project cost has been mentioned in **Chapter 2; Table 2-7**.
13.	A need-based EMP may be prepared in accordance with the MoEF&CC Office Memorandum vide F. No. 22-65/2017.IA.III dated 30.09.2020. Record of communications made in this regard with the identified/ intended beneficiaries (schools/ institutions etc.) may also be uploaded. The activities should be completed within the first two years of the project life.	A need-based EMP has been prepared in accordance with the MoEF&CC Office Memorandum vide F. No. 22-65/2017.IA.III dated 30.09.2020.
14.	A study report on base flow level measured at 5 points with date and supporting photographs should be submitted. It should be committed that mining will be done at least 1m above the base flow level. Accordingly, if required, the excavation	Base flow study report will be provided at the time of final EIA submission.

	plan may also be revised.	
15.	Management plan including the final closure plan of haul road to be submitted.	Compiled.
16.	Study and protection plan of the aquatic life available both during the mining and non-mining seasons should be provided. The study should be done by some reputed institute.	Study and protection plan of the aquatic life will be provided at the time of final EIA Submission.

EXECUTIVE SUMMARY

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1. INTRODUCTIONS

The applicant **Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra)** has obtained Sand mining lease through e-tendering from the Govt. of West Bengal vide Letter of Intent no. **355/1220/MM/Auction27/2018,** dated **12.11.2018** over an area of **2.18 Hectare/5.39 Acres** on Damodar River near Mouza – **Selimabad,** P.S.-**Jamalpur,** Dist – **Purba Bardhaman, West Bengal,** over Plot No. **952(P), 953(P),** J.L. No.- **30** (**Refer Annex 1.2**). Due to the non-potential zone, proponent is surrendering **0.26ha,** now the area after surrendering is **1.92 Ha/4.74 Acres**. Further LoI vide no. **893/67/MM/2022** was extended office of the District Land & Land Reforms Officer, Purba Bardhaman dated **14.11.2022** and will be **valid for 60 days after the disposal of EC application by SEIAA (Refer Annex 1.3).** As riverbed Sand is replenished every year hence life of mine is not applicable. The proposed mine lease area shown in mouza map is attached as **Annex 2.1.**

This particular project is considered to be of 'B' category due to the size of the mining lease (**1.92 HA**). As per notification S.O. 3977(E) published on dated 14th August, 2018, our project is falls under categories "B2" and need not to submit Environmental Impact Assessment Study report. Further, another 2 mines with individual lease ≤ 250ha are coming within 500m from the proposed project area. So, as per office memorandum issued by MoEF&CC, need to submit Environmental Impact Assessment Study report.

2. PROJECT NAME AND LOCATION:

Selimabad Sand Mining Project is located on Damodar River. The Brief Description of the Project is given below:

Table 1: Brief Description of Project

Particulars	**Details**		
Sanctioned Mining Lease area coordinate of 1.92 ha	**Project Co-ordinates**		
	Points	**Latitude**	**Longitude**
	A	23°05'03.81"N	87°59'26.76"E
	B	23°05'04.11"N	87°59'31.39"E
	C	23°05'03.25"N	87°59'32.70"E
	D	23°05'00.66"N	87°59'32.15"E
	E	23°05'00.19"N	87°59'25.67"E
Location of the project	State	West Bengal	
	District	Purba Bardhaman	
	P.S.-	Jamalpur	
	Mouza-	Selimabad	
	J.L No.-	30	
	Plot No.-	952(P) & 953(P)	

EXECUTIVE SUMMARY

Particulars	Details	
	Sand Block no.	JAMALPUR/SELIMABAD/952(P),953(P)/A
Toposheet No.	73M/16	
Total area	2.18 Hectare/5.39 Acres	
Surrendering area	0.26 Ha	
Area after surrendering	1.92 Ha/ 4.74 Acres	
Geological reserve in 5 years	2,28,049.92 m^3 (As per Approved Mine Plan)	
Mineable Reserves in 5 years	1,80,539.52 m^3 (As per Approved Mine Plan)	
Production as per Approved Mine Plan	44,688 m^3/year (1st year) 33,962.88 m^3/year (2nd year onwards) (76.00% replenishment rate)	
Manpower	38 (The laborers will be drawn mainly from Selimabad and surrounding villages)	
Elevation	38 mRL to 42 mRL	
Land-use	River bed	
Nearest habitation/town	Selimabad village (0.50 km, SE Direction)	
Nearest airport	Kazi Nazrul Islam Airport, (97 km, NW Direction)	
Nearest railway station	Berugram Railway Station (2.50 km, NNW Direction)	
Nearest highway	NH-19 (8.00 km, NE Direction) SH-15 (1.00 km, SSE Direction)	
Power supply	The project does not require electricity connection. Excavation will be done only during day time and any requisite electricity will be sourced from solar panels, subject to approval from the Gram Panchayat if necessary.	
Nearest Hospital	Selimabad Health Centre (1.00 km, SE Direction) Jamalpur Hospital (2.00 km, S Direction)	
Educational Facility in the area	Selimabad High School (2.00 km, ESE) Batrishbigha Primary School (1.00 km, NE) Jamalpur Mahavidyalaya (2.00 km, SE Direction)	
Water demand & supply	Water will be taken from hired tankers. The water requirement for mining & allied activities, drinking and plantation has been estimated to be 4.96 KLD (Drinking and domestic- 0.38 KLD, dust suppression & others- 3.00 KLD and Greenbelt development- 1.58 KLD).	
Nearest tourist places	None in the Study Area	
Defence installations	None in the Study Area	
Archaeological features	None in the Study Area	
Nearest Forest area	Mana Forest (26.00, NW Direction)	
Nearest stream/river/water body	Damodar River (onsite)	
Seismic zone	Zone III	

3. MINING METHOD:

- The mining is confined to collection of sand from the riverbed. The extraction process will involve mining up to a maximum depth of 2.94 meters at the riverbank or up to the water table, whichever is less. Dry pit mining will be employed.

- The riverbed material will be collected in its natural state during the mining process. The mining method will be opencast manual (preferably) or semi mechanized. The river bed material will be collected in its existing form.

- The distance of 7.5 m shall be further marked from the lease boundary and this zone constituting the 'safety zone' shall be identified. No mining activities shall be undertaken within this 'safety zone'. This shall be in accordance of West Bengal Minor Mineral Concession Rules 2016 (WBMMCR-2016).

- The excavation of riverbed minerals will begin from the top of the designated area and progress downwards in 0.50-meter increments, removing the minerals in slices

- Riverbed sand extraction will be done through bench of 1.00m height and 1.00m width, the whole material is mineable. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.

Table 2: Required Raw Material

Inputs	Approx. quantity required	Basis
Water Requirement		
Water for Drinking and Domestic Purposes	0.38 KLD	100litre/capita/day
Dust Suppression & others	3.00 KLD	0.5 Liter per plant 2 times a day
Water for green belt development	1.58 KLD	Length of Road (m) x Width of Road (m) x 1litre/m^2 x 2times per day)

The proposed mining project has a total water requirement of 4.96 KLD (Kilo Litres per Day). Drinking water needs will be met by sourcing it from the nearest village, while water for sprinkling and plantation purposes will be obtained from private tankers

4. PRODUCTS AND CAPACITIES:

The mining lease will be granted over an area of **2.18 ha or 5.39 Ac,** due to the non-potential zone, proponent is surrendering **0.26ha,** now the area after surrendering is **1.92 Ha,** on river Damodar at Mouza – **Selimabad**, P.S.- **Jamalpur**, Dist – **Purba Bardhaman**, West Bengal, over Plot No. **952(P) & 953(P),** J.L No- **30**.

Sand mining is generally carried out every year based on the replenishment quantities. As the lease is being done for five years, anticipated life of mine has been restricted for five years only. The Production programme from the mine for the next 5 years is given below is shown in **Table no. 3**.

Table 3: Programme from Mining Lease Area

Year	Project area after surrender (Ha)	Production area (Ha)	Thickness (m)	Geological reserve (m^3)	Production (m^3) as per approved mine plan	Replenishment rate
1st	1.92	1.52	2.94	56,448	44,688	100%
2nd	1.92	1.52	2.2344	42,900.48	33,962.88	76.00%
3rd	1.92	1.52	2.2344	42,900.48	33,962.88	76.00%
4th	1.92	1.52	2.2344	42,900.48	33,962.88	76.00%
5th	1.92	1.52	2.2344	42,900.48	33,962.88	76.00%
Total reserves				**2,28,049.92**	**1,80,539.52**	

5. PROJECT COST:

Total Project Cost is **3.01 cr**. The allocated budget for the EMP and CER Programme is Rs. **15,05,000** and Rs. **6,02,000** respectively based on a project cost. EMP amount will be spent over a period of 5 years and CER amount will be spent over a period of 2 years.

Table 4: Project Cost

Sl. No.	Considerations	Amount (Rs.)
1	Auction Value	98,94,000
2	Estimated Royalty	1,92,54,611
3	Miscellaneous	10,00,000
	Total Cost	**3,01,48,611 approx. 3.01 cr**

6. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES:

Appropriate site selection for mining operations and strict adherence to guidelines such as the Sustainable Sand Mining Guidelines 2016 (SSG), Enforcement & Monitoring Guidelines for Sand Mining 2020, WBMMCR 2016, and The West Bengal Sand Mining Policy 2021 can effectively mitigate the potential adverse impacts of mining on the surrounding environment.

A comprehensive assessment has been conducted to identify the potential environmental impacts of the proposed production from the mine on various aspects, including air quality,

water use and quality, land-use, ecological considerations, soil quality, and socio-economic factors.

A brief description of impacts by the proposed project is given in **Table 5.**

Table 5: Description of Identifiable Impacts

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
A	**Land Environment**		
A.1	Land use & Land Cover	○ Mining of minerals from the river bed will create a void which may affect the stream flow. ○ Mining within a river bed may have some impact on the stream's physical characteristics, such as channel geometry, bed elevation in stream roughness of the bed, flow velocity, discharge capacity, sediment transportation capacity etc. ○ Loss of adjacent land and/or structures. ○ Riverbed mining can have adverse effects on agricultural lands located near rivers. Changes in water flow and sedimentation can disrupt irrigation systems, affect soil fertility, and lead to the loss of productive agricultural land.	○ Sand mining activities will be limited to a maximum depth of 2.94meters below the river bed or the water table, whichever is reached first. ○ Dredging will not be allowed. ○ The mining is planned in non-monsoon seasons only, so that the excavated area gets replenished during the monsoon each year. ○ Grasses and bushes which have fibrous roots at the first instance are proposed to grown along the banks which enhances the binding properties of the soil. ○ The systematic and scientific removal of sand will allow sedimentation during monsoon and not cause bed degradation. ○ Restoration of bank will be ensured at the end of mine closure every year. ○ Mining activities in river-beds will not be allowed within a certain distance from bridge structures. The permissible distance is five times the span of the bridge structure on the upstream side and ten times the span on the downstream side, with a minimum distance of 250 meters on the upstream side and 500 meters on the

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
			downstream side. This regulation ensures the protection of bridge structures and maintains the integrity of the river ecosystem. ○ The proposed river-bed mining is unlikely to change any characteristics of the river as the mined minerals will be replenished every monsoon season.
A-2	Soil Quality	○ Soil compaction may occur due to movement of trucks outside the lease area which may affect the soil characteristics like soil fertility, infiltration rate, porosity etc. This ultimately restricts the growth of deep-rooted plants which finally leads to stagnation of succession.	○ The movement of trucks will be restricted to haul roads. ○ The roads that will be used for transportation of mined minerals are already constructed. ○ The unpaved roads will be strengthened in order to reduce impact on soil quality.
A-3	Traffic Density	○ Sand mining operations may involve the movement of trucks to transport sand. This can contribute to increased traffic congestion, particularly on roads leading to and from mining areas. ○ The constant movement of heavy trucks and dumpers associated with sand mining. This can result in potholes, uneven surfaces, and overall degradation of the road infrastructure. ○ Local communities near sand mining sites may experience disruptions to their daily lives due to increased traffic. This can impact residents' access to roads, schools, businesses, and other essential services.	○ Traffic management plan will help in avoiding any traffic jams and thus concentration of trucks at one place will be avoided. ○ By reducing the speed and/or volume of traffic on such roads to an acceptably low level. ○ Transportation of minerals will be stopped during the opening and closing hours of schools, colleges, and offices.

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
B	**Air Environment**		
B-1	Air Quality	○ The extraction and transportation of sand can lead to the release of dust particles into the air, affecting air quality in the vicinity. ○ The use of vehicles for sand transportation in the project can lead to the emission of pollutants, contributing to air pollution.	The only air pollution sources are the road transport network of the trucks/dumpers. The dust suppression measures like the following will be resorted: ○ Water sprinkling will be done on the roads regularly. This will reduce dust emission by 75%. ○ Preventive measures will be implemented to minimize spillage during transportation of materials. This includes covering the carrying vehicles with tarpaulin to contain the load and prevent any loose material from escaping. ○ Proper tuning of vehicles along with pollution certificate to keep the gas emissions under check. ○ Plantation of trees along road sides as part of social forestry to help reduce the impact of dust in the nearby villages. ○ Vegetation improves air by capturing pollution particles, reducing carbon dioxide and producing oxygen. Photosynthesis in green plant consumes carbon dioxide, plants help in counteracting the increase of this gas in the atmosphere. Thus, planting of trees and shrubs for abatement of air pollution and improvement of environment is an effective way. ○ Plants with dust scavenging capacity i.e. plants species which have aesthetic value and high pollution tolerance level will be recommended for

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
			planting along the roads.
B-2	Noise Level	○ Noise generated by vehicles transporting the mined minerals is identified as a major source of noise. The trucks used for transportation are expected to produce noise levels ranging from 80-85 dB(A). The material transportation road passes through the villages of Selimabad, potentially affecting the residents who will be exposed to increased noise levels. However, considering the relatively low number of trucks (19 trucks or 38 trips), the incremental noise level is expected to be minimal.	○ Periodical monitoring of noise near sensitive receptors will be done. ○ No other equipment's except the transportation vehicles will be allowed. ○ The well-tuned vehicles will be used and loud noise will be checked every day which help in reducing noise during operations. ○ Plantation will be taken up along the approach roads and vicinity of river bank. The plantation minimizes propagation of noise and also arrests dust. ○ By reducing the speed and/or volume of traffic on such roads to an acceptably low level.
C	**Water Environment**		
C-1	Hydrology, Hydro-geology and Water Quality	○ During river bed mining Ground water table may be intersecting. ○ Sand mining can alter the physical structure of riverbeds, leading to the destruction of natural habitats for aquatic plants and animals. Changes in the riverbed can disrupt the breeding and feeding grounds for fish and other organisms. ○ Excessive suspended sediment in the water can cause harm to riparian vegetation and disrupt the natural habitat within the stream. ○ The extraction of sand from riverbeds can stir up sediment, releasing pollutants that were previously trapped in the	○ Mining will be done up to a depth at least 1m above the zero level. Mining will be done in scientific way and as per approve mine plan. ○ Project activity will be carried out in the non-monsoon season and on dry bed. ○ Since mining will be done only in central 3/4th portion of the river bed there will be no diversion or modification in the river flow. It is not proposed to divert or truncate any stream in case of river bed mining.

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
		riverbed. This can degrade water quality, affecting both aquatic ecosystems and the availability of clean water for human use.	
C-2	Waste Generation	○ Impact on surface water bodies through indiscrete disposal of liquid waste and suspended solids carried by flowing rainwater.	○ The estimated municipal solid waste generated will be 4 kg/day and liquid waste generated by 38 employees will be 0.076 KLD. Effective waste management will be implemented through the provision of dustbins and mobile toilets at the project site.
D	**Ecological Environment**		
D-1	Flora	○ Fugitive emission from vehicle movement will form a layer in leaves thus reducing the gaseous exchange process. This ultimately affects the growth of plants. ○ The construction of a new linear surface, such as a road, can create a new microclimate and alter physical conditions in the surrounding area. This change can impact plant mortality and the biological community, extending from the road edge to varying distances. ○ Emissions, litter, noise, and other physical disturbances from road activities can affect roadside vegetation, leading to changes in species composition. These impacts may extend to varying distances from the road.	○ To promote healthy roadside vegetation, it is recommended to choose native plant species that are resilient to stress and pollution and well adapted to the local climate. Selection should consider factors such as agro-climatic suitability, height and canopy structure, growth rate, and aesthetic qualities such as foliage and flower color. Hardy plants that can withstand severe weather conditions and require minimal irrigation are preferred. ○ Annual bio-monitoring will be conducted on roadside plants to assess their exposure to vehicular pollution. This monitoring will involve evaluating the dust load accumulated on plant surfaces and determining the Air Pollution Tolerance Index (APTI) of the plants.
D-2	Fauna	○ The operational activities such	○ Efforts will be made to

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
		as population influx, transportation and noise generation may have an adverse impact on fauna. ○ The presence of suitable roadside habitats for animals that rely on acoustic signals, like birds, presents a tradeoff between habitat availability and the potential negative impacts of traffic noise and passing vehicles on their survival and breeding success. ○ Indiscriminate mining from active river channels has detrimental impacts on the benthic fauna, which resides in the sandy substratum at the river bottom. Excessive extraction of sand from rivers disrupts the eco-biology of various terrestrial insects that rely on aquatic environments during their initial life stages. ○ From a fisheries perspective, the loss of benthic invertebrates as a result of mining activities has a significant negative impact. This depletion of food resources can lead to a decline in the inland fishery resources in the area.	minimize the impact of mining activities on residential areas and crucial wildlife habitats by carefully planning the right-of-way (ROW). This involves avoiding the direct route through residential areas and important wildlife habitats such as rookeries, raptor nesting areas, and calving areas, to the extent possible ○ All equipment used in the mining operations will be equipped with sound-control devices that are as effective as the original equipment. Motorized equipment will be properly muffled and maintained to ensure optimal noise control measures are in place. ○ Exhaust silencers and acoustical pipe lagging (wrapping) will be utilized to minimize compressor noise and ensure optimal noise reduction. ○ A strict monitoring of the mining activity is utmost essential for reviving the health of the river ecosystem and in turn aquatic biology will be benefited. ○ No mining will be carried out during the rainy season to minimize impact on aquatic life. ○ Sand extraction in vegetated riparian areas will be avoided. ○ Undercut and incised vegetated banks will not be altered. ○ Large woody debris within the riparian zone will be preserved

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
			and left undisturbed. If it needs to be moved, it will be carefully replaced rather than burned. ○ Prompt and immediate action will be taken to evenly redistribute any spillage generated during the mining operation over the mined voids. ○ Access roads will not encroach into the riparian zones. ○ Efforts will be made to avoid the removal or disturbance of in-stream roughness elements during mineral extraction activities. If any elements are disturbed, they will be promptly replaced or restored.
E	**Social Environment**		
E-1	Health	○ The socio-health impacts of transportation primarily arise from truck emissions, dust generation, and traffic movement. There is also a potential increase in accidents due to reckless driving of dumpers transporting minerals along the roads.	○ Appropriate measures will be implemented in each impacted area to minimize significant adverse effects. ○ Welfare activities should be initiated in the area so as to improve the quality of life of the local people. ○ To enhance safety and minimize accidents, only licensed drivers will be hired and reckless driving fully prohibited. ○ We will ensure the provision of medical facilities, educational opportunities (with a focus on girls), and access to clean drinking water.

7. ESTIMATED CAPITAL COST OF THE PROJECT:

The details of the estimated EMP cost of the project shall be as follows.

Table 6: EMP Cost

Serial No.	Measures	Description		Investment for EMP per year
1	Pollution Monitoring	Air pollution	Yearly at 4 locations for air, 4 locations for water and 2 locations for noise during mining and 1 location for soil.	60,000
		Water pollution		40,000
		Noise Pollution		30,000
		Soil		20,000
2	Water Sprinkling	Water sprinkling will be done at approach road during the lease period in phases		38,000
3	Green Belt	Trees will be planted along the river bank and along the kuchha road during the lease period in phases.		63,000
4	Road maintenance	Repair and maintenance of approach road		50,000
Total EMP Cost				**3,01,000**

Table 7: CER Budget

Sl. No.	Considerations	CER Cost in Rs. (1st year)	CER Cost in Rs. (2nd year)
1.	Conduct eye check-up and distribute free prescribed medicine at Selimabad High School and in local villages according to their needs- Two times yearly	1,30,000	-
2.	Conduct eye check-up and distribute free prescribed medicine at Dolordanga Primary School and in local villages according to their needs- Two times yearly	-	1,20,000
3.	Develop boundary wall at Selimabad High School	71,000	-
4.	Free ambulance service	-	81,000
5.	Free computer training to local village student	1,00,000	-
6.	Park Development	-	1,00,000
Total/Year in Rs.		**3,01,000**	**3,01,000**
Total in 2 years		**6,02,000**	

****The entire CER cost of Rs. 6,02,000 will be invested within 2 years for the mentioned purpose after consultations with local villagers and local administrative authorities.**

8. PROJECT SITE SELECTION:

Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra) emerged as the highest bidder in the e-bidding process conducted by the Government of West Bengal for the

sand mining project on this government land. The site for sand mining was selected by the District Magistrate Office.

River bed mining is a site-specific project depending upon the geological set up and mineable portion of the river. Given the location within the meandering course of the river, there is minimal disturbance to objects of economic importance, making alternative site selection less viable.

The applicant will invest necessary funds for the rejuvenation and progressive reclamation program and other measures necessary to protect the quality of the environment and human health etc.

The land use pattern in the mine lease area undergoes changes throughout the pre-mining, mining, and post-mining phases. The river bed area serves as the initial zone, which gradually transforms into naturally reclaimed areas and restricted zones as the mining activities progress and conclude.

9. BASELINE ENVIRONMENTAL DATA:

The baseline data has been collected from October 2024 to December 2024. The details area given below:

Ambient Air Quality Results: Samples were collected from 6 sampling locations during the period of October 2024 to December 2024 (post-monsoon season). The results are given below

- **Particulate Matter 10 (PM10)**

The results of PM10 of all locations are showing variations from 66.9µg/m^3 at Bonbibitala to 76.4µg/m^3 at Jotkrishtai. Hence, the results are within the limits of National Ambient Air Quality Standards (NAAQS).

- **Particulate Matter 2.5 (PM2.5)**

The results of $PM_{2.5}$ of all locations are showing variations from 28.2µg/m^3 at Batrishbigha to 35.4µg/m^3 at Selimabad. However, the results are within the limits of National Ambient Air Quality Standards.

- **Percentage of Free Silica**

The PM10 samples collected from various locations show the presence of free silica (polymorphs of quartz, cristobalite, and tridymite) at the following percentages: 0.64% (Selimabad), 0.66%(Jotkrishtai), 0.55%(Kalera), 0.50% (Batrishbigha), 0.58%(Deriapur), 0.55% (Bonbibitala).

- **Gaseous Pollutants**

The results of SO_2 of all locations are showing variations from 15.4 µg/m^3 at Batrishbigha and 21.7 µg/m^3 at Jotkrishtai. However, the results are within the limits of National Ambient Air Quality Standards.

The results of NO_2 of all locations are showing variations from 21.9 µg/m^3 in Deriapur to 27.7 µg/m^3 in Jotkrishtai. However, the results are within the limits of National Ambient Air Quality Standards (NAAQS).

The lowest level of CO was observed at Batrishbigha (0.67 mg/m^3) while the highest value (0.80mg/m^3) was observed at Jotkrishtai. These levels are found to be well within the NAAQ standard of 2.0mg/m^3 for residential and industrial areas.

The values of both the parameters are well within the prescribed limits.

Noise Quality results: Samples were collected from 6 locations.

The ambient noise level at day time are varies from 51.9 dB(A) at Kalera and Deriapur to 54.3 dB(A) at Jotkrishtai which is within standard limits of residential area are ~ 55dB(A). The night time noise result is varying from 42.5 dB(A) at Deriapur to 43.7 dB(A) at Selimabad, Jotkrishtai and Bonbibitala which is within the standard limits of residential ~ 45 dB(A).

Water Quality Results: The samples were collected from 4 ground water locations and 2 surface water sources:

Ground Water results: The analysis results indicate that the pH of the samples ranges in between 7.1 to 7.4 which are well within the specified standard of 6.5 to 8.5. Total hardness was observed to be ranging from 193.4 to 225.7 mg/l. The maximum hardness (225.7 mg/l) was recorded at GW1 (Selimabad) and the minimum (193.4 mg/l) was recorded at GW3 (Kalera). Chlorides were found to be in the range of 60.9 mg/l at GW3 (Kalera) to 79.1 mg/l at GW4 (Deriapur). Sulphate was found to be in the range of 32.6 mg/l to 46.5 mg/l. The maximum value observed at GW1(Selimabad) whereas the minimum value observed at GW4(Deriapur), which is well within the specified standard of 200 mg/l as per IS 10500:2012.

All results were found within standard drinking water standards (IS: 10500).

Surface Water results: The pH of the surficial water is 7.3 in (SW1) and (SW2) which indicates a slightly alkaline nature. In both the samples, the DO exceeds 6.0 mg/l. Higher DO signifies good quality waters and healthy environment for aquatic life. The BOD concentration is 2.1 mg/l (SW1) and 1.9 mg/l (SW2) signifying less pollution in the waters. Higher concentration of harmful bacteria and other microorganisms in polluted water consumes the dissolved oxygen and thus the BOD increases. Total coliform in the samples is within 1000 MPN/100ml.

The overall class of water for individual samples comes as "C" which signifies that water of Damodar River can be used as a drinking water source after conventional treatment and disinfection.

Soil Quality Results: The samples were collected from 4 locations:

pH ranging from 7.2 to 7.5 in the study area. Bulk density of the study area ranges between 1.24 gm/cm^3 S2 (Jotkrishtai) to 1.36 gm/cm^3 at S1 (Selimabad) & S3 (Kalera). The electrical conductivity of the soil samples is found to be average and ranges from 252 µmhos /cm to 265 µmhos /cm. Organic carbon of the soil samples varies from 0.30% in S2 (Jotkrishtai) to 0.48% in S4 (Deriapur). Nitrogen content in the surface soil of the study area varies between 114 kg/ha at S1 (Selimabad) to 162 kg/ha at S4 (Deriapur). Available Phosphorus ranges between 28.5 kg/ha at S4 (Deriapur) to 44.5 kg/ha at S2 (Jotkrishtai). Potassium content in the study area ranges between 240kg/ha at S1 (Selimabad) to 267 kg/ha at S2(Jotkrishtai).

Based on the provided data, it can be inferred that the soil in the study area has average fertility, indicated by medium levels of phosphorus and potassium. However, the nitrogen content in the soil is relatively good. Nitrogen is essential for leaf growth, suggesting that plants in this area would benefit from the available nitrogen for foliage development.

Ecology and Biodiversity Results:
There is no forest in the Study area.
A comprehensive biological study was conducted within a 10km radius of the proposed project site to analyze the flora and fauna composition. The study included a phytosociological assessment to determine vegetation density, diversity, frequency, and relative abundance. Faunal identification was performed at random sites. Data from the district forest department was obtained to facilitate these assessments.
For details information go through the **Chapter 3.**

Socio Economic Condition: The sand mine is located in village **Selimabad**, District **Purba Bardhaman** in West Bengal. The socio-economic profile will provide the insight to population growth rate; population density, gender ratio, work participation rate and description of the vulnerable population in the study area.

- **Demographic Profile:** There are 173 villages in the study area. These villages have 81,972 households accumulating 3,52,084 populations. According to the survey, gender ratio of study area was 972 in 2011.
- **Population:** The total population of the study area is 3,52,084 out of 81,972 households, implying that there is an average of 4 members per households. According to the survey, gender ratio of the study area 972 in 2011.
- **Literacy rate:** Within the study area, the literacy rate accounts for 67.81% of the total population. Out of this, male literacy stands at 55.0% and female literacy at 45.0%.
- **Occupational Structure:** In the villages around the study area, people mainly earn from

agriculture and animal rearing.

10. IDENTIFICATION OF HAZARDS AND MITIGATION MEASURES:

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

- **Risk Due to Inundation:** Mining generally occurs except during the monsoon season; therefore, problem of inundation is not likely to happen except in case of accidental flash flood due to upstream dam opening or failure. Communication channels will be opened with government departments to give early warning in such situations and the workers will be immediately taken out.
- **Risks Due to Failure of Pit Slope:** In order to allay dangers due to open cast slope failure, final pit slope stability estimations will be made for the existing mines. Determining the factor of safety, the slopes shall be monitored at regular intervals to check any possible failure.
- **Risks Due to Failure of Waste Dumps:** In order to allay dangers due to open cast slope failure, final pit slope stability estimations will be made for the existing mines. Determining the factor of safety, the slopes shall be monitored at regular intervals to check any possible failure.
- **Risks of Accidents Due to Trucks and Dumpers:** Identifying the hazards that come along with the presence of vehicles at the workplace (e.g. reversing operations, loading) can cause harm if not properly handled. Among some of the factors that may make vehicle accidents more likely are: Rough access roads, Time pressure, Inadequate brakes (possibly from lack of maintenance), Carelessly parked vehicles (e.g. being parked on a slope without being adequately secured), Unsafe coupling and uncoupling of trailers, Untrained drivers, Overturning vehicles To avoid such instances, we will talk to the workers and their representatives and will involve them in the risk assessment process and tell them what to do, to reduce risk. All transportation within the mine lease area should be carried out directly under the supervision and control of management.

11. IMPACT OF THE PROJECT ON AIR, WATER, LAND, FLORA-FAUNA AND NEARBY POPULATION:

Details of the Impact of the River bed sand mining project on air, water, land, Flora-Fauna and nearby population given in the section **5(Anticipated environmental impacts and mitigation).**

12. EMERGENCY PREPAREDNESS PLAN:

River bed mining projects entail various high-risk accidents such as landslides, subsidence, floods, underground mine inundation, fires, seismic activities, and tailing dam failures. To address these risks, an emergency plan is proposed, encompassing quick evacuation procedures and ameliorative measures. Mining and allied activities inherently carry potential hazards that impact both employees and the general public. To ensure safe and healthy working conditions, adequate safety measures are imperative in mines. Mining Rules & Regulations provide a well-defined framework and procedures for maintaining safety, encompassing the well-being of personnel, machinery, and the overall working environment. By strictly adhering to these regulations, safety is ensured across the mining operation.

- The lessee's preparedness to handle eventualities and the required assistance from local authorities should be clearly outlined. The shallow depth of activities in river bed mining will not involve any high-risk accident due to side falls/collapse.
- The complete mining operation will be carried out under the Management and control of experienced and qualified Mines Manager.
- All the provisions of Mines Act 1952, MMR 1961 and Mines Rules 1955, RMMCR 1986, WBMMDR 2016, WBS(MTSS) Rules, 2021 and other laws applicable to mine will strictly be complied with.
- During heavy rainfall the mining activities will be closed.
- All persons in supervisory capacity will be provided with proper communication facilities.
- Competent persons will be provided first aid kits which they will always carry.

13. PUBLIC CONSULTATION:

Public Hearing will be done after submission of Draft EIA to concern authority. Hence at this moment there are no issues about this matter.

14. ENVIRONMENT MANAGEMENT PLAN AS PER OFFICE MEMORANDUM:

An EMP is a site-specific plan developed to ensure that the project is implemented in an environmentally sustainable manner. An effective EMP should ensure the application of best practice environment management to a project. The purpose of an EMP is to: (i) Assist Management to perform mining operations in an environmental friendly way; (ii) Improve the contribution of Management so that an EMP can be used effectively; (iii) Ensure a minimum standard and consistent approach to the implementation of EMP; (iv) Ensure that the commitments made as part of the project's EIA are implemented throughout the project life, and (v) Ensure that environment management detail is captured and documented at all stages of a project.

For detail EMP Consider **Chapter 10 in EIA Study Report.**

15. OCCUPATIONAL HEALTH HAZARDS AND MITIGATION:

At site, during excavation and loading activity, dust is main pollutant which affects the health of workers whereas environmental and climatic conditions also generate the health problems. Addressing the occupational health hazard means gaining an understanding of the source (its location and magnitude or concentration), identifying an exposure pathway (e.g. a means to get it in contact with someone), and determination of likely a receptor (someone receiving the stuff that is migrating). Occupational hazard due to sand mining mainly comes under the physical hazards. Possible physical hazards and mitigation measures are mentioned below:

- **Light:** Workers may face risks associated with poor illumination or excessive brightness, leading to symptoms such as eye strain, headaches, eye pain, tearing, corneal congestion, and eye fatigue.
- **Heat and Humidity:** Heat and humidity are encountered in hot and humid condition when temperatures and air temperatures increase in summer time up to 48°C or above in the river bed mining area. The direct effects of heat exposure are burns, heat exhaustion, heat stroke and heat cramps; the indirect effects are decreased efficiency, increased fatigue and enhanced accident rates.
- **Eye Irritation:** During the high windy days in summer the sand could be the problems for eyes like itching and watering of eyes.
- **Respiratory Problems:** Excessive airborne dust can pose a health hazard, aggravating respiratory conditions like asthma and causing irritation to the lungs and bronchial passages.
- **Noise Induced Hearing Loss:** Machinery is the main source of noise pollution at the mine site.

Mitigation Measures:

To minimize the health impacts PPE like dust masks, ear plugs/ muffs and other equipment's will be provided for use by the work personnel. All workers will be subjected to Initial Medical Examination as per Mines Rule 1955 at the time of appointment. Periodical Medical Examination will be conducted at least once in five years. Medical camps will be organized.

16. POST PROJECT MONITORING PLAN:

The effectiveness of evaluation of environment mitigation programme, regular monitoring of the important environmental parameters will be taken up after completion of the lease period.

Sl.	Description of Parameters	Location	Schedule and Duration of Monitoring
A	**Air Quality (PM10, PM2.5, SO_2, NO_2) monitoring in Four locations**		
A-1	Four monitoring station	one within and three outside the project area at an angle of 120° each-covering upwind and downwind directions.	Will be monitored in every six months as per CPCB/ MoEF&CC Guidelines/ Notifications
B	**Quality of surface and ground water around the site will be collected from 4 locations**		
B-1	Two Surface Water Samples will be collected as per EIA Report and in consultation with SPCB, out of which one will be taken near the active working area.	Up stream Down stream	will be collected on a quarterly basis in accordance with the guidelines and notifications provided by the (CPCB) and the Ministry of Environment, Forest and Climate Change (MoEF&CC).
B-2	Two Ground Water Samples will be collected as per EIA Report and in consultation with SPCB, out of which one should be taken near the active working area.	Selimabad	
C	**Ambient Noise Level monitoring at 2 locations around the site**		
C-1	Two Noise Samples will be collected as per EIA Report and in consultation with SPCB.	Onsite Approach road connect with main road	Will be monitored quarterly as per CPCB /MoEF&CC Guidelines/ Notifications
D	**Inventory of flora to Judge the comparative status at one location around the site**		
D-1	An Inventory of flora will be prepared at one Location near the mine lease area		
E	**Soil Quality**		
E-1	Soil Samples will be collected from one location.	Selimabad	Will be collected half yearly as per CPCB/MoEF&CC Guidelines/ Notifications
6	Implementation of biological green belt development through block plantation activities.		Every 6 months by a core Soil sample will be collected every six months by a core group consisting of representatives from the management team and the plantation executing agency.

Monitoring data analysis will be done as per CPCB guidelines by NABL/MoEF&CC approved laboratory and shall be submitted to concerned authority (as specified in Environment Clearance Letter issued by SEIAA and Consent issued by SPCB) on regular basis.

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CHAPTER 1

INTRODUCTION

1. INTRODUCTION

1.1 PURPOSE OF REPORT

As per the notification of the MoEF&CC of 14th September 2006, 14th August, 2018 and 20th April, 2022 as amended in till date, mining projects spread over an area less than 250ha are categorized under Category B in the Schedule, including expansion and modernization of existing projects or activities. All these projects require prior environmental clearance from State Environment Impact Assessment Authority (SEIAA), on the recommendations of State Expert Appraisal Committee (SEAC) before the commencement of mining activities. In line with the said notification, a presentation was made to the State Expert Appraisal Committee, W.B. in the meeting held on **28th May, 2025** for determining the ToR for the preparation of EIA/EMP report. State Environment Impact Assessment Authority (SEIAA), West Bengal, issued TOR, vide letter no. **TO24B0107WB5575263N to Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra), on 17th June, 2025** (Refer Annex 1.1).

Based on the ToR conditions stipulated by SEIAA, a draft EIA was prepared. The present draft EIA/EMP prepared for assessing the environmental impacts on the study area (10km from boundary of the project site) due to the proposed mining activities.

1.2 IDENTIFICATION OF PROJECT& PROPONENT

Sand mining involves the extraction of sand from its natural configuration, and it serves as a valuable resource for a wide range of projects, including land reclamations, the construction of artificial islands, coastline stabilization, and various constructions. These activities bring about significant social and economic benefits to communities and industries involved. On a global scale, sand and gravel mining represents the largest volume of solid material extraction. Each year, an estimated 47 to 59 billion tonnes of material are mined worldwide (Steinberger et al., 2010). Within this substantial volume, sand and gravel, collectively known as aggregates, account for the largest share, ranging from 68% to 85%, and also exhibit the highest growth rate of extraction (Krausmann et al., 2009). River and marine aggregates continue to serve as the primary sources for building and land reclamation projects. Compared to other sources, in-stream gravel requires less processing and yields high-quality material that is well-suited for concrete production.

The project involves extraction of sand from **Damodar** River in **Purba Bardhaman** District, over Plot no. **952(P), 953(P)**, J.L. No.-**30**, Mouza: **Selimabad, Jamalpur** P.S. Letter of Intent was granted to **Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra)** for sand mining from the Govt. of West Bengal vide letter no. **355/1220/MM/Auction27/2018**, dated **12.11.2018** over an area of **2.18 Hectare/5.39 Acres** (Refer Annex 1.2). **Due to the non-potential zone, proponent is surrendering 0.26ha, now the area after surrendering is 1.92 Ha/4.74 Acres.** Further LoI vide no. **893/67/MM/2022** was extended by the office of the District Land & Land Reforms Officer, **Purba Bardhaman** dated **14.11.2022** and will be **valid till 60 days after the disposal of EC application by SEIAA (Refer Annex 1.3).** The validity period of the lease is 5 years from the date of deed registration.

1.2.1 PROJECT PROPONENT

Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra), was the highest bidder in the e-bidding process conducted by government of West Bengal. The applicant is involved in the mining business for last many years. The applicant will invest necessary funds for the scientific and systematic development of mines and other measures necessary to protect the quality of the environment and human health etc. The address of the proponent is provided below:

Name of the Applicant	**:**	Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra)
Address of the Applicant	:	Memari, Maszid Para, Krishna Bazar, Purba Bardhaman, 713146.
Period of Lease	:	5 years

1.3 BRIEF DESCRIPTION OF PROJECT

The location of site and the geographical coordinates of the site superimposed on toposheet are provided in **Figures 1.1** and **1.2** respectively as well as project site on satellite image has been shown in **Figure 1.3**. Mining will be carried out up to a maximum depth of **2.94 m** in river bed. Mining will be carried out only during day time except monsoon season. A brief description of the project is given in **Table 1.1**.

Table 1-1: Brief Description of Project

Particulars	**Details**		
Sanctioned Mining Lease area coordinate of 1.92 ha	**Project Co-ordinates**		
	Points	**Latitude**	**Longitude**
	A	23°05'03.81"N	87°59'26.76"E
	B	23°05'04.11"N	87°59'31.39"E
	C	23°05'03.25"N	87°59'32.70"E
	D	23°05'00.66"N	87°59'32.15"E
	E	23°05'00.19"N	87°59'25.67"E
Location of the project	State-	West Bengal	
	District-	Purba Bardhaman	
	P.S-	Jamalpur	
	Mouza-	Selimabad	
	JL No-	30	
	Plot No-	952(P) & 953(P)	
	Sand block code-	JAMALPUR/SELIMABAD/952(P),953(P)/A	
Toposheet No.	73M/16		
Total area	2.18 Hectare/5.39 Acres		
Surrendering area	0.26 Ha/0.65 Acres		
Area after surrendering	1.92 Ha/ 4.74 Acres		
Geological reserve in 5 years	2,28,049.92 m^3 (As per Approved Mine Plan)		
Mineable Reserves in 5 years	1,80,539.52 m^3 (As per Approved Mine Plan)		
Production as per Approved Mine Plan	44,688 m^3/year (1st year) 33,962.88 m^3/year (2nd year onwards) (76.00% replenishment rate)		

Particulars	Details
Manpower	38 (The laborers will be drawn mainly from Selimabad and surrounding villages)
Elevation	38 mRL to 42 mRL
Land-use	River bed
Nearest habitation/town	Selimabad village (0.50 km, SE Direction)
Nearest airport	Kazi Nazrul Islam Airport, (97 km, NW Direction)
Nearest railway station	Berugram Railway Station (2.50 km, NNW Direction)
Nearest highway	NH-19 (8.00 km, NE Direction) SH-15 (1.00 km, SSE Direction)
Power supply	The project does not require electricity connection. Excavation will be done only during day time and any requisite electricity will be sourced from solar panels, subject to approval from the Gram Panchayat if necessary.
Nearest Hospital	Selimabad Health Centre (1.00 km, SE Direction) Jamalpur Hospital (2.00 km, S Direction)
Educational Facility in the area	Selimabad High School (2.00 km, ESE) Batrishbigha Primary School (1.00 km, NE) Jamalpur Mahavidyalaya (2.00 km, SE Direction)
Water demand & supply	Water will be taken from hired tankers. The water requirement for mining & allied activities, drinking and plantation has been estimated to be 4.96 KLD (Drinking and domestic- 0.38 KLD, dust suppression & others- 3.00 KLD and Greenbelt development- 1.58 KLD).
Nearest tourist places	None in the Study Area
Defense installations	None in the Study Area
Archeological features	None in the Study Area
Nearest Forest area	Mana Forest (26.00, NW Direction)
Nearest stream/river/water body	Damodar River (onsite)
Seismic zone	Zone III

Source: Revised Approved Mine Plan, Pre-Feasibility Report, Maa Durga Coal Traders, Purba Bardhaman

Mining will be carried out by manual (preferably) or semi mechanised (as per approved mine plan) method of open cast mining with formation of benches. Proposed height & width of benches shall be kept 1 m & 1 m respectively over all pit slopes shall be maintained. No overburden is present over the sand deposit and no waste will be generated as the entire materials are saleable. A barrier of 7.5m will be left all along the boundary. The mined-out minerals will be loaded in tipper truck/tractor. The tipper truck/tractor and equipment's will be on hire basis or in-house depending upon requirement. The movement of tipper truck/tractor after mineral loading will be through approach roads.

The entire mineral produced will be used in construction of roads, buildings and other infrastructures. The entire mineral will be sold to the buyers thereby bridging the gap between demand and supply of these minor minerals in the region. This will also generate much needed

employment to the local people. Economy will be boost up of the area and there will be an overall growth of the region in terms of standard of living, education, health and transport.

1.4 SCOPE OF STUDY

As per the EIA Notification of 14th September 2006 and subsequent amendments, all 'Category A' projects require prior clearance by the Expert Appraisal Committee, Ministry of Environment, Forest & Climate Change, New Delhi and all category 'B' projects require prior clearance by the State Environment Impact Assessment Authority of the State. This report is prepared for SEIAA, West Bengal State. The environmental clearance process for new projects comprises of a maximum of four stages. The four stages in sequential order are as given below.

Stage 1 - Screening: It refers to the definite assignment of category to projects or activities where the same is not completely specified. The projects are categorized as 'A', 'B1' and 'B2'. Category 'A' projects are scrutinized and cleared through the Environment Appraisal Committee (EAC) at MoEF&CC, Govt. of India. In case of Category 'B' projects, scrutiny of application is done at the State level committee respective to categorize project into 'B1' or 'B2' category. The proposed sand mine is under Category 'B1' project and shall be appraised by State Level Committee of West Bengal.

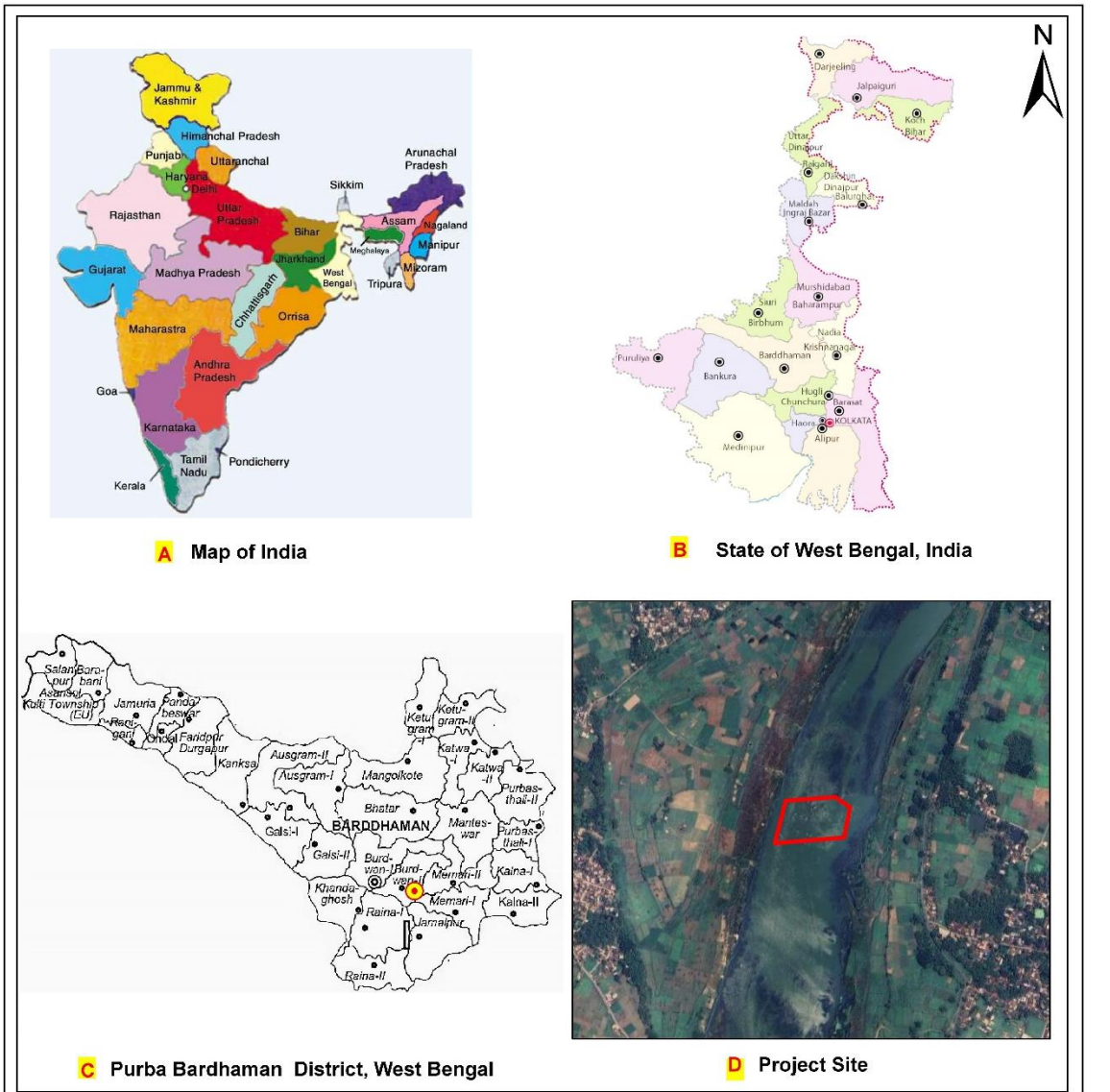
Stage 2 - Scoping: It refers to the process where EAC or SEAC determines detailed and comprehensive Terms of Reference for the EIA report and can also include site visits by the committee if required.

Stage 3 - Public Consultation: It refers to the process by which concerns of local people and other stakeholders are ascertained and their views taken regarding the project. The public consultation takes part in two steps: public hearing and written responses.

Stage 4 - Appraisal: This refers to detailed scrutiny of the application and EIA report to make categorical recommendations to the regulatory authority.

The detailed scope of work for the sand mining project was conducted in accordance with the Terms of Reference (TOR) issued by the State Environment Impact Assessment Authority (SEIAA), West Bengal. The TOR, referenced as letter no. **TO24B0107WB5575263N to Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra), on 17th June, 2025**. The scoping process followed the regulatory requirements outlined in Clause 7(i) of the EIA Notification 2006, as amended to date

The overall contents of the EIA report follow the list of contents given in **APPENDIX III, Generic Structure of Environmental Impact Assessment Document** of the Gazette Notification on Environmental Clearance issued by Ministry of Environment, Forests & Climate Change, Government of India vide no. SO 1533 dated 14thSeptember 2006.



Map:
Location Map of the Project Site
(Project Site Location)

Selimabad Sand Mining Project
Mouza: Selimabad, J.L: 30,
Plot No.: 952(P), 953(P),
Area: 4.74Ac/1.92Ha, P.S: Jamalpur,
District: Purba Bardhaman, West Bengal

Project Proponent:
Maa Durga Coal Traders

Graphic Scale:
0 100 200 400 600 800 m

Legend
Project Site

Fig no. 1.1: Location Map of the Project site

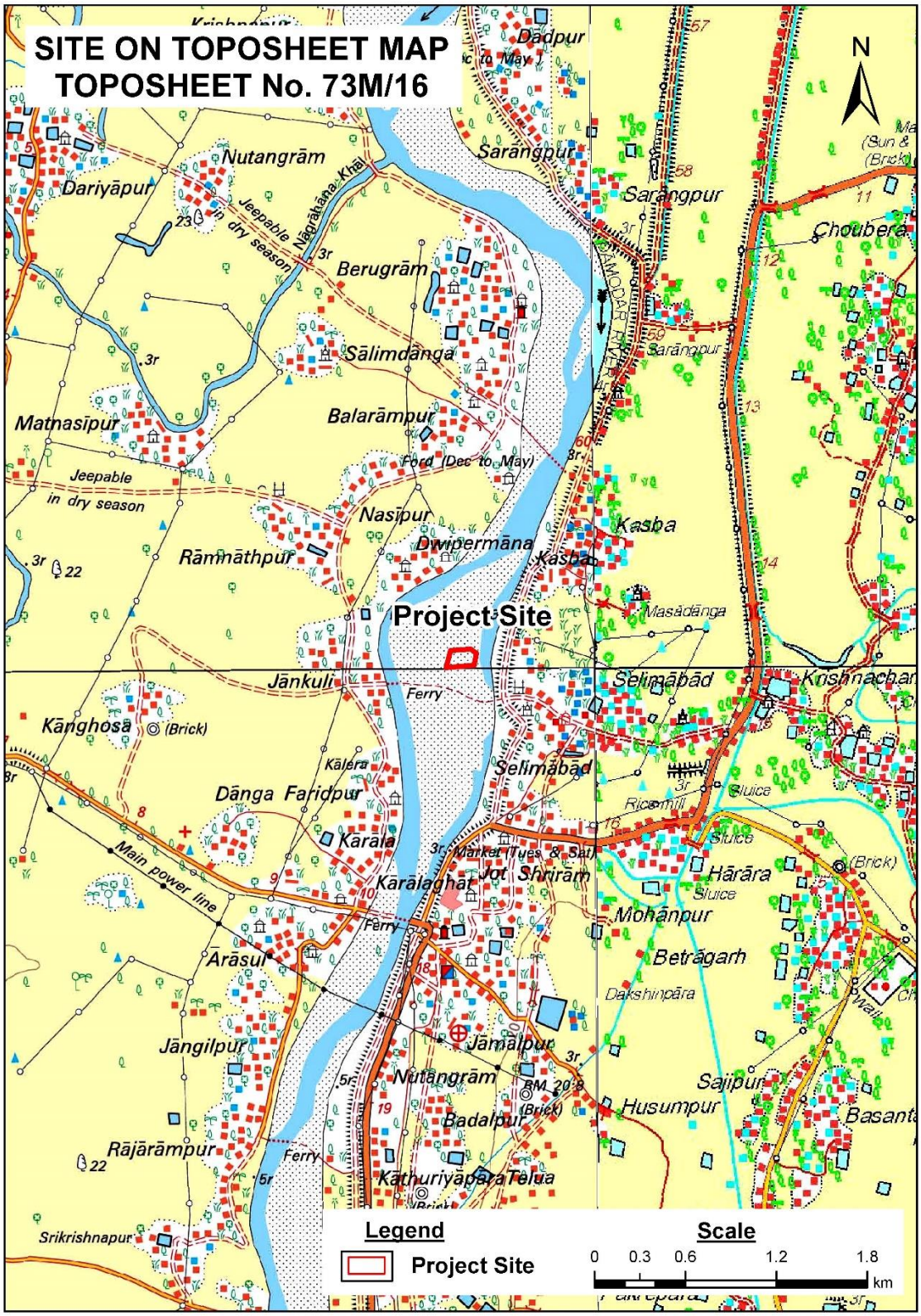


Fig no. 1.2: Site on Toposheet

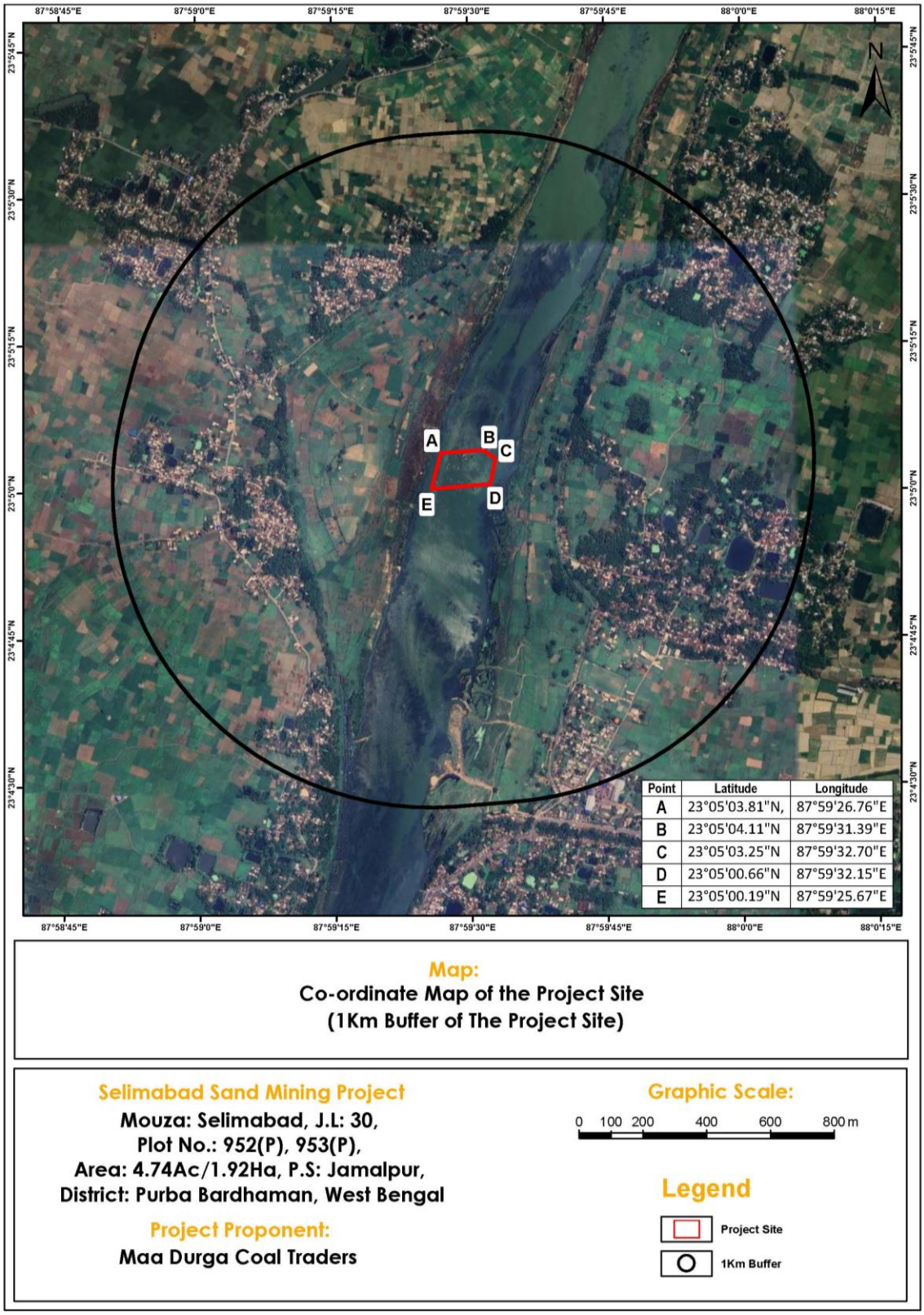


Fig no. 1.3: Co-ordinate Map

CHAPTER 2

PROJECT DESCRIPTION

2. PROJECT DESCRIPTION

2.1 CONDENSED DESCRIPTION OF PROJECT

This chapter contains related to the project like type of project, need for the project, project location and its layout details, project schedule and its implementation, technology and process and others on various facets of environment.

The condensed description of the project reveals that the river bed mining project is located on Damodar River, with **2 sand blocks for mining in 500m** of the project. The brief description of the project aspects likely to cause environmental effects are presented in **Table 2.1.**

Table 2-1: Project Aspects likely to Cause Environmental Effects

S.no	Aspects	Description
1	Sanctioned Mining lease area	2.18 Hectare/5.39 Acres
1(a)	Area after surrendering	1.92 Hectare/4.74 Acres
1(b)	Workable Mining lease area	1.52 Hectare
2	Number of blocks	One
3	River	Damodar River
4	Land Type	Non-Agricultural Government land on river bed
5	Category of the project	"B1"
6	Working days	200 dry days/year except monsoon
7	Minerals of the Mine	Riverbed sand
8	Geological reserve in 5 years	2,28,049.92 m^3 (As per Approved Mine Plan)
9	Mineable Reserves in 5 years	1,80,539.52 m^3 (As per Approved Mine Plan)
10	Production as per Approved Mine Plan	44,688 m^3/year (1st year) 33,962.88 m^3/year (2nd year onwards) (76.00% replenishment rate)
11	Method of Mining	Mining will be carried out through manual mining method if sufficient man power will be available or through semi-mechanised method
12	Ultimate Depth of the Mining	2.94m from surface
13	Water requirement and source	Water will be taken from hired tankers. The water requirement for mining & allied activities, drinking and plantation has been estimated to be 4.96 KLD (Drinking and domestic- 0.38 KLD, dust suppression & others- 3.00 KLD and Greenbelt development- 1.58 KLD).
14	Average Man Power/Day	38 (The laborers will be drawn mainly from Selimabad and surrounding villages)
15	Solid waste generation	No solid waste will be generated during mining. Entire excavated materials will be transported.

Source: Revised Approved Mine Plan, Pre-Feasibility Report, Maa Durga Coal Traders, Purba Bardhaman

2.2 TYPE AND NEED OF PROJECT

The applicant **Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra),** has obtained Sand mining lease through e-tendering from the Govt. of West Bengal vide Letter of Intent no. **355/1220/MM/Auction27/2018,** dated **12.11.2018** over an area of **2.18 Hectare/5.39 Acres** (Refer Annex 1.2). **Due to the non-potential zone, proponent is surrendering 0.26ha, now the area after surrendering is 1.92 Ha/4.74 Acres.** Further LoI vide no. **893/67/MM/2022** was extended by the office of the District Land & Land Reforms Officer, **Purba Bardhaman** dated **14.11.2022** and will be **valid till 60 days after the disposal of EC application by SEIAA (Refer Annex 1.3).** As riverbed Sand is replenished every year hence life of mine is not applicable. The proposed mine lease area shown in mouza map is attached as **Annex 2.1.**

Sand is made of quartz or quartzite or its microcrystalline variety i.e. chalcedony which is resistant to weathering. This quality makes these minerals suitable for construction purposes. The proposed project has planned a targeted production of **44,688 m³ per year** up to the contract period of 5 years from the date of deed registration. This production will cater the needs of construction material mainly in and around West Bengal thereby bridging the gap between demand and supply of these minor minerals in the region. The consistent supply of sand is crucial for construction activities and industries in the area.

2.3 PROJECT LOCATION

The mine lease area is located in Mouza **Selimabad**, P.S. **Jamalpur** of **Purba Bardhaman** District. The external coordinates of the mine lease area are **Latitude 23°05'00.19"N to 23°05'04.11"N to Longitude 87°59'25.67"E to Longitude 87°59'32.70"E**. The detail coordinates of allotted mine lease area and working lease area are shown **in Table 1.1 of Chapter-1**.

The project site is conveniently accessible via village road located **1.00km** away from the site, connected by a local metal road. There is also a well-established haul road that provides sufficient transportation capacity for trucks and dumpers to transport materials to and from the project site. **Figure 2.1** in the report showcases the general and specific location of the project, along with the boundaries of the mine lease area and the surrounding environment.

2.4 SIZE AND MAGNITUDE OF OPERATION

In the mine lease area covering **2.18 ha or 5.39 Ac**, due to the non-potential zone, proponent is surrendering **0.26ha,** now the area after surrendering is **1.92 Ha,** now the annual extraction of sand is projected to be **44,688 cum/year**, equivalent to **224 cum/day**. The mining operations will be carried out manually(preferably) or semi mechanised, employing approximately **38** laborers. To transport the mined material, **19** tipper truck/tractor will be utilized. **Annex 2.2** includes a letter from the district magistrate, certifying the presence of adjacent leases within a 500-meter radius of the project site.

The project site is surrounded by **two** additional sand block within a 500-meter radius. The geo-coordinates and details for the sand blocks are provided below:

Table 2-2: Cluster Details

Name of the Project: Selimabad Sand Mine			
Lessee/ Proponent	Manas Kumar Dhara		
Mouza	Selimabad		
J.L. No.	30		
Plot No.	953(P)		
Sand Block Code	Jamalpur/Selimabad/953(P)/G		
P.S.:	Jamalpur		
District	Purba Bardhaman		
Area Ha/Acres	1.97 Hectare/4.87 Acres		
Geological Reserve in 5 years	2,33,988.72 m^3		
Production/Year	45,864 m^3/year		
Production/Day	229 m^3/day		
Co-ordinate	**Sl. No.**	**Latitude**	**Longitude**
	A	23°4'49.58"N	87°59'31.60"E
	B	23°4'48.82"N	87°59'25.68"E
	C	23°4'52.75"N	87°59'25.18"E
	D	23°4'53.02"N	87°59'31.62"E
No. of dumper required per day	20		
Name of the Project: Selimabad Sand Mine			
Lessee/ Proponent	Sk. Islam Hossen		
Mouza	Selimabad		
J.L. No.	30		
Plot No.	953(P)		
Sand Block Code	Jamalpur/Selimabad/953(P)/B		
P.S.:	Jamalpur		
District	Purba Bardhaman		
Area Ha/Acres	1.88 Hectare/4.66 Acres		
Geological Reserve in 5 years	2,16,172.32 m^3		
Production/Year	41,454 m^3/year		
Production/Day	208 m^3/day		
Co-ordinate	**Sl. No.**	**Latitude**	**Longitude**
	A	23°4'59.77"N	87°59'25.58"E
	B	23°05'00.24"N	87°59'32.06"E
	C	23°04'57.17"N	87°59'31.81"E
	D	23°04'56.70"N	87°59'25.00"E
No. of dumper required per day	18		

2.5 PROPOSED SCHEDULE FOR APPROVAL & IMPLEMENTATION

The project will be implemented after completion of essential administrative procedures, including the signing of a lease deed with the District Collector on issuance of Environment Clearance from SEIAA and Consent to Establish/Operate from SPCB. The project implementation shall be done as per the condition stipulated in approved mine plan and environment clearance. The mine plan, which was approved by the Mining Officer of the Government of West Bengal on **26th March, 2025**.

This is a new mining area allotted to the applicant. Future production programme has been planned as per the details given in **Table 2.3**.

Table 2-3: Project implementation Schedule

Aspects	Value
Allotted Mine Lease Area in ha	2.18
Area after surrender	1.92
Proposed Daily Production in cum	224
Proposed Production per annum in cum (PDP x WDY)	44,688

Aspects	Value
Workable Mine Lease Area in ha	1.52
Working days in a Year	200
Period of allotment of Mine Lease in Years	5

2.6 MINING METHOD AND PROCESS DESCRIPTION

- The mining is confined to collection of sand from the riverbed. The extraction process will involve mining up to a maximum depth of 2.94 meters at the riverbank or up to the water table, whichever is less. Dry pit mining will be employed.

- The riverbed material will be collected in its natural state during the mining process. The mining method will be opencast manual (preferably) or semi mechanised. The river bed material will be collected in its existing form.

- The distance of 7.5 m shall be further marked from the lease boundary and this zone constituting the 'safety zone' shall be identified. No mining activities shall be undertaken within this 'safety zone'. This shall be in accordance of West Bengal Minor Mineral Concession Rules 2016 (WBMMCR-2016).

- The excavation of riverbed minerals will begin from the top of the designated area and progress downwards in 0.50-meter increments, removing the minerals in slices.

- Riverbed sand extraction will be done through bench of 1.00m height and 1.00m width, the whole material is mineable. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.

The guidelines related to sand mining will be followed.

2.7 PROJECT DESCRIPTION

Applicant **Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra)** is the successful highest bidder of Sand Block No.: **JAMALPUR/SELIMABAD/952(P),953(P)/A,** after participating in sand block auction conducted by Government of West Bengal and will obtain sand mining lease after deed registration. The mining lease will be granted over an area of **2.18 Hectare/5.39 Acres, area after surrendering is 1.92 Ha/4.74 Acres** on river **Damodar** at Mouza – **Selimabad,** Plot No. **952(P), 953(P),** J.L. No.- **30,** P.S.- **Jamalpur,** Dist – **Purba Bardhaman, West Bengal**.

Mine plan was Prepared by **Mr. Pritam Kumar Saha (QP)** and was approved by **Mining officer,** Govt. of West Bengal, on **26th March, 2025**.

SH-15 and **NH-19** are passing from about **1.00 km** and **8.00 Km** away from the sand block. Nearest railway station is **Berugram Railway Station** is situated at about **2.50 km** away in the **NNW** direction.

Table 2.4 provides an overview of the considerations taken into account during the preparation of the mining plan at the lease area. The mine plan layout and mining method are presented in **Figure 2.2** and **Figure 2.3**.

Table 2-4: Planning Consideration for Mining

Considerations	Details
Total Lease area	21,800 m^2
Area after Surrender	19,200 m^2
Total Workable Area	15,200 m^2
Peripheral 7.5m Buffer Area	4,000 m^2
Total Geological Reserves (Considering 2.94 m depth) (5 years)	2,28,049.92 m^3
Total Saleable Reserve as per approved mine plan (5 years)	1,80,539.52 m^3

Source: As per Revised Approved Mine plan.

The Production programme from the mine for the next 5 years is given below is shown in **Table 2.5.**

Table 2-5: Production Programme from Mining Lease Area

Year	Project area after surrender (Ha)	Production area (Ha)	Thickness (m)	Geological reserve (m^3)	Production (m^3) as per approved mine plan	Replenishment rate
1st	1.92	1.52	2.94	56,448	44,688	100%
2nd	1.92	1.52	2.2344	42,900.48	33,962.88	76.00%
3rd	1.92	1.52	2.2344	42,900.48	33,962.88	76.00%
4th	1.92	1.52	2.2344	42,900.48	33,962.88	76.00%
5th	1.92	1.52	2.2344	42,900.48	33,962.88	76.00%
Total reserves				**2,28,049.92**	**1,80,539.52**	

Source: As per Approved Mine plan

The mining operations will be carried out manually (preferably) or semi-mechanized mining method that does not involve drilling and blasting will be adopted. The geometry of the pit, including its current state, at the end of the plan period and conceptual period is presented in **Table 2.6**.

The land use pattern of the mine lease area across different phases: pre-mining, mining, and post-mining. It includes the categorization of the riverbed area, naturally reclaimed area, and restricted area during these phases (**Table 2.6**)

Table 2-6: Land use Pattern of Mine Lease Area

Sl. No.	Type of Land Use	Total Value (in Hectares)
A. PRE-MINING AREA		
A-1	Quarry Area	0.00
A-2	Infrastructure (road)	0.00
A-3	Agriculture	0.00
A-4	Plantation	0.00
A-5	Habitation	0.00
A-6	Soil dump	0.00
A-7	OB dump	0.00
A-8	River bed area	1.92
Total		**1.92**
B. DURING MINING		
B-1	Restricted area (7.5m mining area boundary, safety barrier)	0.40
B-2	Plantation (to be done outside the lease area)	0.00
B-3	Available area for mining	1.52
	Total	**1.92**
C. END OF LEASE PERIOD		
C-1	Restricted area (7.5m mining area boundary, safety barrier)	0.00
C-2	Naturally reclaimed in river bed	1.92
C-3	Un-worked river bed	0.00
C-4	Plantation (to be done outside the lease area)	0.00
	Total	**1.92**

Source: As per Revised Approved Mine plan prepared by Shri Pritam Kumar Saha (QP).

Total Project Cost is **3.01 cr.** Out of this, **Rs. 15,05,000** is allocated for the EMP programme and **Rs. 6,02,000** for the CER programme. The EMP budget will be utilized over 5 years, while the CER budget will be spent over 2 years.

Table 2-7: Project Cost

Sl. No.	Considerations	Amount (Rs.)
1	Auction Value	98,94,000
2	Estimated Royalty	1,92,54,611

3	Miscellaneous	10,00,000
	Total Cost	**3,01,48,611 approx. 3.01 cr**

The project requirement involves transport and loading/excavating machine, power, water, manpower and support services like mine office, rest shelter, canteen and washroom facility. The detail description of facilities is presented in **Table 2.8**.

Table 2-8: Infrastructure Required at Mine Lease Area

<table>
<tr><th>Aspects</th><th></th><th>Description</th></tr>
<tr><td>Machineries</td><td>:</td><td>Following machineries shall be deployed for the exploitation & transportation of Sand as per requirement: (i) Truck dumper/tipper; (ii) Excavator/Loader; (iii) water sprinkler;
The number of trucks will depend on per day production. As per production Programme in Table 2.6, 38 trips are needed for Selimabad sand mining project.</td></tr>
<tr><td>Manpower</td><td>:</td><td>Manpower will be about 38 persons as per the details given below
<table>
<tr><th>Manpower</th><th>Number</th></tr>
<tr><td>Manager/Mining mate/Supervisors</td><td>1</td></tr>
<tr><td>Skilled labours</td><td>15</td></tr>
<tr><td>Non-skilled labours</td><td>22</td></tr>
<tr><td>Total</td><td>38</td></tr>
</table>
Source: As per Revised Approved Mine plan for Selimabad Sand Mine prepared by Shri Pritam Kumar Saha (QP).</td></tr>
<tr><td>Power</td><td>:</td><td>Electricity connection is not required for the project. Mining will be carried out in day time only and any requisite electricity will be sourced from solar panels, subject to approval from the Gram Panchayat if necessary. Diesel required for machinery will be outsourced from nearby villages.</td></tr>
<tr><td>Water</td><td>:</td><td>The water supply for drinking purpose will be made available by hiring tankers from nearby villages. For others purpose water will be collected from nearby ponds with permission of Gram Panchayat. The total water requirement is 4.96 KLD. The use wise water requirement is presented below.
<table>
<tr><th>Activities</th><th>Requirement in KLD</th><th>Basis</th></tr>
<tr><td>Drinking and domestic</td><td>0.38</td><td>100litre/capita/day</td></tr>
<tr><td>Green Belt</td><td>1.58</td><td>0.5 Liter per plant 2 times a day</td></tr>
<tr><td>Dust Suppression & others</td><td>3.00</td><td>Length of Road (m) x Width of Road (m) x 1litre/m2 x 2times per day)</td></tr>
<tr><td>Total</td><td>4.96</td><td></td></tr>
</table></td></tr>
<tr><td>Infrastructure</td><td>:</td><td>The workers are mostly locals living in the close proximity of area and will work in shifts during day time only thus there is no requirement of major infrastructural facilities at the site.
The following infrastructure facilities will be made available for the workers.
(i) Mine office: One competent Manager and one Assistant Manager will be required to supervise the mining operations. A temporary office for Manager 15m^2 (5mx3m) shall be provided at the River bank. An additional room for other</td></tr>
</table>

Aspects	Description
	supervisory staff is also proposed at each mine. **(ii) Rest shelter:** A rest shelter will be provided for the employees to take breaks and have lunch during working hours. The size of the rest shelter will be approximately 30m² (10m x 3m) to accommodate the workers. **(iii) Canteen-cum-washroom facility**: To fulfill the needs of the workers in the mine, arrangements will be made to install a canteen-cum-washroom facility. This facility will serve as a space where workers can take breaks, have meals, and enjoy amenities like tea. Additionally, the washroom facility will be available for their use. **(iv) First Aid Room:** For the safety and well-being of workers during mining operations, a small first aid room will be established at each sub-block. These rooms will be equipped with first aid kits and an ample supply of necessary materials and medicines to address any injuries or medical emergencies that may occur.

2.8 DESCRIPTION OF MITIGATION MEASURES IN PROJECT

In the lease area the river flow being reduced and sediment load get deposited During flood season, the area gets sediments and source of erosion at this location is meagre.
The General guidelines of the Ministry of Environment and Forests as also of the Geological Survey of India will be followed the most important is as under:

- Dry pit mining will be followed which means mining at all times will be above the flowing river water level. Mining activity will be immediately stopped when water comes in the mining pits.
- Stream will not be diverted to form inactive channel.
- Mining at the concave side of the river channel will be avoided to prevent bank erosion.
- Mining will be restricted minimum 3m away (inward) from river bank to minimize effect of river bank erosion and to avoid consequent channel migration.
- Mining will be restricted in monsoon season.
- Area of mining lease will be demarcated prior to mining for sustainable development and Pucca Pillars will be erected on ground.
- Mining will be done manually and or Semi-Mechanized Method.
- No mining operations shall be carried out in proximity of any bridge and or embankment. Gate/Check Post with CCTV camera & R.F.I.D Scanner will be built-up and will be ensured all such facility in working condition by the owner.
- Further Rules & Regulations modified time to time by State Govt. shall be adhered.

2.9 ASSESSMENT OF NEW TECHNOLOGY FOR FAILURE

The mining is done using standard procedure of excavation and loading. Therefore, no new technology is involved or practiced in sand mining. The mining is done as per procedure stipulated

in the Sustainable Sand Mining Guideline 2016 and Enforcement & Monitoring Guidelines for Sand Mining 2020 and WBMMCR 2016 and The West Bengal Sand Mining Policy 2021.

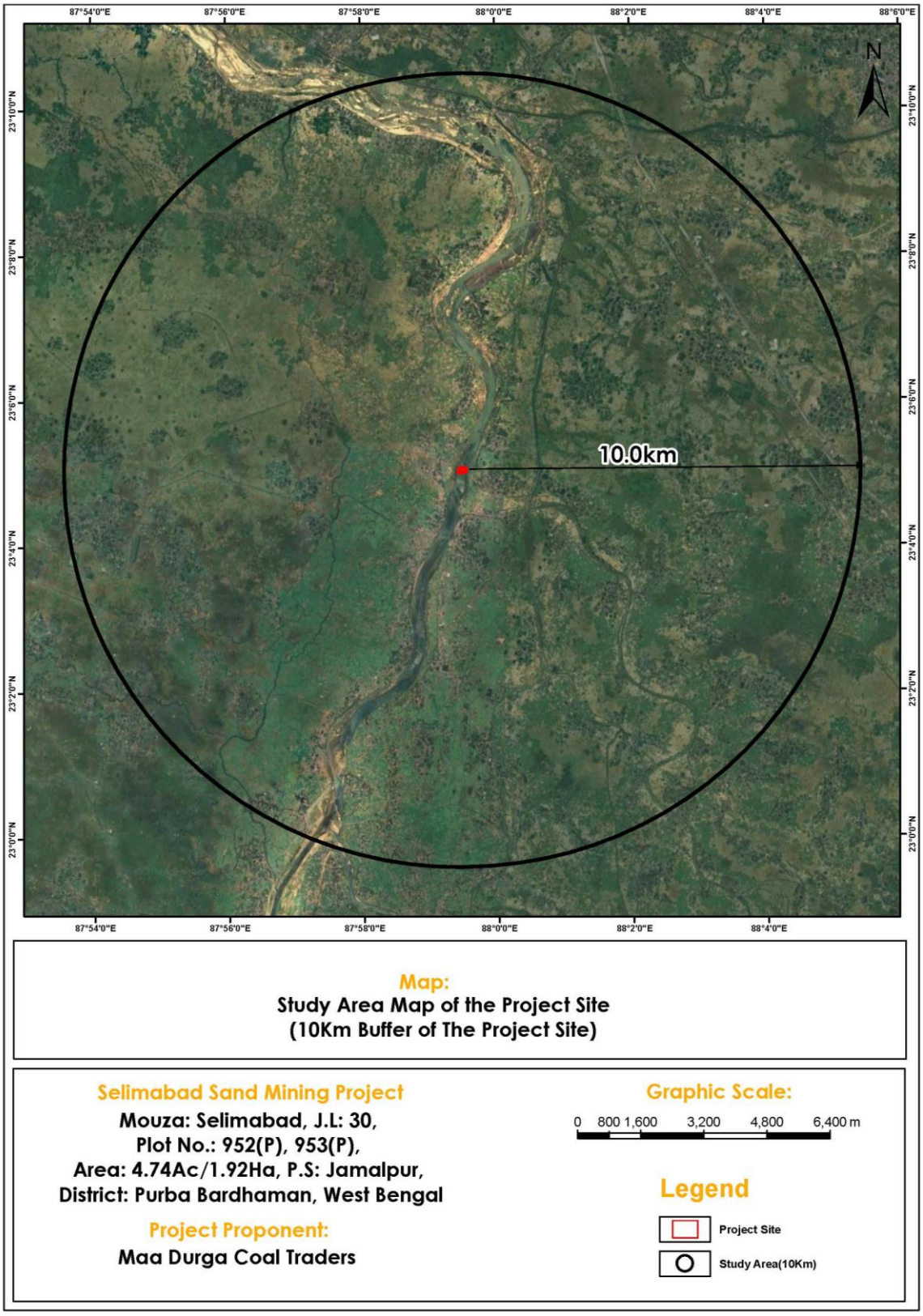


Figure 2.1: Study Area Map

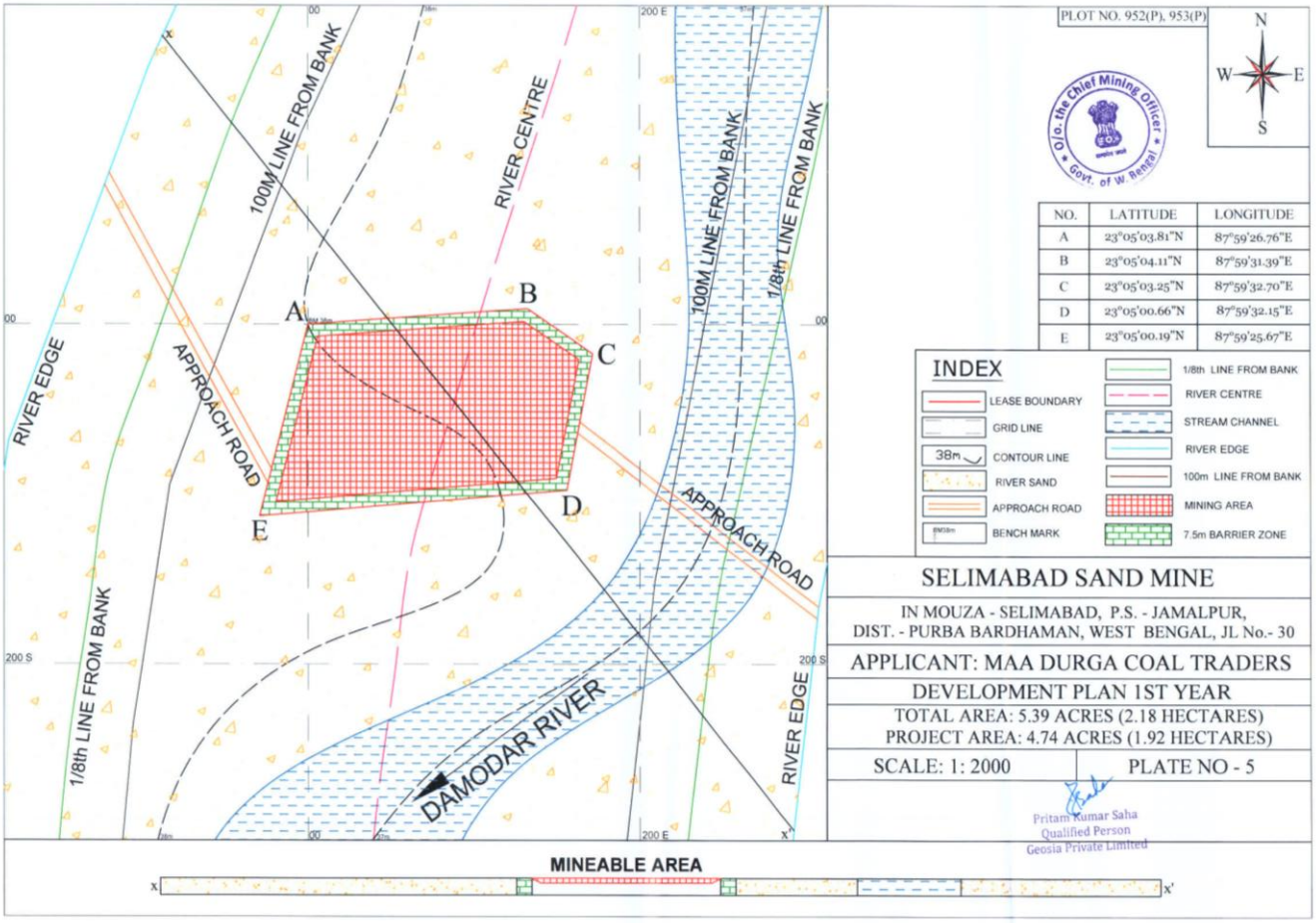


Figure 2.2: Development Plan 1st year

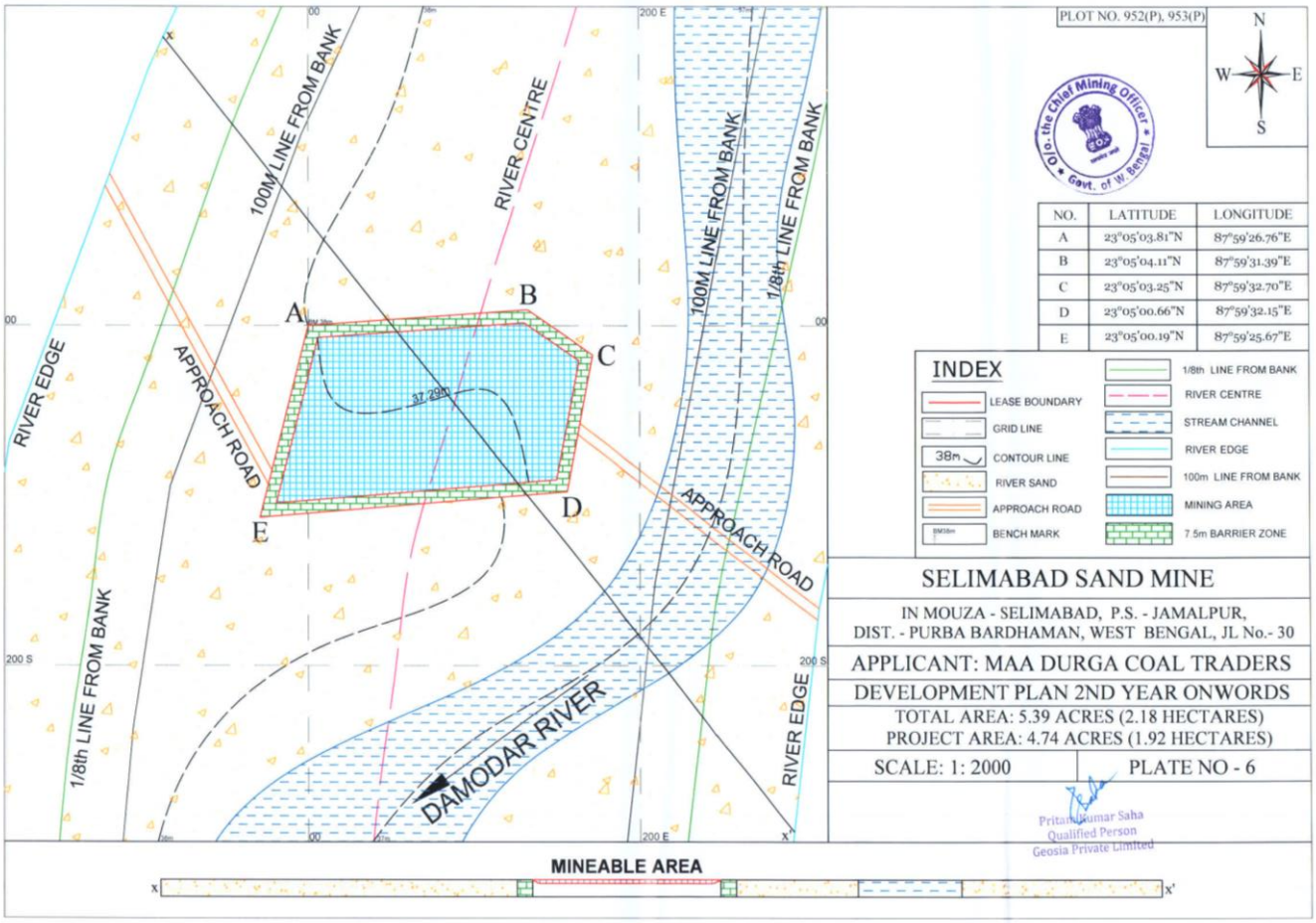


Figure 2.3: Development Plan 2nd year onwards

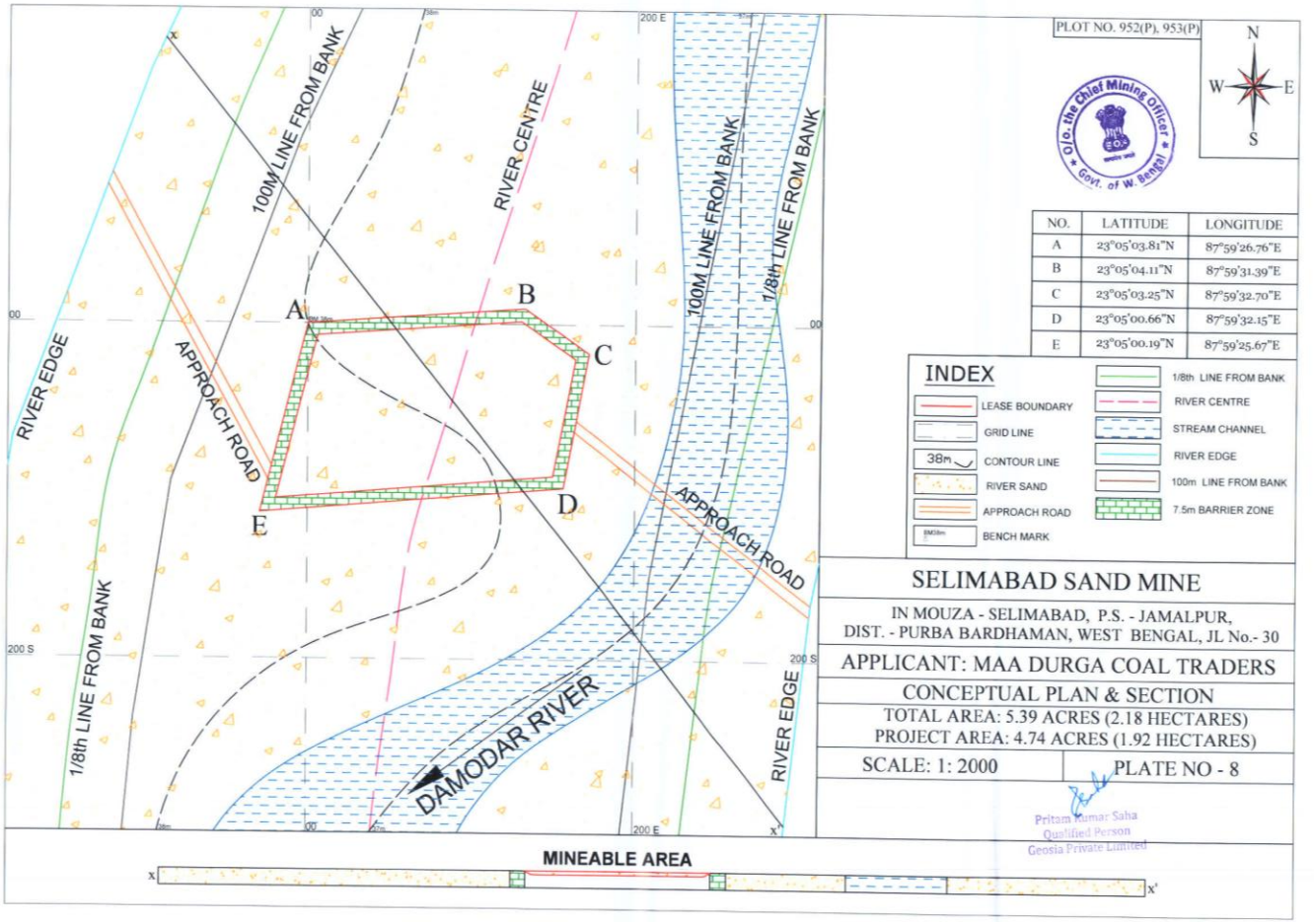


Figure 2.4: Conceptual Plan & Section

CHAPTER 3

DESCRIPTION OF THE ENVIRONMENT

3. DESCRIPTION OF THE ENVIRONMENT

3.1 STUDY AREA, PERIOD, COMPONENTS & METHOD

Baseline data generation is a crucial component of the Environmental Impact Assessment (EIA) study. It involves gathering comprehensive information on the existing environmental conditions in the study area. This data is essential for evaluating the anticipated impacts of a green field project on various environmental aspects using established impact assessment methodologies. Furthermore, baseline data is instrumental in the preparation of an Environmental Management Plan (EMP), which outlines measures to enhance environmental quality and provides a framework for future expansions while ensuring environmentally sustainable development.

3.1.1 STUDY AREA

The study area for the Environmental Impact Assessment (EIA) study encompasses a radius of 10 kilometres (aerial distance) from the boundary of the mine lease area. Project is situated in Mouza–**Selimabad,** P.S.-**Jamalpur,** Dist –**Purba Bardhaman, West Bengal,** within the Survey of India topography sheet no. 73M/16. The study area has been divided into two zones: the core zone, which represents the mine lease area, and the buffer zone, which extends 10 kilometres beyond the mine lease boundary, excluding the ML area. The study area map showing core and buffer zone is given in **Figure 3.1.**

3.1.2 STUDY PERIOD

The baseline study for environmental assessment was conducted concurrently with Selimabad mouza during the Post Monsoon Season from October to December 2024. It involved an extensive field monitoring study to assess the various environmental attributes of the study area and establish a baseline for comparison.

3.1.3 STUDY METHOD

Baseline data was generated for Valued Environment Components (VEC) including ambient air, surface and groundwater, land and soil, ecology, and socio-economic factors. A temporary field office was established at Jamalpur block, close to the mine lease area, to facilitate data collection. The team consisted of experts in relevant fields, along with field and office assistants. The Environment Coordinator visited the site twice during the study period to ensure proper data collection. The team conducted soil and water sampling, monitored air quality and noise levels, and collected other field data from this field station. **Table 3.1** in the report provides details on the sampling methodologies, frequency, and analysis methods for the various environmental parameters required for the study.

Table 3-1: Methodology for Sample Collection & Analysis for VECs

Sl. No	Component	Primary Data					Secondary Sources/ References
		Frequency of Sampling	No. of Locations	Parameters	Instrument	Method	
A	**LAND ENVIRONMENT**						
i	Land use & Land cover	Study Area	Core & buffer zone	Land utilization Pattern	-	Arc View, ERDAS, Arc infosoftware	Survey of India Toposheet, LISS-II &Satellite Imagery
ii	Soil Quality	Once in study period	4	pH, Organic Matter, Organic carbon, EC, BD, N, P, K	Kjeldahl Nitrogen, PH meter, conductivity meter, hydrometer	Gravimetric, photometric	Agriculture Handbook
iii.	Classified TVC	7days Once in Study Period	2	Traffic Volume	Manual with Format	-	IRC Code
B	**AIR ENVIRONMENT**						
i	Meteorology& Climatology	Continuous for whole season on hourly basis	1	Temperature, Humidity, rainfall, wind speed and direction	Automatic weather monitoring machine with data logger	-	30-years IMD data from Climatological Tables (1971 – 2000)
ii	Ambient Air Quality	24 hourly samples twice a week for 3-months	6	PM_{10}	Respirable Dust Samplers (APM 460 BL) with gas attachment	Gravimetric	IS-5182 (23)
				SO_2		West & Gaek	IS-5182 (2)
				NO_2		Jacobs & Hochheiser	IS-5182 (6)
				$PM_{2.5}$	Fine Particle Sample	-	-
				CO	NDIR	InfraredAnalysis	-
				% Free Silica	Gravimetric method	-	IS-1760 (6)
iii	Noise Level	-	6		Integrated sound level meter.	Measurements were taken by following CPCB procedure	-
C	**WATER ENVIRONMENT**						
i	Water Quality	Once in study period	4 GW 2 SW	Physical, chemical and heavy metals	Spectro-photometer Atomic Absorption Spectro-	Titrametric, gravimetric, photometric, AAS	APHA IS10500: GW Designated Best Use of Water as per

					photometer Flame Photometer		CPCB: SW
D	**ECOLOGICAL ENVIRONMENT**						
i.	Ecology	Once in study period	Study Area	Flora, fauna, Aquatic	Field data collection	Quadrant	Forest Working Plan
E	**SOCIO-ECONOMIC ENVIRONMENT**						
i.	Socio-economic	Once in Study period	Core &buffer zone	Demographic, social, economic & infrastructure	Survey Schedule	Village-level Survey, Group Discussion	Census of India 2001/ 2011,BPL List, Revenue Dept. data

3.2 LAND ENVIRONMENT

A detailed study was conducted to analyse the characteristics of the study area's land environment, including land use, soil, and vibration. This study aimed to gain a thorough understanding of the study area's land attributes and their potential role in the propagation of pollution.

3.2.1 ENVIRONMENTAL SENSITIVITY

The environmental sensitivity as per Part-III of Appendix-I (Paragraph-6) of Form-I of the EIA notification 2006 amended to date provides for sensitive receptors within 15km radius of the ML area. **Table 3.2** and **Figure 3.2** also provides the spatial locations of these receptors within the 15km radius of the ML area.

Table 3-2: Environment Sensitive Locations in 15km of ML Area

S.no	Particular	Distance in km	Direction
Forest			
Water Bodies			
1	Damodar river	Onsite	
2	Banka Nadi	12.7	NNE
3	Eden Canal	8.9	NNE
4	Mahindar N.	2.5	E
5	Kana Nadi	4.4	SE
6	Katna Khal	9.1	SW
7	Deb Khal	2.2	NW

Source Eco-sensitivity map Prepared by NIPL,2025

3.2.2 LANDUSE PATTERN-STUDY AREA & ML AREA

The land-use distribution of the study and ML area is given in **Table 3.3**. The land use table can be meaningfully interpreted land-use map of the study area in **Figure 3.4** and from the pie diagram in **Figure 3.5**.

Table 3-3: Land use of Study and ML Area

Land use	Study Area		ML Area	
	Area in hectare	%	Area in hectare	%
Project Site	1.92	0.01	1.92	100
Built-up	5,567.16	17.4	-	-
Open Scrub	5.99	0.02	-	-
Sandy Area	944.89	3.0	-	-
Waterbody	1,526.15	4.8	-	-
Agriculture Land	23,894.00	74.8	-	-
Total Area in hectare	**31,940.11**	**100.00**	**1.92**	**100**

Source: Land use and Land cover map prepared by NIPL,2025

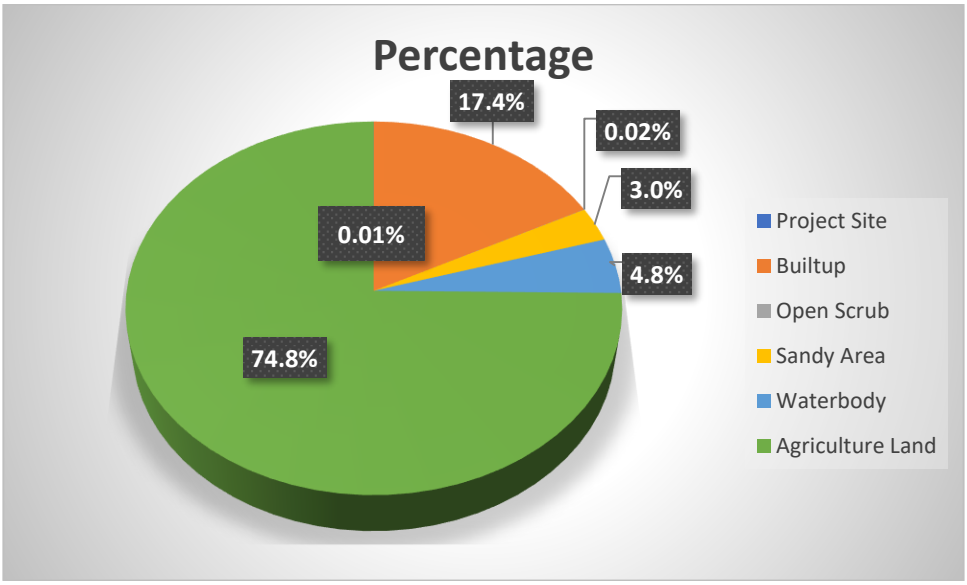


Fig no. 3-5: Pie diagram of Landuse Pattern

The pie chart clearly illustrates the land use distribution in the study area. Agricultural land comprises approximately 74.8% of the area, followed by build-up areas at around 17.4%. Sandy areas and water bodies occupy about 3.0% and 4.8% respectively. The remaining portion consists of Project site and open scrub. Given the dominant presence of agricultural land, human habitation, and some forested areas, it can be inferred that the anticipated impact of mining on the overall area would be minimal.

A comprehensive site visit was conducted across the entire mine lease (ML) area, during which the land features were carefully observed and compared with satellite images for data verification. Since the mining site is situated on a river bed, the entire area consists of sandy terrain. Hence, the entire ML area can be categorized as sandy land, with no portion falling under river water.

The land where the proposed mining activities will be carried out has been taken on lease by the project proponent. There are no R&R issues involved with this project. The relevant land documents and the LoI are attached as **Annex 1.1**.

3.2.3 SESIMOLOGY

Entire West Bengal is divided into seismic zones II, III, IV and V. The ML area falls under seismic zone III which is a Moderate damage risk zone (MSK VII).

3.2.4 FLOOD HAZARD

The Damodar River was once upon a time known as "Sorrow of Bengal" since this is flooded almost every year which receives huge quantum of water from the upland of the Chhotanagpur Plateau. Along with the catchment water, the river also receives a huge quantum of sediment loads. Several attempts have been undertaken from the historic period for flood control which has affected only after the Independence in 1948 when "Damodar Valley Corporation" has been formed. Damodar River was earlier known as the "River of Sorrows" as it used to flood many areas of Bardhaman, Hooghly, Howrah and Medinipur districts. Even now the floods sometimes affect the lower Damodar Valley, but the havoc it wreaked in earlier years is now a matter of history. The floods were virtually an annual ritual. In some years the damage was probably more. Many of the great floods of the Damodar are recorded in history — 1770, 1855, 1866,1873–74, 1875–76, 1884–85, 1891–92, 1897, 1900, 1907, 1913, 1927, 1930, 1935 and 1943. In four of these floods (1770, 1855, 1913 and 1943) most of Bardhaman town was flooded. (Source: District Survey Report of Purba Bardhaman District, published on dated 8th September 2022)

3.2.5 SOIL QUALITY

Soil quality of the study area is one of the important VEC. The composite soil samples are collected from the study area and analysed for different parameters. The locations of the monitoring sites are given in **Table 3.4** and depicted in **Figure 3.6.** Monitoring data are attached as **Annex 3.2**.

For studying soil profile of the region, four sampling locations were selected to assess the existing soil conditions in and around the project area representing various land use conditions in Post Monsoon season (October to December 2024). The soil samples were collected using a random grid method, with a grid size of 10m x 10m. A core-cutter was used to extract samples up to a depth of 90cm. Composite samples has been collected from each grid, by mixing of eight sub-samples and reducing the weight to approximately 500gm by conning and quartering method. The samples were packed in polyethylene bags and assigned a number. The collected samples were air dried at room temperature in the laboratory and lightly crushed with mortar-pastel and passed through 2mm sieve. The soil samples were analysed for the physico-chemical properties by standard procedure as presented in **Appendix 3.1**.

The soil quality as analysed from the collected samples is given in **Table 3.4.**

Table 3-4: Soil Characteristics of the Study Area

Sl. no	Parameters	Unit	S-1: Selimabad	S-2: Jotkrishtai	S-3: Kalera	S-4: Deriapur
		Direction	E	SSE	SW	NNW
		Distance in km	0.22	2.68	1.73	3.37
1.	Soil colour	----	Brownish	Brownish	Brownish	Brownish
2.	pH	----	7.2	7.3	7.5	7.4
3.	Electrical Conductivity	µmhos /cm	261	252	258	265
4.	Moisture	%	2.5	2.9	3.8	3.5
5.	Clay	%	39	42	43	48
6.	Silt	%	36	28	25	22
7.	Sand	%	25	30	32	30
8.	Infiltration Rate	cm/hr	1.27	1.15	1.23	1.43
9.	Bulk density	gm/cm^3	1.36	1.24	1.36	1.25
10.	Porosity	%	42.1	44.6	40.2	35.1
11.	Nitrogen as N	kg/ha as N	114.0	132.0	125.0	162.0
12.	Phosphorus	kg/ha as P	32.6	44.5	30.7	28.5
13.	Potassium as K	kg/ha as K	240	267	250	246
14.	Organic Carbon	%	0.38	0.30	0.41	0.48
15.	Organic matter	%	0.66	0.52	0.71	0.82

Source: Data Collection by NIPL and Analysis by N. D. International.

The following inferences are drawn from **Table 3.4** and standard soil classification by Handbook of Agriculture, Indian Council of Agriculture Research, New Delhi.

- Soil bulk density is a dynamic characteristic that varies depending on the soil's structural conditions. In general, it increases with profile depth, due to changes in organic matter content, porosity and compaction. It is required for gaseous exchange, such as high bulk density would pose restriction to the growth of deeper-rooted plants and maybe one of the reasons of cessation of plant growth (Ghose et al., 2004). Bulk density of the study area ranges between 1.24 gm/cm^3 S2 (Jotkrishtai) to 1.36 gm/cm^3 at S1 (Selimabad) & S3 (Kalera). A normal range of bulk densities for clay is 1.0 to 1.6 mg/m^3 and a normal range for sand is 1.2 to 1.8 mg/m^3 with potential root restriction occurring at ≥ 1.4 mg/m^3 for clay and ≥1.6 mg/m^3 for sand.
- The soil in the study area is neutral to slightly alkaline with pH ranging from 7.2 to 7.5 in the study area.
- The electrical conductivity of the soil samples is found to be average and ranges from 252 µmhos /cm to 265 µmhos /cm.
- Organic carbon, a major nutrient for soil fertility, was found "less to medium" in the study area. Organic carbon content is 0.38% in Selimabad, 0.30% in Jotkrishtai, 0.41% in Kalera, 0.48% in Deriapur.
- Nitrogen is important because it is a major component of chlorophyll, the compound by which plants use sunlight energy to produce sugars from water and carbon dioxide during photosynthesis. It is also a major component of amino acids. Soil nitrogen exists in three

general forms: organic nitrogen compounds, ammonium ions and nitrate ions. The majority of plant-available nitrogen is in the inorganic forms and (sometimes called mineral nitrogen). Nitrogen content in the surface soil of the study area varies between 114 kg/ha at S1 (Selimabad) to 162 kg/ha at S4 (Deriapur).

- Phosphorus is the key content which plays an important role in the photosynthesis, respiration, energy storage and transfer, cell division, cell enlargement and several other properties in the living plant. Available Phosphorus ranges between 28.5 kg/ha at S4 (Deriapur) to 44.5 kg/ha at S2 (Jotkrishtai). As per ICAR classification the phosphorus in the study area present is classified as "medium".
- Potassium is an essential plant nutrient and is required in large amounts for proper growth and reproduction of plants. Potassium is considered second only to nitrogen, when it comes to nutrients needed by plants, and is commonly considered as the "quality nutrient". It affects the plant shape, size, colour, taste and other measurements attributed to healthy produce. Potassium content in the study area ranges between 240kg/ha at S1 (Selimabad) to 267 kg/ha at S2(Jotkrishtai). As per ICAR classification the potassium in the study area present is classified as "average".

Based on the provided data, it can be inferred that the soil in the study area has average fertility, indicated by medium levels of phosphorus and potassium. However, the nitrogen content in the soil is relatively good. Nitrogen is essential for leaf growth, suggesting that plants in this area would benefit from the available nitrogen for foliage development.

3.2.6 CLASSIFIED TRAFFIC VOLUME COUNT (TVC)

The traffic volume count was conducted at two locations as shown in **Figure 3.7**, and the results are provided in **Table 3.5**. The TVC was conducted in November, 2024, following the guidelines outlined in the IRC code. Two staff members were assigned to monitor vehicular movement in a single direction. The 24-hour classified volume count involved recording the number of heavy motor vehicles (HMV), light motor vehicles (LMV), and two/three wheelers. Analysing the data from **Table 3.5**, it is evident that the traffic density in the roads designated for transporting sand is relatively low. Therefore, these roads have the capacity to accommodate the additional traffic generated by the project without significant congestion or issues.

Table 3-5: Traffic Volume in PCU per day

Code and Location	Distance (km)	Direction	HMV		LMV		2/3Whellers		Total
			No.	PCU	No.	PCU	No.	PCU	
T1*: Near Mines Road	0.48	SE	128	384	328	328	1456	728	1440
T2*: Raina Jamalpur Road	1.06	S	467	1401	1543	1543	3244	1622	4566

*Rural (calculate on 24hours basis)
**Urban (calculate on per hours basis)
Source: Traffic Volume Count, N. D. International

3.3 AIR ENVIRONMENT

3.3.1 METEROLOGY AND CLIMATOLOGY AS PER IMD

This section provides a comparative analysis of the meteorological data collected by the project team in the study area from October to December 2024. The data used for this analysis includes the 30-year average data from the Indian Meteorological Department (IMD) spanning from 1971 to 2000. The data was obtained from the Meteorological Station in Bagati.

The climate of the region over most of the year is a pronounced continental in character. It is very hot in summer and markedly cold in winter season (**Table 3.6**).

Table 3-6: Climate Condition in Study Area

Sl. No.	Parameter	Season	Months	Monthly Total (mm)	Heaviest fall in 24 hours (mm)	No. of Rainy Days
i	**Rainfall in mm**	Winter (Dec to Feb)	December	6.8	80.6	0.5
			January	11.9	31	1
			February	26.8	60.1	1.5
			Total	**45.5**	**171.7**	**3**
		Summer (Mar to May)	March	41.7	125	2.3
			April	63.6	95	3.6
			May	131	90	6.9
			Total	**236.3**	**310**	**12.8**
		Monsoon (Jun to Sept)	June	272.7	186.8	11.3
			July	294	235.3	15.2
			August	261.4	174.2	14.7
			September	251.7	280.2	11.3
			Total	**1079.8**	**876.5**	**52.5**
		Post Monsoon (Oct to Dec)	October	133.6	110.8	5.7
			November	26.2	109	0.8
			December	6.8	80.6	0.5
			Total	**166.6**	**300.4**	**7**
ii	**Temperature (Mean daily temperature)**	Winter (Dec to Feb)	**Months**	**Max.**	**Min.**	
			December	28.7	10.2	
			January	28.7	8.6	
			February	32.4	11.7	
			Average	**29.93**	10.167	
		Summer (Mar to May)	March	26.9	15.7	
			April	38.7	19.1	
			May	39.2	20.7	
			Average	**34.93**	**18.5**	
		Monsoon (Jun to Sept)	June	38	23	
			July	35.2	23.7	
			August	34.7	24.1	
			September	34.7	23.4	

			Average	**35.65**	**23.55**	
		Post Monsoon (Oct to Dec)	October	34.2	19.8	
			November	32	14	
			December	28.7	10.2	
			Average	**31.63**	**14.67**	
iii	**Cloud Cover (Oktas of sky)**	Winter (Dec to Feb)	**All cloud**		**Low cloud**	
			08:30	**17:30**	**08:30**	**17:30**
			0.4	0.5	0.2	0.2
			0.7	0.7	0.4	0.4
			1.2	0.9	0.7	0.5
		Summer (Mar to May)	1.6	1.1	0.9	0.7
			2.5	1.9	1.5	1.2
			3.8	2.6	2.2	1.8
		Monsoon (Jun to Sept)	5.3	4.5	3.1	3.2
			6.1	5.5	3.5	3.8
			6.1	5.6	3.5	3.9
			5.4	5	3.1	3.5
		Post Monsoon (Oct to Dec)	3.1	3.1	1.8	2.1
			1.1	1.1	0.6	0.7
			0.4	0.5	0.2	0.2
iv	**Relative Humidity in (RH) %**	Winter (Dec to Feb)	**Months**	**8.30 hrs**	**17.30 hrs**	
			December	81	63	
			January	81	60	
			February	77	57	
			Average	**79.67**	**60**	
		Summer (Mar to May)	March	77	62	
			April	80	67	
			May	81	69	
			Average	**79.33**	**66**	
		Monsoon (Jun to Sept)	June	85	78	
			July	88	83	
			August	88	83	
			September	87	83	
			Average	**87**	**81.75**	
		Post Monsoon (Oct to Dec)	October	84	78	
			November	80	70	
			December	81	63	
			Average	**81.67**	**70.33**	

v	**Wind pattern**	Winter (Dec to Feb)	**Months**	**Wind speed**	
				kmph	**m/s**
			December	1.3	0.361
			January	1.5	0.416
			February	1.4	0.389
			Average	**1.4**	**0.388**
		Summer (Mar to May)	March	1.6	0.444
			April	1.9	0.527
			May	2.2	0.611

			Average	**1.9**	**0.527**
		Monsoon (Jun to Sept)	June	2.2	0.611
			July	1.7	0.472
			August	1.5	0.416
			September	1.6	0.444
			Average	**1.75**	**0.485**
		Post Monsoon (Oct to Dec)	October	1.5	0.416
			November	1.2	0.333
			December	1.3	0.361
			Average	**1.33**	**0.37**

Source: Climatological Table *1971-2000*, Indian Meteorological Department, Govt. of India, New Delhi (Bagati station)

Temperature : The area experiences high temperature during summer accompanied by high humid condition. Based on the average 30 years' data, it is observed that the maximum daily temperature in the study area has reached 39.2°C in the month of May. However, there is no information available regarding the average daily minimum temperature for the given period.

Rainfall : The study area is characterized by heavy rainfall, with an average annual rainfall of approximately 1546.5 mm based on the 30-year average data from the Indian Meteorological Department (IMD). There are about 75 rainy days in a year. The heaviest recorded rainfall within a 24-hour period was 280.2 mm, which occurred on September 28th, 1978. On average, the months of July and September consistently experience the highest rainfall each year, as depicted in **Figure 3.8**.

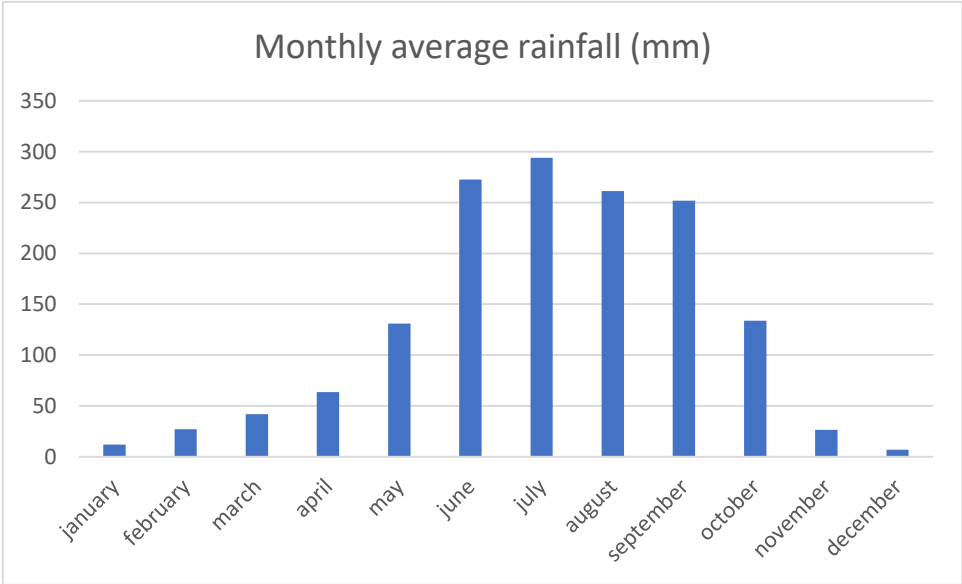


Figure 3-8: Average Rainfall in mm as per IMD

Relative Humidity : The region has reasonably moist climate except with an average value of 87% during morning. The summer season is the driest part of the year when humidity levels 77% to 81% respectively during March and May. June to September, being the rainiest months, experience humidity level of 85% to 88% respectively in the daytime **Figure 3-9**.

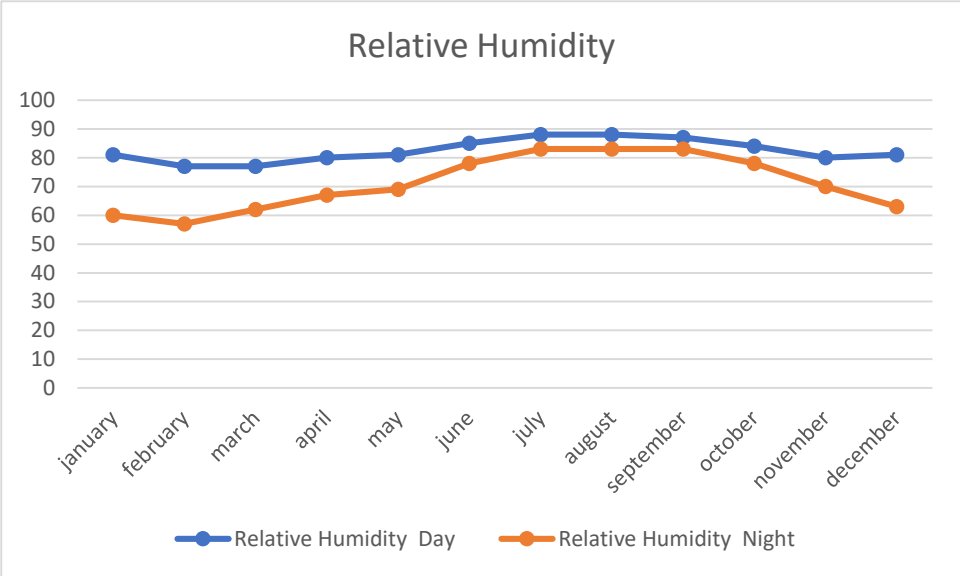
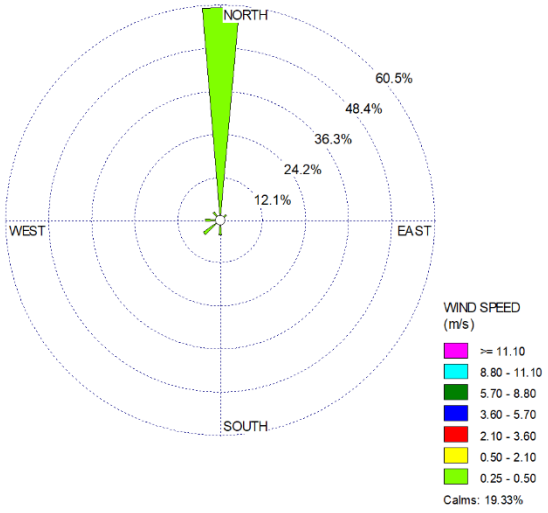
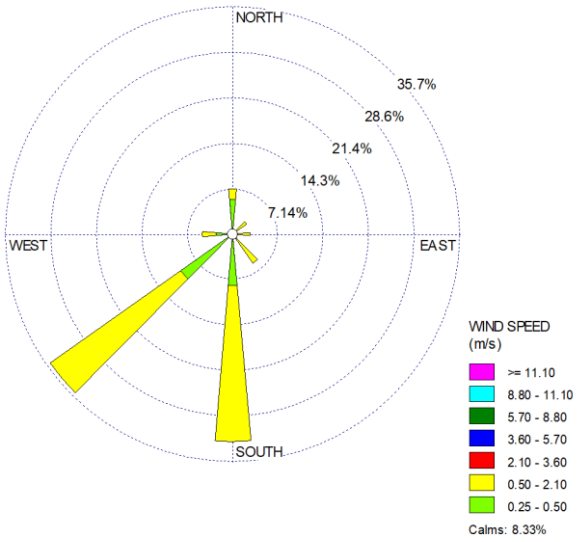


Figure 3-9: Relative Humidity during Day & Evening

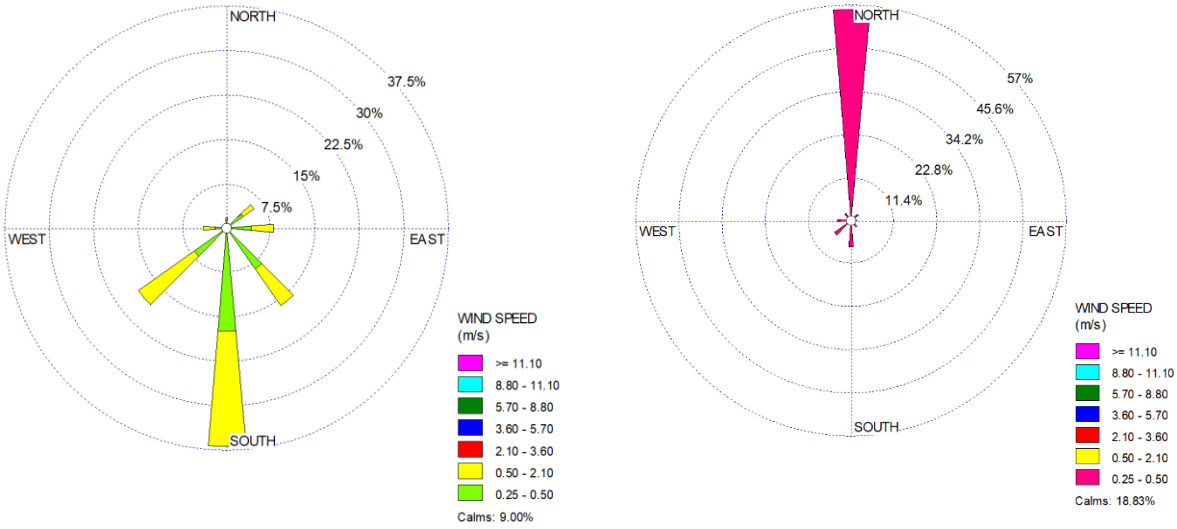
Wind Pattern : The general dominant wind direction is from N to S. The wind-speed was found to be highest during the summer and monsoon seasons with the average wind speed of 1.9 m/s and 1.75 m/s respectively. The seasonal wind roses for the entire year is provided in **Figure 3.10.**



Winter: December - February



Summer: March - May



Monsoon: June - September **Post-Monsoon: October – December**

Figure 3-10: Wind Direction and Speed as per IMD

3.3.2 ON-SITE METEOROLOGICAL DATA

The data on meteorological parameters in the study area were monitored for the period post-monsoon season (October to December, 2024). The data was monitored with an automatic weather monitoring station placed near the proposed mining site. The collected data are presented in **Table 3.7** and detailed data is attached as **Annex 3.1**.

The average maximum temperature recorded during the study period was 43.6°C in November 2024 and the minimum was 14.8°C in December 2024. The average maximum Relative Humidity for the study area was 96.0% while the minimum average was 12.0%. The average maximum wind speed recorded was 8.0km/hr. Wind rose diagram (**Figure 3.11**) from the monitored data shows that the predominant wind direction during the study period was mainly North to south.

Table 3-7: Summary of the Site-Specific Meteorological Data

Month		Temperature (˚C)	Wind Speed (km/hr)	Humidity (%)	Wind Direction (Degree)
October, 24	Min	21.0	0.0	12.0	22.5
	Max	42.4	15.0	96.0	360.0
	Average	**30.2**	**2.7**	**62.2**	**299.4**
November, 24	Min	18.0	0.0	12.0	22.5
	Max	43.6	7.0	94.0	360.0
	Average	**30.2**	**1.7**	**52.9**	**304.5**
December, 24	Min	14.8	0.0	13.0	22.5
	Max	35.0	8.0	94.0	360.0
	Average	**24.2**	**2.2**	**47.2**	**314.8**

Source: On-site monitoring by N. D. International

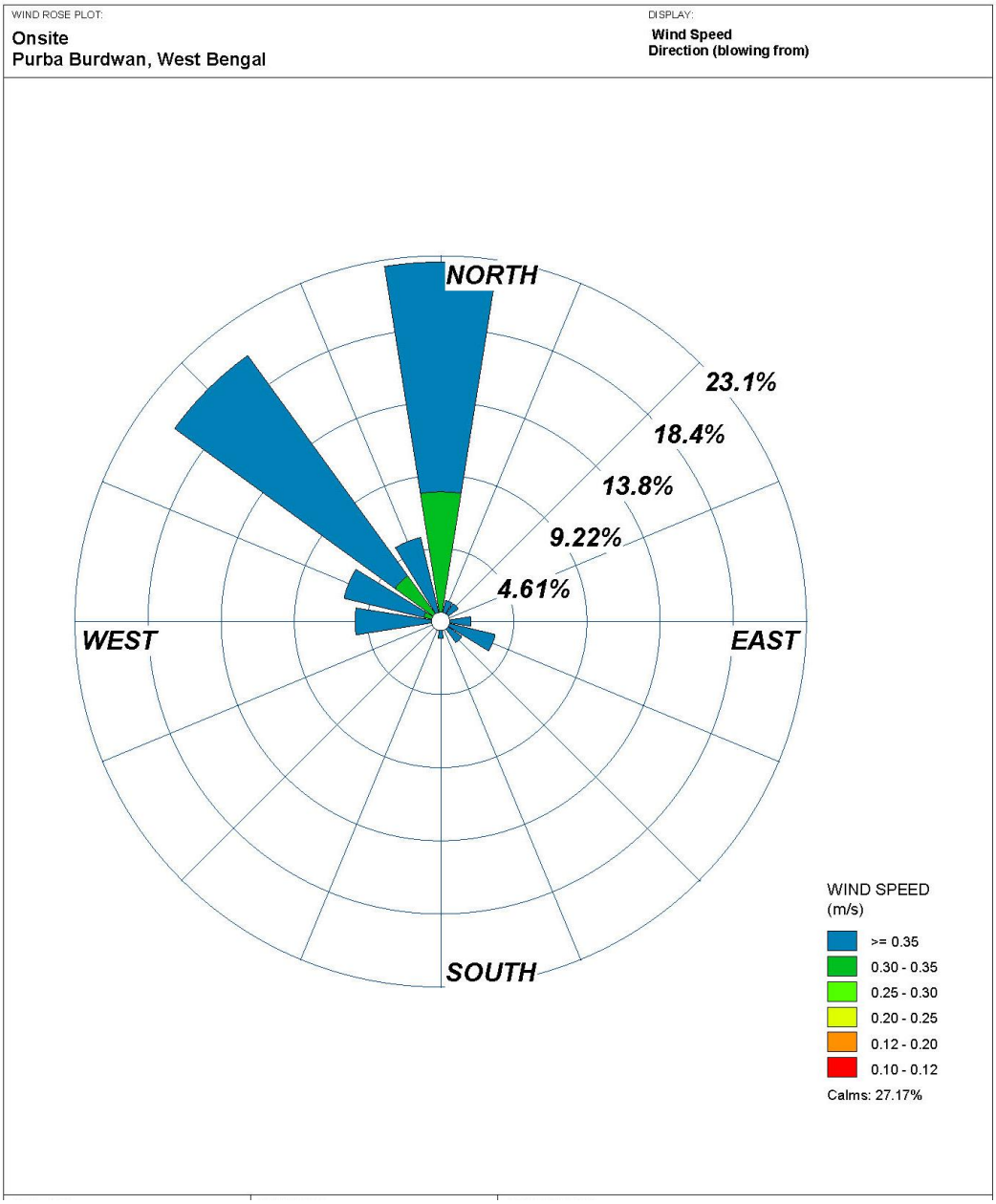


Figure 3-11: On-Site Wind Rose for Post Monsoon Season

3.3.3 SELECTION OF SAMPLING LOCATION

The selection of monitoring stations for ambient air quality was based on several factors. These factors included (i) Meteorological conditions (wind direction and wind speed); (ii) Representativeness of regional background air quality for obtaining baseline status; (iii) Representative of likely affected area; (iv) Topography of the study area; and (v) Accessibility and availability of the infrastructure.

Keeping in view the above-mentioned points six ambient air quality monitoring locations were selected. The location of human habitation and other sensitive areas within the study area were

also considered for selection of ambient air quality monitoring locations. The Ambient Air Quality Monitoring locations are shown in **Figure 3.12**.

3.3.4 OVERALL AMBIENT AIR QUALITY

The detailed survey results from the study period have been analysed, and key statistical values such as the 98th percentile, average, maximum, and minimum values have been calculated for various air pollutants including PM10, PM2.5, SO2, NO2, CO, and % Silica at all the ambient air quality (AAQ) monitoring stations. The summarized results for each pollutant at different locations can be found in **Table 3.8,** while more comprehensive data and information are provided in **Appendix 3.2**. The monitoring data are attached as **Annex 3.2** for reference and further analysis.

Table 3-8: Consolidated Values of AAQ (98 Percentiles)

Code &Location	Distance in km	Direction	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO***	Si
			µg/m³				mg/m³	%
Standard Concentration (24hrs) *			**100**	**60**	**80**	**80**	**02**	**-**
AAQ1: Selimabad	0.22	E	74.6	35.4	20.2	25.1	0.76	0.64
AAQ2: Jotkrishtai	2.68	SSE	76.4	33.8	21.7	27.7	0.80	0.66
AAQ3: Kalera	1.73	SW	68.9	31.0	16.6	22.0	0.69	0.55
AAQ4: Batrishbigha	1.15	NE	71.0	28.2	15.4	22.3	0.67	0.50
AAQ5: Deriapur	3.37	NNW	68.0	29.0	15.6	21.9	0.70	0.58
AAQ6: Bonbibitala	0.55	NW	66.9	30.4	18.9	24.2	0.68	0.55

Source: (i) N. D. International. (ii) Gazette of India Notification, dated 18th Nov, 2009
*Annual Arithmetic Means of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals, ** 24 hourly or 8 hourly or 1 hourly monitored value, 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, *** For CO 8 hourly standard is being considered.

The inference from **Table 3.8** is stated as under

- **Particulate Matter:** The 98percentile concentration of PM_{10} and $PM_{2.5}$ varies from 66.9µg/m³ (Bonbibitala) to 76.4µg/m³ (Jotkrishtai) and 28.2µg/m³ (Batrishbigha) to 35.4µg/m³ (Selimabad) respectively. The results of the monitored data indicate that concentration of Particulate Matter (PM_{10}) is well within prescribed limit of 100 µg/m³. The values of PM_{10} obtained at all the six locations are somewhat similar. The $PM_{2.5}$ values are also well within the prescribed limit of 60 µg/m³.
- The percentage of free silica (polymorphs of quartz, cristobalite, and tridymite) as found in the PM_{10} samples are found as 0.64% (Selimabad), 0.66% (Jotkrishtai), 0.55% (Kalera), 0.50% (Batrishbigha), 0.58% (Deriapur), 0.55% (Bonbibitala). Inhalation of respirable crystalline silica (RCS) is a cause of one of the oldest known occupational diseases, silicosis. Exposure to airborne respirable silica can also cause lung cancer and is possibly linked to a disease known as chronic obstructive pulmonary disease (COPD). Crystalline silica is abundant in the earth's crust and is found in many products and materials. There are efforts to reduce the occupational exposure limits (OELs) for exposure to RCS in several countries, thus, many national institutes, companies, and organizations are concerned about the precision and reliability of respirable silica measurements.

- At each monitoring station, the recorded values for respirable free silica are significantly lower than the NIOSH recommended exposure limit for occupational exposure, which is 0.05 mg/m^3 as a TWA for up to 10-h work shift. At each station, the values are much less.
- The World Health Organization has ranked particulate matter as the 13th leading cause of worldwide mortality. PM is a portion of air pollution that is made up of extremely small particles and liquid droplets containing acids, organic chemicals, metals, and soil or dust particles. Populations subjected to long-term exposure to particulate matter have a significantly higher cardiovascular incident and mortality rate. Short-term acute exposures subtly increase the rate of cardiovascular events within days of a pollution spike. Particulate matter also forms a film on plant leaves reducing sunlight and subsequently interfering with photosynthesis and plant growth. Acidic and alkaline materials may cause leaf surface injury while other materials may be taken up across the cuticle. The regular deposition of particulate matter on tree leaves increases the concentration of particulate matter at the place.
- **Gaseous Pollutant (SO_2, NO_2& CO):** The major source of SO_2 and NO_2 emission are traffic density, use of oil and coal as fuel for cooking and other domestic purpose etc. The maximum and minimum SO_2 concentrations were recorded as 15.4 µg/m^3 at Batrishbigha and 21.7 µg/m^3 at Jotkrishtai. Whereas, the minimum concentration of 21.9µg/m^3 for NO_2 was recorded at Deriapur and maximum concentration of 27.7 µg/m^3 was observed at Jotkrishtai. The concentration of SO_2 and NO_2 was found well within prescribed NAAQ standards.
- The lowest level of CO was observed at Batrishbigha (0.67 mg/m^3) while the highest value (0.80mg/m^3) was observed at Jotkrishtai. These levels are found to be well within the NAAQ standard of 2.0mg/m^3 for residential and industrial areas.
- PM_{10} are particles less than 10micron in size and are mainly caused by traffic on un-metalled roads, dust from mining activities and smoke from factories. Fine particles are caused by all types of combustion, including motor vehicles, residential wood burning, forest fires, agricultural burning, etc. Sulphur dioxide gas is an inorganic gaseous pollutant. Sulphur dioxide emissions occur wherever combustion of any fuel containing sulphur takes place. Sulphur dioxide in atmosphere is significant because of its toxicity; Sulphur dioxide is capable of producing illness and lung injury. The important sources of Nitrogen dioxide are from vehicular movement.
- In the absence of any permanent pollution source in the study area, the overall ambient air quality was found to be satisfactory with all the parameters well within the standard limits as stipulated by CPCB. The only source of present pollution found in the area was from heavy vehicle movements on nearest road and burning of domestic fuel.

3.3.5 NOISE LEVEL ASSESSMENT

Assessing ambient noise levels is a crucial aspect of preparing an impact assessment report. Noise levels, especially during night time, tend to be more bothersome, especially in residential areas. The environmental impact of noise can range from annoyance to potential hearing loss, depending on the intensity and loudness of the noise levels. Therefore, evaluating and addressing noise pollution is essential to mitigate its adverse effects on human well-being and quality of life. The monitoring for noise levels were done in 6 locations keeping considering the population and traffic of the area. The locations are depicted in **Figure 3.13.** Monitoring data are attached as **Annex 3.2**

Table 3-9: Ambient Noise Levels [dB(A)

Code & Location	Category of Area	Distance in km	Direction	Day Limits	Day			Night Limits	Night		
					L_{max}	L_{min}	L_{eq}		L_{max}	L_{min}	L_{eq}
N1: Selimabad	Residential	0.22	E	55	58.1	46.3	52.8	45	45.9	42.0	43.7
N2: Jotkrishtai	Residential	2.68	SSE	55	58.4	49.0	54.3	45	48.8	41.0	43.7
N3: Kalera	Residential	1.73	SW	55	53.4	49.0	51.9	45	45.9	40.9	42.8
N4: Batrishbigha	Residential	1.15	NE	55	54.8	46.8	52.3	45	44.5	40.6	43.0
N5: Deriapur	Residential	3.37	NNW	55	55.4	47.8	51.9	45	45.1	40.4	42.5
N6: Bonbibitala	Residential	0.55	NW	55	54.7	48.0	52.5	45	47.3	40.6	43.7

* Silence zone is defined as an area up to 100meters around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent authority
Source: N. D. International

From **Table 3.9**, it is observed that the present noise level is not exceeding the standard level of CPCB norms. The Leq was recorded in the range of 51.9 to 54.3 dB(A) during daytime and 42.5 to 43.7 dB(A) during night time.

3.4 WATER ENVIRONMENT

3.4.1 DRAINAGE PATTERN IN STUDY AREA

The river system in Bardhaman includes the Bhagirathi-Hooghly in the east, the Ajoy and its tributaries in the north and the Damodar and its branches in the south-west. Besides, there are innumerable Khals and old riverbeds all over the area.
The notable drainage channels are Damodar, Bhagirathi, Barakar, Ajay, Dwarakeswar, Nonia, Singaram, Tamla, Kukua, Kunur, Tumuni, Khari, Banka, Chanda-kanki nala, Behula, Gangur, Brahmani, Khandesvari, Karulia nala, Dwaraka or Babla, Koiya nala, Kandarkahal, Kanadamodar, Kananadi, Ghea, Kakinadi etc.

The city of Bardhaman is situated on the banks of the River Damodar and acts as an anchor for this town. The River Damodar originates from the Sonajuria Falls of the Bijonsa Hill, which is located in the district of Palampur, Bihar. The river joins Barakar at the town of Dishergarh in the Asansol subdivision and then flows through the rest of the district of Bardhaman. It continues to flow through the districts of Hooghly and Howrah in West Bengal before finally joining the Bhagirathi to be part of Ganga river system. Report on National Aquifer Mapping & Management Plan in Parts of Purba and Paschim Bardhaman District, West Bengal 19 Bardhaman takes up the shape of a delta along with the branch rivers of the Damodar surrounding it, namely Balluka, Behula, Gangur, Banka and so on, some of which have almost become extinct at present. The civilization of 'Rarh-Bangla' has also developed with this river as its centre. A bridge has been constructed over the River Damodar at Sadarghat which is known as 'Krishok Setu' (as pronounced in Bangla). The catchment area of this river is 25,820 Sq. Km.

A drainage system of the district and the Study area is shown as **Figure 3.14 and Figure 3.15.**

3.4.2 HYDROGEOLOGY

In the area underlain by older alluvium, laterite, Tertiary and Quaternary sediments, groundwater occurs under unconfined conditions within a maximum depth of 70 mbgl and the zone is tapped through a system of open dug wells and shallow tube wells. Shallow aquifers in Tertiary

Formations are composed of coarse sand and gravel. Whereas, they are represented by layers of fine to medium sand with occasional gravel and pebble in Quaternary Formation. Sometimes these sand and gravels are separated by relatively thin layer of clays which makes them to occur under semi-confined to confined conditions.

Ground water systems are the result of complex combination of different lithological and structural types within an area that together constitutes an aquifer within which ground water accumulates and moves. In the major part of the district, ground water in thick unconsolidated Quaternaries and Tertiaries deposited under fluviatile environment, the sand and/or gravel in different proportions of this formation constitute the main aquifer and they occur down to 295 mbgl in the central and eastern part of the district. Deeper aquifers occur under semi-confined to confined condition. Groundwater in the western part of Upper- Palaeozoic- Mesozoic- Tertiary sequences of Gondwana super group of sedimentaries occur under both unconfined and confined conditions down to 150.35 mbgl. Groundwater in the extreme north western small part of Salanpur Block occupied by the Archaean metamorphics occurs down to a depth of about 82 mbgl under both unconfined and confined conditions down to 150.35 mbgl. It mainly occurs under unconfined condition in the dug well zone and under semi confined to confined condition in the deeper horizons. In Bardhaman district, ground water occurs in semi-confined to confined aquifer conditions in the depth span of 12.00-38.00 mbgl, 31.00-55.00 mbgl and 70.00-88.00 mbgl.The hydrogeology of the district is shown in **Figure 3.16.**

3.4.3 SURFACE WATER QUALITY

The surface water samples were collected from Damodar River at two locations. Surface water qualities represent the aquatic life of an area. The parameters of surface water were compared with Designated Best Use of Water of CPCB as shown in **Appendix 3.3** and conclusions for each sample were drawn accordingly. The surface water quality as analysed and the parameter wise results are given in **Table 3.10**. The locations are depicted in **Figure 3.17.** Monitoring data are attached as **Annex 3.2**.

Table 3-10: Surface Water Quality in Study Area

Parameters	Unit	SW1 (Upstream)	SW2 (Downstream)
	Distance in km	0.25	0.56
	Direction	N	S
Turbidity	NTU	30	32
pH	--	7.3	7.3
Conductivity (at 25°C)	µS/cm	890.3	945.0
Total Dissolve Solids	mg/l	17.0	24.0
Alkalinity as $CaCO_3$	mg/l	580.4	598.6
Total Hardness as $CaCO_3$	mg/l	292.0	295.8
Calcium as Ca	mg/l	335.6	338.4
Magnesium as Mg	mg/l	60.8	60.4
Sodium	mg/l	40.5	45.1
Potassium	mg/l	12.2	12.6
Bi-Carbonate	mg/l	292.0	295.8
Chloride as Cl	mg/l	85.7	84.9
Sulphate as SO_4	mg/l	60.3	66.4
Nitrate as NO_3	mg/l	1.68	1.89

Parameters	Unit	SW1 (Upstream)	SW2 (Downstream)
Fluoride as F	mg/l	0.54	0.52
Phenolic compound as C_6H_5OH	mg/l	BDL (DL - 0.001)	BDL (DL - 0.001)
Cyanide	mg/l	BDL (DL - 0.008)	BDL (DL - 0.008)
Arsenic	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Cadmium	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Total Chromium	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Iron	mg/l	0.34	0.29
Copper	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Lead	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Manganese	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Mercury	mg/l	BDL (DL - 0.01)	BDL (DL - 0.01)
Zinc	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Silica	mg/l	BDL (DL - 0.1)	BDL (DL - 0.1)
Selnium	mg/l	BDL (DL - 0.01)	BDL (DL - 0.01)
Phosphate	mg/l	2.8	3.1
Oil & Grease	mg/l	<5	<5
DO	mg/l	6	6.2
BOD	mg/l	2.1	1.9
COD	mg/l	15.2	21.4
Total Coliform	MPN/100ml	900	950

Source: N. D. International

The guidelines established by the Central Pollution Control Board (CPCB) focus on a few key parameters that help determine the best use of water for human purposes. These parameters include pH, Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), and Total Coliforms. By evaluating these factors, the quality of water can be assessed and its suitability for various human applications can be determined. These guidelines provide important insights into the water's quality and its potential uses.

The pH of the surficial water is 7.3 in (SW1) and (SW2) which indicates a slightly alkaline nature. In both the samples, the DO exceeds 6.0 mg/l. Higher DO signifies good quality waters and healthy environment for aquatic life. The BOD concentration is 2.1 mg/l (SW1) and 1.9 mg/l (SW2) signifying less pollution in the waters. Higher concentration of harmful bacteria and other microorganisms in polluted water consumes the dissolved oxygen and thus the BOD increases. Total coliform in the samples is within 1000 MPN/100ml. Total coliforms are a group of bacteria commonly found in water contaminated by surface water and human or animal waste.

The overall class of water for individual samples comes as "C" which signifies that water of Damodar River can be used as drinking water source after conventional treatment and disinfection.

3.4.4 GROUND WATER QUALITY

The physico-chemical characteristics of groundwater quality are depicted in **Table 3.11** and the locations are depicted in **Figure 3.17**. Monitoring data are attached as **Annex 3.2**.

- The analysis results indicate that the pH of the samples ranges in between 7.1 to 7.4 which are well within the specified standard of 6.5 to 8.5.

- Total hardness was observed to be ranging from 193.4 to 225.7 mg/l. The maximum hardness (225.7 mg/l) was recorded at GW1 (Selimabad) and the minimum (193.4 mg/l) was recorded at GW3 (Kalera). The hardness was found to be within the acceptable limit of 300 mg/l as per IS 10500:2012.
- Chlorides were found to be in the range of 60.9 mg/l at GW3 (Kalera) to 79.1 mg/l at GW4 (Deriapur) which is well within the specified standard of 250 mg/l, as per IS 10500:2012.
- Sulphate was found to be in the range of 32.6 mg/l to 46.5 mg/l. The maximum value observed at GW1(Selimabad) whereas the minimum value observed at GW4(Deriapur), which is well within the specified standard of 200 mg/l as per IS 10500:2012.
- It can be concluded that the ground water quality does not indicate any industrial contamination and meets the standards of IS 10050:2012 and therefore can be used for drinking purposes.

Table 3-11: Ground Water Quality in Study Area

Parameters	Unit	GW1 (Selimabad)	GW2 (Jotkrishtai)	GW3 (Kalera)	GW4 (Deriapur)
Distance in km		0.22	2.68	1.73	3.37
Direction		E	SSE	SW	NNW
Turbidity	NTU	<5	<5	<5	<5
pH	--	7.1	7.4	7.2	7.2
Conductivity	µS/cm	850.0	750.0	730.0	810.0
Total Dissolve Solids	mg/l	545.0	480.0	510.0	540.0
Alkalinity as $CaCO_3$	mg/l	242.0	210.0	209.0	226.0
Total Hardness as $CaCO_3$	mg/l	225.7	194.4	193.4	215.7
Calcium as Ca	mg/l	52.7	42.6	45.2	51.5
Magnesium as Mg	mg/l	22.9	21.4	19.6	21.2
Sodium	mg/l	48.3	36.1	36.2	38.8
Potassium	mg/l	19.5	17.8	24.6	22.7
Bicarbonate	mg/l	242.0	210.0	209.0	226.0
Chloride as Cl	mg/l	72.8	62.5	60.9	79.1
Sulphate as SO_4	mg/l	46.5	40.1	42.2	32.6
Nitrate as NO_3	mg/l	0.49	0.37	0.41	0.45
Fluoride as F	mg/l	0.28	0.31	0.36	0.42
Phenolic compound as C_6H_5OH	mg/l	BDL	BDL	BDL	BDL
Cyanide	mg/l	BDL	BDL	BDL	BDL
Aluminum	mg/l	BDL	BDL	BDL	BDL
Arsenic	mg/l	BDL	BDL	BDL	BDL
Cadmium	mg/l	BDL	BDL	BDL	BDL
Chromium as Cr+6	mg/l	BDL	BDL	BDL	BDL
Iron	mg/l	0.24	0.20	0.22	0.21
Copper	mg/l	BDL	BDL	BDL	BDL
Lead	mg/l	BDL	BDL	BDL	BDL
Manganese	mg/l	BDL	BDL	BDL	BDL
Mercury	mg/l	BDL	BDL	BDL	BDL

Parameters	Unit	GW1 (Selimabad)	GW2 (Jotkrishtai)	GW3 (Kalera)	GW4 (Deriapur)
Zinc	mg/l	0.21	0.19	0.22	0.25

BDL: Below detection limit; DL: Detection Limit; $: Not Specified
Source: N. D. International

3.5 ECOLOGICAL ENVIRONMENT

3.5.1 FOREST IN THE STUDY AREA

There is no forest present in the Study area.

The Damodar is a fast-flowing river, except during summer when the regulated discharge through the dams, transforms it at places into a thin sheet of water with sluggish flow. However, with the variation in seasons and changes in ecological condition onsite phytoplankton, zooplankton and fish diversity are noted.

Table 3-12: Onsite Phytoplankton taxa

Sl. No.	Name	Occurrence
	Class- Cyanophyceae	
1	*Microcystis flosaquae Wittr.*	+
2	*Microcystis protocystis Kirch.*	+
3	*Microcystis aeruginosa Kuetz.*	+
4	*Chrococcus turgidus Naeg.*	+
5	*Gloeocapsa strata Turp.*	+
6	*Gloeocapsa rupestris Kuetz.*	+
7	*Gloeocapsa samoensis Wille.*	+
8	*Aphanocapsa gravelli Hass.*	+
9	*Phormidium corium Ag.*	+
10	*Lyngbya ceylonica Wille.*	+
11	*Lyngbya majuscule Har.*	+
12	*Anabaena ambigna Rao.*	+
13	*Anabaena iyengarii Bhard.*	+
14	*Rivularia globiceps West.*	+
15	*Gloeotrichia pisum Thurs.*	+
16	*Gloeotrichia majus Raben.*	+
	Class- Chlorophyceae	
17	*Scenedesmus bijugatus Turp.*	+
18	*Scenedesmus denticulate Lag.*	+
19	*Scenedesmus serratus Corda*	+
20	*Scenedesmus obliqus Kuetz.*	+
21	*Scenedesmus serratus Corda*	+
22	*Stigeoclonium lubricum Kuetz.*	+
23	*Stigeoclonium tenue Ag.*	+
24	*Bulbochaete annularis Wittr.*	+
25	*Bulbochaete monile Wittr.*	+
26	*Oedogonium amphulum Tiff.*	+

Sl. No.	Name	Occurrence
27	*Oedogonium grands Tiff.*	+
28	*Oedogonium oblongum Wittr.*	+
29	*Oedogonium pusillum Kirch.*	+
30	*Oedogonium vulgaris Kirch.*	+
31	*Oedogonium reticulosporum*	+
32	*Oedogonium varians Wittr.*	+
33	*Oedogonium sociale Wittr.*	+
34	*Zygnema czurdae Randh.*	+
35	*Zygnema inconspicum Randh.*	+
36	*Zygnema cylindrosporum Czu.*	+
37	*Closterium navicula Breb.*	+
38	*Closterium porrectum Nortds.*	+
39	*Closterium subulatum Kuetz.*	+
40	*Closterium tumidulum Johns.*	+
41	*Closterium settacus Breb.*	+
42	*Cosmarium monilifore Turp.*	+
43	*Cosmarium nudum Turne.*	+
	Class- Bacillariophyceae	
44	*Cyclotella kuetzingiana Thw.*	+
45	*Melosira granulate Nitz.*	+
46	*Synedra ulna Nitz.*	+
47	*Gyrosigma spencerii Smith*	+
48	*Gyrosigma acuminatum Kuetz.*	+
49	*Navicula angilica Ralfs.*	+
50	*Navicula exigus Muell.*	+
51	*Gomphonema parvulum Hantz.*	+

Table 3.13: Onsite zooplankton taxa

Family & Genus	Name	Occurrence
Family	***SIDIDAE***	
Genus	***Diaphanosoma***	
	Diaphanosoma excisum Sars	+
	Diaphanosoma sarsi Richard	+
Genus	***Pseudosida***	
	Pseudosida bidentata Herrick	+
Genus	***Latonopsis***	
	Latonopis australis Sars	+
Family	***DAPHNIIDAE***	
Genus	***Scapholeberis***	
	Scapholeberis kingi Sars	+
Genus	***Simocephalus***	
	Simocephalus vetulus	+
Genus	***Ceriodaphnia***	

Family & Genus	Name	Occurrence
	Ceriodaphnia cornuta Sars	+
Family	***MOINIDAE***	
Genus	***Moina***	
	Moina micrura Kurz	+
Family	***BOSMINIDAE***	
Genus	***Bosmina***	
	Bosmina longirostris (O.F.M)	+
Genus	***Bosminopsis***	
	Bosminopsis deitersi (Richard)	+
Family	***MACROTHRICIDAE***	
Genus	***Macrothix***	
	Macrothix spinosa king	+
Genus	***Echinisca***	
	Echinisca triserialis (Brady)	+
Genus	***Ilyocryptus***	
	Ilyocryptus spinifer Herrick	+
Family	***CHYDORIDAE***	
Genus	***Chydorinae***	
	Chydorus ventricosus Daday	+
	Chydorus reticulatus Daday	+
	Chydorus barroisi (Richard)	+
	Chydorus pubescens Sars	+
	Chydorus eurynotus Sars	+
Genus	***Pseudochydorus***	
	Pseudochydorus globosus (Baird)	+
Genus	***Dunhercida***	
	Dunhevedia crassa King	+
Subfamily	***Aloninae***	
Genus	***Alona***	
	Alona pulchella King	+
	Alona rectangula Sars	+
	Alona karua King	+
	Alona guttata Sars	+
	Alona verrucosa Sars	+
	Alona davidi Richard	+
Genus	***Notalona***	
	Notalona globulosa (Daday)	+
Genus	***Leydigia***	
	Leydigia acanthocercoides (Fischer)	+
Order	***Conchostraca***	

Family & Genus	Name	Occurrence
Family	***CYCLESTHERIIDAE***	
Genus	***Cyclestheria***	
	Cyclestheria hislopi (Baird)	+
Family	***CYPRIDIDAE***	
Genus	***Stenocyprinae***	
	Stenocypris distincta Victor & Fernando	+
Genus	***Parastenocypis***	
	Parastenocypis canaliculata Hartmann	+
Subclass	***COPEPODA***	
Suborder	***Calanidae***	
Family	***DIAPTOMIDAE***	
Genus	***Rhinediaptomus***	
	Rhinediaptomus indicus Kiefer	+
Genus	***Paradiaptomus***	
	Paradiaptomus greeni Gurney	+
Family	***CYCLOPIDAE***	
Genus	***Mesocyclops***	
	Mesocyclops hyalinus Rehberg	+
	Mesocyclops aspericornis (Daday)	+

Table 3-14: Onsite Fish Species

Sl. No	Scientific Name	Local Name	IUCN	Human Use	Feeding
1	*Xenentodon cancila*	Kakia	LC	Ornamental Commercial	Omnivore
2	*Amblypharyangodon mola*	Mourola	LC	Ornamental Commercial	Herbivore
3	*Danio devario*	Techokha	LC	Ornamental	Herbivore
4	*Danio rerio*	Techokha	NT	Ornamental	Herbivore
5	*Puntius ticto*	Punti	LC	Ornamental Commercial	Herbivore
6	*Puntius sophore*	Punti	LC	Ornamental Commercial	Herbivore
7	*Puntius conchonius*	Punti	VU	Ornamental Commercial	Herbivore
8	*Salmostoma bacalia*	Chela	LC	Commercial	Herbivore
9	*Labeo callbasu*	Kalbose	LC	Ornamental Commercial	Herbivore
10	*Labeo bata*	Bata	LC	Aquaculture	Herbivore
11	*Labeo rohita*	Rui	LC	Aquaculture	Herbivore
12	*Cirrhinus mrigala*	Mrigel	LC	Commercial	Omnivore
13	*Catla*	Katla	NE	Aquaculture	Herbivore
14	*Amblypharyangodon mola*	Mourola	LC	Commercial	Herbivore
16	*Notopterus chitala*	Chital	EN	Ornamental Commercial	Omnivore
17	*Notopterus*	Pholui	LC	Ornamental	Carnivore
18	*Chanda ranga*	Chanda	NE	Ornamental Commercial	Omnivore
19	*Chanda nama*	Chanda	LC	Ornamental Commercial	Omnivore
20	*Channa punctala*	Lata	LC	Ornamental	Carnivore

Sl. No	Scientific Name	Local Name	IUCN	Human Use	Feeding
21	*Channa marulias*	Sal	LC	Ornamental	Carnivore
22	*Channa striatus*	Sol	NE	Ornamental Commercial	Carnivore
23	*Glossogobius giuris*	Bele	LC	Ornamental Commercial	Omnivore
24	*Nandus*	Bheda	LC	Ornamental Commercial	Carnivore
25	*Colisa fasciata*	Khalisa	LC	Ornamental	Omnivore
26	*Colisa lalia*	Khalisa	NE	Ornamental	Omnivore
27	*Mystus cavassius*	Tengra	LC	Commercial	Carnivore
28	*Mystus aor*	Aard	VU	Ornamental Commercial	Carnivore
29	*Mystus seenghala*	Tangra	NE	Commercial	Carnivore
30	*Mystus tengara*	Tangra	LC	Ornamental Commercial	Carnivore
31	*Mystus vittatus*	Tangra	LC	Ornamental Commercial	Carnivore
32	*Clarias batrachus*	Magur	LC	Ornamental Commercial	Carnivore
33	*Pungasius*	Pangus	LC	Ornamental Commercial	Omnivore
34	*Bagarius*	Garua	VU	Commercial	Herbivore
35	*Wallago attu*	Boal	NT	Commercial	Carnivore
36	*Heteropneustea fossilis*	Singi	LC	Ornamental Commercial	Carnivore
37	*Macrognathus armatus*	Ban	LC	Commercial	Carnivore
38	*Tetradon cutcutia*	Tepa	NT	Ornamental	Herbivore

A detailed biological study of the study area i.e. 10km radius of the proposed project has been carried out to identify the composition of flora and fauna. Phytosociological study was carried out for assessment of vegetation for density, diversity, frequency and relative abundance. For fauna, random sites were selected for faunal identification. For both the parameters, data from district forest department was obtained.

Flora: The detailed phytosociological study has been attached as **Annex-3.3**. The detailed list of trees which was commonly found in the study area and cross-checked with the secondary list available at the Forest Department is given in **Table 3.15.**

Table 3-15: List of Identified Flora Species

Sl. No	Botanical name	Common name	Family name
1.	*Albizia lebbek*	Siris	Mimosaceae
2.	*Aegle marmelos*	Bel	Rutaceae
3.	*Alstonia scolaris*	Chatim	Apocyanaceae
4.	*Acacia longifolia*	Sonajhuri	Mimoceae
5.	*Annogeissus latifolia*	Bokul	Combretaceae
6.	*Artocarpus intigra*	Kathal	Moraceae
7.	*Anthocephalus kadamba*	Kadam	Rubiaceae
8.	*Azadirachta indica*	Neem	Meliaceae
9.	*Bauhinia racemosa*	Kanchan	Caesalpiniaceae
10.	*Bombax ceiba*	Shimul	Bombacaceae
11.	*Butea monosperma*	Polash	Fabaceae
12.	*Cassia fistula*	Sonalu	Ceasalpineaceae

13.	*Cassia siamea*	Minjiri	Caesalpiniaceae
14.	*Delonix regia*	Krishna Chura	Caesalpineaceae
15.	*Dalbergia sissoo*	Sisu	Leguminosae
16.	*Ficus benghalensis*	Bot	Moraceae
17.	*Ficus glomerata*	Dumur	Moraceae
18.	*Ficus religiosa*	Asbattha	Moraceae
19.	*Holoptelea integrifolia*	Nata Karanja	Ulmaceae
20.	*Lagerstroemia speciosa*	Jarul	Lytharaceae
21.	*Madhuca indica*	Mahua	Sapotaceae
22.	*Mangifera indica*	Aam	Anacardiaceae
23.	*Phoenix dactylifera*	Khejur	Aracaceae
24.	*Psidium guajava*	Peyara	Myrtaceae
25.	*Schleichera oleosa*	Kusum	Sapindaceae
26.	*Shora robusta*	Sal	Dipterocarpaceae
27.	*Syzyzium cumini*	Jaam	Myrtaceae
28.	*Tamarindus indica*	Tentul	Caesalpiniaceae
29.	*Stereblus asper*	Shawra	Moraceae
30.	*Jatropha curcas*	Varenda	Spurge
31.	*Polyalthia longifolla*	Debdaru	Anonaceae
32.	*Moringa oleifera*	Sajina	Moringaceae
33.	*Litchi chinensis*	Litchi	Sapindaceae
34.	*Acacia auriculiformis*	Akasmoni	Mimosaceae
35.	*Eucalyptus globulus*	Eucalyptus	Myrtaceae
36.	*Albizia saman*	Megh Shiris	Mimosaceae
37.	*Borassus flabellifer*	Taal	Arecaceae
38.	*Bambusa arund inacea*	Bansh	Poaceae
39.	*Saraca indica*	Sita Ashok	Legumes
40.	*Cocos nucifera*	Narkel	Arecaceae
41.	*Genus Acacia*	Acacia	pea family Fabaceae
42.	*Plumeria alba*	Kathgolap	Apocynaceae
43.	*Annona squamosa*	Aata	Annonaceae
44.	*Phyllanthus emblica*	Amloki	Phyllanthaceae
45.	*Nyctanthas arbortristis*	Siuli	Apocyanaceae
46.	*Dillenia indica*	Chalta	Dilleniaceae
47.	*Hibiscus sabdariffa*	Joba	Malvaceae
48.	*Carica papaya*	Pepe	Caricaceae
49.	*Caesalpinia pulcherrima*	Radha chura	Leguminosae
50.	*Tabernaemontana divaricata*	Togor	Apocynaceae
51.	*Citrus grandis*	Batabi Lebu	Rutaceae
52.	*Pithecellobium dulce*	Khoi fol	Fabaceae
Shrubs, Climbers & Herbs			
53.	*Combretum decandrum*	Madhobilota	Combretaceae
54.	*Datura metel*	Dhutura	Solanaceae
55.	*Calotropis procera*	Akando	Asclepiadaceae
56.	*Imperata cylindrica*	kash	Poaceae
57.	*Andrographis paniculata*	Kalmegh	Acanthaceae
58.	*Dioscoria oppositifolia*	Aparajita	Dioscoriaceae

59.	*Jatorpha curcas*	Sada verenda	Euphorbiaceae
60.	*Jatropha gossypifolia*	Lal verenda	Euphorbiaceae
61.	*Lantena camara*	Putus	Verbenaceae
62.	*Solanum xanthocarpum*	Tit begun	Solanaceae
63.	*Tinospora cordifolia*	guloncho	Menispermaceae
64.	*Justicia adhatoda*	Bashok	Acanthaceae
65.	*Ocimum sanctum*	tulsi	Holy basil (Tulsi)
66.	*Ocimum americanum*	Ram tulsi	Wild basil (Ban Tulsi)
67.	*Poaceae*	Ghas	Poaceae
68.	*Aganosma caryophyllata*	Malati	Apocynaceae
69.	*Nerium oleander*	Korobi	Apocynaceae
70.	*Cynodon dactylon*	Durba	Poaceae
71.	*Tribulus terrestris*	Gokshur	Zygophyllaceae
72.	*Mimosa pudica*	Lojjabati	Legumes
73.	*Mecardonia procumbens*	Shankpushpi	Scrophulariaceae
74.	*Tribulus terrestris*	Gokshur	Zygophyllaceae
75.	*Cestrum diurnum*	day-blooming jessamine	Solanaceae
76.	*Aegle marmelos*	Beli	Rutaceae
77.	*Coccinia grandis*	Telakochu	Cucurbits
78.	*Parthenium hysterophorus*	Parthenium	Asteraceae
79.	*Opuntia ficus-indica*	Fonimonosha	Cactus
80.	*Luffa aegyptiaca*	Dhundal	Cucurbits
81.	*Nymphaea nouchali*	Sapla	Waterlily
82.	*Eichhornia crassipes*	kochuripana	Pontederiaceae

Source: (i) Primary survey by Novomine Team (ii) Interaction with local people

Fauna: The description is based on the field investigation, reports of Forest Department and queries with local inhabitants. Although the Forest department records the presence of few Schedules I species, no such records could be established during field visit or during interaction with local people.

No significant faunal group was observed during the study period. As reported by local inhabitants, the faunal groups are mostly restricted towards the forested areas. The list of major terrestrial fauna in the study area is given in **Table 3.16**.

Table 3-16: List of Major Terrestrial and Avi-Fauna in the Study Area

Vertebrates			
Mammals			
	Scientific Name	**Common English Name**	**Schedule: Wildlife (Protection) Act 1972**
1.	*Sus cristatus*	Pig	III
2.	*Canis familiaris*	Dog	-
3.	*Bos indicus*	Cow	-
4.	*Bubalus indicus*	Buffalo	-
5.	*Felis domesticus*	Cat	-
6.	*Capra hircus*	Goat	-

7.	*Rhinolopus sp.*	Bat	V
8.	*Bos taurus*	Bull	-
9.	*Oryctolagus cuniculus*	Rabbit	-
10.	*Funambulus palmarum*	Squirrel	-
11.	*Bandicota bengalensis*	Lesser Bandicoot Rat	V
12.	*Bandicota indica*	Large Bandicoot Rat	V
13.	*Funambulus palmarum*	Three Stripped Squirrel	-
14.	*Herpestes auropunctatus*	Small Indian Mongoose	IV
15.	*Pteropus giganteus*	Indian Flying Fox	V
16.	*Herpestes edwardsi*	Common mongoose	IV
17.	*Rattus ratus*	Rat	V
18.	*Sus scrofa*	Wild pig	III
19.	*Rattus norvegicus*	Field mouse	V
20.	Vulpes bengalensis	Fox	IV
Reptiles (Snake)			
21.	*Ahaetulla nasutus*	Vine Snake	IV
22.	*Bungarus caeruleus*	Common Krait	IV
23.	*Indotyphlops braminus*	Brahminy Worm Snake	IV
24.	*Najanaja*	Indian Cobra	IV
25.	*Amphiesma stolatum*	*Buff Striped Keel-back*	IV
26.	*Lycodon aulicus*	Indian Wolf Snake	IV
Reptiles			
27.	*Hemidactylus frenatus*	Asian House Gecko	-
28.	*Calotes versicolor*	Common garden Lizard	IV
29.	*Hemidactylus falviviridis*	Northern House Gecko	-
30.	*Hemidactylus parvimaculatus*	Spotted House Gecko	-
31.	Mabuya carinata	Common Skink	-
32.	*Calotes versicolor*	Garden Lizard	-
33.	Riopa albopunctata	White-spotted supple skink	-
34.	Ophisops jerdonii	Jerdon's Snake-eye	-
35.	*Phylum Annelida*	Leech	-
Amphibia			
36.	*Bufo melanosticus*	Toad	IV
37.	*Duttaphrynus melanostrictus*	Common Indian Toad	-
38.	*Hoplobatrachus crassus*	Common frog	IV
39.	*Hoplobatrachus tigerinus*	Indian Bull Frog	IV
Birds			
40.	*Corvus splendens*	Common Crow	V
41.	*C. marorhynchos*	Jungle Crow	V
42.	*Psittacula krameri*	Rose Ringed Parakeet	IV
43.	*Acridotheres tristis*	Indian Mynah	IV
44.	*Sturnus contra*	Pied mynah	IV
45.	*Acridotheres ginginianus*	Bank Mynah	IV
46.	*Dicrurus macrocercus*	Drongo	IV
47.	*Centropus sinensis*	Crow Pheasant	IV
48.	*Motacilla tschutschensis*	Eastern Yellow Wagtail	IV

49.	*Copsychus fulicatus*	Indian robin	IV
50.	*Alcedo atthis*	Common Kingfisher	IV
51.	*Egreta garzetta*	Little Egret	IV
52.	*Columba livia*	Blue rock pegion	IV
53.	*Orthotomus sutorius*	Tailor Bird	IV
54.	*Copsychus saularis*	Magpie robin	IV
55.	*Passer domesticus*	House sparrow	IV
56.	*Eudynamis scolopacea*	Koel	IV
57.	*Pycnonotus cafer*	Red vent Bulbul	IV
58.	*Pycnonotus jocosus*	Red Whiskered Bulbul	IV
59.	*Dinopium benghalense*	Lesser Golden Backed Woodpecker	IV
60.	*Streptopelia chinensis*	Spotted Dove	IV
61.	*Ottus bakkamoena*	Indian Scops Owl	IV
62.	*Mareca strepera*	Duck	IV
63.	*Upupa epops*	Hoopoe	IV
64.	*Gallus domesticus*	Cock	-
65.	*Dendrocitta vagabunda*	Tree pie	IV
		Fish	
66.	*Puntius sophore*	Punti	-
67.	*Labeo bata*	Bata	-
68.	*Elongate glassy perchlet*	Chanda	-
69.	*Wallago attu*	Boyal	-
70.	*Aorichthys seenghala*	Aar	-
71.	*Channa punctala*	Latha	-
72.	*Glossogobius giuris*	Bele	-
73.	*Amblypharyngodon mola*	Mourola	-
74.	*Macrognathus armatus*	Ban	-
75.	*Mystus tengara*	Tangra	-
76.	*Oreochromis niloticus*	Telapia	-
77.	*Notopterus notopterus*	Foli	-
78.	*Salmophasia bacaila*	Chela	-
79.	*Clarias batrachus*	Magur	-
80.	*Labeo rohita*	Rui	-
81.	*Labeo catla*	Katla	-
		Invertebrates	
82.	*Lumbricus terrestris*	Earthworm	-
83.	*Gastropoda*	Snail	-
84.	*Filopaludina bengalensis*	Gugli	-
		Insect	
85.	*Lasius niger*	Black ant	-
86.	*macrolepidopteran suborder clade Rhopalocera*	Butterfly	IV
87.	*Lepidoptera*	caterpillar	-
88.	*Solenopsis geminata*	Red ant	-
89.	*Daphnis nerii*	Green caterpillar	-
90.	*Apis mellifera*	Bee	-

91.	*Ropalidia marginata*	Paper wasp	-
92.	*Order Coleoptera*	Beetle	-
93.	*Lampyridae*	Fire fly	-
94.	*Coccinella septempunctata*	Lady bug	-
95.	*Periplaneta americana*	Cockroach	-
96.	*order Araneae*	Spider	-
97.	*Musca domestica*	Housefly	-
98.	*Mosquito Culicidae*	Mosquito	-
99.	*Anax indicus*	Dragon fly	-
100.	*Gynnidomorpha alisman*	Moth	-
101.	*Acheta domesticus*	Cricket	-
102.	*Chilopoda Scolopendromorpha*	Centipede	-

Source: (i) Primary survey by Novomine Team (ii) Interaction with local people

3.6 SOCIAL ENVIRONMENT

The sand mine is situated in **Selimabad village, Purba Bardhaman district, West Bengal**. The socio-economic profile of the area offers valuable insights into various aspects such as population growth rate, population density, gender ratio, work participation rate, and a description of the vulnerable population within the study area. This information helps to understand the demographic characteristics, economic activities, and social dynamics of the local population residing in the vicinity of the sand mine.

3.6.1 DEMOGRAPHIC PROFILE

There are 173 villages in the study area. These villages have 81,972 households accumulating 3,52,084 populations. According to the survey, gender ratio of study area was 972 in 2011. The details are given in **Table 3.17.**

Table 3-17: Demographic Profile of Study Area

No. of Households	Total Population	Male	Female	Total (o-6 years)	Male (o- 6 years)	Female (o-6 years)
81,972	3,52,084	1,78,522	1,73,564	36,352	18,443	17,909

Source: Primary Census Abstract of India 2011 and District and Census Handbook 2001& 2011

3.6.2 VULNERABLE POPULATION

As per 2011 census, the study area has about 39.43% scheduled caste population and 12.18% scheduled tribe population. (**Refer Table 3.18**).

Table 3-18: Vulnerable Population in the Study Area

SC	in%	Male	Female	ST	in%	Male	Female
1,38,860	39.43	70,132	68,728	42,885	12.18	21,206	21,679

Source: Primary Census Abstract of India 2011and District and Census Handbook 2001& 2011

3.6.3 LITERACY RATE

Literacy is one of the most significant indicators of human and social development. This not only reflects on the educational attainment of the population but also reflects on the status of women, caste equation and economic condition of a particular area. It also shows the skill level of the people and their capability to get trained and work. **Table 3.19** indicates the gender-wise literacy rate of the people in the study area.

Table 3-19: Literacy Rate in the Study Area

Total Literacy	Male	Female	Total ill-literacy	Male	Female
2,38,756	1,31,255	1,07,501	1,13,328	47,277	66,061

Source: Primary Census Abstract, Census of India, 2011

3.6.4 OCCUPATIONAL STRUCTURE

In the villages around the study area, people mainly earn from agriculture and animal rearing. Details are furnished in **Table 3.20**.

Table 3-20: Category of Workers in the Block

Total Worker	Male	Female	Main Worker	Male	Female	Marginal Worker	Male	Female
1,53,088	1,11,301	41,787	1,15,524	91,264	24,260	37,564	20,037	17,527

Source: Primary Census Abstract, Census of India, 2011

3.6.5 INFRASTRUCTURE FACILITIES

Educational Facilities: Details of primary schools, numbers of middle school, secondary school and senior secondary schools are furnished in **Table 3.21.**

Table 3-21: Educational Facilities in the Block

Block name	Primary school	Middle school	Secondary school	Senior Secondary school	Degree college of arts science & commerce	Degree college of engineering
Bardhaman-II	80	36	22	12	1	0
Memari-I	103	45	35	26	19	18
Raina-I	105	25	21	8	1	0
Raina-II	83	36	30	12	0	0
Jamalpur	118	47	33	21	0	0

Source: Primary Census Abstract, Census of India, 2011

Health Facilities: Details of Community health centre, primary health centres maternity and child welfare centres, Family welfare centre, are furnished in **Table 3.22.**

Table 3-22: Health Facilities in the Block

Block name	Community health centre	Primary health centre	Maternity and child welfare centre	Family welfare centre
Bardhaman-II	23	4	3	1
Memari-I	3	7	5	5
Raina-I	4	9	4	4
Raina-II	1	9	9	3
Jamalpur	0	9	7	2

Source: Primary Census Abstract, Census of India2011

Banking and Post Office Facilities: Details of Post office, Commercial & Co-operative bank, ATM Agricultural Credit Society, are furnished in **Table 3.23**.

Table 3-23: Financial Institutions in the Block

Block name	P.O.	Commercial & Co-operative bank	ATM	Agricultural credit Society
Bardhaman-II	20	9	1	16
Memari-I	2	10	0	19
Raina-I	19	6	2	27
Raina-II	12	9	1	25
Jamalpur	26	13	4	20

Source: Primary Census Abstract, Census of India, 2011

Appendix-3.1: Analytical Technique for Soil Sample

Sl. No.	Parameters	Analytical Method	Reference
1	Soil Color	-	-
2	Texture	Sieve analysis & Hygrometer	-
3	Moisture Content	Gravimetric	Department of Agriculture &Cooperation, Govt of India Page No.76-77:2011
4	pH	pH meter	IS2720- Part 26, 1987 by pH meter
5	Electrical Conductivity(1:2)	Conductivity meter	Department of Agriculture &Cooperation, Govt of India Page No.81-82:2011
6	Bulk Density	Sand replacement, core cutter	TM-S/34
7	Organic Carbon	Calculation	IS2720-(Part 22),1972, Reaffirmed2001 (By Calculation)
8	Organic Matter	Black method	IS2720-(Part 22),1972, Reaffirmed2001
9	Nitrogen	Distillation & Titration	TM-S/17
10	Phosphorus	Spectrophotometric	TM-S/11
11	Potassium	Flame Photometric	TM-S/13
12	Infiltration Rate	-	TM-S/40
13	Porosity	-	TM-S/33

Appendix-3.2: Standard Classification of Soil

1	**pH:** (i)<4.5 Extremely acidic; (ii) 4.51- 5.50 Very strongly acidic; (iii) 5.51-6.0 moderately acidic; (iv) 6.01-6.50 slightly acidic; (v) 6.51-7.30 Neutral; (vi) 7.31-7.80 slightly alkaline; (vii) 7.81-8.50 moderately alkaline; (viii) 8.51-9.0 strongly alkaline; (ix) 9.01 very strongly alkaline
2	**Salinity Electrical Conductivity (ppm) (1 ppm = 640 µmhos/cm):** (i) Upto 1.00 Average; (ii) 1.01-2.00 harmful to germination; (iii) 2.01-3.00 harmful to crops (sensitive to salts)
3	**Organic Carbon (%):** (i) Upto 0.2: very less; (ii) 0.21-0.4: less; (iii) 0.41-0.5 medium; (iv) 0.51-0.8: on an average sufficient; (v) 0.81-1.00: sufficient and (vi) >1.0 more than sufficient
4	**Nitrogen (kg/ha):** (i) Upto 50 very less; (ii) 51-100 less; (iii) 101-150 good; (iv) 151-300 Better and (v) >300 sufficient
5	**Phosphorus (kg/ha)**: (i) Upto 15 very less; (ii) 16-30 less; (iii) 31-50 medium, (iv) 51-65 on an average sufficient; (v) 66-80 sufficient and (vi) >80 more than sufficient
6	**Potassium (kg/ha)**: (i) 0 -120 very less; (ii) 120-180 less; (iii) 181-240 medium; (iv) 241-300 average; (v) 301-360 better and (vi) >360 more than sufficient

Source: Handbook of Agriculture, Indian Council of Agriculture Research, New Delhi

APPENDIX 3.3: ANALYSIS OF BASELINE CONCENTRATION

The analysis of air samples was carried out as per the method as described in the applicable standard codes. The result of the analysis has been summarized below.

Concentration of Ambient Air Pollutant of Study Area

PM10						
	Min	Max	STDEV	Percentile 98	Mean	NAAQS
AAQ1	63.7	74.6	3.0	74.6	69.3	100
AAQ2	67.2	77.0	2.2	76.4	72.1	100
AAQ3	60.6	69.6	2.3	68.9	65.1	100
AAQ4	63.1	71.7	1.9	71.0	67.0	100
AAQ5	53.9	69.5	4.3	68.0	59.5	100
AAQ6	57.3	68.1	2.7	66.9	61.2	100

PM2.5						
	Min	Max	STDEV	Percentile 98	Mean	NAAQS
AAQ1	26.5	36.2	2.7	35.4	30.6	60
AAQ2	26.8	34.6	2.0	33.8	30.4	60
AAQ3	23.0	32.2	2.4	31.0	26.8	60
AAQ4	21.7	28.5	1.7	28.2	25.7	60
AAQ5	21.3	29.3	2.1	29.0	24.1	60
AAQ6	23.6	30.8	2.1	30.4	25.9	60

SO_2						
	Min	Max	STDEV	Percentile 98	Mean	NAAQS
AAQ1	14.4	20.7	1.4	20.2	17.7	80
AAQ2	18.0	21.8	1.0	21.7	19.6	80
AAQ3	14.2	16.7	0.7	16.6	15.2	80
AAQ4	12.5	15.4	0.8	15.4	13.8	80
AAQ5	11.5	15.6	1.2	15.6	13.6	80
AAQ6	12.9	18.9	1.6	18.9	17.1	80

NO_2						
	Min	Max	STDEV	Percentile 98	Mean	NAAQS
AAQ1	19.7	25.2	1.6	25.1	22.6	80
AAQ2	22.1	27.9	1.7	27.7	25.1	80
AAQ3	17.3	22.0	1.5	22.0	19.7	80
AAQ4	17.7	22.5	1.4	22.3	20.0	80
AAQ5	16.5	22.0	1.5	21.9	19.3	80
AAQ6	17.5	24.2	1.6	24.2	21.4	80

CO						
	Min	Max	STDEV	Percentile 98	Mean	NAAQS
AAQ1	0.42	0.77	0.10	0.76	0.60	2
AAQ2	0.61	0.80	0.05	0.80	0.70	2
AAQ3	0.50	0.69	0.05	0.69	0.64	2
AAQ4	0.46	0.68	0.05	0.67	0.56	2
AAQ5	0.47	0.71	0.06	0.70	0.57	2

AAQ6	0.45	0.68	0.05	0.68	0.55	2

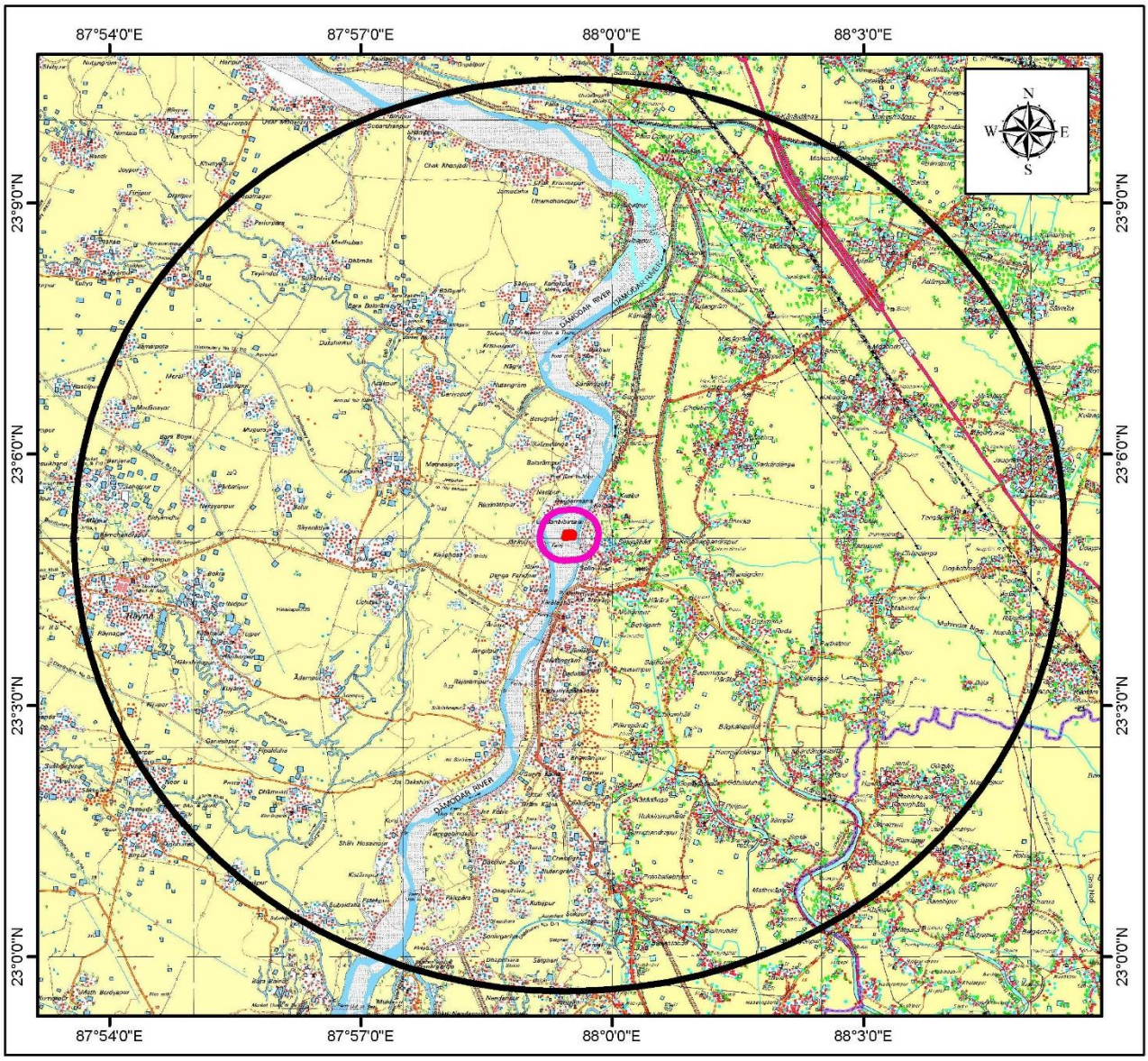
% Silica					
	Min	**Max**	**STDEV**	**98P**	**Mean**
AAQ1	0.45	0.64	0.05	0.64	0.55
AAQ2	0.43	0.67	0.06	0.66	0.57
AAQ3	0.40	0.55	0.04	0.55	0.48
AAQ4	0.40	0.50	0.03	0.50	0.47
AAQ5	0.36	0.60	0.06	0.58	0.47
AAQ6	0.34	0.56	0.05	0.55	0.48

Source: N. D. International

Appendix 3.4: Designated Best Use of Water as per CPCB

Designated Best Use	Class of Water	Criteria
Drinking water source without conventional treatment but after disinfection	A	o Total Coliforms Organism MPN/100ml shall be 50 or less o pH between 6.5 and 8.5 o Dissolved Oxygen 6mg/l or more o Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	o Total Coliforms Organism MPN/100ml shall be 500 or less o pH between 6.5 and 8.5 o Dissolved Oxygen 5mg/l or more o Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	o Total Coliforms Organism MPN/100ml shall be 5000 or less o pH between 6 to 9 o Dissolved Oxygen 4mg/l or more o Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	o pH between 6.5 to 8.5 o Dissolved Oxygen 4mg/l or more o Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	o pH between 6.0 to 8.5 o Electrical Conductivity at 25°C micro mhos/cm Max.2250 o Sodium adsorption Ratio Max. 26 o Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

Source: Central Pollution Control Board (CPCB), Delhi



Legend

- Project Site
- 500m buffer (Core Zone)
- 10 Km Buffer (Buffer Zone)

Figure No : 3.1

Map

Study area map(Core Zone & Buffer Zone) of the Project site (10 Km buffer of the Project site location)

River Bed Sand Mining Project of Selimabad Sand Mine

Mouza- Selimabad ,P.S.- Jamalpur
District- Purba Bardhaman, W.B.
Area- 4.74Ac/1.92Ha

Project Proponent

Maa Durga Coal Traders

Graphic scale

0 1 2 4 KM

Figure 3-1: Study area Map (Core Zone & Buffer Zone)

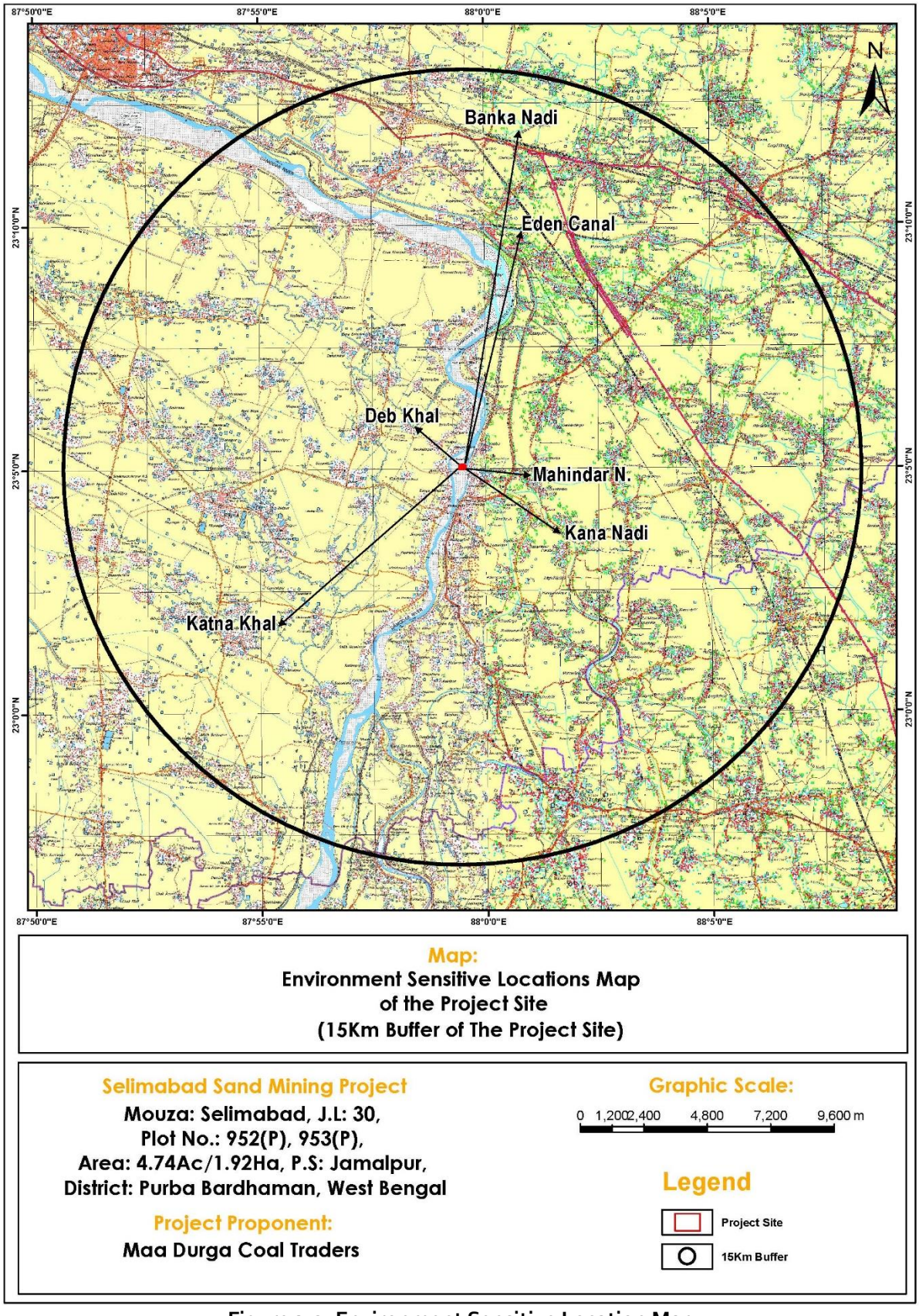
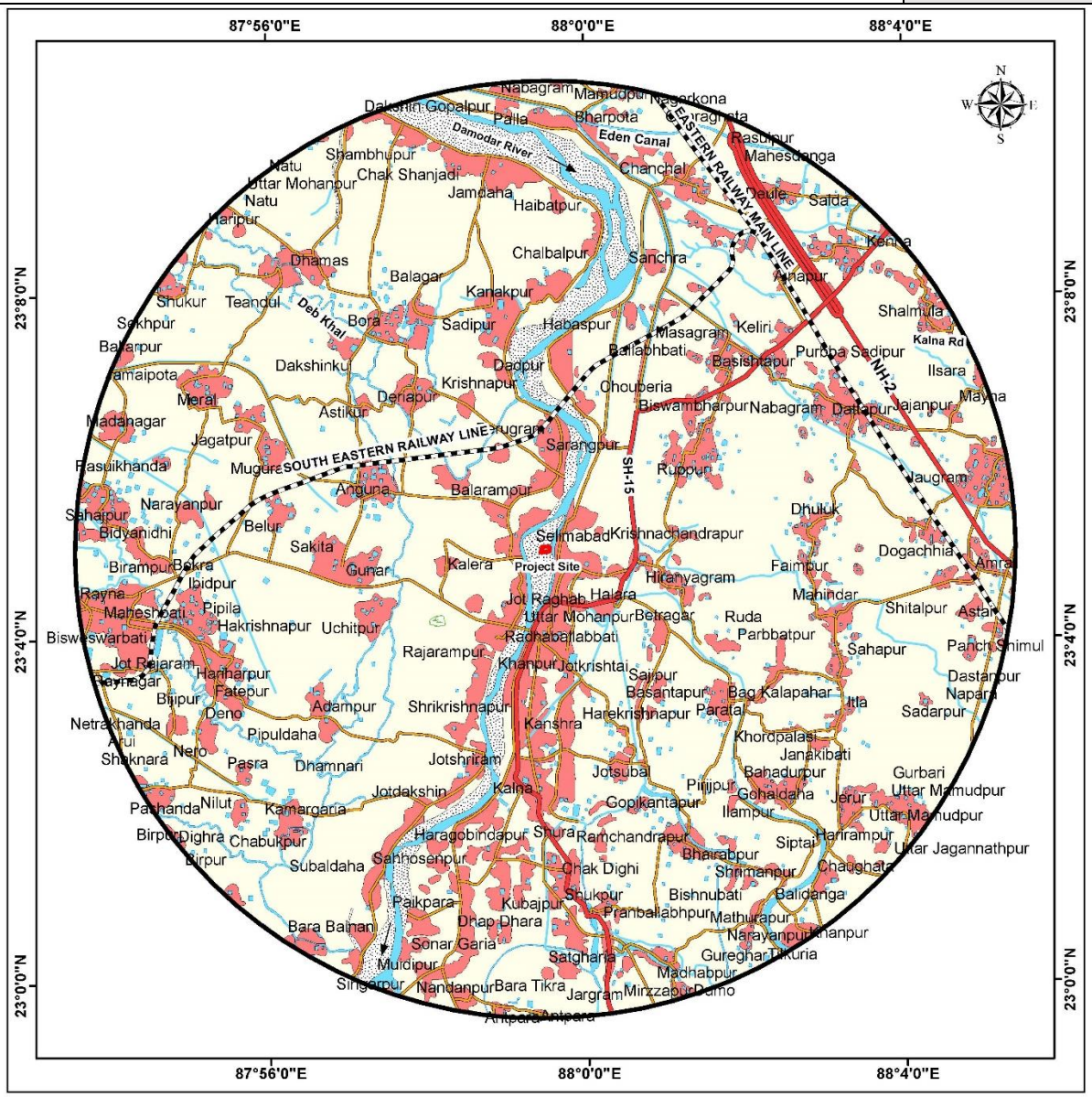


Figure 3-2: Environment Sensitive Location Map



Legend

Figure No : 3.3

- Railway Line
- Major Roads
- Minor Roads
- Nala
- Project Site
- Study Area(10Km)
- Builtup
- Sandy Area
- Water Bodies
- Open Scrub
- Agricultural Land

LULC Breakup

Sl	Land Types	Area (Ha)	Percentage
1	Project Site	1.92	0.0
2	Builtup	5,567.16	17.4
3	Open Scrub	5.99	0.0
4	Sandy Area	944.89	3.0
5	Waterbody	1,526.15	4.8
6	Agriculture Land	23,894.00	74.8
	Total Area	31,940.11	100.00

River Bed Sand Mining Project of Selimabad Sand Mine
Mouza- Selimabad ,P.S.- Jamalpur
District- Purba Bardhaman, W.B.
Area- 4.74Ac/1.92Ha
Project Proponent
Maa Durga Coal Traders

Graphic scale
0 0.75 1.5 3 KM

Map
Land Use Land Cover map
of the Study Area
(10 Km buffer of the Project site location)

Figure 3-3: Land Use Map of Study Area

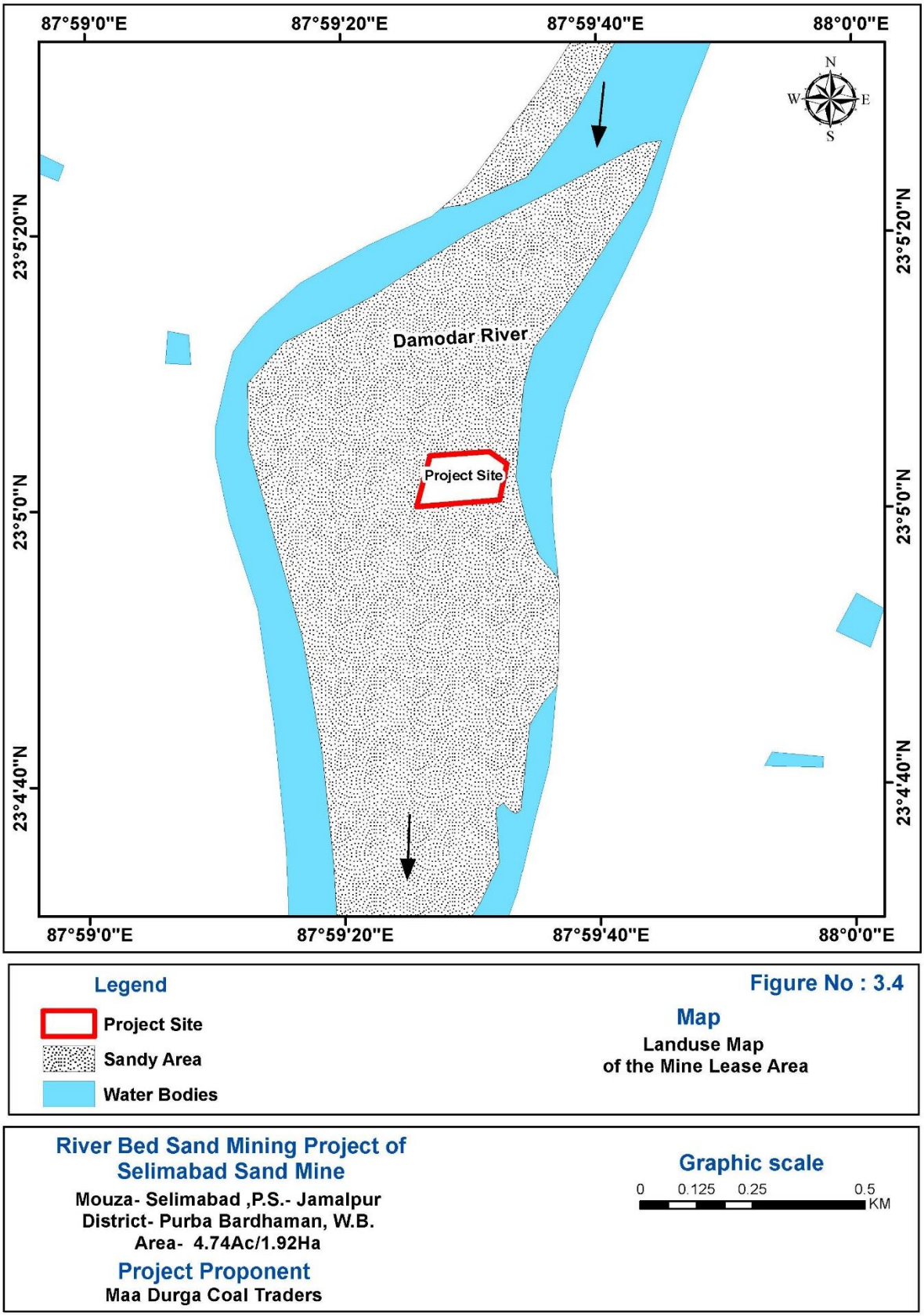


Figure 3-4: Land Use Map of the Mine Lease Area

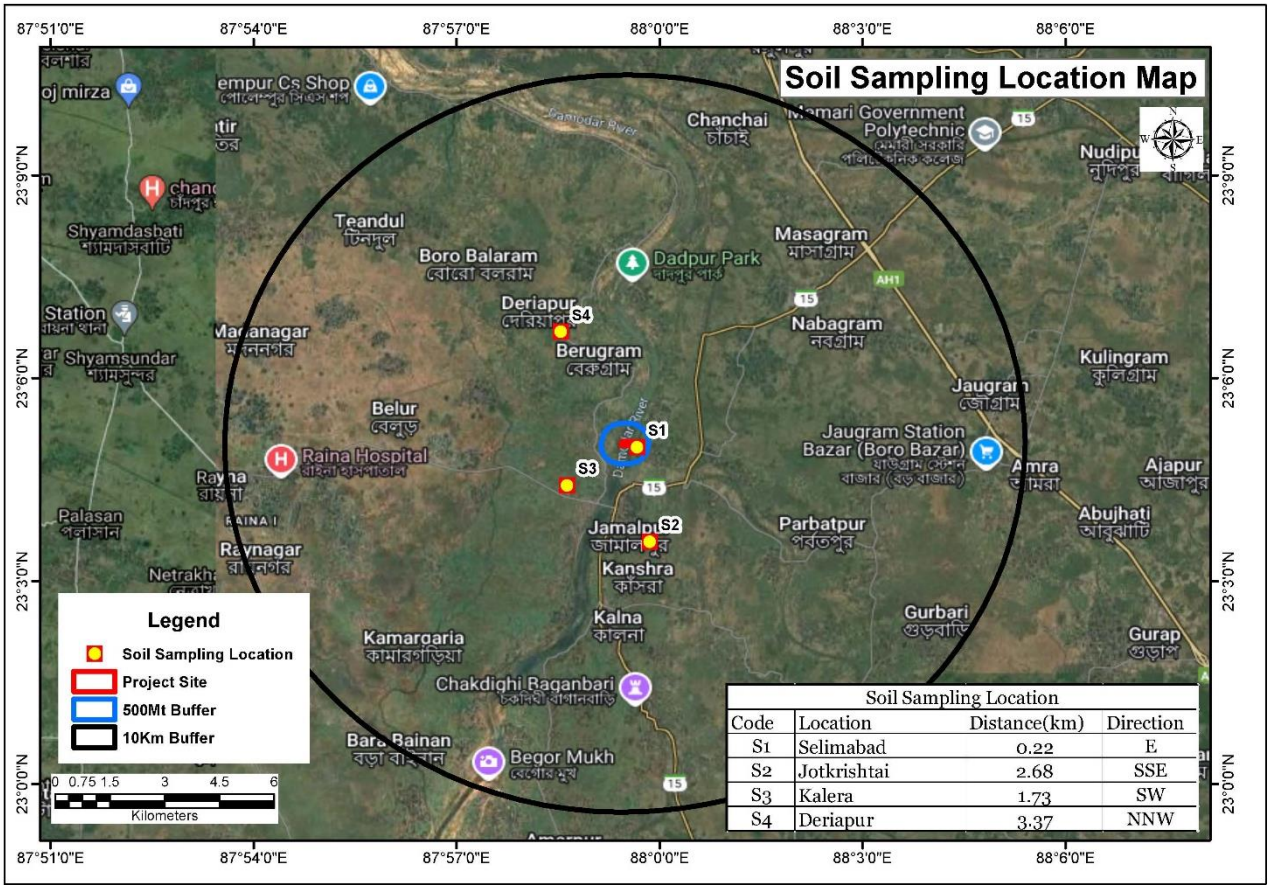


Figure 3-6: Soil Sampling Monitoring Locations Map

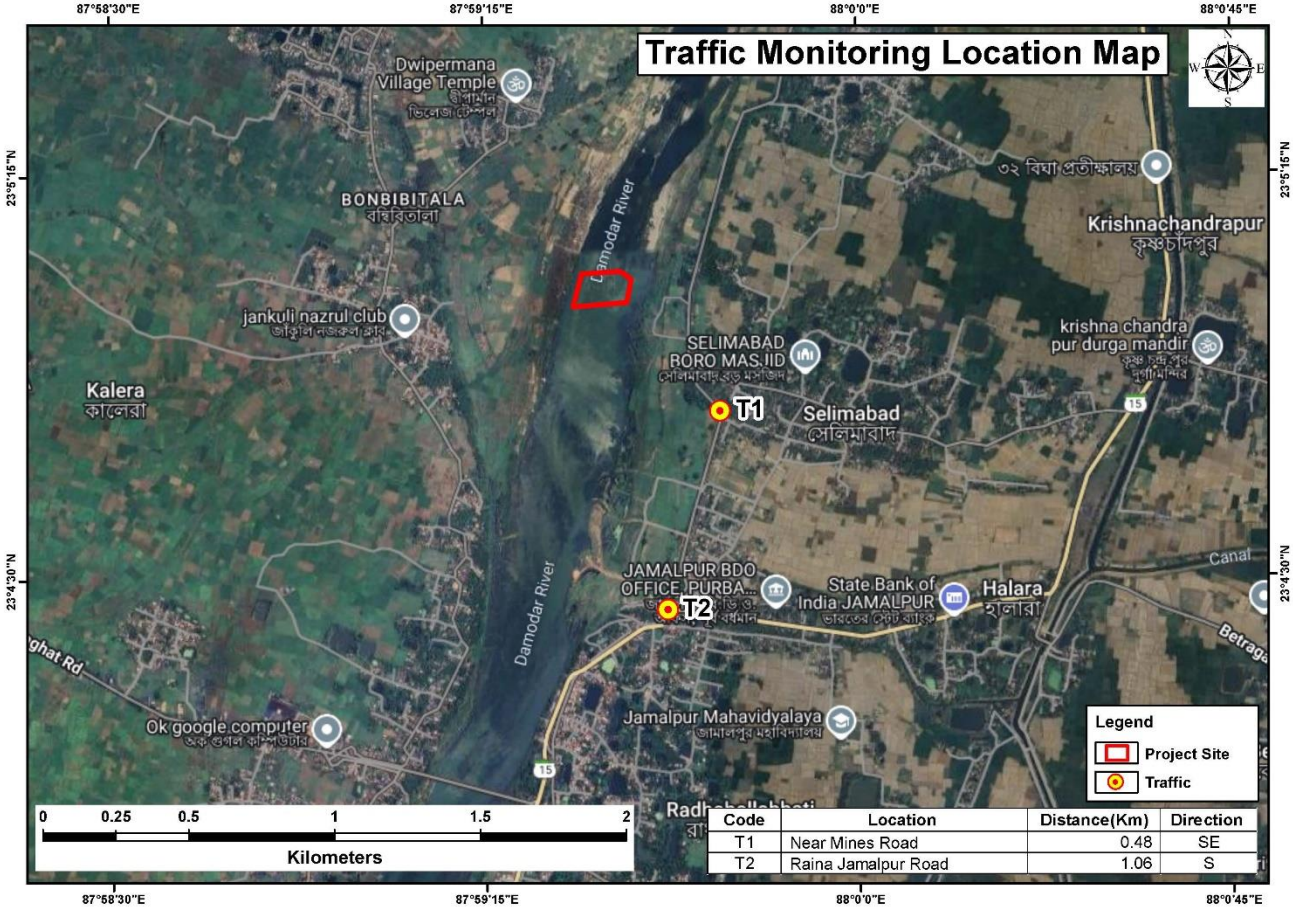


Figure 3-7: Traffic Monitoring Locations Map

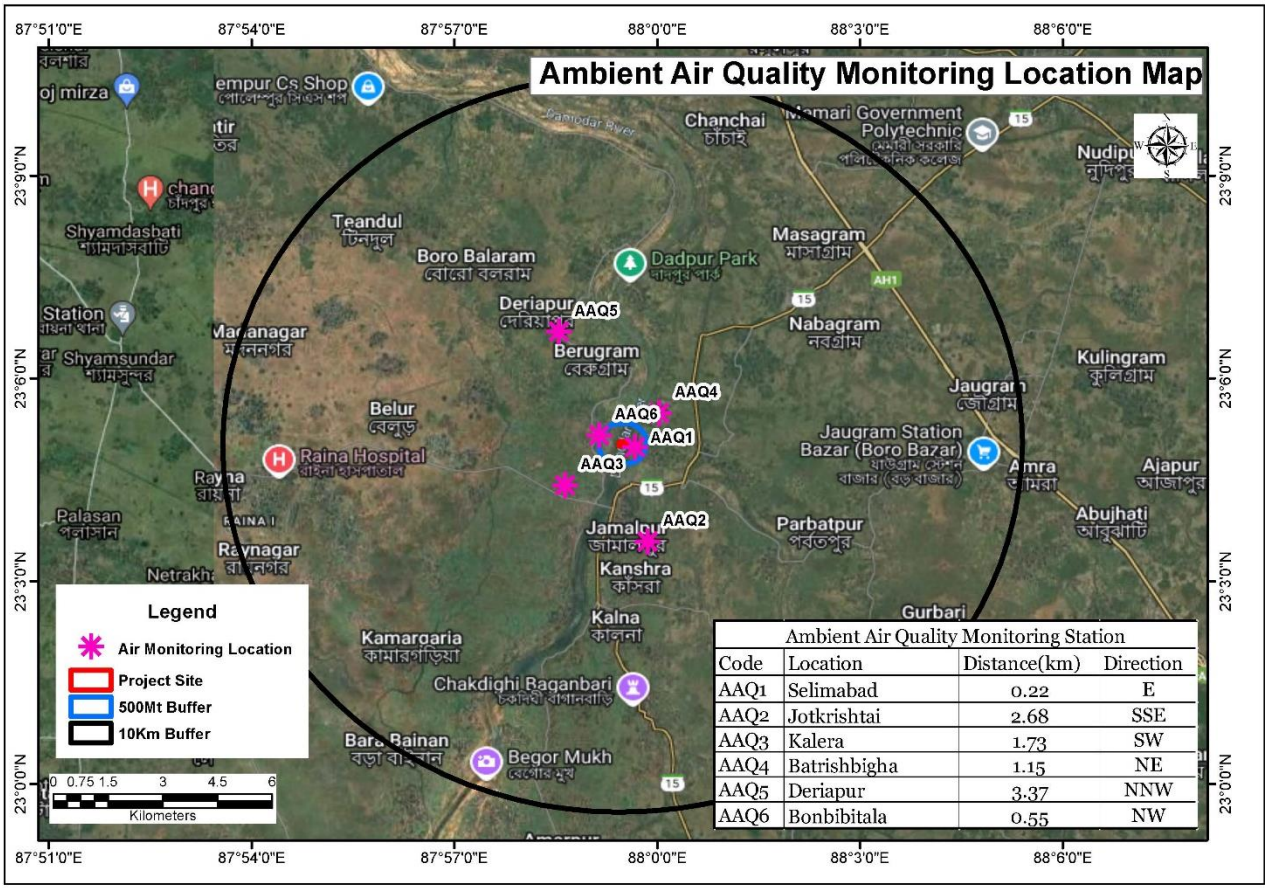


Figure 3-12: Ambient Air Quality Monitoring locations map

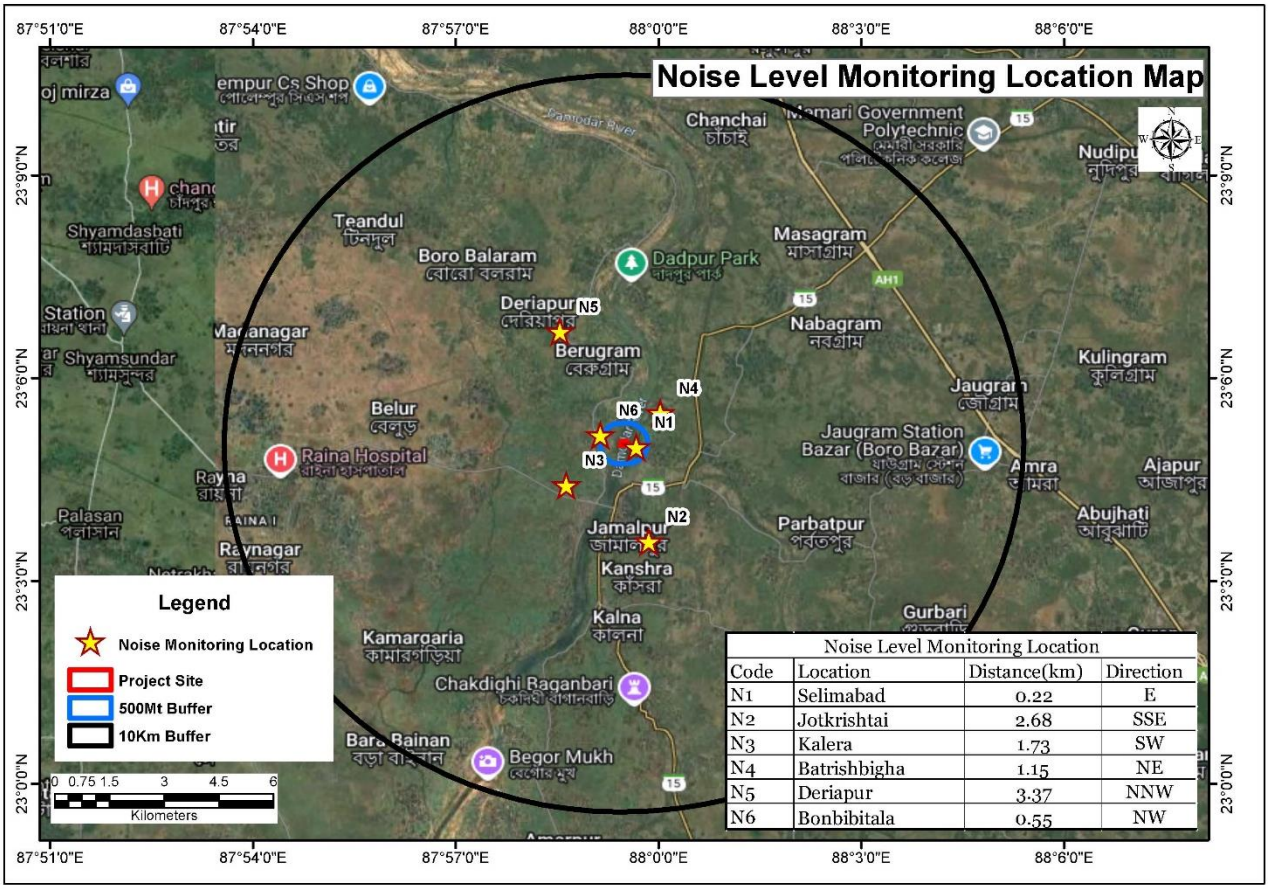


Figure 3-13: Noise Level Monitoring locations map

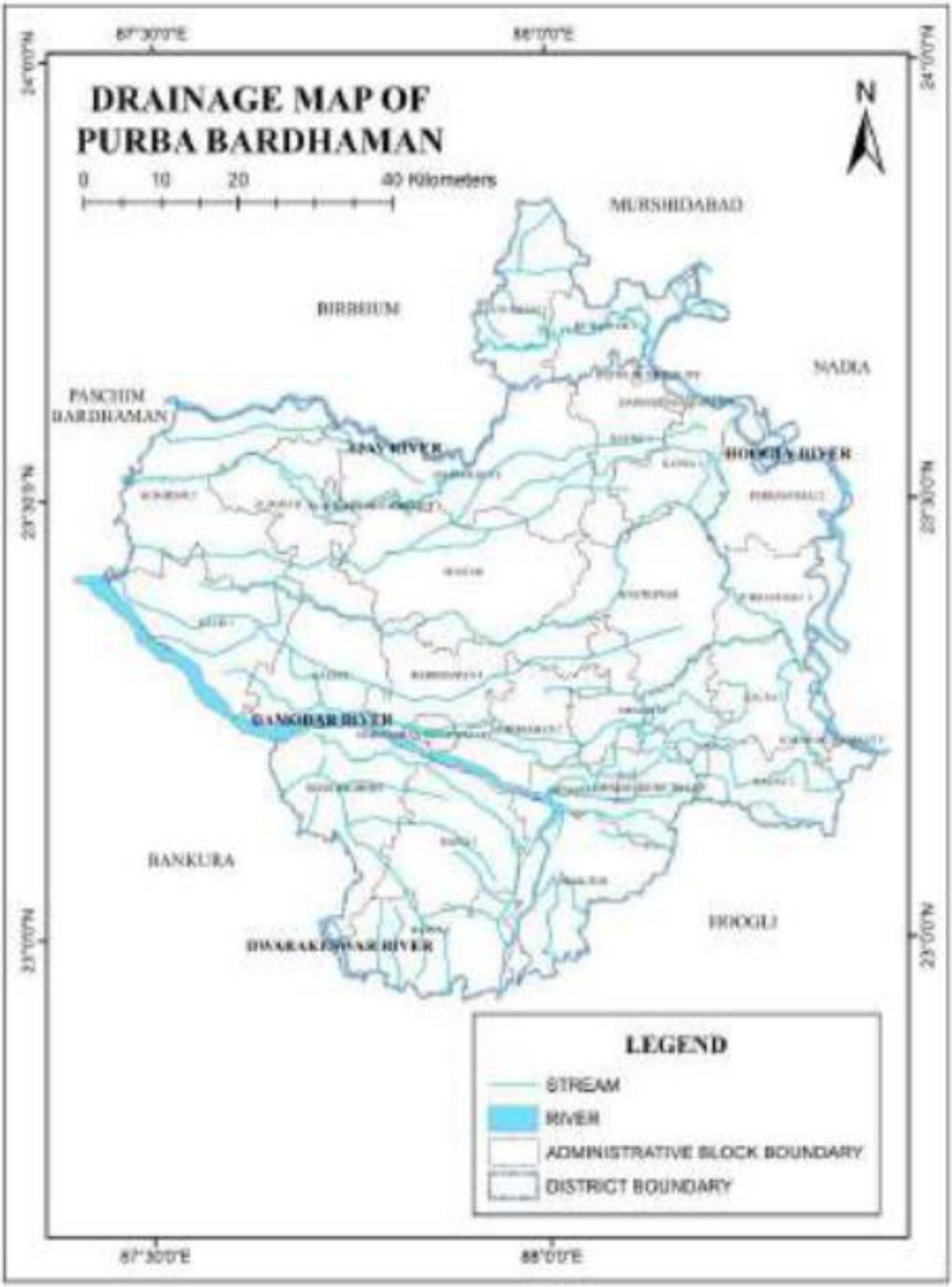


Figure 3-14: Drainage Map of Purba Bardhaman District

Legend

Figure No : 3.15

- Railway Line
- Major Roads
- Minor Roads
- Nala
- Project Site
- Sandy Area
- Water Bodies
- Open Scrub
- Study Area(10Km)

Graphic scale

0 0.75 1.5 3 KM

River Bed Sand Mining Project of
Selimabad Sand Mine
Mouza- Selimabad ,P.S.- Jamalpur
District- Purba Bardhaman, W.B.
Area- 4.74Ac/1.92Ha
Project Proponent
Maa Durga Coal Traders

Map
Drainage map
(10 Km buffer of the Project site location)

Figure 3.15: Drainage Map of Study area

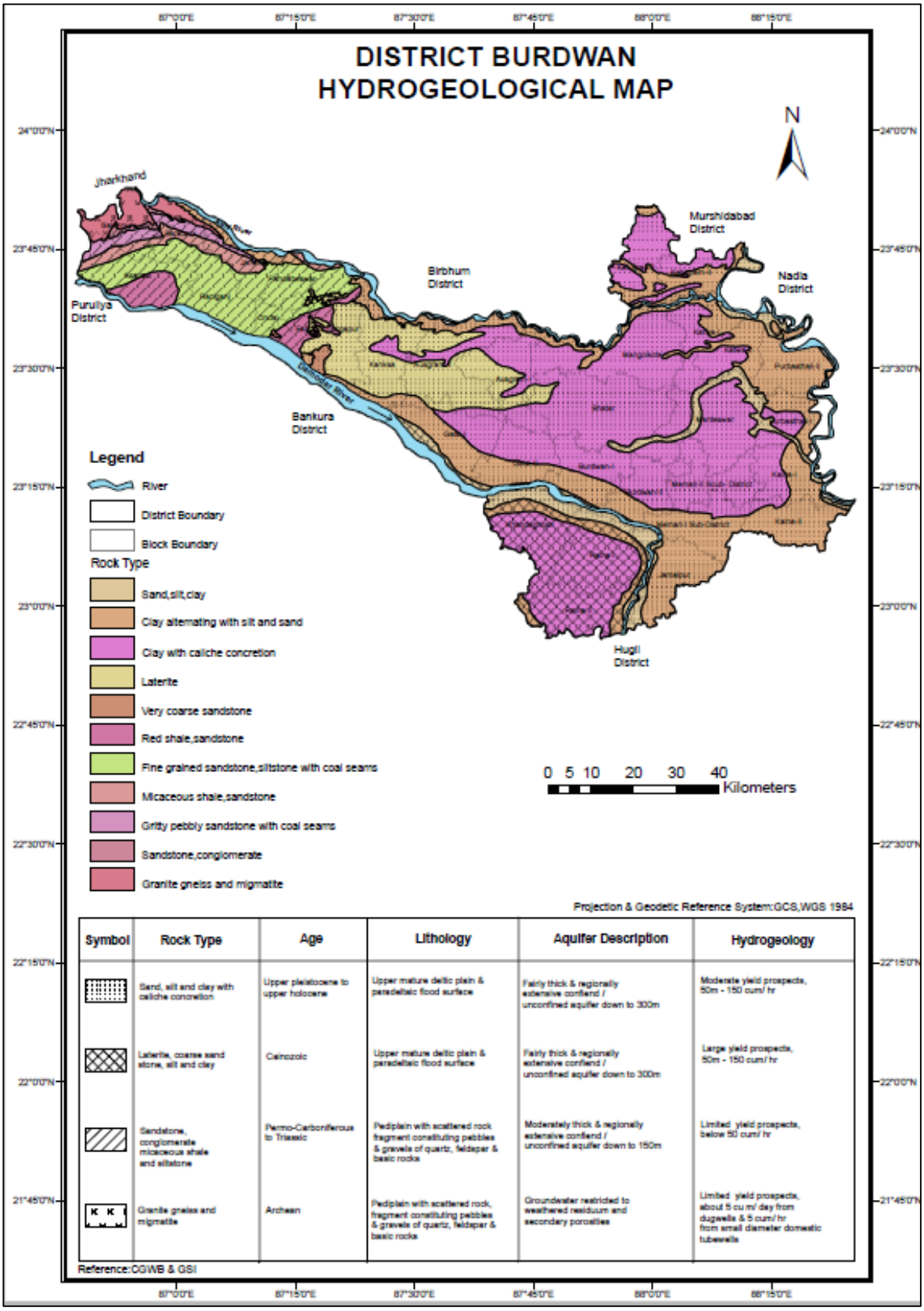


Figure 3-16: Hydrogeology Map of Burdwan District

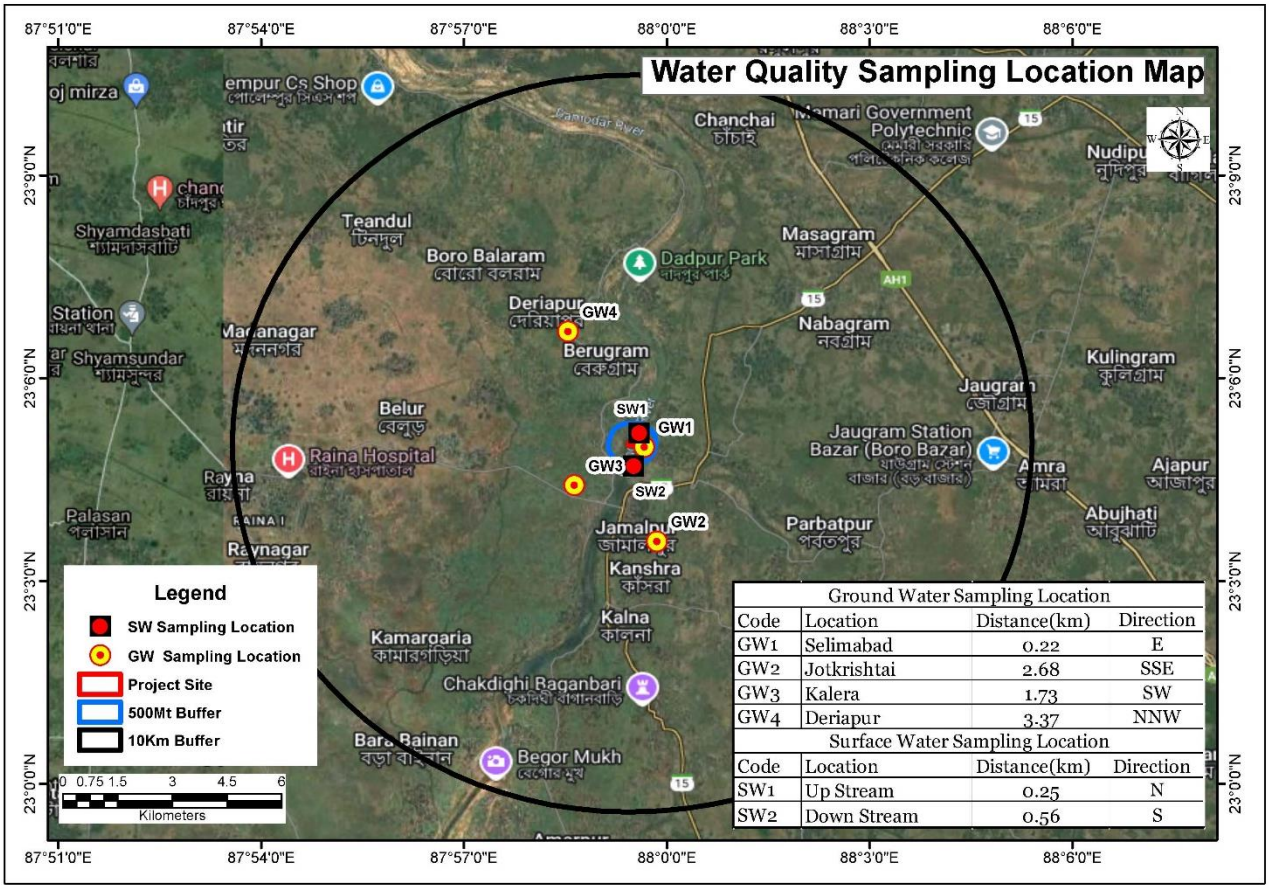


Figure 3.17: Water Quality Sampling Monitoring locations Map

CHAPTER 4

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4. ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 DETAILS OF INVESTIGATED ENVIRONMENT IMPACTS

Mining activities cause adverse impacts on the surrounding environment unless proper environmental management plan is adopted. Selecting suitable sites for mining and also adopting all the guidelines prescribed by Sustainable Sand Mining Guidelines 2016 (SSG), Enforcement & Monitoring Guidelines for Sand Mining, 2020 and WBMMCR 2016 and The West Bengal Sand Mining Policy 2021 can minimize the major possible impacts.

In this chapter, an attempt is made to quantify or quality the possible environmental impacts on various features such as air quality, water use and quality, land-use, ecological considerations, soil quality and socio-economic factors. The above-mentioned aspects have been studied to identify the impacts of the proposed production from the mine. The magnitude and significance of the environmental pollution caused by mining depends on method of mining, scale and concentration of mining activity. On the basis of the impact analysis, the mitigating action and future monitoring requirement are focused in the Environmental Management Plan for counting or minimizing adverse impacts. The impact matrix is given in **Table 4.1**.

Table 4-1: Environment Impact Matrix

Environmental Factors	Activities						
	Open Cast-Operation	Natural Replenishment	Mineral Transportation	Plantation	Employment Generation	Infrastructure development	Traffic Generation
Ambient Air	●		●	❍		●	●
Water Resource	●						
Water Quality	●						
Ambient Noise	●		●			●	●
Flora and Fauna		❍	●	❍			
Soil Quality	●		●	❍			
Land-use					❍		
Health & Safety	●		●	❍			●
Socio-economic	●		❍	❍	❍	●	

● Adverse Impacts ❍ Beneficial Impacts

A brief description of impacts by the proposed project is given in **Table 4.2.**

Table 4-2: Description of Identifiable Impacts

Sl. No.	Activities	Description of Impacts
1	Vegetation	**Moderate impact:** Uprooted plants, damaged to plant parts such as branches, loss of tree species, disturbances to survival, habitat loss
2	Animals	**Moderate impact:** Loss of aquatic habitats (specially for fish and phytoplankton), decreased species diversity due to loss of sensitive species, loss of spawning grounds for aquatic species and river bank dwelling species, disturbances to food webs, habitat loss for bank dwelling species such as aquatic birds, reptiles, amphibians.
3	Ecosystem stability	**Moderate impact:** Soil erosion, loss of fertile soil, bank instability and collapse, loss of protective structures provided by trees, changes to topography due to temporary foot paths and transportation network, obstacles to water flow
4	Water quality	**Moderate Impact:** Pollution by sedimentation, silt loads, vehicular discharge, solid waste dumping by humans, visible impairment of water quality, decreased dissolved oxygen concentration

4.2 IMPACT MITIGATION/MINIMISING MEASURES

Some of the impacts identified in various phases of operation are insignificant and do not warrant much attention whereas some others are important especially with respect to the present context. Therefore, objective is to identify those impacts, which are significant and require a detailed analysis for decision-making or formulating adequate management measures. This section deals with an assessment of impact of various mining activities on the existing environmental conditions. The methodology of assessment is based upon identification and description of the existing project activities as well as environmental components followed by predicting the impact of mining and associated activities on the environment. The environmental components that are likely to be influenced or modified by the continuation of project activities are: (i) Air environment, (ii) Noise and vibration environment, (iii) Water environment, (iv) Land use; (v) Soil environment; (vi) Hydrology; (vii) Geology; (viii) Biological environment, (ix) Socio-economic status of the area, and (x) Land and soil.

The identification of impact and mitigation/minimising measures of the river bed mining in Selimabad is detailed in **Table 4.3.**

Table 4-3: Environmental impact and Mitigation Measures

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
A	**Land Environment**		
A.1	Land use & Land Cover	○ Mining of minerals from the river bed will create a void which may affect the stream flow. ○ Mining within a river bed may have some impact on the stream's	○ Sand mining activities will be limited to a maximum depth of 2.94 meters below the river bed or the water table, whichever is reached first.

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
		physical characteristics, such as channel geometry, bed elevation in stream roughness of the bed, flow velocity, discharge capacity, sediment transportation capacity etc. o Loss of adjacent land and/or structures. o Riverbed mining can have adverse effects on agricultural lands located near rivers. Changes in water flow and sedimentation can disrupt irrigation systems, affect soil fertility, and lead to the loss of productive agricultural land.	o Dredging will not be allowed. o The mining is planned in non-monsoon seasons only, so that the excavated area gets replenished during the monsoon each year. o Grasses and bushes which have fibrous roots at the first instance are proposed to grown along the banks which enhances the binding properties of the soil. o The systematic and scientific removal of sand will allow sedimentation during monsoon and not cause bed degradation. o Restoration of bank will be ensured at the end of mine closure every year. o Mining activities in river-beds will not be allowed within a certain distance from bridge structures. The permissible distance is five times the span of the bridge structure on the upstream side and ten times the span on the downstream side, with a minimum distance of 250 meters on the upstream side and 500 meters on the downstream side. This regulation ensures the protection of bridge structures and maintains the integrity of the river ecosystem. o The proposed river-bed mining is unlikely to change any characteristics of the river as the mined minerals will be replenished every monsoon season.
A-2	Soil Quality	o Soil compaction may occur due to movement of trucks outside the lease area which may affect the soil characteristics like soil fertility, infiltration rate, porosity etc. This ultimately restricts the growth of deep-rooted plants which finally leads to stagnation of succession.	o The movement of trucks will be restricted to haul roads. o The roads that will be used for transportation of mined minerals are already constructed. o The unpaved roads will be strengthened in order to reduce impact on soil quality.
A-3	Traffic Density	o Sand mining operations may involve the movement of trucks to	o Traffic management plan will help in avoiding any traffic jams and thus

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
		transport sand. This can contribute to increased traffic congestion, particularly on roads leading to and from mining areas. o The constant movement of heavy trucks and dumpers associated with sand mining. This can result in potholes, uneven surfaces, and overall degradation of the road infrastructure. o Local communities near sand mining sites may experience disruptions to their daily lives due to increased traffic. This can impact residents' access to roads, schools, businesses, and other essential services.	concentration of trucks at one place will be avoided. o By reducing the speed and/or volume of traffic on such roads to an acceptably low level. o Transportation of minerals will be stopped during the opening and closing hours of schools, colleges, and offices.
B	**Air Environment**		
B-1	Air Quality	o The extraction and transportation of sand can lead to the release of dust particles into the air, affecting air quality in the vicinity. o The use of vehicles for sand transportation in the project can lead to the emission of pollutants, contributing to air pollution.	The only air pollution sources are the road transport network of the trucks/dumpers. The dust suppression measures like the following will be resorted: o Water sprinkling will be done on the roads regularly. This will reduce dust emission by 75%. o Preventive measures will be implemented to minimize spillage during transportation of materials. This includes covering the carrying vehicles with tarpaulin to contain the load and prevent any loose material from escaping. o Proper tuning of vehicles along with pollution certificate to keep the gas emissions under check. o Plantation of trees along road sides as part of social forestry to help reduce the impact of dust in the nearby villages. o Vegetation improves air by capturing pollution particles, reducing carbon dioxide and producing oxygen. Photosynthesis in green plant consumes carbon dioxide, plants help in counteracting

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
			the increase of this gas in the atmosphere. Thus, planting of trees and shrubs for abatement of air pollution and improvement of environment is an effective way. o Plants with dust scavenging capacity i.e. plants species which have aesthetic value and high pollution tolerance level will be recommended for planting along the roads.
B-2	Noise Level	o Noise generated by vehicles transporting the mined minerals is identified as a major source of noise. The trucks used for transportation are expected to produce noise levels ranging from 80-85 dB(A). The material transportation road passes through the villages of Selimabad, potentially affecting the residents who will be exposed to increased noise levels. However, considering the relatively low number of trucks (19 trucks or 38 trips), the incremental noise level is expected to be minimal.	o Periodical monitoring of noise near sensitive receptors will be done. o No other equipment's except the transportation vehicles will be allowed. o The well-tuned vehicles will be used and loud noise will be checked every day which help in reducing noise during operations. o Plantation will be taken up along the approach roads and vicinity of river bank. The plantation minimizes propagation of noise and also arrests dust. o By reducing the speed and/or volume of traffic on such roads to an acceptably low level.
C	**Water Environment**		
C-1	Hydrology, Hydro-geology and Water Quality	o During river bed mining Ground water table may be intersecting. o Sand mining can alter the physical structure of riverbeds, leading to the destruction of natural habitats for aquatic plants and animals. Changes in the riverbed can disrupt the breeding and feeding grounds for fish and other organisms. o Excessive suspended sediment in the water can cause harm to riparian vegetation and disrupt the natural habitat within the stream. o The extraction of sand from riverbeds can stir up sediment, releasing pollutants that were previously trapped in the riverbed.	o Mining will be done up to a depth at least 1m above the zero level. Mining will be done in scientific way and as per approve mine plan. o Project activity will be carried out in the non-monsoon season and on dry bed. o Since mining will be done only in central 3/4th portion of the river bed there will be no diversion or modification in the river flow. It is not proposed to divert or truncate any stream in case of river bed mining.

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
		This can degrade water quality, affecting both aquatic ecosystems and the availability of clean water for human use.	
C-2	Waste Generation	○ Impact on surface water bodies through indiscrete disposal of liquid waste and suspended solids carried by flowing rainwater.	○ The estimated municipal solid waste generated will be 4 kg/day and liquid waste generated by 38 employees will be 0.076 KLD. Effective waste management will be implemented through the provision of dustbins and mobile toilets at the project site.
D	**Ecological Environment**		
D-1	Flora	○ Fugitive emission from vehicle movement will form a layer in leaves thus reducing the gaseous exchange process. This ultimately affects the growth of plants. ○ The construction of a new linear surface, such as a road, can create a new microclimate and alter physical conditions in the surrounding area. This change can impact plant mortality and the biological community, extending from the road edge to varying distances. ○ Emissions, litter, noise, and other physical disturbances from road activities can affect roadside vegetation, leading to changes in species composition. These impacts may extend to varying distances from the road.	○ To promote healthy roadside vegetation, it is recommended to choose native plant species that are resilient to stress and pollution and well adapted to the local climate. Selection should consider factors such as agro-climatic suitability, height and canopy structure, growth rate, and aesthetic qualities such as foliage and flower color. Hardy plants that can withstand severe weather conditions and require minimal irrigation are preferred. ○ Annual bio-monitoring will be conducted on roadside plants to assess their exposure to vehicular pollution. This monitoring will involve evaluating the dust load accumulated on plant surfaces and determining the Air Pollution Tolerance Index (APTI) of the plants.
D-2	Fauna	○ The operational activities such as population influx, transportation and noise generation may have an adverse impact on fauna. ○ The presence of suitable roadside habitats for animals that rely on acoustic signals, like birds, presents a tradeoff between habitat availability and the potential negative impacts of	○ Efforts will be made to minimize the impact of mining activities on residential areas and crucial wildlife habitats by carefully planning the right-of-way (ROW). This involves avoiding the direct route through residential areas and important wildlife habitats such as rookeries, raptor nesting areas, and calving areas, to the extent possible

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
		traffic noise and passing vehicles on their survival and breeding success. o Indiscriminate mining from active river channels has detrimental impacts on the benthic fauna, which resides in the sandy substratum at the river bottom. Excessive extraction of sand from rivers disrupts the eco-biology of various terrestrial insects that rely on aquatic environments during their initial life stages. o From a fisheries perspective, the loss of benthic invertebrates as a result of mining activities has a significant negative impact. This depletion of food resources can lead to a decline in the inland fishery resources in the area.	o All equipment used in the mining operations will be equipped with sound-control devices that are as effective as the original equipment. Motorized equipment will be properly muffled and maintained to ensure optimal noise control measures are in place. o Exhaust silencers and acoustical pipe lagging (wrapping) will be utilized to minimize compressor noise and ensure optimal noise reduction. o A strict monitoring of the mining activity is utmost essential for reviving the health of the river ecosystem and in turn aquatic biology will be benefited. o No mining will be carried out during the rainy season to minimize impact on aquatic life. o Sand extraction in vegetated riparian areas will be avoided. o Undercut and incised vegetated banks will not be altered. o Large woody debris within the riparian zone will be preserved and left undisturbed. If it needs to be moved, it will be carefully replaced rather than burned. o Prompt and immediate action will be taken to evenly redistribute any spillage generated during the mining operation over the mined voids. o Access roads will not encroach into the riparian zones. o Efforts will be made to avoid the removal or disturbance of in-stream roughness elements during mineral extraction activities. If any elements are disturbed, they will be promptly replaced or restored.
E	**Social Environment**		
E-1	Health	o The socio-health impacts of transportation primarily arise from	o Appropriate measures will be implemented in each impacted area

S.no	Aspects	Identification of Impacts	Mitigation/Minimizing Measures
		truck emissions, dust generation, and traffic movement. There is also a potential increase in accidents due to reckless driving of dumpers transporting minerals along the roads.	to minimize significant adverse effects. o Welfare activities should be initiated in the area so as to improve the quality of life of the local people. o To enhance safety and minimize accidents, only licensed drivers will be hired and reckless driving fully prohibited. o We will ensure the provision of medical facilities, educational opportunities (with a focus on girls), and access to clean drinking water.

APPENDIX 4.1: IMPACT ON TRAFFIC DENSITY

The information on traffic volume is an important input required for planning, analysis, design and operation of roadway systems. Level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by drivers/passengers.

Volume (or flow) is the number of vehicles that pass
through a given point on the road during a designated time interval. Since roads have a certain width and a number of a lanes are accommodated in that width, flow is always expressed in relation to the given width (i.e. per lane or per two lanes etc.). The time unit selected is an hour or a day.

Density (or concentration) is the number of vehicles
occupying a unit length of road at an instant of time. The unit length is generally one kilometer. Density is expressed in relation to the width of the road (i.e. per lane or per two lanes etc.) When vehicles are in a jammed condition the density is maximum. It is then termed as the jamming density.

Capacity is defined as the maximum hourly volume (Vehicles per hour) at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under the prevailing roadway, traffic and control conditions.

The idealized relationship between speed, volume and density is expressed in the three basic diagrams given in Fig. 4.1 which are collectively known as the Fundamental Diagram of Traffic Flow.

Level of Service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by drivers/passengers.
Level of Service definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety.

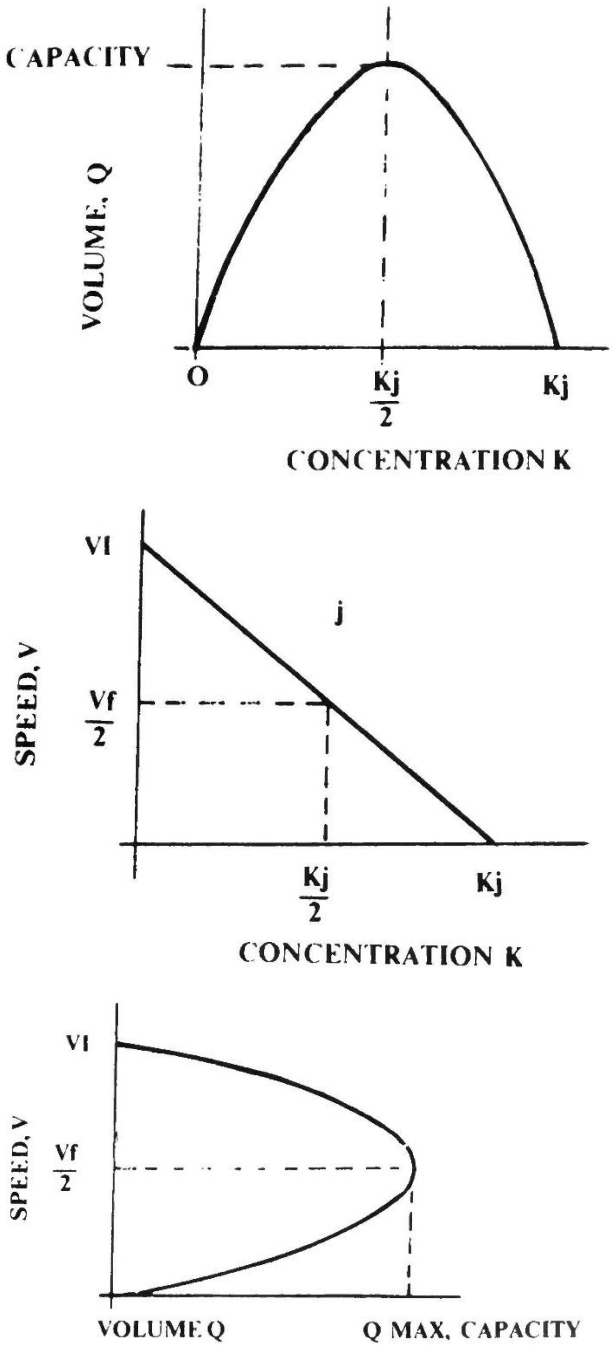


Fig 4.1: The Fundamental Diagram of Traffic Flow

Table 4.4: Recommended Design Service Volumes (Rural)

Terrain	Road Type	Curvature (Degrees per Kilometre)	Suggested Design Service Volume in PCU/day
Plain	Single Lane Roads	Low (0-50)	2,000
		High (above 51)	1,900
	Intermediate Lane Roads	Low (0-50)	6,000
		High (above 51)	5,800
	Two Lane Roads	Low (0-50)	15,000
		High (above 51)	12,500

Source: IRC Guidelines 64-1990

Capacity of urban roads is also a function of the roadside fringe conditions, e.g. parking, extent of commercial activities, frontage access etc. For purpose of recommendations given. Further on, the following fringe conditions are assumed:

Arterials: No frontage access, no standing vehicles, very little cross traffic

Sub-arterials: Frontage development, side roads, bus stops, no standing vehicles, waiting restrictions.

Collectors: Free frontage access, parked vehicles, bus stops, no waiting restrictions

Table 4.5: Recommended Design Service Volumes PCUs Per Hour (Urban)

Sl. No.	Type of Carriageway	Total Design Service Volumes for Different Categories of Urban Roads		
		Arterials*	Sub-arterials**	Collectors
1	2 – Lane (One way)	2400	1900	1400
2	2 – Lane (Two way)	1500	1200	900
3	3 – Lane (One way)	3600	2900	2200
4	4 – Lane Undivided (Two way)	3000	2400	1800
5	4 – Lane Divided (Two way)	3600	2900	-
6	6 – Lane Undivided (Two way)	4800	3800	-
7	6 – Lane Divided (Two way)	5400	4300	-
8	8 – Lane Divided (Two way)	7200	-	-

***** Roads with no frontage access, no standing vehicles, very little cross traffic.
****** Roads with frontage access but no standing vehicles and high-capacity intersections.
******* Roads with frontage access parked vehicles and heavy cross traffic.

Factors for conversion of different type of vehicle into equivalent passenger car unit (PCU) based on their relative interference value as per Indian Road Congress Guidelines i.e. IRC 64: 1990 & IRC 106: 1990 is given below:

Vehicle Type	Rural Road	Urban Road	
	Equivalency factor for PCU	Equivalent PCU factors percentage composition of vehicle type in traffic stream	
		5%	10% and above
Fast Vehicle			
Motor Scooter (Two wheelers)	0.50	0.50	0.75
Passenger Car, Pickup Van	1.0	1.0	1.0
Auto Rickshaw	1.0	1.2	2.0
Agricultural Tractor, Light Commercial Vehicle	1.5	1.4	3.7
Bus or Trucks	3.0	2.2	5.0
Truck Trailer, Agricultural Tractor – Trailer	4.5	4.0	-
Slow Moving Vehicles			
Cycle	0.50	0.4	0.5
Cycle Rickshaw	2.0	0.5	2.0
Hand Cart	3.0	2.0	3.0
Horse Drawn Vehicle	4.0	1.5	2.0
Bullock Cart	8.0	-	--

(Source: - IRC 64-1990 & IRC 106-1990)

5 LOS are recognized commonly, designated from A to E. **Table 4.6 below** shows the relation between V/C ratio and LOS.

Table 4.6: Relation between V/C ratio and LOS

V/C ratio	LOS	Performance
0.0-0.2	A	Represents a condition of free flow
0.2-0.4	B	Represents a zone of stable flow
0.4-0.6	C	The general level of comfort and convenience declines noticeably at this level
0.6-0.8	D	Represents the limit of stable flow
0.8-1.0	E	Represents operating conditions when traffic volumes are at or close to the capacity level

Source: IRC Guidelines 64-1990

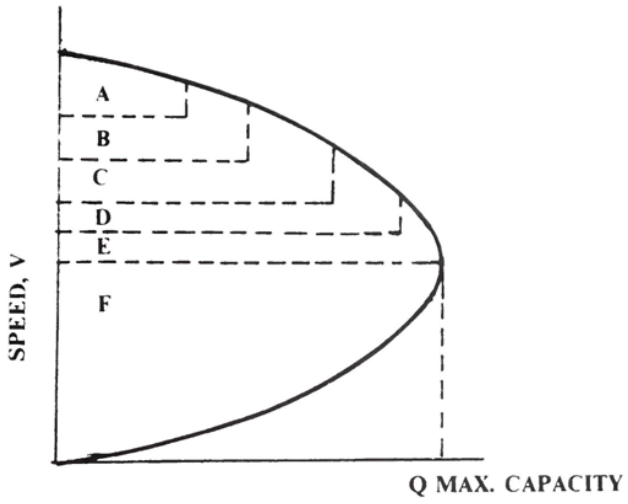


Fig 4.2: Speed volume curve showing levels of service

The incremental traffic load during Mine Operation is given below.

Production per day	224m^3
Capacity of truck	11.5m^3
Capacity of road (c) (T1:Rural)	Intermediate Lane Roads
Capacity of road (c) (T2:Rural)	Two Lane Road
Total trucks required (round trip)	**38**
Incremental PCU	**114**

Table 4.7 below shows the existing Level of Service (LOS) of the roads that will be used for transportation of the mined minerals.

Table 4.7: Traffic Scenario after Mining Operation

Years	Baseline 2024	Projected Traffic						
		2025	Additional Traffic due Mining	2025	2026	2027	2028	2029
Traffic Volume in PCU Per Day (V)								
T1*:	1440	1512	120	1632	1714	1800	1890	1985
T2*:	4566	4794	120	4914	5160	5418	5689	5973
VOLUME BY CAPACITY RATIO (V/C)								
T1:	0.24	0.25	0.02	0.27	0.29	0.30	0.32	0.33
T2:	0.30	0.32	0.01	0.33	0.34	0.36	0.38	0.40
LEVEL OF SERVICE (LOS) AS PER IRC GUIDELINE 64-1990								
T1:	B	B	A	B	B	B	B	B
T2:	B	B	A	B	B	B	B	B

*Rural; ** Urban; Source: IRC Guideline 64-1990

APPENDIX 4.2: IMPACT ON TRAFFIC DENSITY DUE TO THE CLUSTER MINES

The incremental traffic load during all three mine operation is given below.

Production per day	661 m^3
Capacity of truck	11.5 m^3
Total trucks required (round trip)	**116**
Incremental PCU	**348**

Table 4.8 below shows the existing Level of Service (LOS) of the roads that will be used for transportation of the mined minerals.

Table 4.8: Traffic Scenario after Mining Operation (using single road)

Years	Baseline 2024	Projected Traffic						
		2025	Additional Traffic due Mining	2025	2026	2027	2028	2029
Traffic Volume in PCU Per Day (V)								
T1*:	1440	1512	348	1860	1953	2051	2154	2262
T2*:	4566	4794	348	5142	5399	5669	5952	6250
VOLUME BY CAPACITY RATIO (V/C)								
T1:	0.24	0.25	0.06	0.31	0.33	0.34	0.36	0.38
T2:	0.30	0.32	0.02	0.34	0.36	0.38	0.40	0.42
LEVEL OF SERVICE (LOS) AS PER IRC GUIDELINE 64-1990								
T1:	**B**	**B**	**A**	**B**	**B**	**B**	**B**	**B**
T2:	**B**	**B**	**A**	**B**	**B**	**B**	**B**	**C**

*Rural; ** Urban; Source: IRC Guideline 64-1990

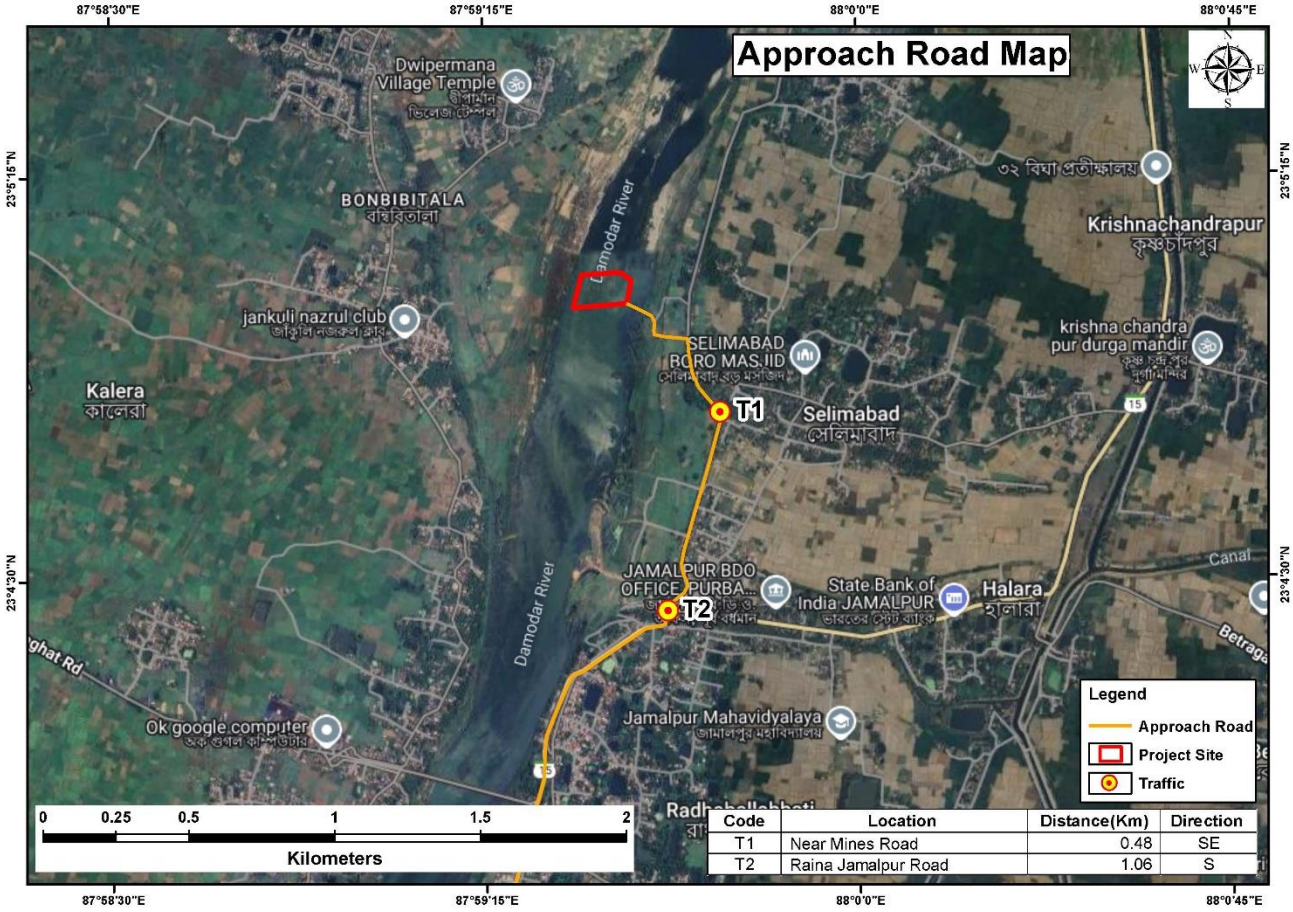


Fig 4.3: Google earth image showing the approach roads

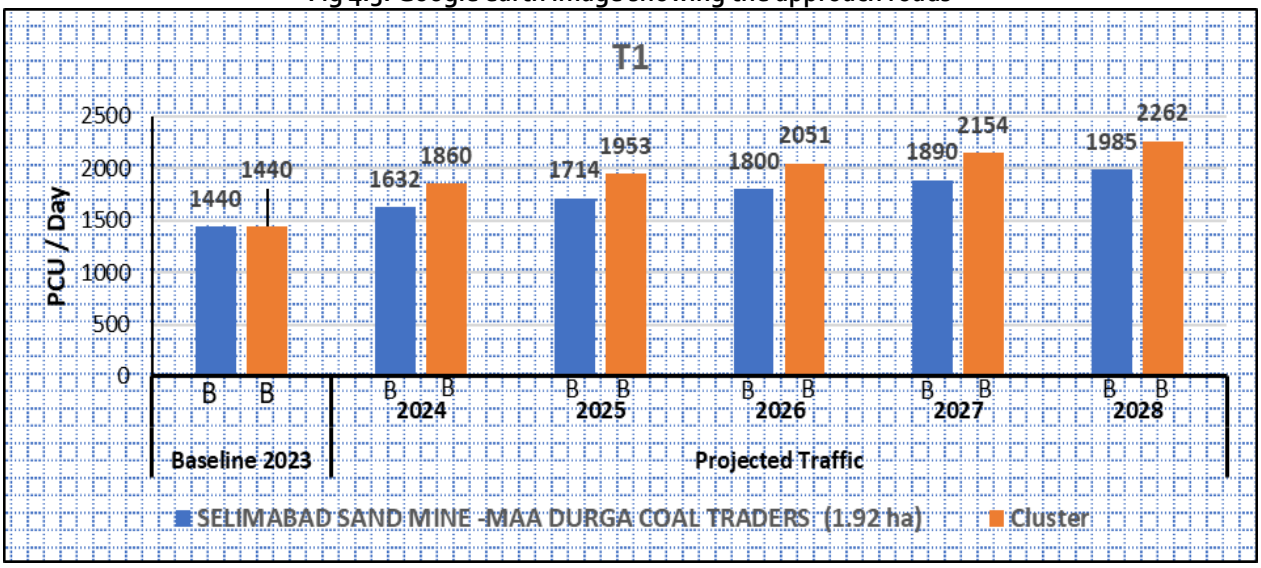


Fig 4.4: Traffic Scenario after Mining Operation (using single road) at T1 site

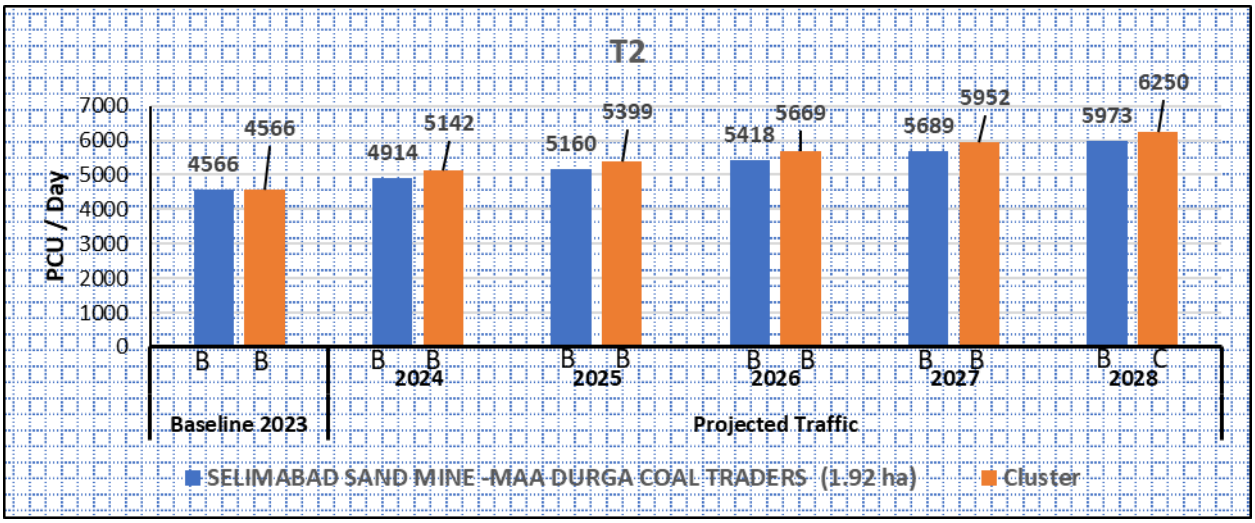


Fig 4.5: Traffic Scenario after Mining Operation (using both road) at T2 site

Traffic Analysis is a study carried out to predict the magnitude and effects of a project, generates on the existing transportation network. Traffic analysis can also be used to evaluate whether the particular project is appropriate and what type of transportation facility improvements would be necessary.

The three main types of automobile vehicles being used in the country are Passenger cars powered by four strokes gasoline engines. Motor cars, scooters and auto rickshaws powered mostly by small two stroke diesel engines. Large trucks and buses powered by mostly 4 stroked engines.

The Level of Service (LOS) and the capacity of the Roadway segments computed for this project as well as cluster condition are based on the Indian Road Congress (IRC) stands sourced from Guidelines of Capacity of Rural Road in Plain Area IRC 64-1990.

Incremental PCU for this project and cluster condition are 114 and 348 respectively. The existing Level of Service (LOS) of the roads for this sand mine shows insignificant alteration from the baseline condition to the end of mine.

T1 Site: It shows changes PUC/day for this project i.e., LOS will be same and remain 'B' to 'B' at the end of the mine. While Volume by Capacity Ratio (V/C) will change from the baseline condition 0.24 to 0.33. In cluster condition it is predicted the V/C ratio and LOS will be altering 0.24 to 0.38 and 'B' to 'B' respectively at the end of 5 years as there will be increase in the traffic density in the road way due to implementation of projects.

T2 Site: In T2 site, the study depicts changes PUC/day for this project i.e., LOS will be 'B' to 'B' at the end of the mine. While Volume by Capacity Ratio (V/C) will change from the baseline condition 0.30 to 0.40. In cluster condition it is predicted the V/C ratio and LOS will be altering 0.30 to 0.42 and 'B' to 'C' respectively at the end of 5 years as there will be increase in the traffic density in the road way due to implementation of projects.

Adequate control measures will be taken for the safe mode of transportation. The peak hours will be avoided for the transportation.

CHAPTER 5

ANALYSIS OF ALTERNATIVES

5. ANALYSIS OF ALTERNATIVES

5.1 ALTERNATIVES OF SITE

Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra), was the highest bidder in the e-bidding process conducted by government of West Bengal. The applicant will invest necessary funds for the scientific and systematic development of mines including land rejuvenation and progressive reclamation programme and other measures necessary to protect the quality of the environment and human health etc.
The site for sand mining was selected by District Magistrate Office.

5.2 ALTERNATIVES OF TECHNOLOGY

5.2.1 DESCRIPTION OF EACH ALTERNATIVES

Mining is the extraction of valuable minerals or other geological materials from the earth or river bed. There are two methods of mining, (i) Semi-Mechanized Mining and (ii) Manual Mining for removal of sand.

In semi-mechanized mining, a combination of machinery and manpower is utilized for either loading or excavation processes.

On the other hand, manual mining involves the extraction of materials without the use of machinery. It relies solely on manpower for the entire mining process.
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5.2.2 SELECTION OF ALTERNATIVES

River bed mining is a site-specific project depending upon the geological set up and mineable portion of the river. Being inside the river meandering course, no objects of economic importance are disturbed. Hence, there is not much scope for site alternative.

The analysis of the technological options it is interpreted that the manual mining is helpful in maintaining the economic and ecological balance and should be preferred over a fully manual option but if required semi mechanised mining method without drilling and blasting will be adopted by project proponent.

CHAPTER 6

ENVIRONMENTAL MONITORING PROGRAM

6. ENVIRONMENTAL MONITORING PROGRAM

6.1 MONITORING EFFECTIVENESS OF MITIGATION MEASURES

Regular monitoring of environmental parameters is essential to assess the effectiveness of mitigation plans and identify any potential issues in the project. This allows for timely corrective measures to be implemented. The monitoring program includes evaluating environmental quality at the work zone and surrounding areas to ensure compliance with regulations and maintain proper operating practices. This post-project monitoring work is a vital component of the Environmental Monitoring Programme.

The Environmental Monitoring Programme plays a crucial role in ensuring sustainable development in the project area and its surroundings. It requires collaboration and contribution from various stakeholders including mine operators, government bodies, regulatory agencies such as the State Pollution Control Board and the Ministry of Environment, Forest and Climate Change (MoEF&CC), and most importantly, the affected population. By working together, these stakeholders can establish a comprehensive and inclusive plan that addresses environmental concerns and promotes sustainable practices.

6.2 MEASUREMENT METHODOLOGIES OF MITIGATION MEASURES

The monitoring team will be responsible for planning, execution and monitoring of all aspects of the environment based on the procedures laid out in the guidelines of CPCB through various notifications, starting from start to closure of mines. The said team will be responsible for: (i) Collecting water and air samples, to monitor air and water; (ii) Analysing the water and air samples; (iii) Implementing the control and protective measures; (iv) Coordinating the environment related activities within the project as well as with the outside agencies; (v) Collecting statistical data on the health status of workers; (vi) Green belt development and inventory of flora; (vii) Monitoring the progress of implementation of environmental management programme; (viii) Facilitating effective communication and coordination with statutory authorities; etc.
The organizational set-up for Environment Management Cell is described in **Figure 10.1**.

6.3 MONITORING FREQUENCY, ANALYSIS & REPORTING

Monitoring frequency will adhere to the provisions outlined in the OM and EIA Notification 12th April 2022, as amended to date. Additionally, quarterly monitoring will be conducted in accordance with the notifications issued by the State Pollution Control Board (SPCB).

Air, water, soil, and noise monitoring will be conducted at the same locations where the samples were originally collected during the Environmental Impact Assessment (EIA) study.

To ensure the effectiveness of the environmental mitigation program, regular monitoring of crucial environmental parameters will be conducted. The specific location, schedule, duration, and parameters to be monitored are detailed in **Table 6.1.**

Table 6-1: Location, Monitoring Schedule and Parameters

Sl. No.	Description of Parameters	Location	Schedule and Duration of Monitoring
A	**Air Quality (PM_{10}, $PM_{2.5}$, SO_2, NO_2) monitoring in 4 locations**		
A-1	Four monitoring station	one within and three outside the project area at an angle of 120° each- covering upwind and downwind directions.	Will be monitored in every six months as per CPCB/ MoEF&CC Guidelines/ Notifications
B	**Quality of surface and ground water around the site will be collected from 4 locations**		
B-1	Two Surface Water Samples will be collected as per EIA Report and in consultation with SPCB, out of which one will be taken near the active working area.	Up stream Down stream	will be collected on a quarterly basis in accordance with the guidelines and notifications provided by the (CPCB) and the Ministry of Environment, Forest and Climate Change (MoEF&CC).
B-2	Two Ground Water Samples will be collected as per EIA Report and in consultation with SPCB, out of which one should be taken near the active working area.	Selimabad	
C	**Ambient Noise Level monitoring at 2 locations around the site**		
C-1	Two Noise Samples will be collected as per EIA Report and in consultation with SPCB.	Onsite Approach road connect with main road	Will be monitored quarterly as per CPCB /MoEF&CC Guidelines/ Notifications
D	**Inventory of flora to Judge the comparative status at one locations around the site**		
D-1	An Inventory of flora will be prepared at one Location near the mine lease area		
E	**Soil Quality at 1 location**		
E-1	Soil Samples will be collected from one location	Selimabad	Will be collected half yearly as per CPCB/MoEF&CC Guidelines/ Notifications
F	Implementation of biological green belt development through block plantation activities.		Soil samples will be collected every six months by a core group consisting of representatives from the management team and the plantation executing agency.

Monitoring data analysis will be done as per CPCB guidelines by NABL/MoEF&CC approved laboratory and shall be submitted to concerned authority (as specified in Environment Clearance

Letter issued by SEIAA and Consent issued by SPCB) on regular basis. The procedure for monitoring of sand mining or river bed mining will be done as per the Appendix-XII of the EIA notification 2006 amended to date.

The compliance reporting will be done as per paragraph 10(ii) of the EIA notification 2006 amended till date. It says *"It shall be mandatory for the project management to submit half-yearly compliance reports in respect of the stipulated prior environmental clearance terms and conditions in hard and soft copies to the regulatory authority concerned, on 1st June and 1st December of each calendar year".* The 1st June report shall be submitted based on data collected for October-December of the preceding year and the 1st December report shall be submitted on data collected for March-April of the same year.

6.4 DETAILED BUDGET & PROCUREMENT SCHEDULES

Adequate budgetary provisions have been made by the company for execution of the EMP. **Table 6.2** gives the overall investment on the environmental safeguards and recurring expenditure for monitoring and implementation of control measures including reclamation.

Table 6-2: Budget for EMP including Environment Protection

Serial No.	Measures	Description		Investment for EMP per year
1	Pollution Monitoring	Air pollution	Yearly at 4 locations for air, 4 locations for water and 2 locations for noise during mining and 1 location for soil.	60,000
		Water pollution		
		Noise Pollution		40,000
		Soil		30,000
				20,000
2	Water Sprinkling	Water sprinkling will be done at approach road during the lease period in phases		38,000
3	Green Belt	Trees will be planted along the river bank and along the kuchha road during the lease period in phases.		63,000
4	Road maintenance	Repair and maintenance of approach road		50,000
Total EMP Cost				**3,01,000**

CHAPTER 7

ADDITIONAL STUDIES

7. ADDITIONAL STUDIES

7.1 INTRODUCTION

The additional studies as suggested in Para 7& Appendix-III of EIA notification 2006 amended to date are (i) Public Consultation; (ii) Risk Assessment; (iii) Social Impact Assessment and (iv) Rehabilitation & Resettlement (R&R) Action Plan.

The additional studies suggested for Selimabad sand mine by the State Level Expert Appraisal Committee (SEAC) in the Terms of Reference (ToR) Point no. 1.1 (35, 36, 39, 42) and 2.1 (13 and 14) to be included in EIA/EMP Report are (i) Public Consultation and (ii) Risk Assessment/Disaster Management Plan/Occupational Health Impact of Project.

7.2 PUBLIC CONSULTATION

Public consultation will be done after submission of the draft EIA to concern authority.

7.3 RISK ASSESSMENT

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

Conducting risk assessments enables mine operators to determine and categorize risks into high, medium, and low levels, as mandated by the Occupational Health and Safety Act 2000. These assessments aid in prioritizing risks and provide valuable insights on the necessary safety measures to control them effectively. By implementing safety improvements based on these assessments, mine owners and operators can enhance overall safety measures within the mining operation. The natural/industrial problems may be encountered during the mining operation are (i) Inundation: filling of the mine pit due to excessive rains or upstream dam opening or failure and (ii) Slope failures at the mine faces.

As per proposal made under the mining plan the area will be developed by means of opencast mining method. Extraction of minerals are to be carried out by semi-mechanized/manual (preferably) mining method and water table will not be intersected during the mining. No high-risk accidents like landslides, subsidence flood etc. are apprehended

Risk Due to Inundation : Mining generally occurs except during the monsoon season; therefore, problem of inundation is not likely to happen except in case of accidental flash flood due to upstream dam opening or failure. Communication channels will be opened with government departments to give early warning in such situations and the workers will be

immediately taken out.

Risks Due to Failure of Waste Dumps : No waste will be generated during the 5-year plan period and thus there will be no waste dump during mining. The entire river-bed material will be transported to the end user.

Risks of Accidents Due to Trucks and Dumpers : Identifying the hazards that come along with the presence of vehicles at the workplace (e.g. reversing operations, loading) can cause harm if not properly handled. Among some of the factors that may make vehicle accidents more likely are: rough access roads, Time pressure, Inadequate brakes (possibly from lack of maintenance), Carelessly parked vehicles (e.g. being parked on a slope without being adequately secured), Unsafe coupling and uncoupling of trailers, Untrained drivers, Overturning vehicles

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

- The vehicles will be maintained in good working condition and checked thoroughly at least once a month by the competent person authorized for the purpose by the management.
- Road signs will be provided at each and every turning point up to the main road (wherever required).
- To avoid danger while reversing the vehicles especially at working place/loading points, stopper should be posted to properly guide reversing/ spotting operating.
- Trained drivers will only be hired.

7.3.1 DISASTER MANAGEMENT

The possible risks in the case of river bed mining project are high risk accidents like landslides, subsidence, flood, inundation in underground mines, fire, seismic activities, tailing dam failures etc. and emergency plan proposed for quick evacuation, ameliorative measures to be taken etc. Mining and allied activities are associated with several potential hazards to both the employees and public at large. A worker in a mine should be able to work under adequately safe and healthy condition. This is possible only when there is adequate safety in mines. Safety of the mine and the employees is taken care of by the Mining Rules & Regulations, which are well defined with laid down procedure for safety, which when scrupulously followed safety is ensured not only to manpower but also to machines & working environment.

The capability of lessee to meet such eventualities and the assistance to be required from the local authorities should be described.

- The shallow depth of activities in river bed mining will not involve any high-risk accident due to side falls/collapse.
- The complete mining operation will be carried out under the Management and control of experienced and qualified Mines Manager.
- All the provisions of Mines Act 1952, MMR 1961 and Mines Rules 1955, RMMCR 1986, WBMMDR 2016, WBS(MTSS) Rules, 2021 and other laws applicable to mine will strictly be complied with.
- During heavy rainfall the mining activities will be closed.
- All persons in supervisory capacity will be provided with proper communication facilities.
- Competent persons will be provided first aid kits which they will always carry.

The probable disaster, its impact and their management measures during sand mining are presented in **Table 7.1**.

Table 7-1: Disaster Management during Sand Mining

Probable Disaster	Impact	Management Measures
Sand Loading: The sand is loaded in the trucks using hand shovels and back-hoe.	○ There are possibilities of injury in the hands during loading with shovels and staying under bucket movement. ○ There are possibilities that the workers standing on the other side of loading may get injured due to overthrown sands with pebbles. ○ There are possibilities of workers getting injured during opening of side covers of the trucks to facilitate and loading. ○ There are possibilities of river-bank collapse due to close proximity of sand extraction. ○ Chance of workers getting injured due to improper balancing of truck while loading.	○ No sand will be collected within 100m distance from the river banks or 1/8th of the distance between the bank lines and 7.5m safety barrier from project area. Safe clearance will be mainly determined by the height of the river bank and thickness of sand to be extracted from the close vicinity of that bank. ○ Ponding in the river bed shall not be allowed. ○ The particular operations, approaching river bed from both the banks will be avoided. ○ No foreign material (garbage's) will be allowed to remain/spill in river bed and catchment area, or no Pits/pockets are allowed to be filled with such material. ○ The trucks will be brought to a level so that the sand loading operation suits to the ergonomic condition of the workers and the back-hoe. ○ Opening of the side covers (pattas) will be done carefully and with warning to prevent injury to the loaders. The loading will be done from one side of the truck only. ○ The workers will be provided with

Probable Disaster	Impact	Management Measures
		gloves and safety shoes during loading.
Sand Transport: The sands loaded in 11.50 cum trucks from mine lease area are moving on 0.50km approach road and then travel on metalled road.	○ Road accidents are possible. ○ Accident may also occur during movement in the mine (sand dunes). ○ There are possibilities that due to overloading, some pebbles or big boulder may injure the passerby.	○ All transportation within the main working will be carried out directly under the supervision and control of the management. ○ The Vehicles must be maintained in good repairs and checked thoroughly at least once a week by the competent person authorized for the purpose by the Management. ○ Road signs will be provided at each and every turning point especially for the guidance of the drivers at the evening/night. ○ To avoid danger while reversing the trackless vehicles especially at the embankment and tipping points, all workers will be removed from all areas for reversing of lorries, and the vehicle will have audio-visual alarm during reversing. ○ A statutory provision of the fences, constant education, training etc. will go a long way in reducing the incidents of such accidents. ○ Generally, overloading will not be permitted. Big boulders will not be loaded. This is unsafe and may damage equipment and stowing bunker. ○ The truck will be covered and maintained to prevent any spillage. ○ The maximum permissible speed limit will be ensured. ○ The truck drivers will have valid driving license.
Inundation / Flooding	○ The possibility of inundation/flooding of the sand mines are very high during monsoon or during heavy rains in lean season or due to upstream dam opening or failure as the mine area lies over the sand dunes	○ During monsoon months and heavy rains, the sand mining operations are ceased. ○ There will be mechanism/warning system of heavy rains and discharges from the upstream dams, if any.

Probable Disaster	Impact	Management Measures
	of a riverbed. o There are dangers to the workers, trucks and other machineries due to flooding.	
Drowning	o There are possibilities of drowning in the deeper part of the river or left out pits full with water.	o Safety jackets, floating tube will be kept at the site office to prevent any mishap. o The workers are not allowed to go to the deeper areas of the rivers. o The workers are not allowed to fish in the river during working hours. o In case it is required to cross the river, it is done under strict supervision and over the shallow area using life lines. o The training of mine personnel shall be provided regularly with respect to environmental protection.
Heavy Machinery: The machinery refers to the trucks and dumpers	o Most of the accidents occur during transportation by dumpers, trucks and other heavy vehicles and are often attributable to mechanical failures, in which the factor of human errors cannot be ruled out.	o All transportation within applied mining lease working will be carried out directly under the supervision and control of the management. o To avoid danger while reversing the equipment's/ vehicles especially at the working place / loading points, stopper will be posted to properly guide reversing/ spotting operating, otherwise no person will be there within 10m radius of machine o A statutory provision of the fences, constant education, training etc. will go a long way in reducing the incidents of such accidents.

7.3.2 OCCUPATION HEALTH HAZARDS

At site, during excavation and loading activity, dust is main pollutant which affects the health of workers whereas environmental and climatic conditions also generate the health problems. Addressing the occupational health hazard means gaining an understanding of the source (its location and magnitude or concentration), identifying an exposure pathway (*e.g.* a means to get it in contact with someone), and determination of likely a receptor (someone receiving the stuff that

is migrating). Occupational hazard due to sand mining mainly comes under the physical hazards. Possible physical hazards and mitigation measures are mentioned below:

Light	The workers may be exposed to the risk of poor illumination or excessive brightness. The effects are eye strain, headache, eye pain and lachrymation, congestion around the cornea and eye fatigue	To minimize the health impacts PPE like dust masks, ear plugs/ muffs and other equipment's will be provided for use by the work personnel. All workers will be subjected to Initial Medical Examination as per Mines Rule 1955 at the time of appointment. Periodical Medical Examination will be conducted at least once in five years. Medical camps will be organized.
Heat and Humidity	Heat and humidity are encountered in hot and humid condition when temperatures and air temperatures increase in summer time up to 48°C or above in the river bed mining area. The direct effects of heat exposure are burns, heat exhaustion, heat stroke and heat cramps; the indirect effects are decreased efficiency, increased fatigue and enhanced accident rates.	
Eye Irritation	During the high windy days in summer the sand could be the problems for eyes like itching and watering of eyes.	
Respiratory Problems	Large amounts of dust in air can be a health hazard, exacerbating respiratory disorders such as asthma and irritating the lungs and bronchial passages.	
Noise Induced Hearing Loss	Machinery is the main source of noise pollution at the mine site.	

Need-based EMP, prepared in accordance with the MoEF&CC Office Memorandum vide F. No. 22-65/2017.IA.III dated 30.09.2020.

CHAPTER 8

PROJECT BENEFITS

8. PROJECT BENEFITS

8.1 INTRODUCTION

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. Also the company's Corporate Social Responsibility initiatives will have a positive impact on socio economic fabric of the region. The opening of the proposed project will enhance the socio-economic activities in the adjoining area. This will result in benefits namely, (i) Improvements in physical infrastructure; (ii) Improvements in social infrastructure; (iii) Increase in employment potential; (iv) Prevention of illegal mining; and (v) Enhancement of green cover;

8.2 IMPROVEMENTS IN PHYSICAL INFRASTRUCTURE

The opening of the project will improve the physical infrastructure of the adjoining areas. This will include the following-

- Improved road communication due to opening of the proposed project;
- Strengthening of existing community facilities through the Community Development Program;
- Creation of community assets (infrastructure) like provision for drinking water, village roads/linked roads, market place etc.;
- Literacy program, adult education etc.;
- Awareness program and community activities, like health camps, medical aids, family welfare programs, immunization camp, sports & cultural activities, plantation etc.;

8.3 IMPROVEMENTS IN SOCIAL INFRASTRUCTURE

Mining activities can lead to notable changes in various environmental parameters. These changes include increased socio-economic activities, the creation of new employment opportunities, infrastructural development, and improved access to educational and healthcare facilities.

8.4 EMPLOYMENT POTENTIAL

As mentioned earlier, the people of this area are dependent only on agriculture and find it difficult to sustain their livelihood, mainly due to climatic extremities in the region. It has been estimated that there will be about thirty-eight people who will get employment from the project. Out of this, the unskilled and semi-skilled workers will be preferably recruited from local area. Other than that, there will be indirect employment in the form of security, shop-keepers, etc.

8.5 OTHER TANGIBLE BENEFITS

There will be positive impact on 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 for truckers etc. Periodic medical

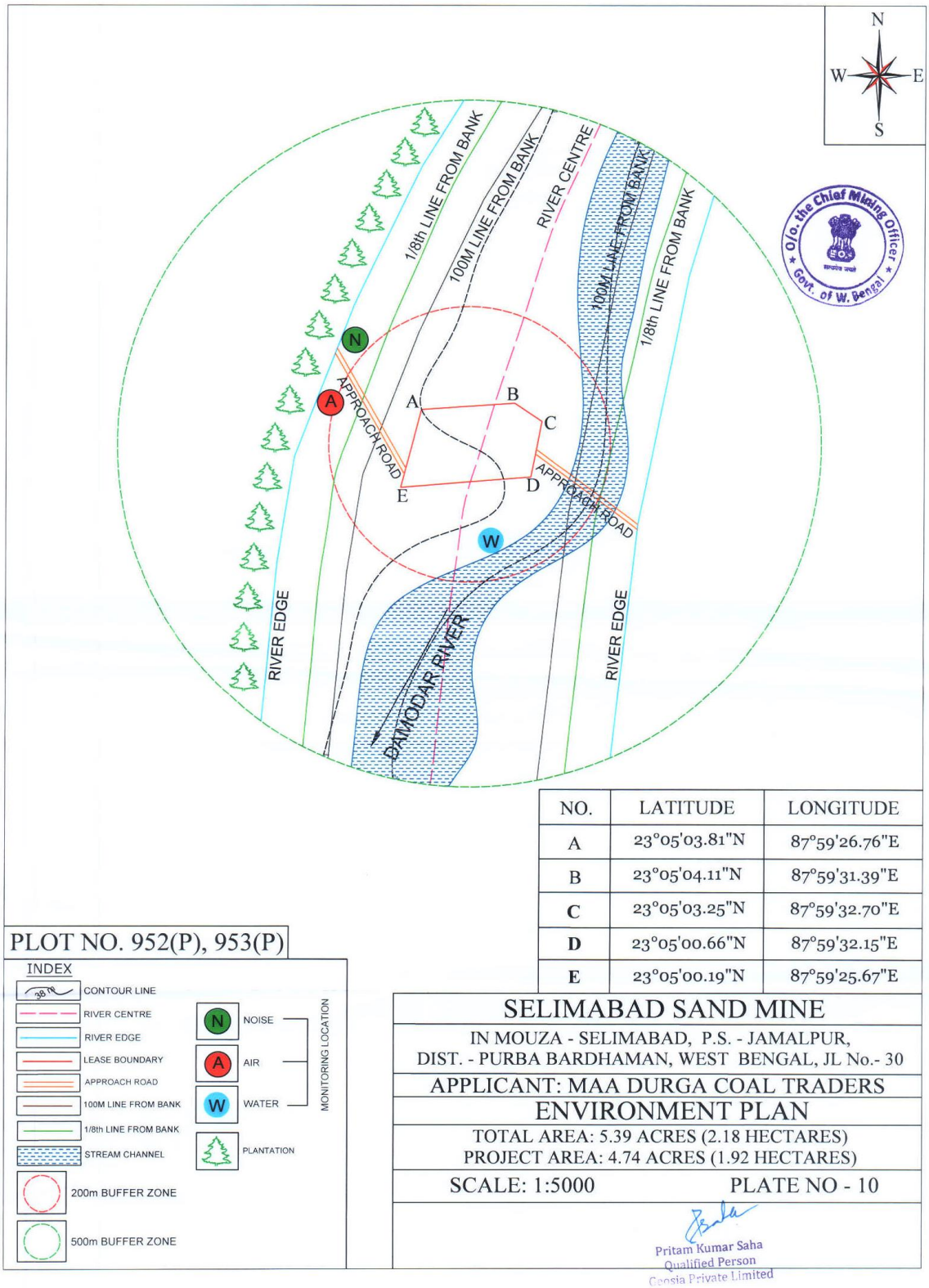
check-ups as per Mines Act/ Rules and other social development and promotional activities will be undertaken. All this will assist to lift the general health status of the residents of the area around mines.

Plantation: Plantation will be done at both the river bank side and beside the approach road leading to the mines. By the end of the lease period green belt area will be cover **0.63ha** which is the 33% of the total project area. Local species are considered for the plantation purpose. The specific locations for the plantation are shown in **Figure 8.1**.

Table No.8-1: Plantation Schedule for 1st two years

Sl. No.	Year of Plantation	Plantation
1	I year	788
2	II year	788
Total Plantation		**1,576**

The project aims to meet the demand for minor minerals in nearby areas, supporting construction activities. It will contribute to the region's economy and social development by providing direct employment to 38 people and indirect employment to many more. This will uplift the socio-economic status of the area, improving transportation facilities and raising awareness. The project will serve as a source of livelihood for households in nearby villages, enhancing their living standards. Additionally, the mining activity promotes sustainable use of mineral resources. The proponent will also undertake development activities in nearby villages as part of corporate environmental responsibility. Overall, the project will bring benefits such as improved lifestyle and area development to the region.



NO.	LATITUDE	LONGITUDE
A	23°05'03.81"N	87°59'26.76"E
B	23°05'04.11"N	87°59'31.39"E
C	23°05'03.25"N	87°59'32.70"E
D	23°05'00.66"N	87°59'32.15"E
E	23°05'00.19"N	87°59'25.67"E

Figure 8.1: Environment Plan

CHAPTER 9

ENVIRONMENT COST BENEFIT ANALYSIS

9. ENVIRONMENT COST BENEFIT ANALYSIS

During the scoping stage, the SEIAA did not recommend conducting an environmental cost-benefit analysis for the project. Furthermore, it was not included as a condition in the proposed Terms of Reference granted to the project proponent by the SEIAA/SEAC.

CHAPTER 10

ENVIRONMENT MANAGEMENT PLAN

10. ENVIRONMENT MANAGEMENT PLAN

10.1 INTRODUCTION

Success of any Environmental Management Plan (EMP) depends upon the efficiency of the organizational set up responsible for the implementation of the program. The environmental management must be integrated into the process of mine planning so that ecological balance of the area is maintained and adverse effects are minimized.

An EMP is a site-specific plan developed to ensure that the project is implemented in an environmentally sustainable manner. An effective EMP should ensure the application of best practice environment management to a project. The purpose of an EMP is to: (i) Assist Management to perform mining operations in an environmental friendly way; (ii) Improve the contribution of Management so that an EMP can be used effectively; (iii) Ensure a minimum standard and consistent approach to the implementation of EMP; (iv) Ensure that the commitments made as part of the project's EIA are implemented throughout the project life, and (v) Ensure that environment management detail is captured and documented at all stages of a project.

10.2 COMPONENTS OF ENVIRONMENT MANAGEMENT PLAN

In the minor mineral mining project EMP is dealt only for operational phase as no construction is involved. The design of EMP for operational phase has been aimed to achieve (i) adoption of practical environmental control measures and implementing them effectively; (ii) Implementation of monitoring program of the surrounding environment; (iii) Institution arrangements to monitor effectively and take suitable corrective steps; and (iv) Implementation of schedule and reporting procedures.

10.2.1 EMP OPERATION PHASE

The probable source and proposed mitigation measures suggested for minimising the impact in the project cycle are provided in **Table 10.1**.

Table 10-1: Probable Source and Mitigation Measures

Aspects	Probable Source	Mitigation Measures
Soil Compaction and Settlement	○ The frequent movement of trucks on unpaved roads can result in soil compaction, reducing the infiltration rate and impeding the growth of deep-rooted plants.	○ The project will utilize paved roads for vehicle movement. In areas where roads are partially paved, measures will be taken to strengthen them, thereby minimizing the impact on soil quality. ○ The vehicles moving to and from the site will be regularly checked to

Aspects	Probable Source	Mitigation Measures
		prevent oil leakage. o There is no toxic element present in the mineral which may contaminate the soil or river water.
Air Pollution due to dust from moving trucks and vehicular emissions	o In riverbed mining activities, the engines of vehicles used for excavation and transportation of mined materials are the sole source of gaseous emissions. o Fugitive dust generation during mining.	o Dust screens and water sprinklers are crucial tools employed in mining operations to effectively mitigate the issue of gusting dust. o To prevent dust emissions in mining areas, regular water sprinkling is employed on the mining grounds and roads. workers in dust-prone areas are equipped with dust masks, ensuring their respiratory safety. o Plantation will be carried out on approach roads and nearby vicinity of river bank. o Transportation of mineral will be done in trucks covered with Tarpaulin to avoid fugitive dust emissions. o To control emissions, regular preventive maintenance of vehicles is conducted, and all transportation vehicles are required to carry a valid Pollution Under Control (PUC) certificate. o No overloading of vehicles to be allowed to avoid any spillages. o Periodic air quality monitoring will be carried out to monitor the changes consequent upon mining activities as per the norms of West Bengal State Pollution Control Board.
Noise Pollution	o Noise generated by trucks, loaders, and dumpers in the mine lease area.	o Proper care and maintenance of the equipment's will be carried out. o The well-tuned vehicles will be used during operation phase. Fixing of silencers to the trucks will reduce the noise levels. o Plantation will be taken up along the approach roads and vicinity of river bank. Plantation serves a dual purpose by minimizing noise

Aspects	Probable Source	Mitigation Measures
		propagation and effectively controlling dust. o Efficient traffic management includes implementing speed limits on vehicles and educating drivers to minimize horn usage. o Ambient noise monitoring will be conducted regularly at different locations in and around the mining areas.
Water Environment	o Surface and ground water, although separate entities, must be recognized and managed as an interconnected system due to their interrelated nature.	o Mining operations will be conducted at a significant distance above the water table to minimize any potential impact on the water regime. River bed mining will be done up to depth of 2.94 meter from the un-mined bed level at any point in time with proper bench formation; o Mining will not intersect the river bed water level or ground water table of the area. Therefore, will not disturb the ground water level. o No water pumping from either ground or surface water sources will be conducted, ensuring the conservation and preservation of water resources. o There will be no diversion or modification in the river flow as mining will be done in the dry areas.
Solid Waste Generation	o Waste management is an important fact of environment management. solid waste management holds significance from both aesthetic and environmental perspectives.	o The trucks will be tarpaulin covered so that there is minimal spillage. Apart from this, no other solid wastes will be generated from the said mining operations. o Food waste or any domestic waste will be collected in dustbins and will be properly disposed. o Toilets will be used by employers on site.
Social Environment	o For improving the socio-economic environment, proper CSR activities will be taken up in vicinity to uplift the condition of people.	o Dust masks will be provided to the workers working in the dust prone areas. o Comprehensive awareness

Aspects	Probable Source	Mitigation Measures
	○ All workers will be subjected to medical examination as per Mines Rule 1955 both at times of appointment and in every two month.	programs will be implemented to educate individuals about potential occupational health hazards, enabling proactive measures to be implemented for prevention and mitigation. ○ Occupational health and safety within the organization will be promoted and develop safer and healthier ways of working will be developed; ○ Accident investigations and supervision of unsafe working conditions will identify causes and provide recommendations for remedial action. ○ Comprehensive training sessions on health, safety practices, and legislation will be developed and delivered to management, supervisors, and workers ○ Emergency procedures for mine rescues will be developed and coordinated. ○ Open communication channels will be established to facilitate regular reporting on health, safety, and risk status to management. This will enable the development and review of comprehensive occupational health and safety strategies and systems, encompassing policies, procedures, and manuals.
Tree Plantation	○ As part of the afforestation plan, nearby villages and connecting roads will undergo plantation initiatives. ○ The tree plantation will be done as per these standards. (i) 200 plant per kilometre and (ii) 2500 plant per hectare ○ It is proposed to plant **1,576** numbers of native species during the first 2 years of plantation period and the remaining 3 years are	○ Native plants like Acacia, Neem, Babla, Simul, Bamboo and other local species will be planted (**Refer Table 10.2**). ○ The species cultivated in the areas are both dust-tolerant and fast-growing, making permanent plantation feasible.

<table>
<tr><th>Aspects</th><th>Probable Source</th><th>Mitigation Measures</th></tr>
<tr><td></td><td>allocated for the maintenance of the established plants.
o Along the approach road total area available for plantation is 0.15ha, in which 375 trees will be planted.
o Along the river bank total area available for plantation is 0.12ha, in which 80 trees will be planted.
Remaining plantation in 0.36ha area will be done after consultation with gram panchayat and local villagers.</td><td></td></tr>
<tr><td></td><td colspan="2">Table 10-2: Tree Plantation Plan
<table>
<tr><th>Scientific Name</th><th>Common Name</th><th>Number</th><th>Probable Pollution Control</th></tr>
<tr><td>Genus Acacia</td><td>Acacia</td><td>360</td><td>Air pollution</td></tr>
<tr><td>Vachellia nilotica</td><td>Babla</td><td>200</td><td>Dust Pollution</td></tr>
<tr><td>Azadirachta indica</td><td>Neem</td><td>420</td><td>Dust, air and noise pollution</td></tr>
<tr><td>Bambusa Vulgaris</td><td>Bamboo</td><td>340</td><td>Air pollution</td></tr>
<tr><td>Bombax ceiba</td><td>Shimul</td><td>256</td><td>Air Pollution</td></tr>
</table></td></tr>
</table>

10.2.2 EMP-IMPLEMENTATION FRAMEWORK

The action plan for mitigation of the environment impact due to the mining activities and the implementing agency is provided in Table **10.3**.

Table 10-3: Impact Management and Implementation Framework

Impact	Management Action	Implementation Responsibility
Soil Compaction and Settlement	o The project will involve movement of vehicles along paved roads. The portion that are partly paved will be strengthened to reduce impact on soil quality. The vehicles moving to and from the site will be regularly checked to prevent oil leakage.	Mine Operator
Air Pollution: The air pollution are vehicular emission and Dust through vehicle movement	o Spraying of water at source of dust emissions. o Trucks carrying sand will be duly covered with tarpaulin to avoid spilling. o Regular monitoring would be carried out.	Mine Operator
Noise Pollution: The noise is generated by trucks/loader/dumper in the mine lease area and the route of transportation	o Identification of structures and vulnerable populations affected by increased noise levels, along with the implementation of remedial measures. o Tree plantation along the transport route helps in minimizing the noise level.	Mine Operator

Impact	Management Action	Implementation Responsibility
Water Pollution: The source of water pollution are	○ Mining operations will be conducted at a significant distance above both the water table and river bed water level to minimize any potential impact on the water regime.	Mine Operator
Solid waste generation	○ Solid waste (boulders, clay & silt) that will be generated during mining activities will be utilized for shore management.	Mine Operator
Social Environment	○ For improving the socio-economic environment, proper CSR activities will be taken up in vicinity to uplift the condition of people. ○ All workers will be subjected to medical examination as per Mines Rule 1955 both at times of appointment and in every two months. ○ Insurance of all employees as per the rules will be carried out.	Mine Operator
Tree Plantation	○ During the mining activities, plantation will be done for three specific reasons (i) Reduce Noise Level; (ii) Absorb Air Pollutants; (iii) Improvement of Soil Quality ○ Selection of plant species is to be done on the basis of their adaptability to the existing geographical conditions and the vegetation composition of the topography of the region.	Mine Operator

The Environmental Management Cell (EMC) is structured with a core group dedicated to environmental management, comprising expert members. The supporting group includes members from allied disciplines and areas of activities, including top management personnel.
This is shown as **Figure 10.1**.

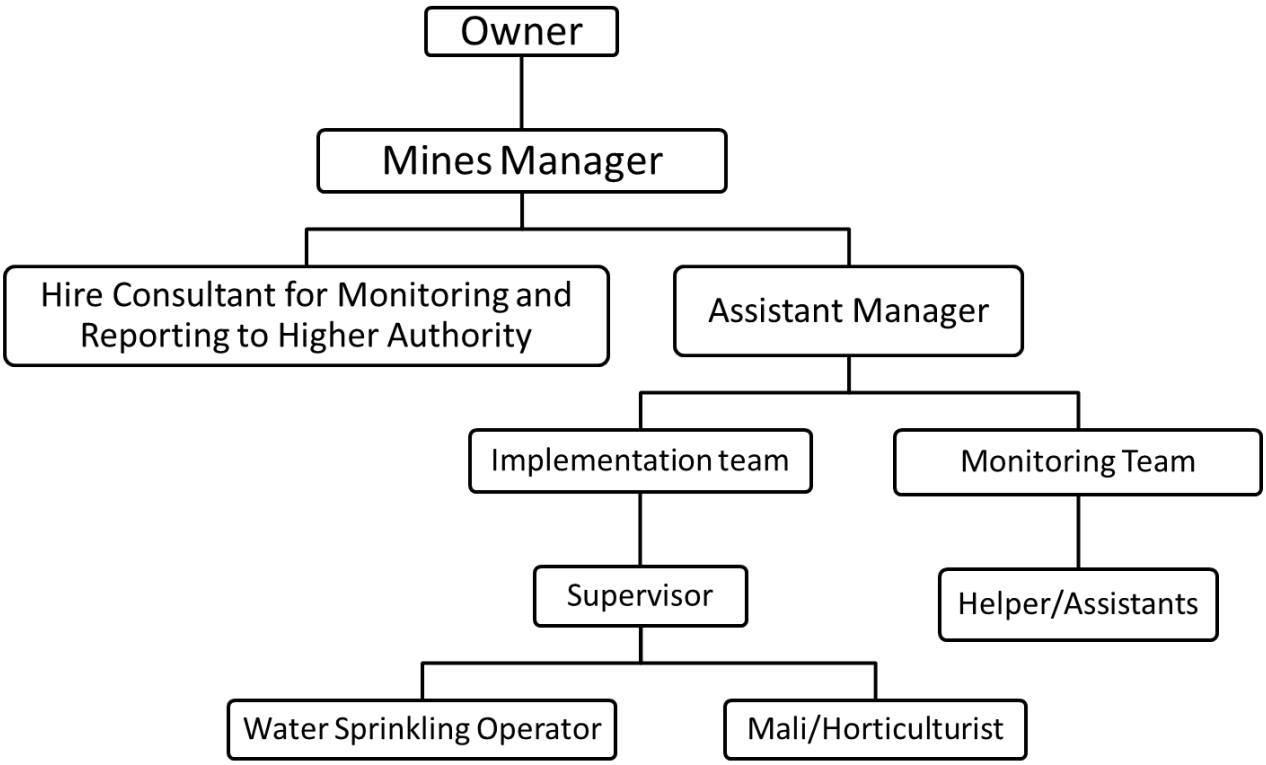


Figure 10-1: Organizational Set-up for Environment Management Cells

10.3 EMP BUDGET

Total Project Cost is **3.01 cr.** Out of this, **Rs. 15,05,000** is allocated for the EMP programme and **Rs. 6,02,000** for the CER programme. The EMP budget will be utilized over 5 years, while the CER budget will be spent over 2 years.

The EMP budget is given in **Table 10-4**.

Table 10-4: EMP COST

Serial No.	Measures	Description		Investment for EMP per year
1	Pollution Monitoring	Air pollution	Yearly at 4 locations for air, 4 locations for water and 2 locations for noise during mining and 1 location for soil.	60,000
		Water pollution		
		Noise Pollution		40,000
		Soil		30,000
				20,000

Serial No.	Measures	Description	Investment for EMP per year
2	Water Sprinkling	Water sprinkling will be done at approach road during the lease period in phases	38,000
3	Green Belt	Trees will be planted along the river bank and along the kuchha road during the lease period in phases.	63,000
4	Road maintenance	Repair and maintenance of approach road	50,000
Total EMP Cost			**3,01,000**

10.4 CORPORATE ENVIRONMENTAL RESPONSIBILITY

The Corporate Environmental Responsibility (CER) Policy aims to promote good corporate governance and socially and environmentally responsible business practices. The allocated budget for the CER Programme is **Rs. 3,01,000** based on a project cost of **Rs. 3.01 cr**. This amount will be spent annually. However, as per the OM 22-65/2017.IA.III dated 30th Sept, 2020, the CER activity may be replaced by other activities i.e., issues raised at the time of public hearing.

Table 10-5: CER Budget

Sl. No.	Considerations	CER Cost in Rs. (1st Year)	CER Cost in Rs. (2ndYear)
1.	Conduct eye check-up and distribute free prescribed medicine at Selimabad High School and in local villages according to their needs- Two times yearly	1,30,000	-
2.	Conduct eye check-up and distribute free prescribed medicine at Dolordanga Primary School and in local villages according to their needs- Two times yearly	-	1,20,000
3.	Develop boundary wall at Selimabad High School	71,000	-
4.	Free ambulance service	-	81,000
5.	Free computer training to local village student	1,00,000	-
6.	Park Development	-	1,00,000
Total/Year in Rs.		**3,01,000**	**3,01,000**
Total in 2 years		**6,02,000**	

****The entire CER cost of Rs. 6,02,000 will be invested within 2 years for the mentioned purpose after consultations with local villagers and local administrative authorities.**

CHAPTER 11

SUMMARY AND CONCLUSION

11. SUMMARY AND CONCLUSION

11.1 INTRODUCTION

The applicant **Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra),** has obtained Sand mining lease through e-tendering from the Govt. of West Bengal vide Letter of Intent no. **355/1220/MM/Auction27/2018,** dated **12.11.2018** over an area of **2.18 Hectare/5.39 Acres** (Refer Annex 1.2). **Due to the non-potential zone, proponent is surrendering 0.26ha, now the area after surrendering is 1.92 Ha/4.74 Acres.** Further LoI vide no. **893/67/MM/2022** was extended by the office of the District Land & Land Reforms Officer, **Purba Bardhaman** dated **14.11.2022** and will be **valid till 60 days after the disposal of EC application by SEIAA (Refer Annex 1.3).** As riverbed Sand is replenished every year hence life of mine is not applicable. The proposed mine lease area shown in mouza map is attached as **Annex 2.1.**

Issued ToR letter vide no. **TO24B0107WB5575263N to Maa Durga Coal Traders (Authorised Signatory- Jitendra Kumar Mishra), on 17th June, 2025** for undertaking detailed EIA study for the purpose of obtaining environmental clearance in accordance with the provisions of the EIA Notification; 2006. The ToR issued is attached as **Annex 1.1** of the EIA report.

The estimated total reserve within the leasehold area is approximately **2,28,049.92 m³** with sand replenishment planned annually after the monsoon. To protect the riverbanks, mining will occur at a distance of 100m or 1/8th of the distance between the bank lines, whichever is less. After leaving a safety barrier of 7.5m, a mining area of **1.52 Ha** remains, containing the mineable reserve of **1,80,539.52 m³**. The maximum mining depth will be 2.94 m, and the proposed average production capacity is **224 m³/day**.

Mining Method:

- The mining is confined to collection of sand from the riverbed. The extraction process will involve mining up to a maximum depth of 2.94 meters at the riverbank or up to the water table, whichever is less. Dry pit mining will be employed.

- The riverbed material will be collected in its natural state during the mining process. The mining method will be opencast manual (preferably) or semi mechanised. The river bed material will be collected in its existing form.

- The distance of 7.5 m shall be further marked from the lease boundary and this zone constituting the 'safety zone' shall be identified. No mining activities shall be undertaken within this 'safety zone'. This shall be in accordance of West Bengal Minor Mineral Concession Rules 2016 (WBMMCR-2016)

- The excavation of riverbed minerals will begin from the top of the designated area and progress downwards in 0.50-meter increments, removing the minerals in slices.

- Riverbed sand extraction will be done through bench of 1.00m height and 1.00m width, the whole material is mineable. The removal is done without affecting the base flow of the river and in such manner as to maintain the smooth flow of the river during the monsoons. This helps in protection of the banks from erosion.

Raw Material Required:

Inputs	Approx. quantity required	Basis
Water Requirement		
Water for Drinking and Domestic Purposes	0.38 KLD	100litre/capita/day
Dust Suppression & others	3.00 KLD	0.5 Liter per plant 2 times a day
Water for green belt development	1.58 KLD	Length of Road (m) x Width of Road (m) x 1litre/m2 x 2times per day)

11.2 DESCRIPTION OF ENVIRONMENT

The baseline data has been collected from October 2024 to December 2024. The details area given below:

Ambient Air Quality Results: Samples were collected from 6 sampling locations during the period of October 2024 to December 2024 (post-monsoon season). The results are given below:

Particulate Matter 10 (Pm_{10})

The results of PM10 of all locations are showing variations from 66.9µg/m^3 at Bonbibitala to 76.4µg/m^3 at Jotkrishtai. Hence, the results are within the limits of National Ambient Air Quality Standards (NAAQS).

Particulate Matter 2.5 (PM2.5)

The results of $PM_{2.5}$ of all locations are showing variations from 28.2µg/m^3 at Batrishbigha to 35.4µg/m^3 at Selimabad. However, the results are within the limits of National Ambient Air Quality Standards.

Percentage of Free Silica

The percentage of free silica (polymorphs of quartz, cristobalite, and tridymite) as found in the PM10 samples are found as 0.64% (Selimabad), 0.66% (Jotkrishtai), 0.55% (Kalera), 0.50% (Batrishbigha), 0.58% (Deriapur), 0.55% (Bonbibitala).

Gaseous Pollutants

The results of SO2 of all locations are showing variations from 15.4 µg/m^3 at Batrishbigha and 21.7 µg/m^3 at Jotkrishtai. However, the results are within the limits of National Ambient Air Quality Standards.

The results of NO_2 of all locations are showing variations from 21.9 µg/m^3 in Deriapur to 27.7 µg/m^3 in Jotkrishtai. However, the results are within the limits of National Ambient Air Quality Standards (NAAQS).

The values of both the parameters are well within the prescribed limits.

Noise Quality results: Samples were collected from 6 locations.

The ambient noise level at day time are varies from 51.9 dB(A) at Kalera and Deriapur to 54.3 dB(A) at Jotkrishtai which is within standard limits of residential area are ~ 55 dB(A). The night time noise result is varying from 42.5dB(A) at Deriapur to 43.7 dB(A) at Selimabad, Jotkrishtai and Bonbibitala which is within the standard limits of residential ~ 45 dB(A).

Water Quality Results: The samples were collected from 4 ground water locations and 2 surface water sources:

Ground Water results: The analysis results indicate that the pH of the samples ranges in between 7.1 to 7.4 which are well within the specified standard of 6.5 to 8.5. Total hardness was observed to be ranging from 193.4 to 225.7 mg/l. The maximum hardness (225.7 mg/l) was recorded at GW1 (Selimabad) and the minimum (193.4 mg/l) was recorded at GW3 (Kalera). Chlorides were found to be in the range of 60.9 mg/l at GW3 (Kalera) to 79.1 mg/l at GW4 (Deriapur). Sulphate was found to be in the range of 32.6 mg/l to 46.5 mg/l. The maximum value observed at GW1(Selimabad) whereas the minimum value observed at GW4(Deriapur), which is well within the specified standard of 200 mg/l as per IS 10500:2012.

All results were found within standard drinking water standards (IS: 10500).

Surface Water results: The pH of the surficial water is 7.3 in (SW1) and (SW2) which indicates a slightly alkaline nature. In both the samples, the DO exceeds 6.0 mg/l. Higher DO signifies good quality waters and healthy environment for aquatic life. The BOD concentration is 2.1 mg/l (SW1) and 1.9 mg/l (SW2) signifying less pollution in the waters. Higher concentration of harmful bacteria and other microorganisms in polluted water consumes the dissolved oxygen and thus the BOD increases. Total coliform in the samples is within 1000 MPN/100ml.

The overall class of water for individual samples comes as "C" which signifies that water of Damodar River can be used as a drinking water source after conventional treatment and disinfection.

Soil Quality Results: The samples were collected from 4 locations:

pH ranging from 7.2 to 7.5 in the study area. Bulk density of the study area ranges between 1.24 gm/cm^3 S2 (Jotkrishtai) to 1.36 gm/cm^3 at S1 (Selimabad) & S3 (Kalera). The electrical conductivity of the soil samples is found to be average and ranges from 252 µmhos /cm to 265 µmhos /cm. Organic carbon of the soil samples varies from 0.30% in S2 (Jotkrishtai) to 0.48% in S4 (Deriapur). Nitrogen content in the surface soil of the study area varies between 114 kg/ha at S1 (Selimabad) to 162 kg/ha at S4 (Deriapur). Available Phosphorus ranges between 28.5 kg/ha at S4 (Deriapur) to

44.5 kg/ha at S2 (Jotkrishtai). Potassium content in the study area ranges between 240kg/ha at S1 (Selimabad) to 267 kg/ha at S2(Jotkrishtai).

Based on the provided data, it can be inferred that the soil in the study area has average fertility, indicated by medium levels of phosphorus and potassium. However, the nitrogen content in the soil is relatively good. Nitrogen is essential for leaf growth, suggesting that plants in this area would benefit from the available nitrogen for foliage development.

Ecology and Biodiversity Results:

Flora: The flora of Purba Bardhaman district is composed mostly of woody plants. Amongst the flora are: Neem (Azadirachta indica), amlaki (Phyllanthus emblica), coconut, date palm, tal (Palmyra palm / Borassus flabellifer), bat (banyan/ Ficus benghalensis), asvattha (pipal/ Ficus religiosa), palash (Butea monosperma), krishnachuda (Caesalpinia pulcherrima) and Aam (mango/ mangifera indica). There are some shrubby plants: ashsheoda (orangeberry/ Glycosmis pentaphylla), tulsi (basil/ Ocimum tenuiflorum) etc.

The common aquatic or marsh weeds found in jheels (lakes) and swamps of the eastern part of the district (in the Bhagirathi Basin) are: bena (andropogon squarrosos), water hyacinth (Eichhornia crassipes), padma (nelumbo nucifera), hogla (Typha domingensis) etc. (Census,2011).

Fauna: The mammals of the district include Small Indian Civet and Five Striped Squirrel whilst wild boar and monkeys (including hanuman) are seen frequently. The common avifauna of the district include Purple Heron, Indian robin and common myna. Other bird species include fowls, crows, munia, sparrow, cuckoo, Asian koel, parakeet, woodpecker, kingfisher, owl, eagle, kite, duck, pigeon, falcon and heron. The low-lying swampy areas are home to migratory birds in winter.

Socio Economic Study Results: The study area encompasses 173 villages within the buffer zone. The study was conducted using a combination of primary surveys and secondary data sourced from the Census of India 2011 report.

Core Zone: There is no habitation in the core zone

Buffer Zone: The village area of the study region comprises 81,972 households, based on the Census of India, 2011 data. The details are given below:

Population:

The study area has a total population of 3,52,084 residing in 81,972 households. On average, each household consists of 4 members. The gender ratio in the study area was 972 in 2011.

Social Structure:

In the study area, the Scheduled Caste (SC) population accounts for 39.43% of the total population, while the Scheduled Tribes (ST) make up 12.18% of the total population. The gender ratio in the study area was 972 in 2011.

Literacy

Within the study area, the overall literacy rate is 67.81% of the total population. Among the

literate population, male literacy stands at 55.0%, while female literacy is recorded at 45.0%.

The project will provide direct employment opportunities for 38 individuals, with a focus on hiring local residents in addition to fulfilling any necessary statutory employment requirements.

Traffic:

Traffic density measurements were conducted continuously for 24 hours using visual observation and vehicle counting in four categories: heavy motor vehicles, light motor vehicles, two/three wheelers, and cycles. To account for low road traffic density, two skilled individuals were deployed during each shift, with one person assigned to each direction for counting the traffic. Hourly counting and recording of vehicles were performed, resulting in the determination of the total number of vehicles in each category per hour.

A summary of the traffic density monitored during survey period is given in **Chapter 3**.

11.3 ANTICIPATED IMPACTS AND MITIGATION MEASURES

- **Land Environment:** A detailed study was conducted to analyze the characteristics of the study area's land environment, including land use, soil, and vibration. This study aimed to gain a thorough understanding of the study area's land attributes and their potential role in the propagation of pollution.

- **Water Environment:** The proposed mining project has a total water requirement of **4.96 KLD** (Kilo Litres per Day). Drinking water needs will be fulfilled by sourcing it from the nearest village. Water for sprinkling and plantation purposes will be obtained through private tankers.

- **Air Environment:** The primary source of air pollution in the area is the road transport network, specifically tipper trucks and tractor. To mitigate this, regular water sprinkling on the roads will be implemented, resulting in a 75% reduction in dust emissions.

- **Noise Environment:** The proposed mining operations will employ well-maintained equipment, and workers will be provided with appropriate protective gear, including ear plugs and muffs if necessary. Additionally, plantation activities will be undertaken to establish a natural barrier against noise sources.

- **Biological Environment:** Lease area is in a Non-Forest Land. The proposed project will have no adverse impact on the flora and fauna in the area.

- **Socio-Economic environment:** The project will enhance direct and indirect employment in the area. Therefore, overall economic development is likely to improve after the commencement of the project.

- **Mine Waste:** As the proposed mine does not generate any waste or mineral rejects, onsite dustbins will be provided for proper management of food waste, which will be regularly

cleaned. A compost pit will also be constructed to dispose of food waste. Additionally, mobile toilets will be made available on site.

- **Impacts due to transportation:** The mineral will be transported to the market through tipper trucks and tractor. Transportation shall be done by 19 tipper trucks and tractor. As per the study done, there will not be any congestion due to the proposed project on the road.

11.4 ENVIRONMENT MONITORING PLAN

A systematic environmental monitoring program will be implemented within the mining lease area and a 10 km radius study area. A comprehensive network for monitoring has been developed, considering factors such as pollution sources from mining operations, wind direction, drainage pattern, topography, and the biological environment. Sampling locations have been identified accordingly to ensure comprehensive coverage and accurate assessment of environmental parameters.

11.5 ADDITIONAL STUDIES

Risk Assessment & Disaster Management Plan: During the proposed five-year plan period, there is no anticipation or occurrence of high-risk factors such as landslides, subsidence, floods, fires, or tailing dam failures. Consequently, there is no need for an emergency plan for quick evacuation or additional protective measures. Furthermore, as the working area is distant from any local population, no local inhabitants are present.

Rehabilitation and Resettlement: There is no human habitation at the project site. So, there will be no rehabilitation and resettlement issue.

11.6 PROJECT BENEFITS

The proposed mining project has a substantial positive impact on the socio-economic environment, supporting the overall development of the area. It contributes significantly to economic growth by generating direct employment for 38 individuals and creating numerous indirect employment opportunities for the local community.

11.7 ENVIRONMENT MANAGEMENT PLAN

To ensure effective environmental protection measures throughout and after the commissioning of the proposed mining project, the preparation of an Environmental Management Plan (EMP) is necessary. The EMP serves as a comprehensive framework for formulating, implementing, and monitoring environmental safeguards. With a project cost of **Rs. 3.01 cr**, the EMP cost is estimated to be **Rs. 15.05 lakhs**.

Budget towards Corporate Environment Responsibility (CER) will be **Rs. 3.01 lakhs** as the annual recurring cost.

By the end of the lease period green belt development programme will be carried out over an area of **0.63 ha**. Local species will be considered for the plantation purpose.

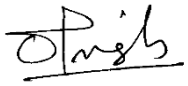
Among other environmental protection measures, following are listed below:

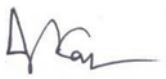
- Sprinkling of water for dust suppression on mine haul roads.
- Regular compaction & grading of haul roads and service roads to clear accumulation of loose material.
- Avoid overloading of dumpers and consequent spillage on the roads.
- Good maintenance of vehicles &machinery.

Water sprinklers of fixed type will be provided at the mine approach roads to prevent the generation of dust.

CHAPTER 12

DISCLOSURE OF CONSULTANTES ENGAGED

Sl. No.	Name of the Expert	Functional Areas	Involvement	Period	Signature
1	Om Prakash Singh	AP Category A	Involved in identifying monitoring locations, interpretation of results, identifying impacts and suggesting mitigation measures.	October 2023 - Ongoing	
		WP Category A	Involved in identifying monitoring locations, interpretation of results, identifying impacts and suggesting mitigation measures.		
		AQ Category A	Involved in meteorological studies, identifying air pollution sources, Suggesting mitigation measures.		
2	Jadab Chandra Dutta	GEO Category A	Involved in interpreting the geology of the project area and identifying impacts. Suggesting mitigation measures.	October 2023 - Ongoing	
3	Rajnarayan Biswas	HW Category A	Involved in quantifying hazardous waste, identifying impacts and suggesting mitigation measures.	October 2023 - Ongoing	
		NV Category A	Involved in identifying monitoring locations, interpretation of results, identifying impacts and suggesting mitigation measures for adverse impacts due to noise.		
		RH Category A	Risk assessment, preparation of risk and disaster management plan.		

4	Amlanjyoti Kar	HG Category A	Involved in identifying the drainage pattern and potential impacts to the surface/groundwater regime of the area. Suggesting mitigation measures.	October 2023 - Ongoing	
5	Asok Kanti Sanyal	EB Category A	Involved in flora & fauna studies by species identification. Identifying impacts and suggesting mitigation measures.	October 2023 - Ongoing	
6	Mita Chakrabarty	SE Category A	Involved in socio-economic studies, data analysis and interpretation, identifying impacts and potential socio-economic change due to the project.	October 2023 - Ongoing	
7	Saumendra Narayan Halder	LU Category A	Processing satellite imageries for land use classification. Identifying impacts and suggesting mitigation measures.	October 2023 - Ongoing	
		SC Category A	Characterisation of soil, assessment of pollutant impacts on soil and suggesting mitigation measures		
8	Rajendra Kumar Kalita	HG Category A	Involved in identifying the drainage pattern and potential impacts to the surface/groundwater regime of the area. Suggesting mitigation measures.	October 2023 - Ongoing	

ANNEXURE-1.1

TOR LETTER

सत्यमेव जयते

File No: EN/T-II-I/141/2025

Government of India

Ministry of Environment, Forest and Climate Change

(Issued by the State Environment Impact Assessment Authority(SEIAA), WEST BENGAL)

***

Dated **17/06/2025**

To,

JITENDRA MISHRA
MEMARI, MASZID PARA, KRISHNA BAZAR, MEMARI, PURBA BARDHAMAN, WEST BENGAL-713146 , PURBA BARDHAMAN, WEST BENGAL, , 713146
jitendramine02@gmail.com

Subject: Grant of Terms of Reference under the provision of the EIA Notification 2006-regarding.

Sir/Madam,

This is in reference to your application for Grant of Terms of Reference under the provision of the EIA Notification 2006-regarding in respect of project Selimabad Sand mine submitted to Ministry vide proposal number SIA/WB/MIN/488176/2024 dated 30/07/2024.

2. The particulars of the proposal are as below :

(i) TOR Identification No.	TO24B0107WB5575263N
(ii) File No.	EN/T-II-I/141/2025
(iii) Clearance Type	TOR
(iv) Category	B1
(v) Project/Activity Included Schedule No.	1(a) Mining of minerals
(vii) Name of Project	Selimabad Sand mine
(viii) Name of Company/Organization	JITENDRA MISHRA
(ix) Location of Project (District, State)	PURBA BARDHAMAN, WEST BENGAL
(x) Issuing Authority	SEIAA
(xii) Applicability of General Conditions	no
(xiii) Applicability of Specific Conditions	no

3. In view of the particulars given in the Para 1 above, the project proposal interalia including Form-1(Part A and B) were submitted to the Ministry for an appraisal by the State Environment Impact Assessment Authority (SEIAA) in the Ministry under the provision of EIA notification 2006 and its subsequent amendments.

4. The above-mentioned proposal has been considered by State Environment Impact Assessment Authority (SEIAA) in the meeting held on 12/06/2025. The minutes of the meeting and all the Application and documents submitted [(viz.

Form-1 Part A, Part B, Part C EIA, EMP)] are available on PARIVESH portal which can be accessed by scanning the QR Code above.

5. he brief and salient features of the project are as follows:
   This is a proposal for Selimabad Sand mine on the JAMALPUR/SELIMABAD/952(P) & 953(P)/A sand block over an area of 2.18 ha (5.39 Acres) on the river Damodar at Plot no: 952(P), 953(P), J.L. No.-30, Mouza: Selimabad, P.S. Jamalpur, District: Purba Bardhaman, West Bengal.
   The project is falling within the DSR potential zone code PBBD_JL_DA_18C.
   According to the DSS of the PARIVESH portal, the project area does not touch any CRZ, ESZ, RFA and PA WII.
   The PP has uploaded the pre-feasibility report and a copy of the valid LoI for the proposed project.
   As required under the West Bengal Minor Mineral Concession Rules, 2016, the PP got a composite 'Mining Plan with Progressive Mine Closure Plan' prepared for riverbed sand mining at the site by an RQP. The revised Mining Plan has been approved by the State Government on 26.03.2025 and the approved plan has been uploaded at the PARIVESH portal by the PP.

6. The SEIAA, in its meeting held on 12/06/2025, based on information & clarifications provided by the project proponent and after detailed deliberations recommended the proposal for grant of Terms of Reference under the provision of EIA Notification, 2006 and as amended thereof subject to stipulation of specific and general conditions as detailed in Annexure (1).

7. The SEIAA has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006 & further amendments thereto and after accepting the recommendations of the State Expert Appraisal Committee (SEAC) hereby decided to grant Terms of Reference for instant proposal of M/s. JITENDRA MISHRA under the provisions of EIA Notification, 2006 and as amended thereof.

8. **Potential impact study in the EIA should be done considering the cumulative effect of all the mines in the cluster situation, if any.**

9. The Ministry reserves the right to stipulate additional conditions, if found necessary.

10. The Terms of Reference to the aforementioned project is under provisions of EIA Notification, 2006. It does not tantamount to approvals/consent/permissions etc. required to be obtained under any other Act/Rule/regulation. The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/ Regulations or Statutes, as applicable, to the project.

11. **The ToR is valid for a period of 4 years from the date of issue. EIA/EMP to be submitted before the expiry of the ToR for consideration of EC applications.**

12. This issues with the approval of the Competent Authority.

Annexure 1

Specific Terms of Reference for (Mining Of Minerals)

1. A. Standard Terms Of Reference

S. No	Terms of Reference
1.1	1. Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994. 2. A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given. 3. All documents including approved mine plan, EIA and Public Hearing should be compatible with

S. No	Terms of Reference
	one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee. 4. All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone). 5. Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics. 6. Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority. 7. It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report. 8. Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided. 9. The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period. 10. Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given. 11. Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given. 12. A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees. 13. Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished. 14. Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated. 15. The vegetation in the RF / PF areas in the study area, with necessary details, should be given. 16. A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted. 17. Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease

S. No	Terms of Reference
	should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished. 18. A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost. 19. Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered. 20. Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority). 21. R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectorial programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report. 22. One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given. 23. Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map. 24. The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated. 25. Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided. 26. Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided. 27. Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.

S. No	Terms of Reference
	28. Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished. 29. Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out. 30. Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same. 31. A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution. 32. Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines. 33. Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report. 34. Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report. 35. Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed. 36. Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations. 37. Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation. 38. Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project. 39. Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project. 40. Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given. 41. The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out. 42. A Disaster management Plan shall be prepared and included in the EIA/EMP Report. 43. Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.

S. No	Terms of Reference
	44. Besides the above, the below mentioned general points are also to be followed:- a. Executive Summary of the EIA/EMP Report (enclosed as **Annexure – A**). b. All documents to be properly referenced with index and continuous page numbering. c. Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated. d. Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project. e. Where the documents provided are in a language other than English, an English translation should be provided. f. The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted. g. While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed. h. Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation. i. As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable. j. The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

2. B. Additional Terms Of Reference Imposed By Seac –

S. No	Terms of Reference
2.1	1) **Revised cluster certificate from the competent authority.** **2) The potential impact study in the EIA should be done considering the cumulative effect of all the mines in the cluster situation, if any.** 3) Surface and ground water hydrology should be included in the EIA report. 4) Drone videography of the entire project area explicitly showing the entire project site along with the existing tree plantation/green belt. Minimum 2 minute video to be submitted. 5) Photographs of the site mentioning the geo-coordinates. 6) Standard practice of management of the intermediate storage area should be submitted. 7) Means of access and egress between the embankment and the sand quarry may be clearly earmarked. The Project Proponent must commit that no hard toping or paving of any haulage route within the riverbed will be attempted. 8) A plan on the management and handling of sand during the period of intermediate stockpiling should be submitted. 9) T**he PP has to do tree plantation in an area equivalent to 33% of the lease area @2500 trees / ha within first two years from the starting of the mining operation. A Progressive Greenbelt Plan may be prepared.** The project area being entirely on the riverbed, afforestation/ vegetation should be attempted alongside the village roads or other public land. This may be done with prior approval of the local self-governing bodies. If no public land is available for the purpose the Project Proponent shall arrange for land with his personal means. To enhance success/ survival rate the

S. No	Terms of Reference
	plantation shall be completed during the first two years of the project life and the plantation so done shall be taken care of during the rest of the project life. Species of the plant selected should be local and self-sustaining in that particular region. Spatial year wise progressive plantation programme to be submitted. 10) Plan showing spatial year wise distribution of the proposed greenbelt has to be submitted along-with supporting documents of administrative approval/s. 11) EIA should also include detailed study of the baseline condition and impact on aquatic flora and fauna. 12) The project cost may include the auction bid value, estimated royalty to be paid, cost of any infrastructure built like office space, stockyard, etc. The calculation/documents to estimate the project cost should be submitted. The planned expenditure for components like need-based activities may be derived based on the project cost. 13) A need-based EMP may be prepared in accordance with the MoEF&CC Office Memorandum vide F. No. 22-65/2017.IA.III dated 30.09.2020. Record of communications made in this regard with the identified/ intended beneficiaries (schools/ institutions etc) may also be uploaded. Evidence of the activities should be provided by photographs with geo-coordinates. The activities should be completed within the first two years of the project life and submitted in a table format showing the proposed expenditure under individual heads separately for two years. 14) A study report on base flow level measured at 5 points with date and supporting photographs should be submitted. It should be committed that mining will be done at least 1m above the base flow level. Accordingly, if required, the excavation plan may also be revised. 15) Management plan including the final closure plan of haul road to be submitted. 16) Study and protection plan of the aquatic life available both during the mining and non-mining seasons should be provided. A comprehensive biodiversity study on the site of the whole cluster should be done. While applying for environmental clearance, the PP shall upload in the PARIVESH portal, the EIA/EMP report along with the documents/ submissions/ clarifications sought hereinabove. The West Bengal Pollution Control Board shall arrange public hearing as per EIA Notification, 2006 on submission of draft EIA/EMP prepared by the Project Proponent as per the above-mentioned ToRs. All the issues mentioned in the 'Public Hearing Report' and public consultation must also be addressed and incorporated in the final EIA / EMP report. The project proponent is requested to pursue the matter with the WBPCB for organizing the public hearing/consultation on submission of the draft EIA/EMP report as per the provision of EIA notification 2006 & its amendments. The project proponent is requested to submit the final EIA/EMP prepared as per the above-mentioned ToRs and incorporating all the issues raised during Public Hearing / Public Consultation to the SEAC for further consideration of the proposal for environmental clearance. **The ToR is valid for a period of 4 (four) years from the date of issue.** The contact details of the proponent and the name of the consultant are given below – Name of the Contact person with Designation: Jitendra Mishra, Owner, Selimabad Sand Mine Correspondence Address: Memari, Maszid Para, Krishna Bazar, Memari, Purba Bardhaman, West Bengal-713146 Email: jitendramine02@gmail.com Telephone Number / Mobile Number: Name of the Environmental Consultant: M/s. Novomine India Private Limited

3. Annexure - A

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

ANNEXURE-1.2

LETTER OF INTENT

GOVERNMENT OF WEST BENGAL
OFFICE OF THE DISTRICT LAND AND LAND REFORMS OFFI CER
PURBA BARDHAMAN
P.O. RAJBATI, BARDHAMAN. PIN CODE: 713104
Phone no.0342-2530641 / Fax no.0342-2533348/e-mail: dlropurbabardhaman@gmail.com

Memo No. 355 /R20 / MM/Auction 27/2018 Date: 12 /09/2018

To
MAA DURGA COAL TRADERS
VILL- PO- BHASTARA, DURGAPUR EXPRESSWAY
DIST- HOOGHLY, PIN-712303.

Sub: - Letter of Intent with reference to e-auction bearing ID No. **2018_WB_1000** conducted on **11/08/2018** for grant of mining lease for sand in sand block **JAMALPUR/SELIMABAD/952(P), 953(P)/A** located in plot No. **952(P), 953(P)** in Mouza- **SELIMABAD** J.L. No. **30**, P.S. **JAMALPUR** District **Purba Bardhaman** over an area of **5.39** acres (**2.18** Hectares).

Background

1. The District Committee for Competitive Bidding of Minor Minerals (henceforth the District Committee) Purba Bardhaman, pursuant to rules 38 and 41 of the West Bengal Minor Minerals Concession Rules, 2016 and the West Bengal Minor Minerals (Auction) Rules, 2016 (hereinafter auction rules) issued notice inviting tender dated **28/07/2018** to commence the e-auction process for grant of mining lease for sand in respect of sand block **JAMALPUR/SELIMABAD/952(P), 953(P)/A** located in plot No. **952(P), 953(P)** in Mouza- **SELIMABAD** J.L. No. **30**, P.S. **JAMALPUR** District **Purba Bardhaman** over an area of **5.39** acres (**2.18** Hectares). The e-auction process was conducted in accordance with the said Rules and also the tender document for the said sand block which was duly published in Government's e-procurement portal as per extant rules and **MAA DURGA COAL TRADERS** has been declared as successful bidder with **Highest Bid Value** of **Rs. 98,94,000** under Rule 9(8) of the said Auction Rules.

2. As required under Rule 10(1) of the said Auction Rules, **MAA DURGA COAL TRADERS** has made payment of Rs. **9,70,200/- (Rupees Nine Lakh Seventy Thousand Two Hundred Only)**, through GRN No **19-201819-027740332-2** dated **21.08.2018** (SBI) alongwith Rs. **23,30,566/- (Rupees Twenty Three Lakh Thirty Thousand Five Hundred Sixty Six Only)**, through GRN No **19-201819-028763622-1** dated **15.09.2018** (PNB) towards one-third of the bid amount as first instalment.

ANNEXURE-1.3

LOI EXTENSION

GOVERNMENT OF WEST BENGAL
OFFICE OF THE DISTRICT LAND AND LAND REFORMS OFFICER
PURBA BARDHAMAN
PO- RAJBATI, BARDHAMAN. PIN CODE: 713104
Phone No. 0342-2530641/ Fax no. 0342-2533348/e-mail: dlropurbabardhaman&gmail.com

Memo No. 893/67 **/MM/2022** **Dated Purba Bardhaman the** 14 **/11/2022**

To,
Maa Durga Coal Traders
Vill+P.O- Bhastara, Durgapur Expressway,
Dist. Hooghly,
Pin - 712303

Email id: mctdgp@gmail.com
Sand Block at : Jamalpur

Sub: Extension of validity of LoI issued vide memo no. 355/1220/MM/Auction-27/18, Dtd-12.11.18 .

In reference to the above stated matter this is to inform him that as per the order of the I&CE Department issued vide memo no. 610-ICE/O/MIN/GEN-MIS/27/2021 dated 20.10.2022 the validity of the previous Lol issued vide memo no. 355/1220/MM/Auction-27/18, Dtd-12.11.18 is hereby extended. As per the above mentioned order of I&CE Department the Lol shall remain valid till 60(sixty) days after the disposal of EC application by SEIAA.

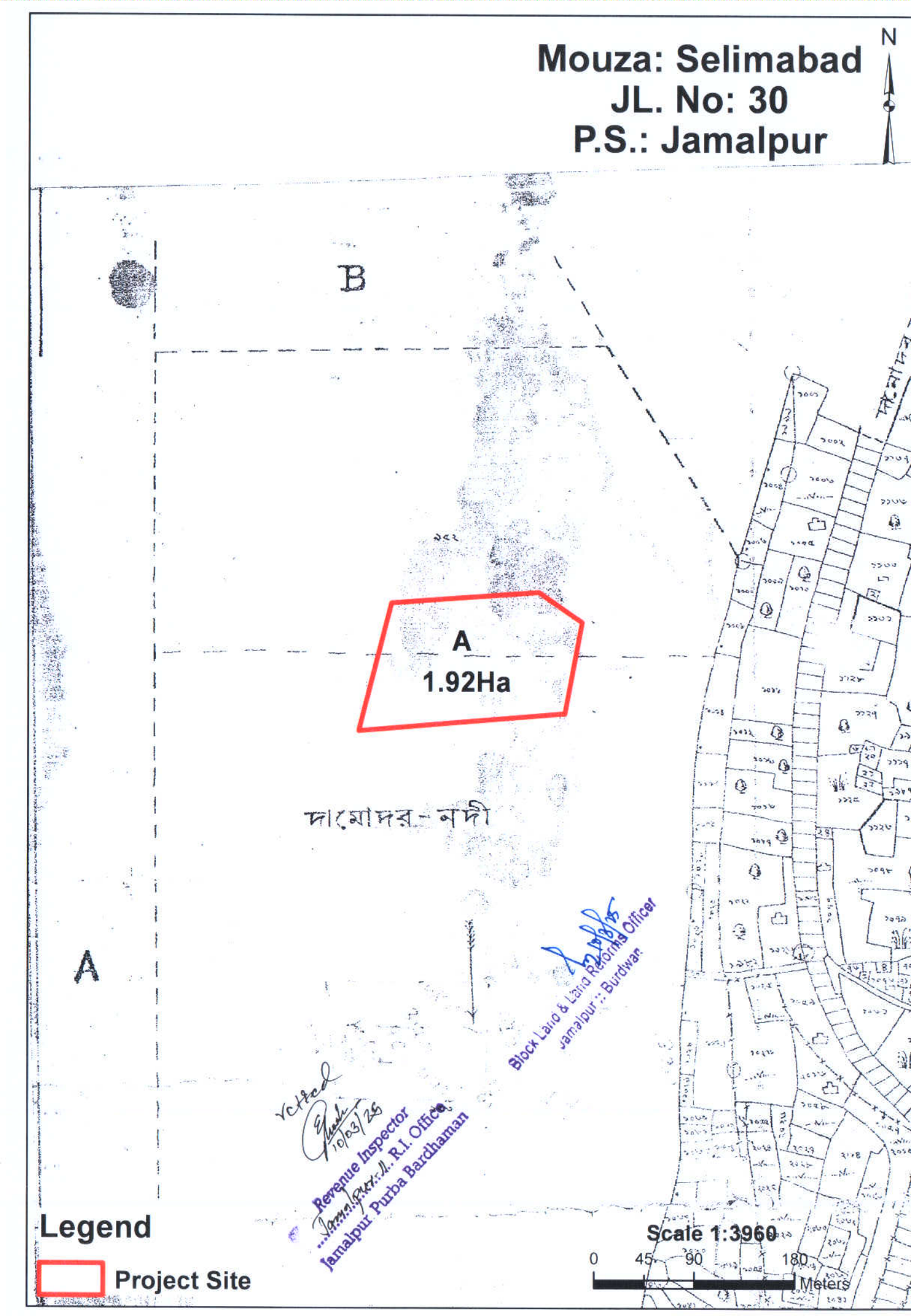
Therefore, he is requested to submit application of EC before SEIAA within 20.12.2022 as DSR of this district has already been uploaded in the District Website on 21.10.2022.

Additional District Magistrate
And
District Land & Land Reforms Officer
Purba Bardhaman

ANNEXURE-2.1

MOUZA MAP

Mouza: Selimabad
JL. No: 30
P.S.: Jamalpur



ANNEXURE-2.2

CLUSTER CERTIFICATE

ANNEXURE-3.1

ON-SITE METEOROLOGICAL DATA

Burdwan Onsite Met data (Oct - Dec 2024)							
Month	Day	Hour	Temp	Wind Speed (km/hr)	Humidity	Wind Direction (Degree)	Hourly Precipitation
10	1	24	22.2	9	90	315	0
10	1	1	22	9	88	315	0
10	1	2	22.8	9	96	315	0
10	1	3	22.6	9	94	315	0
10	1	4	22.4	9	92	315	0
10	1	5	22.6	9	94	315	0
10	1	6	25.2	9	72	270	0
10	1	7	25.8	9	76	270	0
10	1	8	25.8	9	74	270	0
10	1	9	26.1	9	75	270	0
10	1	10	26	9	72	270	0
10	1	11	26	9	70	270	0
10	1	12	25.8	7	80	137	0
10	1	13	25.4	7	78	137	0
10	1	14	25	7	76	137	0
10	1	15	25	7	78	137	0
10	1	16	24.4	7	74	137	0
10	1	17	24.6	7	78	137	0
10	1	18	23.6	9	86	112.5	0
10	1	19	23.2	9	84	112.5	0
10	1	20	23.2	9	86	112.5	0
10	1	21	22.6	9	82	112.5	0
10	1	22	22.8	9	86	112.5	0
10	1	23	22.4	9	84	112.5	0
10	2	24	21.5	6	91	137	0
10	2	1	21.2	6	88	137	0
10	2	2	21	6	86	137	0
10	2	3	21.8	6	94	137	0
10	2	4	21.6	6	92	137	0
10	2	5	21.5	6	91	137	0
10	2	6	24.2	6	62	112.5	0
10	2	7	25.4	6	60	112.5	0
10	2	8	27.6	6	68	112.5	0

10	2	9	28.8	6	66	112.5	0
10	2	10	30	6	64	112.5	0
10	2	11	31.6	6	66	112.5	0
10	2	12	32.2	3	52	137	0
10	2	13	32.6	3	56	137	0
10	2	14	32.4	3	54	137	0
10	2	15	32.5	3	55	137	0
10	2	16	32.2	3	52	137	0
10	2	17	32	3	50	137	0
10	2	18	26.8	3	86	180	0
10	2	19	26.4	3	84	180	0
10	2	20	26	3	82	180	0
10	2	21	26	3	84	180	0
10	2	22	25.4	3	80	180	0
10	2	23	25.6	3	84	180	0
10	3	24	24.6	0	87	360	0
10	3	1	24.4	0	85	360	0
10	3	2	24.6	0	87	360	0
10	3	3	24.2	0	83	360	0
10	3	4	24.6	0	87	360	0
10	3	5	24.4	0	85	360	0
10	3	6	27.5	7	58	112.5	0
10	3	7	28.6	7	55	112.5	0
10	3	8	29.8	7	53	112.5	0
10	3	9	32	7	61	112.5	0
10	3	10	33.2	7	59	112.5	0
10	3	11	34	7	53	112.5	0
10	3	12	35.8	12	68	112.5	0
10	3	13	34.2	12	66	112.5	0
10	3	14	32.6	12	64	112.5	0
10	3	15	31.4	12	66	112.5	0
10	3	16	29.6	12	62	112.5	0
10	3	17	28.6	12	66	112.5	0
10	3	18	27.4	11	78	112.5	0
10	3	19	27.1	11	79	112.5	0
10	3	20	26.4	11	76	112.5	0
10	3	21	25.8	11	74	112.5	0
10	3	22	26.2	11	82	112.5	0
10	3	23	25.4	11	78	112.5	0
10	4	24	24.6	6	83	112.5	0
10	4	1	24.2	6	79	112.5	0

10	4	2	24.6	6	83	112.5	0
10	4	3	24.6	6	83	112.5	0
10	4	4	24.4	6	81	112.5	0
10	4	5	24.6	6	83	112.5	0
10	4	6	26.2	5	66	180	0
10	4	7	27.8	5	70	180	0
10	4	8	28.8	5	68	180	0
10	4	9	30.1	5	69	180	0
10	4	10	31	5	66	180	0
10	4	11	32	5	64	180	0
10	4	12	34.8	5	66	90	0
10	4	13	33.2	5	64	90	0
10	4	14	31.2	5	58	90	0
10	4	15	30.6	5	66	90	0
10	4	16	29	5	64	90	0
10	4	17	27.4	5	62	90	0
10	4	18	26.6	0	86	360	0
10	4	19	25.4	0	82	360	0
10	4	20	25	0	86	360	0
10	4	21	24	0	84	360	0
10	4	22	23.3	0	85	360	0
10	4	23	22.2	0	82	360	0
10	5	24	22	4	88	270	0
10	5	1	22.8	4	96	270	0
10	5	2	22.8	4	96	270	0
10	5	3	22.6	4	94	270	0
10	5	4	22.4	4	92	270	0
10	5	5	22.6	4	94	270	0
10	5	6	25.2	15	66	270	0
10	5	7	27	15	70	270	0
10	5	8	28.4	15	70	270	0
10	5	9	29.6	15	68	270	0
10	5	10	31.2	15	70	270	0
10	5	11	32.2	15	66	270	0
10	5	12	34.6	4	52	292.5	0
10	5	13	34.2	4	50	292.5	0
10	5	14	34.1	4	51	292.5	0
10	5	15	33.6	4	48	292.5	0
10	5	16	33.2	4	46	292.5	0
10	5	17	33.8	4	54	292.5	0
10	5	18	29.6	0	77	360	0

10	5	19	29.1	0	76	360	0
10	5	20	28.4	0	73	360	0
10	5	21	27.8	0	71	360	0
10	5	22	28.2	0	79	360	0
10	5	23	27.6	0	77	360	0
10	6	24	25.4	0	81	360	0
10	6	1	25.6	0	83	360	0
10	6	2	25.2	0	79	360	0
10	6	3	25.6	0	83	360	0
10	6	4	25.4	0	81	360	0
10	6	5	25.5	0	82	360	0
10	6	6	29.2	6	44	315	0
10	6	7	30.2	6	42	315	0
10	6	8	32.2	6	50	315	0
10	6	9	33.2	6	48	315	0
10	6	10	34.2	6	46	315	0
10	6	11	35.6	6	48	315	0
10	6	12	37.2	3	48	337.5	0
10	6	13	37.2	3	52	337.5	0
10	6	14	36.8	3	52	337.5	0
10	6	15	36.2	3	50	337.5	0
10	6	16	36	3	52	337.5	0
10	6	17	35.2	3	48	337.5	0
10	6	18	30.6	0	66	360	0
10	6	19	30	0	64	360	0
10	6	20	29.7	0	65	360	0
10	6	21	29	0	62	360	0
10	6	22	28.4	0	60	360	0
10	6	23	28.8	0	68	360	0
10	7	24	25.6	0	77	360	0
10	7	1	25	0	71	360	0
10	7	2	25.8	0	79	360	0
10	7	3	25.6	0	77	360	0
10	7	4	25.4	0	75	360	0
10	7	5	25.6	0	77	360	0
10	7	6	30.2	7	50	315	0
10	7	7	32	7	54	315	0
10	7	8	33.2	7	52	315	0
10	7	9	34.7	7	53	315	0
10	7	10	35.8	7	50	315	0
10	7	11	37	7	48	315	0

10	7	12	39.8	7	54	112.5	0
10	7	13	39.6	7	56	112.5	0
10	7	14	39.2	7	56	112.5	0
10	7	15	38.8	7	56	112.5	0
10	7	16	38.4	7	56	112.5	0
10	7	17	38	7	56	112.5	0
10	7	18	34	0	62	360	0
10	7	19	33.4	0	62	360	0
10	7	20	32.8	0	62	360	0
10	7	21	32.2	0	62	360	0
10	7	22	30.8	0	54	360	0
10	7	23	30	0	52	360	0
10	8	24	26.8	2	75	315	0
10	8	1	26.6	2	73	315	0
10	8	2	26.4	2	71	315	0
10	8	3	26.6	2	73	315	0
10	8	4	26.2	2	69	315	0
10	8	5	26.6	2	73	315	0
10	8	6	32.4	4	32	315	0
10	8	7	34.1	4	33	315	0
10	8	8	35.4	4	30	315	0
10	8	9	36.8	4	28	315	0
10	8	10	39.2	4	36	315	0
10	8	11	40.6	4	38	315	0
10	8	12	41.4	7	26	225	0
10	8	13	41	7	28	225	0
10	8	14	40	7	24	225	0
10	8	15	39.8	7	28	225	0
10	8	16	39.2	7	28	225	0
10	8	17	38.4	7	26	225	0
10	8	18	33.6	0	46	360	0
10	8	19	33	0	42	360	0
10	8	20	33.2	0	46	360	0
10	8	21	32.8	0	44	360	0
10	8	22	32.7	0	45	360	0
10	8	23	32.2	0	42	360	0
10	9	24	28	0	52	360	0
10	9	1	28.8	0	60	360	0
10	9	2	28.6	0	58	360	0
10	9	3	28.5	0	57	360	0
10	9	4	28.2	0	54	360	0

10	9	5	28	0	52	360	0
10	9	6	31.8	4	26	270	0
10	9	7	33.2	4	24	270	0
10	9	8	34.6	4	22	270	0
10	9	9	36.4	4	24	270	0
10	9	10	37.6	4	20	270	0
10	9	11	39.6	4	24	270	0
10	9	12	41.4	4	39	315	0
10	9	13	40.9	4	40	315	0
10	9	14	40	4	37	315	0
10	9	15	39.2	4	35	315	0
10	9	16	39.4	4	43	315	0
10	9	17	38.6	4	41	315	0
10	9	18	33.4	0	59	360	0
10	9	19	33.2	0	61	360	0
10	9	20	32.4	0	57	360	0
10	9	21	32.4	0	61	360	0
10	9	22	32	0	61	360	0
10	9	23	31.4	0	59	360	0
10	10	24	28.6	0	65	360	0
10	10	1	28.2	0	61	360	0
10	10	2	28.6	0	65	360	0
10	10	3	28.4	0	63	360	0
10	10	4	28.5	0	64	360	0
10	10	5	28.2	0	62	360	0
10	10	6	32	9	66	270	0
10	10	7	34.4	9	78	270	0
10	10	8	35.8	9	79	270	0
10	10	9	36.8	9	76	270	0
10	10	10	39.2	9	74	270	0
10	10	11	40.6	9	82	270	0
10	10	12	42.4	6	78	270	0
10	10	13	42	6	83	270	0
10	10	14	41	6	79	270	0
10	10	15	40.8	6	83	270	0
10	10	16	40	6	83	270	0
10	10	17	39.5	6	62	270	0
10	10	18	32.2	0	66	360	0
10	10	19	31.4	0	78	360	0
10	10	20	31.6	0	79	360	0
10	10	21	30.7	0	76	360	0

10	10	22	29.8	0	74	360	0
10	10	23	29	0	82	360	0
10	11	24	28.8	0	78	360	0
10	11	1	28.4	0	83	360	0
10	11	2	28	0	79	360	0
10	11	3	28	0	83	360	0
10	11	4	27.4	0	83	360	0
10	11	5	27.6	0	74	360	0
10	11	6	30.6	3	42	292.5	0
10	11	7	31.8	3	40	292.5	0
10	11	8	33.4	3	42	292.5	0
10	11	9	34.4	3	38	292.5	0
10	11	10	36.2	3	42	292.5	0
10	11	11	37.4	3	40	292.5	0
10	11	12	41.5	2	17	315	0
10	11	13	40.6	2	14	315	0
10	11	14	39.8	2	12	315	0
10	11	15	40	2	20	315	0
10	11	16	39.2	2	18	315	0
10	11	17	38.5	2	17	315	0
10	11	18	33.2	0	56	360	0
10	11	19	32.2	0	54	360	0
10	11	20	32.2	0	62	360	0
10	11	21	31.2	0	60	360	0
10	11	22	30.2	0	58	360	0
10	11	23	29.6	0	60	360	0
10	12	24	28.2	0	75	360	0
10	12	1	28.2	0	79	360	0
10	12	2	27.6	0	77	360	0
10	12	3	27.3	0	78	360	0
10	12	4	26.6	0	75	360	0
10	12	5	26	0	73	360	0
10	12	6	29.8	6	57	315	0
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11	17	24	29.6	1	82	360	0
11	17	1	29	1	78	360	0
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11	20	18	35.2	2	77	360	0
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12	22	11	28.4	3	39	315	0
12	22	12	28.8	2	26	22.5	0
12	22	13	29.8	2	28	22.5	0
12	22	14	28.4	2	24	22.5	0
12	22	15	28.2	2	28	22.5	0
12	22	16	26.4	2	28	22.5	0
12	22	17	25	2	26	22.5	0
12	22	18	23.2	1	48	360	0
12	22	19	22	1	44	360	0
12	22	20	19.2	1	48	360	0
12	22	21	22	1	46	360	0
12	22	22	20.8	1	48	360	0
12	22	23	19.6	1	44	360	0
12	23	24	19.4	1	62	360	0
12	23	1	17.6	1	60	360	0
12	23	2	19	1	61	360	0
12	23	3	18	1	58	360	0
12	23	4	18.2	1	56	360	0
12	23	5	16.8	1	64	360	0
12	23	6	21	1	44	292.5	0
12	23	7	25.4	1	38	292.5	0
12	23	8	25.8	1	46	292.5	0

12	23	9	26.2	1	44	292.5	0
12	23	10	28.2	1	42	292.5	0
12	23	11	27.8	1	44	292.5	0
12	23	12	32.4	3	28	315	0
12	23	13	30.4	3	32	315	0
12	23	14	31.6	3	30	315	0
12	23	15	30.4	3	31	315	0
12	23	16	30.4	3	28	315	0
12	23	17	28.8	3	26	315	0
12	23	18	22	2	62	360	0
12	23	19	24.8	2	60	360	0
12	23	20	23.6	2	58	360	0
12	23	21	22.4	2	60	360	0
12	23	22	22.8	2	56	360	0
12	23	23	20.8	2	59	360	0
12	24	24	20.4	1	76	360	0
12	24	1	20.2	1	74	360	0
12	24	2	19.2	1	82	360	0
12	24	3	19.8	1	80	360	0
12	24	4	18	1	78	360	0
12	24	5	19.4	1	80	360	0
12	24	6	22.6	1	46	270	0
12	24	7	24.4	1	50	270	0
12	24	8	24.6	1	48	270	0
12	24	9	25.2	1	49	270	0
12	24	10	29.8	1	46	270	0
12	24	11	30.4	1	44	270	0
12	24	12	30	3	66	337.5	0
12	24	13	33	3	64	337.5	0
12	24	14	32	3	62	337.5	0
12	24	15	31	3	64	337.5	0
12	24	16	31.6	3	60	337.5	0
12	24	17	29.8	3	64	337.5	0
12	24	18	26.4	1	84	360	0
12	24	19	25.2	1	82	360	0
12	24	20	25.2	1	84	360	0
12	24	21	23.6	1	80	360	0
12	24	22	22.4	1	84	360	0
12	24	23	25.2	1	82	360	0
12	25	24	23.4	4	88	360	0
12	25	1	22.4	4	85	360	0

12	25	2	23	4	83	360	0
12	25	3	21.2	4	91	360	0
12	25	4	22.6	4	89	360	0
12	25	5	22.4	4	88	360	0
12	25	6	23.6	1	56	292.5	0
12	25	7	25.6	1	54	292.5	0
12	25	8	25.2	1	62	292.5	0
12	25	9	28	1	60	292.5	0
12	25	10	28.4	1	58	292.5	0
12	25	11	30.4	1	60	292.5	0
12	25	12	33.8	5	45	315	0
12	25	13	34.4	5	49	315	0
12	25	14	32.6	5	47	315	0
12	25	15	32	5	48	315	0
12	25	16	29.8	5	45	315	0
12	25	17	28	5	43	315	0
12	25	18	28.2	5	71	360	0
12	25	19	27	5	69	360	0
12	25	20	24.2	5	67	360	0
12	25	21	27	5	69	360	0
12	25	22	25.8	5	65	360	0
12	25	23	24.6	5	69	360	0
12	26	24	23.4	2	80	360	0
12	26	1	21.4	2	78	360	0
12	26	2	22.6	2	80	360	0
12	26	3	21.4	2	76	360	0
12	26	4	21.4	2	80	360	0
12	26	5	19.8	2	78	360	0
12	26	6	22	3	51	270	0
12	26	7	27	3	48	270	0
12	26	8	28	3	46	270	0
12	26	9	29	3	54	270	0
12	26	10	31.6	3	52	270	0
12	26	11	31.8	3	46	270	0
12	26	12	32.4	4	56	337.5	0
12	26	13	32.4	4	54	337.5	0
12	26	14	32.6	4	52	337.5	0
12	26	15	30.4	4	54	337.5	0
12	26	16	29.4	4	50	337.5	0
12	26	17	26.8	4	54	337.5	0
12	26	18	19	0	64	360	0

12	26	19	22.2	0	65	360	0
12	26	20	21.4	0	62	360	0
12	26	21	20.6	0	60	360	0
12	26	22	21.4	0	68	360	0
12	26	23	19.8	0	66	360	0
12	27	24	21.4	0	76	360	0
12	27	1	21.4	0	84	360	0
12	27	2	20.6	0	82	360	0
12	27	3	21.4	0	80	360	0
12	27	4	19.8	0	82	360	0
12	27	5	21.4	0	78	360	0
12	27	6	21.6	3	62	315	0
12	27	7	23.2	3	60	315	0
12	27	8	23.2	3	61	315	0
12	27	9	23.6	3	58	315	0
12	27	10	28	3	56	315	0
12	27	11	28.4	3	64	315	0
12	27	12	30	1	64	360	0
12	27	13	32.6	1	62	360	0
12	27	14	31.2	1	64	360	0
12	27	15	29.8	1	60	360	0
12	27	16	30	1	63	360	0
12	27	17	27.8	1	60	360	0
12	27	18	22.4	1	78	360	0
12	27	19	21.4	1	86	360	0
12	27	20	21.6	1	84	360	0
12	27	21	20.2	1	82	360	0
12	27	22	19.2	1	84	360	0
12	27	23	22.2	1	80	360	0
12	28	24	21.4	0	86	112.5	0
12	28	1	20.4	0	84	112.5	0
12	28	2	21	0	85	112.5	0
12	28	3	19.2	0	82	112.5	0
12	28	4	20.6	0	80	112.5	0
12	28	5	20.4	0	88	112.5	0
12	28	6	22.6	2	60	315	0
12	28	7	25	2	58	315	0
12	28	8	25	2	60	315	0
12	28	9	28.2	2	56	315	0
12	28	10	29	2	60	315	0
12	28	11	31.4	2	60	315	0

12	28	12	31.8	2	59	360	0
12	28	13	33	2	61	360	0
12	28	14	31.8	2	57	360	0
12	28	15	31.8	2	61	360	0
12	28	16	30.2	2	59	360	0
12	28	17	29	2	60	360	0
12	28	18	28.2	0	66	360	0
12	28	19	26.8	0	64	360	0
12	28	20	23.8	0	72	360	0
12	28	21	26.4	0	70	360	0
12	28	22	25	0	69	360	0
12	28	23	23.6	0	72	360	0
12	29	24	22.4	0	80	360	0
12	29	1	20.6	0	78	360	0
12	29	2	22	0	80	360	0
12	29	3	21	0	76	360	0
12	29	4	21.2	0	80	360	0
12	29	5	19.8	0	78	360	0
12	29	6	22	0	57	360	0
12	29	7	26.4	0	54	360	0
12	29	8	26.8	0	52	360	0
12	29	9	27.2	0	60	360	0
12	29	10	29.2	0	58	360	0
12	29	11	28.8	0	56	360	0
12	29	12	33.4	1	61	45	0
12	29	13	33.2	1	57	45	0
12	29	14	32.2	1	60	45	0
12	29	15	32.8	1	57	45	0
12	29	16	31	1	55	45	0
12	29	17	32.4	1	63	45	0
12	29	18	26.6	0	74	360	0
12	29	19	26.8	0	72	360	0
12	29	20	24.6	0	74	360	0
12	29	21	25.6	0	70	360	0
12	29	22	24.2	0	74	360	0
12	29	23	24	0	72	360	0
12	30	24	22.8	0	85	360	0
12	30	1	21.6	0	82	360	0
12	30	2	24.4	0	80	360	0
12	30	3	23.2	0	88	360	0
12	30	4	20.4	0	86	360	0

12	30	5	23.2	0	84	360	0
12	30	6	24.4	1	60	292.5	0
12	30	7	24.6	1	56	292.5	0
12	30	8	26.4	1	60	292.5	0
12	30	9	25.8	1	60	292.5	0
12	30	10	28.4	1	58	292.5	0
12	30	11	29.4	1	60	292.5	0
12	30	12	33.6	0	72	360	0
12	30	13	33.8	0	75	360	0
12	30	14	31.6	0	72	360	0
12	30	15	32.6	0	70	360	0
12	30	16	31.2	0	78	360	0
12	30	17	31.4	0	76	360	0
12	30	18	19.8	2	91	360	0
12	30	19	21.4	2	93	360	0
12	30	20	20.6	2	89	360	0
12	30	21	21	2	93	360	0
12	30	22	19.8	2	91	360	0
12	30	23	19	2	92	360	0
12	31	24	21.2	0	83	360	0
12	31	1	20.4	0	83	360	0
12	31	2	18	0	83	360	0
12	31	3	21.2	0	83	360	0
12	31	4	20.4	0	83	360	0
12	31	5	19.6	0	83	360	0
12	31	6	21.4	3	61	270	0
12	31	7	20.6	3	61	270	0
12	31	8	23	3	61	270	0
12	31	9	22.2	3	61	270	0
12	31	10	24.6	3	61	270	0
12	31	11	24.6	3	61	270	0
12	31	12	26.4	2	48	337.5	0
12	31	13	24.8	2	48	337.5	0
12	31	14	26.4	2	48	337.5	0
12	31	15	25.6	2	48	337.5	0
12	31	16	26	2	48	337.5	0
12	31	17	24.8	2	48	337.5	0
12	31	18	21	2	62	360	0
12	31	19	24	2	62	360	0
12	31	20	23	2	62	360	0
12	31	21	20.4	2	62	360	0

12	31	22	22.6	2	62	360	0
12	31	23	20.8	2	62	360	0

ANNEXURE-3.2

Monitoring Data

Monitoring Data

Ambient Noise

Noise Location	Day						Night					
	L Max	L Min	L equ	L10	L50	L90	L Max	L Min	L equ	L10	L50	L90
(N1)	58.1	46.3	52.8	54.7	52.0	48.3	45.9	42.0	43.7	44.9	43.3	42.4
(N2)	58.4	49.0	54.3	56.2	54.1	49.9	48.8	41.0	43.7	45.7	41.5	41.1
(N3)	53.4	49.0	51.9	53.4	52.3	49.3	45.9	40.9	42.8	44.0	42.2	41.3
(N4)	54.8	46.8	52.3	54.5	52.8	47.4	44.5	40.6	43.0	44.4	43.2	40.7
(N5)	55.4	47.8	51.9	54.2	51.5	48.7	45.1	40.4	42.5	44.8	41.8	40.8
(N6)	54.7	48.0	52.5	54.4	52.1	49.9	47.3	40.6	43.7	46.5	42.1	41.0

Soil

Parameters	Unit	S-1	S-2	S-3	S-4
Soil colour	----	Brownish	Brownish	Brownish	Brownish
pH	----	7.2	7.3	7.5	7.4
Electrical Conductivity	µmhos /cm	261	252	258	265
Moisture	%	2.5	2.9	3.8	3.5
Clay	%	39	42	43	48
Silt	%	36	28	25	22
Sand	%	25	30	32	30
Infiltration Rate	cm/hr	1.27	1.15	1.23	1.43
Bulk density	gm/cm^3	1.36	1.24	1.36	1.25
Porosity	%	42.1	44.6	40.2	35.1
Nitrogen as N	kg/ha as N	114.0	132.0	125.0	162.0
Phosphorus	kg/ha as P	32.6	44.5	30.7	28.5
Potassium as K	kg/ha as K	240	267	250	246
Organic Carbon	%	0.38	0.30	0.41	0.48
Organic matter	%	0.66	0.52	0.71	0.82

Groundwater

Parameters	Unit	GW1	GW2	GW3	GW4
Turbidity	NTU	<5	<5	<5	<5
pH	--	7.1	7.4	7.2	7.2
Conductivity	µS/cm	850.0	750.0	730.0	810.0
Total Dissolve Solids	mg/l	545.0	480.0	510.0	540.0
Alkalinity as $CaCO_3$	mg/l	242.0	210.0	209.0	226.0
Total Hardness as $CaCO_3$	mg/l	225.7	194.4	193.4	215.7
Calcium as Ca	mg/l	52.7	42.6	45.2	51.5
Magnesium as Mg	mg/l	22.9	21.4	19.6	21.2
Sodium	mg/l	48.3	36.1	36.2	38.8
Potassium	mg/l	19.5	17.8	24.6	22.7
Bicarbonate	mg/l	242.0	210.0	209.0	226.0
Chloride as Cl	mg/l	72.8	62.5	60.9	79.1
Sulphate as SO_4	mg/l	46.5	40.1	42.2	32.6
Nitrate as NO_3	mg/l	0.49	0.37	0.41	0.45
Fluoride as F	mg/l	0.28	0.31	0.36	0.42
Phenolic compound as C_6H_5OH	mg/l	BDL	BDL	BDL	BDL
Cyanide	mg/l	BDL	BDL	BDL	BDL
Aluminum	mg/l	BDL	BDL	BDL	BDL
Arsenic	mg/l	BDL	BDL	BDL	BDL
Cadmium	mg/l	BDL	BDL	BDL	BDL
Chromium as Cr^{+6}	mg/l	BDL	BDL	BDL	BDL
Iron	mg/l	0.24	0.20	0.22	0.21
Copper	mg/l	BDL	BDL	BDL	BDL
Lead	mg/l	BDL	BDL	BDL	BDL

Parameters	Unit	GW1	GW2	GW3	GW4
Manganese	mg/l	BDL	BDL	BDL	BDL
Mercury	mg/l	BDL	BDL	BDL	BDL
Zinc	mg/l	0.21	0.19	0.22	0.25

Surface Water

Parameters	Unit	SW1	SW2
Turbidity	NTU	30	32
Temperature	^{o}C	24	24
pH	--	7.3	7.3
Conductivity	µS/cm	890.3	945.0
Total Suspended Solids	mg/l	17.0	24.0
Total Dissolve Solids	mg/l	580.4	598.6
Alkalinity as $CaCO_3$	mg/l	292.0	295.8
Total Hardness as $CaCO_3$	mg/l	335.6	338.4
Calcium as Ca	mg/l	60.8	60.4
Magnesium as Mg	mg/l	44.7	45.6
Sodium	mg/l	40.5	45.1
Potassium	mg/l	12.2	12.6
Bicarbonate	mg/l	292.0	295.8
Chloride as Cl	mg/l	85.7	84.9
Sulphate as SO_4	mg/l	60.3	66.4
Nitrate as NO_3	mg/l	1.68	1.89
Fluoride as F	mg/l	0.54	0.52
Phenolic compound as C_6H_5OH	mg/l	BDL (DL - 0.001)	BDL (DL - 0.001)
Cyanide	mg/l	BDL (DL - 0.008)	BDL (DL - 0.008)
Arsenic	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Cadmium	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Chromium as Cr^{+6}	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Iron	mg/l	0.34	0.29
Copper	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Lead	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Manganese	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Mercury	mg/l	BDL (DL - 0.01)	BDL (DL - 0.01)
Zinc	mg/l	BDL (DL - 0.005)	BDL (DL - 0.005)
Silica	mg/l	BDL (DL - 0.1)	BDL (DL - 0.1)
Selnium	mg/l	BDL (DL - 0.01)	BDL (DL - 0.01)
Phosphate	mg/l	2.8	3.1
Oil & Grease	mg/l	<5	<5
DO	mg/l	6	6.2
BOD	mg/l	2.1	1.9
COD	mg/l	15.2	21.4
Total Coliform	MPN/100ml	900	950

Ambient Air Quality

PM10						
	Min	**Max**	**STDEV**	**98P**	**Mean**	NAAQS
AAQ1	63.7	74.6	3.0	74.6	69.3	100
AAQ2	67.2	77.0	2.2	76.4	72.1	100
AAQ3	60.6	69.6	2.3	68.9	65.1	100
AAQ4	63.1	71.7	1.9	71.0	67.0	100
AAQ5	53.9	69.5	4.3	68.0	59.5	100
AAQ6	57.3	68.1	2.7	66.9	61.2	100

PM2.5						
	Min	**Max**	**STDEV**	**98P**	**Mean**	NAAQS
AAQ1	26.5	36.2	2.7	35.4	30.6	60
AAQ2	26.8	34.6	2.0	33.8	30.4	60
AAQ3	23.0	32.2	2.4	31.0	26.8	60
AAQ4	21.7	28.5	1.7	28.2	25.7	60
AAQ5	21.3	29.3	2.1	29.0	24.1	60
AAQ6	23.6	30.8	2.1	30.4	25.9	60

SOx						
	Min	**Max**	**STDEV**	**98P**	**Mean**	NAAQS
AAQ1	14.4	20.7	1.4	20.2	17.7	80
AAQ2	18.0	21.8	1.0	21.7	19.6	80
AAQ3	14.2	16.7	0.7	16.6	15.2	80
AAQ4	12.5	15.4	0.8	15.4	13.8	80
AAQ5	11.5	15.6	1.2	15.6	13.6	80
AAQ6	12.9	18.9	1.6	18.9	17.1	80

NOx						
	Min	**Max**	**STDEV**	**98P**	**Mean**	NAAQS
AAQ1	19.7	25.2	1.6	25.1	22.6	80
AAQ2	22.1	27.9	1.7	27.7	25.1	80
AAQ3	17.3	22.0	1.5	22.0	19.7	80
AAQ4	17.7	22.5	1.4	22.3	20.0	80
AAQ5	16.5	22.0	1.5	21.9	19.3	80
AAQ6	17.5	24.2	1.6	24.2	21.4	80

CO						
	Min	**Max**	**STDEV**	**98P**	**Mean**	NAAQS
AAQ1	0.42	0.77	0.10	0.76	0.60	2
AAQ2	0.61	0.80	0.05	0.80	0.70	2
AAQ3	0.50	0.69	0.05	0.69	0.64	2
AAQ4	0.46	0.68	0.05	0.67	0.56	2
AAQ5	0.47	0.71	0.06	0.70	0.57	2
AAQ6	0.45	0.68	0.05	0.68	0.55	2

% Silica					
	Min	**Max**	**STDEV**	**98P**	**Mean**

AAQ1	0.45	0.64	0.05	0.64	0.55
AAQ2	0.43	0.67	0.06	0.66	0.57
AAQ3	0.40	0.55	0.04	0.55	0.48
AAQ4	0.40	0.50	0.03	0.50	0.47
AAQ5	0.36	0.60	0.06	0.58	0.47
AAQ6	0.34	0.56	0.05	0.55	0.48

98 Percentile						
	PM10	**PM2.5**	**SO_2**	**NO_2**	**CO**	**% Silica**
AAQ1	74.6	35.4	20.2	25.1	0.76	0.64
AAQ2	76.4	33.8	21.7	27.7	0.80	0.66
AAQ3	68.9	31.0	16.6	22.0	0.69	0.55
AAQ4	71.0	28.2	15.4	22.3	0.67	0.50
AAQ5	68.0	29.0	15.6	21.9	0.70	0.58
AAQ6	66.9	30.4	18.9	24.2	0.68	0.55

ANNEXURE-3.3

PHYTOSOCIOLOGICAL STUDY

Onsite Phytoplankton taxa

Sl. No.	Name	Occurrence
	Class- Cyanophyceae	
1	*Microcystis flosaquae Wittr.*	+
2	*Microcystis protocystis Kirch.*	+
3	*Microcystis aeruginosa Kuetz.*	+
4	*Chrococcus turgidus Naeg.*	+
5	*Gloeocapsa strata Turp.*	+
6	*Gloeocapsa rupestris Kuetz.*	+
7	*Gloeocapsa samoensis Wille.*	+
8	*Aphanocapsa gravelli Hass.*	+
9	*Phormidium corium Ag.*	+
10	*Lyngbya ceylonica Wille.*	+
11	*Lyngbya majuscule Har.*	+
12	*Anabaena ambigna Rao.*	+
13	*Anabaena iyengarii Bhard.*	+
14	*Rivularia globiceps West.*	+
15	*Gloeotrichia pisum Thurs.*	+
16	*Gloeotrichia majus Raben.*	+
	Class- Chlorophyceae	
17	*Scenedesmus bijugatus Turp.*	+
18	*Scenedesmus denticulate Lag.*	+
19	*Scenedesmus serratus Corda*	+
20	*Scenedesmus obliqus Kuetz.*	+
21	*Scenedesmus serratus Corda*	+
22	*Stigeoclonium lubricum Kuetz.*	+
23	*Stigeoclonium tenue Ag.*	+
24	*Bulbochaete annularis Wittr.*	+
25	*Bulbochaete monile Wittr.*	+
26	*Oedogonium amphulum Tiff.*	+
27	*Oedogonium grands Tiff.*	+
28	*Oedogonium oblongum Wittr.*	+
29	*Oedogonium pusillum Kirch.*	+
30	*Oedogonium vulgaris Kirch.*	+
31	*Oedogonium reticulosporum*	+
32	*Oedogonium varians Wittr.*	+
33	*Oedogonium sociale Wittr.*	+
34	*Zygnema czurdae Randh.*	+
35	*Zygnema inconspicum Randh.*	+
36	*Zygnema cylindrosporum Czu.*	+
37	*Closterium navicula Breb.*	+
38	*Closterium porrectum Nortds.*	+
39	*Closterium subulatum Kuetz.*	+
40	*Closterium tumidulum Johns.*	+
41	*Closterium settacus Breb.*	+

Sl. No.	Name	Occurrence
42	*Cosmarium monilifore Turp.*	+
43	*Cosmarium nudum Turne.*	+
Class- Bacillariophyceae		
44	*Cyclotella kuetzingiana Thw.*	+
45	*Melosira granulate Nitz.*	+
46	*Synedra ulna Nitz.*	+
47	*Gyrosigma spencerii Smith*	+
48	*Gyrosigma acuminatum Kuetz.*	+
49	*Navicula angilica Ralfs.*	+
50	*Navicula exigus Muell.*	+
51	*Gomphonema parvulum Hantz.*	+

Onsite zooplankton taxa

Family & Genus	Name	Occurrence
Family	***SIDIDAE***	
Genus	***Diaphanosoma***	
	Diaphanosoma excisum Sars	+
	Diaphanosoma sarsi Richard	+
Genus	***Pseudosida***	
	Pseudosida bidentata Herrick	+
Genus	***Latonopsis***	
	Latonopis australis Sars	+
Family	***DAPHNIIDAE***	
Genus	***Scapholeberis***	
	Scapholeberis kingi Sars	+
Genus	***Simocephalus***	
	Simocephalus vetulus	+
Genus	***Ceriodaphnia***	
	Ceriodaphnia cornuta Sars	+
Family	***MOINIDAE***	
Genus	***Moina***	
	Moina micrura Kurz	+
Family	***BOSMINIDAE***	
Genus	***Bosmina***	
	Bosmina longirostris (O.F.M)	+
Genus	***Bosminopsis***	
	Bosminopsis deitersi (Richard)	+
Family	***MACROTHRICIDAE***	
Genus	***Macrothix***	
	Macrothix spinosa king	+
Genus	***Echinisca***	
	Echinisca triserialis (Brady)	+
Genus	***Ilyocryptus***	

Family & Genus	Name	Occurrence
	Ilyocryptus spinifer Herrick	+
Family	***CHYDORIDAE***	
Genus	***Chydorinae***	
	Chydorus ventricosus Daday	+
	Chydorus reticulatus Daday	+
	Chydorus barroisi (Richard)	+
	Chydorus pubescens Sars	+
	Chydorus eurynotus Sars	+
Genus	***Pseudochydorus***	
	Pseudochydorus globosus (Baird)	+
Genus	***Dunhercida***	
	Dunhevedia crassa King	+
Subfamily	***Aloninae***	
Genus	***Alona***	
	Alona pulchella King	+
	Alona rectangula Sars	+
	Alona karua King	+
	Alona guttata Sars	+
	Alona verrucosa Sars	+
	Alona davidi Richard	+
Genus	***Notalona***	
	Notalona globulosa (Daday)	+
Genus	***Leydigia***	
	Leydigia acanthocercoides (Fischer)	+
Order	***Conchostraca***	
Family	***CYCLESTHERIIDAE***	
Genus	***Cyclestheria***	
	Cyclestheria hislopi (Baird)	+
Family	***CYPRIDIDAE***	
Genus	***Stenocyprinae***	
	Stenocypris distincta Victor & Fernando	+
Genus	***Parastenocypis***	
	Parastenocypis canaliculata Hartmann	+
Subclass	***COPEPODA***	
Suborder	***Calanidae***	
Family	***DIAPTOMIDAE***	
Genus	***Rhinediaptomus***	
	Rhinediaptomus indicus Kiefer	+
Genus	***Paradiaptomus***	
	Paradiaptomus greeni Gurney	+
Family	***CYCLOPIDAE***	
Genus	***Mesocyclops***	
	Mesocyclops hyalinus Rehberg	+

Family & Genus	Name	Occurrence
	Mesocyclops aspericornis (Daday)	+

Onsite Fish Species

Sl. No	Scientific Name	Local	IUCN	Human Use	Feeding
1	*Xenentodon cancila*	Kakia	LC	Ornamental	Omnivore
2	*Amblypharyangodon*	Mourola	LC	Ornamental	Herbivore
3	*Danio devario*	Techokha	LC	Ornamental	Herbivore
4	*Danio rerio*	Techokha	NT	Ornamental	Herbivore
5	*Puntius ticto*	Punti	LC	Ornamental	Herbivore
6	*Puntius sophore*	Punti	LC	Ornamental	Herbivore
7	*Puntius conchonius*	Punti	VU	Ornamental	Herbivore
8	*Salmostoma bacalia*	Chela	LC	Commercial	Herbivore
9	*Labeo callbasu*	Kalbose	LC	Ornamental	Herbivore
10	*Labeo bata*	Bata	LC	Aquaculture	Herbivore
11	*Labeo rohita*	Rui	LC	Aquaculture	Herbivore
12	*Cirrhinus mrigala*	Mrigel	LC	Commercial	Omnivore
13	*Catla*	Katla	NE	Aquaculture	Herbivore
14	*Amblypharyangodon*	Mourola	LC	Commercial	Herbivore
16	*Notopterus chitala*	Chital	EN	Ornamental Commercial	Omnivore
17	*Notopterus*	Pholui	LC	Ornamental	Carnivore
18	*Chanda ranga*	Chanda	NE	Ornamental	Omnivore
19	*Chanda nama*	Chanda	LC	Ornamental	Omnivore
20	*Channa punctala*	Lata	LC	Ornamental	Carnivore
21	*Channa marulias*	Sal	LC	Ornamental	Carnivore
22	*Channa striatus*	Sol	NE	Ornamental	Carnivore
23	*Glossogobius giuris*	Bele	LC	Ornamental	Omnivore
24	*Nandus*	Bheda	LC	Ornamental	Carnivore
25	*Colisa fasciata*	Khalisa	LC	Ornamental	Omnivore
26	*Colisa lalia*	Khalisa	NE	Ornamental	Omnivore
27	*Mystus cavassius*	Tengra	LC	Commercial	Carnivore
28	*Mystus aor*	Aard	VU	Ornamental	Carnivore
29	*Mystus seenghala*	Tangra	NE	Commercial	Carnivore
30	*Mystus tengara*	Tangra	LC	Ornamental	Carnivore
31	*Mystus vittatus*	Tangra	LC	Ornamental	Carnivore
32	*Clarias batrachus*	Magur	LC	Ornamental	Carnivore
33	*Pungasius*	Pangus	LC	Ornamental	Omnivore
34	*Bagarius*	Garua	VU	Commercial	Herbivore
35	*Wallago attu*	Boal	NT	Commercial	Carnivore
36	*Heteropneustea fossilis*	Singi	LC	Ornamental	Carnivore
37	*Macrognathus armatus*	Ban	LC	Commercial	Carnivore

Sl. No	Scientific Name	Local	IUCN	Human Use	Feeding
38	*Tetradon cutcutia*	Tepa	NT	Ornamental	Herbivore

List of Identified Flora Species

Sl. No	Botanical name	Common name	Family name
1.	*Albizia lebbek*	Siris	Mimosaceae
2.	*Aegle marmelos*	Bel	Rutaceae
3.	*Alstonia scolaris*	Chatim	Apocyanaceae
4.	*Acacia longifolia*	Sonajhuri	Mimoceae
5.	*Annogeissus latifolia*	Bokul	Combretaceae
6.	*Artocarpus intigra*	Kathal	Moraceae
7.	*Anthocephalus kadamba*	Kadam	Rubiaceae
8.	*Azadirachta indica*	Neem	Meliaceae
9.	*Bauhinia racemosa*	Kanchan	Caesalpiniaceae
10.	*Bombax ceiba*	Shimul	Bombacaceae
11.	*Butea monosperma*	Polash	Fabaceae
12.	*Cassia fistula*	Sonalu	Ceasalpineaceae
13.	*Cassia siamea*	Minjiri	Caesalpiniaceae
14.	*Delonix regia*	Krishna Chura	Caesalpineaceae
15.	*Dalbergia sissoo*	Sisu	Leguminosae
16.	*Ficus benghalensis*	Bot	Moraceae
17.	*Ficus glomerata*	Dumur	Moraceae
18.	*Ficus religiosa*	Asbattha	Moraceae
19.	*Holoptelea integrifolia*	Nata Karanja	Ulmaceae
20.	*Lagerstroemia speciosa*	Jarul	Lytharaceae
21.	*Madhuca indica*	Mahua	Sapotaceae
22.	*Mangifera indica*	Aam	Anacardiaceae
23.	*Phoenix dactylifera*	Khejur	Aracaceae
24.	*Psidium guajava*	Peyara	Myrtaceae
25.	*Schleichera oleosa*	Kusum	Sapindaceae
26.	*Shora robusta*	Sal	Dipterocarpaceae
27.	*Syzyzium cumini*	Jaam	Myrtaceae
28.	*Tamarindus indica*	Tentul	Caesalpiniaceae
29.	*Stereblus asper*	Shawra	Moraceae
30.	*Jatropha curcas*	Varenda	Spurge
31.	*Polyalthia longifolla*	Debdaru	Anonaceae
32.	*Moringa oleifera*	Sajina	Moringaceae
33.	*Litchi chinensis*	Litchi	Sapindaceae
34.	*Acacia auriculiformis*	Akasmoni	Mimosaceae
35.	*Eucalyptus globulus*	Eucalyptus	Myrtaceae
36.	*Albizia saman*	Megh Shiris	Mimosaceae
37.	*Borassus flabellifer*	Taal	Arecaceae
38.	*Bambusa arund inacea*	Bansh	Poaceae
39.	*Saraca indica*	Sita Ashok	Legumes
40.	*Cocos nucifera*	Narkel	Arecaceae

41.	*Genus Acacia*	Acacia	pea family Fabaceae
42.	*Plumeria alba*	Kathgolap	Apocynaceae
43.	*Annona squamosa*	Aata	Annonaceae
44.	*Phyllanthus emblica*	Amloki	Phyllanthaceae
45.	*Nyctanthas arbortristis*	Siuli	Apocyanaceae
46.	*Dillenia indica*	Chalta	Dilleniaceae
47.	*Hibiscus sabdariffa*	Joba	Malvaceae
48.	*Carica papaya*	Pepe	Caricaceae
49.	*Caesalpinia pulcherrima*	Radha chura	Leguminosae
50.	*Tabernaemontana divaricata*	Togor	Apocynaceae
51.	*Citrus grandis*	Batabi Lebu	Rutaceae
52.	*Pithecellobium dulce*	Khoi fol	Fabaceae
Shrubs, Climbers & Herbs			
53.	*Combretum decandrum*	Madhobilota	Combretaceae
54.	*Datura metel*	Dhutura	Solanaceae
55.	*Calotropis procera*	Akando	Asclepiadaceae
56.	*Imperata cylindrica*	kash	Poaceae
57.	*Andrographis paniculata*	Kalmegh	Acanthaceae
58.	*Dioscoria oppositifolia*	Aparajita	Dioscoriaceae
59.	*Jatorpha curcas*	Sada verenda	Euphorbiaceae
60.	*Jatropha gossypifolia*	Lal verenda	Euphorbiaceae
61.	*Lantena camara*	Putus	Verbenaceae
62.	*Solanum xanthocarpum*	Tit begun	Solanaceae
63.	*Tinospora cordifolia*	guloncho	Menispermaceae
64.	*Justicia adhatoda*	Bashok	Acanthaceae
65.	*Ocimum sanctum*	tulsi	Holy basil (Tulsi)
66.	*Ocimum americanum*	Ram tulsi	Wild basil (Ban Tulsi)
67.	*Poaceae*	Ghas	Poaceae
68.	*Aganosma caryophyllata*	Malati	Apocynaceae
69.	*Nerium oleander*	Korobi	Apocynaceae
70.	*Cynodon dactylon*	Durba	Poaceae
71.	*Tribulus terrestris*	Gokshur	Zygophyllaceae
72.	*Mimosa pudica*	Lojjabati	Legumes
73.	*Mecardonia procumbens*	Shankpushpi	Scrophulariaceae
74.	*Tribulus terrestris*	Gokshur	Zygophyllaceae
75.	*Cestrum diurnum*	day-blooming jessamine	Solanaceae
76.	*Aegle marmelos*	Beli	Rutaceae
77.	*Coccinia grandis*	Telakochu	Cucurbits
78.	*Parthenium hysterophorus*	Parthenium	Asteraceae
79.	*Opuntia ficus-indica*	Fonimonosha	Cactus
80.	*Luffa aegyptiaca*	Dhundal	Cucurbits
81.	*Nymphaea nouchali*	Sapla	Waterlily
82.	*Eichhornia crassipes*	kochuripana	Pontederiaceae

List of Major Terrestrial and Avi-Fauna in the Study Area

Vertebrates			
Mammals			
	Scientific Name	**Common English Name**	**Schedule: Wildlife (Protection) Act 1972**
1.	*Sus cristatus*	Pig	III
2.	*Canis familiaris*	Dog	-
3.	*Bos indicus*	Cow	-
4.	*Bubalus indicus*	Buffalo	-
5.	*Felis domesticus*	Cat	-
6.	*Capra hircus*	Goat	-
7.	*Rhinolopus sp.*	Bat	V
8.	*Bos taurus*	Bull	-
9.	*Oryctolagus cuniculus*	Rabbit	-
10.	*Funambulus palmarum*	Squirrel	-
11.	*Bandicota bengalensis*	Lesser Bandicoot Rat	V
12.	*Bandicota indica*	Large Bandicoot Rat	V
13.	*Funambulus palmarum*	Three Stripped Squirrel	-
14.	*Herpestes auropunctatus*	Small Indian Mongoose	IV
15.	*Pteropus giganteus*	Indian Flying Fox	V
16.	*Herpestes edwardsi*	Common mongoose	IV
17.	*Rattus ratus*	Rat	V
18.	*Sus scrofa*	Wild pig	III
19.	*Rattus norvegicus*	Field mouse	V
20.	Vulpes bengalensis	Fox	IV
Reptiles (Snake)			
21.	*Ahaetulla nasutus*	Vine Snake	IV
22.	*Bungarus caeruleus*	Common Krait	IV
23.	*Indotyphlops braminus*	Brahminy Worm Snake	IV
24.	*Najanaja*	Indian Cobra	IV
25.	*Amphiesma stolatum*	*Buff Striped Keel-back*	IV
26.	*Lycodon aulicus*	Indian Wolf Snake	IV
Reptiles			
27.	*Hemidactylus frenatus*	Asian House Gecko	-
28.	*Calotes versicolor*	Common garden Lizard	IV
29.	*Hemidactylus falviviridis*	Northern House Gecko	-
30.	*Hemidactylus parvimaculatus*	Spotted House Gecko	-
31.	Mabuya carinata	Common Skink	-
32.	*Calotes versicolor*	Garden Lizard	-
33.	Riopa albopunctata	White-spotted supple skink	-
34.	Ophisops jerdonii	Jerdon's Snake-eye	-
35.	*Phylum Annelida*	Leech	-
Amphibia			
36.	*Bufo melanosticus*	Toad	IV
37.	*Duttaphrynus melanostrictus*	Common Indian Toad	-

38.	*Hoplobatrachus crassus*	Common frog	IV
39.	*Hoplobatrachus tigerinus*	Indian Bull Frog	IV
Birds			
40.	*Corvus splendens*	Common Crow	V
41.	*C. marorhynchos*	Jungle Crow	V
42.	*Psittacula krameri*	Rose Ringed Parakeet	IV
43.	*Acridotheres tristis*	Indian Mynah	IV
44.	*Sturnus contra*	Pied mynah	IV
45.	*Acridotheres ginginianus*	Bank Mynah	IV
46.	*Dicrurus macrocercus*	Drongo	IV
47.	*Centropus sinensis*	Crow Pheasant	IV
48.	*Motacilla tschutschensis*	Eastern Yellow Wagtail	IV
49.	*Copsychus fulicatus*	Indian robin	IV
50.	*Alcedo atthis*	Common Kingfisher	IV
51.	*Egreta garzetta*	Little Egret	IV
52.	*Columba livia*	Blue rock pegion	IV
53.	*Orthotomus sutorius*	Tailor Bird	IV
54.	*Copsychus saularis*	Magpie robin	IV
55.	*Passer domesticus*	House sparrow	IV
56.	*Eudynamis scolopacea*	Koel	IV
57.	*Pycnonotus cafer*	Red vent Bulbul	IV
58.	*Pycnonotus jocosus*	Red Whiskered Bulbul	IV
59.	*Dinopium benghalense*	Lesser Golden Backed Woodpecker	IV
60.	*Streptopelia chinensis*	Spotted Dove	IV
61.	*Ottus bakkamoena*	Indian Scops Owl	IV
62.	*Mareca strepera*	Duck	IV
63.	*Upupa epops*	Hoopoe	IV
64.	*Gallus domesticus*	Cock	-
65.	*Dendrocitta vagabunda*	Tree pie	IV
Fish			
66.	*Puntius sophore*	Punti	-
67.	*Labeo bata*	Bata	-
68.	*Elongate glassy perchlet*	Chanda	-
69.	*Wallago attu*	Boyal	-
70.	*Aorichthys seenghala*	Aar	-
71.	*Channa punctala*	Latha	-
72.	*Glossogobius giuris*	Bele	-
73.	*Amblypharyngodon mola*	Mourola	-
74.	*Macrognathus armatus*	Ban	-
75.	*Mystus tengara*	Tangra	-
76.	*Oreochromis niloticus*	Telapia	-
77.	*Notopterus notopterus*	Foli	-
78.	*Salmophasia bacaila*	Chela	-
79.	*Clarias batrachus*	Magur	-
80.	*Labeo rohita*	Rui	-

81.	*Labeo catla*	Katla	-
Invertebrates			
82.	*Lumbricus terrestris*	Earthworm	-
83.	*Gastropoda*	Snail	-
84.	*Filopaludina bengalensis*	Gugli	-
Insect			
85.	*Lasius niger*	Black ant	-
86.	*macrolepidopteran suborder clade Rhopalocera*	Butterfly	IV
87.	*Lepidoptera*	caterpillar	-
88.	*Solenopsis geminata*	Red ant	-
89.	*Daphnis nerii*	Green caterpillar	-
90.	*Apis mellifera*	Bee	-
91.	*Ropalidia marginata*	Paper wasp	-
92.	*Order Coleoptera*	Beetle	-
93.	*Lampyridae*	Fire fly	-
94.	*Coccinella septempunctata*	Lady bug	-
95.	*Periplaneta americana*	Cockroach	-
96.	*order Araneae*	Spider	-
97.	*Musca domestica*	Housefly	-
98.	*Mosquito Culicidae*	Mosquito	-
99.	*Anax indicus*	Dragon fly	-
100.	*Gynnidomorpha alisman*	Moth	-
101.	*Acheta domesticus*	Cricket	-
102.	*Chilopoda Scolopendromorpha*	Centipede	-