

DRAFT EIA/EMP REPORT

OF

Environmental Clearance for Production of River sand of 10700 M³/Annum with Opencast Manual Mining Method from Sirigida Sand Quarry (ML Area 18.00 Acres or 7.28 Ha) located at in Village Sirigida, Under Talcher- Tahasil of Angul District, Odisha

by

Sanghamitra Bhutia

At: Biharipur Po.- Kankili

Dist.- Angul, Odisha.

Prepared By:



AN ISO 9001 COMPANY

Ardra Consulting Services Pvt. Ltd.

A/79, Saheed Nagar, Bhubaneswar, Odisha-751007

NABET Certificate No:-NABET/EIA/1922/IA0055

DECEMBER-2021

Part-A Declaration by Experts contributing to the EIA

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

Project Name: Sirigida Sand Quarry (ML area 7.28 ha), village Sirigida, Tahsil Talcher, Angul, Odisha by Sanghamitra Bhutia, At-Biharipur, Po- Kankili, Angul, Odisha

EIA Co-coordinator: 1,7 & 8

Name : Mr. Suryakanata Pradhan

Signature and Date :

Suryakanta Pradhan

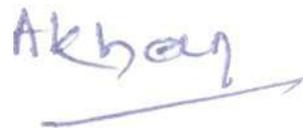
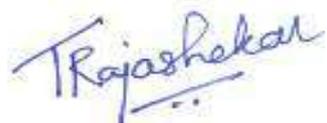
Period of involvement: 2020-2021

Contact information: suryakantapradhan@gmail.com

Functional Area Experts:

S. No.	Functional areas	Name of the expert/s	Involvement (period and task**)	Signature and date
1	AP*	Suryakanta Pradhan	Jan 2021-till now Finalization of Air monitoring location, check the air quality data and evaluate the data & identification the impact.	<i>Suryakanta Pradhan</i>
2	WP*	Arti Sahoo	Jan 2021-till now Finalization of the Ground and Surface water location and validate the baseline monitoring data and interpreted the data. Identify the impact and assess mitigation measures.	<i>Arti Sahoo</i>
3	ISW,HW*	Suryakanta Pradhan	Jan 2021-till now Identify the waste management strategies and for the contribution in EIA report	<i>Suryakanta Pradhan</i>

Environment Clearance of Sirigida Sand Quarry (Lease Area 7.28 Ha) village Sirigida under Talcher Tahasil of Angul District, Odisha

4	SE*	Akbar Ali Khan	Jan 2021-till now Field survey, assessment of different aspect related to socio economic issues due to the development of the project for the contribution in the EIA report	
5	EB*	Rajashekhhar Tummala	Jan 2021-till now Site, Survey and assessment of impact on biological environment due to the development of the project.	
6	HG*	Ratikanta Mohanty	Jan 2021-till now Finalization of GW location and identify the impact and mitigate the measure and incorporate in the EIA	
7	GEO*	Ratikanta Mohanty	Jan 2021-till now Geology, Geomorphology survey of the project area and incorporate in the report	
8	SC*	Subbarao Venkata Vissa	Jan 2021-till now Finalization of soil sample location and validation of the soil baseline data and contribution to the EIA documentation	
9	AQ*	Ratikanta Mohanty	Jan 2021-till now Developing Micro Meteorological data for modeling & air quality model in prediction of dispersion of pollutant and incorporated in EIA	
10	NV*	Asim Ku Pal	Jan 2021-till now Noise monitoring data finalization & identify impact and suggest mitigation of noise pollution	

11	LU*	Dipti Ranjan Jena	Jan 2021-till now Site Visit, Develop land use map of the Buffer and core zone of the project area using GIS which contribute to EIA study	<i>Dipti Ranjan Jena</i>
12	RH*	Suryakanta Pradhan	Jan 2021-till now Identify the risk assessment of risk and mitigate the measures and contribute to the finalization of EIA report.	<i>Suryakanta Pradhan</i>

Part-B Declaration by the Head of the accredited consultant organization/ authorized person

I, Ratikanta Mohanty, hereby, confirm that the above mentioned experts are involved in the EIA preparation of Sirigida Sand Quarry (ML area 7.28 ha), village Sirigida, Tahsil Talcher, Angul, Odisha and EIA Coordinator (EC) is fully aware of the content. The consultant organization shall be fully accountable for any mis-leading information. It is also certified that EIA Report has been analysed by the system for plagiarism check using <https://smallseotools.com/plagiarism-checker/> software in accordance with good scientific practice. No unethical practices have been carried out and external data / text has not been used without proper acknowledgement, while preparing this EIA report.

Certificate of Plagiarism Check

Title of EIA Report:	EIA-EMP Report for M/s Sirigida Sand Quarry (Lease Area: 7.28 Ha) Village- Sirigida, Tahasil- Talcher, Dist- Angul
Name of Accredited Organization:	Ardra Consulting Services Pvt. Ltd.
Unique Identification Number:	U74140OR2009PTC010710
Name of EIA Coordinator (EC):	Mr. Suryakanta Pradhan
Name of the Software:	https://smallseotools.com/plagiarism-checker/
Date of Check:	
Time of Check:	

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

I hereby certify that this EIA report has been evaluated using online software viz- <https://smallseotools.com/plagiarism-checker/> the report produced has been analyzed by the system and based on it, I certify that EIA report produced in accordance with good scientific practice.

Signature:



Name: **Ratikanta Mohanty**

NABET Certificate No. & Issue Date: **NABET/EIA/1922/IA0055-16.03.2020**

Date and Sign of EIA Coordinator:

Name: **Mr. Ratikanta Mohanty**

Designation: **Managing Director**



Date and Sign of Head of Accredited Organization:

Name of the EIA Consultant Organization: **Ardra Consulting Services Pvt. Ltd.**

NABET Certificate No. & Issue Date: **NABET/EIA/1922/IA0055 & 16.03.2020**

Term of Reference

State Environment Impact Assessment Authority, (SEIAA), Odisha

5RF-2/1, Unit – IX, Bhubaneswar – 751022, Tel: 0674-2541029

No. 3505/SEIAA

Dt. 25.11.2021

SEIAA File No. SIA/OR/MIN/64601/2021

To

Smt. Sanghamitra Bhutia
At-Biaripur
Po-Kankili
Dist-Angul
Pin-759100

Sub. Proposal of Smt. Sanghamitra Bhutia for EC of **Sirigida River Sand Bed**, over an area of **18.00 acres or 7.28 hectares** in village Sirigida, Tahasil-Talcher, District Angul-Issuance of Terms of Reference (ToR) reg.

Ref. 1) Your online application dated 22.10.2021 for issue of ToR vide Proposal No: SIA/OR/MIN/64601/2021

2. SEIAA meeting held on 29.10.2021.

Sir,

This has reference to the online proposal submitted in the Ministry of Environment, Forest and Climate Change (SEIAA, Odisha) to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format. (Form-1) along with Pre-feasibility Report, Checklist, DSR and Approved Mining Plan.

In this regard, I am directed to inform you that the proposal for ToR was considered in the meeting of SEIAA held on 29.10.2021 and the Authority have decided to issue ToR (Standard & Specific) for the project. Hence, under the provisions of the EIA Notification 2006 as amended, the Standard ToR (enclosed as Annexure-I) with public hearing along with specific ToR as mentioned below for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed.

Specific ToRs

1. Whether it is an existing mine? If yes, submit the copy of Environmental Clearance and compliance to EC conditions from the Regional Office, SPCB. The year which last operated.
 - 1(a) The project proponent (PP) has to carry out by engaging appropriate consultant, a study of the annual replenishment rate of sand by collecting pre monsoon & post monsoon data from the field to know the quantum or volume of sand deposited /replenished & extracted in the mining lease area. The detailed comparison of both pre monsoon and post monsoon elevation data shall be included in the study report. The replenishment rate of sand may be studied as per the procedure laid down in the Enforcement and Monitoring Guidelines for Sand Mining, 2020 (www.moef.gov.in) issued by the MoEF&CC, Govt. of India. The finding of the study shall be submitted to SEIAA along with the final EIA / EMP report to assess the rate of replenishment of mined out sand.
2. Area of the 'no mining zone' specially demarcated within the list out area for safety of the river bank / any bridge or such other structure nearby; and the dimensions and geo-co-ordinates of this zone w.r.t lease boundary.
3. The PP has to submit the correct distance from proposed quarry to eco-sensitive zone from nearest WL Sanctuary.
4. The Project proponent has to submit the Google map showing details about quarry area, nearest environmental sensitive location and sand transporting path from quarry to Village road/SH/NH and its distance.
5. Any approach road existing or will be constructed inside the safety zone?
6. Mitigation measures to be taken to ensure not to disturb free flow of river.
7. Distance of the river bank / embankment from the lease boundary. Is it a river bank or embankment?
8. Any ramp existing or will be constructed on the river bank / embankment for movement of vehicles to reach the nearest road.
9. Distance of the village road / city road / district road / public road from the river bank. Is this road single road / double road?
10. No. of village (s) and name of village (s) or the city (s) or urban place (s) or semi urban place (s) through which the sand carrying vehicles will ply and the distance of it from the river bank or embankment whether there is any forest land in the intervening area through which the sand carrying trucks will ply.

11. Whether schools / colleges / hospitals / health centers / bus stops / religious places existing nearby and if so, the distances of it from the bank or the road through which the vehicle will ply or existing alongside the road?
12. Any plantation done in the safety zone or embankment in case of an existing mines and if so, the area of plantation, number of species? If not, the plan for it to arrest bank erosion.
13. Any stone packing in the river bank / embankment existing in case of existing mines and if not, the plan for it.
14. Whether, any alternative mine exists or explored or can be explored if this mine is otherwise found unsuitable? Please furnish details.
15. (i) Whether permission taken or will be taken from Water Resource Authority or the concerned Authority of the roads to be used for plying of vehicles loaded with sand or empty vehicles for the same after the river bank.
(ii) Responsibility of perennial perpetual maintenance of these roads and the mechanism for the same.
16. No and type of vehicles to be used daily and the frequency for the purpose of transportation and the time and duration of such transportation. Whether permission taken or will be taken for the appropriate authority for the purpose.
17. Intersection point of the haulage roads with the main SH / NH / public road and the traffic density study at appropriate locations by domain expert with remedial measures for decongestion and road safety.
18. (i) Any bridge (road / rail) existing and the distance of it from the lease boundary.
(ii) Any culvert or small bridge will be used by the plying vehicles carrying the sand minerals.
19. Any High Transmission Electric line existing and if yes, the distance of the same from the boundary of the lease.

The prescribed TOR would be valid for a period of four years for submission of the EIA/EMP report from the date of issue.

Yours faithfully,


Environmental Scientist

Memo No 3506/SEIAA

Dated 25.11.2021

Copy forwarded to

1. The ADM & Collector, Angul for information and necessary action.
2. The Deputy Secretary, of MM&S Branch of Revenue and DM Department, Govt. of Odisha Bhubaneswar for information.
3. The Tahasildar, Talcher, Dist-Angul for information and necessary action.


Environmental Scientist

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

Terms of Reference (TOR) for preparation of Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for "Mining of Minerals" as per the EIA Notification, 2006 has been devised to improve the quality of the reports and facilitate decision-making transparent and easy. TOR will help the project proponents to prepare report with relevant project specific data and easily interpretable information. TOR for mining of minerals is expected to cover all environmental related features.

Mining of minerals plays a positive role in the process of country's economic development. In addition to the contribution towards economic growth, mining can also be a major source of degradation of physical as well as social environment, unless it is properly managed. Environmental impacts can arise during all activities of the mining process. Minimizing the damage due to mining operations depends on sound environmental practices in a framework of balanced environmental legislation. The potential adverse effects of mining activities include air pollution, surface and groundwater pollution, noise and vibration, damage to local ecology, natural topography and drainage, depletion of water resources etc. All these environmental components are required to be considered while selecting a proper methodology of mining, mitigation measures to reduce pollution load, conservation of natural resources etc.

The projects of mining of minerals as stated in the schedule require prior environment clearance under the EIA notification, 2006. Category 'A' Projects are handled in the MoEF&CC and Category 'B' projects are being handled by the respective State Environment Impact Assessment Authorities (SEIAAs) notified by MoEF&CC and following the procedure prescribed under the EIA Notification, 2006. As per this Notification, as amended, the projects of mining of minor minerals with mining lease area equal to or greater than 50 hectare are to be handled at the level of the MoEF&CC for grant of EC. Such projects with mining lease area less than 50 hectare are to be handled by the respective State Environment Impact Assessment Authority (SEIAA).

1(a):STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR NON-COAL MINING PROJECTS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

- 1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.
- 2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
- 3) All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.
- 4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of

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- 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.

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- 14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
- 15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
- 16) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.
- 17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.
- 18) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan alongwith budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.
- 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 Dept. 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 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.

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- 22) One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.
- 23) Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.
- 24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.
- 25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.
- 26) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.
- 27) Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.
- 28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
- 29) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.
- 30) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.
- 31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered

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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.

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- 43) Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.
- 44) Besides the above, the below mentioned general points are also to be followed:-
- a) All documents to be properly referenced with index and continuous page numbering.
 - b) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.
 - c) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.
 - d) Where the documents provided are in a language other than English, an English translation should be provided.
 - e) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.
 - f) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.
 - g) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.
 - h) As per the circular no. J-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.
 - i) 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.

ToR COMPLIANCE

SI No	Specific Terms of Reference	Compliance
1	<p>Whether it is an existing mine? If yes, submit the copy of Environmental Clearance and compliance to EC conditions form the Regional Office, SPCB.</p> <p>The year which last operated.</p> <p>1(a) The project proponent (PP) has to carry out by engaging appropriate Consultant, a study of the annual replenishment rate of sand by collecting pre monsoon & post monsoon data from the field to know the quantum or volume of sand deposited /replenished & extracted in the mining lease area. The detailed comparison of both pre monsoon and post monsoon elevation data shall be included in the study report. The replenishment rate of sand may be studied as per the procedure laid down in the Enforcement and Monitoring Guidelines for Sand Mining, 2020 (www.moef.gov.in) issued by the MoEF&CC, Govt. of India. The finding of the study shall be submitted to SEIAA along with the final EIA / EMP report to assess the rate of replenishment of mined out sand.</p>	<p>It is a new mines. Replenishment study report given in Chapter-7</p>
2	<p>Area of the 'no mining Zone ' specially demarcated within the list out area for safety of the river bank / any bridge or such other structure nearby; and the dimensions and geo-co-ordinates of this zone w.r.t lease boundary.</p>	<p>There is no bridge within 500meter form the mines and mining shall be carried out with lease area only.</p>
3	<p>The PP has to submit the correct distance from proposed quarry to eco-sensitive zone from nearest WL Sanctuary.</p>	<p>Map showing distance of mines to Eco sensitive zone is given in EIA report.</p>

4	The Project proponent has to submit the Google map showing details about quarry to area, nearest environmental sensitive location and sand transporting path from quarry to Village road/SH/NH and its distance.	Google map showing details about quarry to area, nearest environmental sensitive location and sand transporting path from quarry to Village road/SH/NH and its distance given in EIA report.
5	Any approach road existing or will be constructed inside the safety zone?	Details of approach road to mine is given in EIA report. No new road shall be constructed.
6	Mitigation measures to be taken to ensure not to disturb free flow of river.	Chapter-10
7	Distance of the river bank / embankment from the lease boundary. It is a river bank or embankment?	Google Map showing river bank embankment from the lease boundary shown in is given in EIA report
8	Any ramp existing or will be constructed on the river bank / embankment for movement of vehicles to reach the nearest road.	There will no requirement for construction of any ramp for mining operation.
9	Distance of village road / city road / district road / public road for the river bank. Is this road single road / double road?	Village road is at 3 km from the mines and it is single road.
10	No of village (s) and name of village (s) or the city (s) or urban place (s) or semi urban place (s) through which the sand carrying vehicles will ply and the distance of it from the river bank or embankment whether there is any forest land in the intervening area through which the sand carrying trucks will ply.	Chapter-2
11	Whether schools / colleges / hospitals / health centers / bus stops / religious places existing nearby and if so, the distance of it from the bank or road through which the vehicle will ply or existing alongside the road?	Details given in EIA report.

12	Any plantation done in the safety zone or embankment in case of an existing mines and if so, the area of plantation, number of species? If not, the plan for it to arrest bank erosion.	Chapter-10
13	Any stone packing in the river bank / embankment existing in case of existing mines and if not, the plan for it.	There will be no stone packing in the river.
14	Whether, any alternative mine exists or explored or can be explored if this mine is otherwise found unsuitable? Please furnish details.	Mines is site specific.
15	(i) Whether permission taken or will be taken from Water Resource Authority or the concerned Authority of the roads to be used for plying of vehicles loaded with sand or empty vehicles for the same after the river bank. (ii) Responsibility of perennial perpetual maintenance of these roads and the mechanism for the same.	Permission shall be taken during start of operation if required.
16	No and type of vehicles to be used daily and the frequency for the purpose of transportation and the time and duration of such transportation. Whether permission taken or will be taken for the appropriate authority for the purpose.	Transportation shall be carried out day time only.
17	Intersection point of the haulage roads with the main SH / NH / public road and the traffic density study at appropriate locations by domain expert with remedial measures for decongestion and road safety.	Detail given in traffic study.
18	(i) Any bridge (road / rail)	There is no bridge (road / rail)

	existing and the distance of it from the lease boundary. (ii) Any culvert or small bridge will be used by the plying vehicles carrying the sand minerals.	existing and the distance within 500mter form mines.
19	Any High Transmission Electric line existing and if yes, the distance of the same from boundary of the lease.	There is no High Transmission Electric line existing within 500mter form mines.
	Standard Terms of Reference	Compliance
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 archived prior to 1994.	As this is a New project and the lease was granted to Sanghamitra Bhutia, At-Biharipur, Po- Kankili, Angul, Odisha. being the successful bidder Vide letter no- . 4610 dated- 20.11.2020 from Tahsildar cum- Competent Authority, Talcher Odisha & the production will commence after obtaining the EC so this point is Not Applicable for this project.
2	A copy of the document in support of the fact that the proponent is the rightful lessee of the mine should be given.	Lease deed of Sanghamitra Bhutia is attached as Annexure-1
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 level, waste generation and its management, mining technology etc. and should be in the name of lessee.	Yes, all documents including approved mine plan, EIA is compatible with one another in terms of the mine lease area, production level, waste generation and its management, mining technology etc. all are in the name of lessee. However this is a draft report Public Hearing is not conducted.
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	Chapter-2 & 3

	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.	Chapter-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.	Ch-2
7	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	Ch-10
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	Not Applicable as it is Sand Mines

	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.	Ch-4
10	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use of the study area is given in Ch-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, its land use, R&R issues, if any, should be given.	There is no Over Burden Dump outside the mine lease area however it is a Sand Mine.
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	Not Applicable

	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.	Not Applicable
14	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable
15	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	Not Applicable
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	Not Applicable
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 Map is at Ch-3

	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, tire 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.	Ch-3
19	Proximity to Areas declared as 'Critically Polluted' or the project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.	Not Applicable
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	Not Applicable

	concerned Coastal Zone Management Authority).	
21	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	Not Applicable
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 predominant downwind direction and location of sensitive receptors. There should be at least one	Ch-3

	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.	Ch-4
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	Ch-2
25	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Not Applicable
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.	Not Applicable
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.	Ch-4

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.	Not applicable
29	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Not applicable
30	Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bg1. A schematic diagram may also be provided for the same.	Not applicable
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	Ch-6

	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 mick 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.	Ch-4
33	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report	Not Applicable
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.	Not Applicable
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	Ch-7

	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.	Not Applicable
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.	Ch-7
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.	Ch- 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.	As it is a Draft Report which will be submitted for Public Hearing
40	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	Not Applicable
41	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Ch-10
42	A Disaster management Plan shall be prepared and included in the	Ch-7

	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.	Ch-8
	Besides the above, the below mentioned general points are also to be followed:-	
a	All documents to be properly referenced with index and continuous page numbering	Yes
b	Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.	Yes
c	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF & CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.	Enclose in Annexure-3
d	Where the documents provided are in a language other than English, an English translation should be provided	Odiya translation of Executive Summary is attached in the EIA Report
e	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted	Not Applicable
f	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed	Yes, Followed

g	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF &CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation	Not Applicable
h	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.	Not Applicable
i	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	Yes, Provided

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EXECUTIVE SUMMARY

The project has been proposed for the Mining of Sand from the Government Land by open cast manual extraction mining method. Mining will be confined to the allotted lease area which lies on the Brahamani River bed from which approximately 53,500 cum (Max) during the five year plan period i.e. 10,700 Cu.m/Annum by Open Cast Manual method and the estimated project cost is Rs. 25.00 Lakhs.

The mining lease has been granted in favor of Sanghamitra Bhutia, At-Biharipur, Po- Kankili, in the district of Angul over an area 18.00 acres (7.28 ha.) Khata no-142, Plot no- 1791, situated at Village- Sirigida, Tahasil- Talcher of Angul District, Odisha. Mining has been carried out on the basis of govt. consent order to continue mining operations for 05 years.

The proposed project is an opencast manual mining project, where mining of sand will be done. An Excavator shall be deployed for the removal of overburden & inter burden but its deployment will be rarely & occasionally for 4-5 days in a month. Methods of mining will be open cast manual. Mining will be confined to the allotted lease area which lies on the Brahamani River bed from which approximately 53,500 cum of Sand will be excavated. Drilling and Blasting is not proposed in this mining activity.

Salient features of the project

Project Name	Sand mine project at Brahamani River Bed at village - Sirigida, Thasil - Talcher, District- Angul, Odisha. Lessee- Sanghamitra Bhutia, At-Biharipur, Po- Kankili, Angul, Odisha.		
Latitude & Longitude	Corner	Latitude	Longitude
	A	21°00'52.89"N	85°13'32.68"E
	B	21°00'46.07"N	85°13'32.80"E
	C	21°00'47.39"N	85°13'28.69"E
	D	21°00'48.36"N	85°13'26.03"E
	E	21°00'47.93"N	85°13'25.00"E
	F	21°00'48.09"N	85°13'24.39"E
	G	21°00'48.52"N	85°13'24.21"E
	H	21°00'49.03"N	85°13'21.95"E
	I	21°00'49.85"N	85°13'19.56"E
J	21°00'55.79"N	85°13'20.55"E	
Total Geological Reserve	151082 Cu.m		
Total Mineable Reserve in LOI	74289 Cu.m		
Total Production in 5 years	53500 Cu.m		
Sanctioned period of Mining Lease	2020-2025		
Method of Mining	Open cast & Manual		

No. of working days in a year	240
No. of workers	17
Type of Land	Govt./ Non forest, Kisam- Nadi
Ultimate Depth of Mining	2m
No. of trees to be planted in 5years	3000
Water Requirement	1.0 KLDs
Proposed CSR	20,000/-
CER	50,000/-
Proposed EMP	70,000/-

Mining Methodology

Sand from river bed within the lease area will be extracted by manual method and the sand will be collected in dry river bed in the lease area.

Mining will be started from center and advanced towards the banks across the river uniformly.

Sand will be transported to the buyer's location by 3-4tonne capacity tractor trolleys and 8/10tonne trucks. About 20trips/day of 10tonne trucks will be required for transportation of the sand from the mine.

No mining operations shall be carried out in proximity of any bridge and/or embankment and during monsoon season.

Baseline Study

PM₁₀ ranges within 71.8-38.1 µg/m³, PM_{2.5} ranges within 39.0-13.5 µg/m³, SO₂ ranges within 7.5-4.1 µg/m³ & NO_x ranges within 15.1-9.1 µg/m³. The parameters monitored at the project area as per NAAQ standards are found to be within limits. It may be observed that the all parameters at all stations are well within the limits prescribed by Central pollution control Board.

Noise is an unwanted sound without musical quality. Artificial noise impact on environment, grown apace is with advancing human civilization. Noise pollution is equally hazardous to environment as air, water and other forms of pollution. Various noise measurement units have been introduced to describe, in a single number, the response of an average human to a complex sound made up of various frequencies at different loudness levels. The most common scale is, weighted decibel dB (A), and measured as the relative intensity level of one sound with respect to another sound (reference sound).

The impact of noise depends on its characteristics (instantaneous, intermittent or continuous in nature), time of day and location of noise source. The environmental impact of noise can have several effects varying from noise

induced hearing loss to annoying depending on noise levels. 8 location are chosen for assessing Noise Quality of the project area.

For Surface Water Analysis 6 location are chosen to know the surface water quality. Surface water analysis data it interpreted that mostly all parameters are within the permissible limit and the water is suitable for agricultural use.

For Baseline study of ground water, resources are selected from different nearby open well and bore well within 5km radius from the project site to know the ground water quality. The locations of the bore wells were chosen from as near as 0.52 Km to as far as 3.0 km from the project site. Due to presence of open wells only 2 identifiable operating public bore wells were chosen for the sampling. Ground Water Analysis Data it interpreted typically that pH is neutral within 7 and all parameter within the permissible limit as per IS 10500. The water is portable at each location.

Project buffer and core zone consist of Sand; Coarse loamy, Typic Ustochrepts; Fine Loamy Typic Ustochrepts; Fine loamy, Fluventic Ustochrepts; Fine loamy, Udifluventic Ustochrepts; Fine Typic Endoaquepts; Fine Vertic Ustochrepts; Fine, Aeric Haplaquepts; Fine- mixed- hyperthermic, Anthreptic Ustochrepts; Loamy Skeletal, Fluventic Ustochrepts; Loamy Skeletal, Lithic Ustochrepts & Loamy Skeletal, Lithic Ustochrepts.

Soil Samples collected from 5 identified locations indicate the soil is Sand Loamy type and the pH value ranging from 6.23 to 7.15 which indicating that soil samples is neutral in nature.

Anticipated Environmental Impacts

The mine working will remain confined to river bed lot only and in no case disturbing any surface area outside which may affect topography or drainage.

The proposed dry sand mining project may impact the ambient air quality due to mining and transportation activities. The increase in particulate matter will not be more than 2µg/m³ over the baseline levels and no gaseous pollutants are expected to be generated other than vehicular emissions.

Trucks carrying the sand are the only sources of noise pollution. With the incremental value being less than the ambient noise levels, there is no likelihood of excess addition of noise, from the mine operation, on the surrounding background noise level.

There are no effluents generated from the proposed mining operations, the surface and ground water quality will not be impacted by proposed dry sand mining.

Excavation in the mining area and construction of roads, offices etc. does not affect the flora in the area where these operations are carried out. Plantation will be carried out on approach roads and nearby vicinity will, over a period of time, upgrade the flora.

Environmental Management Plan (EMP)

Proper environmental management plan is proposed for "Sand" mining project to mitigate the impact during the mining operation.

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

Sl. No	Particulars	Capital cost (in Rs.)
1	Environmental Monitoring(Ambient Air Quality Monitoring PM ₁₀ and PM _{2.5} SO ₂ , NOx and CO & Other Parameters as per regulatory norms))	30,000
2	Water Sprinkling ,Plantation and maintenance	5,000
3	CSR activities	20,000
4	Miscellaneous Activities	15,000

Total Capital Cost in Rs.	70,000
Total Recurring Cost in Rs.	30,000

Environmental Monitoring Program

SL No	Activity	Schedule
Air Pollution Monitoring		
1	Ambient air monitoring of parameters specified by MoEF&CC (PM10, SO2 & No2).	Once in every season except monsoon
Water Quality Monitoring		
2	Monitoring water quality surface water from the river	Once in every season except monsoon
3	Monitoring of one sample of tube well and open well at mine / nearby location. Parameters are essential parameters as per IS: 10500:1991	Once in every season except monsoon
4	Monitoring of water spray requirements	Log-sheet of water spray will be maintained on daily basis
Noise Quality Monitoring		
5	Noise in the ambient atmosphere in mining lease	Once in every season except monsoon
Greenbelt Maintenance		
6	Monitoring schedule for Greenbelt development as per mining plan	Yearly
Soil Quality Monitoring		
7	Soil at six locations	Once in every year

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

CHAPTER-1

INTRODUCTION

1.1 PURPOSE OF THE REPORT

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

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

EIA is a process to examine both beneficial and adverse consequences of the proposed project and ensures that these impacts are taken into account during the project design. The benefits are to protection of the environment, optimum utilization of resources and saving time and cost of the project. The EIA lessens conflicts by promoting community participation, informs decision-makers, and helps lay the base for environmentally sound projects.

Environmental Management plays a vital role in sustainable development of a country. The Ministry of Environment and Forest, Government of India had formulated policies and procedures governing the industrial and other developmental activities to prevent indiscriminate exploitation of natural resources, to promote integration of environmental concern in project development. The Ministry of Environment, Forest and Climate Change Govt. of India made environmental clearance (EC) for certain development projects mandatory through its notification of 27/01/1994 under the Environment Protection Act, 1986. Keeping in view of the experience gained in environmental clearance process over a period of one decade, the MoEF&CC came out with Environment Impact Notification, S.O. 1533(E), as dated 14/09/2006 and further various amendments done on and also the EIA guidance Manual for Mining of Minerals of MoEF & CC, Govt. of India, for seeking environmental clearance for mining of sand/moram in the applied mining lease area. It is mandatory to obtain environmental clearance for different kinds of developmental projects (Schedule-

1 of notification). The notification has classified in to two categories-A and B. Category-A Projects (including expansion and modernization of existing projects) require clearance from Central Government (Ministry of Environment and Forest, Govt of India) while category-B projects should be considered by State Level Environmental Impact Assessment Authority (SEIAA), constituted with the approval of MoEF & CC.

The major objectives of the report are:

To establish the present environmental scenario

To anticipate the impact of proposed project and

To suggest preventive and mitigate measures

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

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

The lease area of Sirigida Sand Quarry present in river Brahamani over an area of 18.00 acres (7.28 ha.) is located in Village- Sirigida, Tahasil – Talcher, in district Angul of Odisha. The lease is granted in the name of Sanghamitra Bhutia, At-Biharipur, Po- Kankili, in the district of Angul for a lease period of 5 (five) years from 2020-2021 to 2024-2025 vide order no. 4610 dated- 20.11.2020. (Copy of letter of Tahasildar order is attached as **Annexure-1**). The plan period is considered from 2020-21 to 2021-2025 as per approved mining plan. The report is for Environment Clearance for Sirigida Sand Quarry. (Copy of ToR attached as **Annexure- 2**).

1.3 BRIEF DESCRIPTION OF THE PROJECT

The project has been proposed for the Mining of Sand from the Government Land by open cast manual extraction method. Mining will be confined to the allotted lease area which lies on the **Brahamani** River bed proposed for a production of 10,700 CuM (max) for the plan period by Open Cast Manual method from river Brahamani located at village- Sirigida under Talcher Tahasil of Angul District, Odisha, over an area of 18.00 Acres. or 7.28 ha. bearing Khata No.- 142 and Plot No- 1791.

The Mining Plan of the Mining Project has been approved by Joint Director of Geology, Zonal survey, Dhenkanal, Odisha vide memo **no.-- on dated ---. As** per EIA notification 2006 and subsequent amendments, the project falls under item 1(a)-Mining of Minerals in the Schedule of EIA Notification,2006 & Subsequent amendments thereof. The project is coming under Category B as the lease area is

greater than 5.0 Ha.). Drilling and Blasting is not proposed in this mining activity.

No mining activity will be undertaken during the monsoon season. So the material will be replenished during the monsoon season every year. The excavated Sand will be sold in domestic market for construction purposes.

1.4 PROJECT NATURE, SIZE & LOCATION

NATURE: The proposed project is sand mining project. The total lease area is 7.28 ha of Govt. land at village Sirigida under Talcher Tahasil of Angul District, Odisha. The method of mining is open cast manual where no drilling or blasting is required. The proposed mining project is categorized as '**Category B**' project as per EIA notification dated 14th September 2006.

SIZE: The total proposed production is 10,700.00 cum of Sand during plan period.

LOCATION:

Table 1.1 Details of the location Site

Sl. No.	Particulars	Details		
1.	Project Site	Environmental Clearance for Sand Mining with production capacity 10,700 Cum. Sirigida Sand Quarry present in river Brahmani over an area of 18.00 acres (7.28 ha.) is located in Village-Sirigida, Tahasil – Talcher, in district Angul of Odisha. The lease is granted in the name of Sanghamitra Bhutia, At-Biharipur, Po-Kankili, in the district of Angul.		
2.	S. No. in the schedule	1(a) Mining of minerals, Non-Coal Mining Category "B"		
3.	Latitude & Longitude	Corner	Latitude	Longitude
		A	21°00'52.89"N	85°13'32.68"E
		B	21°00'46.07"N	85°13'32.80"E
		C	21°00'47.39"N	85°13'28.69"E
		D	21°00'48.36"N	85°13'26.03"E
		E	21°00'47.93"N	85°13'25.00"E
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		H	21°00'49.03"N	85°13'21.95"E
		I	21°00'49.85"N	85°13'19.56"E
J	21°00'55.79"N	85°13'20.55"E		
4.	Elevation above MSL	64m above MSL		
5.	Toposheet	73G/4		
6.	Present land use	Govt. Land, Khata No 142, Plot No 1791 Kisam- Nadi,		

7.	Nearest National Highway/State Highway	National HighwayNH-23(Gumla-Barkote) is 3.98 Km away from the ML area. State Highway SH-53(Banarpal-Pallahara)is 3.92 km away(Aerial Distance)
8.	Nearest Airport/ Railway station	Bhubaneswar Airport:96 km Scotlaland Railway station -3.72 km
9.	Nearest Town/City/ District Headquarter	Talcher-6.73 kms
10.	Forest	There is a forest in the 10km radius of the project area.
11.	Ecologically Sensitive Zones like wild life sanctuaries, national parks and	No Ecologically Sensitive Zones like wild life sanctuaries, national parks within 10 Km radius
12.	Seismic Zone	II
13.	Water Bodies	Brahamani River

1.5 PROJECT IMPORTANCE TO THE COUNTRY & REGION

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

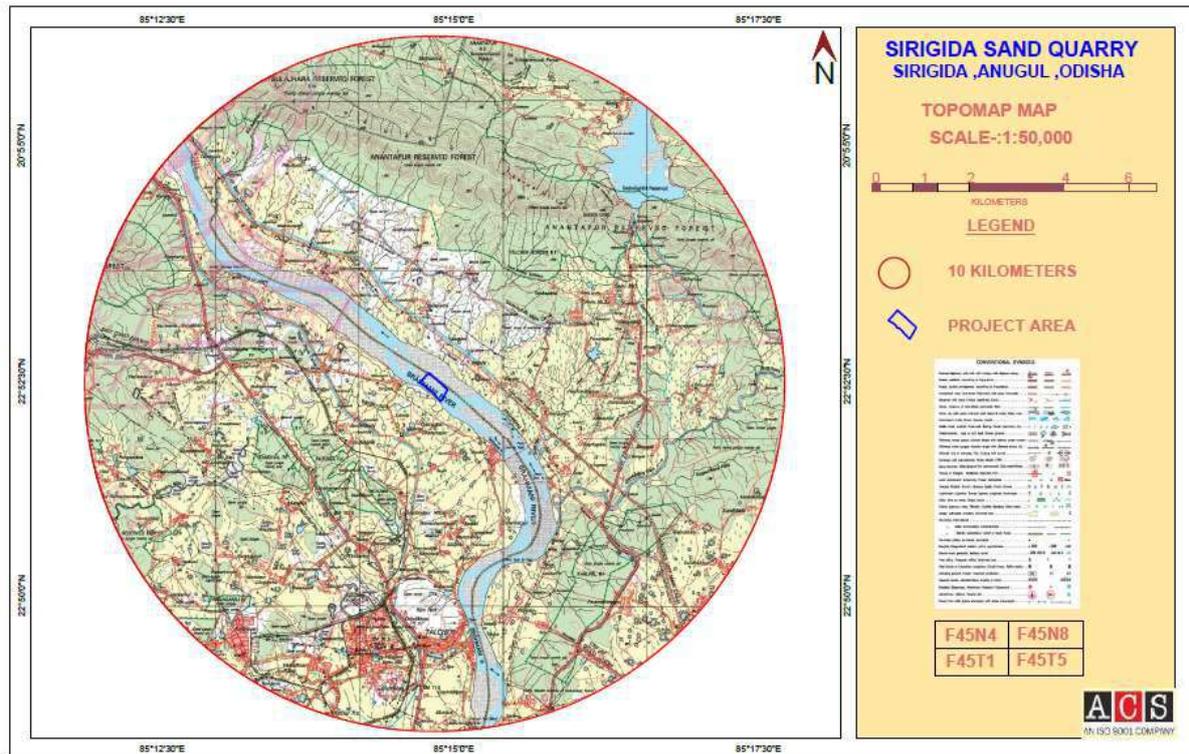
1.6 STATUTORY REQUIREMENTS

The lease is granted in the name of Sanghamitra Bhutia, At-Biharipur, Po-Kankili, Tahasil Talcher, in the district of Angul for a lease period of 5 (five) years from 2020-2025 vide order no. 4610 dated- 20.11.2020 from Tahsildar cum-Competent Authority, Talcher Odisha attached as **Annexure-1**.

1.7 SCOPE OF THE STUDY

The proposal was considered in the SEIAA meeting held on 29.10.2021 and Based on the information contained in the documents submitted, SEIAA, Odisha prescribed the Terms of Reference (TOR) vide no 3505/SEIAA dated 25.11.2021.. The Points stipulated by the SEIAA, Odisha in the TOR and its compliance are given in this report.

Figure 1.1: Topo Map



1.8 ENVIRONMENT SENSITIVITY

Sl. No.	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	No	There is no Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	No	The project site is a part of Brahamani river.
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	The proposed project area is not used by any protected, important or sensitive species of flora or fauna for breeding, nesting, foraging resting over, and winter migration.
4	Inland, coastal, marine or underground waters	No	There is no coast line or marine ecosystem in the zone.
5	State, National boundaries	Yes	NH-23-3.98 Km SH-53-3.92 Km
6	Routes or facilities used by the public	Yes	Access to the area through public

Environment Clearance of Sirigida Sand Quarry (Lease Area 7.28 Ha) village Sirigida under Talcher Tahasil of Angul District, Odisha

	for access to recreation or other tourist, pilgrim areas		road connecting village Sirigida.
7	Defence installations	No	No defence installation within the 10km Radius
8	Densely populated or built-up area	Yes	Talcher town is the nearest densely populated area near to the mining lease which is located at a distance of 6.73kms.
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	Yes	The mining lease is at a distance from areas occupied by sensitive man-made land uses. There is a temple at a distance of 5.1 km from the mining lease. Govt. Hospital 1.7 kms, Educational institutions- Govt. High School at Sirigida village. Govt. College – 6.32 Kms.
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	No	There are no forests, agriculture, tourism spot and mines in nearby area. Moreover, the area does not fall in over exploited/critical area on Ground Water Resources consideration.
11	Areas already subjected to pollution or Environmental damage (those where existing legal environmental standards are exceeded)	No	There is no area already subjected to pollution or environmental damage within 15 km radius.
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	No	The area is not sensitive to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions.

Figure 1.2: Key Plan



Figure 1.4: Lease Plan Map of the area



Figure 1.5: Surface Plan Map

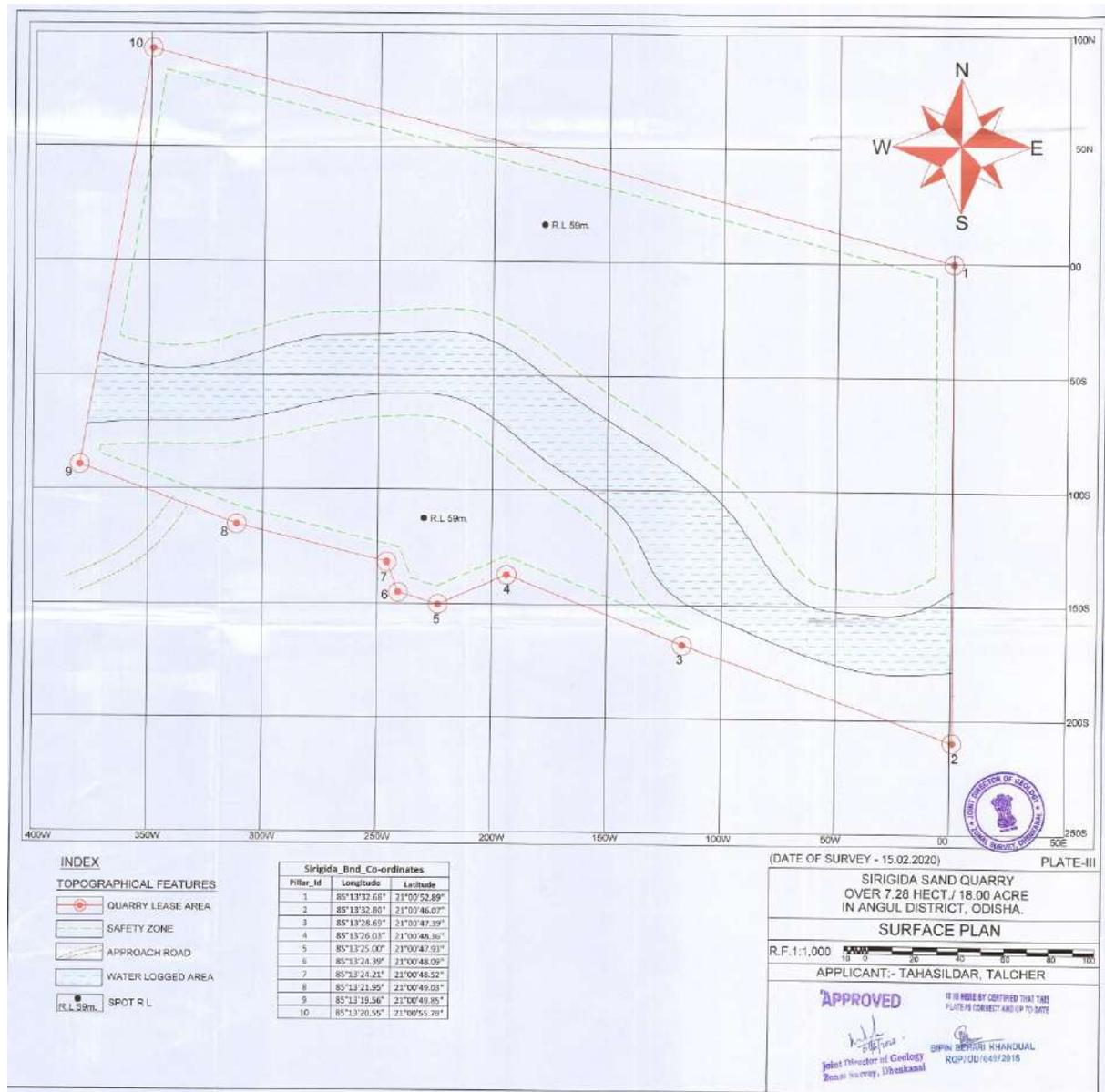
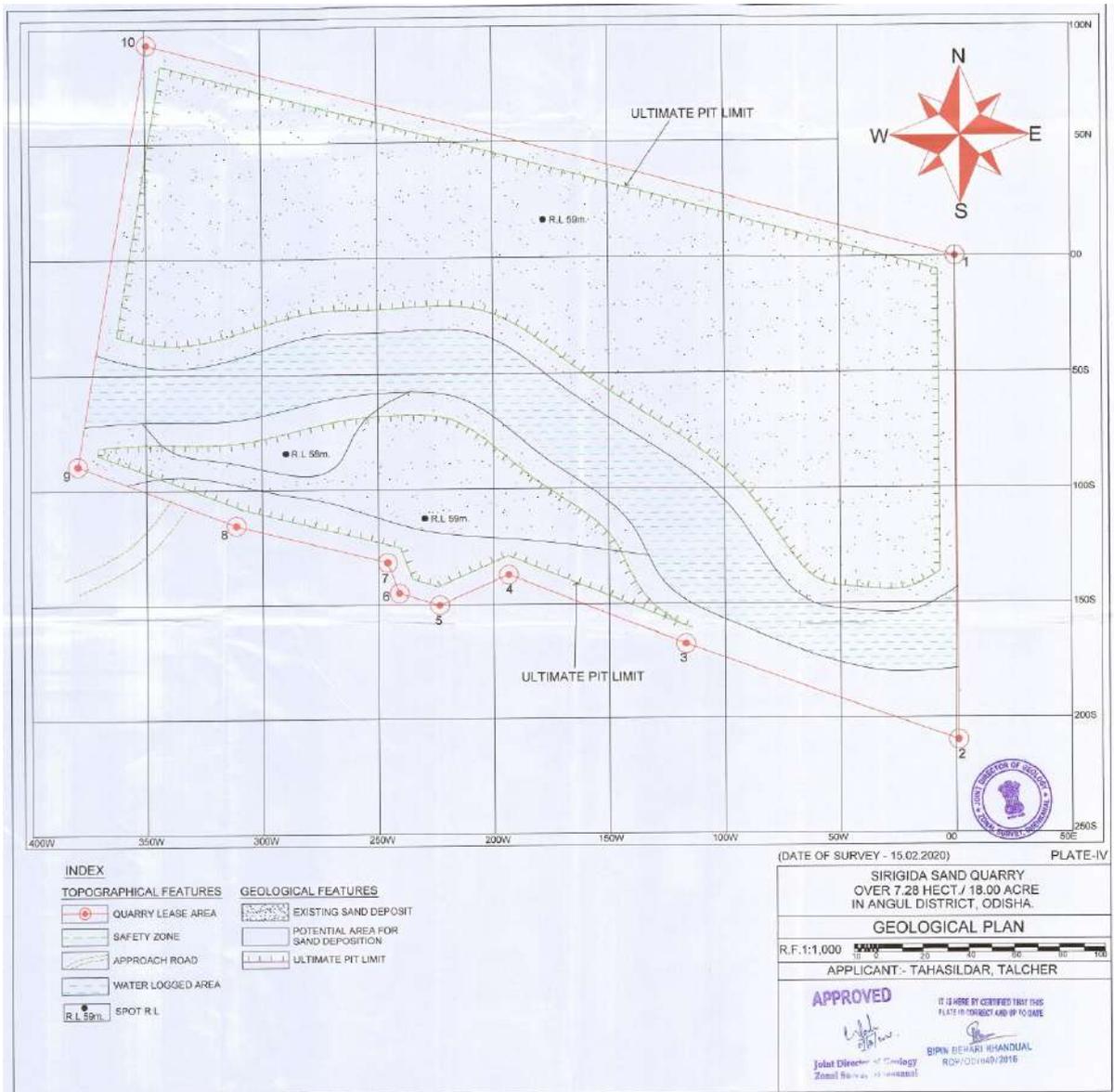


Figure 1.6: Geological Plan Map



CHAPTER -2

PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

The lease area of Sirigida Sand quarry present in river Brahamani over an area of 18.00 acres (7.28 ha) in village- Sirigida, Tahasil-Talcher, District Angul, Odisha. It is estimated that the amount of total proposed production of River Sand is 12000 Cu.m, which is to be extracted by open cast manual method. As the project is categorized in category-B of Schedule under item 1(a) in the EIA notification, 2006 and its subsequent amendments; it will be considered at the State Export Appraisal Committee (SEAC) for the purpose of obtaining Environment Clearance also for determining whether or not the project or activity requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) for its appraisal prior to the grant of Environmental Clearance depending up on the nature and location specificity of the project.

2.2 NEED OF THE PROJECT

This project involves mining of sand due to their most diversified use. It is a basic raw material required for manufacturing industries improving the construction activities like buildings, road, bridges infrastructure etc. The Materials will be sold in the domestic market transported by Tractors/tractors. The demand for the sand is always high in the nearby areas.

Apart from this, the project will generate direct and indirect employment opportunities to the nearby villages. The economy of the area will get a boost and there will be overall growth of the region in terms of educational & industry. The management of the mine will conduct medical camps at regular interval for villagers and labors. There will be generation of revenue to Govt of Odisha in form of tax, DMF etc.

2.3 LOCATION WITH COORDINATES (Map Showing General Location, Specific Location And Project Boundary With Project Layout)

The proposed lease area of Sirigida Sand Quarry present in river Brahamani situated at village-Sirigida, Tahasil-Talcher, District Angul. Location map and Google Earth Map of the project are given as Figure 2.1 and Figure 2.2.

Figure 2.1: Location Map

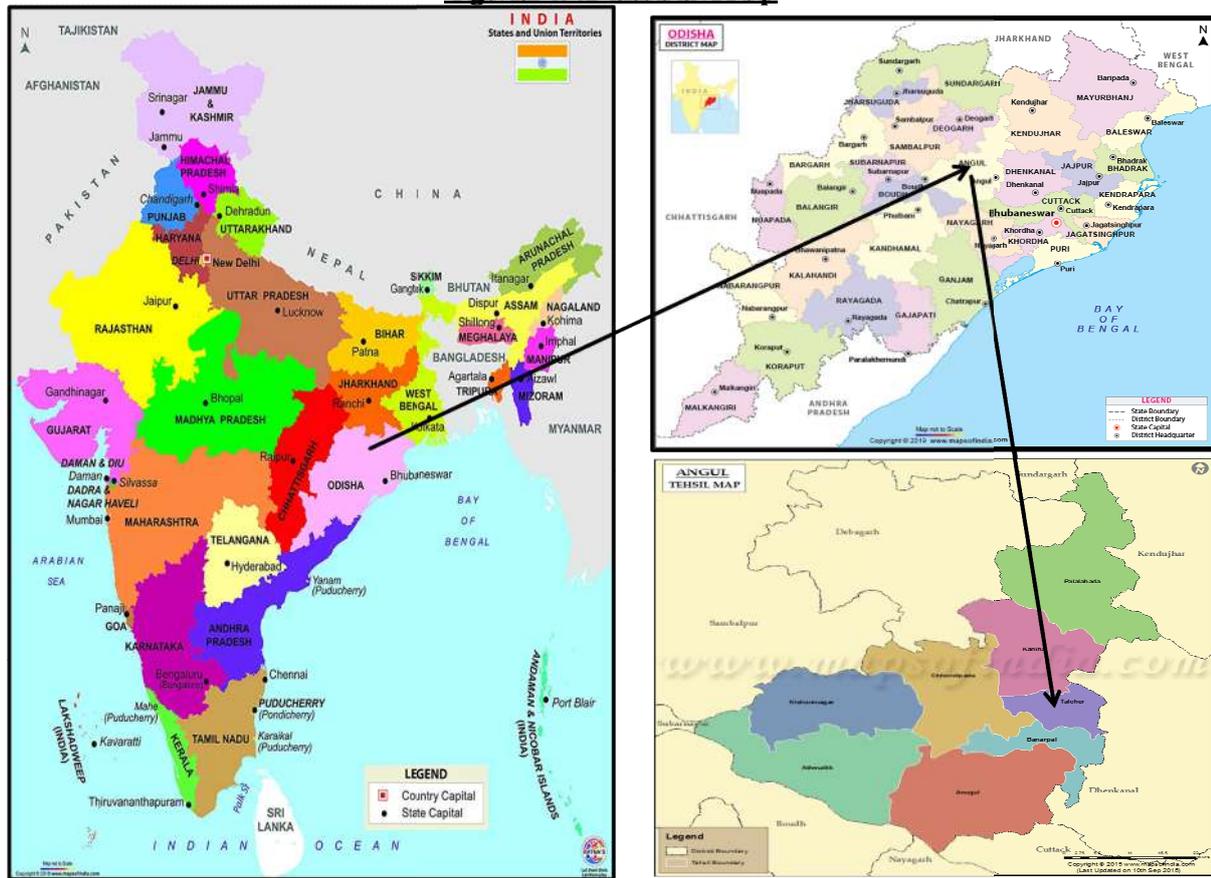


Figure 2.2: Google Earth Map



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

Particulars	Details																																	
Location	Sirigida Sand quarry present in river Brahmani over an area of 18.00 acres (7.28 ha) in village- Sirigida, Tahasil-Talcher, District Angul, Odisha.																																	
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Plot/ Khata No	Plot No 1791& Khata No 142																																	
Village	Sirigida																																	
Tahasil	Talcher																																	
District	Angul																																	
State	Odisha,																																	
Nearest Airport/ Railway station	Bhubaneswar Airport:90 km Scotland Railway station-3.72 km																																	

2.4 SIZE OR MAGNITUDE OF OPERATION

The total lease area is 18.00 acres(7.28 ha) of non- forest Govt. land of "Nadi" kism and the lessee is going to work within the said area for plan period of five

years (2020-2025) with a total production of 53500 Cu.m for the plan period. The land belongs to Brahamani River bed area and got huge amount of sand deposited at the site. Hence, the mining activity is envisaged. There is no forest land or agriculture in the mine lease area as well as Sanctuary.

2.4.1 Estimation of Reserves

The method of cross section has been adopted for computing the reserve. The mining lease boundary, proven & mining limits are marked on the plan which is there after transferred to cross section for determining the different categories of reserve.

Table 2-2: Estimation of Reserves

Lease Area applied	7.28 ha
Peripheral strip	0.941 Ha (10% of total mining area)
Geological Reserve	151082 Cu.m
Mineable Reserve	74289 Cu.M
Method of Mining	Opencast Manual

2.4.2 Geological Reserves

All the quantity estimated is under proved (111) category under UNCEF classification. The area of mining lease and the average thickness of mineral are multiply to get volume.

Lease area is = 7.28 ha

Estimated Depth of reserve = 1.0 Cum.

Geological reserves of the lease area = 151082 Cu.m

The river sand deposits are derived from hard rock due to weathering, erosion and long term transportation. The size of the sand grain is small and shape is mostly rounded because of long transportation from the source. These deposits are renewable unlike other mineral deposits. It is mostly difficult to assess the deposit of a specific stretch with certainty as every year sand gets deposited there in various patches along the river course. Unlike other mineral resources sand is formed and gets deposited through majorly physical action. However, the assessment has been made based on prevailing surface conditions.

The resource/ reserve have been estimated based on surface area method taking average thickness of the deposit.

Based on the surface exposures, the updated geological reserve as well as mineable reserve has been estimated in the entire lease area on the following parameters.

The following table shows the detailed estimates.

Table 2.3 Geological Reserves (Proved)

Area of potential sand zone (m ²)	Thickness of sand (m)	Replenishment Factor (100%)	Geological resource Of Sand (m ³)
75541	1	2	151082

2.4.3 Mineable Reserve

Based on the surface exposures, the updated geological resources as well as mineable reserves have been estimated in the entire lease area under proved, reserves for geological and mineable category based on the following parameters. The category wise geological proved sources as well as Mineable proved Reserves have been calculated for the lease area referring different parameters

The mineable reserves are calculated on the basis of safety distance of 7.5 mtrs are left as barrier zones from the lease area boundary. Sand will be extracted up to 1.0 mtrs from the top level. The flowing table shows the detailed estimates.

Table 2.4 Mineable Reserves (Proved)

Area of potential sand zone (m ²)	Thickness of sand (m)	Replenishment Factor (100%)	Mineable reserve Of Sand (m ²)	Extractable Mineable reserve
53574	1	2	107148	74289

As estimated, geological reserve of sand is 151082 Cu.M. and mineable reserve is 74289 Cu.M. During the plan period, a total of 53,500 Cu.M. sand will be extracted. The proposed mined out areas will gradually get filled up by river sands transported with water from upstream direction.

2.5 PROPOSED PROJECT SCHEDULE FOR APPROVAL AND IMPLEMENTATION

Project activities will be started immediately after obtaining Environmental Clearance from SEIAA, Bhubaneswar, Odisha. The mining / project activities will be completed within 5 years time after start.

2.6 TECHNOLOGY AND PROCESS DESCRIPTION

2.6.1 Method of Mining

The project lies on the bed of Brahamani River. The project for production of Sand (minor minerals) from Sirigida Sand Quarry which has been proposed for a total production of 53,500 Cu.m during the plan period. The open cast manual method and transportation through dumpers and tractors. No mining activity will be undertaken during the monsoon season. So the material will be replenished during the monsoon season every year. The bench height will be 1.0 m and width will be along the base of deposit. There will be no under cuttings or over hangs.

The average thickness of the deposit is 1.0 m. No drilling & blasting will be performed for production requirement.

2.6.2 Working Depth

The mining is confined to extraction of sand from the bed of Brahamani River. The mining will be manual in which the material will be collected in its existing form and transportation through dumpers and tractors. Mining of minor minerals in river-bed proves to be most viable and least disturbing to the environment. The mining process is manual method without drilling & blasting. There would be no risk to the employee working in the mines. Except in cases of emergency, when suppliers are to be effected to Government agencies and other requisite parameters of need, semi mechanized mining operations may be resorted to, without drilling & blasting. As the working is going to be methodical i.e. mining will be done in benches. There would be no risk to the employee working in the mines.

Mining will be starting from its center and advance toward the banks across the river uniformly. The mineral extraction will be done for a period of 240 days in a year.

In order to maintain safety and stability of river banks a safety distance of 3 m or 1/10th of the width of the river on both side of river bank will be left as per sustainable sand.

Sand Mining Guidelines issued by MOEF&CC in 2016 & 2020 shall be followed. The lease area gets the sediment deposit due to the river flow which remains undisturbed during the monsoons. The extraction process can slow or stop aggradations thereby maintaining the channel's capacity and its flow.

NO mining shall be carried out up to a distance of 1 kilometre (1 km) from major bridges and highways on both sides, or five times (5x) of the span (x) of a bridge/public civil structure (including water intake points) on up-stream side and ten times (10x) the span of such bridge on down-stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.

For the optimum utilization of the mineral available in the lease area, mine working has been planned in a scientific and systematic way as shown in the working plan and section. The excavation planning, slope, height, width and length of the bench are planned on the basis of deposit. Since the deposit is very simple, shallow and beds are horizontal, the simple adopted mining is most suitable.

2.6.3 Haulage & Surface Transport

The Lessee has a proposal to transport of sand is by Tractors/tractor trolley of 8-10 tonnes capacity. Tractors of larger size may also be used where the material is to be carried to a long distance. The Tractors will be properly covered with tarpaulin. The water will be sprinkled or dust suppression twice a day or as per requirement. Also trees will be planted along the approach road as a part of Green belt development and grasses will be planted to avoid soil erosion. The River Sand will be used for different construction, building work etc.

Annual Production capacity : 10700 Cu.m
No. of working Days : 240
Monthly production capacity : 879.45 Cu.m
Tractors/trolleys required per day : 10-20 Trolley twice a day.

2.7 THE PROPOSED TOTAL PRODUCTION IS 470600 CUM OF SAND.

Table 2.5: Proposed Year Wise Production

year	Production (m ³)
2020-2021	10700
2021-2022	10700
2022-2023	10700
2023-2024	10700
2024-2025	10700
Total	53500

As per LOI, mineable reserve will be 10,700 cum. More than 10700 cum sand will be replenished each rainy/monsoon season.

2.7.1 Conceptual Mine Plan

The collection of sand is restricted up to a maximum depth of 2 m. River/stream will be not diverted in any case. No mining proposed in rainy season.10700 cum excavation of sand is proposed as per LOI. More than 10700 cum sand will be replenished each rainy season.

2.8 PROJECT DESCRIPTION

As the project is categorized in category-B of Schedule under item 1(a) in the EIA notification, 2006 and its subsequent amendments; it will be considered at the State Export Appraisal Committee (SEAC) for the purpose of obtaining Environment Clearance also for determining whether or not the project or activity requires further environmental studies for preparation of an Environmental

Impact Assessment (EIA) for the appraisal prior to the grant of Environmental Clearance depending up on the nature and location specificity of the project

The project has been proposed for the Mining of Sand from the Government Land by open cast manual extraction method. Mining will be confined to the allotted lease area which lies on the Mahanadi River bed from which approximately 10700 cum of Sand will be excavated per annum and the estimated project cost is Rs. 25.00 Lakhs.

The Sand will be exploited manually. Loading will be done by semi-mechanized method by the loader. The extracted / collected Sand will be used for different purposes.

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

Table 2.6: Schematic presentation for Environmental Clearance

Area of Lease (in Ha)	Category of Project	Requirement of EIA/EMP	Requirement of Public Hearing	Requirement of EC	Who can Prepare EIA/EMP	Who will apply for EC	Authority to appraise/grant EC	Authority to monitor EC compliance
EC proposal of Sand mining in cluster situation								
Cluster are of mine lease up to 5Ha	B2	Form 1 M PFR and approved Mine plan	No	Yes	State, State Agency, Group of Project Proponent, Project Proponent	Project Proponent	DEAC/ DEIAA	DEIAA SEIAA SPCB CPCB MoEFCC Agency nominated by MoEFCC
Cluster are of mine lease >5Ha And < 25ha with no individual lease > 5ha	B2	Form 1 PFR and approved Mine plan and one EMP for all leases in the cluster	No	Yes	State, State Agency, Group of Project Proponent, Project Proponent	Project Proponent	DEAC/ DEIAA	
Cluster are of mine lease >5Ha And < 25ha with no individual lease > 50ha	B1	YES	Yes	Yes	State, State Agency, Group of Project Proponent, Project Proponent	Project Proponent	SEAC/ SEIAA	

(Adopted from SMMG, 2016 issued by MoE&CC)

2.8.1 Land Use Pattern of the Core Zone

The land is totally sandy and this land is good for mining. There is no forest land or agriculture in the mine lease area. There is neither seasonal nor perennial nala with in the lease area. Surface runoff water from quarry will be discharged to the seasonal nala/canal and therefore, there is no possibility of ground water puncher during the plan period. In this lease area there is no national park, wild life sanctuary, eco sensitive areas and industrial area situated within 10 Kms radius of the lease area. The area considered for mining of river bed material has not been utilized for any purpose other than for the natural flow of the river. The

objective of this operation is only to regulate the flow in its natural course which is presently being hindered by the sedimentation over a long period of time.

Table 2.7: Land Utilization Statistics of the Core Zone

Khata No.	Plot No.	Kisam	Area (acre)
142	1791	Nadi	18.00
TOTAL			18.00 acres or 7.28 ha

2.8.2 Nature of Waste Generated

There is no generation waste material. No area will be reserved for dumping of waste material. As no waste will be generated, there will be no threat to environment. The very small amount of municipal waste will be generated, however collection bins will be provided for the same and will be dumped in a proper way.

2.9 UTILITIES

2.9.1 Water Requirement

This is a mining project to produce required size River Sand as a raw material for building & constructions purpose. The total water requirement will be approximately 1.0 KLD for different purposes like domestic, dust suppression, plantation purposes. Water will be withdrawn from tube wells from nearby village.

2.9.2 Power Requirement

No electrical power shall be required for operations as the mining will be worked out during day time only. Minimal power required for office shall be taken from the general electric supply of the area. Dumpers, tractors will be used for transportation. So, the approximate quantity of the fuel used per day is 80 Lits/day.

2.9.3 Manpower Requirement

In the mine for total production of 10,700 Cu.m/Annum of River Sand 17 nos. of person are to be employed daily. The indirect employment opportunities for shops/food stalls, hired vehicles, etc also can be generated to full fill the day to day requirements of the mining personals. The details of personnel to be employed are given below:

Table 2.8 Details of Manpower

Category	No of persons
Supervisor & Statutory Person	1
Skilled Labourers (Operator & Helper)	3
Semi skilled Labourers	3
Un Skilled Labourer	10
Total	17

2.9.4 Use of Mineral

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

2.9.5 Mineral Benefaction

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

2.9.6 Green Belt Development

There is no forest growth in the quarry site. Avenue plantation is proposed by consulting the concerned authority. During the plan period local species like Neem, Chakunda etc. is proposed to be planted at 2.5m spacing. The area for developing green belt area covers 50 numbers of concerned authorities. This worked out area will be reclaimed/rehabilitated by way of plantation in the following manner after the reserve is completely exhausted.

Watering and maturing will be done periodically as per requirement. Post plantation care such as soil working, pruning etc will be done. Causal replacement will be done. Insecticides will be spread for pest control. Proper watch and ward will be there to save the trees from cattle fire.

2.10 WASTEWATER GENERATION AND TREATMENT

There is no waste water generation during the process and there will be no threat to environment.

2.10.1 Solid waste

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

2.11 ASSESSMENT OF NEW & UNTESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE

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

CHAPTER -3

DESCRIPTION OF THE ENVIRONMENT

3.0 INTRODUCTION

Detailed outline of activities and process technology for the proposed project has been presented in the previous chapter. This chapter presents in detail the existing environmental scenario and condition in & around the project site. This is required to assess the likely impact on the environment due to the proposed activity.

3.1 STUDY PERIOD

The monitoring to study the present environmental condition in terms of its components at the location was carried out from Dec 2020 to Feb 2021.

3.2 COMPONENT & METHODOLOGY

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

Land

Water (Surface & Ground)

Air

Noise

Biological (Flora & Fauna)

Socio-economic status

Study Area

Study area for baseline data collection covers a 10 Km radius from the mine lease periphery. Further, the study area has been divided into two zones namely "Core Zone" and "Buffer Zone". Core zone comprises of the mine lease area within the mine lease boundary while the area around the mine lease periphery covering 10 Km radius area constitutes the Buffer Zone.

Methodology adopted for Baseline Study

The methodology for conducting the baseline data collection was adopted from Technical Guidance Manual of Mining Project available on the MoEF & CC website. Baseline information with respect to Land, Water, Air, Noise, Biological and Socio-

economic quality status in the study area were collected by conducting primary sampling / field studies during winter season Dec 2020 - Feb 2021. The characteristics of baseline status of study area with respect to the parameters are discussed.

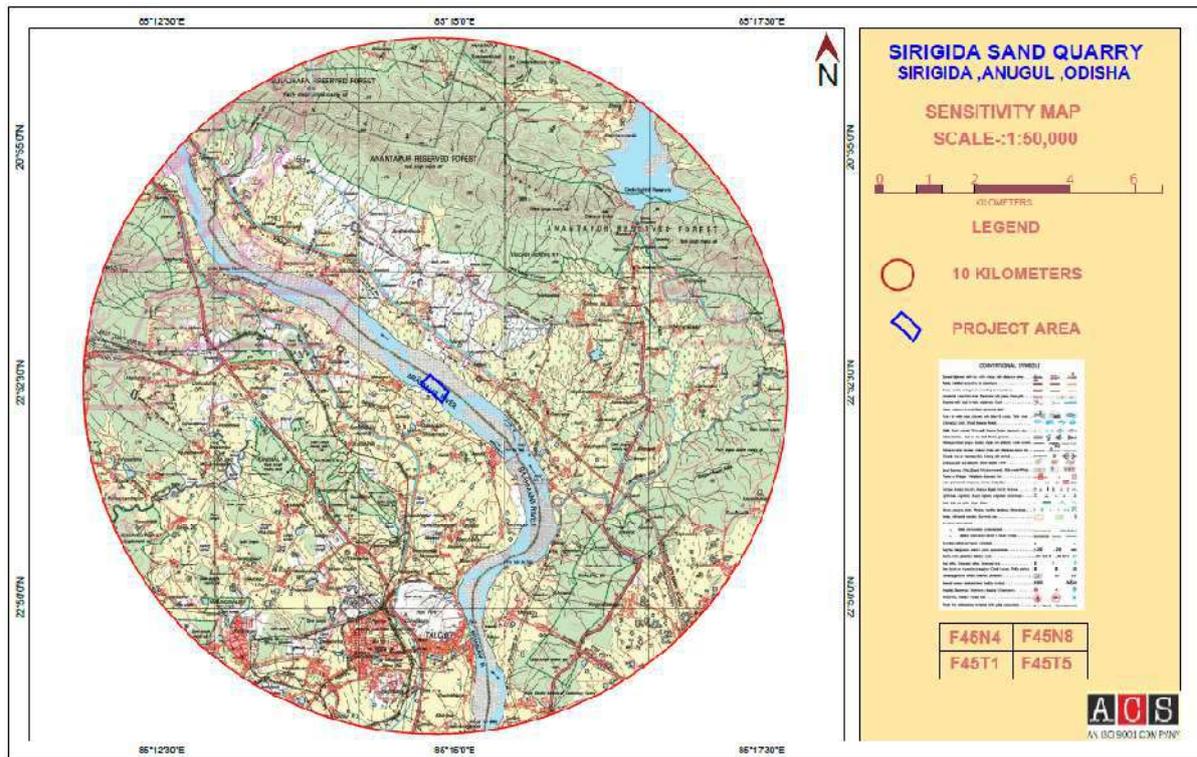
Location of the project

Sirigida Sand Quarry ML area present in river Brahamani over an area of 18.00 acres (7.28 ha.) is located in Village- Sirigida, Tahasil – Talcher, in district Angul of Odisha. Geographical location of mine lease area is covered under Survey of India Toposheet No-73G/4.

Figure 3.1 Google Map



Figure 3.2 Sensitivity Map



3.2 LAND ENVIRONMENT

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

3.2.1 Buffer Area

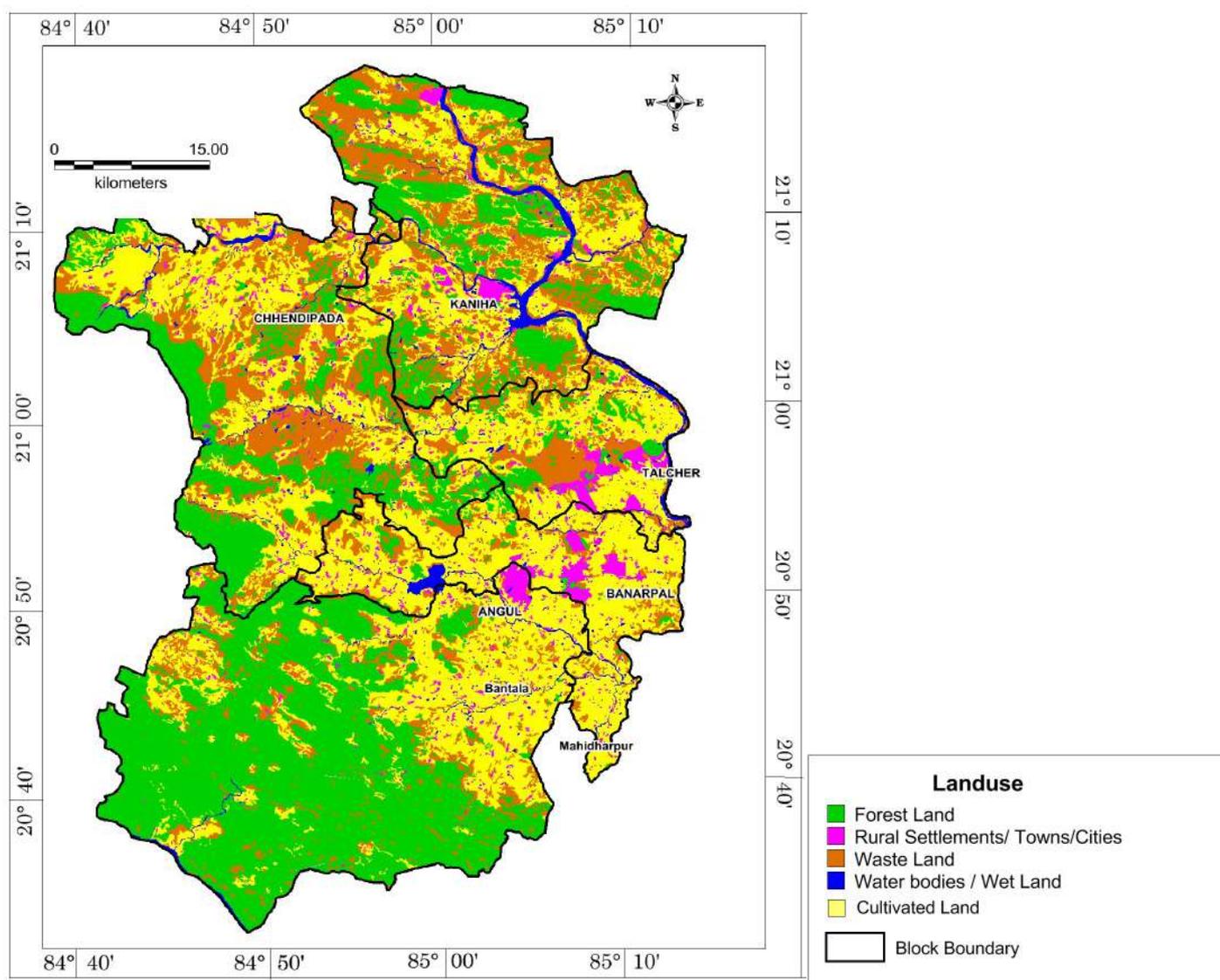
Existing land use pattern {agriculture, non-agriculture, forest, water bodies (including area under CRZ)}, shortest distance from the periphery of the project to periphery of the forest, national park, wild life sanctuary, eco sensitive areas, water bodies (distance from the HFL of the River), CRZ. In case of notified Industrial area, a copy of the Gazette notification should be given.

There is neither seasonal nor perennial nala with in the lease area. Surface runoff water from quarry will be discharged to the seasonal nala / Canal and therefore, there is no possibility of ground water puncher during the plan period. There is no national park, wildlife sanctuary, eco sensitive areas and industrial area situated within 10 Kms radius of the lease area. Land use map of the Buffer zone is given below.

Table 3.1 Land use of the Buffer Zone

Land use pattern	Area in Ha
Forest	4635
Misc. tree crops & Groves	376
Barren & Uncultivable land	577
Non-agricultural use	3486
Culturable waste	1083
Permanent pastures and other grazing land	551
Current Fallows	2615
Other Fallows	1724
Net area sown	6766
Total irrigated land	1097.87
Total	

Figure 3.3 Land use Map of the Buffer Zone



3.2.2 Core Area

The total land use pattern for mining in the mining lease area is 18.00 acres. After five year the workings in which the sands are excavated up to a depth of 2m will be replenished in flood times. No plantation programme will do inside lease area since the deposit is in river bed.

Applied Mining lease area is plain, non-forest government land. The excavated area at the end of the plan period will be 7.28 Ha. The quarry lease area over 7.28 ha is Govt. owned non-forest area as per land schedule of the revenue department. The land use of the mine lease area is the Brahamani River and there will be no change in land use after operation. The excavated sand will be replenished every year during the monsoon season. Hence the ultimate land use of the mine lease area will not be change.

The area considered for mining of river bed material has not been utilized for any purpose other than for the natural flow of the river. The objective of this operation is only to regulate the flow in its natural course which is presently being hindered by the sedimentation over a long period of time

Table 3.2 Land use pattern

Khata No.	Plot No.	Kisam	Area (acre)
142	1791	Nadi	18.00
TOTAL			18.00 acres or 7.28 ha

3.3 TOPOGRAPHY

The District is surrounded by Cuttack & Dhenkanal on the east, Sambalpur & Deogarh on the west, Sundargarh & Keonjhar on the north and Phulbani on the south. Covering an area of 6232 sq.km, Angul District is located at Latitude 20.50 North to 85.00 East Longitude. The altitude of this place is 564 to 1187 mts. The northern part of the district is characterized by dense forest of Pallahara subdivision and WNW-ESE trending hills immediately north of the Talchir coal, the area is drained by river Brahamani. The southern hilly region forms the watershed between river Brahamani and Mahanadi River. Base Map, Counter Map & DEM Map is given below.

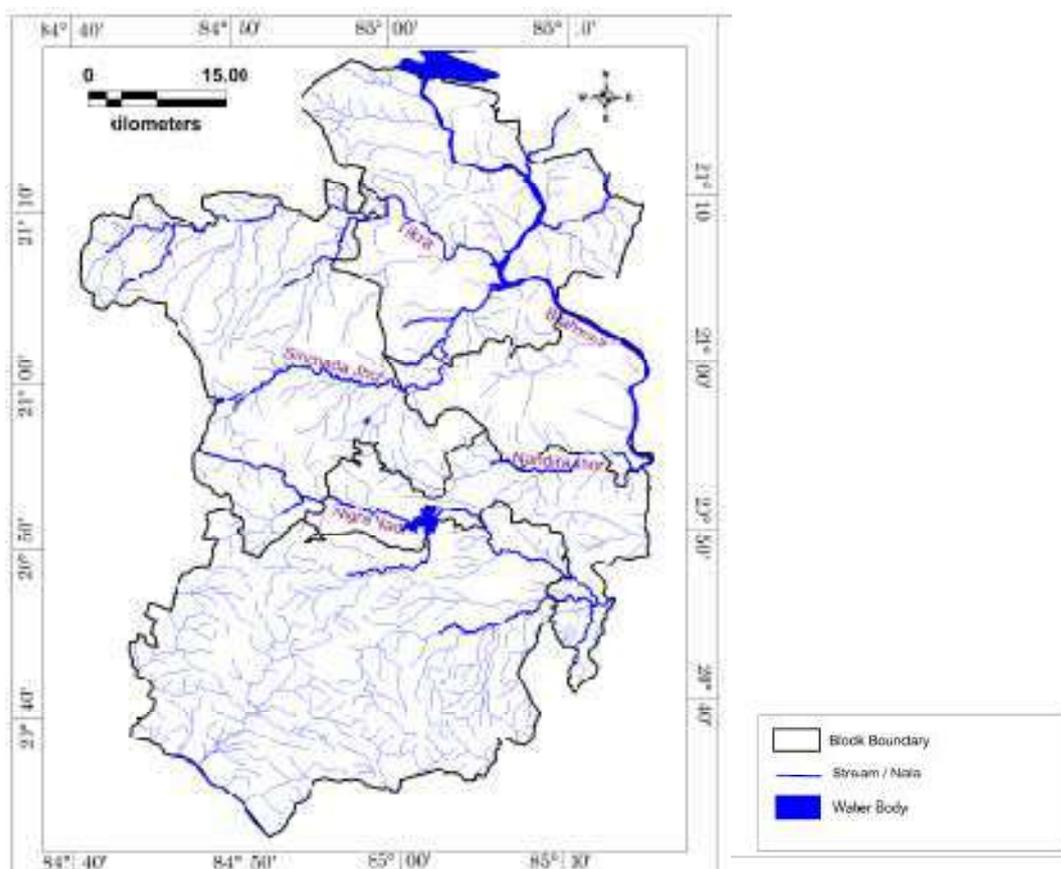
3.4 DRAINAGE PATTERN

The drainage of the district is mainly controlled by rivers like Mahanadi, Brahmani, Tikira and their tributaries. Brahmani and Mahanadi are the two major rivers of the district. Both these rivers have numerous perennial and non-perennial tributaries. Most part of the district lies within the Brahmani basin while the Mahanadi basin spreads over Athmalik subdivision and southern part of Angul sub-division.

The Brahmani river which is the second longest river in Orissa flows through Talcher subdivision. The major portion of the district is drained by Brahmani river and its tributaries. The Brahmani flows in a general SE direction, broadly parallel to the general strike trends of the prevalent rock formations, but locally guided by major joints and faults. The major tributaries of Brahmani are Tikra Jhor, Singhara Jhor, Samakoi, Nandira Jhor, Gambhira, Nigra, Bade Jhor etc.

These major streams show a general right angle pattern while joining with the river Brahmani. The Mahanadi flows along the south-west boundary of the district, parallel to the strike of Khondalites and is guided by a major shear zone. The major tributaries of this river are Karandi Jhor, Ghosar Jhor, Sindol Jhor, Chanagorhi and Malia Jhor etc., all flow from the northern side of the river originating in Athmalik and Angul subdivisions. The river Mahanadi though flows in a general SE direction, but occasionally flows due south or east at places.

Figure 3.7 Drainage Map



3.5 GEOLOGY

Physiography

The sand bed is on the river Brahmani. The Haturipal sand bed deposit represents a gently sloping to almost flat terrain with highest altitude of 58 mRL to the central part of the lease area. Vegetation is scanty with small bushes existing in the auction hold area. There is no human settlement with in the area.

Regional Geology

Gondwana Group Palaeozoic-Mesozoic Upper Mahanadi Valley basin which is in this basin, the Gondwana sediments unconformably overlies the Precambrian basement, the latter comprising migmatitic granitic gneiss, amphibolites, schist and quartzite traversed by pegmatite and quartz veins. Era (Upper carboniferous-Early Permian)- Glacio-lacustrine and fluvial sediments were deposited in linear basins along faulted throughs over the Precambrian basement. These sediments characterized by fluvial assemblages of interbedded sandstone-shale sequence. While the lower Gondwana rocks are a vast repository of coal, the upper Gondwana witness sandstones of Palaeozoic-Mesozoic era. Gondwana rocks are exposed over a large area along NW-SE trending linear belt in the Mahanadi valley rift/ graben in three major basin (Talcher, river & Athgarh). Beside these a number of small patches outliers of Gondwana rocks occur in Angul, Dhenkanal districts and others. The lower Gondwana rocks have vast resources of coal.

Upper Gondwana	Migmatitic granitic gneiss, amphibolites, schist and quartzite	Palaeozoic-Mesozoic
	Conglomerate, sandstone, shale fireclay	Lower Cretaceous
Middle Gondwana	Conglomerate, ferruginous sandstone, red shales	Lower to Middle Triassic
----- Un Conformity -----		
Lower Gondwana	Fine to medium grained Sandstone, siltstone, clay-beds, coal	Upper permian
	Sandstone, shale, clay, ironstone shale	Middle permian
	Conglomerate, sandstone Shale, fireclay, coal	Lower permian
----- Un Conformity -----		
	Boulder Bed, green shale, Sandstone, marlstone	Upper carboniferous to lower permian

----- Un Conformity-----		
	Grinite,greisses,amphibolites, migmatites	percambrian

Local Geology

The sand deposit in Brahmani River near Haturipal belongs to recent to sub recent deposits of Holocene age . Beach sand,younger and older alluvium also belongs to the same age . The proposed area is occupied by a gently sloping to almost flat deposits of sand.

The basement consists of Tertiary deposits and the sequence of litho-units encountered in the auction hold area is as follows:



3.6 Lithology

The characteristic features of the litho units of the area are described below:

Sand :The area under reference is covered with grey to white sand deposits with average thickness of 1m throughout the lease area. Sand by definition is a loose, incoherent mass of mineral materials and is a product of natural processes. These processes are the disintegration of rocks and corals under the influence of weathering and abrasion. When sand is freshly formed, the particles are usually angular and sharply pointed,but they grow gradually smaller and more rounded as they become constantly worn down by the wind or water. Sand particles tend to settle quite rapidly because of their shape, density and size. Therefore the concentration of sand is highest near the bed of a river and lowest near the surface. Clean sand is indeed a rare commodity on land ,but common in sand dunes and beaches.

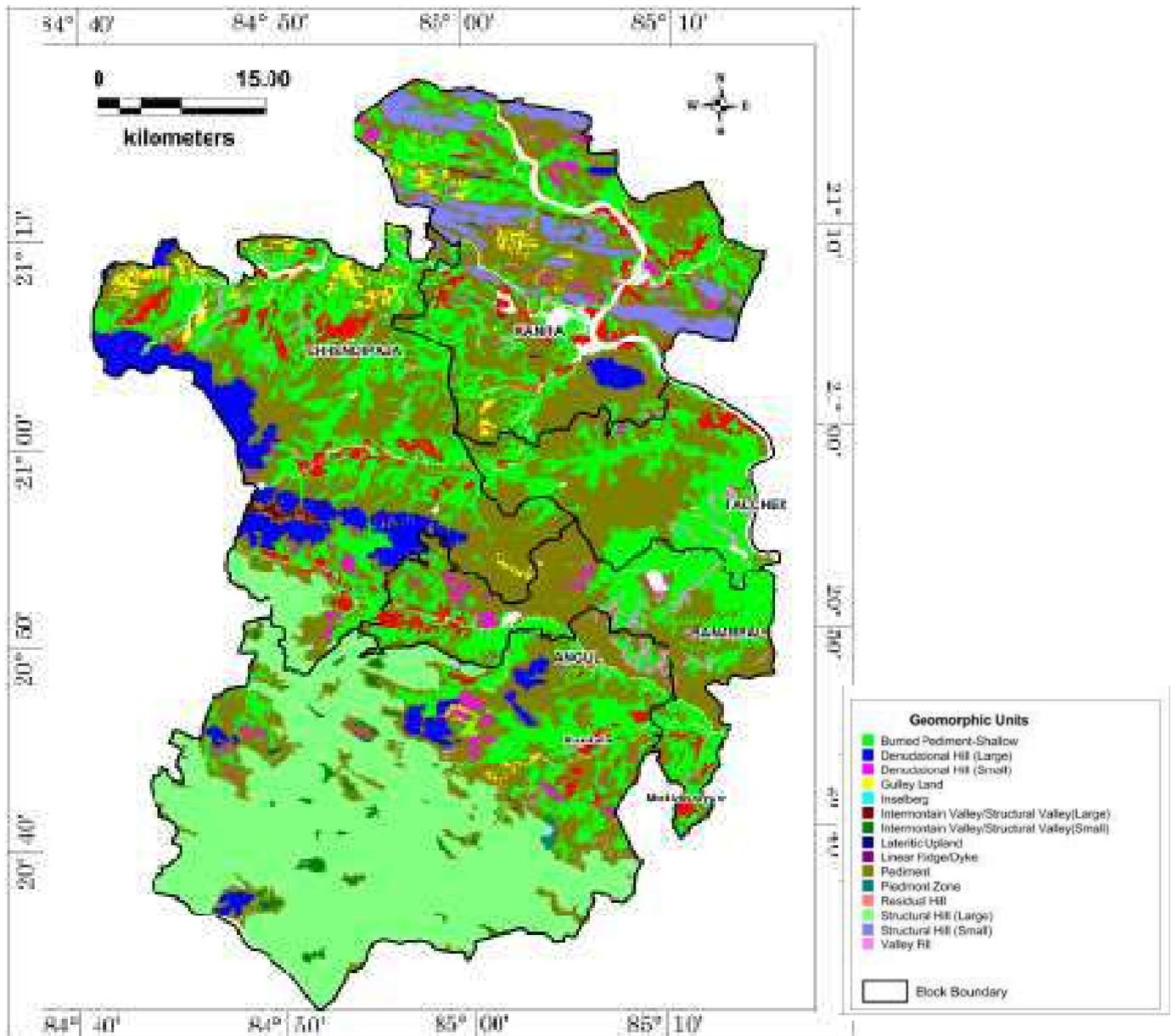
The composition of sand is highly variable in nature , depending on the local rock types/sources and conditions, but the most common constituent of sand in inland continental settings and non-tropical coastal settings is silica (silicon dioxide or SiO₂), usually in the form of quartz which because of its chemical inertness and considerable hardness ,is the most common mineral resistant to weathering.

Alluvium: Decomposed vegetal materials admixed with clay and soil constitutes alluvium which is underlain by the sand bed with some clayey matter.

Basic Reserve Estimation

1. The sands within the river bed have been demarcated on Geological Plan, then the reserve has been calculated by surface area method.
2. The recovery of used material has been considered as 100% from the total volume of sands.
3. Taking into consideration of the geological features of the area & sand bed the reserves has been taken as proved category only.
4. The proved reserve has been taken from the lower level of exposure of sand at water course cutting, which has been considered 1m below the surface sand will be replenished during rainy season, so reserve will be sufficient for proposed production.

Figure 3.8 Geomorphology Map



3.7 Hydrogeology

The hydrogeological condition of the study area can be broadly grouped into three units.

Consolidated Formation

This includes Granite, Granite gneiss, Charnockites, Khondalites, Quartzite, Phyllites, Micaschist etc. These rocks are devoid of primary porosity. The secondary porosity developed in the rocks due to intense weathering and fracturing, which forms repository and passage for movement of ground water. Groundwater occurs under water table condition in the weathered residuum and in semi-confined to confined condition in fractured rocks at deeper depths. The thickness of weathered residuum varies from 5 to 20 m, which form repository of ground water at shallow depth. Groundwater from this zone is developed through dugwells. The result of shallow deposit wells constructed by CGWB in the study area show that weathered and semi-weathered granite gneiss form moderately potential aquifers.

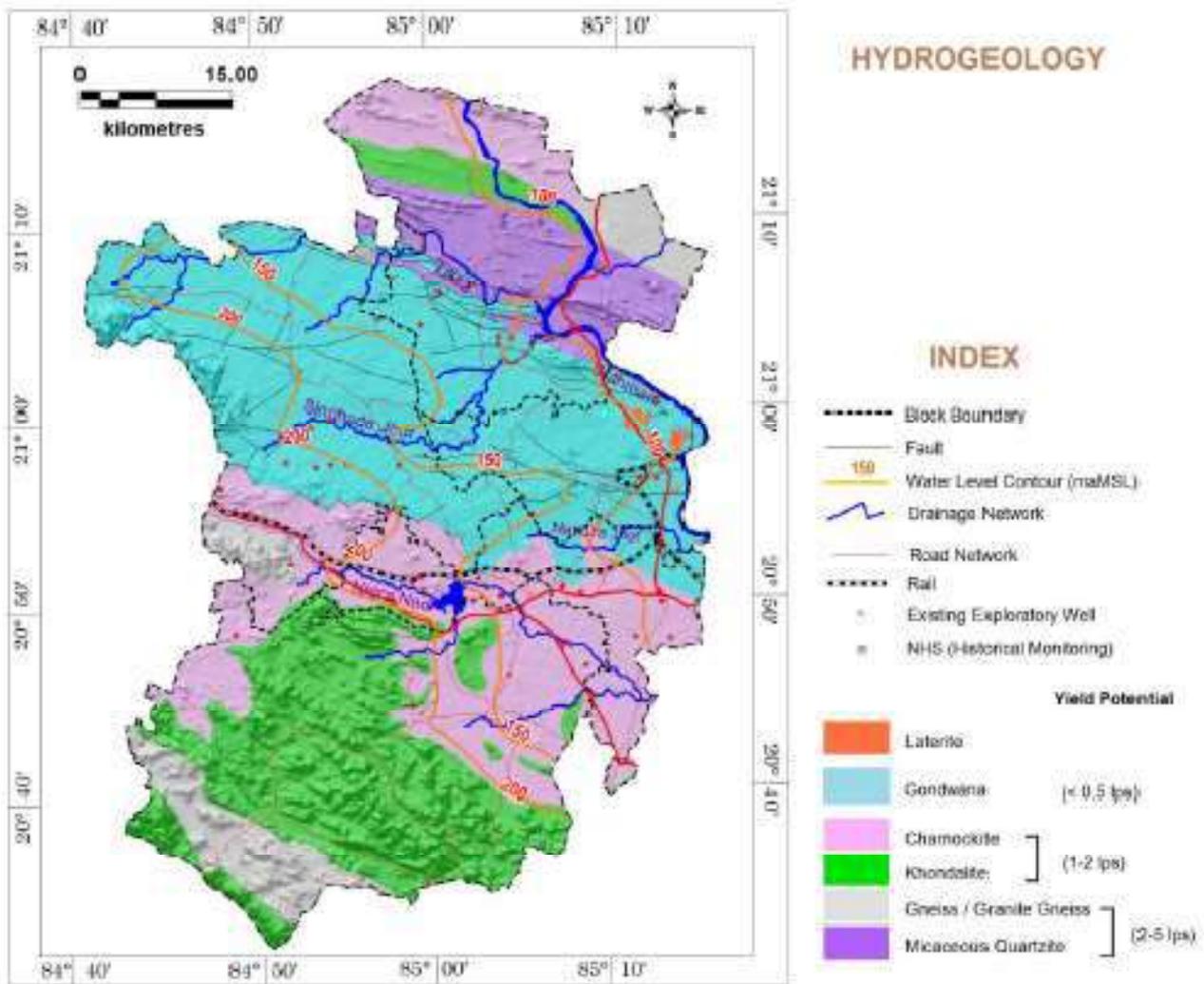
Semi-consolidated Formation

It includes semi-consolidated Gondwana formation comprising mainly of sandstone and shale. The sandstone when weathered and fractured form good aquifer. Groundwater occurs under water table condition in the weathered zone and under semi-confined to confined condition in the fracture zone.

Unconsolidated Formation

Laterite occurs as capping over the older formation and groundwater occurs under water table condition. The aquifer supports moderate yield. The alluvium occurs along the course of major rivers and streams and is having limited occurrence in pocket. The alluvium supports good yield.

Figure 3.10 Hydrogeological Map



3.7 SOIL

Project buffer and core zone consist of Sand; Coarse loamy, Typic Ustochrepts; Fine Loamy Typic Ustochrepts; Fine loamy, Fluventic Ustochrepts; Fine loamy, Udifluventic Ustochrepts; Fine Typic Endoaquepts; Fine Vertic Ustochrepts; Fine, Aeris Haplaquepts; Fine- mixed- hyperthermic, Anthreptic Ustochrepts; Loamy Skeletal, Fluventic Ustochrepts; Loamy Skeletal, Lithic Ustochrepts & Loamy Skeletal, Lithic Ustochrepts.

In order to assess the impact on soil due to operation phase soil quality analysis is carried out from 5 locations within the 5km radius from the project location. Soils were taken from the location similar to the Groundwater location. Representative soil sampling was done at several important locations and these locations details are given in **Table 3.3** & shown in **Figure 3.12**. Analytical data of soil samples is presented in **Table 3.4**.

Table 3.3 Soil Sampling Location

Monitor	Description	Direction from site
S-1	Dharamapur	21°0'23.93"N 85°13'13.92"E)
S-2	Gunthubahal	20°59'8.57"N 85°14'4.38"E)
S-3	Manikamara	21° 2'54.64"N 85°11'59.79"E
S-4	Kadapada	21° 1'53.16"N 85°13'50.18"E
S-5	Bholeswarpur	21° 0'51.54"N 85°11'1.78"E

Figure 3.12 Soil Sampling Location

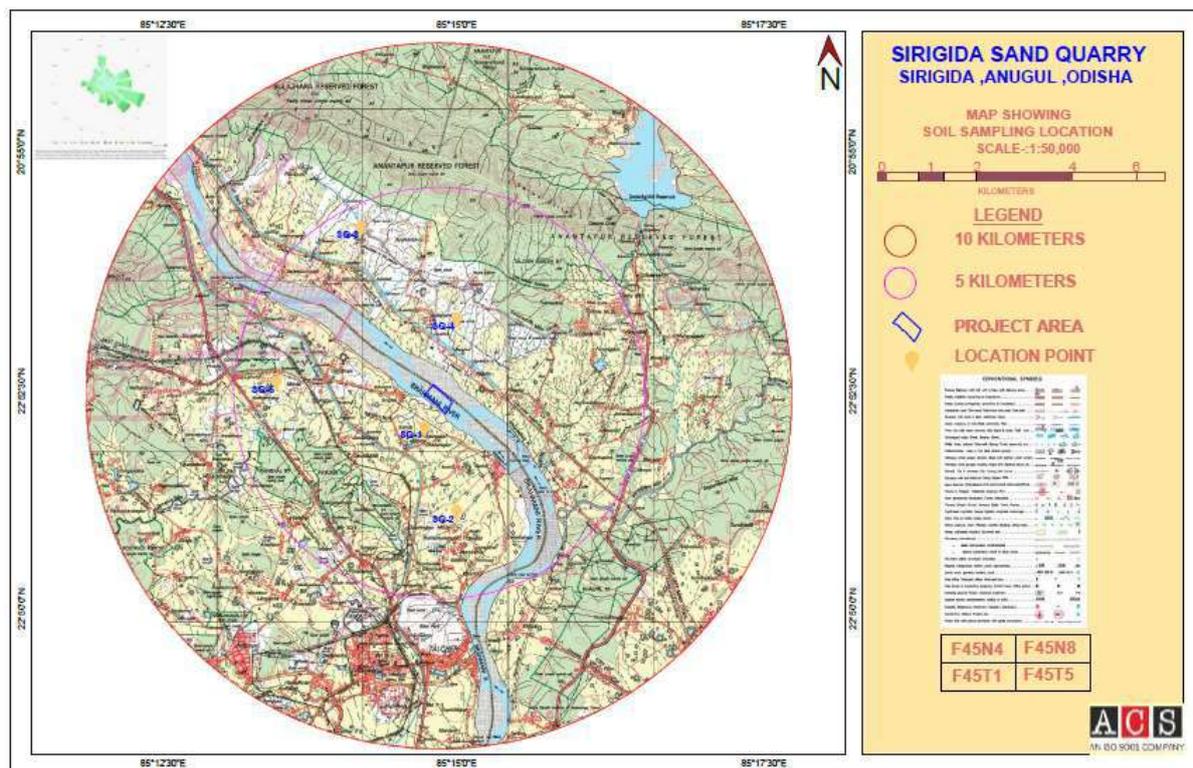


Table 3.4 Analytic Data of Soil Sampling Location

Sl.No.	Parameters	Unit	Analysis Results				
			S-1 (Dharamapu)	S-2 (Gunthubaha)	S-3 (Manikamara)	S-4 (Kadapada)	S-5 (Bholeswarpur)
1	pH	-	6.92	6.25	7.02	6.23	7.15
2	Total Nitrogen as N	mg/kg	0.057	0.082	0.075	0.051	0.043
3	Colour	Hazen	Reddish	Brown	Reddish	Brown	Reddish
4	Phosphorus	Kg/Ha	0.034	0.029	0.015	0.032	0.025
5	Porosity /Waterholding capacity	%	15.8	23.9	21.8	17.3	21.1
6	Organic Matter	%W/W	1.29	1.43	1.74	1.53	1.12
7	Infiltration Rate	Cm/hr	5.4	5.7	5.1	5.5	4.2
8	Calcium (as Ca)	mg/kg	1.2	1.6	1.5	1.3	1.7
9	Magnesium (as Mg)	mg/kg	1.2	1.9	1.6	1.5	2
10	Moisture content	%	6.5	6.2	5.7	5.3	5.8
11	Bulk Density	gm/cc	1.63	1.71	1.73	1.51	1.37
12	Chloride	mg/kg	0.032	0.022	0.019	0.024	0.037
13	Sulphate	mg/kg	0.14	0.34	0.23	0.54	0.37
14	Soil Texture	-	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
i)	Sand(>0.2mm)	%	57	63	55	63	52
ii)	Slit(0.002-0.2mm)	%	13	17	25	17	18
iii)	Clay(<0.02-0.2mm)	%	33	27	26	22	29
15	Exchangeable Potassium	mg/kg	0.07	0.5	0.03	0.07	0.01

3.8 CLIMATOLOGY

The study area experiences tropical monsoon climate with mild winter and hot summer. There are three distinct season, good rainfall has been observed in the area through south-west monsoon between May to September every year. The Climatologically data including the monthly temperature, humidity and rainfall for the period of last eight years from Angul I.M.D station has been analyzed to arrive at the annual normal rainfall of the area and is presented in following table. The average annual rainfall of the Angul area has been observed as 1266.7 mm, of which major amount is received during the four months extending from June to September.

Rainfall: The district is generally hot with high humidity during April and May and cold during December and January. The monsoon generally breaks during the month of July and continues till end of October. The temperature goes as high as up to 45⁰C in the summer and up to 70 -80 C during peak winter. The rainfall statistics of the district for last four years is given below is shown as **Table 3.5 & Figure 3.12**.

Table 3.5 Rainfall Data (10years)

Year/Month	April	May	June	July	August	Sept	Oct	Nov	Dec	Jan	Feb	March	Total
15-16	37.04	39.93	218.86	343.29	224.64	142.20	16.38	0.23	31.85	0.63	24.98	42.59	1122.62
16-17	1.93	44.25	126.63	267.16	389.86	143.23	98.26	4.90	NIL	8.43	NIL	22.44	1107.09
17-18	1.23	35.76	201.05	213.38	213.05	143.69	109.87	16.90	NIL	NIL	NIL	0.10	935.03
18-19	74.34	80.10	123.42	333.20	299.31	295.03	114.29	2.70	50.95	0.40	27.00	24.60	1425.34
Avg.	28.63	50.01	167.49	289.25	281.72	181.04	84.70	6.18	20.70	2.36	13.00	22.43	1147.52

3.8.1 Mixing Height

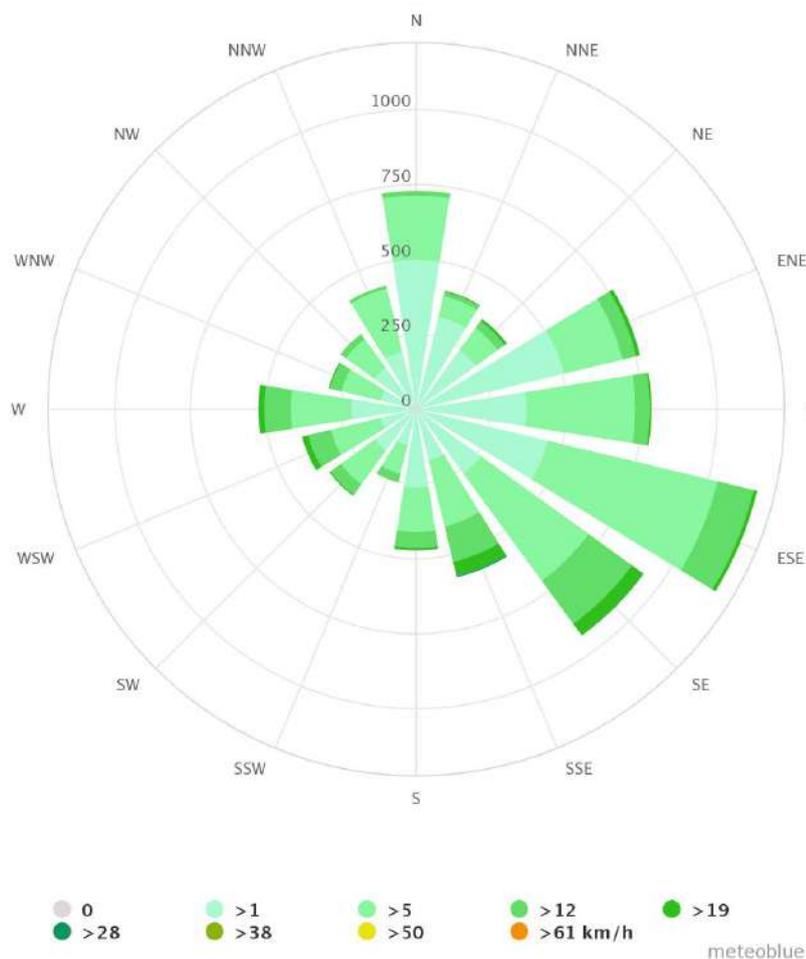
The mixing height data is procured from Envitrans for winter season and the diurnal variation is unanimously absorbed between 7 am in the morning and 7 pm in the afternoon. The trend of variation is increasing between 7 am to 3 pm after which there is a gradual decrease in mixing height and laps rate is approximately dry adiabatic.

3.9 METEOROLOGICAL

The meteorological conditions in an area regulate the transport and diffusion of air pollutants released into the atmosphere. These data are very important for proper interpretation of the baseline information as well as for input prediction for air quality prediction models. Hence historical & site specific details are collected and the details are as below:

Based on the last three months' average diurnal climatological data from the AERMOD source, the following Wind rose for three month average Wind Directions are extracted for Project area. IMD base Windrose is given below in **Figure 3.16**. Wind rose of Project area is given below **Figure 3.17**.

Figure 3.16 IMD based Wind Rose



3.9.1 Site Specific Meteorological Data

METEOROLOGICAL DATA			
1	Season/ Period	Winter Season(Dec 2020- Feb 2021)	
2	Location	Project Area- 20°00'50.80"N ; 85°13'27.82"E	
3	Methodology	Automatic weather monitoring system	
4	Frequency	Data Recorded at hourly intervals throughout the monitoring period of three months	
5	Data Description		
i.	PARAMETERS	MINIMUM	MAXIMUM
ii.	Temperature in °C	15	45
iii.	Humidity in %	8	96
iv.	Wind speed Km/Hr	0.2	17
v.	Total Rainfall in mm	0.0	1.8
vi.	Predominant wind direction (From)	N-SE	
Remarks: No variation from general trend observed			

3.11 AIR QUALITY

Air pollution means the presence in the outdoor atmosphere of one or more contaminants or combinations thereof in such quantities and of such duration as are or may tend to be injurious to human, plant or animal life or property. Air pollutants include smoke, vapours, soot, fumes, gases, mist, odours, particulate matter, radioactive material or noxious chemicals. With upcoming activity a range of different pollutants are released into the atmosphere that are dispersed and have a significant impact on neighborhood air environment. Thus collection of base line data of air environment occupies a predominant role in the impact assessment statement. The ambient air quality status across the study zone forms basis for prediction of the impacts due to the project.

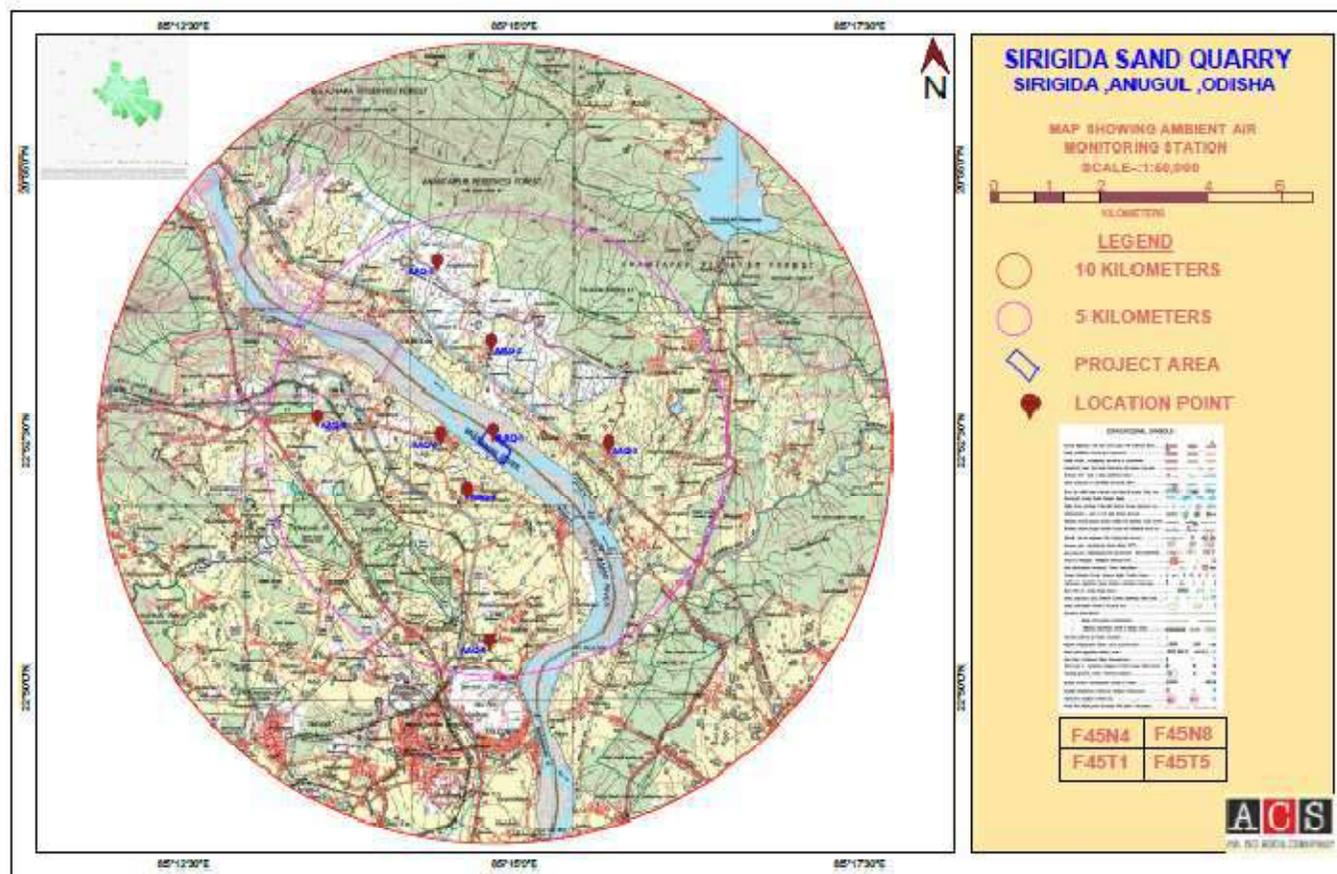
3.11.1 Basis of Selection of Station

Primarily as the IMD based wind rose diagram indicates the resultant wind blowing from ESE to SE direction, therefore 4 locations were chosen in the south-East side of the project area and 3 locations were chosen in north side of the project area & 1 from the main core zone of the project location. The location details are in the following **Table 3.6** & **Figure 3.18**.

Table 3.6 Details of Air Sampling Location

Monitor	Description	Direction from site
AQ1	Project Site	21°0'53.24"N 85°13'26.36"E
AQ2	Kadapada village	21°1'52.92"N 85°13'28.78"E
AQ3	Basulie village Near kulei pitiri	21°0'36.53"N 85°15'35.85"E
AQ4	Dawripur village Near kisshoripal	21° 0'1.40"N 85°13'18.91"E
AQ5	Bholeswarpur chawak	21° 1'3.70"N 85°10'45.50"E
AQ6	Khairal village near up school	21° 0'48.22"N 85°13'5.94"E
AQ7	Manika mara chawak	21° 3'4.03"N 85°13'36.01"E
AQ8	Kisoripal chawak	20°58'20.00"N 85°13'53.90"E

Figure 3.18 Air Quality Sampling Location



The existing baseline levels with respect to Particulate Matter Size Less than 2.5µm, PM₁₀ µg/m³, Carbon Monoxide, Sulphur dioxide and Oxides of Nitrogen at eight locations are presented in **Table 3.7**. PM₁₀ ranges within 77.0-38.0 µg/m³, PM_{2.5} ranges within 38.0-13.0µg/m³, SO₂ ranges within 7.3-4.1 µg/m³ & NOx ranges within 14.9-9.5 µg/m³. The parameters monitored at the project area as per NAAQ standards are found to be within limits. It may be observed that the all parameters at all stations are well within the limits prescribed by Central pollution control Board.

Table 3.7 Ambient Air Quality Analysis

	PM ₁₀ (µg/M ³)	PM _{2.5} (µg/M ³)	SO ₂ (µg/M ³)	Nox (µg/M ³)
AAQ1-Project in side				
Max	75.4	36.0	9.1	15.1
Min	44.1	17.4	4.8	9.8
Average	59.6	25.3	7.4	11.6
98%percentile	73.4	35.6	9.1	13.6
Location-2 (Kadapada village)				
Max	71.8	35.7	7.5	14.0
Min	41.8	15.4	4.0	9.1
Average	57.8	25.7	5.6	11.4
98%percentile	71.5	34.8	7.4	13.9
Location-3 (Basulie village Near kulei pitiri)				
Max	68.0	35.4	6.5	11.5
Min	39.1	15.4	4.1	9.1
Average	52.1	24.7	4.9	10.1
98%percentile	65.2	35.3	6.2	11.2
Location-4 (Dawripur village Near kisshoripal)				
Max	71.8	35.7	7.5	14.0
Min	41.8	15.4	4.0	9.1
Average	57.8	25.7	5.6	11.4
98%percentile	71.5	34.8	7.4	13.9
Location-5 (Bholeswarpur chawak)				
Max	59.0	39.0	6.9	13.8
Min	38.9	14.0	4.9	9.8
Average	49.7	26.1	6.0	11.7
98%percentile	58.1	38.0	6.9	13.8
Location-6 (Khairal village near up school)				
Max	58.2	37.9	6.8	11.7
Min	38.1	13.5	4.3	9.6
Average	58.2	24.6	5.4	11.7
98%percentile	58.2	37.7	6.7	11.7
Location-7 (Manika mara chawk)				
Max	44	21	5.8	10.4

Min	44	20	6.4	9.5
Average	56	18	5.6	10.2
98%percentile	66	20	5.7	11.4
Location-8 (Kisoripal chawk)				
Max	49	21	5.4	11.4
Min	58	37	5.2	12.2
Average	57	24	4.8	11.2
98%percentile	57	15	5.6	12.6
Study Areas	71.8-38.1	39.0-13.5	7.5-4.1	15.1-9.1
NAAQS Standard	100	60	80	80

3.12 NOISE ENVIRONMENT

Noise is an unwanted sound without musical quality. Artificial noise impact on environment, grown apace is with advancing human civilization. Noise pollution is equally hazardous to environment as air, water and other forms of pollution. Various noise measurement units have been introduced to describe, in a single number, the response of an average human to a complex sound made up of various frequencies at different loudness levels. The most common scale is, weighted decibel dB (A), and measured as the relative intensity level of one sound with respect to another sound (reference sound).

The impact of noise depends on its characteristics (instantaneous, intermittent or continuous in nature), time of day and location of noise source. The environmental impact of noise can have several effects varying from noise induced hearing loss to annoying depending on noise levels.

Table 3.8 Noise Quality Monitoring Location

Monitor	Description	Direction from site
NQ1	Project Site	21°0'49.17"N 85°13'27.80"E
NQ2	Siriguda traffic	21°0'51.36"N 85°13'8.47"E
NQ3	Kanikili village	21°0'5.98"N 85°13'34.70"E
NQ4	Kisiropal Bus stop	20°58'16.59"N 85°14'2.70"E
NQ5	Basulie village near ram temple	21°1'4.16"N 85°14'34.91"E
NQ6	Kadapada chawk	21° 1'52.92"N 85°13'28.78"E

Figure 3.19 Noise Monitoring Location

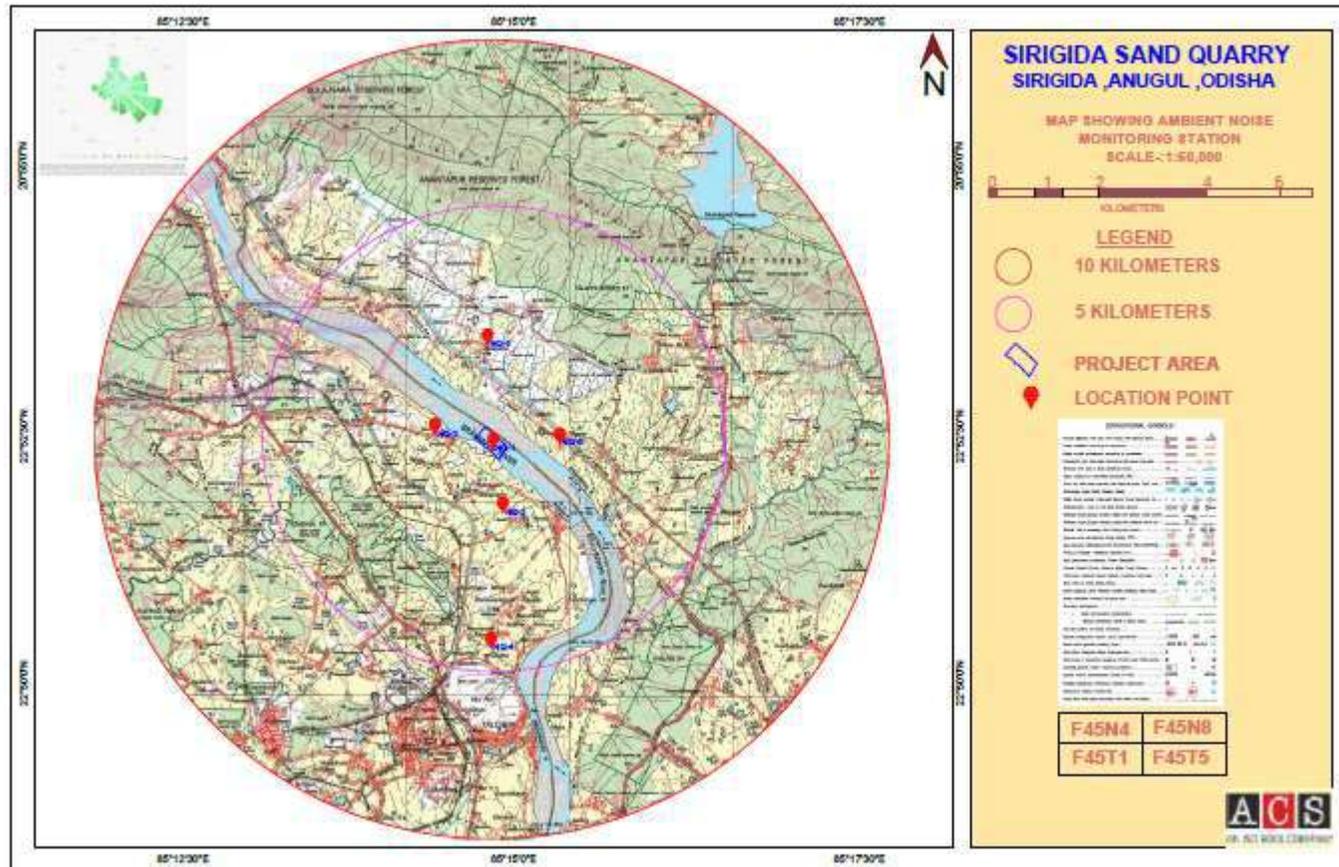


Table 3.9 Equivalent Noise Levels in the Study Area

Day Time Noise monitoring results (Noise Level in dB (A))						
TIME (6.00AM to 10.00 PM)	N-1: Project in site	N-2: Siriguda traffic	N-3: Kanikili village	N-4: Kisiropal Bus stop	N-5: Basulie village near ram temple	N-6: Kadapada chawk
Avg.	53.38	51.92	44.38	50.76	46.65	49.29
Standard as per CPCB	55.0					
Night time Noise monitoring results (Noise Level in dB (A))						
TIME (10.00P M to 6.00AM)	N-1: Project in site	N-2: Siriguda traffic	N-3: Kanikili village	N-4: Kisiropal Bus stop	N-5: Basulie village near ram temple	N-6: Kadapada chawk
Avg.	41.29	41.36	35.43	40.93	37.23	38.47
Standard as per CPCB	45.0					

3.13 WATER ENVIRONMENT

Development of any region is contingent on the availability of sufficient water resources, as most of the process industries would require water for process or cooling purposes. The potential for exploitation of ground water resources increases as development of new projects increases in industrial and agricultural areas. With the increasing industrialization and urbanization the possibilities of contamination of surface water and ground water sources are rapidly increasing. The water resources in the area broadly fall into following categories:

Surface Water resources: Streams and ponds, etc.

Ground Water resources: Accumulation in deeper strata of ground.

The source of recharge for both the resources is atmospheric precipitation in the form of rainfall.

Table 3.10 Detail of Surface Water Location

Monitor	Description	Direction from site
SW-1	Brahmani River	21° 0'41.12"N 85°13'44.91"E
SW-2	Banguru nala Down stream	21° 0'35.62"N 85°11'23.04"E
SW-3	Right bank canal	21° 0'8.48"N 85°12'45.93"E
SW-4	Dadaraghai sub canal	21° 1'55.52"N 85°14'4.49"E
SW-5	Dadaraghai main canal	21° 1'46.90"N 85°15'26.32"E
SW-6	Main Left bank canal	21°2'52.98"N 85°11'43.47"E

Figure 3.20 Surface Water Locations

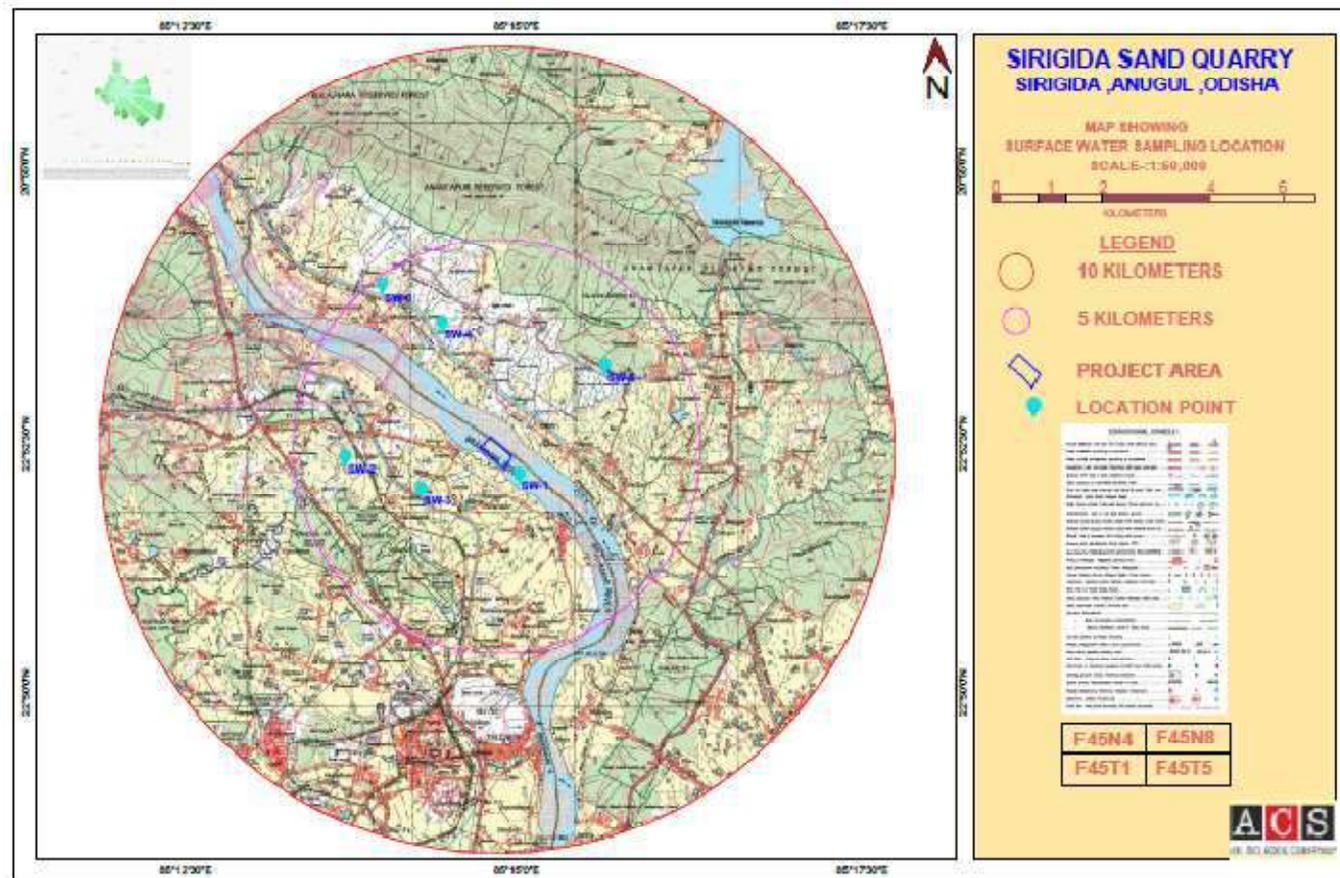


Table 3.11 Surface Water Analysis Data

Sl. No	Parameter	Testing Methods	Unit	Standards as per IS-2296:1992 Class -'C'	SW-1 Brahmani River	SW-2 Banguru nala (Down stream)	SW-3 Right bank canal	SW-4 Dadaraghai sub canal	SW-5 Dadaraghai main canal	SW-6 Main Left bank canal
1	pH	IS-3025 (P-04)1983, RA.2002	--	6.5-8.5	7.03	6.97	7.45	6.92	7.56	7.26
2	Dissolved oxygen	IS-3025 (P-38) RA.2003	mg/l	4 (min)	7.2	6.1	6.5	6.6	6.9	7.3
3	BOD (3) days at 270C	IS-3025 (P-44)1993, RA.2009	mg/l	30	1.1	1.3	1.0	1.8	2.1	1.5
4	Colour	IS-3025 (P-04)1983, RA.2017	Hazen	300	CL	CL	CL	CL	CL	CL
5	Total Dissolved Solids	IS-3025 (P-16)1984: RA.2006	mg/l	1500	72.7	66.4	83.2	74.8	80.9	82.7
6	Chloride (as Cl)	IS-3025 (P-32): RA.1988	mg/l	600	13.7	12.4	18.5	14.5	16.3	19.3
7	Sulphates (as SO4)	IS-3025 (P-24)1986, RA.2003	mg/l	400	10.6	8.1	9.2	7.4	9.0	8.4
8	Fluoride (as F)	APHA 21st,4500F (D)	mg/l	1.5	0.021	0.016	0.023	0.021	0.022	0.025
9	Oil & Grease	IS-3025 (P-39):1991, RA.2009	mg/l	0.1	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
10	Phenolic Compounds (as C6H5OH)	5530-B, C&E, APHA 23nd 2017	mg/l	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
11	Arsenic (as As)	3110-B, APHA 23nd 2017	mg/l	0.2	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
12	Lead (as Pb)	3110-B, APHA 23nd 2017	mg/l	0.1	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
13	Cadmium (as Cd)	3110-B, APHA 23nd 2017 (AAS)	mg/l	0.01	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
14	Hexa Chromium (as Cr)	IS-3025 (P-52): 200	mg/l	0.05	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
15	Copper (as Cu)	3110-B, APHA 23nd 2017 (AAS)	mg/l	1.5	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
16	Zinc (as Zn)	3110-B, APHA 23nd 2017 (AAS)	mg/l	15	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
17	Anionic Detergents	Annexure K Of IS 13428	mg/l	1.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
18	Iron (as Fe)	3500-Fe-B, APHA 23nd Ed.2017	mg/l	0.5	0.15	0.13	0.09	0.10	0.16	0.09
19	Cyanide (as CN)	4500-CN-B, C & F, APHA 23nd Ed.2017	mg/l	0.05	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
20	Odour	IS-3025 (P-05)	mg/l	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
21	Sodium (as Na)	APHA 22nd Edition	mg/l	--	7.2	6.5	10.2	9.2	10.2	11.4
22	Potassium (as K)	APHA 22nd Edition	mg/l	--	0.2	0.7	0.5	0.7	0.8	0.7
23	Selenium (as Se)	APHA 22nd Edition.3114	mg/l	0.05	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
24	Turbidity	IS-3025 (P-10)	NTU	--	5.1	6.4	7.2	6.8	7.1	4.8
25	Alkalinity (as CaCO3)	IS-3025 (P-23)	mg/l	200	29.3	21.8	25.3	20.4	25.8	23.5
26	E-coli	IS-15185-2016		--	Absent/100ml	Absent/100ml	Absent/100ml	Absent/100ml	Absent/100ml	Absent/100ml
27	Coliform Bacteria	IS-15185-2017		--	Absent/100ml	Absent/100ml	Absent/100ml	Absent/100ml	Absent/100ml	Absent/100ml

From above **Table 3.11** Surface water analysis data it interpreted that mostly all parameters are within the permissible limit and the water is suitable for agricultural use.

3.13.2 Justification of Ground Water Location

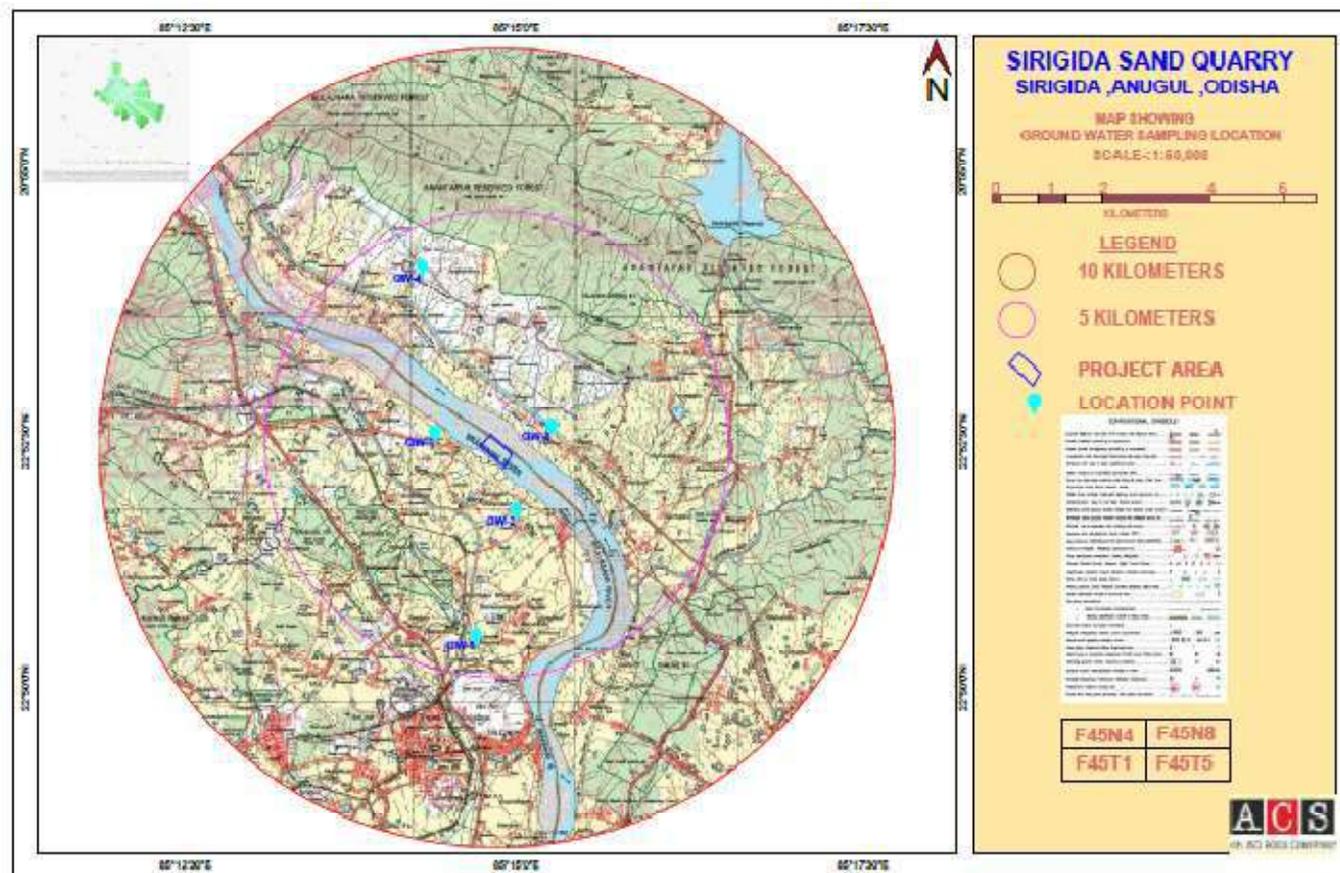
For Baseline study of ground water, resources are selected from different nearby open well and bore well within 5km radius from the project site to know the ground water quality. The locations of the bore wells were chosen from as near as 0.24 Km to as far as 2.52 km from the project site. Due to presence of open wells only 2 identifiable operating public bore wells were chosen for the sampling. Detail of the Ground Water Location is given in **Table 3.12 & Figure 3.21**. Analysis data of Ground water is given in **Table 3.13**.

Table 3.12 Detail of Ground Water Location

Monitor	Description	Direction from site
GW-1	Khairapal village	20°13'33.12"N 85°10'35.56"E
GW-2	Dwaripur	21° 0'5.50"N 85°13'34.60"E
GW-3	Basulie village Near Ram temple	21° 0'57.42"N 85°14'33.18"E
GW-4	Kadapada village	21° 2'0.06"N 85°13'42.80"E
GW-5	Kishoripal village	20°58'33.18"N 85°13'50.28"E

Environment Clearance of Sirigida Sand Quarry (Lease Area 7.28 Ha) village Sirigida under Talcher Tahasil of Angul District, Odisha

Figure 3.21 Ground Water Locations



Environment Clearance of Sirigida Sand Quarry (Lease Area 7.28 Ha) village Sirigida under Talcher Tahasil of Angul District, Odisha

Table 3.13 Ground Water Analysis Data

Sl.No.	Parameter	Unit	Testing Methods	Requirement (Acceptable Limit)	Permissible Limit in absence of alternate Source	Analysis Results				
						GW-1 Khairapal village	GW-2 Dwaripur	GW-3 Basulie village Near Ram temple	GW-4 Kadapada village	GW-5 Kishoripal village
Essential Characteristics										
1	Colour	Hazen	IS-3025 (P-04)	5	15	CL	CL	CL	CL	CL
2	Taste	--	IS-3025 (P-07)	Agreeable	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Turbidity	NTU	IS-3025 (P-10)	5	5	3.8	4.2	4.8	3.2	4.0
4	pH	--	IS-3025 (P-11)	6.5-8.5	--	7.11	6.82	7.36	7.70	7.08
5	Total Hardness (as CaCO ₃)	mg/l	IS-3025 (P-21)	300	600	64	104	78	116	92
6	Iron (as Fe)	mg/l	IS-3025 (P-53)	0.3	No Relaxation	0.07	0.04	0.08	0.11	0.06
7	Chloride (as Cl)	mg/l	IS-3025 (P-32)	250	1000	1.8	2.1	1.4	2.2	1.5
Desirable Characteristics										
8	Aluminium (as Al)	mg/l	IS-3025 (P-55)	0.03	0.2	<0.02	<0.02	<0.02	<0.02	<0.02
9	Total Ammonia	mg/l	IS-3025 (P-34)	0.5	No Relaxation	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
10	Anionic Detergents as MBAS	mg/l	Annex K of IS-13428	0.2	1.0	Absent	Absent	Absent	Absent	Absent
11	Total Dissolved Solids	mg/l	IS-3025 (P-16)	500	2000	96	122	108	110	92
12	Calcium (as Ca)	mg/l	IS-3025 (P-40)	75	200	14.2	20.4	12.9	21.2	9.9
13	Magnesium (as Mg)	mg/l	IS-3025 (P-46)	30	100	4.6	6.2	7.0	6.6	4.8
14	Copper (as Cu)	mg/l	IS-3025 (P-42)	0.05	1.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
15	Manganese (as Mn)	mg/l	IS-3025 (P-59)	0.1	0.3	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
16	Sulphate (as SO ₄)	mg/l	IS-3025 (P-24)	200	400	2.2	1.4	2.3	2.2	1.7
17	Nitrate as NO ₃	mg/l	IS-3025 (P-34)	45	No Relaxation	1.45	2.08	1.67	2.26	2.40
18	Fluoride as F	mg/l	IS-3025 (P-60)	1	1.5	0.11	0.15	0.12	0.05	0.09

Environment Clearance of Sirigida Sand Quarry (Lease Area 7.28 Ha) village Sirigida under Talcher Tahasil of Angul District, Odisha

19	Phenolic Compounds (as C6H5OH)	mg/l	IS-3025 (P-43)	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
20	Mineral Oil	mg/l	IS-3025 (P-39)	0.01	No Relaxation	ND	ND	ND	ND	ND
21	Zinc (as Zn)	mg/l	IS-3025 (P-49)	5	15	0.022	0.010	0.020	0.014	0.018
22	Alkalinity	mg/l	IS-3025 (P-23)	200	600	18.2	20.7	24.5	16.9	15.9
23	Boron (as B)	mg/l	IS-3025 (P-57)	0.5	1.0	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Toxic Substances										
24	Cadmium (as Cd)	mg/l	IS-3025 (P-41)	0.01	No Relaxation	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
25	Cyanide (as CN)	mg/l	IS-3025 (P-27)	0.05	No Relaxation	<0.002	<0.002	<0.002	<0.002	<0.002
26	Lead (as Pb)	mg/l	IS-3025 (P-47)	0.05	No Relaxation	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
27	Mercury (as Hg)	mg/l	IS-3025 (P-48)	0.001	No Relaxation	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
28	Chromium as (Cr+6)	mg/l	IS-3025 (P-52)	\$	No Relaxation	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
29	Residual Free Chlorine	mg/l	IS-3025 (P-26)	0.2	1	ND	ND	ND	ND	ND
30	Selenium (as Se)	mg/l	IS-3025 (P-56)	0.002	No Relaxation	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
31	Arsenic (as As)	mg/l	IS-3025 (P-37)	0.01	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
32	Poly Aromatic Hydrocarbon as PAH	μ g/l	AHPA6640	0.0001	No Relaxation	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
33	Pesticides	μ g/l	--	--	No Relaxation	Absent	Absent	Absent	Absent	Absent
34	Sodium as Na	mg/l	AHPA3500 Na B	--	No Relaxation	2.0	2.0	2.0	2.0	2.0
35	Potassium as K	mg/l	AHPA3500 K B	--	No Relaxation	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
C. BACTERIOLOGICAL										
36	Total Coliform at 370C	MPN/100ml	IS-3025 (P-34)	Absent	Absent	Absent	Absent	Absent	Absent	Absent

From above **Table 3.13** Ground Water Analysis Data it interpreted typically that pH is neutral within 7 and all parameter within the permissible limit as per IS 10500. The water is portable at each location.

3.14 SOCIO ECONOMIC OF THE AREA

M/s Sirigida Sand mine located at Village- Sirigida, Tahasil- Talcher of Angul District, Odisha, are covers 10t village are –Sirigida, Banmalipur, Gengutia, Belapada, Dumuduma, Jandabahal, Ramchandrapur, Hariharpur, Raghunathpur, Gurujang and Bherubania. Considering the location of the mine and its surrounding environment, nearby villages were surveyed for their socio-economic status. Apparently, the villages are distantly speculated and having spreader households within the village boundary. Hence considering the maximum influence due to mining activity Pollution 10 villages within 7 km radius spread over in four quadrants of the buffer zone is been considered for the assessment. The socio-economic data through sample survey of 10 households from each of 10 villages are surveyed.

The Schedule Caste (SC) population are 851(15.25%) out of which male population are 438 and female population are 413, Schedule Tribe population (ST) are 1062 (19.04%) out of which male population are 545 and female population are 517 and OBC/ GC population are 3666 (65.71%) out of which male are 1898 and female are 1768. The total literate population is 3696 (66.25%) out of which male literate are 2153 and female literate are 1543 and Illiterate population of the area is 1883 (33.75%) out of which male is 728 and female is 1155 in all ten villages. The Odisha state literacy rate is 73% as per 2011 census.

The general pattern and social fabric of these villages are as given below:

The villagers for their livelihood depend upon on agriculture and its allied activities and mining activates near by the plant.

For cultivation majority people depended on rainfall.

For drinking water purpose people depend upon tap supply, well & hand pump, which is not fulfill the requirement of the people.

The Government medical facilities available in the area and private medical available in the villages. ANM regularly visits the villages for regular vaccination and health checkup & Regular health camps organized by the Govt in the project area.

The public transport (Bus) system facilities available all the area, private facilities like auto rickshaw and two wheelers.

Electricity & street light facilities available all the villages but frequent power cut / load shedding problem is experienced by the people, electricity is available for mostly 8-12 hours a day. For cooking purpose people use wood, kerosene and LPG gas.

3.15 ECOLOGY BIODIVERSITY

Study of Flora And Fauna In Study Area and impacts of projects

Biological environment Ecology is the study of the relation and interactions between organisms and their environment. It comprises the floral and faunal communities of an area. With changes in environmental conditions, structure, density and composition of plants, animals also undergo changes. For the proposed study, the study area has been identified as 10km around the project site.

For sustainable and eco-friendly mining project development, biological environment is studied. As per EIA 2006 norms study are classified in 2 parts.

One is core zone where mining proposed and another part is buffer zone that's 10 km radius of mine lease area.

The present study was undertaken with the following objectives:

To assess the nature and distribution of vegetation in and around the project site;

To assess the distribution of animal life spectra;

To understand the productivity of the water bodies;

To assess the biodiversity and to understand the resource potential; and

To ascertain migratory routes of fauna and possibility of breeding grounds.

Methodology for Baseline Data Generation

To achieve the above objectives a detailed study of the area was undertaken in 10km radius around proposed mine area.

The different methods adopted were as follows:

Generation of primary data by undertaking systematic ecological studies in the area;

Discussion with local people so as to elicit information about local plants, animals and birds.

The primary data was generated through:-

Preparing a general checklist of all plants encountered in the study area. This would indicate the diversity for plants.

Determining the bird population of migratory and local birds by taking 10 random readings at every Location;

Observing mammals, amphibians and reptiles, noting their calls, droppings, burrows, pugmarks and other signs.

Core zone: The study area of core zone consist river bed with rocks. There is no vegetation present except some grasses.

Fauna Composition in the Buffer Zone For the documentation of the faunal biodiversity of the study area with respect to birds, reptiles, amphibians and butterfly species, a baseline survey had been conducted & the details of flora composition is given in the table below

Table 3.14 List of Fauna

Sl. No	Common Name	Scientific Name
1.	Common Mongoose	Herpestres edwardsii
2.	Jackal	Canis aureus
3.	Common house rat	Rattus rattus
4.	Indian hare	Lepus nigricollis
5.	Indian Field Mouse	Mus booduga
6.	Monkey	Macaca mulata
7.	Squirrel	Funambulus pennant
8.	Hare	Lepus nigricolis
9.	Monitor Lizard	Varanus spp.
10.	Common krait	Bangarus caeruleus
11.	Common Indian House Gecko	Homodactylus flevirudis
12.	Yellow Rat Snake	Ptyas mucosus
13.	Garden Lizard	Calotes versicolor
14.	Common of Brahminy Skink	Mabuya carinata
15.	Pariah Kite	Milvus migrans
16.	Common Crow	Corvus splendens
17.	Jungle Crow	C. marorrhynchos
18.	House Sparrow	Passer domesticus
19.	Cattle Egret	Bubulcus ibis
20.	Drongo	Dicrurus adsimilis
21.	Doves	Streptopelia spp

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22	Common Kingfisher	Alcedo atthis
23.	Common Babbler	Turboides caudatus
24.	Crow-Pheasant	Psittacula krameri
25.	Koel	Eudynamys scolopacea
26	Tailor Bird	Orthotomus sutorius
27	House Sparrow	Passer domesticus
28.	Common Indian Toad	Bufo melanosticus
29.	Paddy-field Frog	Rana limnocharis

Table 3.15 List of Flora

Sl. No	Name of the Plant	Family	Local Name
TREE SPECIES			
1.	Acacia leucophloea (Roxb.) Willd.	Mimosaceae	Gahira
2.	Acacia nilotica (L.) Delile	Mimosaceae	Babool
3.	Acacia sps	Mimosaceae	Acasia
4.	Aegle marmelos (L.) Correa	Rutaceae	Bela
5.	Ailanthus varieg Roxb.	Simaroubaceae	Mahaneem
6.	Alangium salvifolium (L.f.) Wang	Alangiaceae	Ankula
7.	Albizia procera (Roxb.) Benth.	Mimosaceae	Sirisa
8.	Alstonia scholaris (L.) R.Br.	Apocynaceae	Chatiana
9.	Anacardium occidentale	Anacardiaceae	Kaju
10.	Annona squamosa L.	Annonaceae	Ata
11.	Anogeissus latifolia (Roxb. Ex DC.) Wall. Ex Guill.	Combretaceae	Dhau
12.	Anthocephalus kadamba	Rubiaceae	Kadamba
13.	Antidesma acidum Retz.	Euphorbiaceae	Naharakoli
14.	Artocarpus heterophylla Lam.	Moraceae	Panas
15.	Azadirachta indica A. Juss.	Meliaceae	Nima
16.	Bambusa sps	Poaceae	Baunsa
17.	Bauhinia racemosa Lam.	Caesalpiniaceae	Kanchana
18.	Bauhinia variegata L.	Caesalpiniaceae	Siali
19.	Bombax ceiba L.	Bombacaceae	Simili
20.	Borassus flabellifer L.	Arecaceae	Tala
21.	Bridelia retusa (L.) Spreng.	Euphorbiaceae	Kasi
22.	Buchanania lanzan Spreng.	Anacardiaceae	Chara
23.	Butea monosperma (Lam.) Taub.	Fabaceae	Palasa
24.	Cassia fistula L.	Caesalpiniaceae	Sunari

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25.	Cleistanthus collinus (Roxb.) Benth. Ex Hook.	Euphorbiaceae	Karada
26.	Dalbergia lanceolaria L.f.	Fabaceae	Sisoo
27.	Dalbergia latifolia Roxb.	Fabaceae	Sisoo
28.	Dillenia pentagyna Roxb.	Dilleniaceae	Ou
29.	Diospyros malabarica (Desr.) Kostel.	Ebenaceae	Kendu
30.	Diospyros melanoxylon Roxb.	Ebenaceae	Mankada kendu
31.	Erythrina variegata	Fabaceae	Paladhua
32.	Eucalyptus citridora	Myrtaceae	Eucalyptus
33.	Ficus benghalensis L.	Moraceae	Bara
34.	Ficus hispida L.f.	Moraceae	Dimiri
35.	Ficus religiosa L.	Moraceae	Osta
36.	Gardenia gummifera L.f.	Rubiaceae	Ghurudu
37.	Garuga pinnata Roxb.	Burseraceae	Kukurdanti
38.	Gmelina arborea Roxb.	Verbenaceae	Gambhari
39.	Haldina cordifolia (Roxb.) Ridsdale	Rubiaceae	Kuruma
40.	Holarrhena pubescens (Buch.-Ham.) Wall. Ex	Apocynaceae	Kutaja
41.	Lagerstroemia parviflora Roxb.	Lythraceae	Sidha
42.	Limonia acidissima L.	Rutaceae	Kaitha
43.	Madhuca longifolia (Koen.)Macbr.var.	Sapotaceae	Mahua
44.	Mallotus philippensis (L.) Muell.-Arg.	Euphorbiaceae	Kukuma
45.	Mangifera indica L.	Anacardiaceae	Amba
46.	Melia azedarach L.	Meliaceae	Mahanimba
47.	Michelia champaca L	Magnoliaceae	Champa
48.	Mimusops elengii L.	Sapotaceae	Baula
49.	Nyctanthes arbor-tristis L.	Nyctanthaceae	Gangasiuli
50.	Oroxylum indicum (L.) Vent.	Bignoniaceae	Phanaphana
51.	Phyllanthus emblica L.	Euphorbiaceae	Amla
52.	Pongamia pinnata (L.) Pierre	Fabaceae	Karanja
53.	Psidium guajava	Myrtaceae	Pijuli
54.	Schleichera oleosa (Lour.) Oken	Sapindaceae	Kusuma
55.	Semecarpus anacardium L.f.	Anacardiaceae	Bhalia
56.	Shorea robusta Gaertn.f.	Dipterocarpaceae	Sal
57.	Sterculia urens Roxb.	Sterculiaceae	Genduli
58.	Syzygium cumini (L.) Skeels	Myrtaceae	Jamun
59.	Tamarindus indica	Fabaceae	Tentuli
60.	Tectona grandis	Verbenaceae	Saguan
61.	Terminalia alata Heyne ex Roth	Combretaceae	Asana
62.	Terminalia arjuna (Roxb. ex DC.) Wight &	Combretaceae	Arjuna
63.	Terminalia bellirica (Gaertn.) Roxb.	Combretaceae	Bahada
64.	Terminalia catappa L.	Combretaceae	Desi badam
65.	Terminalia chebula Retz.	Combretaceae	Harida
66.	Ziziphus jujuba (Retz.) Willd.	Rhamnaceae	Barakoli

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CLIMBERS

Sl. No	Name of the Plant	Family	Local Name
1.	Abrus precatorius	Faceae	Kaincha
2.	Acacia sinuata (Lour.) Merr.	Mimosaceae	
3.	Aristolochia indica	Aristolochiaceae	Panairi
4.	Clitoria ternatea L.	Fabaceae	Aparajita
5.	Dalbergia volubilis Roxb.	Fabaceae	
6.	Asparagus racemosus Willd.	Liliaceae	Satabari
7.	Atylosia scrabaeoides (L.) Benth.	Fabaceae	Banakolatha
8.	Caesalpinia bonduc (L.) Roxb.	Caesalpinaceae	Gila
9.	Celastrus paniculata Willd.	Celastraceae	Pingu
10.	Cissampelos pareira L.	Menispermaceae	Akanabindhi
11.	Cissus quadrangularis L.	Vitiaceae	Hadajoda
12.	Cuscuta reflexa Roxb.	Convolvulaceae	Nirmuli
13.	Cryptolepis buchananii Roem. & Schultes	Periplocaceae	Gopakanhu
14.	Dioscorea bulbifera L.	Dioscoreaceae	Pita alu
15.	Dioscorea pentaphylla L.	Dioscoreaceae	Pita alu
16.	Dioscorea wallichii Hook.f.	Dioscoreaceae	Pita alu
17.	Hemidesmus indicus (L.) R.Br.	Periplocaceae	Anantamool
18.	Jasminum arborescens Roxb.	Oleaceae	Banamalli
19.	Luffa acutangula (L.) Roxb var. amara	Cucurbitaceae	Pitatarada
20.	Mucuna puriens	Fabaceae	Baidonka
21.	Pergularia daemia (Forssk.) Chiov.	Asclepiadaceae	Uturuli
22.	Scindapsus officinalis (Roxb.) Schott	Araceae	Gajapippali
23.	Smilax zeylanica L.	Smilacaceae	Muturi
24.	Tinospora cordifolia (Willd.) Miers ex Hook.f.	Menispermaceae	Guluchi
25.	Tragia involucrate L.	Euphorbiaceae	Bichhuati
26.	Tylophora indica (Burm.f.) Merr.	Asclepiadaceae	Anantamool
27.	Ziziphus oenoplia (L.) Mill.	Rhamnaceae	Kanteikoli

SHRUBS

Sl. No	Name of the Plant	Family	Local Name
1.	Agave Americana	Agavaceae	Murga
2.	Calotropis gigantea (L.) R.Br.	Asclepiadaceae	Arakha
3.	Clerodendrum viscosum Vent	Verbenaceae	Nagari
4.	Clerodendrum serratum (L.) Moon	Verbenaceae	Samarkana
5.	Clistanthus collinus	Euphorbiaceae	Karada
6.	Datura metel L.	Solanaceae	Dudura
7.	Dendrocalamus strictus (Roxb.) Nees	Poaceae	Kani Baunsa
8.	Desmodium gangeticum (L.) DC.	Fabaceae	Salapni

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9.	Desmodium pulchellum (L.) Benth.	Fabaceae	Masaparni
10.	Euphorbia neriifolia auct. non L.	Euphorbiaceae	Trikon siju
11.	Flemingia chappar Buch.-Ham.ex. Benth.	Fabaceae	Ranikathi
12.	Helicteres isora L.	Sterculiaceae	Modimodica
13.	Hibiscus rosa-sinensis	Malvaceae	Mandara
14.	Ipomoea carnea Jacq.	Convolvulaceae	Ammari
15.	Jatropha gossypifolia L.	Euphorbiaceae	Nalibaigaba
16.	Justicia adhatoda	Acanthaceae	Basanga
17.	Lantana camara L. Var. Aculeata (L.) Mold.	Verbenaceae	Nagairi
18.	Lawsonia inermis L.	Lythraceae	Manjuati
19.	Nerium oleander	Apocyanaceae	Kaniar
20.	Opuntia stricta (Haw.) Haw. var. dillenii		
21.	Pavetta tomentosa Roxb. Ex. Sm.	Rubiaceae	Kukurdanti
22.	Phoenix acaulis Roxb. Ex Buch.-Ham.	Arecaceae	Khajuri
23.	Phyllanthus reticulatus Poir	Euphorbiaceae	Jajanga
24.	Ricinus communis	Euphorbiaceae	Gaba
25.	Vitex nigundo	Verbenaceae	Begunia
26.	Woodfordia fruticosa (L.) Kurz	Lythraceae	Dhataki

HERB

Sl. No	Name of the Plant	Family	Local Name
1.	Abelmoschus manihot (L.) Medic.	Malvaceae	Banabhendi
2.	Acalypha indica L.	Euphorbiaceae	Indramaris
3.	Alternanthera sessilis (L.) R.Br.	Amaranthaceae	Madarnga saga
4.	Achyranthes aspera L.	Amaranthaceae	Apamaranga
5.	Aerva lanata (L.) Juss. Ex Schultes	Amaranthaceae	Torania
6.	Ageratum conyzoides L.	Asteraceae	Pokasungha
7.	Amaranthus viridis L.	Amaranthaceae	
8.	Amaratnus spinosus	Amaranthaceae	Kanta leutia
9.	Andrographis paniculata (Burm.f.) Wall. Ex Nees	Acanthaceae	Bhuin neem
10.	Argemone 54mexicana L.	Papavaraceae	Agara
11.	Barleria cristata L.	Acanthaceae	Daskerenda
12.	Boerhavia diffusa L.	Nyctaginaceae	Puruni
13.	Cassia occidentalis L.	Caesalpiniaceae	Jadumari
14.	Centella asiatica (L.) Urban	Apiaceae	Thalakudi
15.	Chrysopogon aciculatus (Retz.) Trin.	Poaceae	Guguchia
16.	Cleome viscosa L.	Capparaceae	Bana sorish
17.	Colocasia esculenta (L.) Schott	Araceae	Banasaru
18.	Commelina benghalensis L.	Commelinaceae	Kanasiri
19.	Costus speciosus (Koenig) Sm.	Zingiberaceae	Keu

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20.	<i>Crotalaria albida</i> Heyne ex Roth	Fabaceae	
21.	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Talamuli
22.	<i>Curcuma pseudomontana</i> Graham	Zingiberaceae	Banahaladi
23.	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Duba
24.	<i>Cyperus rotundus</i> L.	Cyperaceae	Mutha
25.	<i>Eclipta prostrata</i> (L.) L.	Asteraceae	Bhrungaraja
26.	<i>Elephantopus scaber</i> L.	Asteraceae	Mayurchulia
27.	<i>Eleusine indica</i> (L.) Gaertn.	Poaceae	Ghasa
28.	<i>Eragrostis ciliaris</i> (L.) R.Br.	Poaceae	Ghasa
29.	<i>Evolvulus alsinoides</i> (L.) L.	Convolvulaceae	Jyotismati
30.	<i>Evolvulus nummularius</i> (L.) L.	Convolvulaceae	Bichamalia
31.	<i>Glinus oppositifolius</i> (L.) A. DC.	Molluginaceae	Pitasaga
32.	<i>Hygrophilla auriculata</i>	Acanthaceae	Koilekha
33.	<i>Justicia glauca</i> Rottl.	Acanthaceae	
34.	<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	Gayasa
35.	<i>Mimosa pudica</i>	Mimoceae	Lajakuli
36.	<i>Ocimum americanum</i> L.	Lamiaceae	Banatulasi
37.	<i>Ocimum canum</i> Sims	Lamiaceae	Sree tulasi
38.	<i>Oldenlandia corymbosa</i> L.	Rubiaceae	Gharapudia
39.	<i>Orthosiphon rubicundus</i> (D.Don) Benth.	Lamiaceae	
40.	<i>Oxalis corniculata</i> L.	Oxalidaceae	Ambiliti
41.	<i>Phyllanthus amarus</i> Schum. & Thonn.	Euphorbiaceae	Badi anala
42.	<i>Phyllanthus urinaria</i> L.	Euphorbiaceae	Badi anala
43.	<i>Phyllanthus virgatus</i> Forst. F.	Euphorbiaceae	Badi anala
44.	<i>Rauvolfia tetraphylla</i>	Apocyanaceae	Patalagaruda
45.	<i>Rungia pectinata</i> (L.) Nees	Acanthaceae	Sankhasaga
46.	<i>Scoparia dulcis</i> L.	Scrophulariaceae	Badijustimadh
47.	<i>Sida acuta</i> Burm.f.	Malvaceae	Bajramuli
48.	<i>Sida cordata</i> (Burm.f.) Borssum	Malvaceae	Brhmanajhatia
49.	<i>Solanum virginianum</i> L.	Solanaceae	Ankaranti
50.	<i>Sphaerathus indicus</i>	Rubiaceae	Bhuin
51.	<i>Tridax procumbens</i> L.	Asteraceae	Bisayakarani
52.	<i>Uraria lagopodioides</i> (L.) Desv. ex. DC.	Fabaceae	Krushanaprani
53.	<i>Vanda tessellata</i> (Roxb.) Hook. ex G.Don	Orchidaceae	Rasna

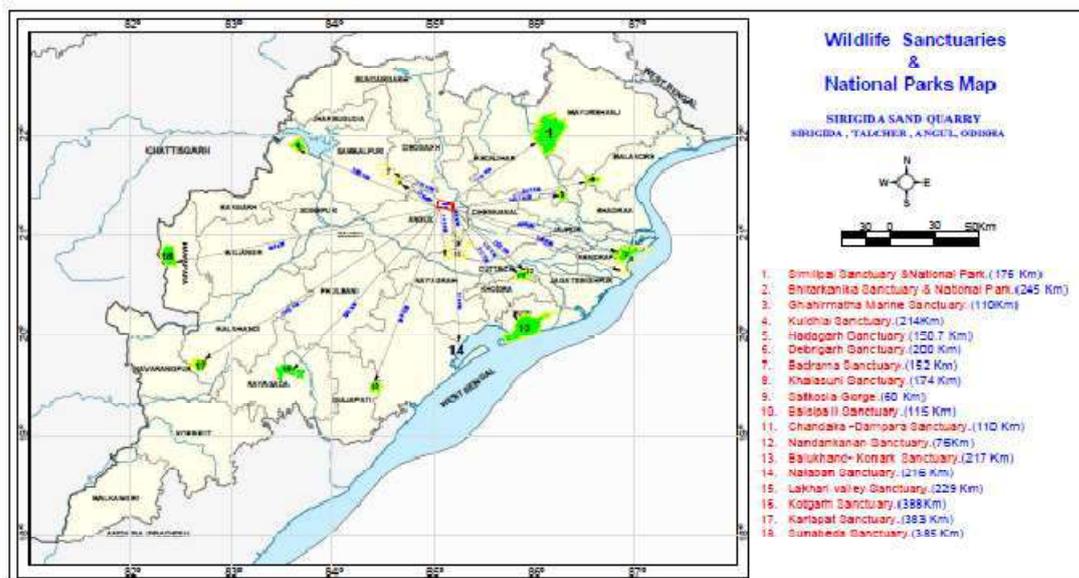
Aquatic Fish Fauna

Among all the aquatic life in the study area the fish fauna occupies an important place. The fish fauna of the study area are given in table below

Table 3.16 List of Aquatic Fish Fauna

Sl. No	Local Name	Scientific Name
1.	Changa	Notoperus chital
2.	Dhandikiri	Esomus dondrica
3.	Jalanga	Pargasius pargasius
4.	Kerondi	Barbus ambassius
5.	Mirikali	Cirrhina mrigala
6.	Mohurali	Amblyupharngodon mola
7.	Pohala	Cirrhina reba
8.	Rohi	Labeo rohita
9.	Seula	Ophiocephalus striatus
10.	Singi	Heterophnaustes fossilis
11.	Todi	Mastacombelus armetus
12.	Apple snail	Pila globusa
13.	Leech	Hirudinaria sps
14.	Crab	Cancer sps
15.	Prawn	Paleomon sps
16.	Water bug	Belostoma sps
17.	Back swimmer	Notonecta sps

Figure 3.22 Wildlife Map of the Project Area



3.16 Traffic study

As per the Specific Tor No 17. stipulated in the Tors Vide No 3505/SEIAA dated 25.11.2021 issued by SEIAA, Odisha a comprehensive field study including traffic survey at 3 different locations, discussions with the Sirigida Sand Quarry Official and it management w.r.t nearby school, NH, Bust stop, Nearby town was carried out. The details are given in final EIA report.

CHAPTER -4

ANTICIPATED ENVIRONMENT IMPACTS AND MITIGATION MEASURES

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

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

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

In order to maintain the environmental commensuration with the mining operation, it is essential to undertake studies on the existing environmental scenario and assess the impact on different environmental components. This would help in formulating suitable management plans sustainable resource extraction.

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

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

- Land Environment
- Water Environment
- Air Environment
- Noise Environment
- Solid waste

Biological

Socio-Economic

4.1 LAND ENVIRONMENT

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

The extraction of sand minerals (minor) is proposed from the Mahanadi River Bed, village at Sirigida, Tahasil- Talcher, Dist-Angul, Odisha. Mining activity will be open cast. The proposed volume of scrapping of sand is 53500 cum up to the depth of 2m. the maximum depth of mining will not be more than 250 m. The mining method will be bar scalping/scrapping using bar scrapper for sand scrapping from the lease area and collecting in designated area. In such activities cases, mining below the existing land may leads to several impacts such as erosion of channel bed and banks of river, increment in channel slope, change in channel morphology due to mining of river bed. Mining outside of river May leads the soil erosion due to unsafe soil stacking nearby for backfilling purpose, Water logging due to the pits or unfilled area after soil backfilling.

4.1.1 Anticipated Impacts

Land Use /Land Cover

The land is totally sandy. This land is good for mining. There is no forest land or agriculture in the mine lease area. Land use pattern for pre-operational, operational & conceptual stage of the mining as per mine plan for the proposed mine site is given below in Table 4-1: Present land Use Pattern.

Table 4-1: Present land Use Pattern

Khata No.	Plot No.	Kisam	Area (acre)
142	1791	Nadi	18.00
TOTAL			18.00 acres or 7.28 ha

As per the mine plan the river bed area will be replenished by sediments during rainy season. This practice will continuous and simultaneous.

Anticipated Impacts

Excessive and unscientific river bed material mining may impact to nearby structures.

River bank cutting and erosion of river bed.

Waste water, heavy metal, stack emissions and fugitive emission may leads the oil pollution

Damage of river bank due to access ramps to river bed, causing damage to vegetation, soil erosion, micro disturbance to ground water, possible inducement of charged river course.

Loss of riparian vegetation standing along the bank due to making roads connecting successive access to river bed.

Contamination of sand aquifer water due to ponding: Due to uneven rocky bed of river, sand bed thickness vary considerably and digging more sand from a pocket where thickness of sand is more may cause ponding. In this stagnant water, biodegradable materials especially flora waste gets accumulated causing contamination and inducing an unhealthy environment.

Surface degradatation due to stockpiling and road network.

Mitigation Measures

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

Present land use pattern of the lease area is riverbed and at the conceptual stage the land use pattern will remain the same, hence will not be changed.

Mining activity will be carried out in dry bed only.

There will be no mining near the banks. This is to protect the bank erosion and river migration.

There will be no mining activity when there is a flow of water.

Mining on the concave side of bank shall be avoided to prevent the bank erosion.

There is no generation of waste material in case of River Bed mining. No back filling is proposed as river Bed will be replenished by sediments during rainy season.

Minimum number of access roads to river bed for which cutting of river banks will be avoided and ramps are to be maintained.

Access points to the river bed will be decided based on least steepness of river bank and least human activity.

Mining is avoided during the monsoon season and at the time of floods.

Mining schedule is synchronized with the river flow direction and the gradient of the land. Haulage roads parallel to the river bank and roads connecting access to river bed will be made away from the bank.

Care will be taken to ensure that ponds are not formed in the river bed.

Access roads from public roads and up to river bank will be aligned in such a way that it would cause least environmental damage.

Vegetation development is proposed along the road sides of the approach roads, to arrest soil erosion. While selecting the plant species, preference will be given for planting native species of the area.

4.2 WATER ENVIRONMENT

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

4.2.1 Anticipated Impacts

Because of the manual method in the mining activity, the impact of mining operations on water quality is also expected to be insignificant. There would be no impact on the quality/quantity of ground water as existing ground water level in study area is deep. Surface water does also not diverted or disturbed. Therefore, there would not be any impact on surface water and ground water quality. There is only one river (Brahamani river) existing in the core and adjoining to the lease area zone. The lease area is almost flat where only direct precipitation flows down the slope during rains. During rains the rainwater flow on natural slope of the surface, which flows during rains only in north direction.

Since the mining process is totally dry, no effluent will be generated hence, no adverse impact on water is anticipated. Mining activity in river bed of River Mahanadi will be open and semi mechanized. The proposed volume of scrapping of sand is 53500 cum up to the depth of 2m. the maximum depth of mining will not be more than 250 m and during the entire lease period, the deposit will be worked from the top surface up to 1.1 m bgl or above ground water table, whichever comes first neither water table (aquifer) will be intersected by the mining activities. Hence there will not be any adverse impact either on the quality or quantity of ground water.

Domestic Effluent

There is no domestic effluent is generated at the mine site no settlement in the mining area. Hence the question of contamination of ground water does not arise. Any adverse impact on the ground water regime is not expected from the domestic effluent.

Surface Run-Of

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

Mitigation Measures

Ground water table will not be intersected during the mining activity. During the entire lease period, the deposit will be worked from the top surface up to 1.1 m bgl or above ground water table, whichever comes first.

4.3 IMPACTS ON AIR ENVIRONMENT

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

4.3.1 Anticipated impacts

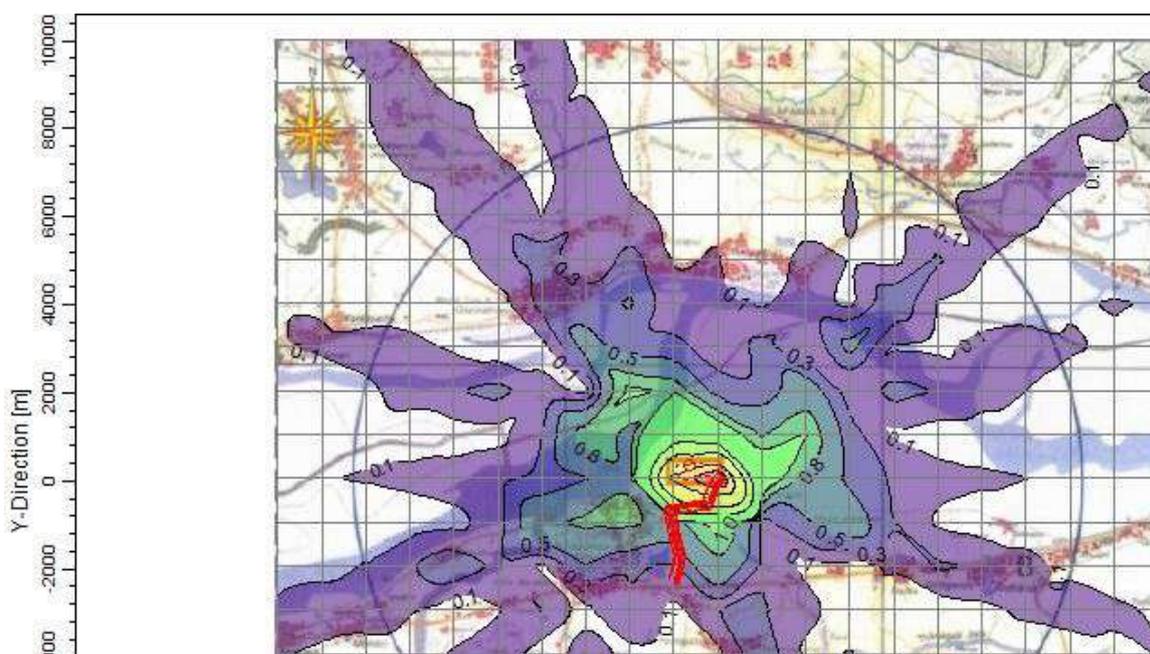
The major sources of air pollution in the proposed mine is dust generation due to extraction, loading and haulage of mineral (sand) and wind erosion of exposed material. In this present study, United States Environmental Protection Agency (USEPA-42 series) approved mathematical equations have been used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

The operations considered for determining source strength for dispersion modeling are as follows:

Excavation,
Loading, and
Haulage.

Air dispersion modeling has been carried out using SCREEN view model version 4.0.1 (Lakes Environmental Software Company). Since the project activity is limited to manual to semi-mechanized mining, the emission will be limited to PM10 and NOx only due to excavation and vehicular movement respectively. The modeling Isopleth of particulate matter is given below:

Figure 4.1 Isopleth of Particulate Mater



Due to the traffic movement within the study area the increase in Particulate concentration is high and Isopleths of PM is shown in Figure No 4.1. However, as per our site visit and secondary data collection there is no other point source of other pollutant such as SOx & NOx so other Isopleth is not given.

Mitigation Measures

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

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

Green Belt: - Planting of trees all along main mine haul road and regular grading of haul roads will be practiced to prevent the generation of dust due to movement of dumpers/tractors. Avenue plantation in nearby free Govt. lands will be done

with proper permission from the concerned authorities. Plantation of suitable local species will be done in outside of the lease area is river bed.

Other Mitigation Measures

Water sprinkling will be done on the roads regularly.

Care will be taken to prevent spillage by covering the carrying vehicles with tarpaulin and sprinkling of water, if dry.

Fortnightly scraping of road in order to keep the roads almost leveled. This will ensure smooth flow of vehicles and also prevent spillage.

Proper tuning of vehicles to keep the gas emissions under check.

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

4.4 Impacts on Noise Environment

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

4.4.1 Anticipated Impact

The source of noise pollution will be the vehicular movements.

Noise will be generated by the digging of mine area using shovels, crowbars etc.

Mitigation Measures

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

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

No such machinery is used for mining which will create noise to have ill effects.

Awareness will be imparted to the workers about the permissible noise levels & maximum exposure to those levels.

4.5 Impacts on Biological Environment

The project site and its buffer zone are devoid of any wild life sanctuary. So the wild life found within the project site and its buffer zone is very less. However few wild animals like fox, wild cat, mongoose, snakes and few bird species were

occasionally found in the lease area. The most possible impacts on wildlife are being illustrated below:

Accident of animal with vehicle carrying sand.

Dust pollution due to movement of vehicles,

Noise pollution due to movement of vehicles

Impact on aquatic habitat of Brahamani river

Mitigation measures

Speed of vehicle movement shall be controlled and symbol will be provided at the animal movement area

Mining shall be carried out away from the water.

Mining shall be stopped in rainy season

4.6 Impacts on Socio-Economic Environment

The direct & indirect employment generated due to mining operation has a great impact for balancing overall socio-economic condition of the people around the area. The impact of mining activity in the area is positive on the socio-economic environment of the region. This project will improve socio-economic status of the joining areas and will help to meet the energy demand of the nation.

Anticipated Impacts

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

Mitigation Measures

Mining in this lease will give job opportunities to the local people. Thus, mining will create beneficial effect on local people. With the operation of mining lease, various indirect employment opportunities will also be generated. Several persons of the neighboring villages have been benefited with contract works, employment through contractors, running jeeps, tractors and buses on hire, running canteens, different kinds of shops and transport related business avenues. Villagers have been provided with either direct employment or indirect employment such as business, contract works and development work like roads etc. Villagers also get access to the other welfare amenities such as drinking water, foods and provisions, shed.

4.7 Solid Waste

Anticipated Impact

No solid waste will be generated during mining activity. This river bed mining project does not involve any waste generation. Thus, no waste dump sites are needed for the project. However, there will be about 8 workers on site. While cooking on site will not be allowed, some food wastes are expected to be generated which if not disposed appropriately will render the site dirty. During rains, the same shall find their way into the river and pollute the same.

Mitigation Measures

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

4.8 Mine closer

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

4.8.1 Anticipated Impact

Increase in traffic density will lead to air pollution.

Movement of vehicles will cause noise pollution.

Increased traffic may cause accidental incidences.

Mitigation Measures

Vehicles with PUC Certificate will be hired. Regular maintenance of vehicles will be done to ensure smooth running of vehicle.

Un- necessary blowing of horn will be avoided.

To avoid accidents the speed of vehicles will be low near habitation.

CHAPTER-5

ANALYSIS OF ALTERNATIVE (Technology & Site)

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

5.1 Alternative for Mine Lease

During monsoon season, when rivers reach high stage River also bears significant catchment area and it transports river bed material (sand) which gets accumulated at such stretch which widens river width and concave banks. Thus, it is evident that the proposed site shall be mined for the purpose of preventing land cutting during heavy rainfall and floods. Sand (minor mineral) deposits are site specific and in Brahamani river bed, mining of the material will be done by open cast manual method. No new technology is involved. The mining shall be done as per SSMMG Guidelines 2016. The mined out in river bed area will get replenished annually after monsoon. Nuaplli Sand Ghat, lease area is a Govt. land of "Nadi" kisam. This is an existing mine having River Sand deposit and the lease area is non forest govt. waste land. Hence no such alternative sites have been considered, as the mining activity is site specific.

5.2 Alternative for Technology and other Parameters

The mechanized mode of working has been proposed sand mine using diesel operated excavator (backhoes) in combination with diesel operated tipping Tractors. Following type of mining equipments/ machinery will be required at the mine for carrying out the mining operation:

Hydraulic excavators (Back-hoe shovels) of 1.2 m³ bucket capacity.

Tipping Tractors of 8.5 m³ carrying capacity.

Motor grader (145 HP) / pay loader (of 1.5 m³ bucket capacity)

Water tanker/ sprinkler (tanker carrying capacity of 12 kl).

Utility service vehicle – diesel operated, and Light vehicle

5.1 Some alternatives considered during EIA study:

Sl No	Particular	Alternative -A	Alternative -B	Remarks
1	Technology	Open-cast manual & Semi mechanized mining	Open-cast mechanized mining	Open-cast Semi mechanized Mining is Preferred. Benefits No electrical power Requirement Minimal noise will be generated Minimal air pollution will be generated Overburden will not be generated
2	Employment	Local Employment	Outsource Employment	Local Employment is Preferred. Benefits Provides employment to local people along with Financial Benefits No residential building/housing is required
3	Labor Transportation	Public Transport	Private Transport	Local labours will be deployed so they will either reach mine site by bicycle or by foot. Benefits Cost of transportation of men will be negligible
4	Material Transportation	Public Transport	Private Transport	Material will be transported through Tractor/trolley on the contract basis Benefits It will give indirect employment
5	Water Requirement	Tanker Supply	Ground water /Surface water supply	Tanker supply will be Preferred Benefits No change in the surface water or ground water quality
6	Road	Haul Road	Metallic Road	Haulage road will be considered for linking mine site from metallic road for transportation purpose. Minimum distance will be measured along with less number of trees for considering optimum haul road route. Benefits Less distance; less fuel used Minimum or negligible number of trees will be cut in best opted haul road route

CHAPTER-6

ENVIRONMENT MONITORING PROGRAM

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

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

6.1 Environmental Monitoring & Reporting Procedure

Monitoring will conform that commitments are being met with. This will take the form of direct measurement and recording of quantitative information, such as quantity and concentrations of discharges, emissions and wastes, for measurement against corporate or statutory standards, consent limits or targets. The measurement of ambient environmental quality in the vicinity of a site using ecological/ biological, physical and chemical indicators. Monitoring may include socioeconomic interaction, through local liaison activities or even assessment of complaints.

The preventive approach by management may also require monitoring of process inputs, for example, type and method used, resource consumption, equipment and pollution control performance etc. The key aims of monitoring are, first to ensure that results/ conditions are as per prediction during the planning stage and where they are or not, to pinpoint the cause and implement action to remedy the situation. A second objective is to verify the evaluations made during the planning process, in particular with risk and impact assessments and standard & target setting and to measure operational and process efficiency. Monitoring will also be required to meet compliance with statutory and corporate requirements. Finally, monitoring results provide the basis for auditing.

6.1.1 Monitoring Schedule

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

Table 6-1: Environment Monitoring Schedule

SL No	Activity	Schedule
Air Pollution Monitoring		
1	Ambient air monitoring of parameters specified by MoEF&CC (PM10, SO2 & No2).	Once in every season except monsoon
Water Quality Monitoring		
2	Monitoring water quality surface water from the river	Once in every season except monsoon
3	Monitoring of one sample of tube well and open well at mine / nearby location. Parameters are essential parameters as per IS: 10500:1991	Once in every season except monsoon
4	Monitoring of water spray requirements	Log-sheet of water spray will be maintained on daily basis
Noise Quality Monitoring		
5	Noise in the ambient atmosphere in mining lease	Once in every season except monsoon
Greenbelt Maintenance		
6	Monitoring schedule for Greenbelt development as per mining plan	Yearly
Soil Quality Monitoring		
7	Soil at 4 locations	Once in every year

6.2 Environmental monitoring Cell

In order to maintain the environmental quality within the standards, regular monitoring of various environmental components is necessary. The company will have a full-fledged environmental management cell (EMC) which will report directly to Functional Head for environmental monitoring and control. The EMC team will take care of pollution monitoring aspects and implementation of control measures. A group of qualified and efficient engineers with technicians will be deputed for maintenance, up keep and monitoring the pollution control equipment to keep them in working at the best of their efficiencies.

Responsibilities of EMC

The generalized responsibilities of the EMC will be as follows:

- Conducting Environmental monitoring of the surrounding area.
- Carrying out the Environmental Management Plan.

- Organizing meetings of the Environmental Management Committee and reporting to the committee.
- Ensuring that prescribed environmental standards are maintained.
- Ensure that all different types of statutory returns / compliance report to be submitted to relevant regulatory bodies.
- Commissioning of pollution control equipment/ measures.
- Specification and regulation of maintenance schedules for pollution control equipment.
- Developing the green belt.
- Ensuring water use is minimized.

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

Table 6-2: Environmental management Cell

SL No	Designation	Proposed Responsibility
1	Management	Overall in-charge of operation of environment management facilities Ensuring legal compliance by properly undertaking activities as laid down by various regulatory agencies from time to time and interacting with the same
2	General Manager – Environment Management System	Secondary responsibility for environment management and decision making for all environmental issues & ensure environmental monitoring as per appropriate procedures.
3	Assistant Manager – Environment	Implementation of EMP Allotment of daily job Field visit Liaison with MOEF &CC/SPCB

6.3 Activities to be monitored

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

Slope Failure

Mining will be carried out by opencast as per mine plan. Drilling/ blasting are not required as the material is loose in nature. The proposed volume of scrapping of

sand is 53500 cum up to the depth of 1 m, the maximum depth of mining will not be more than 2m. The mining method will be bar scalping/scrapping using bar scrapper for sand scrapping from the lease area and collecting in designated area.

Drainage

The general topography of the area around the mine site is general plan agricultural land along the river Brahamani. The area constitutes almost alluvial plain without any conspicuous topographical features and forms a part of the vast Indo-Gangetic plain. The proposed area is undulating. The difference of the highest 177 mRL & the lowest 172 mRL elevation of the area is about 4 to 5 meter. The flow rate of the river varies with the quantity of precipitation in the catchment area. The lease area surrounded mostly with agricultural lands. There is no major impact of mining on the topography of the area. The mining lease area in river bed will be replenished with sediments after monsoon and the area which in agriculture field will be reclaimed after mining.

Blasting effects

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

Re-vegetation & Green Belt Development

During five years, about 5000 saplings of local varieties of trees will be planted along the roads, in schools and public building and other social forestry programme. Plant species act as bio-monitoring agent to monitor the air environment as well as to keep and maintain the project environ healthy. Trees have substantial inter-specific as well as intra-specific variation in air pollution tolerance. Green Belt development / tree plantation in organized manner will be carried out around the existing mine site by the end of the mining activity. The species suggested are Local tree species in the mine area and nearby villages, to reduce the impact of expansion activities in the surroundings of the existing mine site. The suggested plants are suitable for green belt development have characteristics like, fast growing, thick canopy cover, perennial and evergreen large leaf area, naturally growing, efficient in absorbing pollutants without major effects on natural growth.

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

Azadirachta indica

Ficus religiosa
 Mangifera indica
 Dalbergia sissoo
 Vachellia nilotica
 Delonix regia

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

Table 6-3: Greenbelt Development Program

Year	Saplings to be planted	Species	Place of Plantation
1	1000	Neem, Peepal, Mango, Shisham, Sirish, Babool, Chakunda	Along the roads, in schools and public building and other social forestry programme
2	1000		
3	1000		
4	1000		
5	1000		
Total	250		

6.3.1 Air quality Monitoring

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

Table 6-4: Air Quality Monitoring

Potential Impact	Action	Parameters for Monitoring	Timing
Air Emissions	All equipment are operated within specified design parameters.	Random checks of equipment logs/ manuals	During site clearing
	Vehicle trips to be minimized to the extent possible	Vehicle logs / Increase the capacity of vehicle	During site clearing, transportation of minerals
	Topsoil must be removed from the entire area to be mined and stored from where it can be recovered and utilized immediately	Absence of stockpiles	During site clearing

	after mining for reclamation		
	Regular water spraying shall be done	Quantity of water requirement shall be monitored	During site clearing, Transportation etc.
	Ambient air quality within the premises of the proposed unit to be monitored.	The ambient air quality will conform to the standards for PM10, SO2 and NO2	As per CPCB requirement.

6.3.2 Water Quality Monitoring

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

Table 6-5: Water Quality Monitoring

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

6.3.3 Noise level Monitoring

Table 6-6: Noise Monitoring

Potential Impact	Action	Parameters for Monitoring	Timing
Noise	List of all noise generating machinery onsite along with age to be prepared. Equipment to be maintained in good working order.	Equipment logs, noise reading	During mining operation.
	Generation of vehicular noise	Maintenance records of vehicles	During transportation.
	The Noise level should not exceed the permissible limit both during day and night times.	Noise reading	As per SPCB requirement or quarterly whichever is lesser.
	All equipment operated within specified design parameters.	Random checks of equipment logs/ manuals	During mining operation

	Vehicle trips to be minimized to the extent possible	Vehicle logs	During mining operation
	Plantation of dense hedges on the boundary of lease area, these will reduce dust and noise in the vicinity	Adhere to mine closure plan	

6.3.4 Occupational Health & Safety

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

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

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

Reporting schedule of monitored data

It is proposed that voluntary reporting of environmental performance with reference to the EMP. The frequency of reporting will be on six monthly bases to the State PCB and SEIAA and to Regional Office of MoEF&CC, Bhubaneswar. The Environmental statement will be prepared for the entire year of operations and will be regularly submitted to regulatory authorities.

CHAPTER-7

ADDITIONAL STUDIES

7.1 PUBLIC HEARING

The public hearing will be conducted after draft EIA/EMP report submitted to SPCB. After public hearing conducted the detail will be attached in Final EIA/EMP report

7.2 RISK ASSESSMENT

The quarrying process & activities inherently pose hazards. There may be possible hazards to human beings, flora-fauna, all forms of property and the environment as a whole. Full preparedness to meet effectively the eventualities resulting from any unfortunate occurrence of accidents. The main objective of the risk assessment study is to determine damage due to major hazards with damage potential to life and property and provide a scientific basis to assess safety level of the facility & operation. To identify major risk in manufacturing process, operation, occupation and provide control through assessment is the secondary objective. To prepare on-site, off site management plan for control of hazards. The concept of risk assessment and its industrial application has been well acclaimed since more than a decade. A variety of major accidents have focused attention on the dangers of risk exposure for human health and environment. Risk analysis (RA) provides a numerical measure of the risk that a particular facility poses to the public. It begins with the identification of potential hazardous events and determination of impact of each event. The consequences of each event are then calculated for numerous combinations of environmental parameters. These consequence predications are combined to provide numerical measures of the risk for entire facility.

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

- Initial Site Evaluation.
- Detailed Site Evaluation.
- Priority Site Investigations and Recommendations.

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

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

- The Initial Site Evaluation and Detailed Site Evaluation both apply weighted criteria to the existing information and information obtained from one site visit. The Initial Site Evaluation subdivides the initial inventory listing of sites into 5 risk assessment site groups.
- The Detailed Site Evaluation risk assessment is then performed on each of the three highest risk site groups in order of the group priority level of risk. The result of the Detailed Site Evaluation process is a prioritized listing of the sites within each of the three highest risk site groups.

7.1.1 Inundation/Flooding

Proper care regarding the surface flooding/inundation from the unforeseen circumstance (like sudden inrush of water from upstream side, a flood, or blockage of water flow in downstream side of River) shall be taken so that the machinery deployed in proposed sand winning areas in the river bed would not get drowned. Suitable warning system both upstream and downstream side will have to be maintained for giving warning signal in advance of impending danger so that machinery deployed could be withdrawn at a safer distance from the proposed sand mining site. Inundation or flooding is expected and beneficial for these mines as during this time only the mineral reserve gets replenished.

A careful assessment of the dangers of surface flooding / inundation/ a flood from these unforeseen circumstances shall be made before the onset of every monsoon season and before start of the sand mining operation. Adequate precautions against such dangers shall be clearly laid down and implemented.

7.1.2 Accident Due To Vehicular Movement

It is possible event with moderate consequences as frequency of this operation is more but the predicted/assumed intensity is less like minor cuts, bodily injury. The possibilities of road accidents are due to reckless or untrained driver or overloading of tractors or in case pathway is not compacted suitably etc. The roads should be constructed with sufficient width for smooth plying of tippers. Necessary road crossing may be planned properly with deployment of traffic personnel where ever necessary to prevent vehicular accidents.

- All transportation within the main working should be carried out directly under the supervision and control of the management.
- The Vehicles will be maintained/ repaired and checked thoroughly by the competent person.

- A statutory provision of constant education, training etc. will go a long way in reducing the incidents of such accidents.
- Overloading will not be permitted and will be covered with tarpaulin.
- The maximum permissible speed limit will be ensured.
- The Tractor drivers will have valid driving license.

7.1.3 Drowning

This may occur due to flash floods etc due to which the workers at the site may get seriously injured or drowned.

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

7.1.4 Accident during Material Handling & Loading

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

The loading should be done from one side of the Tractor only to avoid over throw of materials.

The workers should be provided with gloves and safety shoes during loading. All the activities will be done under strict supervision/control to avoid anticipated accidents so that the risk is reduced to a level considered. As Low as Reasonably Practicable (ALARP) conditions which are adequately safe and healthy.

7.3 DISASTER MANAGEMENT PLAN

Anticipated Disasters & its Mitigation Measures

The word 'disaster' is synonymous with 'emergency' as defined by the Ministry of Environment and Forests & Climate Change (MoEF & CC). The area is prone to floods. However bank protection has been taken care by the govt. by constructing of flood embankments/retaining walls/check dams etc. Precautionary measures will be taken to avoid the effects on the workers at the site if the disaster occurs. The lease area falls in seismic zone II which is moderate intensity zone. However there will be no impact as there is no built-in structure at the site. Some safety measures are below:

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

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

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

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

Health Education: Adequate health education and information related to the job will be provided to the workers. Baseline health information will be recorded for future references. To meet the medical needs of the mine workers tie-up with nearest hospitals will be made. Efforts will be made to reserve few beds in the above hospitals for the workers of the mining project. This will ensure timely medical aid to the affected persons.

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

Special Telephone Number: A special telephone number will be made available to the workers in case of emergency so that they can dial the same for-medical assistances. Further, efforts will be made to provide vehicles to the patients in short duration for shifting to a hospital. The doctors and medical professionals are given sufficient training for handling emergencies.

Fire: Fire-fighting equipments are to be provided in adequate numbers at suitable locations in movable machinery to meet any eventuality in case of outbreak of fire. Adequate provision for fire detection and alarm system shall be made and the mine management will need to remain vigilant. All other statutory provisions with regard to prevention of dangers due to fire will be strictly adhered to.

Lastly with adoption of above preventive measures, the operation of this sand mine will be safe as well as environment friendly.

7.4 OCCUPATIONAL HEALTH HAZARDS

The project Sand mining involved for excavation of sand from Madhapur Sand Mines, Sand Mines over Mahanadi river may leads to occupational hazard due to dust generation by excavation, loading and transportation of mineral. Dust is the major pollutants which affect the health of the mining worker. Occupational hazard due to sand mining is as below:

Possibly Impacts:

- The mines worker will be mostly exposed to heat and humidity mainly during summer season.
- The direct effects of heat exposure are heat exhaustion, heat stroke and heat cramps;
- The indirect effects are decreased efficiency, increased fatigue and enhanced accident rates.
- Heat and humidity are encountered in hot and humid condition when temperatures and air temperatures increase in summer time up to 45° C or above in the river bed mining area. During the high windy days in summer the sand could be the problems for eyes like itching and watering of eyes.
- Respiratory disorder may cause due to continuous exposure to dust during excavation, loading and transportation.

Mitigation Measures

- During the summer season proper drinking water facility will be provided for the mines worker so that they will remain hydrated and avoid sun stroke
- First aid facility will made available and easily accessible to all the workers in case of emergency situation
- Mines workers will be provided with PPEs like dust masks, goggles and ear muffs
- Periodic medical examinations will be provided for all workers.

7.5 SOCIAL IMPACT STUDY OF THE AREA & R&R Plan

7.5.1 Resettlement and Rehabilitation

The land in the core zone of the mine consists of govt. land (Nadi- Kissam) only. No tenancy land is being acquired nor are the tenants of the concerned revenue

villages affected. Hence Rehabilitation and Resettlement are not applicable for this mine.

7.5.2 Justification of Study

This assessment is been done to evaluate the existing Socio-economic Status of the people surrounding the Industry with the impact of the industry on their socio-economic status as per the criteria mentioned below:

7.5.3 As per ToR issued by SEAC

The SIA Report has been prepared in line with the Terms of Reference (ToR) as per the Office Memorandum No.-J-11013/25/2014-IA.I dated 11.08.2014 issued by the Ministry regarding guidelines on environment sustainability and CSR related issues. The social impact assessment study so carried out should form part of EIA and EMP. SIA is mandated according to Ministry of environment forest and climate change Government of India circular -2014.

The purpose of preparing SIA report is mentioned below:-

- This SIA report is a statutory compliance in line with the Terms of Reference (ToR) carried out from part of EIA and EMP report.
- As employees are primary stakeholders for the industry prospect & company keeps record and are measurable factors for the developmental work that will be given as a mandate of the report.
- As this SIA study develops stake holder ownership for company, hence this report is mandated for necessary implementation.
- The SIA has been prepared as per the Office Memorandum No. - F.No.22-65/2017-IA.III dated 01.05.2018 issued by the Ministry regarding guidelines on Corporate Environment Responsibility (CER) for the prescribed process for granting prior environment clearance (EC) for certain development projects/activities.

7.5.4 Objectives for SIA Study

- **Assess Social Status** : people's way of life, demographic changes, interaction with each other on a day-to-day basis and impacts on family life;
- **Evaluate Financial Structure** : job/occupational issues, financial security, economic status , living standard etc. ;
- **Analyze Political Systems** : the extent to which people are able to participate in decisions that affect their lives, the level of democratization that is taking place, and the resources provided for this purpose;

- **Community Assessment** : its cohesion, stability, character, services and facilities;
- **Cultural Assessment** : Cultural beliefs, customs, values and language or dialect;
- **Environmental Assessment** : The quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed, the adequacy of sanitation, their physical safety, and their access to and control over resources;
- **Health and wellbeing factor** : Health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity;
- **Fears and aspirations**: The perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children.

7.5.5 Justification of Village Adoption

- The project located at Sirigida village, Tahasil-Talcher of Angul district of Odisha. The total work force is skilled workers, semi skilled and office staff is 17.
- Keeping in mind well being of the employee and developing sense of ownership amongst the employees, these peripheral villages are Sirigida, Banmalipur, Gengutia, Belapada, Dumuduma, Jandabahal, Ramchandrapur, Hariharpur, Raghunathpur, Gurujang and Bherubania within 10km radius of the mine lease area considered for SIA study.
- For all direct and indirect benefits it would be easier and beneficial for the management and indentified villages to maintained consolidated stakeholders in implementation of developmental activities.
- The choices of social indicators are based on close adherence to the human ecosystem, ease of the understanding as well as interpretation of resource management and vigilance for the implementation along with majorability of social changes.
- Opening a channel of feedback for flow of information and need assessment as to which mitigation plan can be developed by the management.
- Most of the population depends upon agriculture activities, small business for their livelihood and hence improvement of their living.

7.5.6 Methodology of Study

The survey aims to document the living conditions, level of socio-economic development of the region and the socioeconomic profile of people in the core and buffer zones of the proposed plant area. The survey was organized to collect information on socio-economic variables at the village level as well as household level. The village level data are collected from revenue offices, Grampanchayat office Censuses while the household level data are collected through questionnaire method.

The agreed methodology has been followed with the tools of SIA. The following strategies were adopted for undertaking the study:

a) Coordination and Consultation

Close coordination was maintained with concerned Public Representative's Offices, Local representatives and common village folks. Assessment of the area was made in joint visit with the M/s Sirigida sand quarry representative and the SIA team of Ardra Consulting Services Pvt. Ltd.

b) Assessment of study area

Initial field visit was conducted with assessment of the area and people interacting with concerned employees and few opinion leaders of the area including. This visit facilitated the strategic plan to complete the study in stipulated time.

c) Orientation training

One day orientation training program was conducted at the plant site for the study methodology and strategy of site visits to make the investigators acquainted with the questionnaire and the area to be studied with the background information about the area.

d) Collection of Information

Three-stage process informed consultation and participation were adopted:

- i. **Informing:** This phase included transact walk through the area to have a physical characterization of the socio- economic aspects and informal introductory meetings with various households within the proposed route.

- ii. **Counseling:** People at large were consulted formally and informally before enumeration of interview schedule. The communities were educated on risks impacts and opportunities the project provides.
 - iii. **Questionnaire:** A sample population adjacent to the area was interviewed through a standard questionnaire for their assessment and opinion regarding the project.
- e) The primary and secondary information were collected through;
- i. **Questionnaire/Interview Schedule:** The questionnaire covering the identification of household. This facilitated the field investigators in collection of different information from individuals of the villages under study consideration.
 - ii. **Focus Group Discussion:** A guiding principle was developed to conduct focused group discussion with different categories of people of the studied villages.
 - iii. The secondary information was also collected from concerned Government offices and Local Panchyat/ Municipality Office etc.

f) Study of Village Profile

This study includes village level survey of Population, Economics, Employment pattern, Healthcare Facilities, Amenities for Livelihood. This primary data is statistically validated and the statistical anomalies and is interpreted in the light of economic impacts. From the processed data, and pre-recorded data, the matrix as mentioned above is derived to quantify the level of impact and cause of the socio-economic conditions of the area.

g) Study of Household Profile

From each household the detail of the demographical and economic data is collected through village survey and the profiles are compared with the Regional data (Village Level / Ward Level). Thus with the comparison of the data, the socio-economic segments are identified with associative social causes and economic status of the people.

• **Computation of Data and Analysis:**

The data collected from primary sources through individual schedule is validated with cross tabulation and computerized using MS Excel and SPSS packages. Both tabular and graphical information are generated using SPSS package.

- **Implementation Strategy**

Based on the identified areas to be addressed under CER & CSR programs, a site specific implementation plan is prepared with factors attributing to continuous monitoring & improvement of program standards.

- **Program monitoring**

The monitoring plan is prepared for keeping check -&-balance of implementation & related benefits to the community as well as to create a feedback loop for program reinforcement & identification of new issues.

- **Submission of Report:**

The report of the study is considered completed after due incorporation of gap resolution, implementation planning, monitoring program for the existing conditions & is subjected to periodic revision by the management of implementing agency as a continuous improvement process.

7.5.7 Assumptions & Limitations

In any Social Impact Assessment (SIA) Study, there will always be gaps in knowledge or uncertainties encountered. For the proposed project, the following assumptions were made in undertaking the Social Impact Assessment (SIA) Study as listed below.

- a) This initial report targets the direct beneficiary of the sourced villages for adoption within the program.
- b) The general asset evaluations are based on visual assessment by the field investigators.
- c) Land holding criteria are not considered in this assessment due to time constraint & actualization of the facts.
- d) People's actions can never be predicted with 100% accuracy, even when circumstances are similar and predictions are based on rigorous research results.
- e) Most of the statistics obtained from secondary data sources comparable with district level data. Some statistics are validated through public / stakeholder consultation meetings and quantitative data specific to project areas as incorporated for assessment.

- f) The interview process was restricted to few senior persons from the villages in isolated condition due to the Covid- 19 situation.

7.5.8 Evaluation Method

The methodology adopted in the assessment of socio-economic condition is as given below:

To evaluate the socio-economic conditions of the people.

Analysis of the identified social attributes like population distribution, sex ratio, literacy rate, occupational structure, availability of public utilities etc through literature like the census of India, District Census Statistical Handbooks and from records of National Informatics Centre etc.

7.5.9 Demographic Profile of SIA Village Area

Khata No.	Plot No.	Kisam	Area (acre)
142	1791	Nadi	18.00
TOTAL			18.00 acres or 7.28 ha

Table No 7.1 As per 2011 Census Gender Wise and Sex Ratio Distribution

Sl. No.	Name of the Village	Total House Holds	Population			Sex Ratio	Population (0-6 Years)			Sex ratio	Avg. Family Size
			Male	Female	Total Population		Male	Female	Total		
1	Sirigida	272	630	560	1190	889	72	69	141	958	4.38
2	Gengutia	200	368	385	753	1046	33	43	76	1303	3.77
3	Belapada	158	337	330	667	979	37	39	76	1054	4.22
4	Dumuduma	37	97	87	184	897	13	7	20	538	4.97
5	Jandabahal	168	397	349	746	879	43	27	70	628	4.44
6	Ramchandra pur	130	305	288	593	944	32	18	50	563	4.56
7	Hariharpur	59	129	124	253	961	14	17	31	1214	4.29
8	Raghunathpur	119	238	217	455	912	36	29	65	806	3.82
9	Gurujang	133	291	264	555	907	44	37	81	841	4.17
10	Bherubania	35	89	94	183	1056	17	10	27	588	5.23
	Total	1311	2881	2698	5579	936	341	296	637	868	4.26

Source: Census 2011

Environment Clearance of Sirigida Sand Quarry (Lease Area 7.28 Ha) village Sirigida under Talcher Tahasil of Angul District, Odisha

Table No 7.2 As per 2011 Census Caste wise Distribution

Sl. No.	Name of the Village	Caste wise Distribution of Population (As per 2011 Census)								
		SC-Male	SC-Female	SC-Total	ST-Male	ST-Female	ST-Total	OBC/GC-Male	OBC/GC-Female	OBC/GC-Total
1	Sirigida	115	111	226	135	128	263	380	321	701
2	Gengutia	104	107	211	0	0	0	264	278	542
3	Belapada	14	12	26	86	83	169	237	235	472
4	Dumuduma	3	1	4	0	0	0	94	86	180
5	Jandabahal	27	28	55	173	166	339	197	155	352
6	Ramchandrapur	67	59	126	10	11	21	228	218	446
7	Hariharpur	64	65	129	0	0	0	65	59	124
8	Raghunathpur	6	5	11	14	12	26	218	200	418
9	Gurujang	38	25	63	127	117	244	126	122	248
10	Bherubania	0	0	0	0	0	0	89	94	183
	Total	438	413	851 (15.25%)	545	517	1062 (19.04%)	1898	1768	3666 (65.71%)

Source: Census 2011

Table No 7.3 As per 2011 Census Literacy of the area

Sl. No.	Name of the Village	As per 2011 Census Literacy of the area					
		Male	Female	Total Literate	Male	Female	Total Illiterate
1	Sirigida	381	237	618	249	323	572
2	Gengutia	285	201	486	83	184	267
3	Belapada	267	187	454	70	143	213
4	Dumuduma	82	72	154	15	15	30
5	Jandabahal	312	209	521	85	140	225
6	Ramchandrapur	263	208	471	42	80	122
7	Hariharpur	90	59	149	39	65	104
8	Raghunathpur	192	143	335	46	74	120
9	Gurujang	221	180	401	70	84	154
10	Bherubania	60	47	107	29	47	76
	Total	2153	1543	3696 (66.25%)	728	1155	1883 (33.75%)

Source: Census 2011

7.5.10 Socio Economic Condition of Survey area

Sirigida Sand Quarry is located at Sirigidab village, Tahasil-Talcher of Anugul district of Odisha. The socio-economic data through sample survey of 10 households from each of 10 villages are surveyed. Based on the convenience of taking up focused approach in planning and implementing objective viable CER/ESC activities, which are falling within Project Impact Zone. The Socio-

economic study includes demographic structure, social & economic profile, provision of basic amenities at the baseline level. The area divided into core zone, plant area of Sirigida Sand Quarry and buffer zone covers area of 10 km radius distance from the periphery of core zone.

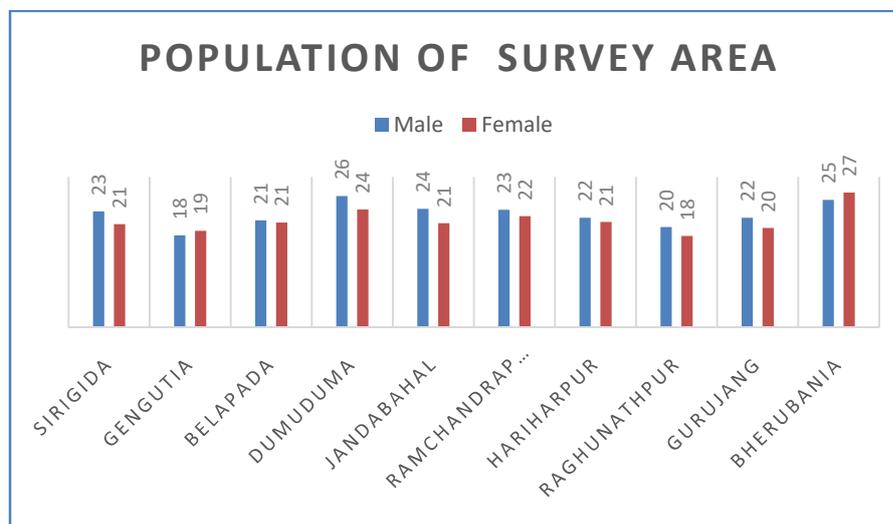
Table No- 7.4 Population of Survey area

Sl. No.	Name of the Village	HH	Male	%	Female	%	Total Population	Sex Ratio
1	Sirigida	10	23	52.94	21	47.06	44	889
2	Gengutia	10	18	48.87	19	51.13	38	1046
3	Belapada	10	21	50.52	21	49.48	42	979
4	Dumuduma	10	26	52.72	24	47.28	50	897
5	Jandabahal	10	24	53.22	21	46.78	44	879
6	Ramchandrapur	10	23	51.43	22	48.57	46	944
7	Hariharpur	10	22	50.99	21	49.01	43	961
8	Raghunathpur	10	20	52.31	18	47.69	38	912
9	Gurujang	10	22	52.43	20	47.57	42	907
10	Bherubania	10	25	48.63	27	51.37	52	1056
	Total	100	225	51.40	213	48.60	438	946

Source: Field Survey

As per the data depicted in the above table, it is interpreted that, there are 100 households have taken as sample households of 10 villages. Total population of these 10 villages are 438 which includes 225 male and 213 are female. The sex ratio is 946 females per 1000 males, which is lower than Odisha state average of 979.

Figure No- 7.1 Population of Survey area



7.5.10.1 Age wise Distribution of Survey Villages

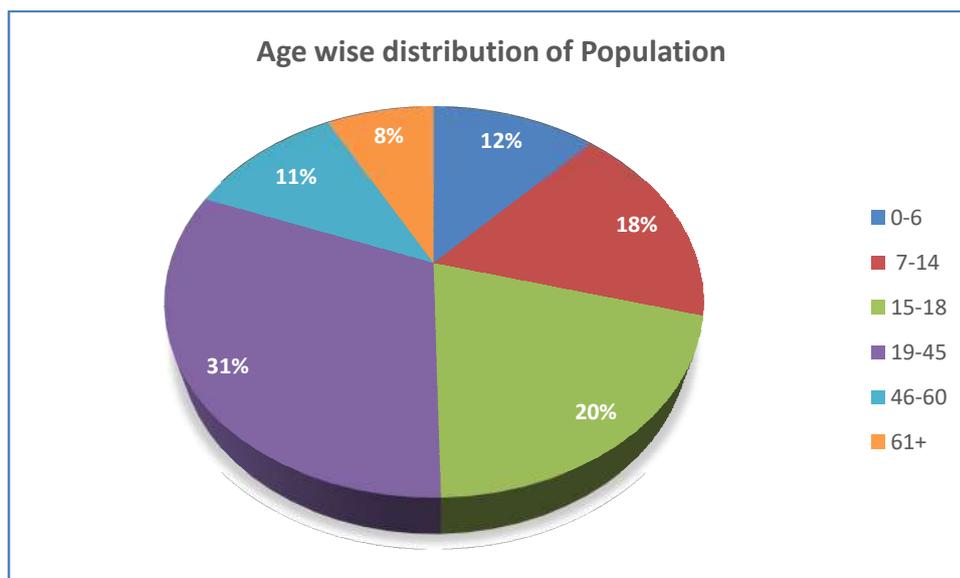
The age-group divided into 6 groups i.e., up to 0-6 are 52 (11.85%) years, between 7-14 are 76 (17.33%)years, 15-18 are 89 (20.29%) years, 19-45 are 137 (31.24%) years, 46-60 are 49 (11.18%) years, 61+ are 34 (7.75%) years and above. The study reveals that majority of the population falls within the age group of 19-45 years, i.e., 31.24% and lowest in 7.75% age group of 60+ years in the study villages.

Table No- 7.5 Age wise Distribution Survey area

Sl. No.	Name of the Village	Total Population	0-6	7-14	15-18	19-45	46-60	61+
1	Sirigida	44	6	7	8	13	6	4
2	Gengutia	38	4	5	9	12	4	4
3	Belapada	42	4	8	10	13	6	3
4	Dumuduma	50	6	9	10	16	5	4
5	Jandabahal	44	5	4	8	14	4	3
6	Ramchandrapur	46	3	9	6	15	3	5
7	Hariharpur	43	5	10	11	14	5	3
8	Raghunathpur	38	5	7	8	12	4	2
9	Gurujang	42	6	9	9	13	5	3
10	Bherubania	52	8	8	10	15	7	3
	Total	438	52 (11.85%)	76 (17.33%)	89 (20.29%)	137 (31.24%)	49 (11.18%)	34 (7.75%)

Source: Field Survey

Figure No- 7.2 Age wise Distribution Survey area



7.5.10.2 Social Profile of Survey Villages

The study has also enquired about religion of the survey households. It reveals that 100% HHs of affected villages belongs to Hindu community.

7.5.10.3 Caste wise Distribution of Survey Villages

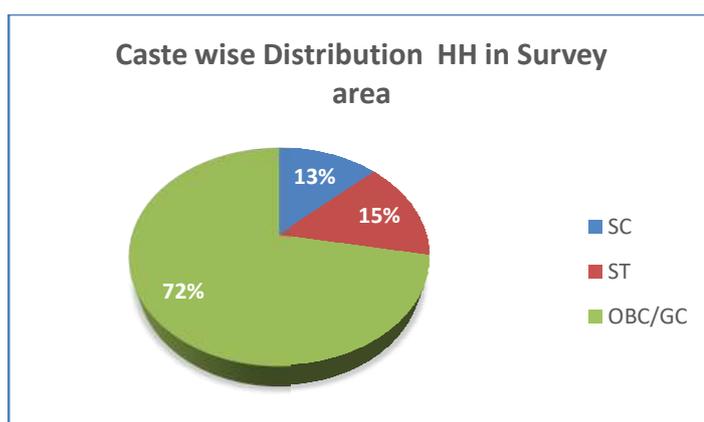
The total 80HHs are surveyed in the eight villages, the families include SC, ST & OBC/GC, the SC HHs are 20(25.00%), ST HHs are 4(5.00%) and OBC/GC HHs are 56(75%). The SC HHs & ST HHs are 30% of the total HHs.

Table No- 7.6 Caste wise Distribution Survey area

Sl. No.	Name of the Village	SC	ST	OBC/GC	Total HH
1	Sirigida	2	2	6	10
2	Gengutia	2	0	8	10
3	Belapada	0	4	6	10
4	Dumuduma	0	0	10	10
5	Jandabahal	2	3	5	10
6	Ramchandrapur	2	0	8	10
7	Hariharpur	5	0	5	10
8	Raghunathpur	0	0	10	10
9	Gurujang	0	6	4	10
10	Bherubania	0	0	10	10
	Total	13	15	72	100

Source: Field Survey

Figure No- 7.3 Caste wise Distribution Survey area



7.5.10.4 Education status of Survey Villages

In the project area total illiterate person are 68 (17.95%), Just literate 93 (24.54%), Primary 55(14.51%), Middle 64(16.88%), HSC 61(16.10%), Intermediate 24(6.33%) and Graduate are 14(3.69%).In the entire eight villages

Environment Clearance of Sirigida Sand Quarry (Lease Area 7.28 Ha) village Sirigida under Talcher Tahasil of Angul District, Odisha

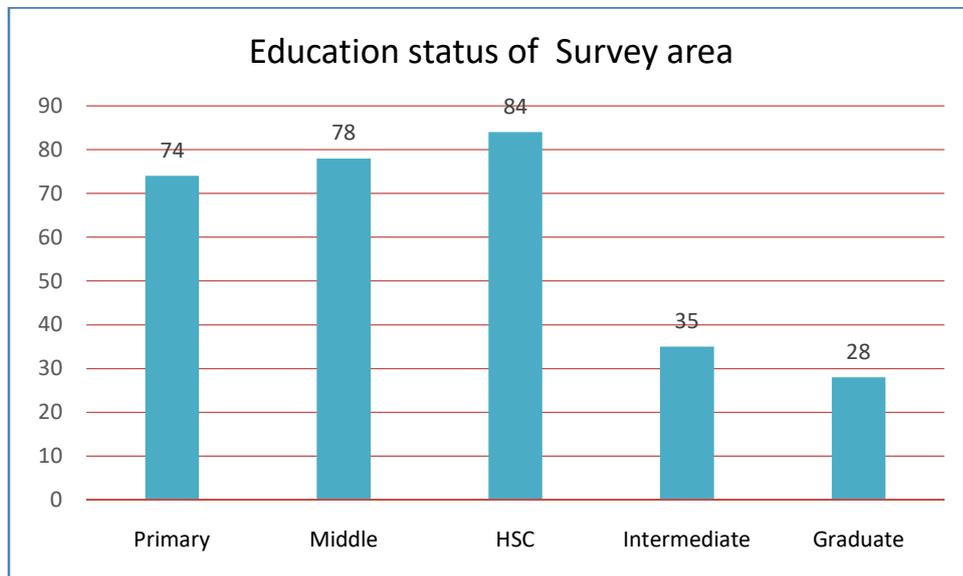
AWC & Primary school available, for higher education students have to go to at Nua-Barbara & Talcher.

Table No- 7.7 Education status of Survey area

Sl. No.	Name of the Village	Total Illiterate	Total Literate	Primary	Middle	HSC	Intermediate	Graduate
1	Sirigida	21	23	6	6	6	3	2
2	Gengutia	13	24	6	6	7	3	2
3	Belapada	13	29	7	8	8	3	3
4	Dumuduma	8	41	10	11	12	5	4
5	Jandabahal	13	32	8	8	9	4	3
6	Ramchandrapur	11	36	9	9	10	4	3
7	Hariharpur	18	25	6	7	7	3	2
8	Raghunathpur	10	28	7	7	8	3	3
9	Gurujang	11	31	8	8	9	4	3
10	Bherubania	21	30	7	8	8	3	3
	Total	139 (31.74%)	299 (68.26%)	74 (24.51%)	78 (26.38%)	84 (28.09%)	35 (11.33%)	28 (9.69%)

Source: Field Survey

Figure No- 7.4 Education status of Survey area



7.5.10.5 Housing Pattern of Survey area

The type of housing has been categorized under pucca (concrete), kutcha (mud) with thatched or tiled roof and kutcha-pucca (semi concrete) mixed. As per the survey data depicted in the following table, it is seen that, out of 100 HH, 17HHs (17%) are kutcha (mud), 22 HHs (22%) houses are kutcha-pucca (semi

concrete) and 61 HHs (61%) are pucca houses. The community should be linked with the existing housing schemes propagated by the government to improve the housing condition.

In all the villages sanitation condition is not good & open defecation practice in the area is available. There is no community toilet or urinal available within the area. However due to lack of water supply some parts of villages and newly built toilets are not functional. The Swachh Bharat Mission is going on for construction of new toilet but it is not been successful due to appropriate awareness. There is no drainage system available in the Village. There is no system to collection garbage on street and drain water is discharged into sewer plant. All of the villages in the study area 100% have been electrified by the State Government.

Table No- 7.8 Housing status of Survey area

Sl. No.	Name of the Village	HH	Kutcha	Pucca	Katcha/Pucca
1	Sirigida	10	1	7	2
2	Gengutia	10	2	6	2
3	Belapada	10	1	8	1
4	Dumuduma	10	2	5	3
5	Jandabahal	10	1	7	2
6	Ramchandrapur	10	3	6	1
7	Hariharpur	10	2	5	3
8	Raghunathpur	10	1	4	5
9	Gurujang	10	2	7	1
10	Bherubania	10	2	6	2
	Total	100	17	61	22

Source: Field Survey

7.5.10.6 Cooking Pattern of Survey area

The HHs is using LPG, wood, cow dung, kerosene stove as the primary fuel for cooking.

7.5.10.7 Drinking water facilities of Survey area

In all villages, drinking water problem exists. The major sources of drinking water are available by means of supply water, hand pump, wells and springs & river. The water supply to villages by RWSS Odisha.

7.5.10.8 Health Facilities in Survey area

The district has a three-tier public health care system viz. village level, Block level and District level. There are primary health centres, private clinics, government hospitals and drug vendors that meet the basic health care needs of people in the district. Services provided include disease prevention and mother and child health care. Among the surveyed HHs 47 preferred Govt. doctor for treatment for various reasons like being approachable, availability, cheaper and also convenience. Homeopathy treatment preferred by 27 HHs & Private hospital is 26 HHs depend upon for health services.

The Health & Family Welfare Department of the State Government has responsibility of maintaining and developing the health care system. The public health, sanitation and hospitals are the exclusive responsibilities of the State. The Govt. provides financial support for the basic health system and infrastructural development in rural area. The Govt. Provides free ambulance service 24*7. The Government health care services to the citizens are being provided free of cost to BPL families. The HHs preferred the medical facilities are depicted bellow:

Table No- 7.9 Health Facilities in Survey area

Sl. No.	Name of the Village	HH	Govt Hospital	Homeopathy	Private Hospital
1	Sirigida	10	7	2	3
2	Gengutia	10	5	2	4
3	Belapada	10	6	2	3
4	Dumuduma	10	5	3	2
5	Jandabahal	10	2	1	4
6	Ramchandrapur	10	6	1	2
7	Hariharpur	10	5	2	3
8	Raghunathpur	10	7	1	2
9	Gurujang	10	2	7	1
10	Bherubania	10	2	6	2
	Total	100	47	27	26

Source: Field Survey

7.5.10.9 Occupational Status

The livelihood pattern of the surveyed households is depending on agriculture work, agricultural labour, daily wage earner, private jobs, small business & Govt jobs. The average income of the surveyed HHs of 10 villages is depicted bellow:

Table No- 7.10 Occupational Status in Survey area

Sl. No.	Name of the Village	HH	Average income PA (In Rs.)
1	Sirigida	10	88462.00
2	Gengutia	10	87730.00
3	Belapada	10	89403.00
4	Dumuduma	10	87626.00
5	Jandabahal	10	88881.00
6	Ramchandrapur	10	88358.00
7	Hariharapur	10	89403.00
8	Raghunathpur	10	84280.00
9	Gurujang	10	89090.00
10	Bherubania	10	90240.00

Source: Field Survey

7.5.11 Gap Analysis

Although there is no limit to the need however based on the living standard of people around, which is set as benchmark for rest of the common people in order to identify the gap in bringing an equality status. In consideration to their socio-economic status, the parities, the differential opportunities, unequal access to basic resources and ongoing state & central Government programs were evaluated to identify the gaps. Various needs were identified during the base line survey in the proposed project attached area. Due to the industrialization people have somehow detached out of their traditional livelihood practice and have come to be a safeguard of industrial development within the area. They need to emphasize in order to actualize inclusive growth through involvement and participation methodology. Therefore a process is adopted to focus their issues on the major problems they are facing and address them on priority basis as per the socio-economic indicators as have been given below.

Safe drinking water supply and basic sanitation are so intrinsically linked to human and ecosystem health that, it is most essential components of a safe and healthy life. Although it comes under Panchayat areas, the collection of solid waste practice is very poor, for which at places domestic solid waste are dumped. This has issues with health and hygiene. The various gaps in this sector have been identified as below:

- Construction of community toilet for Men & women
- Supply of Dustbin to common market areas and local composting facilities
- Construction of Drains

- Drinking Water supply.

7.5.12 Infrastructural Needs

The growth of population and intensive industrialization in and around the study area has created a need for adequate infrastructure at par with the local modern facilities in order to be in synch with the local standards of living. Some of the areas which need attention and are doable by the industry are listed as below:

1. On a regular basis, the access road to the lease area needs to be maintained for reduction in air and noise pollution of the area.
2. Construction of primary school for improvising early education.
3. Renovation of ICDS centres in all the villages.
4. Supply of Bench & Desk, Study materials, Supply sports materials to ICDS & all the school for development extracurricular activities
5. Construction building, toilet , library & community
6. Renovation of village schools with adequate Sanitation facilities for boys and girls along with over head tanks for retention of the rolling students.
7. If industrial based skill development programe can be implemented for the youth the unemployment issues will be drastically dismiss.

7.5.13 Livelihood Support

The pattern shows that some of the population depends on wage from nearby sand mines, which is an indication of the local livelihood dependency. Again most of the wage-earners are skilled and semi-skilled workforce engaged in various niche skills required in the nearby mines. Due to lack of technical skills like Smithy, Carpentry, Mechanical, Electrical and Civil subjects the engagement of local youth in secondary industrial shops is not so prevalent.

Other than industrial work force, there are other avenues of livelihood support. Again due to intensity of Industrialization, the dependency on agriculture has drastically reduced. Further there is insufficient water available for Year-wide agriculture practice. Most important is the mindset of the local people to generate a second income source for betterment of their livelihood pattern, which is to be motivated and cultured.

Irrespective of having own land for residence in the village with sufficient backyard provisions, people here depend on the local market for Day-to-day vegetables and grocery. With a little impetus and motivation, each household can

develop a Back-Yard Kitchen Garden, which can be of great assistance to family budget.

7.6 ANNUAL REPLENISHMENT SURVEY

As per specific condition-1 of ToRs a study on annual replenishment of sand was done. As the mining has not been started secondary data available has been considered for surveying the annual replenishment of sand. The finding of the study given in Annexure.

CHAPTER- 8

PROJECT BENIFITS

8.1 IMPROVEMENTS IN THE PHYSICAL INFRASTRUCTURE

As the mining activity is commissioned, social as well as economical condition of localized will upgrade and nearby area infrastructural facilities like communication system will be improve.

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

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

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

The proposed mine area lies in the flood plain, hence the removal of extracted material will minimize the chances of flood disaster in the area.

Improved road communication system in villages in adjoining area.

Strengthening of existing community facilities through the existing Community Development Programme.

Outside river bed area will be reclaimed and converted to agricultural field.

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

8.2 IMPROVEMENTS IN THE SOCIAL INFRASTRUCTURE

M/s Sirigida Sand Quarry is very much conscious about the socio-economical development of neighboring areas, wants to change the quality of life and to develop social well-being of communities where it operates. The proposed project is expected to provide employment to local people in different activities such as Mining, sizing, transportation and plantation activities. The project activity will not have any major impact on the environment. At Post mining stage of proposed project, the existing waste land shall be converted to water harvesting bodies and green belts. Proponent main effort towards the socio economic activities, How to make better society.

8.3 EMPLOYMENT POTENTIAL

As the project will be considerable employment & trade opportunities with the commencement of the production activities. Secondary jobs will also bind to be generated to provide daily needs and services to the work force. This will increase the demand for essential daily utilities in the local market. The manpower requirement for the proposed project will generate permanent and secondary jobs for the operation and maintenance of plant. The project will benefit the people living in the neighboring villages by giving preference to them in relation to direct employment associated with the various project activities.

The local labour shall be engaged for the purpose of mining of mineral, loading & unloading of mineral besides, watch and ward and plantation activity with proper maintenance On assumption that one man on and average can extract load & unload 5 to 6 tonnes of material per man-day. The total manpower required for mining works out to 55. This will help in the improvement of financial condition of the area.

8.4 OTHER TANGIBLE BENEFIT

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

The significant positive impact on employment and occupation is envisaged on account of:-

- Better economic status of the community due to better earnings.

- Higher input towards infrastructural facilities due to the proposed activities by establishing the new plant unit.
- Provision of Enhancement of the literacy due to the educational facilities under CER activities have been made in operation phase.
- Community infrastructure and services will be further improved in operation phase under CER.

Health

Company will undertake awareness program and community activities like health, camps, medical aids, family welfare camps, AIDS awareness program etc. Periodic medical checkups as per Mines Act/ Rules and other social development and promotional activities will be undertaken. All this will assist to lift the general health status of the residents of the area around mines.

Plantation

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

Education

M/s Sirigida Sand Quarry has initiated action plan for social upliftment in the area like female education and vocational training. Financial support will also be extended to strengthen the educational infrastructure in the region.

Transportation

There will also be small increase in the vehicular traffic due to passenger transport. This increase in traffic will not have any impact on the existing transportation facilities. One should expect that the increased passenger load in the sector would prompt the state government to start new and frequent public transport services to this area, bringing upliftment of the area.

Other Benefits

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

8.5 CORPORATE ENVIRONMENT RESPONSIBILITY (CER) – ACTIVITIES

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

OBJECTIVE OF CSR and CER

CSR and CER are the main strategies for enterprises to create efficient, persistent and environmentally sustainable development.

CSR & CER have a very thin line during interpretation and both interconnected.

Both the concept is the accountability of the enterprise for its impact on relevant stakeholder.

As both the concept CSR & CER, influence environmental protection whereas CER considers within corporate strategy.

CER is more focused on economic and environmental while CSR relates to social and environmental aspect.

The activities carried out in CER are infrastructure creation for drinking water supply, sanitation, health, education, skill development, roads, cross drains, electrification including solar power, solid waste management facilities, scientific support and awareness to local farmers to increase yield of crop and fodder, rain water harvesting, soil moisture conservation works, avenue plantation, plantation in community areas, etc.

The activities proposed under CER are Government compliant, which should be reported the District Collector and monitored by the Company.

Apart from business, **M/s Sirigida Sand Quarry** shall be devoted to social commitments and will continue to do the same as per the needs of nearby village people. For Corporate Social Responsibility, Various Programs/ Projects related to social & economic development of surrounded area has been planned, which are as follows, Planned for providing Water purifier for Village people, conducting medical camps for Cataract operation, senior citizen check-up, deputing teacher for literacy development to Senior Citizens.

This CER fund will be administered by a local area development committee in accordance with the orders of the appropriate Government. This fund will be used for the creation of infrastructure and overall economic development of the project area. Other such activities as stated as below:

Integrated agricultural growth project for improvement and use of the modern techniques and thereby would certainly contribute to prosperity in the agriculture

sector and reduce the rural poverty by programs like farmers training, nursery growing trainings and modern agriculture equipment distribution programs etc.

Income Generation Program

- Establishment of Self -help groups
- Rural entrepreneurship development program
- Vocational training
- Business process outsourcing

Health, Education & Infrastructure

- Health camps
- Innovative teaching methods
- Adult education
- Sanitation
- Infrastructure development projects

8.5.1 Recommendation for CER activities

Based on the various studies conducted during the baseline survey the following points related to social environment have been highlighted in the study area. Workers from nearby villages shall be given priority for employment as per their skills.

Community awareness programmed like aids awareness, polio camps, eye camps and blood donation camps will be organized in the company and in its vicinity from time to time for the benefit of employees and their families and people living in the surrounding area.

The project comes under green field project, the project cost is less than Rs.100 crore, the total project cost is Rs.25.00 lakh, 2.0 % of capital cost has been earmarked towards CER is Rs 0.5 Lakh.

Table No- 8.1 CER Budget

SL No	Item	Totals in RS. Lakhs		
		Year 1	Year 2	Total
1	Village Infrastructure Development			
1.0	Construction of community toilet	0.5	0	0.5
	Total	0.5	0	0.5

8.6 CORPORATE SOCIAL POLICY

The evolving Corporate Policy will be adjusted periodically based on the target areas and their performance results, which shall be monitored by M/s Sirigida Sand quarry. The benchmark a company’s current operations and impact on

society and the environment in order to know how and where they can improve. Whole point of a CSR report should be to understand and showcase how business was conducted in the past, so a company can plot a course to do better in the future. The CSR strategy is good, don't make the mistake of dwelling on the past CSR successes and forget to focus on future goals. The future goal is how to achieve in time. This will help the organization and their stakeholders to measure the success of that particular plan.

8.6.1 Implementation Methodology

The projects are to be planned in a participatory manner, in consultation with the community, literally sitting with them, and gauging their basic needs. Industry management should take recourse to "Participatory Rural Appraisal", which is a mapping process. Subsequently, based on a consensus and in discussion with the village level, prioritize requirements. And thus a project is born to implement. Implementation is the responsibility of the community and management team jointly, as is the monitoring of milestones and the other aspects. The Monitoring system entails physical verification of the progress and the actual output of the project. Village meetings are to be held periodically to elicit feedback on the benefits to the community programs and the areas where these need to be beefed up. Initially the management of **M/s Sirigida Sand Quarry** should try and ensure that while in the short term they have to do enormous hand-holding, the projects become sustainable by the beneficiaries over the long haul. Once this stage is reached, the management can withdraw and the programs can be self sustainable. In this way we do not build a culture of dependence, instead we make the villagers self-reliant.

For an efficient system and implementation practice, village committees are to be formed which should send their representatives to the constituted peripheral development committee, constituted with the industry/proponents, representatives of the concerned village committee, local administrative representatives. This Peripheral Development Committee shall prioritize the areas of work and work schedule, which shall be jointly monitored by the Industry / proponent and the respective village committee. After due completion of the project, for peripheral development of project area shall be shared with the Peripheral Development Committee for all transparency.

8.6.2 Formulation of Individual Village Committee

Each village will be having a selective group of people either by election or by selection to represent the village and to put forth demands before the Development Committee in order to allocate funds for utilization in the identified area for sustainable programs. One or two elderly persons in the village, the school teachers and AWC workers should be chosen for local representatives of the village in this committee.

Table 8.2 CSR Activities and its Cost

Category	Cost (in Rupees)
Educational support facilities for poor students	20,000
Total	20.000

8.6.3 Formulation of Individual Village Committee

Each village will be having a selective group of people either by election or by selection to represent the village and to put forth demands before the Development Committee in order to allocate funds for utilization in the identified area for sustainable programs. One or two elderly persons in the village, the school teachers and AWC workers should be chosen for local representatives of the village in this committee.

8.6.4 CSR Reporting and Showcasing

The primary intent of CSR/CER reporting is to attempt for portraying the relationship between the Corporate and Community at large in order to enhance the communication between the two for a sustainable growth of business. CSR reports go beyond the financial facts and figures of interest to investors to describe a company's relations with the full range of its stakeholders, employees, customers, communities, suppliers, governments and the environment. The nine categories of reporting parameters are Social/Community, Philanthropy, Integrated (Annual Financial and Non-Financial), Sustainability (Environmental/Social/Economic), Corporate Responsibility (EHS / Community / Social), Environment, Health and Safety, and Environment and Social Causes.

The financial implications of CSR activities may be registered in a format as given in the table below, as well as be included in the general ledger for common accounting for clarity and transparency. More so, it is a mandate by virtue of the

CSR guidelines as per the revised Company's Act 2016. The following heads of accounts is been given as a template, subjected to change based on the recommendation of CSR committee in future.

Table No 8.3: Format for CSR Record Maintenance

SL	Category	Activities	Description of Location / Area/Community Spending for Year 2020-21*	Amount Spent in INR
1	Health & Sanitation	Drinking water		
2	Health & Sanitation	Health Care		
3	Education and Literacy	Education		
4	Basic Infrastructure	Roads & Infrastructure		
5	Community Infrastructure	Community Development		
6	Social Cause	Women Empowerment		
7	Social Cause	Cultural		
8	Awareness Development	Awareness program		
Total				

* Sample Year for Record Keeping

8.6.5 CSR Committee

To monitor the CSR policies and activities of the company there should be a CSR Committee. As provided under Section 135(1) itself, the companies shall be required to constitute. Corporate Social Responsibility Committee of the Board **"Hereinafter CSR Committee"**. The CSR Committee shall be comprised of 3 or more directors, out of which at least one director shall be an independent director. The Committee shall meet at least twice in a year to discuss and review the CSR activities and policy. The quorum shall be two members are required to be present for the proceeding to take place. The Chairperson and members of the committee will recommend a formal CSR Policy, this document and will recommend particular CSR activities, set forth a budget, describe how the company will implement the project, and establish a transparent means to monitor progress. The Board of Directors on its own and/or on the recommendation of CSR committee can amend its policy as and when required deemed fit. Any or all provisions of CSR Policy would be subjected to revision/ amendment in accordance with the regulations on the subject as may be issued from relevant statutory authorities, from time to time.

8.6.6 Benefits of CSR Activities

Now CSR is a mandated practice in India. This practice is benefited for both companies as well as for Society.

Benefits for the Company:

CSR creates a platform of image building for companies. It provides a better brand recognition.

It improves relation with stakeholder as well as motivates its employees for retaining their jobs.

CSR practice attracts investors, vendors and increases sales & customer loyalty.

CSR also is beneficial for risk mitigation and is helpful for being compliant with government regulations and legal provisions.

It improves business reputations, makes easier access to capital for organizational growth.

It saves operational cost and improves financial performance.

Benefits for Society:-

CSR practices not only, benefits the company by creating a good will and support system, but also helps in supporting the wellbeing of the locals with enhanced livelihood support for a sustainable development of the area.

It creates scope for better education.

Availability of better employment opportunities.

Availability of technology and infrastructure to the society.

Motivate and aware to the society about natural environment protection and sustainable livelihood.

Availability of better health care facility.

Improves quality of living.

Develops sense of security & belongingness.

8.7 CONCLUSION

The stories do a great job of showing the types of relationships CSR efforts have with community and the environment. However, they don't give a company and its stakeholder's baseline metrics to test against and evaluate the success of future CSR efforts.

The company should be committed to be a good corporate citizen not only in compliance with all relevant laws and regulations but also by actively assisting in the improvement of the quality of life in which it operates with the objective of making them self reliant. The social responsibility is to support community initiatives in community health, family welfare, water management, vocational

training, education and literacy. It will be reviewed periodically in consonance with national and regional priorities. The company not to treat these activities as optional but would strive to incorporate them as integral part of its business plan. The company would encourage volunteering amongst its employees and help them to work in the communities.

Corporate Social Responsibility has no boundary for addressing the Peripheral Developments for locals. More so it is the intent of the management to incorporate the local entities as stakeholders with a live & let live ideology. As it has become a mandate by the statutory organizations, hence it needs to be addressed at all levels of Corporate Planning, Strategy and Implementation of Projects. Until the local partners are in synch with business, there cannot be a steady growth of the business. This planning is a stepping tool to address the subject and can be utilized for a better plan and corporate synchronization in **M/s Sirigida Sand Quarry** future endeavors.

CHAPTER- 9

ENVIRONMENTAL COST BENEFIT ANALYSIS

As per EIA Notification dated 14th September, 2006 as amended from time to time; the chapter on "Environmental Cost Benefit Analysis" is applicable only, if the same is recommended at the Scoping Stage, which is not for this case. Again as per the ToR points issued by SEAC, vide letter no. **64601/SEIAA dtd.25.11.2021** for proposed project, the Environmental Cost Benefit Analysis is not a criteria of compliance. However, some of the distinct project benefits are laid out as below:

9.1 PROJECT BENEFIT

The comprehensive Environmental Management Plan will focus on the complete reduce, recover, recycling/reuse of treated waste water achieving a zero discharge standard, the maximum reuse of solid waste, adequate air pollution control measures so as to keep the resultant of the ground level concentration well within the NAAQS residential norms and the adequate green belt cover in one third of the project area for enhancement of the local ecology. M/s Sirigida Sand Quarry. has already achieved Zero discharge for its existing unit and planning to utilize all its waste products to achieve Zero waste and same principle will be followed for the product mix change activity project also. All these achievements will obviously neutralize the adverse impacts of the pollution caused due to operation. Then the beneficial impacts like the employment opportunity, improvement in infrastructure facilities, improved business opportunity etc. will obviously improve the socio-economic conditions of the locality.

- Infrastructure development.
- Direct & indirect Employment opportunity
- Revenue generation to central & state government.
- Allocation of minimum 2.5 % of the project cost towards the ESC activities.
- Under CSR activities 2% of profit after sustainable running of project to spent towards development of locality as per guide line of section 135 of Companies Act 2013.

9.2 EMPLOYMENT POTENTIAL

The project has already created substantial employment and income. Skilled and semi-skilled workers are engaged by the company as per its policy. Further the project will contribute in a positive manner towards direct employment in the project area. Some employment potential benefits are given below:

- Long term employment for 17 people in the operation phase of the existing project.
- Generating additional associated jobs.
- Indirect employment will be developed due to project.

CHAPTER- 10

ENVIRONMENT MANAGEMENT PLAN

10.1 INTRODUCTION

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

Objectives of EMP

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

10.2 ENVIRONMENT MANAGEMENT SYSTEM

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

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

- If wild animals are noticed crossing the river bed, they will not be disturbed or chased away, instead the labours will move away from their path.

10.3 ENVIRONMENTAL MANAGEMENT PLAN IMPLEMENTATION

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

Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.

Collection of soil samples at strategic locations once in every two years and analysis thereof with regard to deleterious constituents, if any.

Measurement of water level fluctuations in the nearby ponds dug wells and bore wells.

Regular visual examination will be carried out to look for erosion of river banks. Any abnormal condition, if observed will be taken care of. The banks will be restored before the monsoon during the suspension of mining activity.

Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done twice a year for the first two years and thereafter once a year.

Plantation will be done as per program i.e along the road sides and near civic amenities, which will be allotted by Government, Post plantation, the area will be regularly monitored in every two years for evaluation of success rate. For selection of plant species local people should also be involved.

Mine management will be in regular touch with local surrounding villages to update the various developmental schemes made for or by them. It will also consider any immediate requirement, which could be taken care of in near future.

An Environmental Management Cell (EMC) is envisaged which will be responsible for monitoring EMP and its implementation. EMC members shall meet

periodically to assess the progress and analyze the data collected within the month.

EMC will be in regular touch with State Pollution Control Board and send them regular progress report. Any new regulations considered by State/Central Pollution Control Board for the mining industry will be taken care of by it.

Proposed set up

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

The said team will be responsible for:

Collecting water and air samples from surrounding area and work zone monitoring for pollutants.

Analyzing the water and air samples from authorized Lab from SPCB

Implementing the control and protective measures.

Co-coordinating the environment related activities within the project as well as with outside agencies.

Collecting statistics of health of workers and population of surrounding villages.

Monitoring the progress of implementation of environmental management program. Greenbelt development, etc.

10.4 BUDGET ALLOCATION FOR EMP IMPLEMENTATION

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

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

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

Table No- 10.1 Environment Management Plan Cost (in Lakhs)

Sl. No	Particulars	Capital cost (in Rs.)
1	Environmental Monitoring(Ambient Air Quality Monitoring PM10 and PM2.5 SO ₂ , NO _x and CO & Other Parameters as per regulatory norms))	30,000
2	Water Sprinkling ,Plantation and maintenance	5,000
3	CSR activities	20,000
4	Miscellaneous Activities	15,000
Total Capital Cost in Rs.		70,000
Total Recurring Cost in Rs.		30,000

10.5 OCCUPATIONAL SAFETY AND HEALTH

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

Provided that in case any dust related diseases need to be conducted more frequently as the examination authority deems necessary.

10.6 ENVIRONMENT POLICY

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

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

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

Comply with all applicable safety, health and environment laws and regulations
Enhance Safety, Health and Environment (SHE) awareness among employees and associated stakeholders through effective communication and training

Investigate all workplace incidents and illness in order to promptly correct any unsafe conditions or practices Integrate SHE considerations into business planning and decision making SHE responsibility among our employees in their practices, and promote and value their involvement in achieving the goals of this policy Increase shareholder value through SHE excellence

CHAPTER- 11

SUMMARY & CONCLUSION

Name of the Project	Green field project- Sand Mining with production capacity 10700 Cum/Annum over Sirigida Sand Quarry (ML area 7.28 ha), village- Sirigida, Tahsil-Talcher, District-Angul, Odisha.
Name of Project Proponent	Mrs Sanghamitra Bhutia

SL No	Salient Features			
1	Village	Sirigida		
	Tahsil	Talcher		
	District	Angul		
	State	Odisha		
	Average height of area above MSL(M)	64m		
2	Toposheet No	73-G/4		
3	Latitude/Longitude at the four corners of site	Corner	Latitude	Longitude
		A	21°00'52.89"N	85°13'32.68"E
		B	21°00'46.07"N	85°13'32.80"E
		C	21°00'47.39"N	85°13'28.69"E
		D	21°00'48.36"N	85°13'26.03"E
		E	21°00'47.93"N	85°13'25.00"E
		F	21°00'48.09"N	85°13'24.39"E
		G	21°00'48.52"N	85°13'24.21"E
		H	21°00'49.03"N	85°13'21.95"E
		I	21°00'49.85"N	85°13'19.56"E
J	21°00'55.79"N	85°13'20.55"E		
4	Number of days operation in a year	240		
5	Total Production for plan period of five years	53,500 Cu.m		
6	water	This is a mining project to produce required size River Sand as a raw material for building & constructions purpose. However, total water approx, 1.0 KLD will be required for different purposes like Domestic, Dust suppression, plantation purposes.		
7	Cost of the project	25.00Lakh		
8	CER Budget	0.5lakh		
9	CSR Budget	20,000.00		
10	Manpower	17		
11	Power Requirement	No electrical power shall be required for operations as the mining will be worked out during day time only. Solar lights will be used for day to day living purposes		

CONCLUSION

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

CHAPTER-12

DISCLOSURE OF CONSULTANTS ENGAGED

12. INTRODUCTION

The EIA/EMP report for M/s Sirigida Sand Quarry (Lease Area: 7.28 ha) Village- Sirigida Tahasil- Talcher Dist- Angul, Odisha by Sanghamitra Bhutia, Angul, Odisha. For the proposed project has been prepared by Ardra Consulting Services Pvt. Ltd., Bhubaneswar accredited by QCI/NABET for preparing EIA/EMP reports in 9 major sectors, including "Mining of minerals including opencast mining" vide certificate no. NABET/EIA/1922/IA0055 dated 16.03.2020. This certificate is valid up to 29.12.2022. The details of sectors accorded to ACS under the QCI-NABET scheme for accreditation of EIA consultant organization is given below.

12.1 PROFILE OF EIA/EMP CONSULTANT

ACS established and NABET accredited Environmental Consultant based in Bhubaneswar and working since last 11 years. We are having tie up with well-equipped laboratory for field studies as well as for testing and monitoring of Air, Water, Noise, Soil and other related activities of Environment of Mines and Industries. Ardra Consulting Services Pvt. Ltd. (ACS) intends to impart quality management services to all sectors of society and be a part of the nation building activities. The focus of this Consulting House is to identify and analyze any given problem and facilitate the scope of management to all sectors of present society. The members of the ACS Family have strong skills; experience and understanding of various current socio-economic issues; and can design and implement solutions for the "Bottom of the Pyramid". ACS fellows believe in Innovativeness, encompassed with scientific skills and professional management.

ACS is specialized in Environmental Services as mentioned below:-

Environment Impact Assessment studies for Industries, Mines, Municipalities and Govt Agencies

ESA phase I, II and III

Preparation of Comprehensive EMP with risk assessment and its mitigation measures

Solid Waste, Industrial Waste, & Urban Waste Management

Greenery Management & Planning

Environment Auditing

Environmental Impact Assessments and DMP Preparation
Third Party Hazardous Waste Audit
Risk Assessment & Disaster Management Plan
Geological and Hydro geological studies and assessment
Rainwater Harvesting Plan with Recharge techniques
Watershed Management and Implementation
Remote Sensing and GIS studies with Spatial Database Management
CRZ Clearance and EMP/DMP preparation
Business Work Flow preparation and Logistic Management
Problems of Deforestation, Social Forestry and Agro-Forestry
Site Survey, Total Station Survey and DGPS Survey with Boundary demarcation and pillar posting.
PFR preparation for Industrial and mining processes and design specifications for implementation.
Global Environmental Issues and Awareness Programs
Industrial training of Environmental Management and Planning
Study of Social Environmental degradation and its Socio-Economic Impacts
Issues pertaining to Mining and Environment with preparation and review of mining plans, closure plans and management plans
Human Health Risk Assessment due to Industrialization and necessary modelling
Air and Water Quality Modelling, GW Modelling, Transport Modelling, Optimization Modelling
Source Apportionment Studies
Pollutant Pathway Transportation Modelling
Air Quality and Water Quality Modelling
Dump Management Plan
Traffic Studies and vehicular pollution load estimation
Ecological Impact Assessment studies
Channel Studies and Drainage Planning
Regional Impact Assessment Studies and Strategic Planning
Strategic Implementation of MIS and CIS programs
Work-Environment Studies
Municipality Solid Waste Management Plan for Medium and Large ULBs
FRA, Compensatory A forestation Plan and Cost-Benefit Analysis
Diversion of Forest land for Non-Forest purposes
Site Specific Wildlife Conservation Plan
DGPS Survey and Land Use / Land Cover maps
Socio-Economic Problems and Their Cause

Socio-Economic Impact Assessment
Logistics Management
Problem related to Growth of Small Scale Industries
Issues relating to Tribal Areas and Tribal Population
Various Problems relating to Industries for Labor Management, Production Scheduling
Panchayatiraj & Rural Development Programs
Functioning of "Mission Shakti", National Employment Guarantee Program, "Indira Avas Yojana", "Swarna Jayanti Yojana", "Mahila Vikash Yojana", "Samabaya Nigam" (MVSN)
Employment of women in Agriculture and Allied Industries
SIA, PRA Studies with Socio-Economic Assessment
SIA Studies with R & R Survey and Rehabilitation Planning
CSR Planning & Documentation for CSR Audit
Women & Child labour issues and strategic solutions
Watershed Management and Livelihood Planning
Reinforcement Strategies for "Pani Panchayat "
Studies on Agri-Industries' problem and prospects
Contact Farming and Commercialization of Agriculture
Co-operative Credit Societies and Investment in Agriculture
Marketing of Agricultural Products
Rural employment and Rural Based Industries
Organic Farming and Vermi-culture
Livestock Farming, Pisci-culture, and Allied Farming Techniques
Problem of Storage of Agri-Products and economically viable suggestions
New Technological Management and cost effectiveness of Agriculture
Supply Chain logistics for Food Grain Management and Marketing
Problem of Crop Insurance and Reduction of Risk in Agriculture
Natural Resource Management
Employee and Employer Relationship Management
Communication Management for smooth functioning of Corporations, Banks, Social Organizations, Industries, and any Functionary Units & necessary Training
Rural Unemployment issues and Employment Strategies
Women Empowerment and building self confidence
Industrial Development and equity in income of the Industrial Workers
Labour unrest and Productivity issues of Industries

Implementation of Labour Welfare measures in Industries
Personality Development and Corporate Cultural Training
Hiring Assistance and Strategic Planning
Resource management and Planning
Soft Skill development and Finishing School
Project Formulation, Evaluation, Implementation, and Training
Formulation of different Socio-Economic Projects and laying out Methodology for implementation
Evaluation of Projects with current and post-facto considerations
Impart training to unemployed rural youth for engagement in various economic activities by use of local natural resources
Natural Resource Management, Training & Evaluation
Training & Strategy for Leadership and Corporate Communications
Corporate Behavior study and HR Allignment
Resource Management and Optimization
Job Risk Assessment, Mitigations, and Management Training
Leadership Training and Capacity Building
Supply Chain Logistic Management and Training
Resource management for Tribal youths for sustainability and growth
Training rural women for AIDS Awareness, child malnutrition, sanitation and hygiene, reproductive health and Women Trafficking
Training for self-help groups and micro-finance institutions
Farmer training packages for crop management and choice of crops, harvest technology,
Method of Storage and Field Operation of different activities
Training on diversified farming system and risk mitigation w.r.t calamities
Disaster Management & Response system Training
Communication & Counseling programs for target groups
Market Awareness training for Farmers
Sustainable Development strategy training for Industrial Houses
Environmental Training for Corporate Houses

Fig. 12.1: NABET Accreditation Certificate

