DRAFT ENVIRONMENTAL IMPACT ASSESSMENT

AND

ENVIRONMENTAL MANAGEMENT PLAN

for

BALANDA STONE QUARRY (7,9,14,15,16)

(Under Cluster)

(Baseline monitoring period- October, 2023 to December, 2023)

Plot No.	**2473/P, 1899/P, 2008/P, 2009/P, 2473/P, 2473/P & 2010/P and 1893/P & 2010/P**
Khata No.	**504 & 506**
Area	**Proposed area 44.05 Ac or 17.823 Hc out of total cluster of area 95.6Ac or 38.687 Hc**
Production	**2,10,208.4 Cum/ Year**
Location	**Village - Balanda, Tehsil – Lathikata, District - Sundargarh, Odisha**

APPLICANT

Sri Bijay Kumar Agarwal & Others
Plot no-V/4,Civil Township,
Rourkela, P.S-Raghunathpali,
Odisha-769004

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A QCI –NABET Accredited Organization

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CHAPTER 1 : INTRODUCTION

1.0 PREAMBLE

Environment Impact Assessment (EIA) is a process used to identify the environmental, social & economic impacts of a project prior to decision making. It is a decision-making tool, which guides the decision makers in taking appropriate decisions for proposed projects. It aims predicting environmental impacts at an early stage of project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision makers. By using EIA, both environmental & economic benefits can be achieved. By considering environmental effects prediction & mitigation, early benefits in project planning, protection of environment, optimum utilization of resources, thus saving overall time & cost of the project.

Environmental Impact Assessment report is prepared to comply with the Terms of Reference (TOR) received from SEAC, Odisha under EIA notification of the MoEF & CC dated 14th September, 2006 and its subsequent amendment there-off and also the EIA Guidance Manual for Mining of Minerals of MoEF & CC, Govt. of India, for seeking environmental clearance for mining of Stone in the applied mining lease area.

Description of Lease Area

The proposed projectBalanda Stone Quarry Cluster (7, 9, 14, 15, 16) is located at village-Balanda, Tehsil-Lathikata, District - Sundargarh in Odisha. Details of Proposed Project have been given in **Table No.1.1.**

The total lease area of the proposed cluster is 17.823 Ha which is greater than 5 ha. So, as per the EIA notification 2006 and its subsequent amendment, Proposed Project falls in Category B1.

There are 14 projects in total which lie within 500m radius of each other. Of which, **05 projects are currently proposed**, 03 project are operating mines, 02 projects are non-operating mines and 04 projects are Extinct. **The 05 Projects that are Proposed in cluster now are Balanda Stone Quarry Cluster - 7,9,14,15 & 16**and 03 Projects are Operating Mines i.e. Balanda Stone Quarry Cluster - 2, 3, 10 and 02 Projects are Non-Operating Mines i.e. Balanda Stone Quarry Cluster – 1, 8 and 04 Projects are Extinct Mines i.e. Balanda Stone Quarry Cluster – 4, 5, 6, 11. The proposed project lies near village Balanda, Tehsil-

Lathikata, District – Sundargarh of Odisha over an area of 17.823 Ha, 44.05 Acres. And the area of all the 14 quarries in the Cluster is 38.687 Ha, 95.6Acres. Details of all the Quarries is given below in Table 1.1

Table 1.1, Details of Stone Quarry in Cluster

S. N	Mine	Proponent	LandSchedu	Area (Acres	Production (cum/year)	Status of Mine
1	Balanda Stone Quarry-1	Natwarlal Bansal	KhataNo-504 Plot No – 1897/P	4.249 Ha 10.50 Acres	38054	It is a Running source and Lease will expire on Dt. 19.12.2023
2	Balanda Stone Quarry- 2	Kameswar Tiwari	Khata No-504 Plot No – 1897/P	4.876 Ha 12.05 Acres	100019.6	Operating Mine
3	Balanda Stone Quarry- 3	Shankarlal Agarwal	Khata No-504 Plot No – 1893/P	4.046 Ha 10.00 Acres	97097.0	Operating Mine
4	Balanda Stone Quarry-4	NA	NA	NA	NA	Extinct Mine
5	Balanda Stone Quarry-5	NA	NA	NA	NA	Extinct Mine
6	Balanda Stone Quarry-6	NA	NA	NA	NA	Extinct Mine
7	**Balanda Stone Quarry-7**	**Essen Construction**	**Khata No-506 PlotNo– 2473/P**	**4.046 Ha 10.00 Acres**	**50049**	**TOR Granted on 08-02-2024 (Proposed Quarry)**
8	Balanda Stone Quarry-8	Punam D Sahu	Khata No-238(Sabak) PlotNo– 2292/P	2.832 Ha 7.00 Acres	60004	It is a Running source and Lease will expire on Dt.

						19.12.2023
9	**Balanda Stone Quarry-9**	**No Successful bidder finalized**	**Khata No-504 PlotNo– 2008/P 1899/P 2009/P**	**4.876 Ha 12.05 Acres**	**50057.8**	**TOR Granted on 08-02-2024 (Proposed Quarry)**
10	Balanda Stone Quarry-10	Prem Kumar Sahu	KhataNo-504 Plot No - 1899/P	4.856 Ha 12.00 Acres	12086.2	Operating Mine
11	Balanda Stone Quarry-11	NA	NA	NA	NA	Extinct Mine
12	**Balanda Stone Quarry-14**	**Bijay Kumar Agarwal**	**Khata No-506 PlotNo– 2743/P**	**2.832 Ha 7.00 Acres**	**15016**	**TOR Granted on 08-02-2024 (Proposed Quarry)**
13	**Balanda Stone Quarry-15**	**Katakata Jagnyanarayan Prusty**	**Khata No-506 504 PlotNo– 2473/P 2010/P**	**2.023 Ha 5.00 Acres**	**15015**	**TOR Granted on 08-02-2024 (Proposed Quarry)**
14	**Balanda Stone Quarry-16**	**Katakata Jagnyanarayan Prusty**	**Khata No-504 Plot No – 1893/P 2010/P**	**4.046 Ha 10.00 Acres**	**80070.6**	**TOR Granted on 08-02-2024 (Proposed Quarry)**
	Total			**95.6 Acres. 38.687 Ha**	**Cluster Production is 5,17,469.2 cum/year**	

Copy of Form-F for each quarry (Intimation to Successful Bidder) is attached as ***Annexure-II***. Mining Plan for each individual quarry has been prepared and approved. The Mine plans have been attached as ***Annexure-III.***

The Environmental Impact Assessment (EIA) study report is prepared for obtaining Environmental Clearance (EC) from SEIAA, Odisha for the Proposed Project.

Table 1.2, Details of Mining Plan & Form F of proposed Stone Quarries

Mine	Dates of Form F	Mining Plan Approval Date
Balanda StoneQuarry-7	26.11.2021	27.10.2021
Balanda StoneQuarry-9	Bidding is to be done	16.04.2022
Balanda StoneQuarry-14	29.11.2021	27.10.2021
Balanda StoneQuarry-15	04.02.2021	27.10.2021
Balanda StoneQuarry-16	14.12.2021	23.11.2021

1.1 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

Name of the Project:

The proposed project is Balanda Stone Quarry Cluster (7, 9, 14, 15, 16)which is over an area of 17.823Ha (44.05 Acres). The total proposed production is 210208.4cum/year.

Location of the Project:

Balanda Stone Quarry Cluster (7, 9, 14, 15 & 16) is located at village -Balanda, Tehsil-Lathikata, District - Sundargarh in Odisha. There are 14 quarries within 500m radius of the proposed quarries, for which the details are given above in Table 1.1. The area falls in Survey of India Topo sheet No. F45G12 & F45G16.pillar Coordinates of the proposed quarries has been given in Table 1.3 below

Table 1-3: Pillar Coordinates

Balanda Stone Quarry 7		
P1	22° 11' 21.45" N	84° 45' 34.90" E
P2	22° 11' 21.37" N	84° 45'24.21" E
P3	22° 11' 25.66" N	84° 45' 24.18" E

P4	22° 11' 25.72" N	84° 45' 34.64" E
Balanda Stone Quarry 9		
P1	22° 11' 13.43" N	84° 44' 42.19" E
P2	22° 11' 15.43" N	84° 44' 54.24" E
P3	22° 11' 10.75" N	84° 44' 54.49" E
P4	22° 11' 08.91" N	84° 44' 43.08" E
Balanda Stone Quarry 14		
P1	22° 11' 28.44" N	84° 45' 34.26" E
P2	22° 11' 28.98" N	84° 45' 26.78" E
P3	22° 11' 32.96" N	84° 45' 22.68" E
P4	22° 11' 32.76" N	84° 45' 31.87" E
Balanda Stone Quarry 15		
P1	22° 11' 15.27" N	84° 45' 26.51" E
P2	22° 11' 15.55" N	84° 45' 20.85" E
P3	22° 11' 19.18" N	84° 45' 20.76" E
P4	22° 11' 19.18" N	84° 45' 26.29" E
Balanda Stone Quarry 16		
P1	22° 11' 15.36" N	84° 45' 12.42" E
P2	22° 11' 16.20" N	84° 45' 05.18" E
P3	22° 11' 22.09" N	84° 45' 05.42" E
P4	22° 11' 21.26" N	84° 45' 12.45" E

Brief Description of the project

Balanda Stone Quarry Cluster (7, 9, 14, 15, 16)is located at village - Balanda, Tehsil- Lathikata, District – Sundargarh of Odisha. The applied project is over an applied area of 17.823 Ha or 44.05 Acres

As per EIA Notification 2006 and Subsequent Amendments, the project is coming under B1 Category as the lease area is more than 5.0 Ha.

The estimated project cost for the proposed cluster project is Rs 45.2829 Crore (Balanda Stone Quarry -7 = 17.5098 Crore + Balanda Stone Quarry- 9= 5.0054 Crore + Balanda Stone Quarry-14 = 7.5080 Crore + Balanda Stone Quarry-15 = 5.2553 Crore & Balanda Stone Quarry-16= 10.0044 Crore). The Average proposed Cluster Production is proposed to be 210208.4 cum/year. This stone would be mainly used for civil works in major projects and nfrastructures development so as to meet the market potential.

Table 1-4: Brief Description of the Project

S. No.	Particulars	Details
A.	Nature & Size of the Project	Balanda Stone Quarry Cluster (7, 9, 14, 15 & 16) near village- Balanda, Tahasil – Lathikata, District- Sundargarh, Odisha Area- 17.823Ha, 44.05 Acres. Proposed Production is210208.4cum/year
B.	Location	
	Name of Village	Balanda
	Tehsil	Lathikata
	District	Sundargarh
	State	Odisha
	Toposheet No.	F45G12 & F45G16
C.	**Mine Lease AreaDetails**	
	Lease Area	17.823 Ha or 44.05 Acres (Proposed Area)
	Topography	The lease area represents a rugged terrain.

<table>
<tr><td></td><td>Site Elevation Range</td><td colspan="2"><table>
<tr><th>Mine Blocks</th><th>Max (m RL)</th><th>Min (m RL)</th></tr>
<tr><td>7</td><td>250</td><td>234</td></tr>
<tr><td>9</td><td>280</td><td>256</td></tr>
<tr><td>14</td><td>302</td><td>278</td></tr>
<tr><td>15</td><td>250</td><td>246</td></tr>
<tr><td>16</td><td>310</td><td>290</td></tr>
</table></td></tr>
<tr><td>D.</td><td colspan="3">Cost Details</td></tr>
<tr><td></td><td>Cost of the project</td><td colspan="2">Rs. 45.2829 Crores (for Cluster Area)</td></tr>
<tr><td></td><td>Cost for EMP</td><td colspan="2">For Cluster:
Capital cost :- 23.00 Lakhs,
Reccuring cost :- 12.10 Lakh/annum</td></tr>
<tr><td></td><td>Cost of CER</td><td colspan="2">For Proposed Quarries: Rs. 90.56 Lakhs
For Cluster: Rs. 91.00 Lakhs</td></tr>
<tr><td>E.</td><td colspan="3">Details of Environmental Setting</td></tr>
<tr><td></td><td>Ecological Sensitive Areas (National Park, Wild Life Sanctuary, Biosphere Reserve, Reserve/ Protected Forest etc.) within 10 km distance</td><td colspan="2">There is no National Park, wildlife Sanctuary or Biosphere Reserve within 10 km distance from the lease area.
Butukupiri RF approx 2.50 Km, SSE direction.
Sagjor RF approx 2.48 Km, West direction.
Rutukupiri RF approx 7.10 Km, South direction
Kumaria RF approx 5.91 Km, WSWdirection
Jogisar RF approx 8.71 Km, North direction</td></tr>
<tr><td></td><td>Water Bodies,</td><td colspan="2">Pitamahal Dam , approx.0.25 km towards West direction from the Mining lease.
Brahmani River, approx. 5.11 km towards North East direction from the Mining Lease.
Sankh River, approx. 6.60 km towards North direction from the Mining Lease.</td></tr>
<tr><td></td><td>Nearest Town</td><td colspan="2">Kansbahal Town, approx.9.04 km in WNW direction.</td></tr>
<tr><td></td><td>Nearest Railway Station</td><td colspan="2">Kansbahal Railway station, approx. 8.55 km in WNW direction.</td></tr>
</table>

	Nearest National/State Highway	National Highway is NH- 143 at a distance of 4.92 km towards NE direction State Highway is SH- 10 at a distance of 5.25 km towards North direction
	Nearest state boundary	There are no state boundary within 10 km radius from proposed mine site
	Nearest Airport	Biju Patnaik International Airport is approx.245.10 Km towards SE direction.
	Seismic Zone	As per the 2002 Bureau of Indian Standards (BIS) Map, Odisha also falls in Zones II.

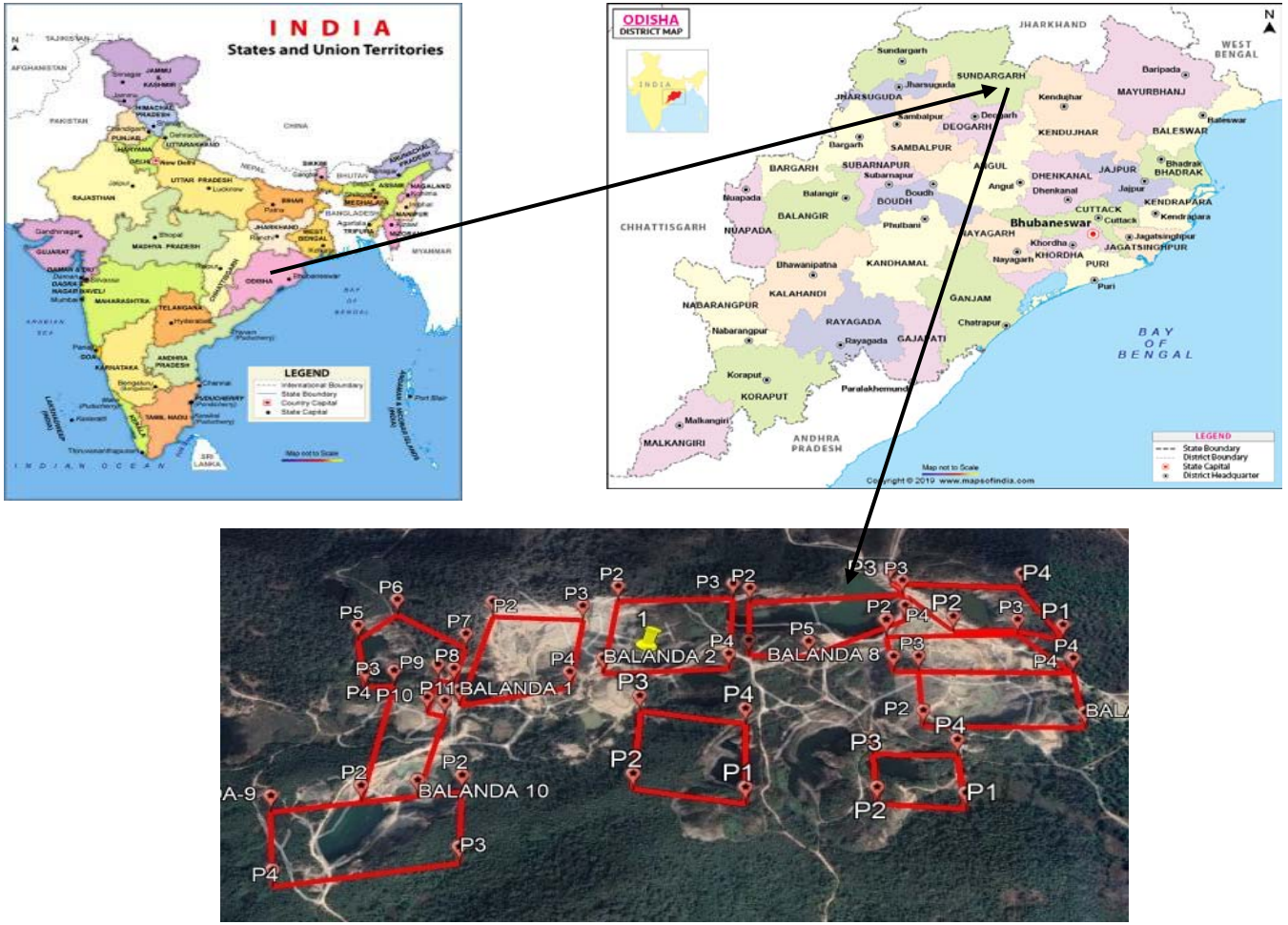


Figure 1-1:Location of the Project

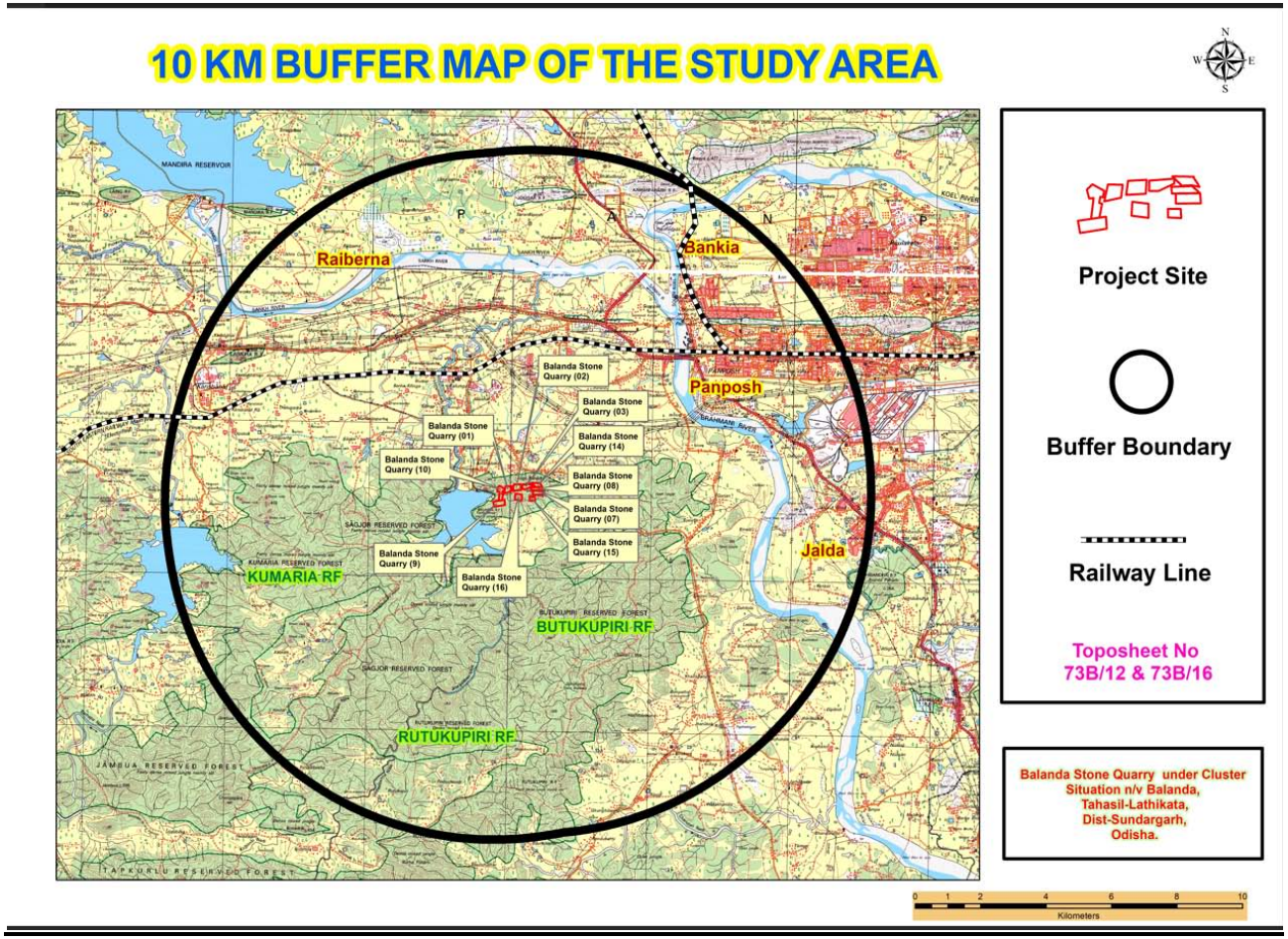


Figure 1-2: 10 Km Buffer Map of the Study Area

1.2 SCOPE OF THE STUDY

In line with the Terms of Reference (TOR) prescribed by SEIAA, Odisha the area comprising 10 km radius around the proposed mine lease boundary is considered as the study area. The EIA/EMP report has been prepared following the TGM of mining published in February 2010 & according to generic structure as per appendix III of EIA notification 2006. The detailed studies have been conducted as per prescribed TOR. The study area map is shown in **Figure-1.2**.

Table 1.5, TOR Detail

Mine	TOR Letter No
Balanda Stone Quarry- 7	File No. 418212/821-MINB1/06-2023 Dt. 08.02.2024
Balanda Stone Quarry- 9	File No. 418212/821-MINB1/06-2023 Dt. 08.02.2024
Balanda Stone Quarry- 14	File No. 418212/821-MINB1/06-2023 Dt. 08.02.2024
Balanda Stone Quarry- 15	File No. 418212/821-MINB1/06-2023 Dt. 08.02.2024
Balanda Stone Quarry- 16	File No. 418212/821-MINB1/06-2023 Dt. 08.02.2024

The Scope of Study broadly covered:

- Literature review and collection of data relevant to the study area;
- Establish the baseline environmental aspects in and around the proposed project;
- Identify various existing pollution loads due to various mining activities;
- Predict incremental levels of pollutants in the study area due to the proposed operations;
- Evaluate the predicted impacts on various environmental attributes in the study area by using scientifically developed and widely accepted environmental impact assessment methodologies;

- Prepare an Environment Management Plan (EMP) outlining the measures for improving the environmental quality; and
- Identify critical environmental attributes that are required to be monitored in the post-project scenario.

Compliance of TOR

Standard Terms of Reference for conducting Environment Impact Assessment study for non-coal mining projects and information to be included in EIA/EMP report by Ministry of Environment and forest and climate change.

	Conditions	**Reply**
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.	This is a new mine. Mining will be done after the grant of EC.
2.	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Form F (Intimation to Successful Bidder) has been attached as **Annexure-II.**
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 lessee.	All documents including approved mine plan, EIA are compatible with one another. The EIA report is prepared on the basis of information given in the approved mine plan and supportive documents like Form F. Copy of Approved Mining Plan is attached as **Annexure- III**. Production details are given in **Chapter 2.** Waste Generation & its Management are

		given in **Chapter 2.**
4.	All corner coordinates of the mine lease area, superimposed on a High Resolution/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	The corner co-ordinates of the mine leases area are shown in Chapter 2,Figure 2.1.
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.	Information has been provided in Survey of India Topo-Sheet as 1:50,000 as Figure 1.2 of Chapter-1**.**
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.	Detail of land proposed for mining activities has been given in Chapter 2. Present mining conforms to the land use policy of the State. There is no land diversion proposed.
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	The Environment policy prescribed for standard operating process to bring into focus any violation/deviation of the environment and forest norms/conditions that the company operations will

	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.	implement operational and risk management practices that provide for maximum protection of people and the environment. Details are given in Chapter 6.
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.	Issue related to mine safety has been given in Chapter 7.
9.	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.	The EIA study has been carried out in the 10 km radius zone from the periphery of the quarries. All the data so generated have been incorporated in EIA/EMP report. Details of Waste generation have been given in Chapter 2. A map showing Study Area (10 km radius)

		is given in Figure 1.2 of Chapter 1.
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 delineating forest area, agricultural land, grazing land, water bodies, human settlements, and other ecological features etc. are shown in figure 3.1of Chapter 3 and is supported by area breakup of the land use within 10 km radius from the mine site in table 3.1 of Chapter 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.	The detail of OB is given in Chapter 2 of EIA report.
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,	There is no forest land involved in the quarry areas

	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.	There is no forest land involved hence 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.	This project does not attract the recognition of forest right.
15.	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	The vegetation in the RF/PF areas is given in Chapter 3.
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	A study has been done to ascertain the impact of the mining project on wild life. Details of mitigation measures have been given in Chapter 4.

	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.	There is no National Parks, Biosphere Reserves, Wildlife Corridors, Ramsar Site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease area.
18.	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled- I fauna found in the study area, the necessary plan along with budgetary provisions for their	No flora or fauna species are found in the core zone. The species found in the study area are detailed under Section 3.6 of Chapter 3.

	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.	Proposed project does not fall in any such areas.
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).	Proposed project does not involve in CRZ zone.
21.	R&R Plan/compensation details for the Project Affected People (PAP) should be	There is no R & R plan involved for the proposed project.

	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 sectoralprogrammes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.	
22.	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site- specific meteorological data should also be	Primary baseline data on ambient air quality is given in Chapter 3. Water quality is given in Chapter 3. Noise level is given in Chapter 3. Soil characteristics is given in Chapter 3 Details of Flora and Fauna are given in Chapter 3. Site-specific metrological data have been collected, as prescribed, for post-monsoon

	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.	season of October, 2023 to December, 2023 in Chapters 3.
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.	Details of Air Quality impact and mitigation measures are given in Chapter 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	Total Water Requirement of the proposed project is 54.788 ~ 55.0 KLD and 27.67 KLD ~ 28 KLD for Cluster. Detail of

	Project should be indicated.	water requirement is given in Chapter 2.
25.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Agreed.
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.	At Conceptual Stage mined out area will be rehabilitated by water reservoir. The rain water shall be conserved here.
27.	Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	The proposed mining will not intersect the ground water table. The detailed impact and control measure w.r.t the quality of water in the surrounding area is discussed under Chapter 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	The proposed mining will not intersect the ground water table as the mining has not been proposed upto such depth and water table is about 20m to 30m bgl (varying in dry and rainy season). The proposed mining will be done in benches upto a depth of Balanda stone quarry 7 – upto 216mRL, Balanda stone quarry 9 – Upto 234 mRL, Balanda stone quarry 14 – Upto 258 mRL, Balanda stone quarry 15 – Upto 246 mRL&Balanda stone

<table>
<tr><td></td><td>Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.</td><td>quarry 16 – Upto 270 mRLand water table is about 20m to 30m bgl.

The detailed impact and control measure w.r.t the quality of water in the surrounding area is discussed under Chapter 4. No hydrological study is required.</td></tr>
<tr><td>29.</td><td>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.</td><td>No diversion is proposed.</td></tr>
<tr><td>30.</td><td>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.</td><td>The elevation range of mining lease area:

<table><tr><th>Mine Quarry Block</th><th>Max (m RL)</th><th>Min (m RL)</th></tr><tr><td>7</td><td>250</td><td>234</td></tr><tr><td>9</td><td>280</td><td>256</td></tr><tr><td>14</td><td>302</td><td>278</td></tr><tr><td>15</td><td>278</td><td>250</td></tr><tr><td>16</td><td>310</td><td>290</td></tr></table>The water table is about 20m to 30m bgl.

Details have been given at Chapter 2.</td></tr>
<tr><td>31.</td><td>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</td><td>A time bound Progressive Greenbelt Development Plan has been given in Chapter 9.</td></tr>
</table>

	mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	
32.	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	Impact on local transport has been given in Chapter 2.

33.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Infrastructure facilities to be provided for the mine workers are as under:- i. Rest shelter/ rest room. ii. Separate facility for female and male workers. iii. First aid room. iv. Training center. v. Canteen facilities.
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.	A detailed study on Conceptual post mining land use and Reclamation and Restoration of mined out areas with plans is discussed in Chapter-2.
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.	Detail of Occupational and Safety has been given at Chapter 6.
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	Detail of Public Health has been given at Chapter 6.

	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.	Socio economic significance and influence to the local community proposed has been discussed in Chapter 3.
38.	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Detailed Environmental Management Plan is discussed under Chapter 9 of EIA report.
39.	Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	Public hearing is yet to be conducted.
40.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	There is no litigation pending against the project.

41.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	Budget for Environmental Protection is given in Chapter 9.
42.	A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	A disaster management plan has been prepared and given in Chapter 7 of the EIA 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.	Details of Project Benefits have been given in Chapter 8.

44.	**Besides the above, the below mentioned general points are also to be followed:-**	
a.	All the documents to be properly referenced with index and continuous page numbering.	All the documents are 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.	Complied.
c.	The project proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL	Complied.

	accredited laboratories. All the original analysis/testing reports should be available during appraisal of the project	
d.	Where the documents provided are in language other than English, an English translation should be provided,	Agreed.
e.	The Questionnaire for environment appraisal of mining projects as devised earlier by the ministry shall also be filled and submitted.	Complied.
f.	While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF&CC vide O.M. No-J-11013/41/2006-IA.II (I) dated 4rth August, 2009.	Complied.
g.	Changes, if any made in the basic scope the project parameters (as submitted in Form-1 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 modification arising out of the P.H. process) Will entail conducting the PH	Agreed.

	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 compliance of the conditions stipulated in the environment clearance for the existing operations of the project should be obtained from the regional office of Ministry of Environment, Forest and Climate Change, as may be applicable.	This is new case for Mining.
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.	Compiled With EIA Report.

Specific Term of reference given by SEIAA Odisha on 08.02.2024 **Balanda Stone Quarry- (7, 9, 14, 15, 16)**		
Conditions		**Reply**
(i)	Submit NOC/Permission copy for 55KLD of ground water/surface waterutilization. They should also take permission from Water Resource Department.	Agreed &Noted.
(ii)	Submit plan for roads to be used for transportation and its management.	Agreed.

(iii)	Submit the SOP for blasting to be conducted at the cluster ML area.	Agreed.
(iv)	The PP shall submit a revised mining plan after maintaining a minimum 200- meter safety zone from nearest habitation/village and canal which are located adjacent to the proposed lease area.	Agreed.
(v)	The consultant shall submit geo-coordinating real-time photographs of all points during data collection and submit it in the EIA report.	Noted.
(vi)	Installation of STP of adequate capacity and requisite design.	Noted.
(vii)	Traffic study duly vetted by reputed institution.	Agreed.
(viii)	Arrangement of pipeline sprinkling (permanent water line) to be explored andconfirmed.	Agreed.
(ix)	Silt management and SOP for the same to arrest /remedy of silt ingress to surrounding agricultural lands.	Garland drain and settling tanks has been designed to arrest the silt surrounding the agricultural lands.
(x)	Safety measures during blasting including provision of warning to be submitted.	A detailed study on safety measures during blasting has been incorporated in chapter 2.

(xi)	Waste/Dump Management: Generation, use for construction and maintenance of haulage road and maximum inventory at any point of time including dump area, height and slope etc.	For waste and dump management Garland drain and settling tanks has been designed.
(xii)	Detail engineering estimate of use of waste in construction and maintenance of the haulage road.	The waste generated will be used for approach road development & maintenance purposes during plan period.
(xiii)	Distance of the nearest habitation / village (s) etc. from the lease boundary duly certified by the concerned Tahasildar/Ming Officer.	Approx 400 meters in North East direction from mine lease.
(xiv)	Will the village road be used for transportation of the mineral? If not andhaulage road will be used, the width and distance of it till it intersects with SH/NH /District Road any public road and the later distance from the village road.	Already there is a haulage road is present for transportation. Hence no need construct any other haulage road.
(xv)	In case village / any habitation is very nearby, plan to ensure safety of human life and livestock from accidents by submitted.	Blasting will be done by maintaining distance of more than 500meters from nearby habitation to ensure safety of human life and livestock from accidents.
(xvi)	Number and type of vehicles to be engaged per day and their frequency of	The detail has been discussed in Chapter -2.

	plying.	
(xvii)	Zero Liquid Discharge (ZLD) Management w.r.t garland drain details, settling tank details during monsoon. If ZLD is not possible, the SOP with details of discharge of water beyond lease boundary be submitted.	No discharge will be there as garland drain and settling tanks has been designed to arrest the silt.
(xviii)	Whether the waste / contaminated water will be discharged to barren land / agricultural land/nala /river? Mechanism to ensure discharge of contamination free water and the periodic test / analysis thereof before discharge.	No waste/ contaminated water will be discharged to barren land / agricultural land / nala / river and in order to avoid it garland drain and settling tank has been designed.
(xix)	Any High Transmission electric line passing nearby and if yes, the distance ofthe same from the leaser boundary.	Nearest electrical transmission line pole is at a distance of 0.8 Km in NW.
(xx)	Undertaking by project proponent for not disturbing the general flow of seasonal nala during mining activity.	Agreed.
(xxi)	Any water reservoir/dam/bridge / barrage exist nearby and if yes, the distance of the same with geo co-ordinates.	Nearest river embankment is near Rourkela at Brahmani River at a distance of 6.20 Km. in NE.
(xxii)	License for use and storage of explosive used in the mining from theappropriate	Controlled blasting will be done and licensed person will be hired from the

	Authority to be submitted.	authorized agency.
(xxiii)	Certificate from the concerned DFO that there is no DLC land involved in lease area. Distance of the mines from the boundary of the Notified Eco-Sensitive Zone / Wildlife Sanctuary if any.	Certificate showing that there is no DLC land involved in lease area and same has been attached as annexure.
(xxiv)	Details of drainage plan proposed.	Agreed.
(xxv)	Details of silt management be submitted.	Details of silt management has been shown in development plan.
(xxvi)	Present use of land.	Detailed information of land use is given in chapter 2.
(xxvii)	NOC of Panchayat for usage of haulage road/Panchayat Road	Agreed.
(xxviii)	Rainwater harvesting plan shall be prepared and furnished by the project proponent.	Agreed.
(xxix)	The issues raised during the public hearing and commitment of the project proponent to address. The same shall be compiled and submitted in a time bound action plan. The action plan shall alia. contain the year-wise activities with corresponding financial allocations.	Noted.

CHAPTER 2 : PROJECT DESCRIPTION

2.0 GENERAL

This proposed stone mine is cluster of 05quarriesi.e Balanda Stone Quarry Cluster- 7, 9, 14, 15 & 16at village Balanda, Tehsil- Lathikata, District - Sundargarh of Odisha. There are 09 (Nine) more adjoining quarries which lies within 500m radius of the proposed quarries, of which 03 Projects are Operating Mines (Balanda Stone Quarry Cluster - 2, 3, 10), 02 Projects are Non-Operating Mines (Balanda Stone Quarry Cluster – 1, 8) and 04 Projects are Extincted Mines (Balanda Stone Quarry Cluster – 4, 5, 6, 11).The proposed production of stone is 210208.4cum/year.

2.1 DESCRIPTION OF PROJECT

The proposed projectBalanda Stone Quarry Cluster (7, 9, 14, 15 & 16) is located at village- Balanda, Tehsil- Lathikata, District - Sundargarh in Odisha. Details of Cluster quarry Project have been given in **Table No.2.1.**

The total lease are of the proposed cluster is 17.823 Ha which is greater than 5 ha. So, as per the EIA notification 2006 and its subsequent amendment, Proposed Project falls in Category B1.

There are 14 projects in total which lie within 500m radius of each other. Of which**, 05 projects are currently proposed**, 03 project are operating mines, 02 projects are non-operating mines and 04 projects are Extinct. **The 05 Projects that are Proposed in cluster now are Balanda Stone Quarry Cluster - 7, 9, 14, 15 & 16** and 03 Projects are Operating Mines i.e. Balanda Stone Quarry Cluster - 2, 3, 10 and 02 Projects are Non-Operating Mines i.e. Balanda Stone Quarry Cluster – 1, 8 and 04 Projects are Extincted Mines i.e. Balanda Stone Quarry Cluster – 4, 5, 6, 11. The proposed project lies near village Balanda, Tehsil-Lathikata, District - Sundargarh of Odisha over an area of 17.823 Ha or 44.05 Acres.And the area of all the 14 quarries in the Cluster is 38.687 Ha or 95.6Acres. Details of all the Quarries is given below in Table 2.1

The mining lease area is granted for 5years period. Copy of Form-F (Intimation to Successful Bidder) is attached as **Annexure-II.**

Table 2.1 Details of Stone Quarry in Cluster

S. N	Mine	Proponent	LandSchedule	Area (Acres))	Production (cum/year)	Status ofMine
1	Balanda Stone Quarry-1	Natwarlal Bansal	Khata No-504 Plot No – 1897/P	4.249 Ha 10.50 Acres	38054	It is a Running source and Lease will expire on Dt. 19.12.2023
2	Balanda Stone Quarry- 2	Kameswar Tiwari	Khata No-504 Plot No – 1897/P	4.876 Ha 12.05 Acres	100019.6	Operating Mine
3	Balanda Stone Quarry- 3	Shankarlal Agarwal	Khata No-504 Plot No – 1893/P	4.046 Ha 10.00 Acres	97097.0	Operating Mine
4	Balanda Stone Quarry-4	NA	NA	NA	NA	Extinct Mine
5	Balanda Stone Quarry-5	NA	NA	NA	NA	Extinct Mine
6	Balanda Stone Quarry-6	NA	NA	NA	NA	Extinct Mine
7	**Balanda Stone Quarry-7**	**Essen Construction**	**Khata No-506 PlotNo– 2473/P**	**4.046 Ha 10.00 Acres**	**50049**	**TOR Granted on 08-02-2024 (Proposed Quarry)**
8	Balanda Stone Quarry-8	Punam D Sahu	Khata No-238(Sabak) PlotNo– 2292/P	2.832 Ha 7.00 Acres	60004	It is a Running source and Lease will expire on Dt. 19.12.2023
9	**Balanda Stone Quarry-9**	**No Successful bidder finalized**	**Khata No-504 PlotNo–**	**4.876 Ha 12.05 Acres**	**50057.8**	**TOR Granted on 08-02-2024 (Proposed**

			2008/P 1899/P 2009/P			**Quarry)**
10	Balanda Stone Quarry-10	Prem Kumar Sahu	Khata No-504 Plot No - 1899/P	4.856 Ha 12.00 Acres	12086.2	Operating Mine
11	Balanda Stone Quarry-11	NA	NA	NA	NA	Extinct Mine
12	**Balanda Stone Quarry-14**	**Bijay Kumar Agarwal**	**Khata No-506 PlotNo– 2743/P**	**2.832 Ha 7.00 Acres**	**15016**	**TOR Granted on 08-02-2024 (Proposed Quarry)**
13	**Balanda Stone Quarry-15**	**Katakata Jagnyanarayan Prusty**	**Khata No-506 504 PlotNo– 2473/P 2010/P**	**2.023 Ha 5.00 Acres**	**15015**	**TOR Granted on 08-02-2024 (Proposed Quarry)**
14	**Balanda Stone Quarry-16**	**Katakata Jagnyanarayan Prusty**	**Khata No-504 Plot No – 1893/P 2010/P**	**4.046 Ha 10.00 Acres**	**80070.6**	**TOR Granted on 08-02-2024 (Proposed Quarry)**
	Total			**95.6 Acres. 38.687 Ha**	**Cluster Production is 5,17,469.2 cum/year**	

Location of the project

The Balanda Stone Quarry Cluster - 7, 9, 14, 15 & 16 in village- Balanda, Tehsil – Lathikata, District- Sundargarh, Odisha. The area falls in Survey of India Topo sheet No.F45G12 & F45G16.

Boundary pillar Coordinates of the quarries has been given in Table 2.2 below:

Table 2.2, List of GPS Boundary Pillar Co-Ordinates

S.NO	LONGITUDE	LATITUDE
Balanda Stone Quarry 7		
P1	22° 11' 21.45" N	84° 45' 34.90" E
P2	22° 11' 21.37" N	84° 45'24.21" E
P3	22° 11' 25.66" N	84° 45' 24.18" E
P4	22° 11' 25.72" N	84° 45' 34.64" E
Balanda Stone Quarry 9		
P1	22° 11' 13.43" N	84° 44' 42.19" E
P2	22° 11' 15.43" N	84° 44' 54.24" E
P3	22° 11' 10.75" N	84° 44' 54.49" E
P4	22° 11' 08.91" N	84° 44' 43.08" E
Balanda Stone Quarry 14		
P1	22° 11' 28.44" N	84° 45' 34.26" E
P2	22° 11' 28.98" N	84° 45' 26.78" E
P3	22° 11' 32.96" N	84° 45' 22.68" E
P4	22° 11' 32.76" N	84° 45' 31.87" E
Balanda Stone Quarry 15		
P1	22° 11' 15.27" N	84° 45' 26.51" E
P2	22° 11' 15.55" N	84° 45' 20.85" E
P3	22° 11' 19.18" N	84° 45' 20.76" E
P4	22° 11' 19.18" N	84° 45' 26.29" E
Balanda Stone Quarry 16		
P1	22° 11' 15.36" N	84° 45' 12.42" E
P2	22° 11' 16.20" N	84° 45' 05.18" E

P3	22° 11' 22.09" N	84° 45' 05.42" E
P4	22° 11' 21.26" N	84° 45' 12.45" E

Need of the project

The stone quarried will be used as construction material. The production of mineral will benefit to the State in the form of Royalty. Apart from this, the project will generate direct and indirect employment opportunities to the tune of persons from the nearby villages. Also, the mine management will conduct medical camps at regular interval in the nearby villages and will help the nearby villages in providing infrastructure like school furniture, water tankers, etc.

Size/Magnitude of operation

Balanda Stone mining lease is presently spanning over an area of 17.823Ha or 44.05 Acres at a proposed rate of production of210208.4 cu.m/year of stone.

Table 2.3: Details of Mining Lease Area

Mine	**LandSchedule**	**Area (Acres)**	**Production (cum/year)**	**Status ofMine**
Balanda Stone Quarry-7	Khata No- 506 PlotNo– 2473/P	4.046 Ha 10.00 Acres	50049	TOR Granted on 08-02-2024
Balanda Stone Quarry-9	Khata No- 504 PlotNo– 2008/P 1899/P 2009/P	4.876 Ha 12.05 Acres	50057.8	TOR Granted on 08-02-2024
Balanda Stone Quarry-14	Khata No- 506 PlotNo– 2743/P	2.832 Ha 7.00 Acres	15016	TOR Granted on 08-02-2024
Balanda Stone Quarry-15	Khata No-504 506 PlotNo–	2.023 Ha 5.00 Acres	15015	TOR Granted on 08-02-2024

	2473/P 2010/P			
Balanda Stone Quarry-16	Khata No- 504 Plot No – 1893/P 2010/P	4.046 Ha 10.00 Acres	80070.6	TOR Granted on 08-02-2024
Total		**17.823 Ha 44.05 Acres**	**210208.4 cum/year**	

2.2 LEASE HOLD AREA

The details of the lease hold area are as follows:

Table 2-4: Description of the lease hold area

Sr. No.	Parameter	Description
1	Name of the Mine	Balanda Stone Quarry Cluster (7, 9, 14, 15 & 16)
2	Mining Capacity	Balanda Stone Quarry 7 - 50049 cum/year for Balanda Stone Quarry9 - 50057.8 cum/year for Balanda Stone Quarry 14 - 15016 cum/year for Balanda Stone Quarry 15 - 15015 cum/year for Balanda Stone Quarry 16 - 80070.6 cum/year for **Total Proposed Production - 210208.4 cum/year**
3	Method of mining	Opencast semi-mechanized mining method.
4	Total proposed area	17.823ha or 44.05 Acres
5	Benches width and Height of the bench	**Mine** / **Height (m)** / **Width (m)** 7 / 6.0 / More than height 9 / 6.0 / More than height 14 / 6.0 / More than height 15 / 6.0 / More than height 16 / 6.0 / More than height
6	Ultimate pit Slope	80^{o} - 85^{o}
7	Working Days	220 days
8	Manpower	268 persons for Proposed Quarries 448 persons for Cluster

Sr. No.	Parameter	Description
9	Water Requirement	27.67 KLD for Proposed Quarries 54.788 ~ 55.0 KLD for Cluster
10	Source of Water	Ground water through dug wells and tube wells and Mine sump.

2.3 GEOLOGY

Regional Geology

Being the part of the Chhota- Nagpur Plateau, major parts of the district has rough and hilly terrain and rich in mineral resources as well. Hills of Sundargarh district may be classified in to three broad categories, Bonai hills, Sundargarh hills, Biramitrapur hills. The Bonai hills which further elongate into the Keonjhar district are known for their iron ore resources, whereas Sundargarh hills famous for coal deposits, which further elongate into Jharsuguda district and Chhatisgarh state as well.

Local Geology:-

Balanda Stone Quarry – 7

The proposed area represents Granite (as a broader sense as per OMMCR2016) exposure within the proposed quarry area having numbers of Fracture and joints. Hence the rock will not be suitable for decorative stone purpose The grain size of the rock is medium to coarse. Colour of the exposure is light grey to dark grey. There are few thin quartz vein noticed in the area. There are few parts within the area covered with soil & surficial weathered rock about 2m while other few parts possess about 4m soil cover, hence on an overage 3m soil cover & 2m surficial weathered rock has been considered, which has been depicted on geological plan & sections. Soil types are classified according to many more factors. They can be classified on the basis of colour depth, pH, productivity, Texture and process of formation. Soil types are also classified according to depth, i.e (i) shallow soil, (ii) medium soil (iii) deep soil. But as such, the area under consideration has no remarkable soil present.

Balanda Stone Quarry – 9

The proposed area represents Granite (as a broader sense as per OMMCR2016) exposure within the proposed quarry area having numbers of Fracture and joints. Hence the rock will

not be suitable for decorative stone purpose The grain size of the rock is medium to coarse. Colour of the exposure is light grey to dark grey. There are few thin quartz vein noticed in the area. There are few parts within the area covered with soil & surficial weathered rock about 2m while other few parts possess about 1m soil cover, hence on an overage 1m soil cover & 1.5m surficial weathered rock has been considered, which has been depicted on geological plan & sections. Soil types are classified according to many more factors. They can be classified on the basis of colour depth, pH, productivity, Texture and process of formation. Soil types are also classified according to depth, i.e (i) shallow soil, (ii) medium soil (iii) deep soil. But as such, the area under consideration has no remarkable soil present.

Balanda Stone Quarry – 14

The proposed area represents Granite (as a broader sense as per OMMCR2016) exposure within the proposed quarry area having numbers of Fracture and joints. Hence the rock will not be suitable for decorative stone purpose The grain size of the rock is medium to coarse. Colour of the exposure is light grey to dark grey. There are few thin quartz vein noticed in the area. There are few parts within the area covered with soil & surficial weathered rock about 1m while other few parts possess about 3m soil cover, hence on an overage 2m soil cover & 2m surficial weathered rock has been considered, which has been depicted on geological plan & sections. Soil types are classified according to many more factors. They can be classified on the basis of colour depth, pH, productivity, Texture and process of formation. Soil types are also classified according to depth, i.e (i) shallow soil, (ii) medium soil (iii) deep soil. But as such, the area under consideration has no remarkable soil present.

Balanda Stone Quarry – 15

The proposed area represents Granite (as a broader sense as per OMMCR2016) exposure within the proposed quarry area having numbers of Fracture and joints. Hence the rock will not be suitable for decorative stone purpose The grain size of the rock is medium to coarse. Colour of the exposure is light grey to dark grey. There are few thin quartz vein noticed in the area. There are few parts within the area covered with soil & surficial weathered rock about 2m while other few parts possess about 4m soil cover, hence on an overage 3m soil cover & 2m surficial weathered rock has been considered, which has been depicted on geological plan & sections. Soil types are classified according to many more factors. They can be classified

on the basis of colour depth, pH, productivity, Texture and process of formation. Soil types are also classified according to depth, i.e (i) shallow soil, (ii) medium soil (iii) deep soil. But as such, the area under consideration has no remarkable soil present.

Balanda Stone Quarry – 16

The proposed area represents Granite (as a broader sense as per OMMCR2016) exposure within the proposed quarry area having numbers of Fracture and joints. Hence the rock will not be suitable for decorative stone purpose The grain size of the rock is medium to coarse. Colour of the exposure is light grey to dark grey. There are few thin quartz vein noticed in the area. There are few parts within the area covered with soil & surficial weathered rock about 2m while other few parts possess about 4m soil cover, hence on an overage 3m soil cover & 2m surficial weathered rock has been considered, which has been depicted on geological plan & sections. Soil types are classified according to many more factors. They can be classified on the basis of colour depth, pH, productivity, Texture and process of formation. Soil types are also classified according to depth, i.e (i) shallow soil, (ii) medium soil (iii) deep soil. But as such, the area under consideration has no remarkable soil present.

The rock exposure is weathered on it's surface unevenly hence about 3% rocks as per field observation has been considered as weathered rock waste.

Topography: The area comes within the revenue jurisdiction of Balanda village of Lathikata Tehsil. The lease area is a rugged terrain. The elevation rage of the cluster lease area has been given below:-

Stone Quarry No	Max (m RL)	Min (m RL)
7	250	234
9	280	256
14	302	278
15	278	250
16	310	290

2.4 Quality of Reserve

Method of estimation of Reserve

The total mineral resources and reserves have been calculated by cross sectional area method basing on local parameters. In this method the cross sectional area with length of influence to give the volume. This in turn has been multiplied by the bulk density to find out the tonnage. The mineral reserve thereafter has been calculated by depleting remaining resources from total mineral resources.The total Geological Reserve for the proposed Quarries is **5765755.7 cum** and total Mineable Reserve is **2400609.3 cum.**

The table indicating the same is furnished below in Table 2.6:

Table 2.5, Geological & Mineable Reserves (For Proposed Quarries)

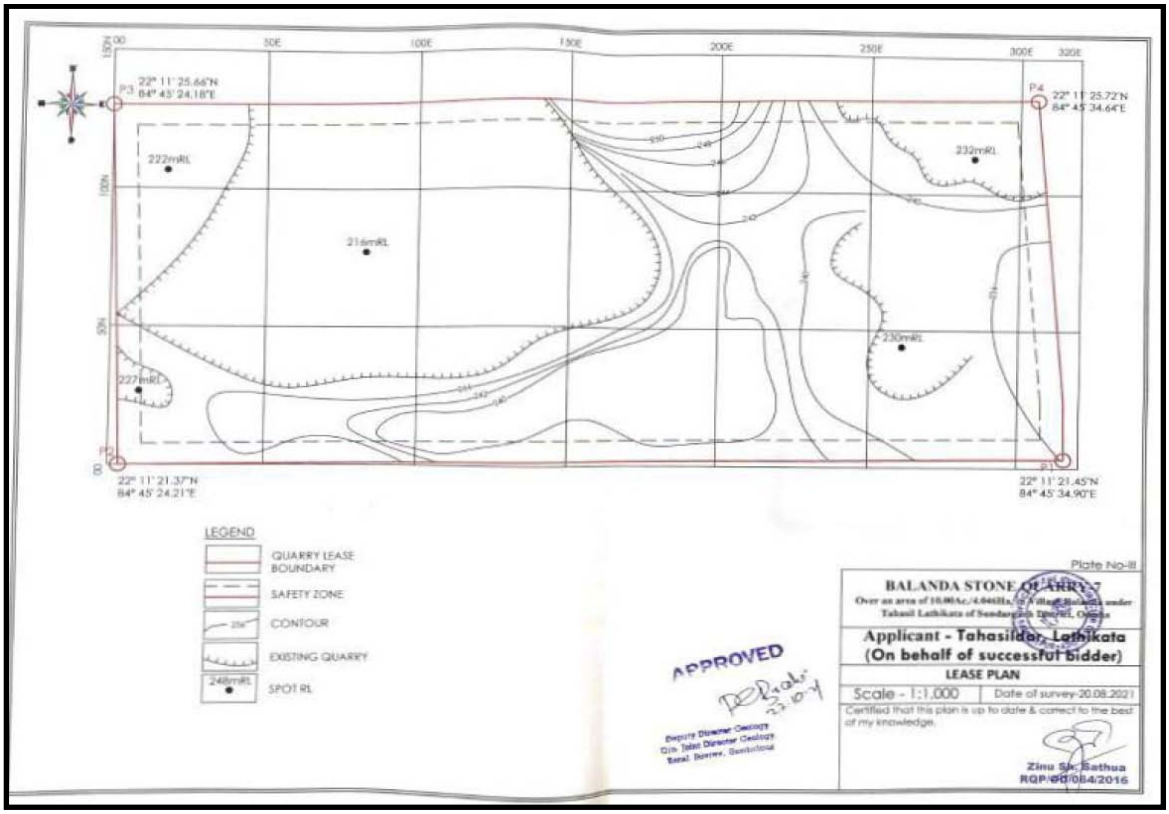
S No.	Name of the Quarry	Geological Reserve	Mineable Reserves
1	Balanda Stone Quarry- 7	1265556.1	455197.7
2	Balanda Stone Quarry- 9	1374642.3	570660.7
3	Balanda Stone Quarry- 14	1102430.2	295371.8
4	Balanda Stone Quarry- 15	477629.0	176404.2
4	Balanda Stone Quarry-16	1545498.1	902974.9
Total		**5765755.7**	**2400609.3**

The Geological & Mineable Reserves for the remaining 5 quarries of the cluster (remaining 4 area extinct mines) is shown in the tables below:

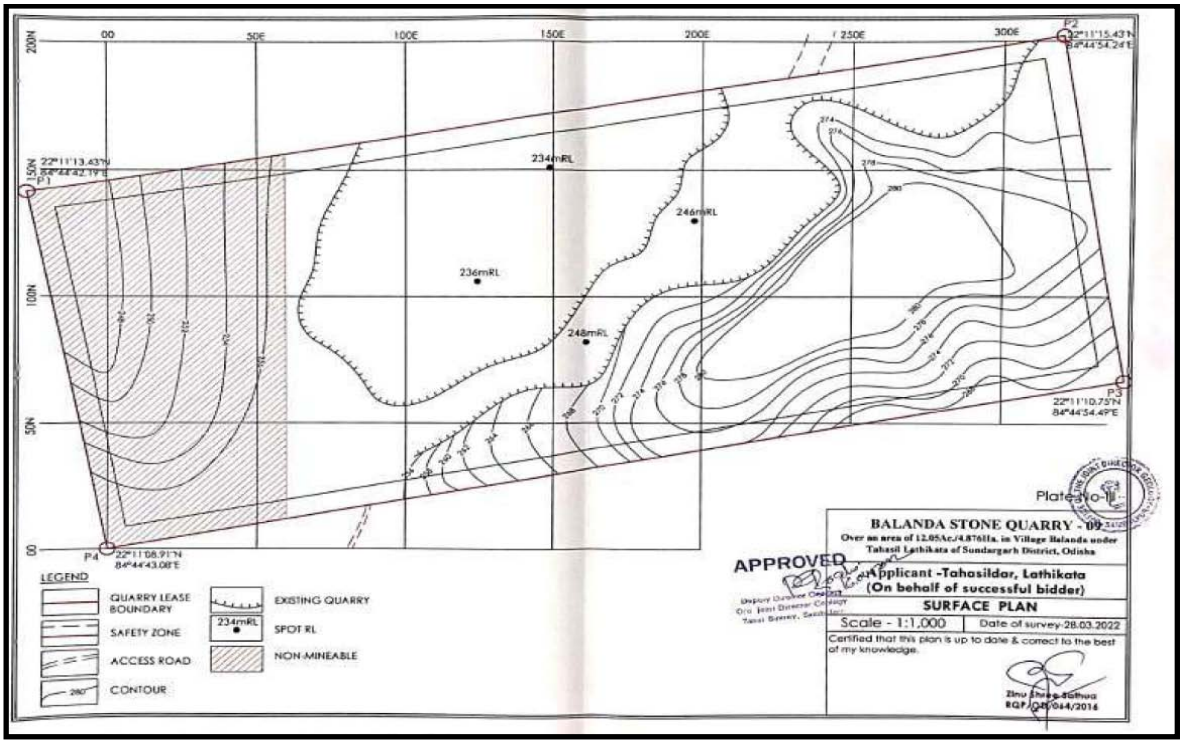
Table 2-6, Geological & Mineable Reserves (For Existing Quarries)

S No.	Name of the Quarry	Geological Reserves	Mineable Reserves
		Operational Mines	
1	Balanda Stone Quarry- 2	162493	878724.9
2	Balanda Stone Quarry- 3	1196087.6	484231.8
3	Balanda Stone Quarry- 10	1028786.9	519409.8
Total		**2387367.5**	**1882366.5**

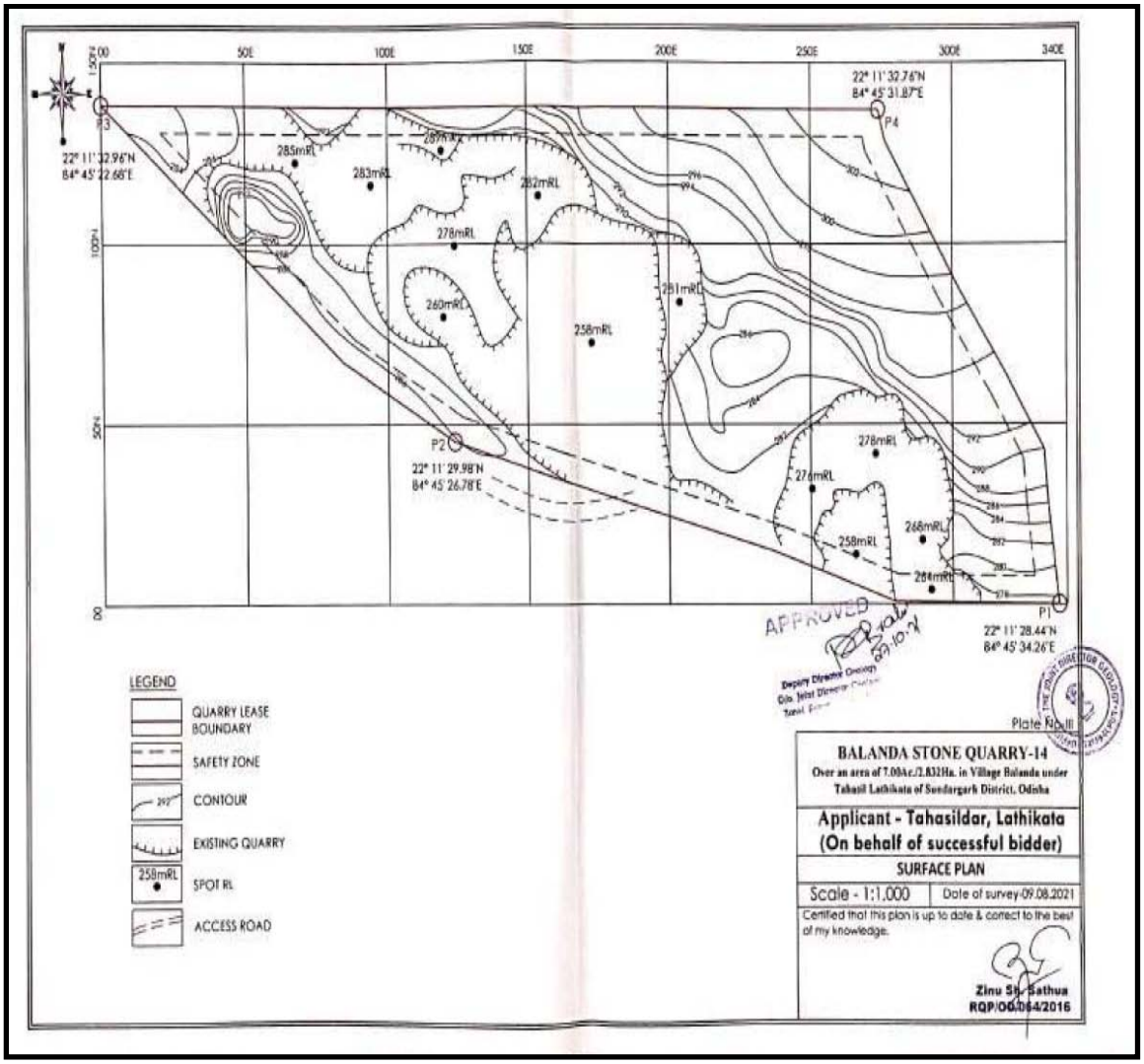
S No.	Name of the Quarry	Geological Reserves	Mineable Reserves
		Non-Operational Mines	
1	Balanda Stone Quarry- 1	693982	361417
2	Balanda Stone Quarry- 8	622233	302302
Total		**1316215**	**663719**



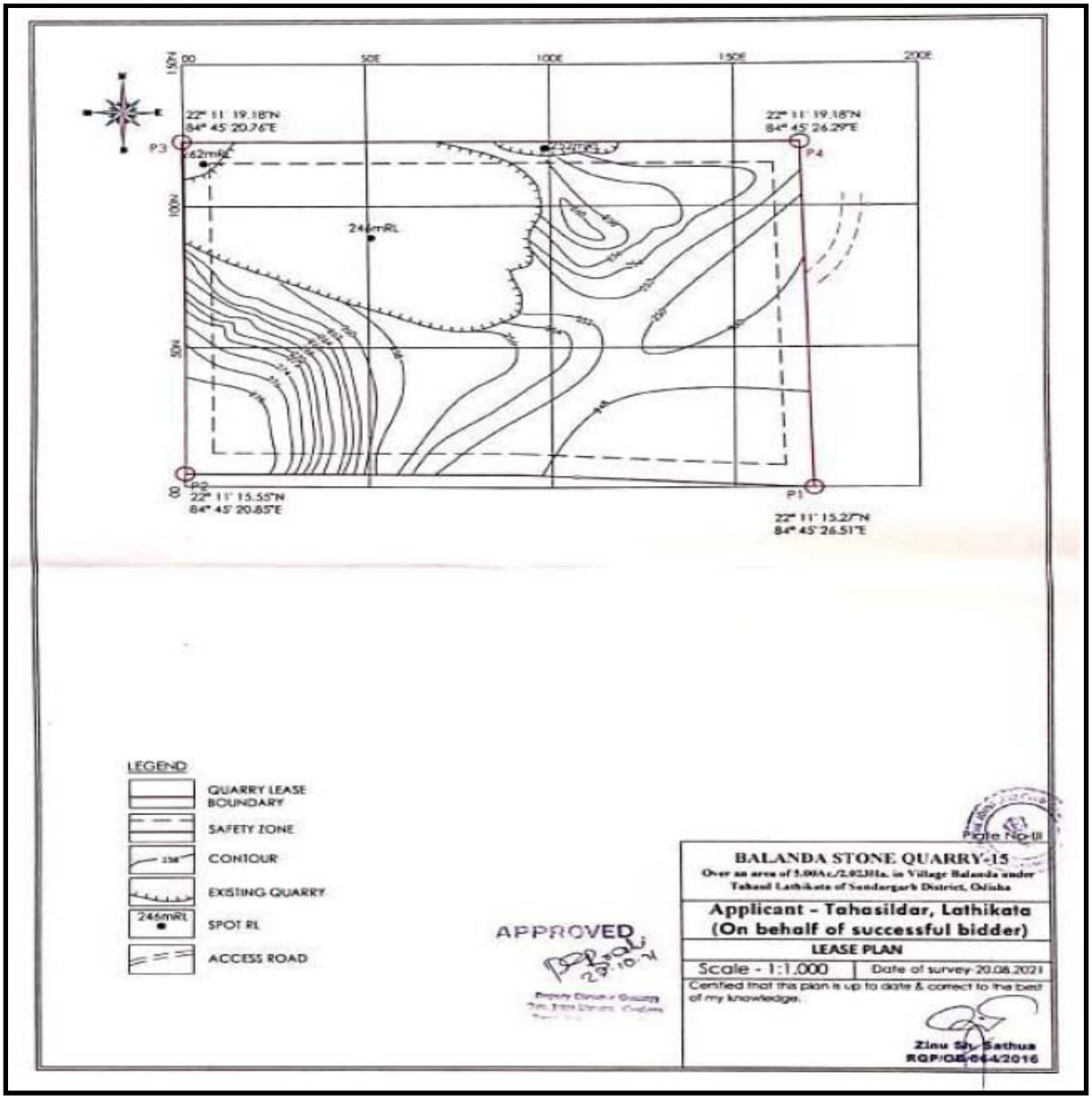
Balanda Stone Quarry- 7



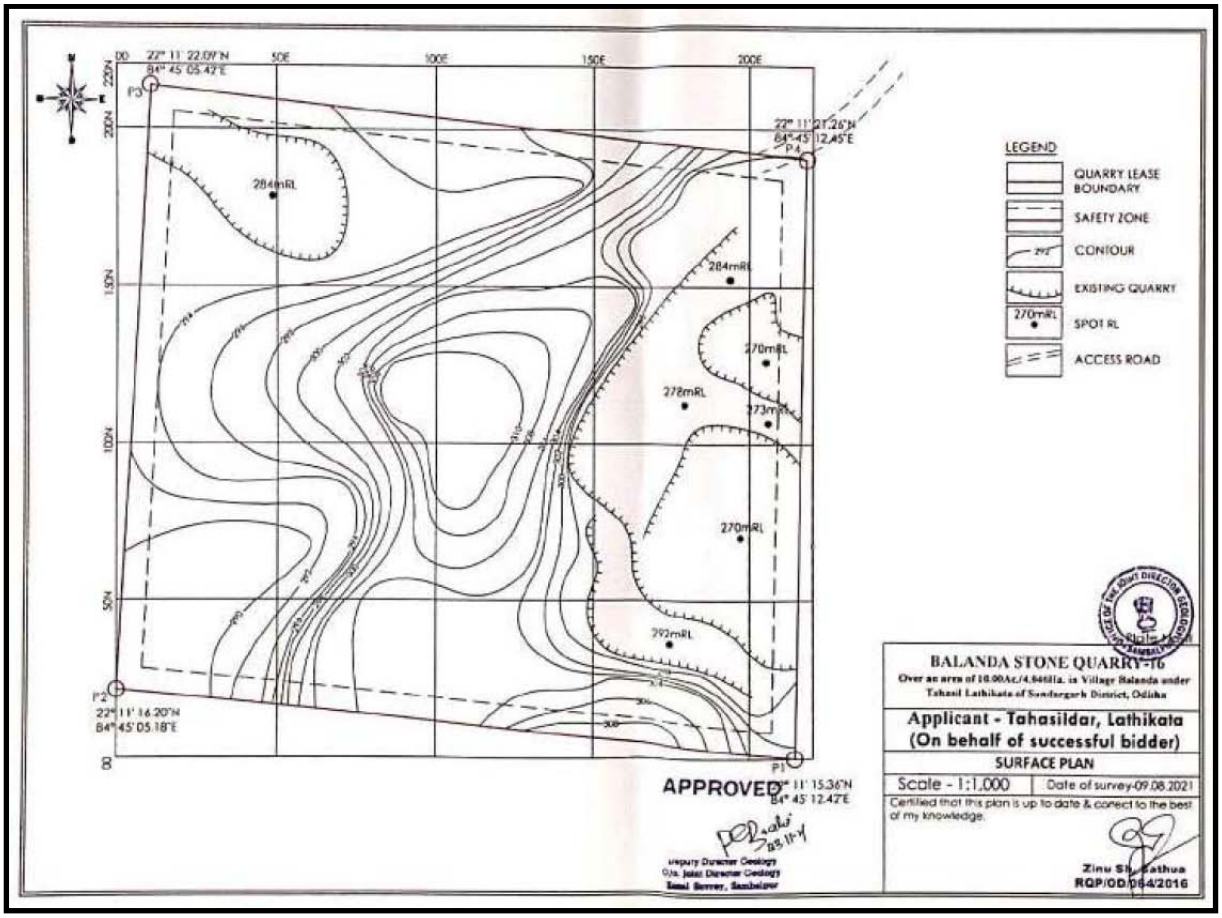
Balanda Stone Quarry- 9



Balanda Stone Quarry- 14



Balanda Stone Quarry- 15



Balanda Stone Quarry- 16

Figure 2-1: Surface Plans for the proposed Quarries

2.5 TYPE OF MINING

2.5.1 Proposed Method of Mining

Mining: In the applied ease area mining of rock mass will be worked out opencast method of mining. Handling of rock mass will be done both manually and by excavators, Handpicks, jack hammer, drill compressor, rock breaker, spade, chisel, hammer will be used by manual labors for sorting and sizing. Loosening of rock mass will be done by drilling and blasting. (details given below).

Excavation & loading: The excavated rock mass will be loaded in Tractors/Tippers by excavators or loaders. The excavated mineral will be transported through tippers or Hyva from the quarry.The maximum production of construction stone from the quarries is shown below, which is excluding volume of waste.

Table 2-7: Production Details: - (Proposed 5 Quarries)

S No.	Name of the Quarry	Production(cum/year)
1	Balanda Stone Quarry - 7	50049
2	Balanda Stone Quarry - 9	50057.8
3	Balanda Stone Quarry - 14	15016
4	Balanda Stone Quarry - 15	15015
5	Balanda Stone Quarry - 16	80070.6
Total		**210208.4**

Table 2-8: Production Details: - (Existing 5 Quarries)

S No.	Name of the Quarry	Production(cum/year)
Operational Mines		
1	Balanda Stone Quarry - 2	100019.6
2	Balanda Stone Quarry- 3	97097.0
3	Balanda Stone Quarry - 10	12086.2
Total		**209202.8**

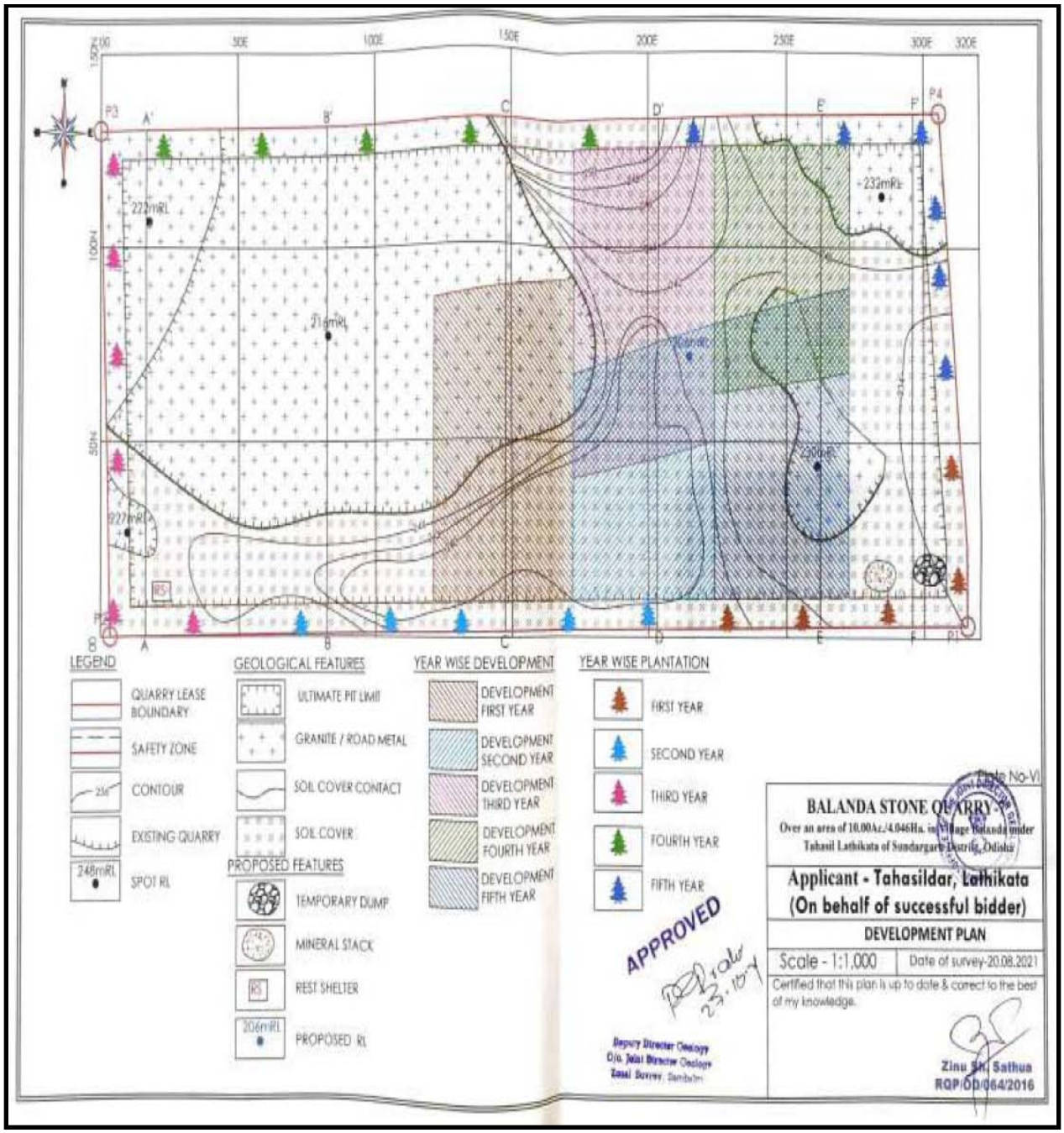
S No.	Name of the Quarry	Production(cum/year)
Non Operational Mines		
1	Balanda Stone Quarry - 1	38054
2	Balanda Stone Quarry- 8	60004
Total		**98058**

Note: Remaining 4 quarries of 14quarries are extinct, hence no production details mentioned.

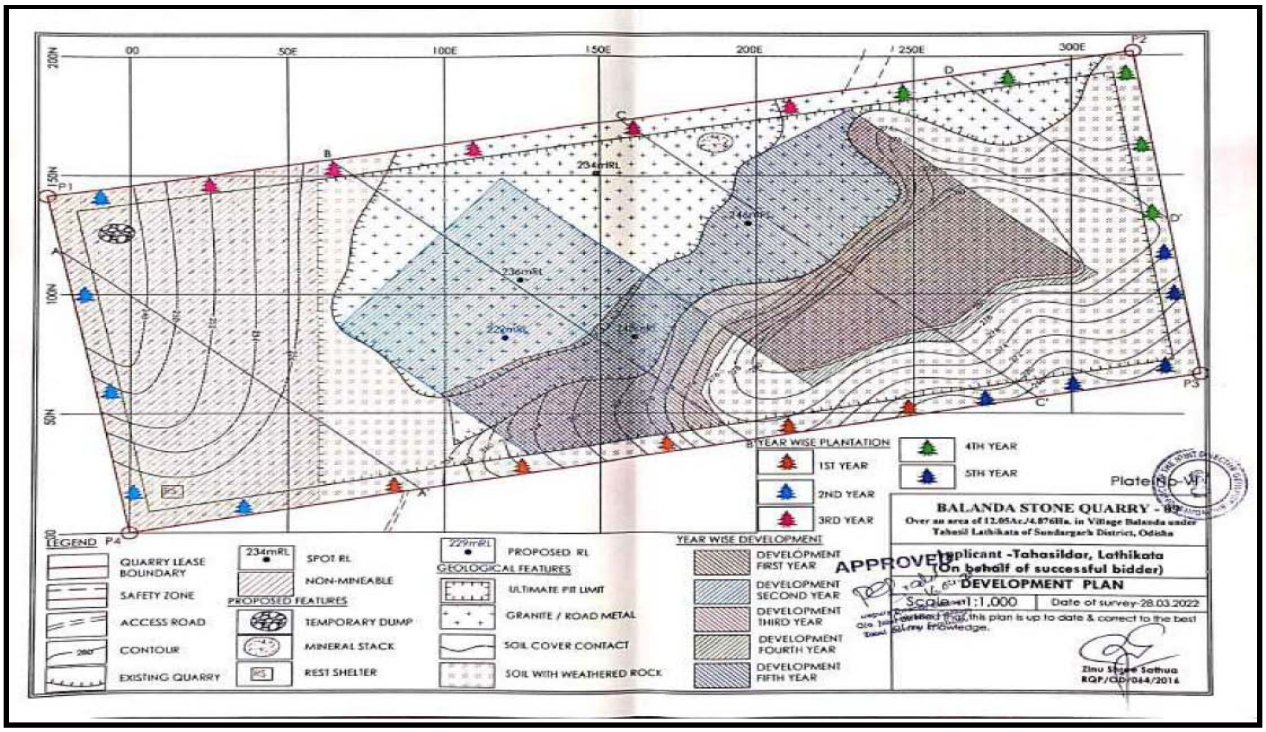
Mining depth will be as follows:

Mine	Depth (m RL)
Balanda Stone Quarry- 7	Upto 216mRL
Balanda Stone Quarry- 9	Upto 234 mRL
Balanda Stone Quarry- 14	Upto 258 mRL
Balanda Stone Quarry- 15	Upto 246mRL
Balanda Stone Quarry- 16	Upto 270mRL

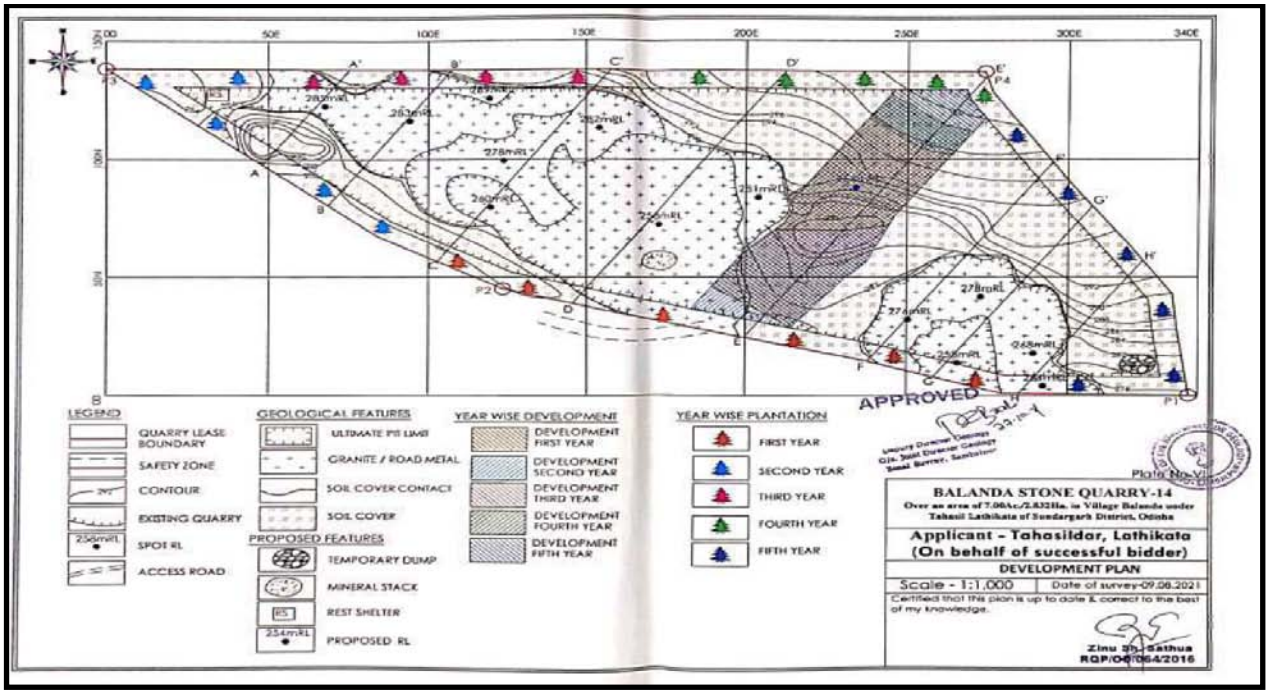
The five years development plan map with year wise development of mine quarries are shown below:



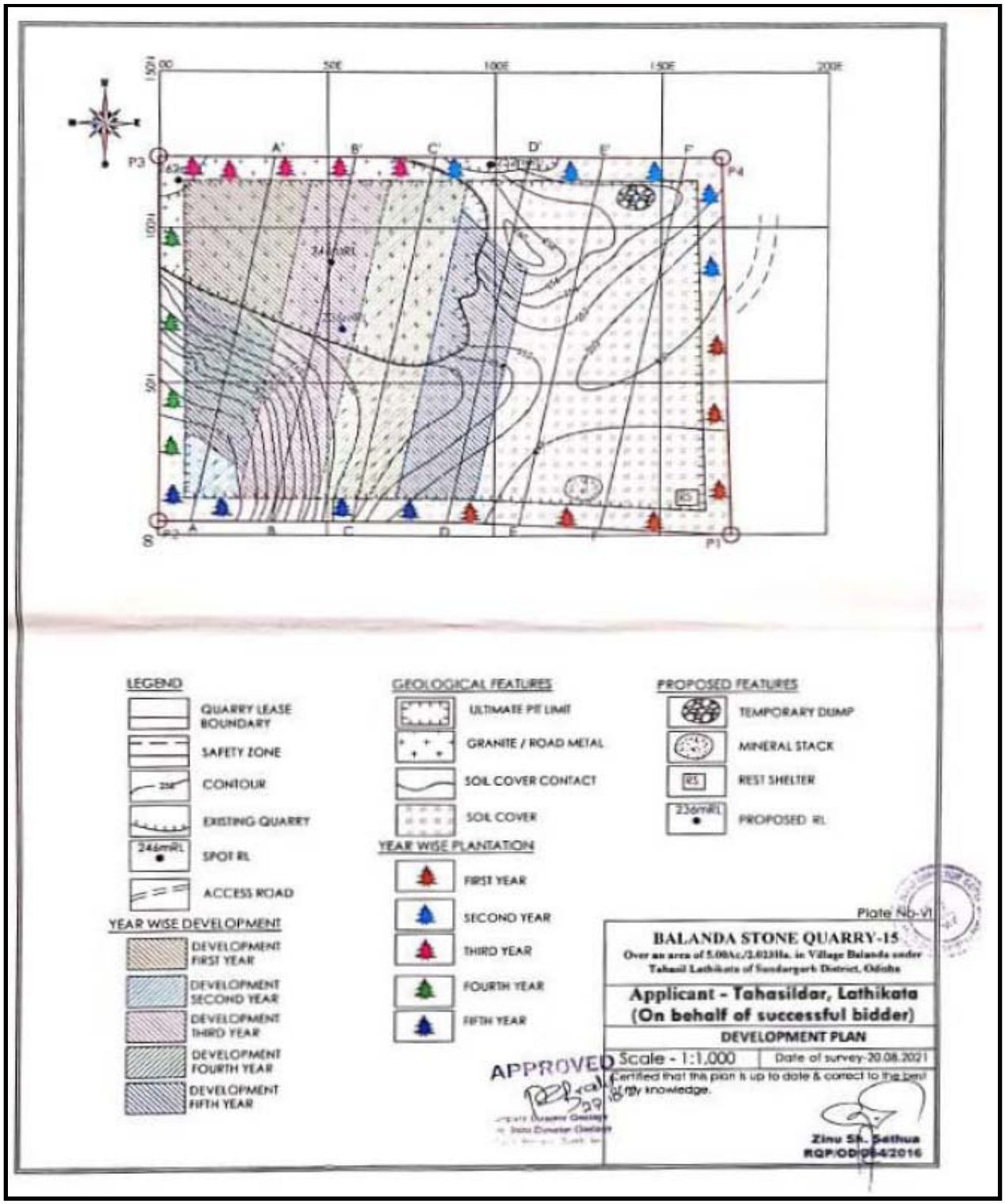
Balanda Stone Quarry- 7



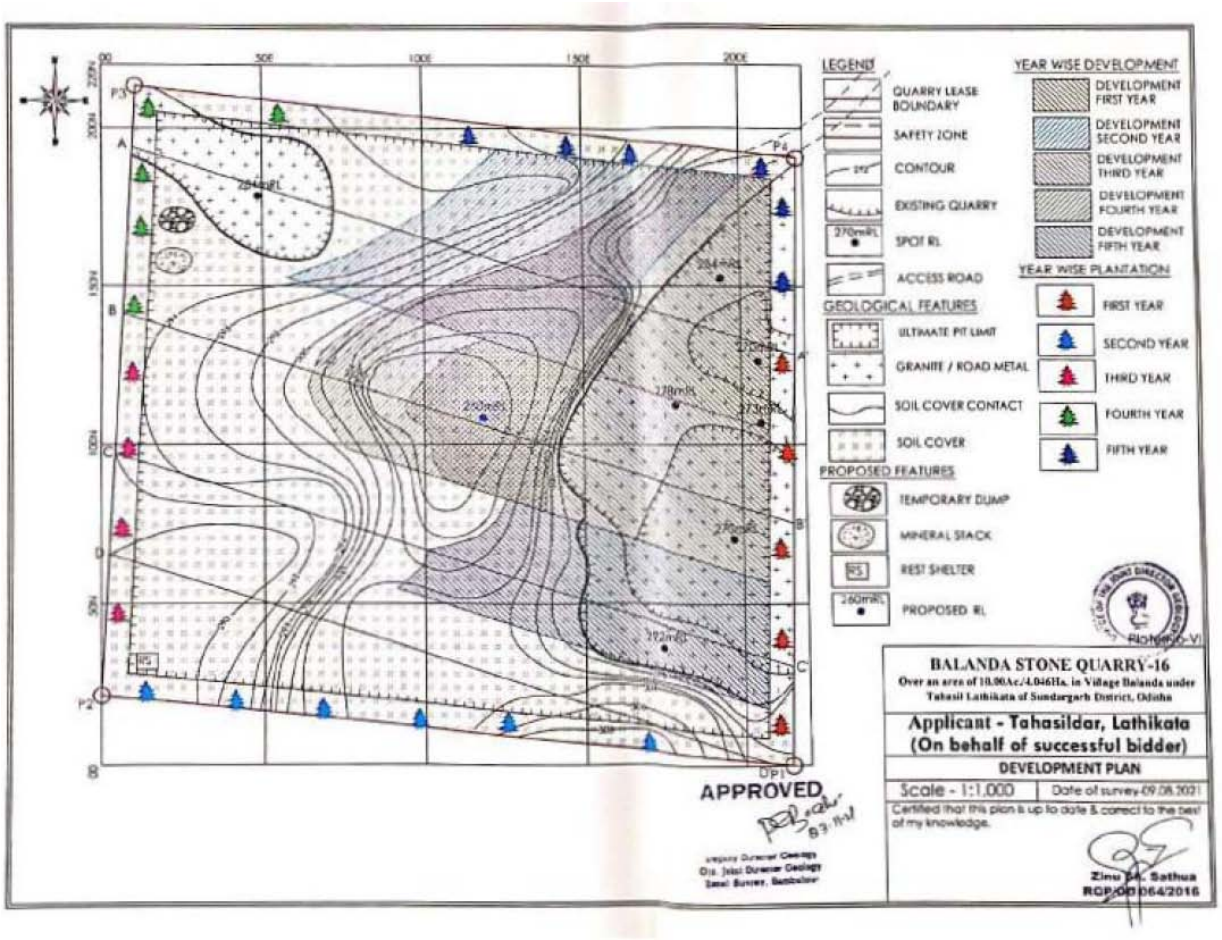
Balanda Stone Quarry- 9



Balanda Stone Quarry- 14



Balanda Stone Quarry- 15



Balanda Stone Quarry- 16

Figure 2-2, Development Plan &Section

2.5.2 Drilling and Blasting

Drilling & blasting Loosening of rock mass will be done by drilling and blasting. Hard rock mass will be drilled by wagon drill/DTH and jack hammer either in single or multi rows on staggered pattern which will be blasted using light charges. Secondary/boulder blasting will also be done or rock breaker may be used to avoid secondary blasting as per requirement.

Sr. No.	**Parameters**		**Drilling Details**	
			Large	**Small**
1	Dia of the Hole		100mm	32mm
2	Drilling Pattern	Burden	2.00	0.6m
		Spacing	3.00	1.0m
3	Depth	Bench Height	6.00	2.0m
		Sub-grade Drilling	0.60	0.2m
		Hole Depth	6.60	2.2m
4	Nature of Hole	Type	Vertical	Vertical
		Angle	80^o - 90^o	80^o - 90^o
5	Main Explosive	Name	Power Gel	Power Gel & ANFO
		Dia of Catridge	83mm	25mm
6	Powder Factor		1.8 to 2 Cu.m/kg	1 to 1.2 Cu.m/kg
7	Initiative Explosive	Detanator	OD ED	OD ED
		Fuse		
8	Type of Blasting		Primary	Primary Secondary
9	Yield /Hole		$36m^3$	$1.2m^3$

70% of excavation will be done by large dia holes with DTH/Wagon drill and 30% excavation will be done by small dia hole with jack hammer.

Storage of explosive:

The storage of explosive not proposed, as the explosives to be used for blasting purpose will be procured by the hired licensed contractors from authorized dealers.

Precaution to be observed during drilling & blasting:-

Preparation of charge and charging and stemming of holes will be done by a qualified blaster.

Before a shot is charged, stemmed or fired, sufficient warnings by signal is given over the entire area falling within the danger zone and ensure that all persons within such area have taken proper shelter.

During blasting, controlled blasting will be done to prevent flying fragments which may cause injury to local inhabitants within danger zone.

Proper inspection after shot firing will be done by the blaster.

The number of shots which exploded shall be counted by the blaster toassess misfire.

All necessary precautions as enumerated under 106(2)(b) of MMR 1961 will be followed.

2.5.3 Life of mine

The life of the mine are as follow:-

Mine	Life of mine (year)
Balanda Stone Quarry- 7	9.09
Balanda Stone Quarry- 9	11.40
Balanda Stone Quarry- 14	19.67
Balanda Stone Quarry- 15	11.74
Balanda Stone Quarry- 16	11.27

2.6 Waste Management

As the granite rock (road metal) body is mostly exposed and about 3% of rock has been considered as weathered/overburden/unusable shall be generated during the plan period. These materials will be dumped temporarily and shall be utilized for approach road development & maintenance purposes during the plan period.

Year Wise Waste Generation &Management

Mine	Waste (cu.m.)
Balanda Stone Quarry-7	28306
Balanda Stone Quarry- 9	19566.4
Balanda Stone Quarry- 14	9190
Balanda Stone Quarry- 15	12994
Balanda Stone Quarry- 16	33681.6
Total	**103739.0**

Top soil

About 96915cumof top soil shall be generated during the plan period excavation for all the mines, and the soil generated from the quarry will be utilized for plantation in the safety zone and avenue plantation as directed by the competent authority. Therefore, no soil stack yard has been proposed in the mining plan.

Year Wise Top Soil Generation

Mine	Top Soil (cu.m.)
Balanda Stone Quarry-7	32421
Balanda Stone Quarry- 9	7830
Balanda Stone Quarry- 14	6870
Balanda Stone Quarry- 15	17066
Balanda Stone Quarry- 16	32728
Total	**96915**

Reclamation and Rehabilitation of mined out area

During the plan period the total mined out land of the cluster will be 6.549 Ha out of total cluster area of 17.823 Ha. So, total land which will be degraded in the cluster area during plan period is 6.549 Ha only. Since the individual quarries are at the development stage and the excavation of construction stone from the quarry areas have not been completely exhausted so proposal for reclamation of mined out land for the cluster would not be provided at this stage.

Since, the dump will be active during the plan period so no reclamation has been suggested. However at the end of life of mine, reservoir shall be developed and rainwater shall be harvested. However, plantation will be done in safety zone during plan period.

Table 2-9: Stage Wise Land Use Pattern

Land Use (During Plan period) (ha)						
Sl. No.	**Type of land use**	**Balanda Stone Quarry - 7**	**Balanda Stone Quarry - 9**	**Balanda Stone Quarry - 14**	**Balanda Stone Quarry - 15**	**Balanda Stone Quarry - 16**
1	Area of excavation	1.569	1.677	0.349	0.955	1.999

2	Temporary OB dump	0.007	0.007	0.007	0.007	0.007
3	Infrastructure	0.003	0.003	0.003	0.003	0.003
4	Roads	0.000	0.000	0.000	0.000	0.000
5	Plantation/ Safety Zone	0.637	0.710	0.573	0.412	0.582
6	Miscellaneous	1.830	2.479	1.900	0.646	1.455
	Total	**4.046**	**4.876**	**2.832**	**2.023**	**4.046**

2.7 General Features

2.7.1 Surface Drainage

As the area is situated at a height from the general ground level, the runoff water will follow the natural path on the surface of the earth. So no artificial drainage system is required.

2.7.2 Ground Water

It is observed from the dug well in the adjacent plain area and in the nearby villages that the ground water table varies between 20m to 30m from the surface level depending upon seasonal variations. During dry season the water level falls below 30m from the surface where as during rainy season the water table remains tentatively at 20m from the surface.

The average annual rainfall is 1450 mm. The climate is sub-humid and it is characterized by a hot dry summer and cold winter. About 90% of rainfall takes place from July to September. During monsoon surplus water is available for charging ground water.

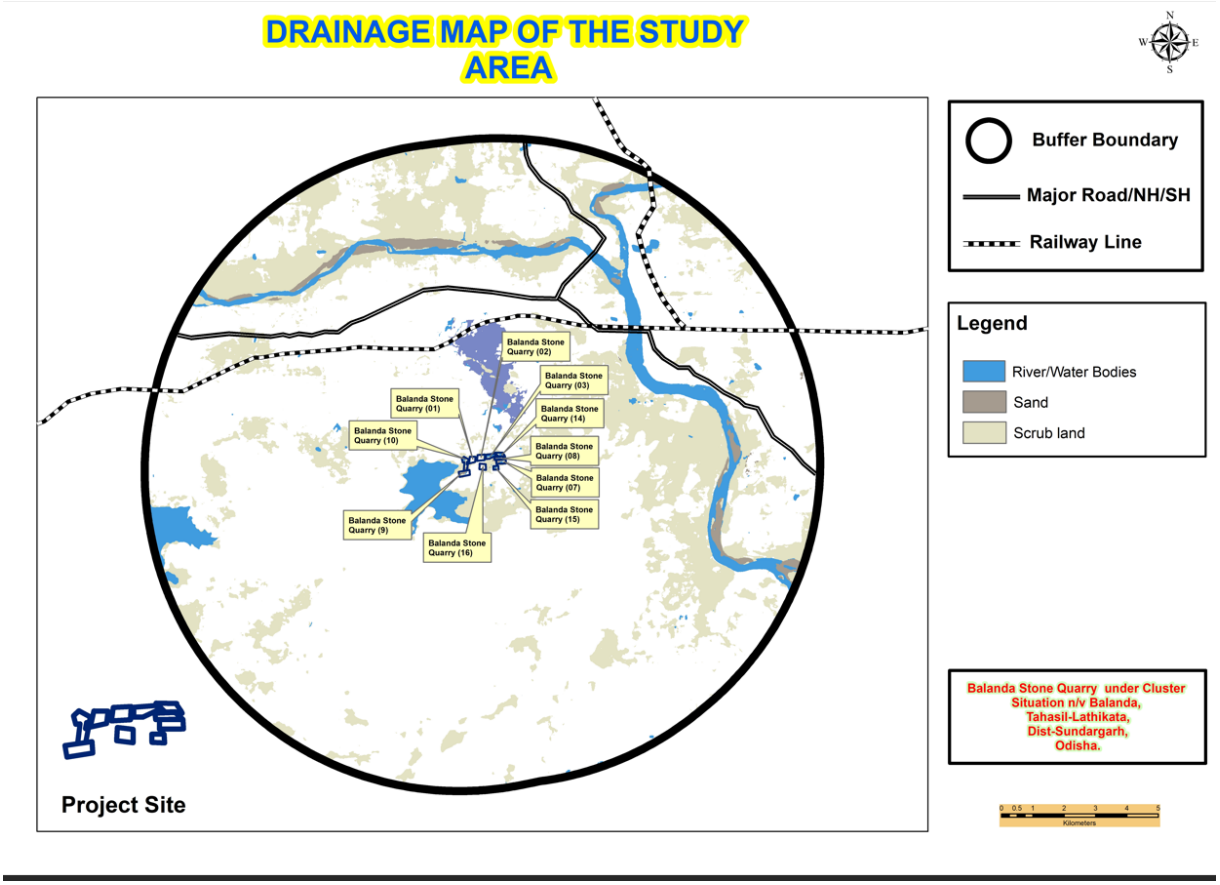


Figure 2-3: Drainage Pattern

2.7.3 VehicularTraffic Density

Traffic study is carried out by understanding the existing carrying capacity of the road in the vicinity of site and flow towards Kalunga-Gurundia RD Roadin the area. Then depending on the capacity of the mine, the number of trucks that will be added to the present scenario will be compared to the carrying capacity as recommended by Indian Road Congress (IRC). The existing volume of traffic and, the Level of Service are given in Table-2.12and shown in traffic density maps Figure 2.4.

Table 2-10: Existing Traffic Scenario & LOSfor Proposed 5 quarries

Road	V (PCU/day)	C (PCU/day)	Existing V/C Ratio	LOS
Kalunga-Gurundia RD Road	1500	15000	0.1	A

V= Volume in PCU's/day & C= Capacity in PCU's/ day

The existing Level of Service at Kalunga-Gurundia RD Road is "A" i.e. "Excellent" when compared with LOS recommended by IRC, as given in Table-2.13.

Table 2-11: V/C Ratio & LOS

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

Note: Capacity as per IRC: 64-1990

During Mine Operation for Proposed 5 quarries

Total Capacity of mine : 210208.4 cum/year

No. of working days : 220

Total Capacity of mine/day :955.49 or say 955 cum

Truck Capacity : 6 cum

No. of truck trips per day : 159.16~ 159 trucks per day

No. of trucktrips /day to and fro : 318 trucks

PCU (318*3) : 954

Table 2-12: Modified Traffic Scenario & LOS for Proposed 5 quarries

Road	V	C	Modified V/C Ratio	LOS
Kalunga-Gurundia RD Road	1500 + 954 = 2454	15000	0.16	A

Results:

From the above analysis it can be seen that the V/C ratio will remain same 0.16with LOS remain**"A" "Excellent"**. So the additional load on the carrying capacity of the concerned roads is not likely. So there is negligible impact on the road network as the proposed project is very small.

During Mine Operation (Entire Cluster i.e. Proposed & Existing Quarries)

Total Capacity of mine : 5,17,469.2 cum/year
No. of working days : 220
Total Capacity of mine/day :2352.13 or say 2352 cum
Truck Capacity : 6 cum
No. of truck trips per day 392 trucks per day
No. of trucktrips /day to and fro : 784 trucks
PCU (784*3) : 2352

Table 2-13:

Modified Traffic Scenario & LOS for Entire Cluster (i.e. Proposed & Existing Quarries)

Road	V	C	Modified V/C Ratio	LOS
Kalunga-Gurundia RD Road	1500 + 2352 = 3852	15000	0.25	B

Results:

From the above analysis it can be seen that for the cluster scenario the V/C ratio will change from 0.10 to 0.25 at Kalunga-Gurundia village road with LOS changing from **"A" to "B" i.e from Excellent to Very Good.** So the additional load on the carrying capacity of the concerned roads is not likely to impact in a significant way. So there is negligible impact on the road network as the magnitude of the cluster of quariies is very small.

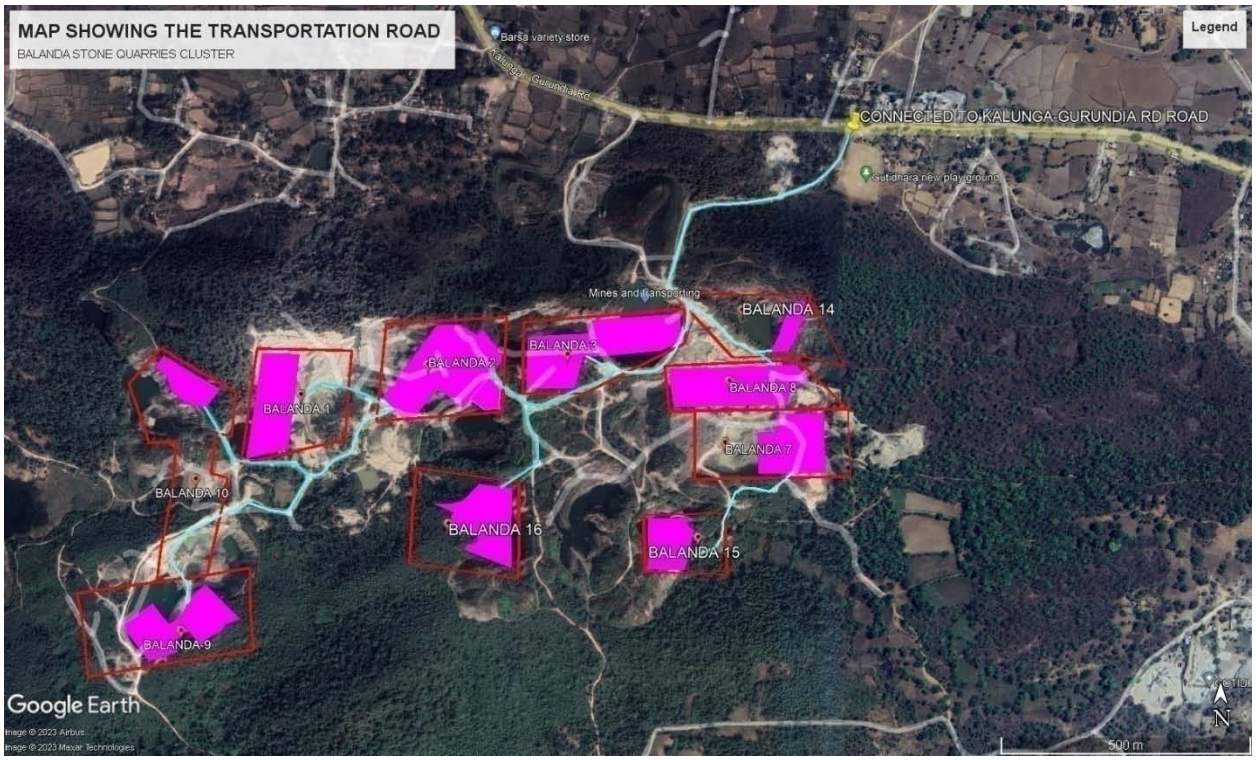


Figure 2-4: Traffic Route Map

2.7.4 Beneficiation/ Processing

No mineral beneficiation will be carried out within the lease area, on the other hand only simple manual sorting and sizing is done. ROM ore will be dispatched.

2.7.5 Utilities

Power, Water Supply and other Infrastructure requirements

- **Power**

Electrical power will be required only for site office and will be obtained from Solar energy. Transportation will be done through dumpers or trucks operating on diesel. No storage for diesel is proposed.

- **Water Supply**

In the mining projects there is as such no need of water to carry out operations, except for dust suppression & drinking. The number of working people is 448 so the water requirement for workers for drinking purpose will be around 4.48 KLD & the total water requirement will be around 54.788 ~ 55.0 KLD for proposed project. This water will be supplied from the nearby area.

Table 2-14: Water Requirement
Water Requirement for Balanda Stone Quarry- 7

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor 10*63/1000= 0.63 KLD	0.63
Dust Suppression	**Total approach road to be water sprinkled** = 600 m 600m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	764 plant (during plan period) @ 2 L/per plant= 764*2 lts = 1528/1000= 1.528 KLD	1.528
Total		**5.758 ~ 6 KLD**

Water Requirement for Balanda Stone Quarry- 9

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor 10*76/1000= 0.76 KLD	0.76
Dust Suppression	**Total approach road to be water sprinkled** = 600 m 600 m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	852 plant (during plan period) @ 2L/per plant= 852*2 lts = 1704/1000= 1.704 KLD	1.704
Total		**6.064~6 KLD**

Water Requirement for Balanda Stone Quarry- 14

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor 10*34/1000= 0.34 KLD	0.34
Dust Suppression	Total approach road to be water sprinkled = 600 m 600 m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	687 plant (during plan period) @ 2 L/per plant= 687*2 lts = 1374/1000= 1.374KLD	1.374
Total		**5.314 ~ 6 KLD**

Water Requirement for Balanda Stone Quarry- 15

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor 10*26/1000= 0.26KLD	0.26
Dust Suppression	**Total approach road to be water sprinkled** = 600 m 600 m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	494 plant (during plan period) @ 2 L/per plant= 494*2 lts = 988/1000= 0.988 KLD	0.988
Total		**4.484 ~ 5 KLD**

Water Requirement for Balanda Stone Quarry- 16

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor 10*69/1000= 0.69KLD	0.69
Dust Suppression	**Total approach road to be water sprinkled** = 600 m 600 m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	698 plant (during plan period) @ 2 L/per plant= 698*2 lts = 1396/1000= 1.396 KLD	1.396

Total	**5.686 ~ 6 KLD**

Water Requirement for Total Proposed Quarries

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor 10*268/1000= 2.68KLD	2.68
Dust Suppression	Total haulage road to be water sprinkled = 3000 m 3000 m*6m*0.5 lt/sqm*2times/1000= 18 KLD	18.0
Plantation	3495 plants (in financial year) @ 2 L/per plant= 3495*2lts= 6990/1000= 6.99 KLD	6.99
Total		**27.67 KLD**

Water Requirement for Existing Quarries

Water Requirement for Balanda Stone Quarry- 1

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor 10*30/1000= 0.30 KLD	0.30
Dust Suppression	Total approach road to be water sprinkled = 600 m 600 m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	687 plant (during plan period) @ 2 L/per plant= 687*2 lts = 1374/1000= 1.374KLD	1.374
Total		**5.314 ~ 6 KLD**

Water Requirement for Balanda Stone Quarry- 2

Activity	Calculation	Round off Figure in

		KLD
Drinking	@ 10 lpcd per labor 10*49/1000= 0.49 KLD	0.49
Dust Suppression	Total approach road to be water sprinkled = 600 m 600 m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	775 plant (during plan period) @ 2 L/per plant= 775*2 lts = 1550/1000= 1.55KLD	1.55
Total		**5.64 ~ 6 KLD**

Water Requirement for Balanda Stone Quarry- 3

Activity	**Calculation**	**Round off Figure in KLD**
Drinking	@ 10 lpcd per labor 10*45/1000= 0.45 KLD	0.45
Dust Suppression	Total approach road to be water sprinkled = 600 m 600 m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	760 plant (during plan period) @ 2 L/per plant= 760*2 lts = 1520/1000= 1.52KLD	1.52
Total		**5.57 ~ 6 KLD**

Water Requirement for Balanda Stone Quarry- 8

Activity	**Calculation**	**Round off Figure in KLD**
Drinking	@ 10 lpcd per labor 10*40/1000= 0.4 KLD	0.4
Dust Suppression	Total approach road to be water sprinkled = 600 m 600 m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	500 plant (during plan period) @ 2 L/per plant= 500*2 lts = 1000/1000= 1KLD	1

Total	**5 KLD**

Water Requirement for Balanda Stone Quarry- 10

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor 10*16/1000= 0.16 KLD	0.16
Dust Suppression	Total approach road to be water sprinkled = 600 m 600 m*6m*0.5 *2 times/1000= 3.6 KLD	3.6
Plantation	1372 plant (during plan period) @ 2 L/per plant= 1372*2 lts = 2744/1000= 1KLD	2.744
Total		**6.504 ~ 7 KLD**

Water Requirement for Cluster

Activity	Calculation	Round off Figure in KLD
Drinking	@ 10 lpcd per labor 10*448/1000= 4.48 KLD	4.48
Dust Suppression	Total haulage road to be water sprinkled = 6000 m 6000 m*6m*0.5 lt/sqm*2times/1000= 36.0 KLD	36.0
Plantation	7154 plants (in financial year) @ 2 L/per plant= 7154*2lts= 14308/1000= 14.308 KLD	14.308
Total		**54.788 ~ 55.0 KLD**

2.7.6Employment Generation

It has been proposed that the mining will be carried out by open cast semi-mechanized method.It has been calculatedthat the manpower in proposed cluster project is 268 nos. ofpeople. (Balanda

Stone Quarry- 7= 63nos +BalandaStone Quarry- 9 = 76 nos + Balanda Stone Quarry- 14= 34nos+ Balanda Stone Quarry- 15= 26nos&Balanda Stone Quarry- 16= 69 nos).

Table 2.15: Manpower Requirement

Manpower Requirement(for Proposed Quarries)

S No.	Name of the Quarry	Manpower
1	Balanda Stone Quarry- 7	63
2	Balanda Stone Quarry- 9	76
3	Balanda Stone Quarry- 14	34
4	Balanda Stone Quarry- 15	26
5	Balanda Stone Quarry- 16	69
Total		**268**

Manpower Requirement (for Cluster)

S No.	Name of the Quarry	Manpower
1	Balanda Stone Quarry- 1	30
2	Balanda Stone Quarry- 2	49
3	Balanda Stone Quarry- 3	45
4	Balanda Stone Quarry- 7	63
5	Balanda Stone Quarry- 8	40
6	Balanda Stone Quarry- 9	76
7	Balanda Stone Quarry- 10	16
8	Balanda Stone Quarry- 14	34
9	Balanda Stone Quarry- 15	26
10	Balanda Stone Quarry- 16	69
Total		**448**

2.8 MiningEquipment

The mine will be developed and operated using the following machines given in **Table 2.16.**The following additional equipments/machineries will be required for allied operations related to the mining of the deposit not covered earlier.

Table 2-16: Mining Equipment

Balanda Stone Quarry- 7		
Tpye of Machines	**Capacity**	**No. of Machines**
Excavator/JCB	2.0 Cu.m	4
Compressor	12 Cu.m/min	2
Tipper/Hywa	6/16 Cu.m	5/2
Water tanker	11KLD	1
Jack Hammer(Small Dia)	30mm dia	6
Waggon Drill/DTH(Large Dia)	100mm dia	2

Balanda Stone Quarry- 9		
Tpye of Machines	**Capacity**	**No. of Machines**
Excavator/JCB	2.0 Cu.m	1
Compressor	12 Cu.m/min	2
Tipper/Hywa	6/16 Cu.m	8/3
Water tanker	11KLD	1
Jack Hammer(Small Dia)	30mm dia	3
Waggon Drill/DTH(Large Dia)	100mm dia	1

Balanda Stone Quarry- 14		
Tpye of Machines	**Capacity**	**No. of Machines**
Excavator/JCB	2.0 Cu.m	1
Compressor	12 Cu.m/min	2
Tipper/Hywa	6/16 Cu.m	2/2
Water tanker	11KLD	1
Jack Hammer(Small Dia)	30mm dia	1
Waggon Drill/DTH(Large Dia)	100mm dia	1

Balanda Stone Quarry- 15		
Tpye of Machines	**Capacity**	**No. of Machines**
Excavator/JCB	2.0 Cu.m	1
Compressor	12 Cu.m/min	2

Tipper/Hywa	6/16 Cu.m	3/2
Water tanker	11KLD	1
Jack Hammer(Small Dia)	30mm dia	1
Waggon Drill/DTH(Large Dia)	100mm dia	1

Balanda Stone Quarry- 16		
Tpye of Machines	**Capacity**	**No. of Machines**
Excavator/JCB	2.0 Cu.m	2
Compressor	12 Cu.m/min	2
Tipper/Hywa	6/16 Cu.m	8/3
Water tanker	11KLD	1
Jack Hammer(Small Dia)	30mm dia	6
Waggon Drill/DTH(Large Dia)	100mm dia	1

****

CHAPTER 3 : BASELINE ENVIRONMENTAL STATUS

3.0 GENERAL

The main objective of describing the environment which may be potentially affected, area) to assess present environmental quality and the environmental impacts and ii) to identify environmentally significant factors that could preclude mine development. Mining activities affect the existing status of environment at site. In order to maintain the existing environmental status at mining site it is essential study existing environmental status and assess the impact of upcoming project on various environmental components.

This chapter gives idea of description of environment status of the study area and this will be helpful for assessment of impact on the environment due to proposed mining activities.

Baseline environmental status in and around proposed mining lease area describe the existing conditions of air, noise, water, soil, biological and socio-economic environment. The proposed project as a center, a radial distance of 10 km is considered as study area for baseline data collection and environmental monitoring. The data was collected for various environmental attributes so as to compute the impacts that are likely to arise due to proposed development activity.

Study Area and Study Period

The proposed project as a center, a radial distance of 10 km is considered as study area for baseline data collection and environmental monitoring. The baseline environment quality was carried out over a radial distance of 10 km around the mining lease area during PostMonsoon season of 2023 covering the months of October, 2023 to December, 2023.

Methodology

Base line attributes like ambient air, water, meteorology, noise, Soil, Ecology and Biodiversity & Socio Economy condition were collected as per approved term of reference. Secondary data was also collected from various government department as well as local people. Methodology adopted in this study is as follows.

- ✓ By setting up meteorological station near project site
- ✓ Collection of site specific meteorological data at the mine site.

Installation of respiratory dust samplers (for PM_{10}, $PM_{2.5}$) at different location in the study area for the collection of primary air pollutant and analyze the existing air conditions.

- ✓ Carrying out a detailed biological study for the Core and Buffer Zone
- ✓ Soil sample were collected from various location in the study area to analyze physical and chemical characteristics for assessment of impact on soil.
- ✓ Surface and Ground water samples were also collected from the various locations in the study area for analysing the existing water quality in the study area.
- ✓ Noise measurement has been done in core zone as well as buffer zone to analyze the existing situation in the study area.
- ✓ Literature review that includes identification of relevant data and articles from various publications, various government agencies and other sources for socio-economy, demography has been done with primary data collection in 10 km of the study area.
- ✓ Existing pollution load has been also identified in the buffer zone due to similar activities.
- ✓ Accordingly, field studies were carried out during the study period (October, 2023 to December, 2023) to establish the existing baseline conditions.

3.1 LAND ENVIRONMENT OF THE STUDY AREA

Land use

Land use involves the management and modification of natural environment or wilderness into built environment such as settlements and semi-natural habitats such as arable fields, pastures, and managed woods. It also has been defined as "the total of arrangements, activities, and inputs that people undertake in a certain land cover type.

Land cover

Land cover is the physical material at the surface of the earth. Land covers include grass, asphalt, trees, bare ground, water, etc. Earth cover is the expression used by ecologist Frederick Edward Clements that has its closest modern equivalent being vegetation. The expression continues to be used by the Bureau of Land Management.

To assess the land use pattern surrounding the 10 km radius of the site, a detailed study was carried out. The land use pattern study reveals that the 10 km environs is predominantly Agriculture contributing to more than 50 %. The land use details are given in Table- 3.1 and shown in Figure-3.1.

Table 3-1, Land Use Details

S. No.	Land Use Type	Area (Ha.)
1	Scrub Land	6872.61
2	Forest	14108.32
3	River/Water Bodies	1474.40
4	Settelement	4701.63
5	Vegetation	331.00
9	Agricultural	7579.15
Total		**35067.11**

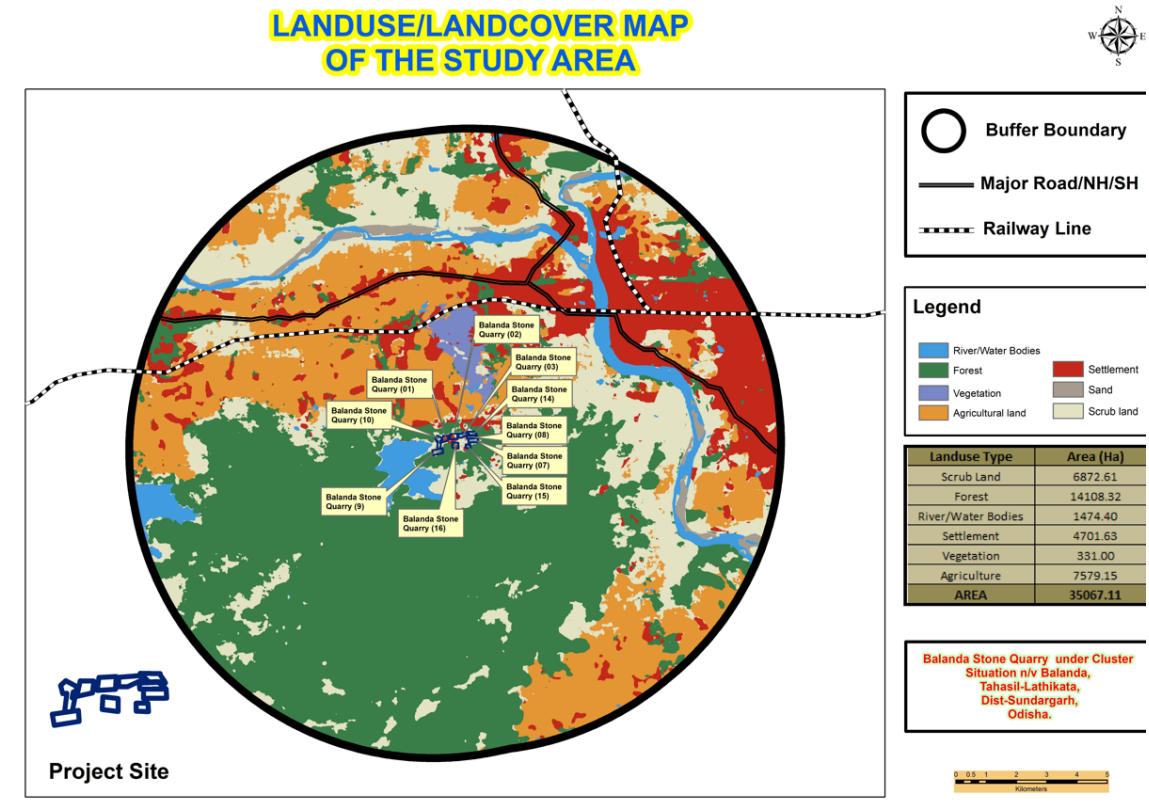


Figure 3-1: Land use Details

3.2 WATER ENVIRONMENT

Water quality assessment is one of the essential components of EIA study. Such assessment helps in evaluating the existing health of water body and suggesting appropriate mitigation measures to minimize the potential impact from development projects. Water quality of

ground water has been studied in order to assess proposed water-uses in construction, drinking, cooling and horticulture purpose.

The water quality at the site and other locations within the 10 km impact zone was monitored during October - December, 2023. The water sampling locations marked within the study are presented in Table 3.2 and Figure 3.2 and the result of the monitoring and analysis are presented in the Table 3.3 to Table 3.4 showing Water Quality Monitoring Locations marked within the Study Area.

Table 3-2, Water Sampling Locations

Location ID	**Location name**	**Distance and Direction**
GW 1	Pitamahul	2.74 Km, SW
GW 2	Ramlata	6.74 Km, SW
GW 3	Gutidarha	1.58 Km, South
GW 4	Sagjore	4.24 Km, West
GW 5	Dandiapali	4.62 Km, NE
Surface Water Monitoring Locations		
SW 1	Brahmani River	4.99 Km, ENE
SW 2	Water Reservoir	0.35 Km, West

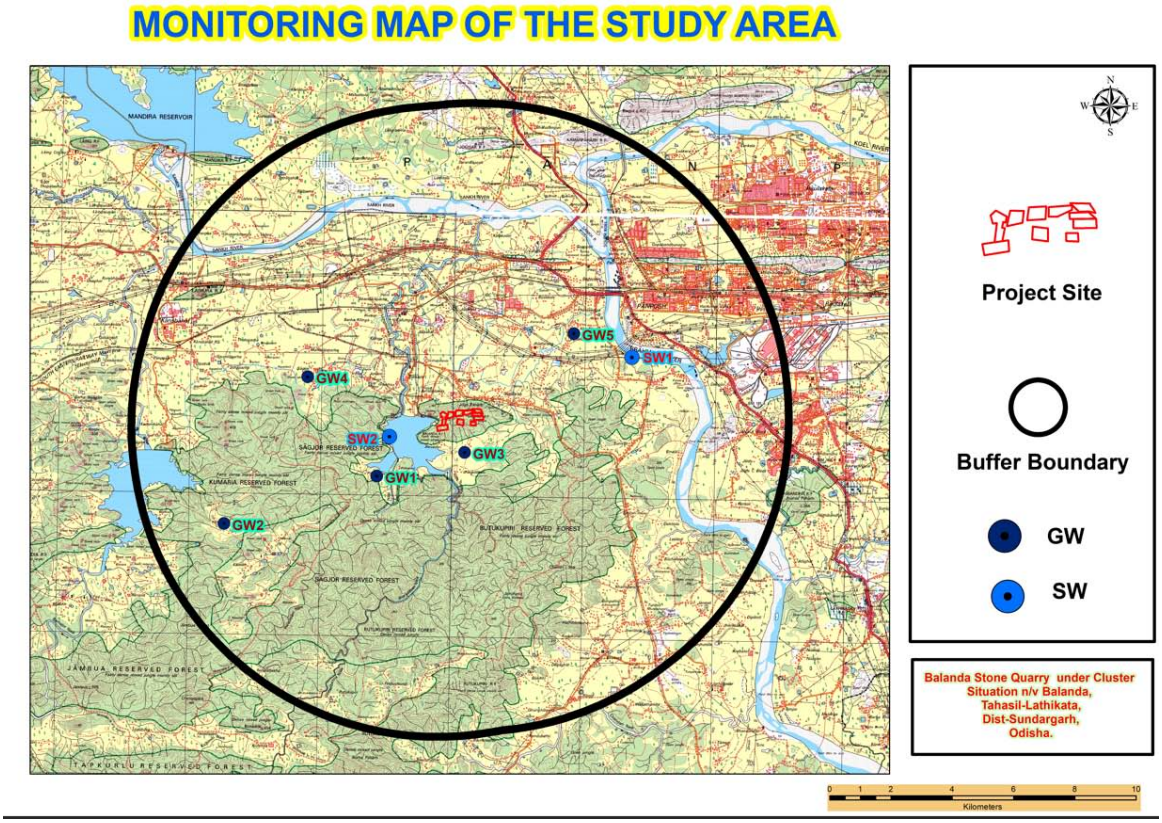


Figure 3-2: Water Quality Monitoring Locations

Table 3-3 Surface Water Monitoring Results

S. No	Parameter	Test Method	Units	Brahmani River	Water Reservoir
1.	pH (at 25^0C)	IS:3025(Part-11)	---	7.55	7.40
2.	Temperature	IS:3025(Part-9)	^{0}C	18.0	22.0
3.	Turbidity	IS:3025(Part-10)	NTU	3.2	4.8
4.	Electric Conductivity @25^0C	IS:3025(Part-14)	µS/cm	380	534
5.	Sulphate (SO_4)	IS:3025(Part-24)	mg/l	14.0	32.0
6.	Nitrate (NO_3)	IS:3025(Part-34)	mg/l	2.98	3.15
7.	Total Hardness (as CaCO3)	IS:3025(Part-21)	mg/l	146.0	158.0
8.	Chloride (as Cl)	IS:3025(Part-32)	mg/l	42.5	56.0
9.	Fluoride (as F)	APHA 4500F	mg/l	0.23	0.36
10.	COD (as O_2)	APHA-5220 B	mg/l	25.0	41.0
11.	Iron (as Fe)	IS:3025(Part-53)	mg/l	0.21	0.21
12.	Dissolve Oxygen	IS-3025(Part-38)	mg/l	7.2	5.6

13.	Total Dissolved Solid	IS:3025(Part-16)	mg/l	250	270
14.	BOD (3 days at 27^0C)	IS:3025 (P-44)	mg/l	4.4	8.2
15.	Calcium (as Ca)	IS:3025(Part-40)	mg/l	37.0	56.0
16.	Magnesium (as Mg)	IS:3025(Part-46)	mg/l	8.8	10.5
17.	Arsenic (as As)	IS:3025(Part-37)	mg/l	BDL (<0.01)	BDL (<0.01)
18.	Lead (as Pb)	IS:3025(Part-47)	mg/l	BDL (<0.01)	BDL (<0.01)
19.	Copper (as Cu)	IS:3025(Part-42)	mg/l	BDL (<0.05)	BDL (<0.05)
20.	Zinc (as Zn)	IS:3025(Part-49)	mg/l	BDL (<0.01)	BDL (<0.01)
21.	Manganese (as Mn)	IS:3025(Part-59)	mg/l	BDL (<0.10)	BDL (<0.10)
22.	Total Chromium (as Cr)	IS:3025(Part-52)	mg/l	BDL (<0.05)	BDL (<0.05)
23.	Sodium (as Na)	IS:3025(Part-45)	mg/l	21.2	28.8
24.	Potassium (as K)	IS:3025(Part-45)	mg/l	1.68	2.10
25.	Total Alkalinity (as $CaCO_3$)	IS:3025(Part-23)	mg/l	165	210
26.	Phosphate (as P)	IS:3025(Part-31)	mg/l	0.21	0.21
27	Nitrite (as NO_2)	IS:3025(Part-34)	mg/l	0.14	0.19
28.	Total Suspended Solid	IS:3025(Part-17)	mg/l	8.5	12.0
29.	Faecal Coliform	IS-1622	MPN/100 ml	1.2×10^3	1.0×10^3
30.	Total Coliform	IS-1622	MPN/100 ml	2.4×10^3	2.8×10^3

Table 3-4: Ground Water Results

S. No.	Parameter	Unit	GW1 Pitamahul	GW2 Ramlata	GW3 Guti darha	GW4 Sagjore	GW5 Dandia pali	Limit (as per IS:10500)	
								Desirable	Permissible
1	Colour	Hazen	<1.0	<1.0	<1.0	<1.0	<1.0	5	15
2	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	-
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	-
4	Turbidity	NTU	<1.0	<1.0	<1.0	<1.0	<1.0	1	5
5	pH	-	7.88	7.54	7.38	7.40	7.21	6.5-8.5	No Relaxation
6	Total Hardness (as CaCO3)	mg/l	219	196	175.4	180.0	226	200	600
7	Iron (as Fe)	mg/l	0.148	0.160	0.21	0.17	0.157	1.0	No Relaxation
8	Chlorides (as Cl)	mg/l	85.2	81.0	45.40	32.50	80.1	250	1000
9	Fluoride (as F)	mg/l	0.58	0.47	0.48	0.86	0.42	1	1.5
10	TDS	mg/l	595	410	650	678	510	500	2000
11	Calcium(as Ca2+)	mg/l	36.8	45.2	48.8	54.5	54.6	75	200
12	Magnesium (as Mg2+)	mg/l	19.0	21.6	15.4	17.2	18.8	30	100
13	Copper (as Cu)	mg/l	BDL (<0.01)	BDL (<0.01)	BDL (<0.01)	BDL (<0.01)	BDL (<0.01)	0.05	1.5
14	Manganese(as Mn)	mg/l	BDL (<0.05)	BDL (<0.05)	BDL (<0.05)	BDL (<0.05)	BDL (<0.05)	0.1	0.3
15	Sulphate (as SO4)	mg/l	39.4	47.2	32.5	27.4	75.2	200	400
16	Nitrate(as NO3)	mg/l	5.21	8.60	7.54	6.98	5.80	45	No Relaxation
18	Mercury (as Hg)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	No Relaxation
19	Cadmium (as Cd)	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	No Relaxation
20	Selenium (as Se)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No Relaxation
21	Arsenic (as As)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No Relaxation

22	Cyanide (as CN)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	No Relaxation
23	Lead (as Pb)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No Relaxation
24	Zinc (as Zn)	mg/l	0.134	0.128	0.18	0.25	0.156	5	15
25	Anionic Detergent (as MBAS)	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	0.2	1
26	Chromium (as Cr6+)	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	No Relaxation
27	Mineral oil	mg/l	<0.50	<0.50	<0.50	<0.50	<0.50	0.5	No Relaxation
28	Alkalinity as CaCO3	mg/l	210	206	202.0	189.6	214	200	600
29	Aluminium (as Al)	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.2
30	Boron (as B)	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	0.5	2.4
31	Total Coliform	MPN /100ml	Absent	Absent	Absent	Absent	Absent	Absent/100ml	
32	*E. coli*	E.coli /100ml	Absent	Absent	Absent	Absent	Absent	Absent/100ml	

Sampling frequency

Parameters for analysis of water quality were selected based on the utility of the particular source of water as per CPCB guidance. Surface water quality was monitored for parameters as per Methods of Monitoring & Analysis published by CPCB and it was rated according to the CPCB Water Quality Criteria against A, B, C, D & E class of water. Water samples were collected as Grab water sample from sampling location for complete physico-chemical and bacteriological tests respectively. The samples were analyzed as per standard procedure / method given in IS: 10500.

The surface water quality is compared with CPCB water quality criteria mentioned in Table 3.5 below:

Table 3-5: Water Quality Criteria as per Central Pollution Control Board

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

As per the standard practice, one sample from each station was taken each month in the study period. Sampling was done by standard sampling technique as per the Standard Methods. Necessary precautions were taken for preservation of samples.

Result & Conclusion:

- The pH limit fixed for drinking water samples as per IS-10500 Standards is 6.5 to 8.5 beyond this range the water will affect the mucus membrane or water supply system. During the study period, the pH was varying for ground waters from 7.21 to 7.88 & in Surface water from 7.40 to 7.55. The pH values for all the samples collected in the study area during study period were found to be within the limits.
- The desirable limit for total dissolved solids as per IS-10500 Standards is 500 mg/l whereas the permissible limit in absence of alternate source is 2000mg/l. In ground water samples collected from the study area, the total dissolved solids are varying from 410 mg/l to 678 mg/l.
- Hardness of ground water varies from 175.4 mg/l to 226 mg/l. The desirable limit for Hardness is 200 mg/l whereas the permissible limit is 600mg/l.
- Concentration of Fluorides varied from 0.42 mg/l to 0.86 mg/l.

3.3 AIR ENVIRONMENT

Meteorology is the key to understand the air quality. The essential relationship between meteorology and atmospheric dispersion involves the wind in the broadest sense. Wind fluctuations over a very wide range of time, accomplish dispersion and strongly influence other processes associated with them.

A meteorological station was set up at the proposed mine premises. Meteorological data was generated during the Post-monsoon monitoring period and shown in Table-3.6.

The following parameters were recorded at hourly intervals continuously during monitoring period, except rainfall which was recorded on daily basis.

- Wind speed
- Wind Direction
- Air Temperature

Table 3-6: Summarized project site meteorological data for post monsoon

Month	Temperature °C		Wind speed		Relative Humidity (%)	Rainfall (mm)	
	Min	Max	Max	Avg	Avg	Avg	Days
October 2023	21	31	9.9	6.2	66	66.78	2
November 2023	18	30	10.4	7	53	1.56	0
December 2023	15	26	10	6.6	53	43.33	3

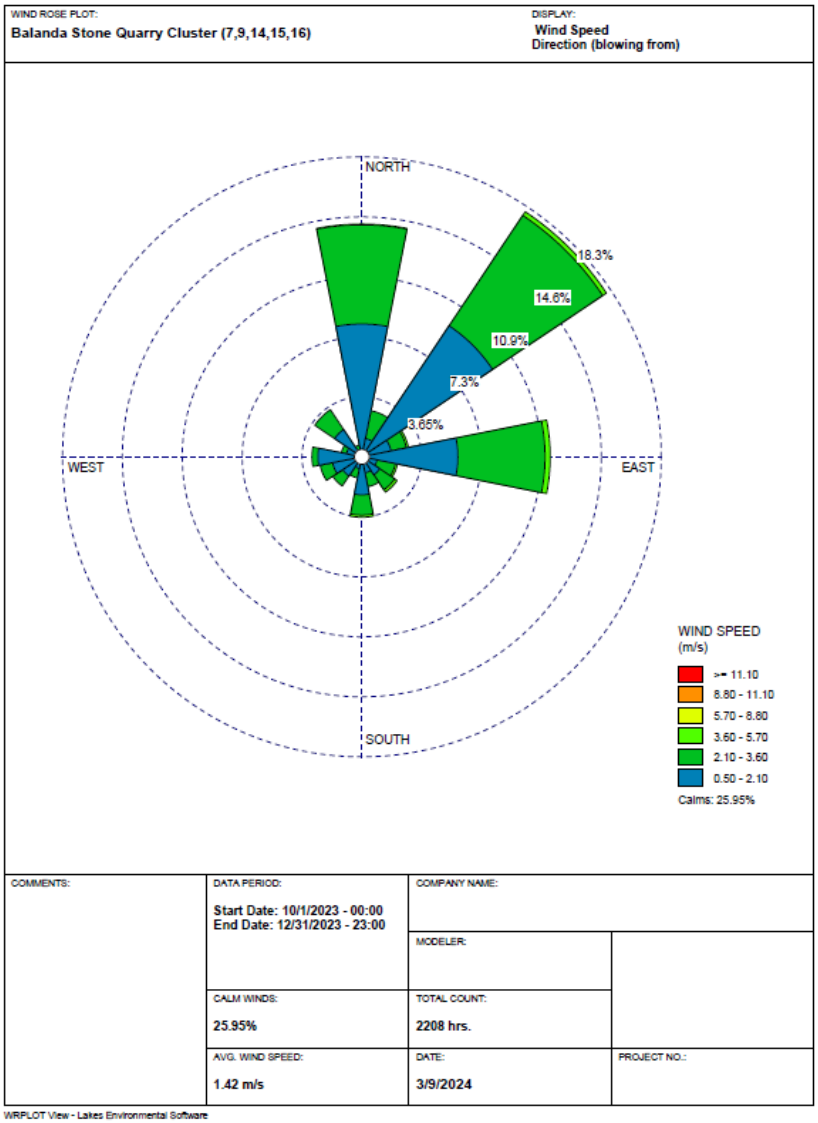


Figure 3-3: Wind Rose Diagram (At site)

Secondary Data Collection from IMD-Jharsugunda

Secondary data from IMD- Jharsugundahas been collected for temperature, relative humidity, rainfall, wind speed and direction. The data at IMD is usually measured twice a day viz., at 0830 and 1730 hr.

The annual variations in average wind speed recorded at 0300 UTC t Jharsugunda during the period 1971-2000. A highest monthly mean wind speed obtained in 5.5 mps in May folled by 5.2 mps in April. The lowest monthly mean wind speed is 2.1 mps in January.

The meteorological data is collected from the IMD- Jharsugunda is about 85 km from project site, which is the nearest operating IMD station to the project site. The data collected from IMD includes wind speed, wind direction, temperature, relative humidity and rainfall. The monthly maximum, minimum and average values are collected for all the parameters except wind speed and direction. The collected data is tabulated in Table-3.7.

Table 3-7, Climatological Data Station: IMD, Jharsugunda

Month	Temperature (^{0}C)		Relative Humidity	Rainfall (mm)
	Max	Min		
January	31.2	8.4	68	19
February	35	11.1	59	19.5
March	40	14.9	46	14.6
April	43.7	19.9	43	24.5
May	45	21.7	51	37.9
June	43.2	22.8	69	221.2
July	35.9	22.6	84	421.7
August	34.1	22.9	86	386.3
September	34.6	22.5	82	233.3
October	34.3	16.9	74	64.8
November	32.8	12.2	69	15.7
December	30.4	9.2	70	8.7

Comparison of Primary and Secondary Data

The India Meteorological Department (IMD) records the data twice a day viz. 08.30 hr and 17.30 hr while the site-specific data has been recorded at an hourly interval. On comparison of site specific data generated for study period vis-à-vis the IMD data, slight variations were observed. The following observations are brought out:

When the data generated at project site is compared with the data recorded at IMD, it is observed that the data generated at the site is broadly in comparison with regional meteorology, except for minor variations. The predominant wind direction at IMD Jharsugunda& site is North East.

Ambient Air Quality

The ambient air quality was monitored in the impact area as per MoEF& CC guidelines. The study area represents entirely rural environment. The prime objective of the baseline air quality study was to assess the ambient air quality of the mining lease area.

Selection Criteria for Monitoring Location

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

- Meteorological parameters including wind direction
- Topography of the study area
- Representative of regional background air quality for obtaining baseline status
- Representative of likely impact areas.

Ambient Air Quality Monitoring (AAQM) stations were set up at 08 locations with due consideration to the above mentioned points. AAQM locations were selected in downwind, upwind as well as crosswind direction of the proposed mining lease area covering core and buffer zones. The details of the monitoring stations are given in Figure 3.4 and shown in Table-3.8.

Ambient air quality monitoring was carried out twice a week with a frequency of 24 hours for three months during the study period. The common air pollutant namely Particulate Matter-10 (PM_{10}) & $PM_{2.5}$, Sulphur-dioxide (SO_2) and Oxides of Nitrogen (NO_2) has been measured through a planned field monitoring.

The baseline values of the air pollutants of concern are presented in Tables below statistical parameters like minimum, maximum, average and 98th percentiles have been computed from the observed field data for all sampling stations and are given Table-3.9, Table-3.10, Table-3.11 & Table 3.12. These are compared with the standards prescribed by Central Pollution Control Board (CPCB) for industrial, residential and rural zone.

Table 3-8: Location of Ambient Air Quality Monitoring Locations

Locations Code	Locations	Distance (km)	Direction
AAQ-1	Project Site	-	-
AAQ-2	Pitamahul	2.74	SW
AAQ-3	Ramlata	6.74	SW
AAQ-4	Gutidarha	1.58	South
AAQ-5	Sagjore	4.24	West
AAQ-6	Dandiapali	4.62	NE
AAQ-7	Beldihi	5.36	North
AAQ-8	Birual	4.94	ESE

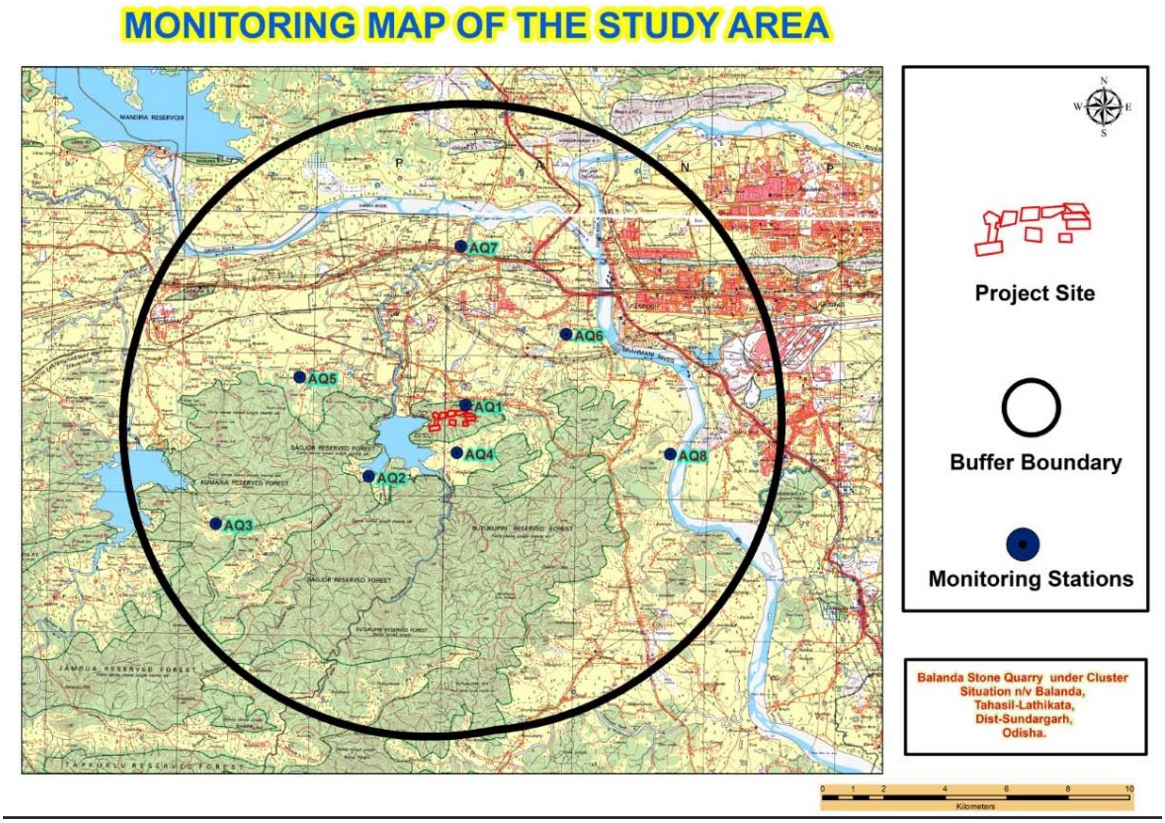


Figure 3-4: Ambient air monitoring locations

Table 3-9: Ambient air quality in the study area ($PM_{2.5}$)

Location Code	PM2.5 (µg/m^3)				
	Name of the station	Min	Max	Average	98th Percentile
AAQ1	Project Site	37.85	46.58	42.98	46.47
AAQ2	Pitamahul	32.56	39.93	35.94	39.63
AAQ3	Ramlata	31.79	39.56	36.05	39.46
AAQ4	Gutidarha	32.46	39.81	35.84	39.52
AAQ5	Sagjore	36.36	46.82	41.02	46.68
AAQ6	Dandiapali	32.42	40.62	36.62	40.21
AAQ7	Beldihi	25.04	30.70	27.75	30.46
AAQ8	Birual	30.28	37.63	33.52	37.28

Table 3-10: Ambient air quality in the study area (PM_{10})

Location Code	PM10 (µg/m^3)				
	Name of the station	Min	Max	Average	98th Percentile
AAQ1	Project Site	77.86	88.03	82.03	87.40
AAQ2	Pitamahul	73.32	82.08	77.28	81.96
AAQ3	Ramlata	70.29	83.54	77.26	82.98
AAQ4	Gutidarha	75.36	82.99	79.14	82.60
AAQ5	Sagjore	72.76	84.36	79.50	84.17
AAQ6	Dandiapali	71.73	83.12	77.32	83.11
AAQ7	Beldihi	64.49	73.06	69.13	72.93
AAQ8	Birual	66.54	77.56	72.50	77.32

Table 3-11: Ambient air quality in the study area (SO_2)

Location Code	SO_2 (µg/m^3)				
	Name of the station	Min	Max	Average	98th Percentile
AAQ1	Project Site	8.69	10.10	9.62	10.09
AAQ2	Pitamahul	13.79	16.04	15.05	15.92
AAQ3	Ramlata	6.74	8.41	7.76	8.41
AAQ4	Gutidarha	14.48	16.84	15.80	16.72
AAQ5	Sagjore	7.29	9.06	8.14	9.03
AAQ6	Dandiapali	6.33	7.98	7.31	7.97
AAQ7	Beldihi	6.45	7.13	6.90	7.12
AAQ8	Birual	6.00	7.81	6.83	7.81

Table 3-12: Ambient air quality in the study area (NO_2)

Location Code	NO_2 (µg/m^3)				
	Name of the	Min	Max	Average	98th

	station				Percentile
AAQ1	Project Site	17.71	19.33	18.72	19.30
AAQ2	Pitamahul	5.79	7.59	6.61	7.59
AAQ3	Ramlata	16.00	18.36	16.99	18.34
AAQ4	Gutidarha	5.79	7.60	6.61	7.59
AAQ5	Sagjore	15.42	18.09	16.53	17.87
AAQ6	Dandiapali	12.05	17.71	14.35	17.39
AAQ7	Beldihi	12.83	16.45	14.44	16.45
AAQ8	Birual	14.42	18.17	16.18	18.15

Baseline Scenario

Suspended particulate matter in general terms is the particulate matter in suspension in ambient air. PM 2.5 refers to particles with a diameter of less than 2.5 microns. These are usually called fine particles and contain secondary aerosols, combustion particles and re-condensed organic metallic vapour, and acid components. Fine particles can reach all the way down to the alveoli in the lungs.

The minimum and maximum level of PM2.5 recorded within the study area was in the range of 25.04µg/m^3 to 46.82µg/m^3 with the 98thpercentile ranging between 30.46µg/m^3 to 46.68µg/m^3.

The 24 hourly average values of $PM_{2.5}$ were compared with the National Ambient Air Quality Standards (NAAQS) and found that all sampling stations recorded in the study area are within the applicable limits i.e., 60 µg/m^3 for $PM_{2.5}$ in rural areas.

a) Suspended Particulate Matter (PM_{10})

PM10 refers to particles with a diameter less than 10 microns. These are commonly called coarse particles - they contain dust from roads and industries as well as particles formed under combustion. Depending on their size, coarse particles can lodge in the trachea (upper throat) or in the bronchi.

The minimum and maximum level of PM_{10} recorded within the study area was in the range of 64.49 to 88.03µg/$m^3$with the 98thpercentile ranging between 72.93µg/m^3 to 87.40µg/m^3.

The 24 hourly average values of PM_{10} were compared with the National Ambient Air Quality Standards (NAAQS) and found that all sampling stations recorded in the study area are within the applicable limits i.e., 100 µg/m^3 for PM_{10} in rural areas.

b) Sulphur Dioxide (SO_2)

Sulphur dioxide gas is an inorganic gaseous pollutant. Sulphur dioxide emissions are expected to be emitted wherever combustion of any fuel containing Sulphur takes place. The Sulphur in the fuel will combine with oxygen to form Sulphur dioxide. The following sources of Sulphur dioxide in the study area are identified:

Emissions from domestic/consumption of fuel (coal, diesel etc.)

Sulphur dioxide in atmosphere is significant because of its toxicity; Sulphur dioxide is capable of causing illness and lung injury. Further it can combine with water in the air to form toxic acid aerosols that can corrode metal surfaces, fabrics and the leaves of plants. Sulphur dioxide is an irritant to the eyes and respiratory system. Excessive exposure to Sulphur dioxide causes breathing related diseases as it affects the lungs.

The minimum and maximum concentration of SO_2 recorded within the study area was 6.00 to 16.84µg/m^3 with the 98th percentile ranging between 7.12µg/m^3 to 16.72µg/m^3.

The 24 hourly average values of SO_2 were compared with the National Ambient Air Quality Standards (NAAQS) and it was found that all sampling stations recorded values are below the applicable limits 80 µg/m^3 for rural areas.

c) Oxides of Nitrogen (NO_2)

- The important sources of oxides of Nitrogen are from utilities and auto exhaust due to vehicular movement in mine lease area. The following sources of oxides of nitrogen in the study area are identified.
- Emissions from vehicular movements in the study area.
- Oxides of Nitrogen in the presence of sunlight will undergo reactions with a number of organic compounds to produce all the effects associated with photochemical smog. NO_2 has inherent ability to produce deleterious effects by themselves like toxicity. It

causes asphyxiation when its concentration is great enough to reduce the normal oxygen supply from the air.

- The minimum and maximum level of NO2 recorded within the study area was in the range of was 5.79µg/m^3 to 19.33µg/m^3 with the 98th percentile ranging between 7.59µg/m^3 to 19.30µg/m^3.
- The 24 hourly average values ofNO_2 were compared with the National Ambient Air Quality Standards (NAAQS) and it was found that all sampling stations recorded values are below the applicable limits 80 µg/m^3 for rural areas.

3.4 NOISE ENVIRONMENT

Sound, a normal feature of our life, is the means of communication and entertainment in most animals, including human beings. It is also a very effective alarm system. A low sound is pleasant whereas a loud sound is unpleasant and is commonly referred to as 'noise'. Noise can be defined as an unpleasant and unwanted sound. Noise is a physical form of pollution and is not directly harmful to the life supporting systems namely air, soil and water. Its effects are more directly on the receiver i.e. man. Noise pollution is the result of modern industrialized urban life and congestion due to over population.

Sources of Noise

The main sources of noise in the study area are domestic activities, industrial activities and vehicular traffic. The main occupation of the villagers in the study area is agriculture.

Noise level in the Study Area

The baseline noise levels have been monitored at 08 locations within the study zone. Locations were identified for assessment of existing noise level status, keeping in view the land use pattern, industrial area, Silence zone, residential areas in villages etc., if available within 10 km radius of the study area.The day levels have been monitored during 6.00 AM to 10.00 PM and night noise levels, during 10.00 PM to 6.00 AM. The noise monitoring stations are shown in Figure 3.5 and represented in Table 3.13. The results are presented in Table 3.14.

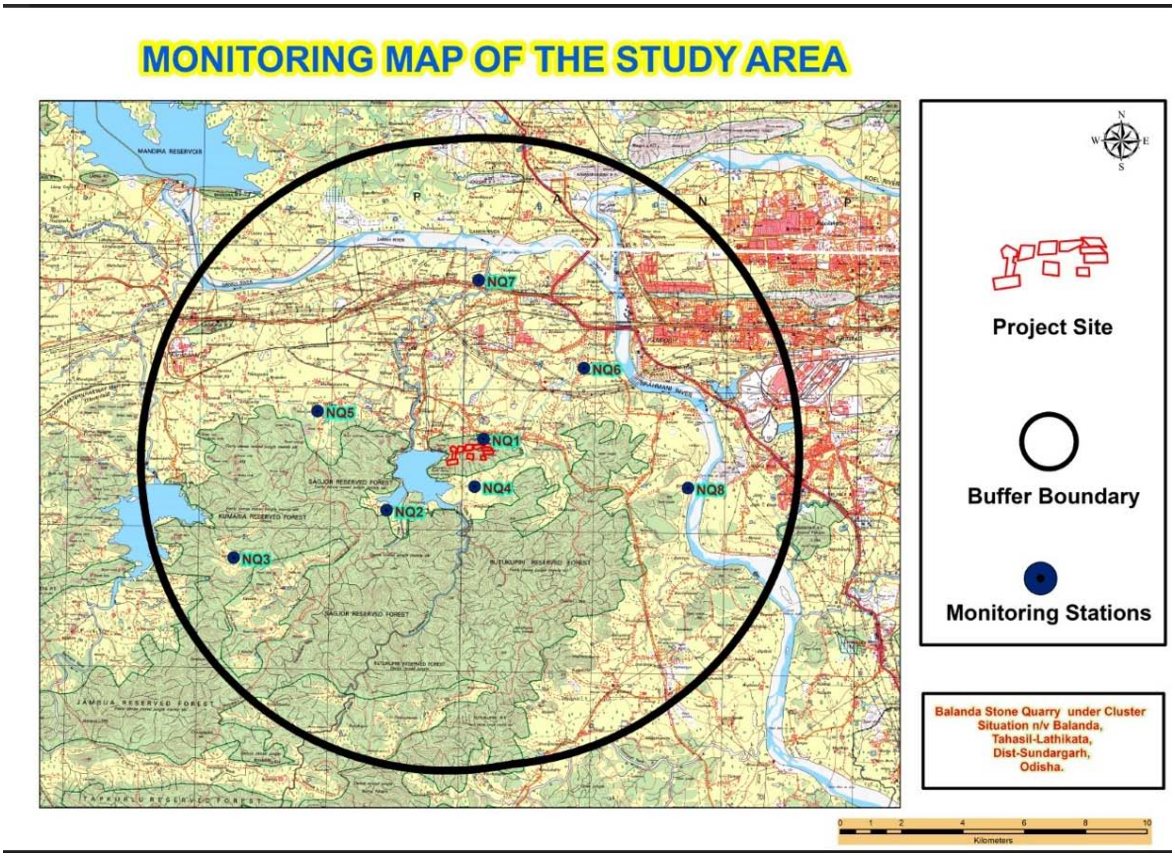


Figure 3-5: Noise Monitoring Locations

Table 3-13: Noise level monitoring Locations in the study area

Code	Locations	Distance km	Direction
NQ-1	Project Site	-	-
NQ-2	Pitamahul	2.74	SW
NQ-3	Ramlata	6.74	SW
NQ-4	Gutidarha	1.58	South
NQ-5	Sagjore	4.24	West
NQ-6	Dandiapali	4.62	NE
NQ-7	Beldihi	5.36	North
NQ-8	Birual	4.94	ESE

Table 3-14: Hourly Leq noise level in the study area

S. No.	Locations		Equivalent Noise Level, Db (A)			
			Limit (as per CPCB Guidelines),Leq, Db(A)		Limit (as per CPCB Guidelines),Leq, Db(A)	
			DAY*	NIGHT*	DAY*	NIGHT*
1	NQ1 (Project Site)	Industrial Zone	75	70	58.2	45.8
2	NQ2 Pitamahul	Residential Zone	55	45	53.1	41.4
3	NQ3 Ramlata	Residential Zone	55	45	51.5	42.1
4	NQ4 Gutidarha	Residential Zone	55	45	52.3	43.0
5	NQ5 Sagjore	Residential Zone	55	45	54.2	40.9
6	NQ6 Dandiapali	Residential Zone	55	45	52.3	41.4
7	NQ7 Beldihi	Residential Zone	55	45	51.8	39.2
8	NQ8 Birual	Residential Zone	55	45	52.4	42.6

Ambient Noise Standards

Ministry of Environment Forests and Climate Change (MoEF&CC) has notified the noise standards vide gazette notification dated February 14, 2000 for different zones under the Environment Protection Act (1986). These standards are given in Table-3.15.

Table 3-15: Ambient quality standards in respect of noise

Area Code	Category of Area	Noise dB (A) L_{eq}	
		Daytime*	Night time*
A	Industrial Area	75	70

B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

1. Daytime is from 6.00 am to 10.00 pm and Night time is from 10.00 pm to 6.00 am.
2. Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicle horns, loud speakers and bursting of crackers is banned in these zones.

Baseline Scenario

The values of noise observed in some of the areas are primarily owing to vehicular traffic. Assessment of hourly night time Leq (Ln) varies from 39.2 to 45.8dB (A) and the hourly daytime Leq (Ld) varies from 51.5 to 58.2 dB (A) within the study area.

The status of noise quality within the 10 km zone of the study area is, therefore, within the MoEF& CC standards.

3.5 SOIL CHARACTERISCTICS

The composite soil samples were collected from sites and the study area and were analyzed for characterization. The locations of the monitoring sites are depicted in Figure 3.6 and given in Table 3.16 Showing Soil Sample Collection Points marked within the Study Area.

Methodology

The soil samples were collected in the month of October, 2023. Soil samples were collected from 05 locations. The samples were filled in polythene bags, labeled in the field with number and site name and sent to laboratory for analysis. The test results are given inTable-3.17.

Table 3-16: Soil Sample Collection Points

S.No	Name	Distance (km)	Dirction
SQ1	Project Site	-	-
SQ2	Pitamahul	2.74	SW
SQ3	Ramlata	6.74	SW

SQ4	Gutidarha	1.58	South
SQ5	Sagjore	4.24	West

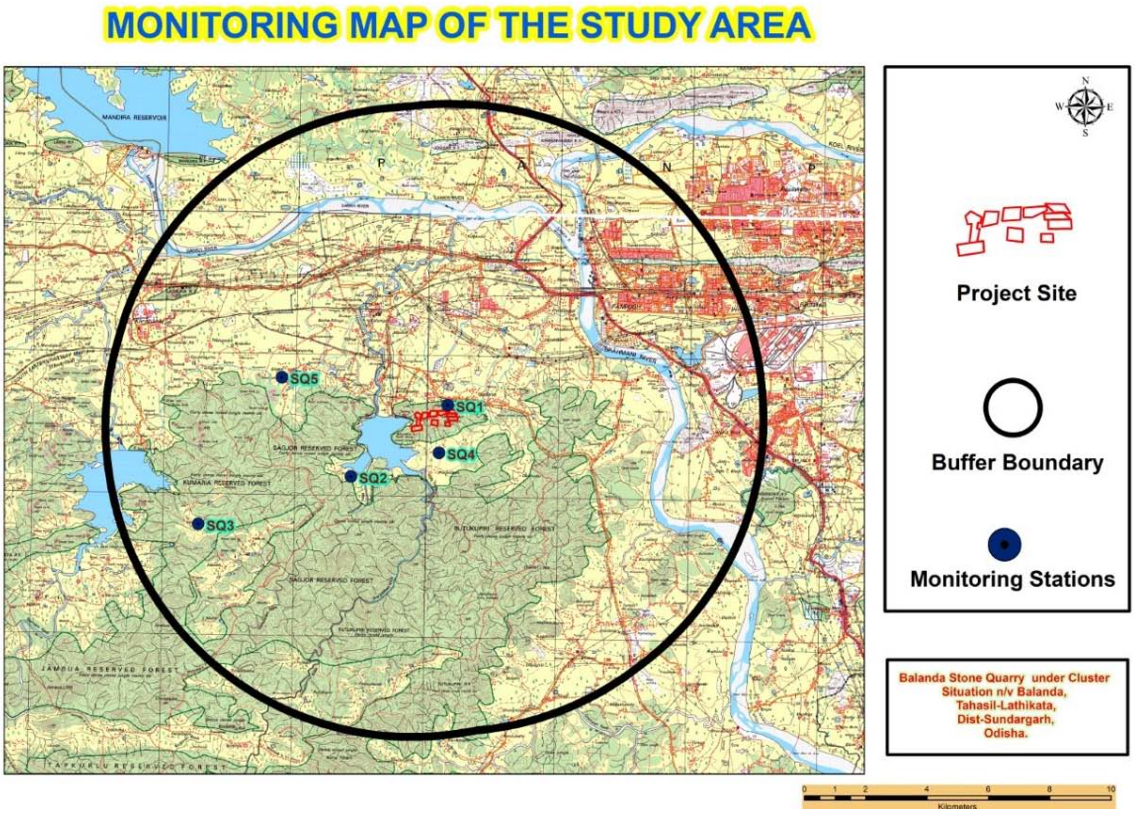


Figure 3-6: Soil Sampling Map

Table 3-17: Physico-Chemical Properties of Soil

		Location	Project Site	Ptamahul	Ramlata	Gutidarha	Sagjore
Sr. No.	**Parameters**	**Units**	**Results**	**Results**	**Results**	**Results**	**Results**
1	pH	-	7.89	7.54	8.23	7.80	7.66
2	Conductivity	µmhos/cm	518.0	460.0	440.0	521.0	498.0
3	Sodium (as Na)	mg/kg	64.70	75.40	78.21	64.80	89.20
4	Water holding capacity	%	32.0	28.6	28.8	30.1	27.5
5	Potassium (as K)	mg/kg	298.0	260.5	254.0	278.2	280.0
6	Sand	%	85.00	86.50	89.00	85.40	84.00
7	Clay	%	8.00	4.80	3.60	4.60	7.00
8	Silt	%	7.00	8.70	7.40	10.0	9.00
9	Calcium (as Ca)	mg/kg	454.00	441.00	445.00	542.00	514.98
10	Magnesium (as Mg)	mg/kg	168.10	173.09	153.56	203.34	158.26
11	SAR	-	0.95	1.49	1.55	1.40	0.69
12	CEC	meq/100gm	2.12	2.12	2.34	2.20	2.72
13	Phosphorus (as P)	mg/kg	10.80	12.50	12.76	12.44	11.81
14	Organic carbon	%	0.43	0.41	0.35	0.42	0.54
15	Porosity	%	38.00	36.89	45.6	35.6	41.26
16	Permeability	cm/hr	1.82	1.60	1.88	1.76	1.67
17	Bulk Density	kg/cm^3	1.41	1.44	1.38	1.45	1.43
18	Total Kjeldahl Nitrogen (TKN)	%	0.026	0.034	0.039	0.028	0.025

Results of Analysis of the Soil

Physical characteristics of soil were characterized through specific parameters viz bulk density, porosity, water holding capacity, pH, electrical conductivity and texture. Soil pH plays an important role in the availability of nutrients. Soil microbial activity as well as solubility of metal ions is also dependent on pH. In the study area, variations in the pH of the soil were found to be slightly alkaline (7.54 to 8.23). Electrical conductivity (EC) is a measure of the soluble salts and ionic activity in the soil. In the collected soil samples the conductivity ranged from 440.0-521.0 µmhos/cm.

The soils with low bulk density have favorable physical condition where as those with high bulk density exhibit poor physical conditions for agriculture crops.

3.6 BIOLOGICAL ENVIRONMENT

The conservation and sustainable use of natural ecosystems and biodiversity is essential to support sustainable development with biological resources providing raw materials for livelihoods, sustenance, trade, medicine and industrial development. Protecting forests and other natural ecosystems can provide a host of services that reduce human vulnerability to natural hazards along with benefits of global value such as carbon sequestration, hydrological and geo-chemical cycling of essential elements. In any Environment Impact Assessment study, it is necessary to identify the baseline levels of relevant biological environmental parameters which are likely to be affected as a result of the construction and operation of the planned project. Similar approach has been adopted for conducting the Biological Environment study of the proposed project. The biological study was undertaken to understand the present status of terrestrial and aquatic ecosystems of the study area. The baseline status has been ascertained for the following aspects:

Terrestrial Ecology

The study area covers core zone and 10 km around the project site. The information presented in this Chapter has been collected through field studies, consultation with various government departments, local resource person and collection of available literature from various institutions and organizations.

The nature of vegetation cover in this region is open dry mixed deciduous type vegetation. Plantations have been done along the road side, and agricultural fields under social forestry. The species are of Mahua, Mango, Pipal, Neem, Tendupatta, Amla, Khamer, Bamboo, Teak, Khair, Saja. Collection of dead and dried branches for fuel, hard wood and local trees for construction purpose, grazing practice on vegetated land is also common.

Forests

The total forest cover of the district is 459 km^2, which constitutes 16.31% of the district's geographic area. The majority of forest cover is of Open Forest type occupying an area of 248km^2. It is followed by shrubs and moderately dense forest which in turn occupy an area of 91km^2 and 22 km^2 respectively.

The recorded forest area of Odisha is 58,136 km^2 which is 37.34% of the geographic area of the State. (**Source**: India Sate of Forest Report 2015).

Table 3-18: District-wise Forest Cover area in Odisha (Area in km^2)

Recorded Forest Area	
Reserve Forest	26,329 sq km
Protected Forest	15,525 sq km
Unclassed Forest	16,282 sq km
Total	58,136 sq km
Of State's Geographical Area	37.34%
Of India's Forest Area	7.60%

Land use pattern of Odisha

Existing Land Use Pattern (Agriculture, Non- Agriculture, Forest, Water Bodies (including area under CRZ)), shortest distances from the periphery of the Project to the periphery of the Forest, National Park, Wild Life Sanctuary, eco-sensitive areas, water bodies (distance from the HFL of the River), CRZ.

Distance of Various Physical Features from the Boundary of the Lease Area

- There is no such Ecologically Sensitive area as per Hon'ble Supreme Court Civil writ petition No.460 of 2004.

- There is no national park/wild life sanctuary/biosphere reserve/ tiger reserve/ elephant reserve in the lease area and buffer zone (10 km radius of the quarry area).
- There is no seasonal or perennial nala in the quarry area.
- There is no endangered fauna like elephant, sloth bear, python etc in & around the Quarry area.

Source: Land use statistics, Ministry of Agriculture, GoI, 2008-09

Eco-sensitive Areas: There are no National Parks, Sanctuaries, Breeding, roosting places or ecologically sensitive areas within the 10 km periphery of the mine lease area, except open mixed jungle in south most direction. No wildlife protected area declared protected under "Wildlife (Protection) Act-1972"is located within 10 km radius of the proposed mining area.

METHODOLOGY

Flora

The primary objective of survey was to describe the floral and faunal communities within the study area. The sampling plots for floral inventory were selected randomly in the suitable habitats. The present study on the floral assessment for the proposed project activity is based on field survey of the core zone. The plant species were identified with the help of taxonomists of related fields and nearby Institutions. Besides the collection of plant species, information was also collected with vernacular names of plant species made by local inhabitants. The other relevant data on bio-diversity, like economically important plant species and medicinal plant, rare and endangered species in the study area have been collected from secondary sources like forest and wild life departments.

Core Zone:-

This area consists of riparian vegetation in which aquatic and marshland plants are the main component. Most among them are weeds. No ecologically sensitive plant species has been reported from this area. Riparian vegetation is found along the river side.

Buffer Zone:-

There are no Reserved Forests and Protected Forests in the lease area.

Table 3-19:, List of Flora within Study Area
List of Trees in Buffer Zone

Scientific Name	Common/local Name	Family
Mangifera indica	Mango	Anacardiaceae
Terminalia arjuna	Arjuna	Combretaceae
Naringi crenulated	Benta (Behenta)	Rutaceae
Litseaglutinosa	Baghatal	Lauraceae
Anacardium occidentale	Cashew nut	Anacardiaceae
Nephelium litchi	Litchi	Anacardiaceae
Bombax malabaricum	Red Silk Cotton Tree	Bombacaceae
Eriodendronanfractuosum	White Silk Cotton Tree	Bombacaceae
Cassia fistula	Indian Laburnum	Caesalpiniae
Delonix regia	Gulmohar	Caesalpiniae
Tamarindus indica	Tamarind	Caesalpiniae
Saraca indica	Ashok	Caesalpiniae
Bauhinia accuminata	Camel’s foot tree	Caesalpiniae
Peltophoruminerme	Radhachura	Caesalpiniae
Cassia siamea	Chakunda	Caesalpiniae
Casuarina equisetifolia	Jhau	Casuarinaceae
Trewianudiflora	Pituli	Euphorbiaceae
Tamarixdioeca	Nona Jhau	Euphorbaceae
Erythrina indica	Coral tree	Fabaceae
Sesbania grandiflora	Bakful	Fabaceae
Dalbergia sisso	Sisso	Fabaceae
Pongamia glabra	Karang	Fabaceae
Gliricidiasepium	gliricidia	Fabaceae
Acacia nilotica	Babul	Mimosaceae
Albizzia lebbeck	Siris	Mimosaceae
Pithecolobium dulce	Manila tamarind	Mimosaceae
Samanea saman	Rain tree	Mimosaceae
Ficus bengalensis	Banyan	Moraceae
Ficus religiosa	Peepal	Moraceae
Ficus cunia	Fig tree	Moraceae
Artocarpus integrifolia	Jackfruit	Moraceae
Morus indica	Mulbery	Moraceae
Syzygiumcumini	Jam	Myrtaceae
Hymendodictyonorixense	Kansa	Rubiaceae
Callistemon speciosus	Bottle brush tree	Myrtaceae

Eucalyptus globules	Eucalyptus	Myrtaceae
Cocos nucifera	Coconut palm	Palmae
Phoenix sylvestris	Date palm	Palmae
Borassus flabellifer	Plamyra palm	Palmae
Areca catechu	Betelnut palm	Palmae
Trema orientalis	charcoal tree	Ulmaceae
Polyalthialongifolla	Debdaru	Anonaceae
Aegle marmelos	Wood apple	Rutaceae
Feronia elephantum	Elephant apple	Rutaceae
Azadirachta indica	Neem	Meliaceae
Sweteniamahogini	Mahogany	Meliaceae
Thespesia populnea	Tulip tree	Malvaceae
Pterospermumacerifolium	Muchkund	Sterculiaceae
Lagerstroemia flosreginae	Jarul	Lythraceae
Terminalia arjuna	Arjun	Combretaceae
Mimusopselengi	Bakul	Zapotaceae
Holarrhenaantidysenterica	Kurchi	Apocynaceae
Morindacitrifolia	Indian Mulberry	Rubiaceae
Anthocephalus chinensis	Kadam	Rubiaceae
Adina cordifolia	Haldu	Rubiaceae
Leucaenealeucocephala	Subabul	Mimosaceae
Gravelia robusta	Silver fir	Proteaceae
Spathodeacampanulata	Fountain tree	Bignoniaceae
Putranjivaroxburghii	Putranjiva	Euphorbiaceae
Alstoniascholaris	Chatim	Apocyanaceae
Mellingtonia hortensis	Indian cork tree	Bignoniaceae
Sizigiumsamarangense	Jamrul	Myrtaceae
Dillenia indica	Chalta	Dilleniaceae
Achras sapota	Sapeda	Zapotaceae
Moringa pterigospermum	Sajina	Moringaceae
Psidium guajava	Guava	Myrtaceae
Tectona grandis	Teak	Verbanaceae
Sizigiumcumini	Jam	Myrtaceae
Phyllanthus emblicus	Amlaki	Euphorbaceae
Morindacoreia	Acchu	Rubiaceae
Mangifera indica	Ambo	Anacardiaceae
Alangiumsalvifolium	Ankula	Alangiaceae
Phyllanthus emblica	Aonla	Euphorbiaceae

Table 3-20: List of Shrubs

Sl. NO.	Scientific Name	Family
1.	*Adhatodavasica*	Acanthaceae
2.	*Ochna obtusata DC.*	Ochnaceae
3.	*Thespesia lampas*	Malvaceae
4.	*Phoenix acaulia*	Arecaceae
5.	*Barleriaprionitis*	Acanthaceae
6.	*Nyctanthasarbortristis*	Apocyanaceae
7.	*Anona squamosa*	Anonaceae
8.	*Calotropis procera*	Asclepiadaceae
9.	*Eupatorium odoratum*	Compositae
10.	*Ricinus communis*	Euphorbiaceae
11.	*Cestrum diurnum*	Solanaceae
12.	*Datura metel*	Solanaceae
13.	*Solanum suratensis*	Solanaceae
14.	*Ixora coccinea*	Rubiaceae
15.	*Zizyphusoenoplia*	Rhamnaceae
16.	*Hyptissuaveolens*	Labiatae
17.	*Leonurus sibiricus*	Labiatae
18.	*Tecoma stans*	Bignoniaceae
19.	*Abutilon indicum*	Malvaceae
20.	*Malachra capitata*	Malvaceae
21.	*Urena lobata*	Malvaceae
22.	*Hibiscus subderifa*	Malvaceae
23.	*Glycosmis pentaphylla*	Rutaceae
24.	*Murraya exotica*	Rutaceae
25.	*Crotalaria alata*	Fabaceae
26.	*Capparis spinosa*	Capparidaceae
27.	*Bougenvalia spectabilis*	Nyctaginaceae
28.	*Pluchia indica*	Compositae
29.	*Lippiajeminata*	Verbanaceae
30.	*Euphorbia trilobata*	Euphorbaceae
31.	*Opuntia delini*	Opantiaceae
32.	*Acanthus illicifolius*	Acanthaceae
33.	*Streblas asper*	Moraceae
34.	*Ipomea fistulosa*	Convolvulaceae
35.	*Jatropha gossypifolia*	Euphorbaceae
36.	*Pedilanthesthethymeloides*	Euphorbaceae

37.	*Abrus plicatorius*	Malvaceae
38.	*Lantana camara*	Vervanaceae
39.	*Durantaplumieri*	Vervanaceae
40.	*Vitex negundo*	Vervanaceae
41.	*Clerodendron infortunatum*	Vervanaceae
42.	*Clerodedroninerme*	Verbanaceae
43.	*Nerium oleander*	Apocynaceae
44.	*Premnacorymbosa*	Verbenaceae
45.	*Bauhunia acuminate L.*	Caesalpiniaceae
46.	*Calotropis gigantean (L.)*	Asclepiadaceae
47.	*Martynia annua L.*	Martyniaceae
48.	*Jatropha gossypifolia L.*	Euphorbiaceae
49.	*Plecospermum spinosum Trecul*	Moraceae
50.	*Cassia tora L.*	Caesalpiniaceae

None of the species present or visiting core zone is listed as threatened species under IUCN Red Data book or under Schedules of Wildlife (Protection) Act, 1972.

Table 3-21: List of Fauna within Study Area
List of Fauna from the Core Zone Area

Common Name	**Scientific Name**	**WPA Schedule Status**	**IUCN Status**
Common Myna	*Acridotheres tristis*	IV	LC
Little Grebe	*Tachybaptus ruficollis*	IV	LC
Rose ringed Parakeet	*Psittaculakrameri*	IV	LC
Eurasian scops Owl	*Otus scops*	IV	LC
Jungle Myna	*Acridotheres fuscus*	IV	LC
Asian pied Starling	*Sturnus contra*	IV	LC
Brahminy Starling	*Sturnus pagodarum*	IV	LC
Grey headed Starling	*Sturnus malabaricus*	IV	LC
Rosy Starling	*Sturnus roseus*	IV	LC
Yellow Wagtail	*Motacilla flava*	IV	LC
Grey Wagtail	*Motacilla cinerea*	IV	LC
Citrine Wagtail	*Motacillacitreola*	IV	LC
White Wagtail	*Motacilla alba*	IV	LC
Large pied Wagtail	*Motacillamaderaspatensis*	IV	--
Olive backed Pipit	*Anthus bodgsoni*	IV	--
Common Crow	*Corvus splendens*	V	LC
Jungle Crow	*Corvus macrorhynchos*	IV	LC

Indian Treepie	*Dendrocittavagabunda*	IV	LC
Red Vented Bulbul	*Pycnonotuscafer*	IV	LC
Red Whiskered Bulbul	*Pycnonotusjocosus*	IV	LC
Black naped Oriole	*Oriolus chinensis*	IV	LC
Eurasian golden Oriole	*Oriolusoriolus*	IV	LC
Slaty backed Flycatcher	*Ficedulabodgsonii*	IV	--
Spotted Flycatcher	*Muscicapa striata*	IV	LC
Loten's Sunbird	*Nectarinialotenia*	IV	LC
Purple rumped Sunbird	*Nectariniazeylonica*	IV	LC
Black Drongo	*Dicrurus macrocercus*	IV	LC
Jungle Babbler	*Turdoides striatus*	IV	LC
Oriental magpie Robin	*Copsychussaularis*	IV	LC
House Sparrow	*Passer domesticus*	IV	LC
Brown Shrike	*Lanius cristatus*	IV	LC
Blue rock Pigeon	*Columba livia*	IV	LC
Spotted Dove	*Streptopelia chinensis*	IV	LC
Little ringed Plover	*Charadrius dubius*	IV	LC
Yellow wattled Lapwing	*Vanellusmalabaricus*	IV	LC
Red wattled Lapwing	*Vanellus indicus*	IV	LC
Common Sandpiper	*Actitis hypoleucos*	IV	LC
Wood Sandpiper	*Tringaglareola*	IV	LC
Bronze winged Jacana	*Metopidius indicus*	IV	LC
White breasted Waterhen	*Amauronisphoenicurus*	IV	LC
White breasted Kingfisher	*Halcyon smyrnensis*	IV	LC
Lesser pied Kingfisher	*Cerylerudis*	IV	LC
Small blue Kingfisher	*Alcedo atthis*	IV	LC
Blue tailed Bee eater	*Meropsphilippinus*	IV	LC
Small Bee eater	*Meropsorientalis*	IV	LC
Indian Roller	*Coracias benghalensis*	IV	LC
Common Hoopoe	*Upapaepops*	IV	LC
Asian Koel	*Eudynamysscolopacea*	IV	LC
Greater Coucal	*Centropussinesis*	IV	LC
Brainfever bird	*Heirococcyxvarius*	IV	--
Indian pond Heron	*Ardeolagrayii*	IV	LC
Cattle Egret	*Bubulcus ibis*	IV	LC
Little Egret	*Egrettagarzetta*	IV	LC
Black Kite	*Milvus migrans*	IV	LC
Black shouldered Kite	*Elanus caeruleus*	IV	LC
Shikra	*Accipiter badius*	IV	LC
Little Cormorant	*Phalacrocorax niger*	IV	LC
Brown headed Barbet	*Megalaima zeylanica*	IV	LC

Coppersmith Barbet	*Megalaimahaemacephala*	IV	LC
Lesser golden backed Woodpecker	*Dinopiumbenghalense*	IV	LC

Mammals of the Study Area:

Common Name	Scientific Name	WPA Schedule Species	IUCN Status
The flying fox	*Pteropus giganteus* (Brunnich)	IV	LC
Small Indian Civet	*Viverricula indica indica (Desmarest)*	II	LC
Common Palm Civet	*Paradoxurus hermaphroditus (Pallas)*	II	LC
The Indian hare	*Lepus nigricollisruficaudatus (Cuvier)*	IV	LC
Fulvous fruit Bat	*Rousettus leschenaultia leschenaulti*(Desmarest)	IV	--
Short nosed Fruit Bat	*Cynopterus sphinx sphinx*(Vahl)	IV	LC
Jungle Cat	*Felis chaus kutas (Pearson)*	II	LC
The Grey Musk Shrew	*Suncus murinus (Linn.)*	--	LC
Five striped palm squirrel	*Funambuluspennati (Wroughton)*	IV	LC
Three Striped palm squirrel	*Funambulus palmarum (Linn.)*	--	LC
Common Langur	*Semnopithecus entellus entellus (Dufr.)*	II	LC
Indian Porcupine	*Hystrix indica (Kerr.)*	IV	LC
Indian Bush Rat	*Golundaellioti (Gray)*	IV	LC
Lesser Bandicot Rat	*Bandicota bengalensis (Gray &Hardw.)*	IV	LC
Little Indian Field Mouse	*Mus booduga (Gray)*	IV	LC
House Rat	*Rattus rattus (Linn.)*	IV	LC
Common Indian Mongoose	*Herpestesedwardsi (Geoffroy)*	II	LC
Small Indian Mongoose	*Herpestesauropunctatus (Hodgson)*	II	LC
Rhesus Macaque	*Macaca mulata mulatto (Zimm.)*	II	LC

Amphibians and Reptiles of the Study Area:

Common Name	Scientific Name	Schedule Status	IUCN Status
FROGS AND TOAD SPECIES			

Common Indian Toad	*Bufo melanostrictus (Schneider)*	IV	--
Skipping Frog	*Rana cynophlyctis (Schneider)*	IV	--
Paddy field frog	*Rana limnocharis (Boie)*	IV	LC
LIZZARD SPECIES			
Indian Chameleon	*Chameleon zeylanicus (Laurenti)*	II	LC
Bramhiny skink	*Mabuyacarinata (Schneider)*	--	LC
Little skink	*Mabhyamacularia (Blyth)*	--	--
Common garden lizard	*Calotes versicolor(Daudin)*	--	--
Rock lizard	*Psammophilus dorsalis (Gray)*	--	LC
Forest lizard	*Calotesrouxi (Dum. &Bibr)*	--	LC
Fan throated lizard	*Sitanaponticeriana (Cuvier)*	IV	LC
Spotted Indian House Gecko	*Hemidactylus brookii (Gray)*	IV	LC
Common Indian House Gecko	*Hemidactylus flaviviridis (Ruppell)*	IV	LC
Tree Gecko	*Hemidactylusleschenaultia(Dum, &Bibr)*	--	LC
SNAKE SPECIES			
Common Krait	*Bungarus caeruleus (Schneider)*	IV	--
Indian Rat. Snake	*Ptyasmucosus (Linn.)*	II	--
Russell's viper	*Viperarusselli*	II	--
Naja naja	*Naja oxiana (Eichwald)*	II	DD
Binocellata Cobra	*Naja naja (Linn.)*	II	--
Banded Krait	*Bungarus fasciatus (Schneider)*	IV	LC

Fish species found in the Study Area

Scientific Name	Common Name	Family
Salmostoma sardinella (Hamilton)	Chela	Cyprinidae
Glossogobiusgiuris (Hamilton)	Beley	Gobiidae
Anabas testudineus (Bloch)	Koi	Anabantidae
MastacembelusarmatusLacepede	Pakal	Mastacembelidae

Hypopthalmicthysmolytrix(Valenciennes)	Silver carp	Cyprinidae
Catlacatla(Hamilton)	Catla	Cyprinidae
Cirrhinusmrigala(Hamilton)	Mrigal	Cyprinidae
Cyprinus carpio(Linnaeus)	American rui	Cyprinidae
Labeorohita(Hamilton)	Rohu	Cyprinidae
Labeo bata (Hamilton)	Bata	Cyprinidae
Osteobramacotiocotio(Hamilton)	Chanda	Cyprinidae
Heteropneustesfossilis (Bloch)	Singi	Heteropneustidae
Channa striatus (Bloch)	Shol	Channidae
Channa punctatus (Bloch)	Lata	Channidae
Lates calcarifera (Bloch)	Bhetki	Latidae
Oriochromismossambica (Peters)	Tilapia	cichlidae

OBSERVATIONS OF PRESENT STUDY (FLORA & FAUNA)

Flora: The proposed stone quarryis located on scrubby land where only some shrubs and seasonal grass species are present. Major vegetation doesn't exist within the quarries. No rare, endangered and threatened floral species were observed from the core and buffer zone of the present study.

Fauna: as per the ecological survey details, there are no rare and endangered faunal species recorded from the lease area due to absence of natural forest or suitable habitats.There is no schedule-I species present in and around the lease area.

3.7 SOCIO ECONOMIC DATA

Introduction

The proposed Balanda Stone Quarry Cluster (7, 9, 14, 15 & 16) project, of Sri Bijaya Kumar Agarwal & Others is situated Near Village Balanda, Tehsil Lathikata District Sundargarh, Odisha over an cluster area of 93.688 acres or 37.915 ha (Proposed area 44.05 acres or 17.823 ha). The mining will be carried out by Open-Cast Semi-Mechanized as per the mining plan only. The entire mining area is Govt. Hill land.

As the total Cluster lease area is greater than >5.0 ha, so, it comes under *Activity No. 1(a) & Category B1* as per the MoEF& CC, New Delhi Gazette dated 14th September, 2006 amended till date.

Need of the Project & Its Importance

The need and the importance of this Quarry Project are mainly to fulfill of market demand. The Stone excavated from the quarry is crushed in the crushing unit to produce the desirable material to be sale in the local market.

Demography

Demography is one of the important indicators of environmental health of an area. It includes population, sex ratio, number of households, literacy, population density, etc. In order to assess the Demographic & Socio-economic features of the area, Census data 2011, for the concerned districtofSundargarhinOdishastatewas compiled and placed in the form of tabulation and graphical representation.

Demography of the SundargarhDistrict

As per the Census Records 2011, the total population of the district was recorded as 2093437 persons followed by1061147 males (50.7%) and 1032290 females (49.3%) respectively. About 1355340 persons (64.7%) lived in rural part and 738097 persons (35.3%) lived in urban part of the district.

Decadal growth in the population of this district during 2001-11 decade has been of the order of 14.4%. The rural population in the district has increased by 12.8% while the urban population growth over the decade has been to the extent of 17.3%.Sundargarh district has a sex ratio of 973 females to 1,000 males followed by 1025 for rural and 917 for urban part of the district.

Child (0-6 age) sex ratio was also recorded as 946 females per 1000 males followed by 966 for rural and 903 for urban part of the district.in the district. The district has a population density of 216 inhabitants per sq. km (550/Sq. mi). The literacy rate of Sundargarh district was also recorded as 73.3% followed by 81.0% in males and 65.5% in females of the district.In 2011 Census, Sundargarh district returned 191660 persons as Scheduled Castes and 1062349 persons as Scheduled Tribes. These accounted for 9.2 &50.8% of the total population (2093437) of the district respectively.

As per the census records 2011, about 46.0% of the population in the district spoke Odia, 14.8% Sadri, 9.6% Mundari, 7.0% Hindi, 5.6% Kurukh, 4.6% Kisan, 4.4% Kharia, 2.1% Urdu and 1.5% Bengali as their first language.

Methodology

In order to assess the Demographic & Socio-economic features along with the 10km distance based on field surveys and public consultations undertaken during the baseline field study period and Census records 2011, for the concerned district namedSundargarhofOdishastatewas compiled and placed in the form of tabulation and graphical representation. Entire study area is observed predominantly urban.

As per the Press Information Bureau Government of India Ministry of Home Affairs dated 26 July 2022, regarding Census 2021, the intent of the Government for conducting Census 2021 was notified in Gazette of India on 28th March, 2019.

From the first synchronous census in 1881, the decadal census exercise has never been delayed or postponed. Until now. Census 2021 has now been postponed more than once. Due to outbreak of COVID 19 pandemic, the Census 2021 and related field activities have been postponed. So the Census information of 2011 being used for this study.

Purpose of the Study

Socio-economic study was conducted to establish the baseline demographic features and impacts due to this '*Stone QuarryMining Project'*, as operation phase of any project invariably leads to Socio-economic changes. The construction phase of any kind of project could lead to unplanned and haphazard development of slums of various size and description with little or rudimentary.

Description of Social Environment

As per the Census Records 2011, the study area has a total number of 57 villages & 5 towns namely Panposh (CT), Kuanrmunda (CT), Jalda (CT), Hatibandha (CT) and Raurkela (M + OG) respectively in Sundargarh district of Odisha state. Overall study area villages & towns are falling mainly under Eight (08) tehsils namely Rajagangapur (09 Villages& 01 town), Biramitrapur (12 Villages& 01 town), Bondamunda (01 Village), Brahmani Tarang (31 Villages), Raghunathapali (01 Village& 02 towns), Tangarapali (01 Village), Lathikata (02 Villages) and Raurkela (M) {01 Town} of Sundargarh district in Odisha state. No village was observed as uninhabited village in the 10km radial study area.

Population Distribution (10 km)

As per the Census Records 2011, the total population of 10 km study zone was recorded as 438151persons of 62revenue villages/townsof mainly SundargarhdistrictinOdishastate. Male-female wise total population was recorded as 228532males (52.2%) and 209619(47.8%) females respectively.

Total number of 'Households' was observed as 97894in the 10 km radius study zone. Scheduled Caste ('SC') population was observed as 32102persons consisting of 16475males (51.3%) and 15627 females (48.7%) in the 10km study zone. Scheduled Tribes ('ST') population was also observed as 125742persons (28.7%) consisting of 62741 males (49.9%) and 63001 females (50.1%) in the 10 km study zone.The child population (0-6 Age) of the study area is recorded as 50449(11.5%) comprising of 26377 (52.3%)males&24072 (47.7%) females respectively.

Rural and Urban population distribution is shown in **Table 3.22, Figure 3.7 & 3.8** given as follows;

Table 3.22:Rural& Urban Population Distribution(10 km)

Zone	No. of Households	Total Population			Scheduled Castes			Scheduled Tribes		
		Persons	Males	Females	Persons	Males	Females	Persons	Males	Females
Rural	**15765**	**74418**	**37235**	**37183**	**3932**	**1956**	**1976**	**54521**	**26914**	**27607**
%age	16.0%	17.0%	16.3%	17.7%	12.3%	12.0%	12.6%	43.4%	43.0%	43.8%
Urban	**82129**	**363733**	**191297**	**172436**	**28170**	**14519**	**13651**	**71221**	**35827**	**35394**
%age	84.0%	83.0%	83.7%	82.3%	87.7%	88.0%	87.4%	56.6%	57.0%	56.2%
Total (10km)	**97894**	**438151**	**228532**	**209619**	**32102**	**16475**	**15627**	**125742**	**62741**	**63001**

Source-Census of India, 2011

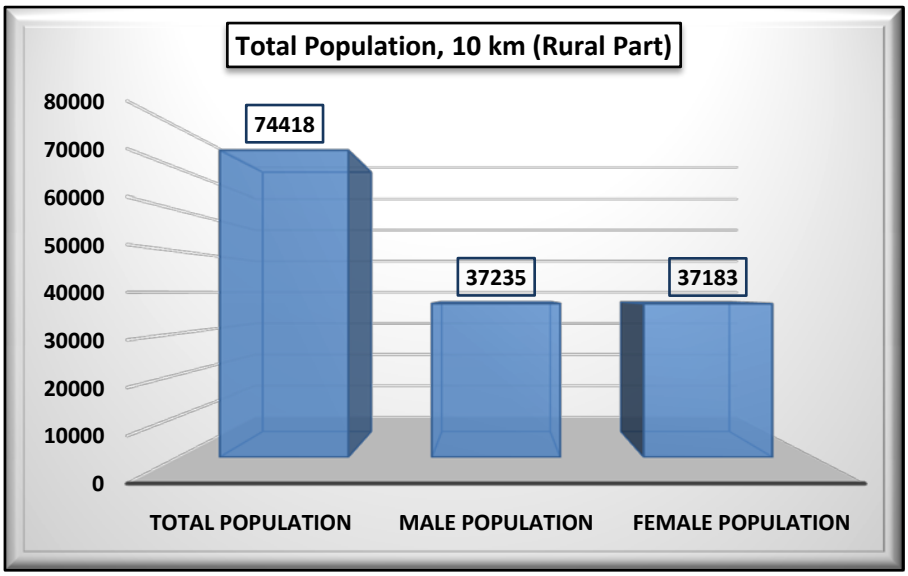


Figure 3.7:Male-Female Wise Rural Population Distribution

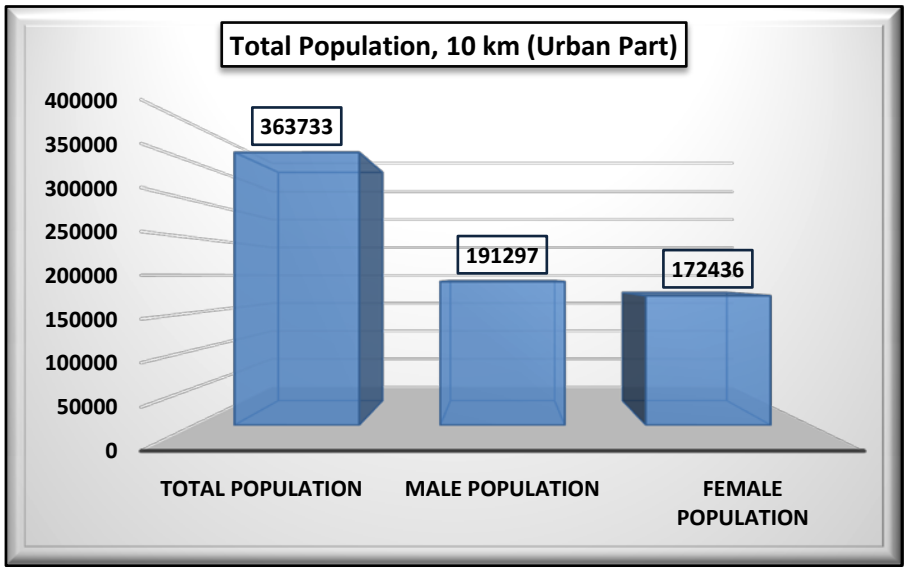


Figure 3.8: Male-Female Wise Urban Population Distribution

Village wise details of population distributionare given as follows in **Table** 3.23 **& 3.24**

Table 3.23:Village-wise Population Distribution (10km)

Name of Village/Town	No of Households	Total Population			Child Population (0-6 Years)		
		Persons	Males	Females	Persons	Males	Females
Dheluan	864	3675	1900	1775	433	223	210
Chungimati	552	2408	1235	1173	261	134	127
Mandiakudar	608	2711	1379	1332	364	189	175
Sagjore	550	2506	1189	1317	366	182	184
Kadambahal	127	582	290	292	92	47	45
Pitamahul	57	297	152	145	46	26	20
Kalodih	112	546	260	286	85	40	45
Ramlata	42	242	126	116	50	22	28

Rengalbeda	83	396	206	190	74	43	31
Panposh (CT)	2236	9923	5032	4891	1123	559	564
Chainpur	64	287	135	152	48	25	23
Teliposh	440	1860	962	898	230	109	121
Lanjiberna	166	977	452	525	138	62	76
Baniguni	181	914	466	448	105	58	47
Mandaria	68	361	177	184	37	18	19
Usra	524	2817	1397	1420	401	207	194
Jagadispur	149	753	386	367	115	56	59
Chandiposh	60	269	129	140	37	19	18
Sarandaposh	96	426	218	208	60	26	34
Sarndamal	83	364	184	180	44	23	21
Padampur	306	1326	682	644	145	81	64
Jamunanaki	329	1519	794	725	239	128	111
Kuanrmunda (CT)	2060	9043	4612	4431	1161	595	566
Panposh	248	1147	580	567	140	79	61
Bhalupatra	136	685	332	353	75	30	45
Chikatmati	270	1304	662	642	188	90	98
Sarla	48	241	115	126	30	15	15
Malikpali	86	365	186	179	45	28	17
Mahaliapalli	9	49	26	23	1	0	1
Beldihi	417	1849	941	908	258	138	120
Kalokudar	243	1105	567	538	131	71	60
Lungei	513	2430	1185	1245	402	195	207
Gopapali	365	1622	827	795	228	118	110
Dandiapali	330	1689	826	863	233	113	120
Jiabahal	345	1478	751	727	204	94	110
Killinga	356	1797	878	919	223	117	106
Sannuagaon	407	1917	947	970	241	120	121
Gadheibalanda	103	480	236	244	61	34	27
Balanda	825	3834	1947	1887	596	283	313
Gutidarha	295	1263	643	620	222	114	108
Dalakudar	41	199	105	94	28	20	8
Tumran	159	756	389	367	104	52	52
Garjan	597	2764	1372	1392	366	191	175
Birual	144	639	318	321	98	49	49
Khairbani	345	1625	814	811	231	120	111
Buchahanda	306	1448	750	698	169	85	84
Gopadihi	168	826	416	410	86	38	48
Arbajharabahal	407	2106	1056	1050	249	134	115
Jadakudar	232	1332	665	667	154	79	75
Nakkhandia	75	309	165	144	42	26	16
Ranto	414	1855	910	945	230	115	115
Birikera	757	3840	1696	2144	418	213	205
Sanbirikera	75	377	194	183	56	28	28
Fikodchundi	103	496	261	235	74	41	33
Rutukupidi	102	455	230	225	61	32	29
Kansar	290	1368	681	687	194	100	94
Jalda (CT)	3482	15789	7933	7856	1829	941	888
Hatibandha (CT)	2015	8938	4625	4313	948	490	458
Asurchhapal	716	3568	1843	1725	416	219	197
Suidihi	179	967	476	491	120	55	65
Ataghat	198	997	526	471	155	91	64
Raurkela (M + OG)	72336	320040	169095	150945	35489	18747	16742

TOTAL (10km	**97894**	**438151**	**228532**	**209619**	**50449**	**26377**	**24072**
Source-Census of India, 2011							

Table 3.24: Village-wise SC &STPopulation Distribution (10km)

Name of Village/Town	Total Population	Scheduled Castes			Scheduled Tribes		
		Persons	Males	Females	Persons	Males	Females
Dheluan	3675	138	57	81	1000	493	507
Chungimati	2408	154	82	72	1589	815	774
Mandiakudar	2711	253	130	123	1483	741	742
Sagjore	2506	172	79	93	2166	1025	1141
Kadambahal	582	5	2	3	571	286	285
Pitamahul	297	0	0	0	295	151	144
Kalodih	546	0	0	0	545	260	285
Ramlata	242	0	0	0	242	126	116
Rengalbeda	396	0	0	0	396	206	190
Panposh (CT)	9923	749	380	369	5992	2970	3022
Chainpur	287	67	35	32	191	83	108
Teliposh	1860	10	4	6	1277	651	626
Lanjiberna	977	31	18	13	845	392	453
Baniguni	914	124	58	66	766	394	372
Mandaria	361	0	0	0	360	177	183
Usra	2817	283	143	140	2169	1061	1108
Jagadispur	753	0	0	0	749	384	365
Chandiposh	269	0	0	0	269	129	140
Sarandaposh	426	0	0	0	423	217	206
Sarndamal	364	0	0	0	350	176	174
Padampur	1326	23	13	10	993	518	475
Jamunanaki	1519	78	41	37	476	254	222
Kuanrmunda (CT)	9043	836	427	409	3673	1793	1880
Panposh	1147	20	10	10	847	430	417
Bhalupatra	685	62	27	35	583	283	300
Chikatmati	1304	105	53	52	878	440	438
Sarla	241	10	5	5	229	109	120
Malikpali	365	7	4	3	347	175	172
Mahaliapalli	49	0	0	0	49	26	23
Beldihi	1849	272	138	134	1056	520	536
Kalokudar	1105	9	3	6	999	507	492
Lungei	2430	81	46	35	1614	756	858
Gopapali	1622	97	53	44	1188	604	584
Dandiapali	1689	23	12	11	1551	759	792
Jiabahal	1478	31	12	19	654	314	340
Killinga	1797	122	53	69	1592	774	818
Sannuagaon	1917	119	56	63	1464	714	750
Gadheibalanda	480	19	12	7	376	180	196
Balanda	3834	242	124	118	2976	1494	1482
Gutidarha	1263	17	11	6	1013	507	506
Dalakudar	199	0	0	0	197	104	93
Tumran	756	1	1	0	551	278	273

Garjan	2764	213	107	106	2136	1057	1079
Birual	639	94	47	47	224	114	110
Khairbani	1625	79	38	41	1043	509	534
Buchahanda	1448	0	0	0	1431	741	690
Gopadihi	826	108	50	58	605	312	293
Arbajharabahal	2106	208	110	98	1754	886	868
Jadakudar	1332	80	45	35	1214	601	613
Nakkhandia	309	1	1	0	260	137	123
Ranto	1855	99	45	54	1546	760	786
Birikera	3840	140	64	76	3349	1456	1893
Sanbirikera	377	0	0	0	377	194	183
Fikodchundi	496	0	0	0	480	250	230
Rutukupidi	455	0	0	0	418	214	204
Kansar	1368	237	116	121	462	227	235
Jalda (CT)	15789	1614	813	801	8370	4149	4221
Hatibandha (CT)	8938	634	329	305	3773	1890	1883
Asurchhapal	3568	67	33	34	2585	1303	1282
Suidihi	967	31	18	13	532	253	279
Ataghat	997	0	0	0	786	387	399
Raurkela (M + OG)	320040	24337	12570	11767	49413	25025	24388
TOTAL (10km	**438151**	**32102**	**16475**	**15627**	**125742**	**62741**	**63001**
Source-Census of India, 2011							

Sex Ratio

The 'Sex Ratio' of the study area is a numeric relationship between females and males of an area and bears paramount importance in the present day scenario where the un-ethnic pre-determination of sex and killing of female foetus during pregnancy is practiced by unscrupulous medical practitioners against the rule of the law of the country. It is evident that by contrast the practice of female foeticide is not prevalent in the study area.

The '*Sex Ratio'* was observed as 973females per 1000 males in the District. The same was recorded as 1000females for every 917 males in the study area. The child (0-6 Yrs age) sex ratio of the study area was observed as 913 female children per 1000 male children.

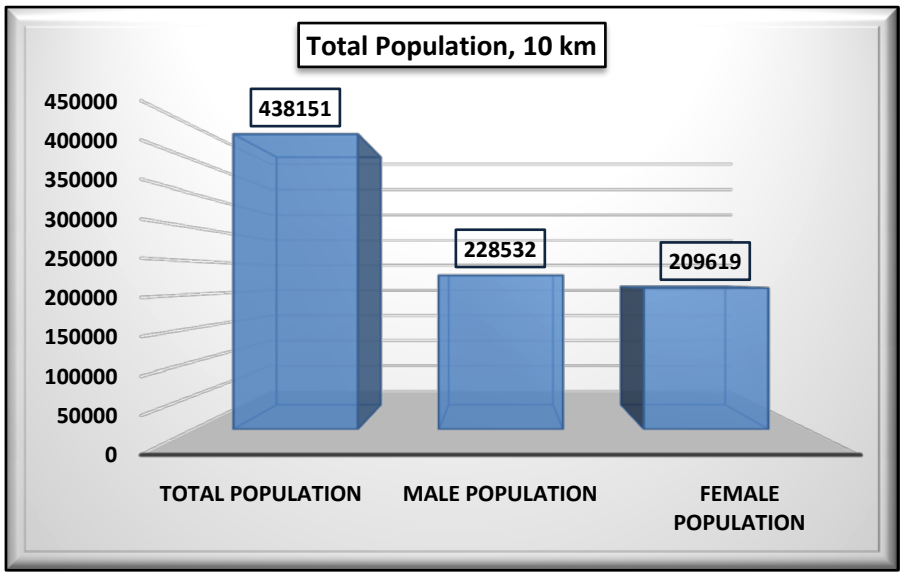


Figure 3.9:Male-Female Wise Population Distribution

Scheduled Caste & Scheduled Tribe Population

On the basis of the village wise SC & ST population distribution of the study area during 2011, the *'Scheduled Castes'*population was observed as 32102persons consisting of 16475 males (51.3%) and 15627females (48.7%) respectively in the study area which accounts as 7.3% to the total population (438151persons) of the study area. Scheduled Tribes ('ST') population was observed as 125742 persons,accounts as 28.7% to the total population of the study zone consisting of 62741males (49.9%) and 63001females (50.1%) in the 10 km radius study zone.It implies that the rest 64.0% of the total population belongs to the general category.

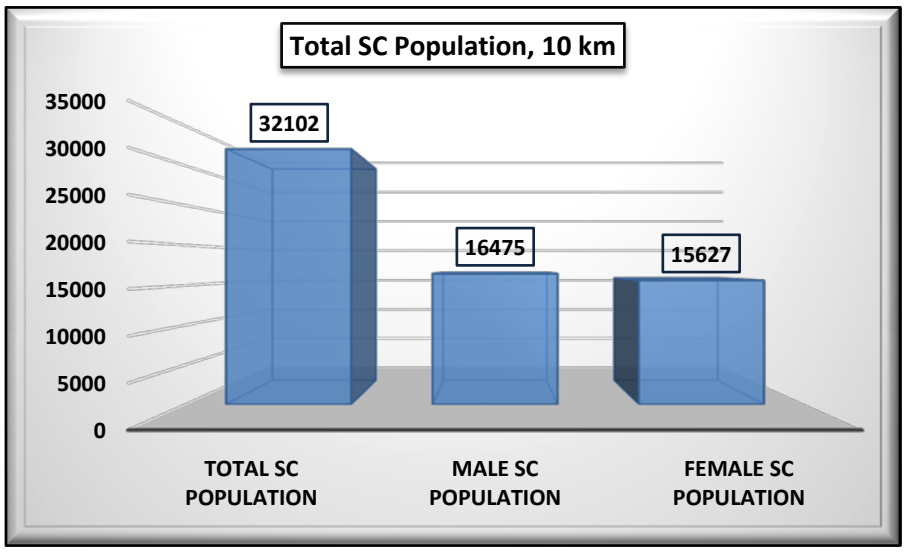


Figure 3.10: Scheduled Caste Population in the Study Area

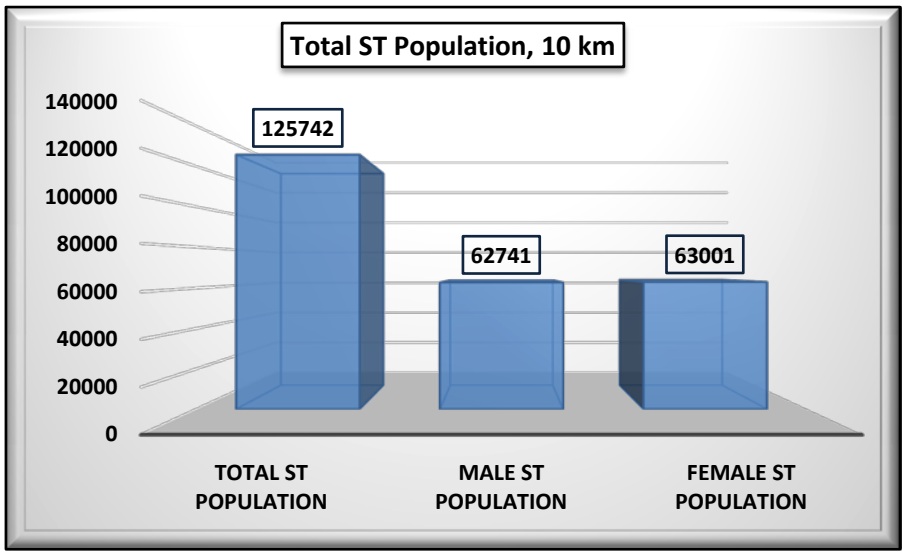


Figure 3.11:Scheduled Tribes Population in the Study Area

Literacy Rate

Literacy level is quantifiable indicator to assess the development status of an area or region. Male-Female wise literates and illiterate's population is represented. Total literate's population was recorded as321048persons (73.3%) in the study area. Table reveals that Male-Female wise literates are observed as 178802&142246 persons respectively, implies that the 'Literacy Rate' is recorded as 73.3% with male-female wise percentages being 40.8% &32.5% respectively.

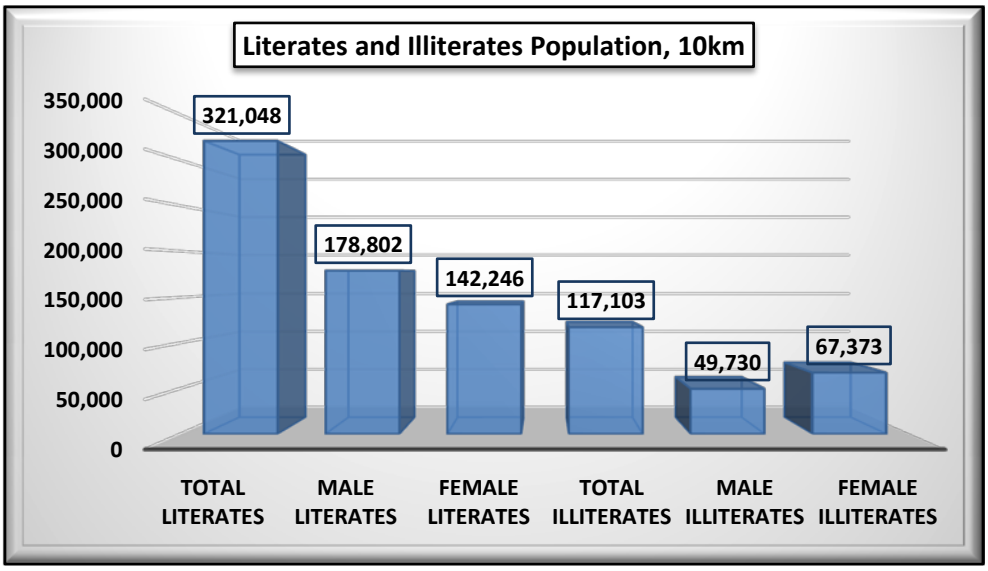


Figure 3.12:Male-Female Wise Distribution of Literates & Illiterates

Table 3.25:Male-Female Wise Literates and Illiterates (10km)

Name of Village/Town	Total Population	Literates			Illiterates		
		Persons	Males	Females	Persons	Males	Females
Dheluan	3675	2759	1518	1241	916	382	534
Chungimati	2408	1694	936	758	714	299	415
Mandiakudar	2711	1551	871	680	1160	508	652
Sagjore	2506	1184	660	524	1322	529	793
Kadambahal	582	301	175	126	281	115	166
Pitamahul	297	113	63	50	184	89	95
Kalodih	546	267	159	108	279	101	178
Ramlata	242	87	55	32	155	71	84
Rengalbeda	396	139	84	55	257	122	135
Panposh (CT)	9923	6948	3848	3100	2975	1184	1791
Chainpur	287	139	72	67	148	63	85
Teliposh	1860	1257	734	523	603	228	375
Lanjiberna	977	525	292	233	452	160	292
Baniguni	914	550	333	217	364	133	231
Mandaria	361	234	125	109	127	52	75
Usra	2817	1616	921	695	1201	476	725
Jagadispur	753	381	256	125	372	130	242
Chandiposh	269	152	85	67	117	44	73
Sarandaposh	426	231	147	84	195	71	124
Sarndamal	364	234	134	100	130	50	80
Padampur	1326	827	478	349	499	204	295
Jamunanaki	1519	1036	582	454	483	212	271
Kuanrmunda (CT)	9043	6273	3460	2813	2770	1152	1618
Panposh	1147	645	369	276	502	211	291
Bhalupatra	685	427	234	193	258	98	160
Chikatmati	1304	790	468	322	514	194	320
Sarla	241	150	83	67	91	32	59
Malikpali	365	215	124	91	150	62	88
Mahaliapalli	49	39	25	14	10	1	9
Beldihi	1849	1082	609	473	767	332	435
Kalokudar	1105	671	401	270	434	166	268
Lungei	2430	1439	798	641	991	387	604
Gopapali	1622	943	527	416	679	300	379
Dandiapali	1689	897	496	401	792	330	462
Jiabahal	1478	881	535	346	597	216	381
Killinga	1797	1051	604	447	746	274	472
Sannuagaon	1917	1142	638	504	775	309	466
Gadheibalanda	480	277	153	124	203	83	120
Balanda	3834	2069	1275	794	1765	672	1093
Gutidarha	1263	560	341	219	703	302	401
Dalakudar	199	128	73	55	71	32	39
Tumran	756	411	245	166	345	144	201
Garjan	2764	1472	820	652	1292	552	740
Birual	639	285	172	113	354	146	208
Khairbani	1625	886	509	377	739	305	434

Buchahanda	1448	879	517	362	569	233	336
Gopadihi	826	498	292	206	328	124	204
Arbajharabahal	2106	1492	805	687	614	251	363
Jadakudar	1332	956	527	429	376	138	238
Nakkhandia	309	171	104	67	138	61	77
Ranto	1855	976	576	400	879	334	545
Birikera	3840	2550	1174	1376	1290	522	768
Sanbirikera	377	167	103	64	210	91	119
Fikodchundi	496	315	185	130	181	76	105
Rutukupidi	455	178	117	61	277	113	164
Kansar	1368	788	433	355	580	248	332
Jalda (CT)	15789	10599	5924	4675	5190	2009	3181
Hatibandha (CT)	8938	6529	3659	2870	2409	966	1443
Asurchhapal	3568	2338	1398	940	1230	445	785
Suidihi	967	641	344	297	326	132	194
Ataghat	997	611	363	248	386	163	223
Raurkela (M + OG)	320040	246402	136794	109608	73638	32301	41337
TOTAL (10km	**438151**	**321048**	**178802**	**142246**	**117103**	**49730**	**67373**
Source-Census of India, 2011							

Economic Profile of the District:

In 2006 the Ministry of Panchayati Raj named Sundargarh one of the country's 250 most backward districts (out of a total of 640). It is one of the 19 districts in Odisha currently receiving funds from the Backward Regions Grant Fund Programme (BRGF).

Mines and Minerals

This district possesses a sizeable portion of the mineral wealth of the state. The most important minerals of economic value in the district are Iron Ore, Manganese Ore, Limestone and Dolomite, which are at present being exploited on a large scale. Several valuable minerals like base metals and fire clay occur in the district.

The rock formations found in the Sundargarh district belong mainly to the Gangapur and Iron-Ore series of Pre-Cambrian age. The important rock types of Gangapur series, the oldest of all, are represented by Mica-Schists, Quartzite's, Phyllites, Calcitic and Dolomitic marbles, Limestone, Carbonphyllites, which are over-lain by the rocks of iron-ore series. The rocks of the iron ore series are well exposed in the whole of Bonai and Gangapur area.

Workers Scenario:

Occupational Patternwas studied to assess the skills of people in the study area. Occupational pattern helps in identifying major economic activities of the area. In the study area the Main

and Marginal Workers population was observed as 130082(30.0%) and 22257(5.0%) to the total population (438151 persons) while the remaining 285812persons (65.0%) were recorded as non-workers. Thus it implies that the semi-skilled and non-skilled work-force required in study area for the project is available in aplenty.

Table 3.26:Village-wise Occupational Pattern (10km)

Name of the Village/Town	MAIN WORK_P	MAIN_CL_P	MAIN_AL_P	MAIN_HH_P	MAIN_OT_P	MARG WORK_P	MARG_CL_P	MARG_AL_P	MARG_HH_P	MARG_OT_P
Dheluan	1042	31	1	74	936	243	18	9	8	208
Chungimati	673	273	114	21	265	51	23	3	3	22
Mandiakudar	475	39	5	42	389	443	34	7	49	353
Sagjore	710	98	6	5	601	371	105	137	1	128
Kadambahal	288	125	1	5	157	23	4	2	0	17
Pitamahul	68	6	3	1	58	21	7	3	0	11
Kalodih	5	0	0	0	5	316	261	0	6	49
Ramlata	9	0	0	0	9	52	0	1	3	48
Rengalbeda	93	42	16	3	32	98	2	89	2	5
Panposh (CT)	2466	399	118	78	1871	905	83	228	41	553
Chainpur	104	31	10	0	63	34	7	17	0	10
Teliposh	448	112	18	21	297	250	113	14	61	62
Lanjiberna	119	52	0	0	67	125	2	66	34	23
Baniguni	297	6	2	2	287	82	14	18	1	49
Mandaria	96	5	0	0	91	3	0	0	0	3
Usra	782	116	67	2	597	245	26	11	1	207
Jagadispur	238	55	1	0	182	24	4	0	0	20
Chandiposh	61	13	0	0	48	22	1	3	0	18
Sarandaposh	136	25	1	2	108	41	6	4	0	31
Sarndamal	122	25	0	0	97	12	7	0	0	5
Padampur	174	30	2	16	126	282	53	15	17	197
Jamunanaki	444	14	5	22	403	41	2	3	2	34
Kuanrmunda (CT)	2672	158	53	234	2227	500	7	12	34	447
Panposh	231	41	4	4	182	161	49	21	0	91
Bhalupatra	96	1	3	61	31	160	10	119	19	12
Chikatmati	440	72	1	98	269	86	8	22	8	48
Sarla	115	16	2	78	19	11	0	1	7	3
Malikpali	95	0	0	41	54	43	3	2	11	27
Mahaliapalli	12	4	0	5	3	3	1	0	2	0
Beldihi	626	11	2	125	488	84	29	7	14	34
Kalokudar	269	28	5	67	169	136	1	2	79	54
Lungei	559	70	12	87	390	283	4	31	87	161
Gopapali	500	52	1	23	424	101	61	3	0	37
Dandiapali	479	149	45	2	283	221	4	16	3	198
Jiabahal	464	40	15	24	385	108	16	29	1	62
Killinga	490	186	19	46	239	232	16	175	12	29
Sannuagaon	388	90	33	48	217	285	54	71	31	129
Gadheibalanda	81	3	2	15	61	91	0	3	3	85
Balanda	1040	106	16	39	879	483	32	57	85	309
Gutidarha	449	7	0	4	438	127	17	8	5	97
Dalakudar	57	2	2	0	53	17	14	2	0	1
Tumran	180	43	3	4	130	104	1	3	0	100
Garjan	625	87	9	33	496	272	14	24	38	196
Birual	123	96	3	0	24	168	6	29	14	119
Khairbani	284	142	9	25	108	652	81	363	7	201
Buchahanda	233	118	8	1	106	495	228	206	3	58
Gopadihi	256	192	17	0	47	216	127	79	1	9
Arbajharabahal	429	370	20	5	34	658	21	485	3	149
Jadakudar	389	240	3	0	146	125	3	18	2	102
Nakkhandia	75	59	3	0	13	91	2	85	3	1
Ranto	698	460	114	7	117	368	15	322	1	30
Birikera	606	216	15	10	365	1423	345	804	16	258
Sanbirikera	2	1	0	0	1	206	71	107	6	22

Fikodchundi	145	145	0	0	0	144	3	141	0	0
Rutukupidi	72	50	1	2	19	198	16	120	3	59
Kansar	405	92	19	0	294	13	1	8	0	4
Jalda (CT)	4355	75	34	138	4108	1394	11	52	141	1190
Hatibandha (CT)	2612	21	12	69	2510	488	29	15	35	409
Asurchhapal	1256	57	10	26	1163	93	1	10	1	81
Suidihi	276	162	4	14	96	11	0	1	3	7
Ataghat	399	58	1	0	340	35	3	28	0	4
Raurkela (M + OG)	98749	701	560	2920	94568	8287	296	171	520	7300
TOTAL (10km)	**130082**	**5918**	**1430**	**4549**	**11818 5**	**22257**	**2372**	**4282**	**1427**	**14176**

Source-Census of India, 2011

ABBREVIATIONS:

MAIN WORKERS POPULATION: MAIN WORK_P:Main worker's total population**, MAIN_CL_P:**Main cultivated labour population,**MAIN_AL_P:**Main agricultural labour population, **MAIN_HH_P: Main Workers-**Population involved in household industries, **MAIN_OT_P:** Main other worker's population

MARGINAL WORKERS POPULATION:

MARG WORK_P : Marginal workers total population, **MARG_CL_P :** Marginal cultivated labors total population, **MARG_AL_P :** Marginal agricultural labors population, **MARG_HH_P :** Marginal workers involved in household industries, **MARG_OT_P :** Marginal other workers Population

Table 3.27:Distribution of Work Participation Rate (10km)

Occupation Class	Year, 2011
Main Workers	**130082 (30.0%)**
Male	109148(84.0%)
Female	20934(16.0%)
Marginal Workers	**22257(5.0%)**
Male	12765(57.4%)
Female	9492(42.6%)
Non-Workers	**285812(65.0%)**
Male	106619 (37.3%)
Female	179193(62.7%)
Total Population (10km)	**438151**

Source: Census of India Records, 2011

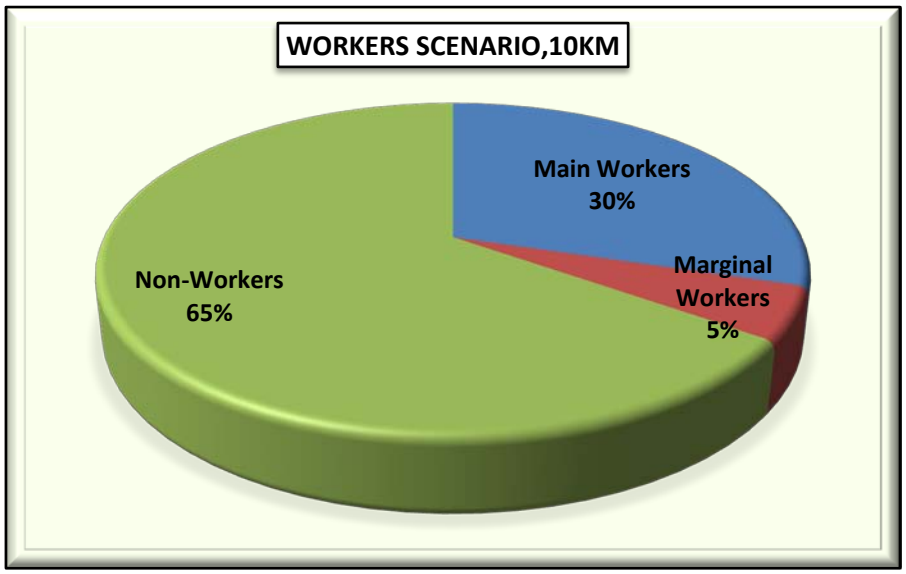


Figure 3.13: Workers Scenario of Study Area

Composition of Main Workers:

The 'Main Workers' were observed as 130082 persons (30.0%) to the total population (438151 persons) of the study area and its composition is made-up of Casual laborers as 5918 (5.0%), Agricultural laborers as 1430(1.0%), Household workers 4549(3.0%) and other workers as 118185(91.0%) respectively. Composition of Main workers is shown below:

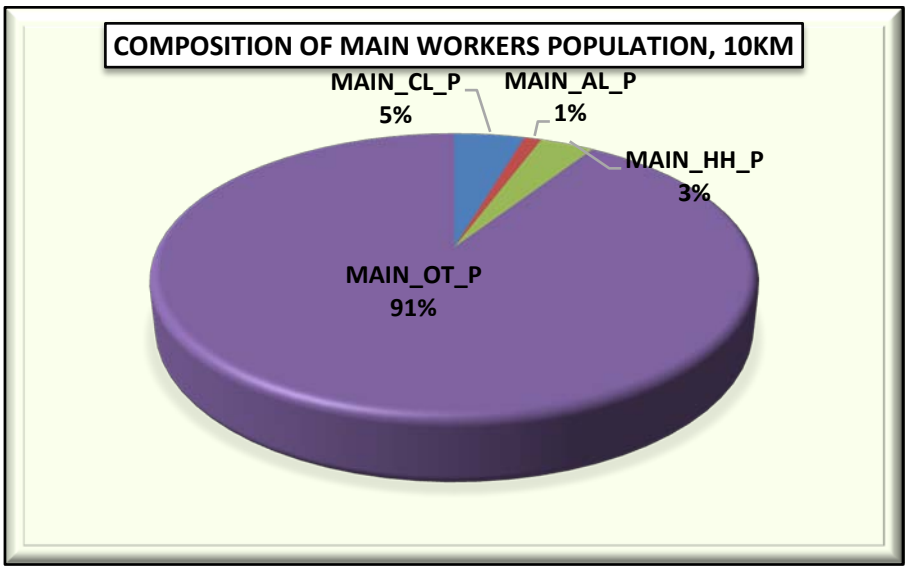


Figure 3.14: Composition of Main Workers Population

Composition of Marginal Workers:

The total marginal workers are observed as 22257 which constitute 5.0% to the total population (438151 persons) comprising of Marginal Casual Laborers as 2372 (11.0%), Marginal Agricultural Laborers as 4282(19.0%), Marginal Household laborers as 1427 (6.0%) and marginal other workers were also observed as 14176 (64.0%) to the total marginal workers respectively.

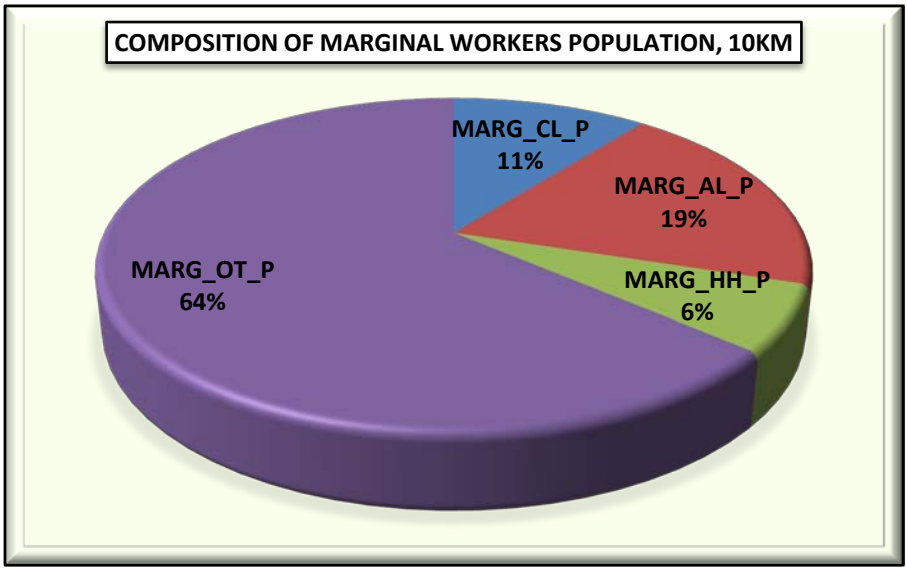


Figure 3.15:Composition of Marginal Workers

Composition of Non-Workers:

The total Non-worker's population was observed as 285812which accounts65.0% to the total population (438151 persons) of the study area. Male-female wise Non-worker's population was recorded as 106619Males (37.3%) and 179193Females (62.7%) respectively. Details about Total Non-workers in the study area are compiled.

Table 3.28:Composition of Non-Workers

Non-Workers Population		
Persons	**Males**	**Females**
285812	106619 (37.3%)	179193(62.7%)

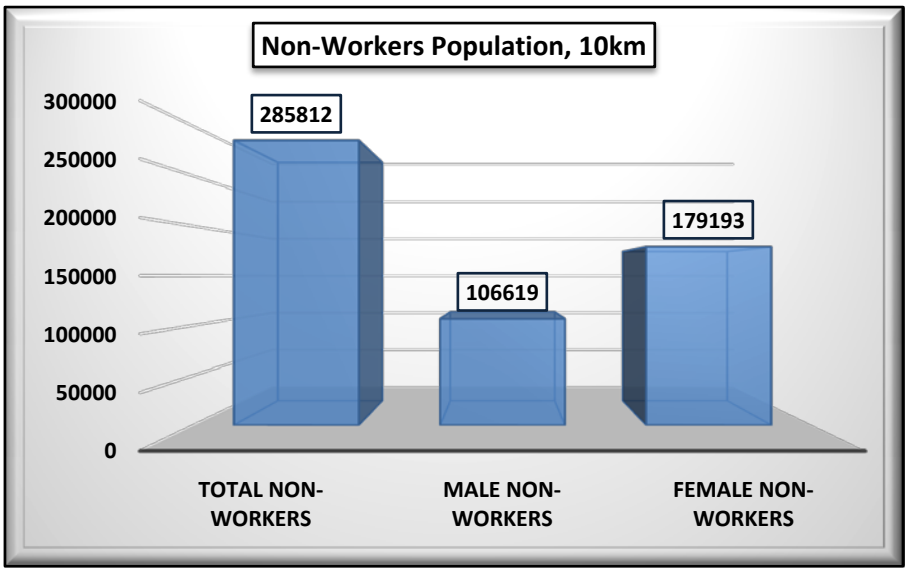


Figure 3.16: Composition of Non-Workers

❖ **Basic Infrastructure Facilities Availability***(as per the census records of 2011)*

A review of basic infrastructure facilities (*Amenities*) available in the study area has been done on the basis of the field survey and Census records, 2011 for the study area inhabited revenue villages/towns of Sundargarh District in Odishastate.The study area has average level of basic infrastructure facilities like educational, medical, potable water and power supply and transport& communication network.

As per the Census Records 2011, the study area has a total number of 57 villages & 5 towns namely Panposh (CT), Kuanrmunda (CT), Jalda (CT), Hatibandha (CT) and Raurkela (M + OG) respectively in Sundargarh district of Odisha state. Overall study area villages & towns are falling mainly under Eight (08) tehsils namely Rajagangapur (09 Villages& 01 town), Biramitrapur (12 Villages& 01 town), Bondamunda (01 Village), Brahmani Tarang (31 Villages), Raghunathapali (01 Village& 02 towns), Tangarapali (01 Village), Lathikata (02 Villages) and Raurkela (M) {01 Town} of Sundargarh district in Odisha state. No village was observed as uninhabited village in the 10km radial study area.

Educational Facilities

There isa total no. of88 Primary schools existing in the 10km radius study area.Thirty-seven (37) no of Middle schools are foundin the study area. Only fourteen (14)Higher Secondary School (SS) were found andnoSenior Secondary School (SSS) facility was available in the study area. The educational facilities have been further strengthening now and a number of private public schools and colleges are also functioning in the surroundings of the study area.

Besides, there are Engineering and Medical colleges available in Towns and District headquarters only. Higher education facilities are available in Towns of the district. There is a considerable improvement in educational facility. The villages of the study area have no such facilities can reach within 5to 10km range.There are2 townsnamelyRajgangapurandRaurkela of Sundargarh district in the range of 4 to70 km from the villages of the study area.

Medical Facilities

The medical facilities are provided by different agencies like Govt. & Private individuals and voluntary organizations in the study area. As per the census 2011, only one primary health centerinBirikera village under Brahmani Tarang tehsil existsin the study area; most of the study area villages depend upon the towns & district HQ of the study area having such facility. Twenty (20)Primary Health Sub-Centers exists in the villages of the study area. No Mother & Child Welfare Centersfound in therural part of the study area. Noallopathichospitalsexist in the study area exceptonemedicaldispensaryexists in the study area. Only two Family Welfare Centers found in the study area. Overall study area villages are served by average medical facilities. Specialized medical facilities are available only in towns and District Headquarter (HQ) only.

Potable Water Facilities

Potable water facility is available in most of the villages/towns of the study area. The entire study area has average level of potable water facilities. Hand Pump(HP) facility is commonly observed in the study area as potable water facility. Out of the total 62 villages/Towns,only26 villages/towns (42.0%)are served with River/Canal water in the study area. As per the compiled census records of 2011, about43villages/towns (69.4%) being served with Tank/Pond/Lake in the study area.

Communication, Road & Transport Facilities

Apart from Post &Telegraph (P & T) services, transport is the main communication linkage in the study area. Compiled census 2011, data shows that the study area has moderate postal facilities in the 10km radius zone. Only about 15 villages(24.2%) were foundserving with Post Office facilities in the study area, remaining villages are depending upon towns of the study area. The study area has average rail and road network, passes from the area. There isonly one (01) village named Tumran under Brahmani Tarang tehsil with railway station facility in the rural part of the study area.

Nearest Railway Station is located at Kansbahal at a distance of 4.2km in NW direction of the mine site. Nearest Town is Sundargarh located at a distance of 73.0km in WSW direction from the site. Nearest National Highway(NH-143) and State Highway (SH-10) both are passing at 6.0km&5.50km respectively in Northeast direction from the mine site.Nearest airport is Veer Surendra Sai Airport, Jharsuguda located at 89.0km in Southwest direction from the mine site.

Connectivity

The quarry area is accessible by all weather & Well-connected by road and rail. The quarry site is connected through 240km road from state head quarter Bhubaneswar and 73.0km long road from district head quarter.

The district has vast network of roads with NH-168 km, SH-211 Km, major district roads-291 km, other district roads-274 km, forest roads-685 km and village roads-1230 km as available from Departmental sources, during 2008-09. There are bus services and rail services to important tourist spots in the district. There were 32 railway stations with 285.16 km railway routesduring the year 2009in the district. The railway routes both single and double lines have Broad-gauge railway tracks. During the year 2008-09 total 20046 numbers of motor vehicles wereregistered in Sundargarh district.

In respect of postal services, during the year 2008-09 there were total 403 post offices, out of which 3 numbers of Head post offices only in urban area, 82 sub post offices and 318 branch post offices in the district were functioning. Also Telecommunication services i.e., 29231 fixed land lines, 1540 PCOS, 260868 mobile users and 5402 broad band connections were available in the district.

Trade and Commerce

The first institutional banking organization in the district came into existence in 1st June 1955. Prior to this existence, cooperative societies of this district were affiliated to Sambalpur District Central Cooperative Bank Ltd., Prior to it, the old pattern of credit system maintained by the village money lenders mostly Gaontias and traders. The inhabitants of the district are Adivasis and backward classes whose economic condition is not sound.

Now the banking facilities available in the district are good. State Bank of India is the lead bank of the district. Sundargarh District Central Cooperative Bank was having profit and 47 large sized Adivasis multi-purpose societies in the district are affiliated to the DCCB.

The steel township of Raurkela is the centre of trade and commerce in the district. Most of the wholesalers and retail traders are concentrated in the Raurkela city. Rajgangpur, Sundargarh, Bonai and Biramitrapur are other important trade centers which serve as marketing centers for the surrounding areas. Trade relations of Raurkela city are mostly with Jamshedpur, Ranchi, Kolkata, Raipur and Mumbai. The district has trade links with Madhya Pradesh and Bihar being a border district of these two states.

Banking Facility

The study area has almost all the schedule commercial banks with ATM facility at urban areas and the district HQ.

Power Supply

It is revealed from the compiled information on amenities availability as per the census record of 2011; most of the villages and towns are electrified for Domestic, Agriculture, and Commercial& for allpurposes. About fifty-eight(58) villages/towns (93.6%) of the study area are electrified for domestic purpose, 52villages/towns(84.0%) for agricultural purpose, 37villages (59.7%) for commercial purpose and 35villages (56.5%) for all purposes in the study area.Out of 62 villages/towns of the study area, only 4villagesof Rajagangapur tehsil lying in study zone werefoundnot electrified for any purpose in the study area.

In the year 1950, a thermal power station of 3,000 KW was installed at Rajgangpur for exclusive use of newly installed cement factory. In 1955, Rajgangpur town was electrified and power was supplied from the above station. But after completion of the Hirakud Hydro electricity project, the thermal power station was closed. Since 1957, Sundargarh is getting electricity from Hirakud, situated at Sambalpur district and from Talcher thermal station situated at Anugul district.

Table 3.29: Village wise Basic Amenities Availability

Name of the Village/Town	Educational				Medical							Drinking Water						CT	Communication & Transport				Approach to the Village				Power Supply				Nearest Town Distance from Village, km
	P	M	SS	SSS	CHC	PHC	PHSC	MCWC	H	D	FWC	T	W	HP	TW	R	TK		PO	PTO	BS	RS	PR	KR	NW	FP	ED	E Ag.	EC	EA	
Dheluan	3	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1	Rajgangapur,22km
Chungimati	2	1	0	0	0	0	1	0	0	1	0	2	2	1	2	1	1	2	1	2	1	2	1	1	2	1	1	1	1	1	Rajgangapur,20km
Mandiakudar	3	1	1	0	0	0	0	0	0	0	0	2	2	1	2	1	1	2	2	2	1	2	1	1	2	1	1	1	1	1	Rajgangapur,21km
Sagjore	3	1	0	0	0	0	1	0	0	0	0	2	2	1	2	1	1	2	2	1	2	2	2	1	2	1	1	1	1	1	Rajgangapur,22km
Kadambahal	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	2	2	Rajgangapur,25km
Pitamahul	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	1	2	2	2	2	2	2	1	2	1	2	2	2	2	Rajgangapur,30km
Kalodih	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	2	1	2	1	2	2	2	2	Rajgangapur,28km
Ramlata	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	2	1	2	1	2	2	2	2	Rajgangapur,27km
Rengalbeda	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	2	1	2	1	2	2	2	2	Rajgangapur,27km
Chainpur	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	1	2	2	2	2	2	1	1	1	1	1	2	2	2	Raurkela,23km
Teliposh	2	0	0	0	0	0	1	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	2	2	Raurkela,18km
Lanjiberna	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	2	1	2	1	1	1	2	2	Raurkela,23km
Baniguni	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1	Raurkela,22km
Mandaria	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	1	2	2	2	2	2	1	1	1	1	1	1	2	2	Raurkela,16km
Usra	3	2	0	0	0	0	1	0	0	0	0	2	2	1	2	1	1	2	1	2	2	2	1	1	2	1	1	1	1	1	Raurkela,35km
Jagadispur	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	1	2	2	2	2	2	1	1	1	1	1	2	2	2	Raurkela,17km
Chandiposh	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	2	2	Raurkela,22km
Sarandaposh	1	0	0	0	0	0	1	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	2	2	Raurkela,18km
Sarndamal	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	1	2	Raurkela,15km
Padampur	1	1	0	0	0	0	1	0	0	0	0	2	2	1	2	1	1	2	1	2	2	2	2	1	1	1	1	1	1	1	Raurkela,17km
Jamunanaki	2	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	2	1	2	1	1	1	1	1	Raurkela,13km
Panposh	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	1	1	Raurkela,8km
Bhalupatra	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	1	1	2	1	1	2	1	2	Raurkela,15km
Chikatmati	2	2	1	0	0	0	1	0	0	0	1	2	2	1	2	2	1	2	1	2	1	2	1	1	2	1	1	1	1	1	Raurkela,14km
Sarla	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2	Raurkela,16km

Malikpali	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2	Raurkela,17km
Mahaliapalli	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Raurkela,13km
Beldihi	2	0	0	0	0	0	1	0	0	0	0	2	2	1	2	1	2	2	1	2	1	2	1	1	2	1	1	1	1	1	Raurkela,12km
Kalokudar	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Raurkela,12km
Lungei	3	1	1	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	1	2	2	2	1	1	2	1	1	1	1	1	Raurkela,4km
Gopapali	2	1	0	0	0	0	1	0	0	0	0	2	2	1	2	2	2	2	1	2	2	2	1	1	2	1	1	1	1	1	Raurkela,9km
Dandiapali	2	1	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	1	1	2	1	1	1	2	2	Raurkela,4km
Jiabahal	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	2	2	Raurkela,10km
Killinga	2	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	2	2	1	1	2	1	1	1	2	2	Raurkela,10km
Sannuagaon	2	1	0	0	0	0	1	0	0	0	0	2	2	1	2	1	1	2	2	1	2	2	1	1	2	1	1	1	1	1	Raurkela,10km
Gadheibalanda	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	2	2	2	Raurkela,10km
Balanda	4	1	1	0	0	0	1	0	0	0	0	2	2	1	2	1	2	2	1	2	1	2	1	1	2	1	1	1	1	1	Raurkela,10km
Gutidarha	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Raurkela,19km
Dalakudar	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Raurkela,18km
Tumran	1	0	0	0	0	0	1	0	0	0	0	2	2	1	2	2	2	2	2	2	1	1	1	1	2	1	1	1	1	1	Raurkela,28km
Garjan	1	1	1	0	0	0	1	0	0	0	0	2	2	1	2	1	1	2	1	2	2	2	1	1	2	1	1	1	1	1	Raurkela,10km
Birual	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	1	2	2	2	2	1	2	1	1	2	1	1	1	1	1	Raurkela,20km
Khairbani	2	0	0	0	0	0	1	0	0	0	0	2	2	1	2	2	1	2	2	2	1	2	1	1	1	1	1	1	1	1	Raurkela,20km
Buchahanda	1	1	0	0	0	0	0	0	0	0	0	2	1	1	2	1	1	2	2	2	1	2	1	1	1	1	1	1	1	1	Raurkela,20km
Gopadihi	1	0	0	0	0	0	0	0	0	0	0	2	1	1	2	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	Raurkela,22km
Arbajharabahal	3	2	1	0	0	0	0	0	0	0	0	2	2	1	2	1	1	2	1	2	2	2	1	1	2	1	1	1	1	1	Raurkela,25km
Jadakudar	1	1	1	0	0	0	1	0	0	0	0	2	2	1	2	1	1	2	1	2	1	2	1	1	1	1	1	1	1	1	Raurkela,25km
Nakkhandia	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	1	1	2	2	2	2	2	1	1	2	1	1	1	1	1	Raurkela,32km
Ranto	2	1	0	0	0	0	1	0	0	0	0	2	2	1	2	1	1	2	2	2	1	2	1	1	1	1	1	1	1	1	Raurkela,30km
Birikera	4	1	1	0	0	1	1	0	0	0	1	2	2	1	2	2	1	2	1	2	1	2	1	1	1	1	1	1	1	1	Raurkela,30km
Sanbirikera	1	1	1	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	1	2	2	2	1	1	2	1	1	1	1	1	Raurkela,30km
Fikodchundi	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Raurkela,70km
Rutukupidi	1	0	0	0	0	0	0	0	0	0	0	2	2	1	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	Raurkela,50km
Kansar	2	1	0	0	0	0	1	0	0	0	0	2	2	1	2	1	1	2	2	2	2	2	1	1	2	1	1	1	2	2	Raurkela,12km
Asurchhapal	3	1	0	0	0	0	1	0	0	0	0	2	2	1	2	2	1	2	1	2	1	2	1	1	2	1	1	1	1	1	Raurkela,12km
Suidihi	1	1	1	0	0	0	1	0	0	0	0	2	2	1	2	2	1	2	1	2	1	2	1	1	2	1	1	1	1	1	Raurkela,18km
Ataghat	1	1	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1	2	2	2	2	2	1	1	2	1	1	1	2	2	Raurkela,14km
TOTAL (10km)	**88**	**37**	**14**	**0**	**0**	**1**	**20**	**0**	**0**	**1**	**2**	*Status for Availability and Non-Availability is shown as A (1) & NA (2) respectively*																			
Source-http://www.censusindia.gov.in/2011census/dchb/DCHB.html																															

Abbreviations:
Educational Facilities: P-Primary School, M-Middle School, SS-Higher Secondary Schools, SSS-Senior Secondary School
Medical Facilities: CHC-Community Health Centre, PHC-Primary Health Centre, PHSC-Primary Health Sub-Centre, MCWC-Maternity and Child Welfare Centre, H-Hospital, D-Dispensary, FWC-Family Welfare Centre
Drinking Water Facilities: T-Tap Water, W-Well Water, HP-Hand Pump, TW-Tube Well Water, R-River Water, Tk-Tank Water, O-Other Drinking Water Facility, CT-Community Toilet
Communication & Transport Facilities: PO-Post Office, SPO-Sub-Post Office, PTO-Post & Telegraph Office, Tel. -Telephone Connection, Mob. -Mobile Phone Coverage, BS-Bus Services, RS-Railways Services
Approach to Village: PR-Paved Roads, KR-Kuchha Road, FP-Foot Path
Power Supply: ED-Power Supply for Domestic use, E Ag. -Power Supply for Agricultural use, EC- Power supply for Commercial use, EA-Electricity for All Purposes
Nearest Town & Distance, km : a for < 5 Kms, b for 5-10 Kms and c for 10+ kms of nearest place where facility is available is given.

Brief Description of Places of Religious, Historical or Archaeological Importance and Tourist interest in Villages and Towns of the District:*(District level information only)*

Brief description of place of religious, historical or archaeological and tourist interest are as follows;

Raurkela - Raurkela has a good natural setting. Girdled verdant hills and encircled by three rivers, the modern steel township at Raurkela exudes an air of friendliness and tranquillity. Raurkela is situated on the Howrah-Bombay section of the South-Eastern Railway.

Raurkela has come into prominence with the establishment of the first of three (Raurkela, Durgapur and Bhilai) steel plants in public sector.

Vedavyas -Situated at the confluence of the rivers Sankh and Koel and the united stream flows South under the name of Brahmani, Vedavyas is one of the beauty spots of the district. The place is about 5km from Panposh and about 13.0km from Raurkela, communicable by road.

Khandadhar -A perennial rivulet called Korapaninala creates a remarkable waterfall known as Khandadhar within a few kilometres of its origin. It is a pleasant spot amidst thick jungles and mountains idealfor lovers of nature. It is a hidden treasure of nature and the scene created by the glittering waters that trickledown the magnificent waterfall can be enjoyed from the mountaintop.

Ghogar - Ghogar, a gorge on river Ib, is about 43.0km to the North of Sundargarh town. After rainy season when the water level of Ib comes down, the river passes through a narrow stone bed extending over 5.0km. The beautiful gorge with its sylvan background is a popular picnic spot and attracts many visitors.(*Ib River is a tributary of Mahanadi River)*

Kansbahal -The Utkal machinery Ltd., is located at Kansabahal, which is also a railway station. It is an Indo-German enterprise and manufactures machine parts. It is on the Sundargarh-Raurkela road and is 14.0km east of Rajagangapur and 24.0km West of Raurkela.

Deodhar - It is a beautiful spot on the river Brhamani ideal for picnic; 2.0km away approachable on foot. It is 56.0km from Raurkela on National Highway-23 (NH-23).

Junagarh- It is 4.0km from Hemgir and 15.0km from Kanika. It is a fort of historical and archaeological importance with some ancient caves and having marks of Tantra worship.

Table 3.30: Important Tourist Spots of Sundargarh District

TRANSPORT AND COMMUNICATION					
Important Tourist Spots of Sundargarh District					
S. No.	**Name of the Tourist Spot**	**Distance on road from State HQs. (In Km.)**	**Distance on road from District HQs. (In Km.)**	**Connectivity Rail / Bus Services**	**Importance of the Spot**
1.	Rourkela	512	110	Bus Services	Steel Plant
2.	Junagarh	471	66	Bus Services	Ancient Fort
3.	Ushakothi	452	47	Bus Services	PictorialWritings
4.	Vedvyas	503	95	Rail / Bus	Holy Place
5.	Mandiradam	480	75	Bus Services	Dam
6.	Khandadhar	609	211	Bus Services	Water Fall
7.	Deodarah	568	163	Bus Services	Picnic Spot
8.	Darjeeing	570	165	Bus Services	Picnic Spot
9.	Ghogar	485	80	Bus Services	Holy Place
10.	Mirigikhoj	616	211	Bus Services	SmallWater Fall
11.	Tensa	615	217	Bus Services	Hill Station
12.	Pitamahal	510	91	Bus Services	Dam
13.	Chatrihill	460	55	Bus Services	Cave
14.	Sundargarh	405	00	Bus Services	Dist. HQs
Source-http://www.censusindia.gov.in/2011census/dchb/DCHB.html					

Social and Cultural Events and Natural and Administrative Development

Adivasis celebrate many festivals with their typical dances and songs. The famous festivals are Makar, Nuakhai, Karama, Dolajatra etc. the Hindus also celebrates the main festivals like Mahashivaratri, Bisuba Sankranti, Makar, Raja, Rathajatra, Jaanmastami, Dussehera, Diwali and Nuakhai with pomp and ceremony.

Rehabilitation & Resettlement (R & R)

Policy to be adopted (Central/State) in respect of the project affected persons including home or land oustees and landless labour.R& R Policy of Govt. of Odisha will not be required as there is no human settlement within the quarry area.

Employment Generation (Direct and Indirect) due to the Project

Total number of employment will be around 249 including Management, Supervisory personnel, Skilled, Semiskilled and Unskilled.

CHAPTER 4 : ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 GENERAL

In this chapter we studied about the possible impact on the environment due to proposed opencast mining project. The opencast mining operations in general cause environmental degradation and if adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause irreversible damage to the eco-system.

Impact Assessment Methodology

Environmental impacts are defined as any change in the environment either adverse or beneficial. Environment Impact assessment is the most important tool for identifying the possible impact on environment due to possible upcoming project. Baseline data has been collected through well designed scientific network. Its shows the existing environmental condition in the study area. Following methodology has been adopted for impact assessment.

A) Listing of possible activities during the operational phase due to which environmental degradation may occur.

B) Identifying applicable components on which the possible activities can cause the possible impacts.

C) Key impact identification that include

- Impact on Land use Pattern;
- Impact on Topography and drainage;
- Impact on Air quality including Climate;
- Impact on Water resources and quality;
- Impact on Noise levels and ground vibrations;
- Impact on Soil quality;
- Impact on Flora and Fauna;
- Impact on Socio-Economic conditions; and
- Impact on Occupational Health.

Various environmental impacts, which have been identified due to the mining activities, are discussed in the following sections and mitigation measures are suggested.

4.1 LAND ENVIRONMENT

Anticipated impact

The proposed opencast mine will result in change of the land use pattern of the lease area. The land degradation is expected during mining activities like excavation, overburden dumping, soil extraction etc. Land requirement for the project has been assessed considering functional needs. The impact of mining on land environment is as following.

- Change in Land use Pattern
- Change in Landscape
- Impact on Soil Environment

a) Change in land use pattern

Land use Pattern of the core zone of mining area will be changed due to proposed mining activity. Original topography of the core zone will be affected. The impact of mining on land environment is due to excavated pits & due to dumping of waste & overburden. Land degradation will also be caused due to erection of infrastructures facilities such as mine office, road, rest shelter etc. Stage wise change in land use pattern has been given below.

Table 4-1: Stage wise Change in Land use Pattern

Land Use (During Plan period) (ha)						
Sl. No.	**Type of land use**	**Balanda Stone Quarry - 7**	**Balanda Stone Quarry - 9**	**Balanda Stone Quarry - 14**	**Balanda Stone Quarry - 15**	**Balanda Stone Quarry - 16**
1	Area of excavation	1.569	1.677	0.349	0.955	1.999
2	Temporary OB dump	0.007	0.007	0.007	0.007	0.007
3	Infrastructure	0.003	0.003	0.003	0.003	0.003

4	Roads	0.000	0.000	0.000	0.000	0.000
5	Plantation/ Safety Zone	0.637	0.710	0.573	0.412	0.582
6	Miscellaneous	1.830	2.479	1.900	0.646	1.455
	Total	**4.046**	**4.876**	**2.832**	**2.023**	**4.046**

b) Change in Landscape

Landscape of the core zone will be changed due to proposed mining activity. The topography of area will be characterized as excavated depression or voids or elevated portion by dumping overburden in the core zone of the study area.

c) Impact on Soil Environment

The Main type of soil erosion in the mining areas is water erosion, wind erosion and man-induced erosion. Water erosion takes place in rainy season. Most soil erosion is associated with water erosion. To control the soil erosion afforestation will done around the ML area.

Conceptual reclamation and rehabilitation of the worked out area

During the plan period the total mined out land of the cluster will be 6.549 Ha out of total cluster area of 17.823 Ha. So, total land which will be degraded in the cluster area during plan period is 6.549 Ha. Since the individual quarries are at the development stage and the excavation of construction stone from the quarry areas will have not been completely exhausted so proposal for reclamation of mined out land for the cluster would not be provided at this stage. At the end of mine of life, the area shall be converted into reservoir.

The pit will be wire fenced with gate and proper haulage road will be provided upto water logged limit.

Mitigation Measures

- No siltation on agricultural land will be seen.
- Plantation will be done around the mining site.

4.2 WATER ENVIRONMENT

Water pollution due to mining is one of the most important concerns. Mining activities in general causes adverse impact on the water quality due to mine effluent discharge. As the mining activity for this proposed project will be done only in dry season and no washing of beneficiation of ore is envisaged the impact on water quality is negligible.

Impact on water Sources

4.2.1 Surface water

The main drainage of the area is through seasonal water courses situated nearby lease area. There will be no change & no diversion will be required. There is no toxic element in and around the applied area or in OB or ore. Hence contamination of any nature is not expected for surface water source.

4.2.2 Ground Water

The lease area is a hill and working proposed much above ground water table. The quantity due to peak sudden rainfall on any day may be 6000 cum. The water will be clear devoid of and toxic contamination. The total solids may be on higher side due to suspended as well as dissolved solids.

No dewatering is proposed in view of working proposed much above groundwater table.

Wastewater generation, treatment & disposal

The total water consumption in the Balanda Stone Quarry Cluster- (7, 9, 14, 15, 16) lease is about 27.67 KLD which will be used for the following:

- For dust suppression
- For domestic consumption
- For greenbelt development

The waste water generation from the above consumption is mainly from domestic consumption i.e. the wastewater generated from the domestic front is mainly from toilets. This water will be treated in septic tank followed by soak pit.

Proposed Mitigation Measures for Water Resources

4.2.3 Mine Drainage

In this area no mine drainage is seen so no proposal for this purpose.

Surface Water

- Garland Drains have been constructed around waste dump for preventing wash-offs from dumps.
- Monitoring of water will be carried out periodically. Water analysis will be carried out seasonally.
- Septic tanks and soak pits are being/ will be provided for the disposal of domestic effluent generated from near the site.
- The lease area is slope towards north. In order to avoid surface run off at lower level as well as over flow to seasonal water courses, garland drain will be provided in 1500m boundary of section 2.0m x 1.5m. The protective bund will also be prepared around the periphery of the ML area in 5m width. Plantation will be raised on it. The sides of protective bund will be sloped at an angle of repose i.e. less than 30 degree from the horizontal. Short trenches and holes will be made to further avoid run off.
- Garland drains provided along the UPL boundary will be diverted to settling ponds and the surface run-off from the lease area will be accumulated there for settling. This accumulated water will be used in the mine for dust suppression and plantation. This will also assist in the recharge of ground water system. The settling tank will be constructed at the lowest level in the ML area in boundary.
- The settling tank will be periodically de-silted before the onset of monsoon and after rains.

4.2.4 Ground Water Pollution

- As there is no ground water intersection due to proposed mining activity there is no ground water pollution will occurred.

- Regular monitoring of water levels and quality in the existing open wells and bore wells in the vicinity will be carried out. If found necessary, additional observation wells will be sunk for monitoring the water levels and quality around the mine representing both upstream and downstream conditions.

4.3 IMPACT ON AIR QUALITY

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

The mining is proposed to be carried out by opencast Semi- mechanized method. The air borne particulate matter ($PM_{10\ \&\ 2.5}$) generated by transportation is the main respirable air pollutant. The emissions of Sulphur dioxide (SO_2), Nitrogen Oxides (NO_2) contributed by vehicles plying on haul roads will be marginal. Prediction of impacts on air environment has been carried out taking into consideration proposed production and net increase in emissions.

Air Modeling

In general, mining operations generate substantial quantities of airborne respirable dust, which leads release of huge amount of dust. These air borne dust particles, generally below 100 micron in size, are nuisance particulates and cause health hazards as an ill effect of mining activities. Extraction activities like drilling, blasting, material handling and transport are a potential source of air pollution Therefore, a detailed study on emission sources and quantification of pollutant concentration by means of dispersion modeling is required to access the environmental impact of a mine. On the basis of the predicted increments to air pollutant concentrations, an effective mitigation and environmental plan can be devised for sensitive areas.

FUGITIVE DUST- MODELING In the present study Stone site in Village- Balanda, Tehsil- Lathikata, District - Sundargarh of Odisha was selected. Air quality modeling was done using

line source model as published by USEPA for transportation though roads and the empirical emission factor equations from article, Jyothi Prabha, Gurdeep Singh and I.N. Sinha, 2003 "Emission Factor Equations for Haul roads: The Indian Perspective", Indian Journal of Air Pollution Control Vol. VI No. I March pp 37-43. Emission factors to be used in Line source Dispersion equation is adopted from formula as given below:

E = [{(100-m)/m} 0.8 {s/ (100-s)} 0.1 u0.3 {2663 + 0.1 (v+fc)} 10-6] ---------- (1)

Concentration of the fugitive dust was calculated using the empirical equations for unpaved roads published by USEPA- AP42. The Concentration of the fugitive Dust is given below:

Where

E = Emission Rate (g/sec/m)

m = Moisture Content of the road = 10%

s = Silt Content of the Road = 10%

u = Wind Speed =2.57 m/s

v = Average Vehicle Speed = 2.8 m/sec

f = frequency of Vehicle movement in no per hour = 1 vehicles / hour

c = Capacity of the dumper in tons = 20 ton

Thus using equation (1)

E = 0.0006 g/sec/ m **C = (2/π) 1/2 (E / σz υ) Exp- [(h2) / (2 σz2)] x 106 ---------- (2)**

Where

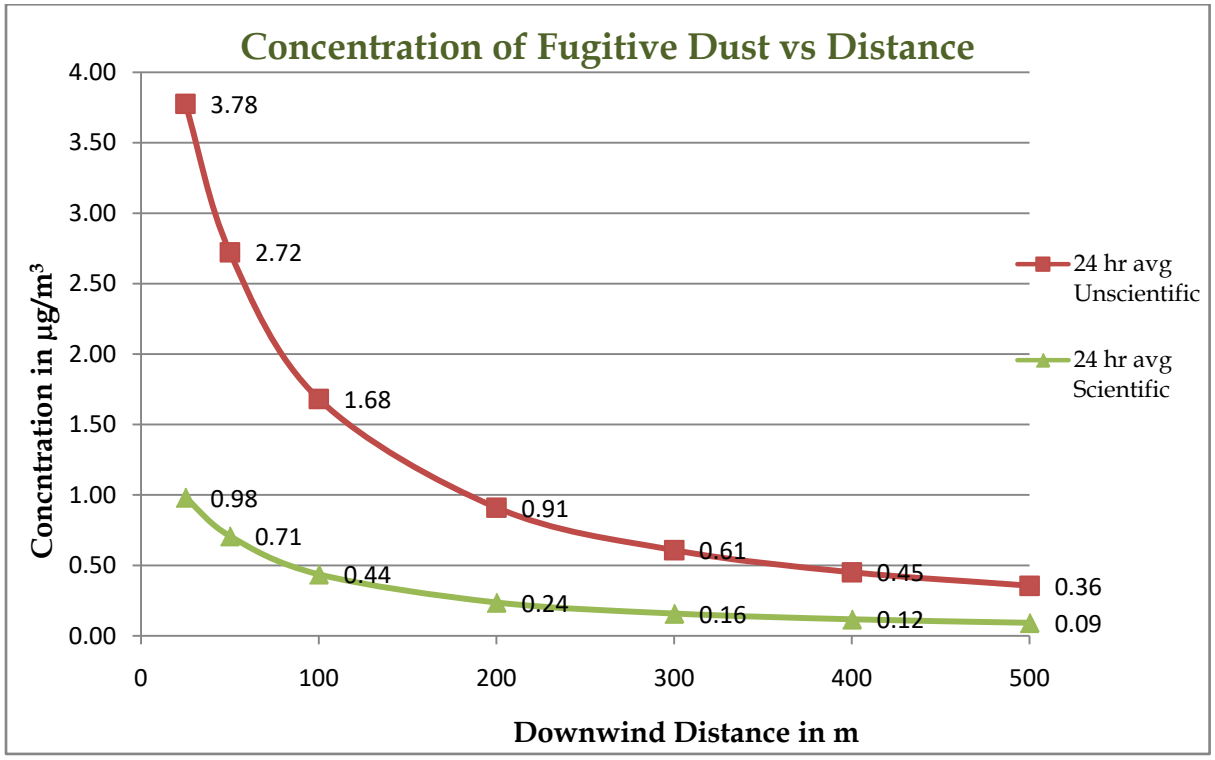
C = Concentration in microgram/ m^3

E = Emission Rate = 0.0001 g/sec/m

υ = Wind Speed = 2.57 m/s

h = 1m

Modeling was done for an infinite line source assuming unpaved road. For conservative calculation wind was assumed to blow at a velocity of 2.57 m/s perpendicular to the road. The results are given in the graph:



It is observed that the ground level concentration (GLC) decreases from 3.78 µg/m^3 at 50 m from the centre line of the road to 0.36 µg/m^3 at 500 m from the centre line of the road. These values have been predicted for a dry unpaved road. With Scientific method, the GLC decreases from 0.98 µg/m^3 at 50 m from the centre line of the road to 0.09 µg/m^3 at 500 m from the centre line of the road

The collection and lifting of minerals will be done by loaders. The air pollution sources are thedrilling, blasting & road transport network of the trucks. The mitigation measures like the following will be resorted:

- ✓ Water sprinkling will be done on the haul roads twice in a day. Speed limits will be enforced to reduce airborne fugitive dust from vehicular traffic.

- ✓ Deploying PUC certified vehicles to reduce their emissions.
- ✓ Proper tuning of vehicles to keep the gas emissions under check.

4.3.1 Proposed Mitigation Measures For Dust Suppression

Control of Fugitive Emissions

- ✓ Use of Personal Protection Equipments (PPE) like dust masks, ear plugs etc. by the mine workers.
- ✓ Regular water sprinkling on haul roads & loading points will be carried out.
- ✓ Development of green belt/plantation around the lease boundary, roads, dumps etc.
- ✓ Ambient Air Quality Monitoring will be conducted on regularly basis to assess the quality of ambient air.

The sources of pollutants from mining activities are given in Table-4.2.

Table 4-2: Sources of Pollutants

Sr. No.	Source	Type of Pollutant
1	Mining activity (loading)	SPM, NOx
2	Transport of Overburden or soil for dumping/ backfill	SPM
3	Dumping of waste	SPM
4	Loading of ore	SPM
5	Transportation of ore	SPM, NOx

Prevention and control of Gaseous Pollution

Proper maintenance of machines improves combustion process & makes reduction in the pollution. Good maintenance and monitoring of fuel and oil will not allow significant addition in the gaseous emission.

4.4 NOISE ENVIRONMENT

Noise Impact on Working Environment

Noise generated at the mine is due to mechanized mining operations and truck transportation activities. The noise is anticipated from blasting activity too. However, mostly the noise generated by the mining activity dissipates within the mine. There would be no major impact of the mining activity on the nearby villages. The pronounced effect of above noise levels is felt only near the active working area.

Noise abattement and control

In this mine the noise levelwillbe up to tolérable limit 90 db(A) and the noise levelcanbereduced by :

- Proper maintenance, oiling and greasing of machines& vehicles at regular intervals will be done to reduce the generation of noise.
- Adequate silencers will be provided in all the diesel engines.
- Blasting will be done in a controlled way.
- Plantation along the sides of approach roads, around office building and mine area will be done to minimize the propagation of noise.
- Personal Protective Equipments (PPE) like earmuffs/earplugs will be provided to all operators and employees working near mining machineries or at higher noise zone.
- Periodical noise level monitoring will be done.

Frequency levels and associated mental and physical response of humans are given in **Table-4.3.**

Table 4-3: Noise exposure levels & its effects

Noise Levels dB(A)	Exposure Time	Effects
85	Continuous	Safe
85-90	Continuous	Annoyance and irritation
90-100	Short term	Temporary shift in hearing threshold, generally with complete recovery
Above 100	Continuous	Permanent loss of hearing

Noise Levels dB(A)	Exposure Time	Effects
	Short term	Permanent hearing loss can be avoided
100-110	Several years	Permanent deafness
110-120	Few months	Permanent deafness
120	Short term	Extreme discomfort
140	Short term	Discomfort with actual pain
150 and above	Single exposure	Mechanical damage to the ear

Source: Hand Book of EIA, Rao& Wooten

Impact due to ground vibrations and abatement

Vibrations can be expected due to drilling and blasting, which would be locally felt in the active area of mine. However, controlled blasting by authorized personnels will be done, so as to minimize the affect of vibrations.

4.5 BIOLOGICAL ENVIRONMENT

The baseline flora and fauna has been depicted in Section-3.6 of Chapter-3. There are no wildlife Sanctuary, national park, Breeding, roosting places or ecologically sensitive areas within the 10 km periphery of the mine lease area. There no wildlife corridors in 10-km radius area. No wild life of Schedule -1 has been reported in the core zone.

Impact on biodiversity

Present data have been collected through direct inventory as well as various Government Departments such as forests, agriculture, fisheries, animal husbandry and various offices to establish the pre-project biological environmental conditions. There are no endangered species, wildlife sanctuary, wildlife corridors, faunal migratory routes or eco-sensitive area near the whole study area. To save the flora/fauna around the project area is one of the basic objectives of present project. For this, mine owner agency planted a good roadside plantation along both side of the mine road.

Greenbelt and plantation

Proposed Plantation at the Mine Site

The main aim of plantation in the mined out areas is to stabilize the land to protect it from rain and wind erosion. The plantation scheme broadly covers the following areas:

- Greenbelt around peripheral portions of the lease area; and
- Afforestation on top soil dumps and either sides of the haul roads.

Plantation will be raised at a spacing of 2.5m along the boundaries of the mining lease by planting the native species around ML area, backfilled and reclaimed area, around water body, roads etc. in consultation with the local DFO/local authorities.

4.6 SOCIO - ECONOMIC ENVIRONMENT

The mine area does not cover any habitation. Hence the mining activity does not involve any displacement of human settlement. No public buildings, places, monuments etc exist within the lease area or in the vicinity. The mining operation will not disturb/ relocate any village or need resettlement. Thus no adverse impact is anticipated.

The impact of mining activity in the area is positive on the socio-economic environment of the region. Mine will be providing employment to local population and it will be give preference to the local people whenever there is requirement of man power.

4.6.1 Impact on population composition

The impact of the proposed mining project on population composition will be marginal as there will be no major immigration of people from distant areas. Only few skilled and managerial staff will be recruited from outside and the rest will be recruited locally. Similarly, there is no scope for emigration of people and there will be no displacement of people due to land acquisition. The PP will ensure that all the unskilled workers deployed for mining activities are local recruits. Further, no mining operation will be carried till it is assured that local people has been recruited and deployed for mining operation.

4.6.2 Impact on employment generation

The proposed mining project is expected to provide Direct and Indirect employment opportunities to local people of different skills and trades. It is a positive impact that needs to be encouraged. It has been estimated that workers of various categories will be employed directly. The employment potentiality of the project is expected to ameliorate the economic condition of the families of those persons who will get employed in the proposed mining project. Further, the project will provide indirect employment to people who will be involved in segregation of extracted mining materials, petty business and service oriented industries.

4.6.3 Impact on consumption pattern

The field survey has revealed that people in the study area are generally poverty ridden. Increased household income may slightly change and enhance the consumption pattern of few who are burdened with poverty.

4.6.4 Impact on road development

Movement of trucks and other vehicles to and fro from the quarry is expected to increase, when mining will start. The existing roads connecting the quarry with the national and state highways are mostly narrow mud roads. There will be mud slide and traffic bottle neck if these roads are not widened and their conditions are not improved by making them paved roads. Hence, there is ample scope for road development in and around the mining areas. It is suggested that concerned department in the Government of the state to undertake widening and strengthening of existing roads connecting the mining sites on priority basis. There should also be budgetary support for road development in and around the mining areas.

4.6.5 Impact on law & order

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

4.7 MINE WASTE MANAGEMENT

Waste Management

As the granite rock (road metal) body is mostly exposed and about 3% of rock has been considered as weathered/overburden/unusable shall be generated during the plan period. These materials will be dumped temporarily and shall be utilized for approach road development & maintenance purposes during the plan period.

Top soil

About 96915cumof top soil shall be generated during the plan period excavation for all the mines, and the soil generated from the quarry will be utilized for plantation in the safety zone and avenue plantation as directed by the competent authority. Therefore, no soil stack yard has been proposed in the mining plan.

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CHAPTER 5 : ANALYSIS OF ALTERNATIVE TECHNOLOGY AND SITE

5.0 ANALYSIS OF ALTERNATIVE TECHNOLOGY AND SITE

5.1 Site alternatives under consideration

Presence of mineral for commercial exploitation has been identified based on the result of geological investigations and exploration carried out by the lessee.

The mining project is site specific for which lease has been allotted, hence as such alternate sites were not considered.

5.2 Analysis of alternative technology

Choice of method of mining

Factors in the choice of an actual mining method for a given deposit are deposit characteristics, percentage recovery, requirement of health and safety and environmental concerns, production, scheduling scope of mechanization and automation, workforce requirements wage rates, and land reclamation, operating and capital cost estimates. The selection of the mining method (development and extraction) is a key decision to be made in the opening up of a mine.

Surface or open pit mining is used for large, near-surface mineral deposits. Mineral is excavated, loaded into trucks, and transported to consumer industry. Surface mining requires the removal and disposal of layers of top soil and underlying rock commonly called the overburden. Mining must be planned so that the combine of mining processing and reclaiming the land is taken up concurrently.

The opencast Semi- mechanized mining method will be adopted because of the following reasons:

- The opencast mining operations ensure higher mineral conservation.
- Low stripping ratio.
- The method used for mining is efficient for ore mining, so no alternative mining method is proposed.

CHAPTER 6 : ENVIRONMENT MONITORING PROGRAMME

6.0 GENERAL

Post Project Monitoring is considered as an essential part to check the impact of any project activities. Hence monitoring of various environmental parameters will be carried out on a regular basis to ascertain the following:

- To know the status of Pollution within the mine site and in its vicinity.
- To generate data for predictive or corrective purpose in respect of pollution. Examine the efficiency of pollution control system adopted at the site.
- To ascertain environmental impacts.

6.1 IMPLEMENTATION OF ENVIRONMENTAL MONITORING PROGRAMME

Implementation schedule of Mitigation measures

The mitigation measures suggested in Chapter-4 will be implemented so as to reduce the impact on the environment due to the operations of the proposed project. Implementation schedule of mitigation measures is given in Table-6.1.

Table 6-1: Implementation Schedule

Sr. No.	Recommendations	Time Requirement	Schedule
1	Air pollution control measures	Before commissioning of respective units	Immediate
2	Water pollution control measures	Before commissioning of the mine	Immediate
3	Noise pollution control measures	Along with the commissioning of the mine	Immediate
4	Ecological preservation and upgradation	Stage-wise implementation	Immediate & Progressive

Administrative aspects & environmental monitoring programme

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 as important as that of control of pollution since the efficiency of control measures can only be determined by monitoring.

Usually, as in the case of the study, an Impact Assessment study is carried over short period of time and the data cannot bring out all variations induced by the natural or human activities. Therefore, regular monitoring programme of the environmental parameters is essential to take into account the changes in the environmental quality.

Formation of Environment Management Cell

The company has a full-fledged environmental management cell (EMC) which will report directly to Functional Head for environmental monitoring and control. The EMC team takes care of pollution monitoring aspects and implementation of control measures. A group of qualified and efficient engineers with technicians are deputed for maintenance, up keep and monitoring the pollution control equipment to keep them in working at the best of their efficiencies.

The organizational structure for Environment Cell for mining operations is shown in Figure-6.1. This Environment Cell is responsible for the management and implementation of the environmental control measures. Basically, this department will supervise the reclamation planning & management, air & water pollution control management, Liasoning with State & Central Statutory agency & Committee.

Environment Management Cell responsibility

Responsibility is as follows

- To monitor the environment of core zone as well as Buffer Zone
- To monitor the performance of pollution control equipments.
- To develop the green belt

- To control the excess water usages
- Ensuring that standards are maintained

Carrying out the Environment management plan

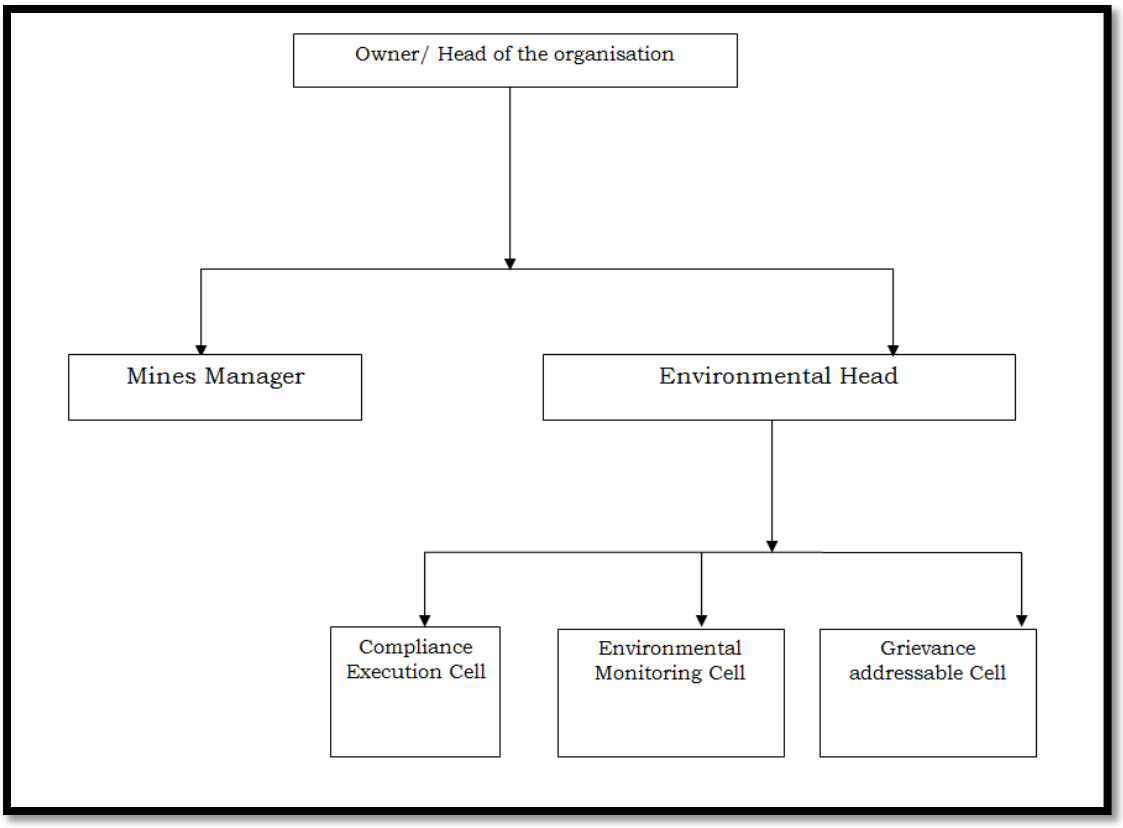

Figure 6-1: Organization structure for environment management

6.2 ENVIRONMENT MONITORING PROGRAMME

The environmental monitoring will be conducted in the mine operations as follows:

- Air quality;
- Water quality;
- Noise levels;
- Soil Quality; and
- Greenbelt Development

6.2.1 Water quality Monitoring

Water monitoring will be done on regular basis. The ground and surface water quality will be monitored in every season at selected location. Ground water depth will be also monitored.

6.2.2 Air quality Monitoring

Ambient quality will be monitored in each month. PM_{10}, $PM_{2.5}$, SO_2 and NO_2 will be on regular basis. Micro metrological data will also be monitored on regular basis.

6.2.3 Noise Levels and Vibration

Noise level in the work zone will be monitored on regular basis. Peak particle velocity will be also recorded at the time of blasting at least twice in a year.

6.2.4 Soil Sampling

Soil sampling will be done before green belt development. The environmental monitoring plan will be implemented is as following:

Table 6-2: Post project monitoring programme

Attributes	Sampling		Measurement Method	Test Procedure
	Network	Frequency		
A. Air Environment				
Meteorological ·Wind direction · Relative humidity · Rainfall	Minimum 1 site in the project impact area	Regularly in one season by Weather Monitoring Station	Mechanical/automatic weather station	-
Pollutants PM10	5 locations in the project impact area (Minimum 2 locations in upwind side, 2 sites in downwind side / impact zone and 1 in	Once in a season	Gravimetric method	-
			Gravimetric method	-
SO2			EPA Modified West & Geake method	Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and

	core zone)			Formaldehyde (IS:5182 Part - II).
NO2			Arsenite modified Jacob &Hochheiser	Absorption in dil. NaOH and then estimated colorimetricallywith sulphanilamide and N (I-Nepthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (CPCB Method).
B. Water Environment				
pH, Turbidity, Colour, Odour, Taste, TDS, Total Hardness, Calcium hardness, Magnesium hardness, Chloride, Fluoride, Sulphate, Nitrates, Alkalinity, Iron, Copper, Manganese, Mercury, Cadmium, Selenium, Arsenic, Cyanide, Lead, Zinc, Chromium, Aluminum, Boron,	Set of grab samples during pre and post-monsoon for ground and surface Water in the vicinity.	Diurnal and Season wise	As per IS 10500	Samples for water quality should be collected and analyzed as per : IS : 2488 (Part 1-5) methods for sampling and testing of Industrial effluents Standard methods for examination of water and wastewater analysis published by American Public Health Association.

Phenolic Compounds				
C. Noise				
Noise levels at Day & night time - Leq dB (A)	Mine Boundary, High noise generating areas within the lease	Quarterly / Half yearly	As per CPCB norms	As per CPCB norms
D. Soil				
pH, Bulk Density, Soil texture, Nitrogen, Available Phosphorus, Potassium, Calcium, Magnesium, Sodium, Electrical Conductivity, Organic Matter, Chloride	5 locations in the project impact area	Yearly/half yearly	As per USDA Method	As per USDA Method
E. Socioeconomic				
· Demographic structure · Infrastructure resource base · Economic resource base · Health status: Morbidity pattern · Cultural and Aesthetic attributes · Education	Socioeconomic survey is based on proportionate, stratified and random sampling method	Minimum for two phases of the project	Primary data collection through Questionnaire	Secondary data from census records, statistical hard books, topo sheets, health records and relevant official records available with Govt. agencies

6.3 OCCUPATIONAL HEALTH AND SAFETY

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The factors of occupational health in mining project are mainly dust and land degradation. Safety of employees during operation and maintenance etc. shall be as per Mines rules and regulations. To avoid any adverse effect on the health of workers due to various pollutants, sufficient measures relating to safety and health will also be practiced:

- Provision of rest shelters for mine workers with amenities like drinking water etc.
- All safety measures like use of safety appliances, such as dust masks, helmets, shoes, safety awareness programs, awards, posters, slogans related to safety etc.
- Training of employees for use of safety appliances and first aid in vocational training center.
- Regular maintenance and testing of all equipment as per manufacturers' guidelines.
- Periodical Medical Examination (PME) of all workers by a medical Officer
- First Aid facility is provided at the mine site.
- Close surveillance of the factors in working environment and work practices which may affect environment and worker's health.
- Working of mine as per approved mining plan and environmental plans

Public health implication

With the mitigation measures in relation to air pollution, water pollution, soil contamination and noise pollution proposed to be adopted at the mine a long with green belt plantation along the periphery of Mining Lease boundary, it is expected that there will be no impact of mining on the population in the impact zone. However, the following measures shall be adopted:

- Health check of all villagers in the immediate vicinity of the mine shall be carried out periodically.
- In case any person or a group of persons is found to be suffering from any ailment, directly related to mining, their medical treatment will be carried out free of cost.
- Surface water management shall be adopted to ensure that run-off from the mining are does not adversely affect natural water streams or other water bodies.

- All water bodies e.g. wells and surface water sources in the vicinity of the mine, shall be periodically tested for any pollution related to mining operations and remedial action taken, if warranted. Operators of all transport vehicles shall be instructed not to honk unnecessarily while passing through villages or near schools.

6.4 CORPORATE ENVIRONMENTAL POLICY

The project proponent commits to contributing towards a clean and sustainable environment and continually enhancing the environmental performance as an integral part of the business philosophy and values.

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CHAPTER 7 : ADDITIONAL STUDIES

7.0 GENERAL

As per EIA Notification dated 14thSeptember, 2006, as amended from time to time, the committee has suggested various Terms of Reference (ToRs) for the preparation of the Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP). The following Additional Studies were carried out as per Terms of Reference:

1. Public Hearing
2. Risk Assessment &
3. Disaster Management Plan

7.1 PUBLIC HEARING

Public hearing yet to be conducted.

7.2 RISK ASSESSMENT

The complete mining operation will be carried out under the management control and direction of a qualified mine manager The DGMS have been regularly issuing standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert. However, following natural/industrial hazards may occur during normal operation.

- Accident due to explosives;
- Accident due to operation of heavy mining equipment; and
- Sabotage in case of magazine.

In order to take care of above hazard/disasters, the following control measures will be adopted:

- All safety precautions and provisions of Mine Act 1952, Metalliferrous Mines Regulations 1961 and Mines Rules1955 will be strictly followed during all mining operations;
- Entry of unauthorized persons in the mining area will be prohibited;
- Fire fighting and first-aid provisions in the mines office complex and mining area;

- Provisions of all the safety appliances such as safety boots, helmets, goggles etc. will be made available to the employees free of cost for their use;
- Training programmes for all the employees working in hazardous premises; under Mines Vocational Training Rules all employees of mines shall have to undergo the training at a regular interval;
- Working of mine, as per approved plans and regularly updating the mine plans;
- Cleaning of mine faces will be regularly done;
- Handling of explosives, charging and blasting will be carried out by competent persons only;
- Provision of magazine at a safe place with fencing and necessary security arrangement;
- Regular maintenance and testing of all mining equipment as per manufacturer's guidelines;
- Suppression of dust on the haulage roads and loading & unloading points ;
- Adequate safety equipment will be provided at explosive magazine; and
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.

Blasting

Most of the accidents from blasting occur due to the projectiles, as they may sometimes go even beyond the danger zone, mainly due to overcharging of the shot-holes or as a result of certain special features of the local ground. Flying rocks are encountered during initial and final blasting operations. Vibrations also lead to displacement of adjoining areas. Dust and noise are also problems commonly encountered during blasting operations.

Overburden

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

To prevent this, height of overburden dumps will be restricted. Further, no stone or loose rock or loose tree will be allowed to remain within 3 meters of the edge of the quarry. To prevent siltation of surface water, retaining wall will be constructed on the down side of each OB dump.

Heavy machinery

Most of the accidents occur during transportation by tippers/ trucks. Operation of poclains and ripper dozers and other heavy vehicles are often attributable to mechanical failures and human errors.

This can be prevented by regular training of all vehicle/machinery drivers/operators, regular maintenance of equipment and ensuring safe operations.

Storage and use of explosives

- No storage of explosives is proposed as it will be procured by the hired licensed contractors from authorized dealers.
- Proper, safe and careful handling and use of explosives by competent Blasters having Blaster's Certificate of Competency issued by DGMS.
- Proper security system to prevent theft/ pilferage, unauthorized entry into blasting area and checking authorized persons to prevent carrying of match box, lights, mobile phones, cigarette or *Bidi* etc.
- Conventional explosives shall be used in their original cartridge packing and such cartridge shall not be cut to remove explosive for making cartridge of different size.
- Explosives shall be conveyed in special containers.
- The holes which have been charged with explosives will not be left unattended till blasting is completed.
- Before starting charging, clear audible warning signals by Sirens will be given so that people nearby can take shelter.

Fuel storage

Most of the HEMM will operate on diesel. However, no major storage is envisaged at the ML area. A diesel bourse will be provided for the crawler mounted machines operating in the mine.

Water logging

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

- Due care will be taken to provide toe wall around the pits.
- Proper drainage will be maintained to eliminate inundation of working pits during rains from run-off water. Suitable garland drain will be provided around pit along with sedimentation pits on each side.
- There is no danger of flood or inundation as the ground level is well below the plateau top, where mining of will be carried out.

Natural resource conservation

- A green belt will be developed so that minimum soil erosion takes place.
- The excavated soil will be spread over the backfilled mined out area in order to minimize the impact on environment.
- In any case the natural habitats of the existing flora and fauna will not be disturbed.
- Use of traditional knowledge in all aspects of conservation shall be utilized.
- Water conservation techniques shall be employed.
- Time to time analysis of the soil, water resources etc will be done in order to analyze the negative impacts of mining activities on the environment.
- To prepare management plans for village landscapes, villages to be seen as landscapes of diverse elements such as forests, scrub, grassland, streams/river, ponds etc. The dynamics of the village as an ecosystem to be assessed, corridors to be devised between major natural landscape elements, so as to facilitate movement of species.

Safety Measures

- Safety Measures at the proposed Open Cast Mining Project
- The opencast mines have been planned for working with shovel tipper system which requires proper benching not only for slope stability but also for movement of tippers and other heavy machinery. The inclination of the quarry sides at the final stage i.e. at the dip most point will not exceed 40^0 to the horizontal. (This angle is measured between the

line joining the toe of the bottom most bench to the crest of the top most bench and the horizontal line);

- The gradient of the haul road inside the pit, access trench and on the dumps will not be steeper than 1 in 16;
- The quarries will be protected by garland drains around the periphery for storm water drainage;
- A minimum safe distance of 100-m will be kept between the surface edge of the quarry and the nearest public building, roads etc.
- All mining operations both within the quarry and outside will be conducted as per the conditions laid down by DGMS and under the strict supervision of competent persons appointed under Metalliferrous Mines Regulations, 1961.

Measures to prevent the danger of overburden

- To prevent the failure of overburden slopes, especially during the rainy season, proper garland drain & bund are constructed around the dump.

Measures to prevent accidents due to trucks and tippers

- All transportation within the main working area should be carried out under the direct supervision and control of the management;
- The vehicles must be maintained in good repairs and checked thoroughly at least once a week by a competent person authorized for this purpose by the management;
- Broad signs should be provided at each and every turning point especially for the guidance of the drivers of vehicles.
- To avoid dangers while reversing the trackless vehicles, especially at the embankment and tripping points, all areas for reversing of lorries should, as far as possible, be made man free, and there should be a light and sound device to indicate reversing of trucks; and
- A statutory provision of the fence, constant education, training etc. will go a long way in reducing the incidence of such accidents.

7.3 DISASTER MANAGEMENT PLAN

Objectives of disaster management plan

The Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation and restoration of production. For effective implementation of the Disaster Management Plan, it should be widely circulated and personnel training should be given.

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

- Effect the rescue and medical treatment of casualties;
- Safeguard other people;
- Minimize damage to property and the environment;
- Initially contain and ultimately bring the incident under control;
- Secure the safe rehabilitation of affected area; and
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

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

Fire Fighting Facilities

Sufficient fire extinguishers will be installed at selected locations such as mine office, garage, stores etc. Besides, sufficient water hydrants with sufficient length of hosepipes will be made available on the surface for fire protection.

Emergency Medical Facilities

An ambulance with driver availability in all the shifts, emergency shift vehicle would be ensured and maintained to transport injured or affected persons. Number of persons would be trained in first aid so that, in every shift first aid personnel would be available.

Rehabilitation & Resettlement

As there is no habitation with in mine lease area no Rehabilitation & Resettlement required. However,proposed is committed towards development of the surrounding area.

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CHAPTER 8 : PROJECT BENEFITS

8.0 GENERAL

The proposed project is mining of stone; it shall have no major impact on surrounding environment. The proposed activity shall provide raw material to various industries, thereby boosting overall improvement in economic growth of the state.

8.1 IMPROVEMENT IN THE PHYSICAL INFRASTRUCTURE

The impact on the civic amenities after the commencement of mining activities is likely to be substantial. The basic requirements of the community needs will be strengthened by extending health care, educational facilities developed in the township for the community, providing drinking water to the villages, building/strengthening of existing roads in the area. The proponent will initiate the above amenities either by providing or by improving the facilities in the area, which will help in uplifting the living standards of local communities.

Medical facilities will be provided in the form of first-aid facility at the mine. These medical facilities will also be available to local people in the surrounding in case of emergencies.

8.2 IMPROVEMENT IN THE SOCIAL INFRASTRUCTURE

Generation of employment and improved standard of living;

Increased revenue to the State by way of royalty, taxes and duties;

and Superior communication and transport facilities etc.

In addition to above, due to increase in purchasing power of local habitants:

There will be significant change in the socio-economic scenario of the area. The proposed project will enhance the prospects of employment. Recruitment for the unskilled and semiskilled workers for the proposed project will be from the nearby villages. The development of the basic amenities viz. roads, transportation, electricity, drinking water, proper sanitation, educational institutions, medical facilities, entertainment, etc. will be developed as far as possible. Overall the proposed project will change living standards of the people and improve the socio-economic conditions of the area.

8.3 EMPLOYMENT POTENTIAL

Future production planning does not indicate some change from present, in the employment. The number of unskilled labour may increase depending on the quantum of overburden removal. The lessee has employed the miners for mining of ore, removal of overburden, quarry cleaning & road repairing. The details of employment are given in Chapter-2.

The employment of local people in primary and secondary sectors of project will upgrade the prosperity of the region. These will in-turn improves the socio-economic conditions of the area. In addition to the above, contractual labour and indirect employment opportunities will also be getting benefited after installation of mining project.

8.4 SOCIOECONOMIC BENEFITS

The benefits of mining activity will be similar to any industrial set-up. There will be opportunities of direct and indirect employments. However, the operations being semi mechanized will not generate large scale direct employment. As mentioned earlier there will be skilled or semi-skilled & unskilled workers. Total 90 % staff will be employed from the local villages. The indirect employment will be far reaching.

Table 8.1, Budget for Corporate Environmental Responsibility (CER)

(Balanda Stone Quarry-7)

SI. No.	**Activity**	**Capital Cost (in Rs.)**
1.	Drinking Water Facility in schools of Balanda & nearby village	5,01,960
2.	Financial aid for Medical Camp	10,00,000
3.	Distribution of educational kits & books in schools	10,00,000
4.	Sports Kits for children in schools	10,00,000
TOTAL		**35,01,960**

(Balanda Stone Quarry-9)

SI. No.	Activity	Capital Cost (in Rs.)
1.	Drinking Water Facility in schools of Balanda & nearby village	5,00,000
2.	Financial aid for Medical Camp	3,00,000
3.	Distribution of educational kits & books in schools	2,01,080
TOTAL		**10,01,080**

(Balanda Stone Quarry-14)

SI. No.	Activity	Capital Cost (in Rs.)
1.	Drinking Water Facility in schools of Balanda & nearby village	5,00,000
2.	Financial aid for Medical Camp	5,00,000
3.	Distribution of educational kits & books in schools	3,00,000
4.	Sports Kits for children in schools	2,01,600
TOTAL		**15,01,600**

(Balanda Stone Quarry-15)

SI. No.	Activity	Capital Cost (in Rs.)
1.	Drinking Water Facility in schools of Balanda & nearby village	3,00,000
2.	Financial aid for Medical Camp	5,00,000
3.	Distribution of educational kits & books in schools	2,51,060
TOTAL		**10,51,060**

(Balanda Stone Quarry-16)

SI. No.	Activity	Capital Cost (in Rs.)
1.	Drinking Water Facility in schools of Balanda & nearby village	2,00,880
2.	Financial aid for Medical Camp	6,00,000
3.	Distribution of educational kits & books in schools	6,00,000
4.	Sports Kits for children in schools	6,00,000
TOTAL		**20,00,880**

Budget for Corporate Environmental Responsibility (CER) (For Cluster)

S. No.	Activity	Capital Cost (in Rs.)/annum
1.	Drinking Water Facility in schools of Balanda village	15,00,000
2.	Financial aid for Medical Camp	25,00,000
3.	Distribution of educational kits & books in schools	30,00,000
4.	For Sports Kits for children in schools	21,00,000
TOTAL		**91,00,000**

The budget provision for mine workers is as under –

Table 8.2: Budget for Occupational Health

Particulars	Recurring Cost per year (Rs.)
For occupational health checkup	10,00,000
Ear protectors or earplugs for the labours	5,00,000
Total	**15,00,000**

8.5 CONCLUSION

As discussed, it is safe to say that the project is not likely to cause any significant adverse impact on the ecology of the area, as adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Green belt development around the area will also be taken up as an effective pollution mitigative technique, as well as to control the pollutants released from the premises of the mine.

CHAPTER 9 : ENVIRONMENTAL MANAGEMENT PLAN

9.0 GENERAL

The Environment Management Plan (EMP) is required to ensure sustainable development in the study area. This chapter covers cause of pollution, main source of pollution, nature of pollution proposed mitigative measures for that pollution. This chapter consists of the set of mitigation, management, monitoring and institutional measures to be taken during the implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels. Overall air of Environment Management plan is as following:

- To reduce generation of pollutant due to various mining activity.
- Overall conservation of environment
- Proper use of natural resources
- Minimization of waste generation and pollution.
- Safety, welfare and good health of the work force and populace.
- Ensure effective operation of all control measures.
- Monitoring of cumulative and long time impacts.
- Ensure effective operation of all control measures.

9.1 AIR QUALITY MANAGEMENT

Over all air quality of the lease area as well in the buffer zone are well within permissible limit. Dust emissions due to mineral handling, during mining operations are not much and restricted to the lease area only. Air pollution is caused mainly due to dust generation added with gaseous emission from transportation activities along with mining operation like loading, transportation haulage etc.

Control of Fugitive Emission

- Use of Personal Protection Equipments (PPE) like dust masks, ear plugs etc. by the mine workers.
- Controlled Blasting of short holes has been proposed.

- Regular water sprinkling on haul roads & loading points will be carried out.
- Development of green belt/plantation around the lease boundary and roads etc.
- Ambient Air Quality Monitoring will be conducted on regular basis to assess the quality of ambient air.

Prevention and control of Gaseous Pollution

In mining activities, the sources of gaseous emissions would be blasting and running of HEMM. Controlled blasting and proper maintenance of machines improves combustion process & makes reduction in the pollution. Good maintenance and monitoring of fuel and oil will not allow significant addition in the gaseous emission.

9.2 NOISE POLLUTION CONTROL

Noise Abattement and Control

- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce the generation of noise.
- Adequate silencers will be provided in all the diesel engines.
- Plantation along the sides of approach roads and mine area will be done to minimize the propagation of noise.
- Personal Protective Equipments (PPE) like earmuffs/earplugs will be provided to all operators and employees working near mining machineries or at higher noise zone.
- Periodical noise level monitoring will be done.

9.3 WATER QUALITY MANAGEMENT

Water for drinking and operations is required to be 27.67 KLD for proposed project. It is proposed to obtain water for drinking from bore well. Adequate control measures will be adopted to check not only the wash-off from soil erosion but also uncontrolled flow of mine water. Garland drain of size 1500mx 2.0 m x 1.5 m will be constructed all around the mineable area.

9.4 WASTE MANAGEMENT

Waste Management

As the granite rock (road metal) body is mostly exposed and about 3% of rock has been considered as weathered/overburden/unusable shall be generated during the plan period. These materials will be dumped temporarily and shall be utilized for approach road development & maintenance purposes during the plan period.

Top soil

About 96915 cum of top soil shall be generated during the plan period excavation for all the mines, and the soil generated from the quarry will be utilized for plantation in the safety zone and avenue plantation as directed by the competent authority. Therefore, no soil stack yard has been proposed in the mining plan.

9.5 BIOLOGICAL MANAGEMENT MEASURES

There is a requirement to establish a stable ecosystem with both ecological and economic returns. Minimization of soil erosion and dust pollution enhances the beauty of the core and the buffer zone. To achieve this, it is planned to increase plantation activities. The basic objectives of plantation are as follows:-

- Improvement of Soil quality
- Quick vegetative cover to check soil erosion
- Improvement in mining site stability
- Conservation of biological diversity
- As dust receptor which likely to produce during mining.

9.6 GREENBELT DEVELOPMENT PLAN

Green belt is plantation of trees for reducing the pollution as they absorb both gaseous and particulate pollutant, thus removing them from atmosphere. Green plants form a surface capable of absorbing air pollutants and forming sinks for pollutants. It improves the aesthetic value of local environment. Under present project, green belt has been planned with emphasis on creating

biodiversity; enhance natural surroundings and mitigating pollution. The greenbelt development plan aims to overall improvement in the environmental conditions of the region. The plan with a five-fold objective addresses issues such as providing sink for air pollutants likely to emitted from the project; enhancing the forest cover for increasing the biodiversity of the region; providing aesthetic value to the project area enhancing the ecological equilibrium of the area; and to a large proportion in combating soil erosion.

- Afforestation on degraded forest area, forest protection / conservation will be carried out every year by the mine owner
- This activity will promote the emergence of the primary succession species, extremely important for maintaining ecology and environmental health of the area
- This helps in regeneration & establishment of pioneer plant species saving exposed land & land cutting
- These plantations will be carried out around mining zone. Most of the area recommended for mining will be used for afforestation/greenbelt as per the "Forest (Conservation) Amendment Rule, 2004".

Table 9-1: Progressive Afforestation Schedule

Progressive Afforestation Schedule (for Proposed Quarries)

S. No.	Stone Quarry	No. of Plants
1	Balanda Stone Quarry - 7	**764**
2	Balanda Stone Quarry - 9	**852**
3	Balanda Stone Quarry - 14	**687**
4	Balanda Stone Quarry - 15	**494**
5	Balanda Stone Quarry - 16	**698**
Total		**3495**

Progressive Afforestation Schedule (for Cluster)

S. No.	Stone Quarry	No. of Plants
1	Balanda Stone Quarry - 1	**250**
2	Balanda Stone Quarry - 2	**775**
3	Balanda Stone Quarry - 3	**760**
4	Balanda Stone Quarry - 7	**764**
5	Balanda Stone Quarry - 8	**500**
6	Balanda Stone Quarry – 9	**852**
7	Balanda Stone Quarry -10	**1374**
8	Balanda Stone Quarry - 14	**687**
9	Balanda Stone Quarry - 15	**494**
10	Balanda Stone Quarry - 16	**698**
Total		**7154**

9.7 OCCUPATIONAL HAZARDS AND SAFETY

Occupational safety and health is very closely related to productivity and good employer-employee relationship. The factors of occupational health in Balanda Stone Quarry cluster – 7, 9, 14, 15, 16 lease will be mainly dust and land degradation. Safety of employees during operation and maintenance etc. shall be as per Mines rules and regulations.

To avoid any adverse effect on the health of workers due to various pollutants, sufficient measures relating to safety and health will also be practiced:

- Provision of rest shelters for mine workers with amenities like drinking water, portable toilets etc.
- All safety measures like use of safety appliances, such as dust masks, helmets, shoes, non breakable goggles, knee pads, as the case may be, shall be ensured. Safety awareness programs, awards, posters, slogans related to safety etc. will be encouraged.
- Training of employees for use of safety appliances and first aid in vocational training center.
- Regular maintenance and testing of all equipment as per manufacturers' guidelines.
- Periodical Medical Examination (PME) of all workers by a Medical Officer
- First Aid facility will be provided at the mine site.

- Close surveillance of the factors in working environment and work practices which may affect environment and worker's health.
- Working of mine as per approved mining plan and environmental plans.

9.8 EMP BUDGET

It is necessary to include the environmental cost as a part of the budgetary cost component. The project authorities propose to undertake the following environmental works to achieve the environmental quality as desired. The budget for environmental protection has been formulated and given in Table 9.2.

Table 9-2: Budget for environmental protection
Budget allotted for the EMP for Proposed Cluster Quarry

Balanda Stone Quarry-7

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,52,800	45,000
5.	Maintenance of approach road	1,50,000	45,000
Total		**3,02,800**	**3,00,000**

Budget allotted for the EMP for Balanda Stone Quarry- 9

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,70,400	50,000
5.	Maintenance of approach road	1,50,000	45,000
Total		**3,20,400**	**3,05,000**

Balanda Stone Quarry- 14

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,37,400	35,000
5.	Maintenance of approach road	1,50,000	37,500
Total		**2,87,400**	**2,82,500**

Balanda Stone Quarry- 15

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,30,000	30,000
5.	Maintenance of approach road	1,50,000	37,500
Total		**2,80,000**	**2,77,500**

Balanda Stone Quarry- 16

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,39,600	40,000
5.	Maintenance of approach road	1,50,000	37,500
Total		**2,89,600**	**2,87,500**

Budget allotted for the Environmental Management Plan (for Cluster)

S. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control & Dust Suppression	--	5,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
3.	Plantation	15,00,000	4,00,000
4.	Construction and maintenance of haul road	8,00,000	2,00,000
Total		**23,00,000**	**12,10,000**

9.9 SOCIO-ECONOMIC CONDITIONS OF THE REGION–

A detailed Community Social Responsibility plan has been prepared and the details of the report are given below.

9.10 CER DETAILS

Balanda stone quarry lease has proposed to provide financial assistance of 2% of capital cost for the development of social infrastructure of the area.

9.11 CONCLUSION

As discussed, it is safe to say that the project is not likely to cause any significant impact on the ecology of the area, as adequate preventive measures will be adopted to contain the various pollutants within permissible limits. Green belt development around the area will also be taken up as an effective pollution mitigative technique, as well as to control the pollutants released from the premises of the Mine.

CHAPTER 10 : SUMMARY AND CONCLUSION

10.0 PREMEABLE

Balanda Stone Quarry Cluster (7, 9, 14, 15 & 16) is located at village- Balanda, Tehsil- Lathikata, District - Sundargarh in Odisha. Details of Proposed Project by has been given in table no.10.1.

The proposed project is in cluster situation as other leases are within 500 m radius of lease & total lease area becomes greater than 5 ha. So, as per the EIA notification 2006 and its subsequent amendment, proposed project fall in category B1.

The 05 Projects that are Proposed in clusternow are Balanda Stone Quarry Cluster - 7,9,14,15&16 and 03 Projectsare Operating Mines i.e. Balanda Stone Quarry Cluster - 2, 3, 10 and 02 Projects are Non-Operating Mines i.e. Balanda Stone Quarry Cluster – 1, 8 and 04 Projects are Extincted Mines i.e. Balanda Stone Quarry Cluster – 4, 5, 6, 11. at village Balanda, Tehsil- Lathikata, District - Sundargarh of Odisha over an applied area of 17.823 Ha, 44.05 Acres and Total Cluster Area is 38.687 Ha, 95.6 Acres.

Table 10-1, Detail of the lease area

Mine	Proponent	Land Schedu	Area (Acres	Production (cum/year)	Status of Mine
Balanda Stone Quarry-1	Natwarlal Bansal	Khata No-504 Plot No – 1897/P	4.249 Ha 10.50 Acres	38054	It is a Runnin source and Lease will expire on Dt. 19.12.2023
Balanda Stone Quarry- 2	Kameswar Tiwari	Khata No-504 Plot No – 1897/P	4.876 Ha 12.05 Acres	100019.6	Operating Mine
Balanda Stone Quarry- 3	Shankarlal Agarwal	Khata No-504 Plot No – 1893/P	4.046 Ha 10.00 Acres	97097.0	Operating Mine

Balanda Stone Quarry-4	NA	NA	NA	NA	Extinct Mine
Balanda Stone Quarry-5	NA	NA	NA	NA	Extinct Mine
Balanda Stone Quarry-6	NA	NA	NA	NA	Extinct Mine
Balanda Stone Quarry-7	**Essen Construction**	**Khata No-506 Plot No – 2473/P**	**4.046 Ha 10.00 Acres**	**50049**	**TOR Granted on 08-02-2024**
Balanda Stone Quarry-8	Punam D Sahu	Khata No-238(Sabak) Plot No – 2292/P	2.832 Ha 7.00 Acres	60004	It is a Running source and Lease will expire on Dt. 19.12.2023
Balanda Stone Quarry-9	**No Successful bidder finalized**	**Khata No-504 Plot No – 2008/P 1899/P 2009/P**	**4.876 Ha 12.05 Acres**	**50057.8**	**TOR Granted on 08-02-2024**
Balanda Stone Quarry-10	Prem Kumar Sahu	Khata No-504 Plot No - 1899/P	4.856 Ha 12.00 Acres	12086.2	Operating Mine
Balanda Stone Quarry-11	NA	NA	NA	NA	Extinct Mine
Balanda Stone Quarry-14	**Bijay Kumar Agarwal**	**Khata No-506 Plot No –**	**2.832 Ha 7.00 Acres**	**15016**	**TOR Granted on 08-02-2024**

		2743/P			
Balanda Stone Quarry-15	**Katakata Jagnyanarayan Prusty**	**Khata No-506, 504 Plot No – 2473/P 2010/P**	**2.023 Ha 5.00 Acres**	**15015**	**TOR Granted on 08-02-2024**
Balanda Stone Quarry-16	**Katakata Jagnyanarayan Prusty**	**Khata No-504 Plot No – 1893/P 2010/P**	**4.046 Ha 10.00 Acres**	**80070.6**	**TOR Granted on 08-02-2024**
Total			**95.6 Acres. 38.687 Ha**	**Cluster Production is 5,17,469.2 cum/year**	

10.1 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

Name of the Project-

Balanda Stone Quarry Cluster- (7, 9, 14, 15 & 16) over an applied area of 17.823 Ha, 44.05 Acres and Total Cluster Area is 38.687 Ha, 95.6 Acres. The total proposed Production is 210208.4 cum/year of Stone.

Location of the Project-

Balanda Stone Quarry Cluster - 7, 9, 14, 15 & 16 in village- Balanda, Tehsil – Lathikata, District- Sundargarh, Odisha. The area falls in Survey of India Topo sheet No. F45G12 & F45G16.

S.NO	LONGITUDE	LATITUDE
Balanda Stone Quarry 7		
P1	22° 11' 21.45" N	84° 45' 34.90" E
P2	22° 11' 21.37" N	84° 45'24.21" E
P3	22° 11' 25.66" N	84° 45' 24.18" E
P4	22° 11' 25.72" N	84° 45' 34.64" E
Balanda Stone Quarry 9		
P1	22° 11' 13.43" N	84° 44' 42.19" E
P2	22° 11' 15.43" N	84° 44' 54.24" E
P3	22° 11' 10.75" N	84° 44' 54.49" E
P4	22° 11' 08.91" N	84° 44' 43.08" E
Balanda Stone Quarry 14		
P1	22° 11' 28.44" N	84° 45' 34.26" E
P2	22° 11' 28.98" N	84° 45' 26.78" E
P3	22° 11' 32.96" N	84° 45' 22.68" E
P4	22° 11' 32.76" N	84° 45' 31.87" E
Balanda Stone Quarry 15		
P1	22° 11' 15.27" N	84° 45' 26.51" E
P2	22° 11' 15.55" N	84° 45' 20.85" E
P3	22° 11' 19.18" N	84° 45' 20.76" E
P4	22° 11' 19.18" N	84° 45' 26.29" E
Balanda Stone Quarry 16		

P1	22° 11' 15.36" N	84° 45' 12.42" E
P2	22° 11' 16.20" N	84° 45' 05.18" E
P3	22° 11' 22.09" N	84° 45' 05.42" E
P4	22° 11' 21.26" N	84° 45' 12.45" E

10.2 BRIEF DESCRIPTION OF PROJECT

Need of the project

The stone quarried will be used as construction material. The production of mineral will benefit to the State in the form of Royalty. Apart from this, the project will generate direct and indirect employment opportunities to the tune of persons from the nearby villages. Also, the mine management will conduct medical camps at regular interval in the nearby villages and will help the nearby villages in providing infrastructure like school furniture, water tankers, etc.

Size of the project

Balanda stone mining lease is presently spanning over an area of 17.823 Ha, 44.05 Acres (Applied Cluster Area) and 38.687 ha, 95.6 Acres (Total Cluster Area). Proposed rate of production is 210208.4 cum/year of stone.

10.3 PROJECT DESCRIPTION

Brief description of the project

Balanda Stone Quarry Cluster – (7, 9, 14, 15 & 16) is located in village- Balanda, Tehsil – Lathikata, District- Sundargarh, Odisha.

The 05 Projects that are Proposed in cluster now are Balanda Stone Quarry Cluster - 7,9,14,15&16 and 03 Projects are Operating Mines i.e. Balanda Stone Quarry Cluster - 2, 3, 10 and 02 Projects are Non-Operating Mines i.e. Balanda Stone Quarry Cluster – 1, 8 and 04 Projects are Extincted Mines i.e. Balanda Stone Quarry Cluster – 4, 5, 6, 11. at village

Balanda, Tehsil- Lathikata, District - Sundargarh of Odisha over an applied area of 17.823 Ha, 44.05 Acres and Total Cluster Area is 38.687 Ha, 95.6 Acres.

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As per EIA notification 2006 and subsequent amendments, the project is coming under B1 Category as the lease area is more than 5.0 Ha.

Salient features of mine lease

The salient features of mine lease are given below:

Table 10-2: Salient features of mine lease

<table>
<tr><th colspan="2">S. No.</th><th>Particulars</th><th>Details</th></tr>
<tr><td colspan="2">A.</td><td>Nature & Size of the Project</td><td>Balanda Stone Quarry Cluster (7, 9, 14, 15 & 16) for Proposed Production of 210208.4 cum/year in village- Balanda, Tahasil – Lathikata, District- Sundargarh, Odisha Area- 17.823 Ha, 44.05 Acres</td></tr>
<tr><td colspan="2">B.</td><td colspan="2">Location</td></tr>
<tr><td colspan="3">Name of Village</td><td>Balanda</td></tr>
<tr><td colspan="3">Tehsil</td><td>Lathikata</td></tr>
<tr><td colspan="3">District</td><td>Sundargarh</td></tr>
<tr><td colspan="3">State</td><td>Odisha</td></tr>
<tr><td colspan="3">Toposheet No.</td><td>F45G12 & F45G16</td></tr>
<tr><td>C.</td><td colspan="3">Mine Lease Area Details</td></tr>
<tr><td></td><td>Lease Area</td><td colspan="2">17.823 Ha, 44.05 Acres (Proposed Area)</td></tr>
<tr><td></td><td>Topography</td><td colspan="2">The lease area represents a rugged terrain.</td></tr>
<tr><td></td><td>Site Elevation Range</td><td colspan="2"><table><tr><th>Mine</th><th>Max (m RL)</th><th>Min (m RL)</th></tr><tr><td>7</td><td>250</td><td>234</td></tr><tr><td>9</td><td>280</td><td>256</td></tr><tr><td>14</td><td>302</td><td>278</td></tr><tr><td>15</td><td>250</td><td>246</td></tr><tr><td>16</td><td>310</td><td>290</td></tr></table></td></tr>
<tr><td>D.</td><td colspan="3">Cost Details</td></tr>
<tr><td></td><td>Cost of the project</td><td colspan="2">Rs. 45.2829 Crores (for Cluster)</td></tr>
</table>

	Cost for EMP	For Cluster: Capital cost :- 23.00 Lakhs, Reccuring cost :- 12.10 Lakh/annum
	Cost of CER	For Proposed Quarries: Rs. 90.56 Lakhs For Cluster: Rs. 91.00 Lakhs
E.	**Details of Environmental Setting**	
	Ecological Sensitive Areas (National Park, Wild Life Sanctuary, Biosphere Reserve, Reserve/ Protected Forest etc.) within 10 km distance	There is no National Park, Wild Life Sanctuary or Biosphere Reserve within 10 km distance from the lease area. Butukupiri RF approx 2.50 Km, SSE direction. Sagjor RF approx 2.48 Km, West direction. Rutukupiri RF approx 7.10 Km, South direction Kumaria RF approx 5.91 Km, WSW direction Jogisar RF approx 8.71 Km, North direction
	Water Bodies,	Pitamahal Dam , approx.0.25 km towards West direction from the Mining lease. Brahmani River, approx. 5.11 km towards North East direction from the Mining Lease. Sankh River, approx. 6.60 km towards North direction from the Mining Lease.
	Nearest Town	Kansbahal Town, approx.9.04 km in WNW direction.
	Nearest Railway Station	Kansbahal Railway station, approx. 8.55 km in WNW direction.
	Nearest National/State Highway	National Highway is NH- 143 at a distance of 4.92 km towards NE direction State Highway is SH- 10 at a distance of 5.25 km towards North direction
	Nearest state boundary	There are no state boundary within 10 km radius from proposed mine site

	Nearest Airport	Biju Patnaik International Airport is approx.245.10 Km towards SE direction.
	Seismic Zone	As per the 2002 Bureau of Indian Standards (BIS) Map, Odisha also falls in Zones II.

Method of mining

In the applied ease area mining of rock mass will be worked out opencast method of mining. Handling of rock mass will be done both manually and by excavators, Handpicks, jack hammer, drill compressor, rock breaker, spade, chisel, hammer will be used by manual labours for sorting and sizing. Loosening of rock mass will be done by drilling and blasting. The excavated rock mass will be loaded in Tractors/Tippers by excavators or loaders

10.4 RECLAMATION AND AFFORESTATION PROGRAMME

Present reclamation and rehabilitation is not required.

The details of plantation and number of saplings to be planted are given below in Table: 10.3.

Table 10-3, Details of greenbelt scheme

Progressive Afforestation Schedule (for Proposed Quarries)

S. No.	Stone Quarry	No. of Plants
1	Balanda Stone Quarry - 7	764
2	Balanda Stone Quarry - 9	852
3	Balanda Stone Quarry - 14	687
4	Balanda Stone Quarry - 15	494
5	Balanda Stone Quarry - 16	698
Total		**3495**

Progressive Afforestation Schedule (for Cluster)

S. No.	**Stone Quarry**	**No. of Plants**
1	Balanda Stone Quarry - 1	**250**
2	Balanda Stone Quarry - 2	**775**
3	Balanda Stone Quarry - 3	**760**
4	Balanda Stone Quarry - 7	**764**
5	Balanda Stone Quarry - 8	**500**

6	Balanda Stone Quarry – 9	**852**
7	Balanda Stone Quarry -10	**1374**
8	Balanda Stone Quarry - 14	**687**
9	Balanda Stone Quarry - 15	**494**
10	Balanda Stone Quarry - 16	**698**
Total		**7154**

10.5 LAND USE PATTERN

Presently (pre-mining), the land covered under the mine lease area is partly under agriculture and remaining is barren land. The details of the post mining land use and area proposed for reclamation are given below in Table: 10.4.

Table 10-4: Land use pattern

Land Use (During Plan period) (ha)						
Sl. No.	**Type of land use**	**Balanda Stone Quarry - 7**	**Balanda Stone Quarry - 9**	**Balanda Stone Quarry - 14**	**Balanda Stone Quarry - 15**	**Balanda Stone Quarry - 16**
1	Area of excavation	1.569	1.677	0.349	0.955	1.999
2	Temporary OB dump	0.007	0.007	0.007	0.007	0.007
3	Infrastructure	0.003	0.003	0.003	0.003	0.003
4	Roads	0.000	0.000	0.000	0.000	0.000
5	Plantation/ Safety Zone	0.637	0.710	0.573	0.412	0.582
6	Miscellaneous	1.830	2.479	1.900	0.646	1.455
	Total	**4.046**	**4.876**	**2.832**	**2.023**	**4.046**

10.6 BASELINE ENVIRONMENTAL STATUS

Soil quality

05 soil samples were collected in and around the mine lease area to assess the present soil quality of the region. The pH of the soil indicates that the soil is slightly alkaline in nature. Based on the results, it is evident that the soils are not contaminated by any polluting sources.

Meteorology

Meteorological data at the site was monitored during October 2023 to December 2023 representing post monsoon season.

Ambient air quality

Ambient Air Quality Monitoring (AAQM) has been carried out at eight locations.

The minimum and maximum level of PM2.5 recorded within the study area was in the range of 25.04µg/m^3 to 46.82µg/m^3 with the 98th percentile ranging between 30.46µg/m^3 to 46.68µg/m^3.

The minimum and maximum level of PM_{10} recorded within the study area was in the range of 64.49 to 88.03µg/$m^3$with the 98th percentile ranging between 72.93µg/m^3 to 87.40µg/m^3.

The minimum and maximum concentration of SO_2 recorded within the study area was 6.00 to 16.84µg/m^3 with the 98th percentile ranging between 7.12µg/m^3 to 16.72µg/m^3.

The minimum and maximum level of NO2 recorded within the study area was in the range of was 5.79µg/m^3 to 19.33µg/m^3 with the 98th percentile ranging between 7.59µg/m^3 to 19.30µg/m^3.

Water quality

To assess the physical and chemical properties of water in the region, ground water samples from 5 locations& surface water from 2 locations were collected from various water sources around the mine lease area. The pH of the ground water samples in the region varied from 7.21 to 7.88.

The results indicate groundwater is generally in conformity with the drinking water standards (IS: 10500) and surface water is in conformity with IS-2296 standards.

Noise Levels

The values of noise observed in some of the areas are primarily owing to vehicular traffic. Assessment of hourly night time Leq (Ln) varies from 39.2 to 45.8 dB (A) and the hourly daytime Leq (Ld) varies from 51.5 to 58.2 dB (A) within the study area.

The status of noise quality within the 10 km zone of the study area is, therefore, within the MoEF& CC standards.

Ecological Environment

Based on the field studies and review of published literature, it is observed that there no schedule-I species in the buffer zone. There are no National Parks within the study area of 10-km radius. However, some RF are present within 10 km radius from the mine site.

Social Environment

The implementation of the Balanda Stone Quarry Cluster-(7, 9, 14, 15, 16) will generate both direct and indirect employment. At present agriculture is the main occupation of the people as more than half of the population depends on it. With the implementation of the proposed mining project the occupational pattern of the people in the area will change making more people engaged in industrial and business activities rather in agriculture. Thus there will be a gradual shifting of population from agriculture to mining and industry. The study area is still lacking in education, health, housing, water, electricity etc. It is expected that same will improve to a great extent due to proposed mining project and associated industrial and business activities.

All persons aged seven years and above, who can both read and write with understanding in any language have been considered as literate in this study.

10.7 ANTICIPATED ENVIRONMENTAL IMPACTS

Impact on air quality

The mining is carried out by opencast semi mechanized method. The air borne particulate matter generated by ore and handling operations, and transportation of ore is the main air pollutant. The emissions of Sulphur dioxide (SO_2), Oxides of Nitrogen (NO_2) contributed by diesel operated excavation/loading equipment and vehicles plying on haul roads are marginal. Prediction of impacts on air environment has been carried out taking into consideration proposed production and net increase in emissions.

Air pollution sources in the operating mine have been classified into:

Line sources

Transportation of ore from mining benches to tipper platform of plant, movement of tippers on the haul road is considered as line sources.

Water tankers with spraying arrangement will be used for regular water sprinkling on the haul roads to ensure effective dust suppression. The tippers are well maintained so that exhaust smoke does not contribute abnormal values of noxious gases and un-burnt hydrocarbons.

Impact on Water Resources

Surface Water Resources

As there is no seasonal *nalla* or water body within the leasehold area, therefore no change will be observed due to mining operation.

Groundwater Resources

The ground water table in the lease area varies from 20m to 30mbgl. The mining will be done much above ground water table. Ground water table will not be intercepted.

Impact on water quality

Analysis results of surface water samples collected from rivers and *nallas* in the buffer zone indicate that the pH, total dissolved solids (TDS) are well below the prescribed limits.

No wastewater generation is envisaged due to the mining operations. The sanitary wastewater will be sent to septic tanks. No impact of wastewater generation on the surface water is envisaged, as there is no discharge into surface water resources.

Impact on noise levels and ground vibrations

With the mining operations, involving deployment of machinery for mine development, excavation and transportation of mineral, it is imperative that noise levels would increase. It is also observed that these incremental noise levels will not significantly affect the existing ambient noise levels.

Impact on Soil

The environmental impacts of the mining activities on topsoil are based on the quantity of removal of topsoil and its dumping. In the present project as it is proposed to temporarily store the topsoil and use it for plantation schemes, no adverse impact of excavation of topsoil is envisaged. The soil erosion from overburden dumps is not envisaged in the present project, as sufficient measures as detailed in the EMP would be undertaken.

Impact on flora and fauna

As the mining activity is restricted to core zone, no significant impact on the flora of the buffer zone due to the proposed mining of mineral is anticipated. It is proposed to include *Azadirachtaindica,*and*Ficusreligiosa* in the plantation program as they serve as sinks for gaseous emissions. Extensive plantation comprising of pollutant resistant trees will be undertaken, which will serve not only as pollution sink but also as a noise barrier.

The incremental dust generations due to the mining operations, at the boundary of the mine lease are insignificant and it is also expected that with the adoption of mitigation measures as suggested in EMP, the impact due to operation of the mine will be minimal on the terrestrial ecosystem and also on the adjacent forest area.

The impact on the fauna of the buffer zone due to the mining activity will be insignificant. The proposed progressive plantation over a period of time will reduce the impact, if any, on the fauna.

Impact on land use pattern

The proposed opencast mine will result in change the land use pattern of the QL area. The land degradation is expected during mining activities like excavation, overburden dumping, soil extraction etc. Land requirement for the project has been assessed considering functional needs.

Impact on Socio-economic aspects

The mine area does not cover any habitation. Hence the mining activity does not involve any displacement of human settlement. No public buildings, places, monuments etc exist within the lease area or in the vicinity. The mining operation will not disturb/ relocate any village or need resettlement. Thus no adverse impact is anticipated.

The impact of mining activity in the area is positive on the socio-economic environment of the region. Balanda Stone Quarry Cluster- (7, 9, 14, 15, 16) lease will be providing employment to local population and it will give preference to the local people whenever there is requirement of man power.

10.8 ENVIRONMENTAL MANAGEMENT PLAN

The summary of suggestive mitigation measures are given in Table-10.5.

Table 10-5, Key suggestive measures under EMP

Impact Predicted	Suggestive measure
Disturbance of free movement/living of wild fauna	• No labour camp will be allowed in reserve forest • Awareness camps will be conducted for labours to make them aware about sensitivity/importance of forest life • No tract or new road for movement of labours or vehicles be laid in reserve forest area, this will prevent forest fragmentation, encroachment and human – animal encounter • Care will be taken that noise produced due to vehicles movement for carrying ore materials are within the permissible noise level. Higher noise level in the forest area will lead to restless and failure in detection of calls of mates and young ones • Care will be taken that no hunting of animals will be carried out by labours

	• If wild animals are noticed crossing the core zone, they will not be disturbed at all • Labours will not be allowed to discard food, plastic etc., which can attract animals near the core site • No honk will be allowed in the forest area, noise level will be within permissible limit (silent zone-50dB during day time) as per noise pollution (regulation and control), rules, 2000, CPCB norms
Harvesting of forest flora	• No tree cutting, chopping, lumbering, uprooting of shrubs and herbs should be allowed • No pilling of ore material should be done in the reserve forest area • Collections of economically important plants will be fully restricted

10.9 ANALYSIS OF ALTERNATIVES

The mineral has been identified based on the result of geological investigations and exploration carried out by the lessee.

The mining projects are site specific as such alternate sites were not considered.

The mine will be operated by opencast semi mechanized method using minimum drilling and blasting. No other alternative technologies can be used because of the hard nature of the ore. Proposed mine is using eco-friendly measures to minimize the impact of mining on the surrounding environment.

Table 10-6: Environmental monitoring programme

Attributes	**Sampling**		**Measurement**	**Test Procedure**
	Network	**Frequency**	**Method**	
A. Air Environment				
Meteorological · Wind direction · Relative humidity · Rainfall	Minimum 1 site in the project impact area	Regularly in one season by Weather Monitoring Station	Mechanical/automatic weather station	-

Pollutants	4 locations in the project impact area (Minimum 1 locations in upwind side, 1 sites in downwind side / impact zone and 1 in core zone)	Once in a season.	Gravimetric method	-
PM_{10}			Gravimetric method	-
SO_2			EPA Modified West & Geake method	Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P-Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II).
NO_2			Arsenite modified Jacob &Hochheiser	Absorption in dil. NaOH and then estimated colorimetrically with sulphanilamide and N (I-Nepthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (CPCB Method).
B. Water Environment				
pH, Turbidity, Colour, Odour, Taste, TDS, Total Hardness, Calcium hardness, Magnesium hardness, Chloride, Fluoride, Sulphate, Nitrates,	Set of grab samples during pre and post-monsoon for ground and surface Water in the vicinity.	Diurnal and Season wise	As per IS 10500	Samples for water quality should be collected and analyzed as per : IS : 2488 (Part 1-5) methods for sampling and testing of Industrial

Alkalinity, Iron, Copper, Manganese, Mercury, Cadmium, Selenium, Arsenic, Cyanide, Lead, Zinc, Chromium, Aluminum, Boron, Phenolic Compounds				effluents Standard methods for examination of water and wastewater analysis published by American Public Health Association.
C. Noise				
Noise levels at Day & night time - Leq dB (A)	Mine Boundary, High noise generating areas within the lease	Quarterly / Half yearly	As per CPCB norms	As per CPCB norms
D. Soil				
pH, Bulk Density, Soil texture, Nitrogen, Available Phosphorus, Potassium, Calcium, Magnesium, Sodium, Electrical Conductivity, Organic Matter, Chloride	4 locations in the project impact area	Yearly/half yearly	As per USDA Method	As per USDA Method
E. Socioeconomic				
· Demographic structure · Infrastructure resource base · Economic	Socioeconomic survey is based on proportionate, stratified and	Minimum for two phases of the project	Primary data collection through Questionnaire	Secondary data from census records, statistical hard books, toposheets, health

resource base · Health status: Morbidity pattern · Cultural and Aesthetic attributes · Education	random sampling method			records and relevant official records available with Govt. agencies

10.10 Cost Estimates

The details of the cost to be incurred for successful monitoring of environmental parameters and implementation of control measures are given in Table-10.7.

Table 10-7: Cost of environmental protection measures

Balanda Stone Quarry- 7

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,52,800	45,000
5.	Maintenance of approach road	1,50,000	45,000
Total		**3,02,800**	**3,00,000**

Balanda Stone Quarry- 9

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,70,400	50,000
5.	Maintenance of approach road	1,50,000	45,000
Total		**3,20,400**	**3,05,000**

Balanda Stone Quarry- 14

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,37,400	35,000
5.	Maintenance of approach road	1,50,000	37,500
Total		**2,87,400**	**2,82,500**

Balanda Stone Quarry- 15

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,30,000	30,000
5.	Maintenance of approach road	1,50,000	37,500
Total		**2,80,000**	**2,77,500**

Balanda Stone Quarry- 16

SI. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control Dust Suppression	--	1,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
4.	Green belt development	1,39,600	40,000
5.	Maintenance of approach road	1,50,000	37,500
Total		**2,89,600**	**2,87,500**

Cost of environmental protection measures (for Cluster)

S. No.	Measures	Capital Cost (In Rs.)	Recurring Cost (In Rs.)
1.	Pollution Control & Dust Suppression	--	5,00,000
2.	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil Pollution iv) Noise Pollution	--	50,000 40,000 10,000 10,000
3.	Plantation	15,00,000	4,00,000
4.	Construction and maintenance of haul road	8,00,000	2,00,000
Total		**23,00,000**	**12,10,000**

10.11 ADDITIONAL STUDIES

Risk assessment and disaster management plan

The complete mining operation will be carried out under the management control and direction of a qualified mine manager holding. The DGMS have been regularly issuing standing orders, model standing orders and circulars to be followed by the mine management in case of disaster, if any. Moreover, mining staff will be sent to refresher courses from time to time to keep them alert.

Disaster Management Plan

Emergency preparedness is an important aspect in the planning of Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel shall be trained in the operations.

10.12 PUBLIC CONSULTATION

Public Hearing

Public hearing yet to be Conducted.

10.13 PROJECT BENEFITS

The impact on the civic amenities will be substantial after the commencement of mining activities. Medical facilities will be provided in the form of first-aid facility at the mine. These medical facilities will also be available to local people in the surrounding in case of emergencies.

- Generation of employment and improved standard of living;
- Increased revenue to the State by way of royalty, taxes and duties; and
- Superior communication and transport facilities etc.

The employment of local people in primary and secondary sectors of project will upgrade the prosperity of the region.

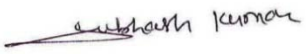
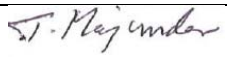
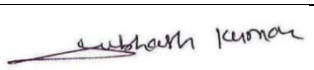
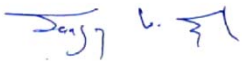
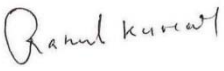
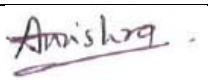
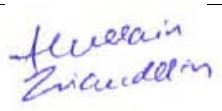
10.14 CONCLUSIONS

- The mining operations will meet the compliance requirements of MoEF;
- Community impacts will be beneficial, as the project will generate significant economic benefits for the region;
- Adoption of best available technology and best management practices with more environmental friendly process; and
- With the effective implementation of the Environment Management Plan (EMP) during the mining activities, the proposed project can proceed without any significant negative impact on environment.

CHAPTER 11 : DISCLOSURE OF CONSULTANTS

Name of the Consultant	P and M Solution
Address	C-88, Sector 65, Noida -201301 – U.P
Credentials	Accredited by QCI/NABET valid till Dec. 10, 2022
Laboratory	Noida Testing Laboratory
Address	GT-20 Sector 117 Noida

EXPERTS ENGAGED

S No	Name	EC/FAE	DETAILS	Signatures
1	Subhash Kumar	EC	EC	
2	Tapan Majumdar	FAE	HG, GEO	
3	Subhash Kumar	FAE	SC	
4	Sanjay Singh	FAE	NV	
5	Manoj Kumar Pandey	FAE	EB	
6	R K Tiwary	FAE	RH,AP	
7	Rahul Kumar	FAE	AQ	
8	Abhay Nath Mishra	FAE	SE	
9	Hussain Ziauddin	FAE	WP	
10	Poonam Kumari Mangalam	FAE	LU	

QUALITY COUNCIL® OF INDIA
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NABET

National Accreditation Board for Education and Training

NABET

Certificate of Accreditation

P and M Solution, Noida

C-88, Sector-65, Noida, Uttar Pradesh- 201301

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

S.No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals including opencast & underground	1	1 (a) (i)	A
2	River Valley projects	3	1 (c)	B
3	Coal washeries	6	2 (a)	B
4	Cement plants	9	3 (b)	A
5	Highways	34	7 (f)	A
6	Building and construction projects	38	8 (a)	B
7	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated July 18, 2023 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no QCI/NABET/ENV/ACO/23/2846 dated August 09, 2023. The accreditation needs to be renewed before the expiry date by P and M Solution, Noida following due process of assessment.

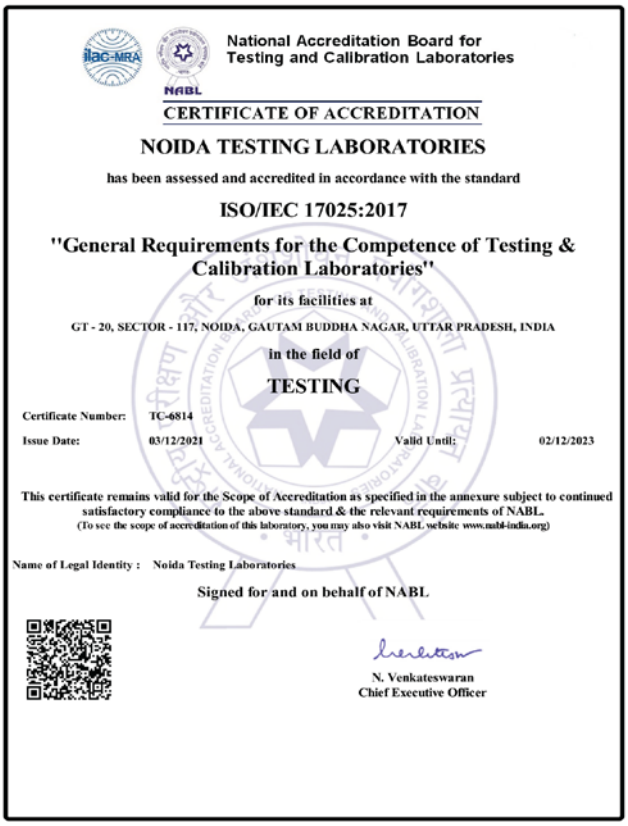
NABET

Sr. Director, NABET
Dated: August 09, 2023

Certificate No.
NABET/EIA/2326/RA 0298

Valid up to
May 07, 2026

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



National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

NOIDA TESTING LABORATORIES

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

GT - 20, SECTOR - 117, NOIDA, GAUTAM BUDDHA NAGAR, UTTAR PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-6814

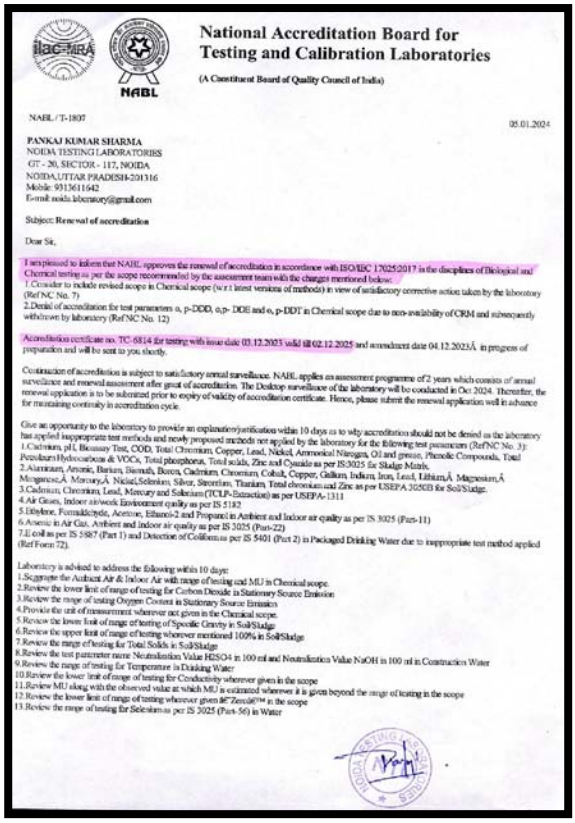
Issue Date: 03/12/2021 Valid Until: 02/12/2023

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : Noida Testing Laboratories

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer



National Accreditation Board for Testing and Calibration Laboratories

(A Constituent Board of Quality Council of India)

NABL

NABL/T-1807

05.01.2024

PANKAJ KUMAR SHARMA
NOIDA TESTING LABORATORIES
GT - 20, SECTOR - 117, NOIDA
NOIDA,UTTAR PRADESH-201316
Mobile 9315611642
E-mail noida.laboratory@gmail.com

Subject: Renewal of accreditation

Dear Sir,

I am pleased to inform that NABL approves the renewal of accreditation in accordance with ISO/IEC 17025:2017 in the disciplines of Biological and Chemical testing as per the scope recommended by the assessment team with the changes mentioned below:

1.Consider to include revised scope in Chemical scope (w.r.t latest versions of method) in view of satisfactory corrective action taken by the laboratory (Ref NC No. 7)
2.Denial of accreditation for test parameters α, p-DDD, o,p- DDE and α, p-DDT in Chemical scope due to non-availability of CRM and subsequently withdrawn by laboratory (Ref NC No. 12)

Accreditation certificate no. TC- 6814 for testing with issue date 03.12.2021 valid till 02.12.2025 and amendment date 04.12.2023Â in progress of preparation and will be sent to you shortly.

Continuation of accreditation is subject to satisfactory annual surveillance. NABL applies an assessment programme of 2 years which consists of annual surveillance and renewal assessment after grant of accreditation. The Desktop surveillance of the laboratory will be conducted in Oct 2024. Thereafter, the renewal application is to be submitted prior to expiry of validity of accreditation certificate. Hence, please submit the renewal application well in advance for maintaining continuity in accreditation cycle.

Give an opportunity to the laboratory to provide an explanation/justification within 10 days as to why accreditation should not be denied as the laboratory has applied inappropriate test methods and newly proposed methods not applied by the laboratory for the following test parameters (Ref NC No. 3):
Petroleum Hydrocarbon & VOCs, Total phosphorus, Total solids, Zinc and Cyanide as per IS:3025 for Sludge Matrix.
2.Aluminum, Arsenic, Barium, Bismuth, Boron, Cadmium, Chromium, Cobalt, Copper, Gallium, Indium, Iron, Lead, LithiumÂ Magnesium,Â Manganese,Â MercuryÂ NickelSelenium, Silver, Strontium, Thallium, Total chromium and Zinc as per USEPA 3050B for Soil/Sludge.
3.Cadmium, Chromium, Lead, Mercury and Selenium (TCLP-Extraction) as per USEPA-1311
4.Air Gases, Indoor air/work Environment quality as per IS 5182
5.Ethylene, Formaldehyde, Acetone, Ethanol-2 and Propanol in Ambient and Indoor air quality as per IS 3025 (Part-11)
6.Arsenic in Air Gas, Ambient and Indoor air quality as per IS 3025 (Part-22)
7.E coli as per IS 5887 (Part 1) and Detection of Coliforms as per IS 5401 (Part 2) in Packaged Drinking Water due to inappropriate test method applied (Ref Form 72).

Laboratory is advised to address the following within 10 days:
1.Segregate the Ambient Air & Indoor Air with range of testing and MU in Chemical scope.
2.Review the lower limit of range of testing for Carbon Dioxide in Stationary Source Emission
3.Review the range of testing Oxygen Content in Stationary Source Emission
4.Provide the unit of measurement wherever not given in the Chemical scope.
5.Review the lower limit of range of testing of Specific Gravity in Soil/Sludge
6.Review the upper limit of range of testing wherever mentioned 100% in Soil/Sludge
7.Review the range of testing for Total Solids in Soil/Sludge
8.Review the test parameter name Neutralization Value H2SO4 in 100 ml and Neutralization Value NaOH in 100 ml in Construction Water
9.Review the range of testing for Temperature in Drinking Water
10.Review the lower limit of range of testing for Conductivity wherever given in the scope
11.Review MU along with the observed value at which MU is estimated wherever it is given beyond the range of testing in the scope
12.Review the lower limit of range of testing wherever given â€˜Zero@™ in the scope
13.Review the range of testing for Selenium as per IS 3025 (Part-56) in Water

Consultant Contact Details:

P and M Solution

Address –C-88, Sector 65 Noida

Mobile no. - +91 8377871554, 8826287364

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