

Draft Environment Impact Assessment

Kusupanga & Kurunti Brahmani Sand Quarry (Cluster)

at Brahmani River

AT

**Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam
Nadi, Tahasil: Odapada, District: Dhenkanal, Odisha**

Proposed New Sand Quarry with Proposed Production Capacity of 65786 m³/year

Category B1 with project activity type "1(a)" (Mining of Minerals)

January 2024

**Baseline Period:
1st October 2023 to 31st December 2023**

**Conducted & Prepared By
GREEN CIRCLE, INC.**

NABET Accreditation No.NABET/EIA/2124/RA 0219 Valid upto 26/01/2024

*Integrated HSEQR Consulting Engineers, Scientists & Trainers (MoEF
Recognized Environment Laboratory)*

*(An ISO: 9001, 14000, 45001, OHSAS: 18001 Certified Organization & GPCB approved
Environment Auditor – Schedule II)*

Corp. Office & Environmental Research Laboratory:
Green Empire (Anupushpam), Above Axis Bank, Nr. Yash Complex, Gotri Road,
Vadodara-390 021(Gujarat) India

www.greencircleinc.com

ACKNOWLEDGEMENT

WE EXPRESS OUR SINCERE THANKS TO MANAGEMET OF KUSUPANGA & KURUNTI BRAHMANI SAND QUARRY (CLUSTER) IS A CLUSTER OF EXISTING & PROPOSED MINE LOCATED AT VILLAGE: KUSUPANGA & KURUNTI, KHATA NO.335 & 571, PLOT NO.1, KISAM NADI, TEHSIL: ODAPADA, DISTRICT: DHENKANAL, ODISHA FOR THEIR CO-OPERATION & UNSTINTED HELP WITHOUT WHICH THE EIA REPORT OF NEW & EXISTING SAND QUARRY MINE COULD NOT HAVE BEEN POSSIBLE. THE COURTESY EXTENDED TO OUR TEAM IS HIGHLY APPRECIATED.

DISCLAIMER

The consulting services conducted by **Green Circle, Inc.** (the "Company") were performed using generally accepted guidelines, standards, and/or practices, which the Company considers reliable. Although the Company performed its consulting services pursuant to reliable and generally accepted practices in the industry, the Company does not guarantee or provide any representations or warranties with respect to Client's use, interpretation or application of the findings, conclusions, and/or suggestions of the consulting services provided by the Company. Moreover, the findings, conclusions, and the suggestions resulting from the consulting service are based upon certain assumptions, information, documents, and procedures provided by the Clients. **As such, in no event and under no circumstance shall the company be liable for special, indirect, punitive or consequential damages of any nature whatsoever, including without limitation, any lost revenue or profits of the customer or its customers, agents and distributors, resulting from, arising out of or in connection with, the services provided by the company.**

The Customer agrees that the Company shall have no liability for damages, which may result from Client's use, interpretation or application of the consulting services provided by the Company.

UNDERTAKING

I, PRADEEP JOSHI, PROPRIETOR OF M/S. GREEN CIRCLE INC. LOCATED AT GREENEMPIRE (ANUPUSHPAM), ABOVE AXIS BANK, NEAR YASH COMPLEX, GOTRIMAIN ROAD, VADODARA-390021, DO HEREBY UNDERTAKE, THAT WE HAVE PREPARED EIA REPORT KUSUPANGA & KURUNTI BRAHMANI SAND QUARRY (CLUSTER) IS A CLUSTER OF EXISTING & PROPOSED MINE LOCATED AT VILLAGE: KUSUPANGA & KURUNTI, KHATA NO. 335 & 571, PLOT NO. 1, KISAM NADI, TEHSIL: ODAPADA, DISTRICT: DHENKANAL, ODISHA, INDIA AS PER TERMS OF REFERENCE (TOR) PRESCRIBED SEIAA FOR FILE NUMBER FILE No. SIA/OR/MIN/423255/2023 on 06/11/2023. THE STATED TOR HAVE BEEN COMPLIED AND THE DATA MENTIONED IN THE EIA REPORT ARE FACTUALLY CORRECT.

THE ABOVE STATED FACT IS TRUE TO THE BEST OF MY KNOWLEDGE.



Date: 12.01.2024
Place: Vadodar

For. Green Circle, Inc

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Sr. No	TERM OF REFERENCE	COMPLIANCE	REFERENCE
STANDARD TOR			
1.	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	It is a new & existing Sand quarry project.	Chapter 1 Section 1.1
2.	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Lease Would be granted after auction by the Tehsildar	-
3.	All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	All documents approved Mine plan, EIA, are compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc.	-
4.	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	All co-ordinates of the Mine lease with specific location and superimposed on google image.	Chapter 2 Section 2.3.
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	Toposheet is Attached. Geology, Geomorphology and land-use pattern details of the study	Chapter 2, Section 2.3. Chapter 3 Section 3.3, 3.4 and 3.6

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	area, important water bodies, streams and rivers and soil characteristics.	area are attached	
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.	There is no land diversion for mining. Approved Mining plan for the same is attached.	Annexure 2
7.	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	The company has well laid down Corporate Environmental Policy approved by the Project proponent. A well laid down Hierarchical system for reporting of non-compliances.	Chapter 10, Section 10.3.
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.	Details of Risks associated with Mining operations and their mitigation measures are mentioned in chapter 7	Chapter 7 Section 7.3
9.	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the	Noted and complied	

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	EIA such as waste generation etc. should be for the life of the mine / lease period.		
10.	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.	Land use land cover details have been mentioned in detail.	Chapter 3, Section 3.6.
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.	Not Applicable as no overburden will be formed. Top Soil is not present in the lease area.	Chapter 2 Section 2.6.3
12.	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	Not Applicable as no Forest Land is involved in the Project Area.	-
13.	Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net	Not Applicable as no Forest Land is	-

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	present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	involved in the Project Area.	
14.	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not Applicable as Forest Land is not involved in the Project Area.	-
15.	The vegetation in the RF / PF areas in the study area, with necessary details, should be given	There is no any RF/PF in the study area.	-
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 mitigation measures required, should be worked out with cost implications and submitted.	Anticipated impacts because of the proposed mine and their mitigation measures are given.	Chapter 4 Section 4.5.6
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.	Not Applicable as no National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves are present in the study area.	-
18.	A detailed biological study of the study area [core zone and buffer zone (10 km	A detailed biological study of the study	

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	radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled- I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] has been done. No Schedule I species were found.	Chapter 3, Section 3.16.
19.	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Department should be secured and furnished to the effect that the proposed mining activities could be considered	Not Applicable as the project area doesn't come under Critically Polluted area or Aravali Range	-
20.	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).	Not Applicable as the project area doesn't come in CRZ.	-
21.	R&R Plan/compensation details for the Project Affected People (PAP) should be	Not Applicable. As there is no	

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	<p>furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.</p>	<p>habitation in the Project site.</p>	<p>-</p>
22.	<p>One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition</p>	<p>One Season: Post Monsoon from October to December (01.10.2023 to 31.12.2023)</p>	<p>Chapter 3 Section 3.1</p>

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	of PM10, particularly for free silica, should be given.		
23.	Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing predominant wind direction may also be indicated on the map.	Air Modelling has been carried out for prediction of impact due to the proposed project. All the emissions are within permissible limits.	Chapter 4 Section 4.5.1
24.	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.	Total water requirement is 5 KLD. Details regarding consumption of water and waste generation are given.	Chapter 2, Section 2.6.1.
25.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water requirement will be sourced from nearby available water resource/ tankers.	Chapter 2 Section 2.6.1
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.	Rain Water Harvesting is not proposed. The water channel of the river will not be disturbed during mining.	Chapter 4, Section 4.5.3
27.	Impact of the Project on the water quality, both surface and groundwater, should be	Impacts due to the proposed Mine on	Chapter 4, Section 4.5.3.

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	assessed and necessary safeguard measures, if any required, should be provided.	the water quality has been assessed and its mitigation measures in detail are mentioned. Project operations would not intersect the ground water table. Surface water (River) will not be disturbed during mining.	
28.	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	Not Applicable. Mining would confer only up to a depth of 1 m or water table, whichever is encountered first.	Chapter 4, Section 4.5.3
29.	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	Not Applicable. The project site is situated on bank of the river but no modifications/ diversions are proposed according to mining plan	Chapter 4, Section 4.5.3
30.	Information on site elevation, working depth, groundwater table etc. Should be	Information on site elevation, working	Chapter 2

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	provided both in AMSL and BGL. A schematic diagram may also be provided for the same.	depth, groundwater table etc. are given.	Section 2.10
31.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	Detail plantation scheme has been prepared with year-wise development of the Greenbelt, Species which will be preferred for plantation are mentioned. 50 trees would be planted per year.	Chapter 10, Section 10.4.
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.	A detailed study regarding the increase in the existing traffic because of the proposed project has been done.	Chapter 3, Section 3.15

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33.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Site shelter and facilities will be provided according to workforce.	-
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.	No reclamation measure is proposed for mine closure. Invariably the volume of sand extracted in each year will be re-deposited in subsequent year during rainy season.	Chapter 2, Section 2.10.
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 Occupational Hazard / Health & Safety Control Measures detailed.	Occupational health impacts of the project its preventive measures etc. have been mentioned.	Chapter 7, Section 7.7
36.	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Public health implication like respiratory disorder, noise induced problems are major issues which will be addressed properly. The impacts will confine to particular zone.	Chapter 7 Section 7.7

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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 benefits from the proposed project will influence the local community in a positive manner.	Chapter 8. Section 8.3
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.	Various impacts which are likely to be caused by the proposed project and their mitigation measures are mentioned.	Chapter 4
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 details will be incorporated in final EIA.	Chapter 7, Section 7.1.
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.	Legal case pending in Judiciary.	
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.	Total project cost is Rs.20 lakhs Capital Cost for EMP is Rs. 1,45,000.Recurring cost of EMP is Rs. 75,000per annum. Details of EMP Budget are mentioned.	Chapter 2, Section 2.4. Chapter 10, Section 10.5.
42.	A Disaster management Plan shall be prepared and included in the EIA/EMP	Disaster management plan	Chapter 7, Section 7.8.

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	Report.	has been prepared and mentioned.	
43.	Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	Project benefits are detailed in EIA/EMP report.	Chapter 8
44.	Besides the above, the below mentioned general points are also to be followed:-		
A.	All documents to be properly referenced with index and continuous page numbering.	Noted	-
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.	Noted	-
C.	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.	Noted.	-
D.	Where the documents provided are in a language other than English, an English translation should be provided.	Noted.	-
E.	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Noted.	-
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 4 th August, 2009, which are available on the website of this Ministry, should be followed.	Noted and complied.	-
G.	Changes, if any made in the basic scope	Noted	-

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	and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the final EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.		
H.	As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Not Applicable. It is a newly proposed mine.	-
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.	Noted and attached in EIA as well as in Approved mining plan.	Chapter 2.
Specific ToRs:			
1	PP shall submit details case status of Hon'ble NGT on O.A. 55/2023/EZ filed by Harihar Samal Vrs State of Odisha & Ors during EC application.	Pending under Judiciary	-
2	1 :50,000 scale topomap with indicate the working area boundaries of the proposed sand bed, transporting route, bridge, water intake point and area proposed for plantation etc.	Noted and complied.	-

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3	<p>NABET accredited consultant certificate along with consent letter that he has prepared the EIA & EMP report and also replenishment study of the proposed sandbed.</p>	Noted and complied.	-
4	<p>The project proponent has to carry out Annual Rate of Replenishment Study (ARRS) of Sand through ORSAC empanel agency, a study of the annual replenishment rate of sand by collecting pre monsoon & post monsoon data from the field to know the quantum of volume of sand deposited/replenished & extracted in the mining lease area. The detailed comparison of both pre-monsoon and post-monsoon elevation data shall be included in the study report. As per the MOEF&CC, Govt. of India 's Enforcement and Monitoring Guideline for Sand Mining, 2020, there are two methods prescribed for the study of rate of'replenishment of sand on a stretch of river bed. These are (1) physical survey of the field by the conventional method and (2) use of UAV I Drone and other image data processing techniques. The second method UAVI Drone method is the one which has been found suitable for the above purpose and recommended by the ORSAC, Bhubaneswar and there are some organization in Odisha state who are empanel by ORSAC to conduct such survey. The details of UA V I Drone method is attached a separate sheet. The finding of the study shall be submitted to</p>	Noted and complied.	-

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	SEIAA to assess the rate of replenishment of mined out sand in the lease area with geo-coordinating photographs during data collection. The finding of the study shall be submitted to SEIAA along with the final EIA I EMP report to assess the rate of replenishment of mined out sand.		
5	Details procedure of sand replenishment study, date of study, pre-monsoon sand deposit and post-monsoon deposit and quantum of sand replenished with attaching real-time gee-coordinating photographs in field of different period of study and data collection.	Noted and complied.	
6	Area of the 'no mining zone' specially demarcated within the list out area for safety of the river bank /any bridge or such other structure nearby and the dimensions and geo-co-ordinates of this zone w.r.t lease boundary.	Details are given in EIA report.	Annexure-3
7	Study of river ecology (i.e. aquatic habitat, fishing catching area for nearest villagers, turtle habitat and birthing place for villagers, or any eco-sensitive area that hamper the river ecology due to sand mining if any) should be mentioned in the EIA report and accordingly prepare for EMP.	Details are given in EIA report.	Chapter 3.
8	Any approach road existing or will be constructed inside the safety zone?	There is an existing approach road.	-
9	Mitigation measures to be taken to ensure not to disturb free flow of river.	Noted	-
10	Distance of the river bank/embankment form the lease boundary. It is a river bank or embankment.	Distance of the river bank/embankment form the lease boundary mentioned	Annexure-3

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		in EIA report.	
11	Any ramp existing or will be constructed on the river bank/ embankment for movement of vehicles to reach the nearest road.	Noted	-
12	Distance of the village road/ city road/ district road/ public road from the river bank. Is this single road / double road?	Details are given in EIA report.	Chapter-2
13	No. of villages and name of villages or the city or urban places or semi urban places through which the sand carrying vehicles will ply and the distance of it from the river bank or embankment whether there is any forest land in the intervening area through which the sand carrying truck will ply.	Details are given in EIA report.	Chapter-2
14	Whether schools/ collages/ hospitals /health centers /bus stops/ religious places existing nearby and if so, the distances of it from the bank or the road through which the vehicles will ply or existing alongside the road?	Details are given in EIA report.	Chapter-2
15	Any plantation done in the safety zone or embankment in case of an existing mines and if so, the area of plantation, number of species? If not, the plan for it to arrest bank erosion.	Details are given in EIA report.	Chapter-10
16	Any stone packing in the river bank/ embankment existing in case of existing mines and if not, the plan for it.	Noted	-
17	Whether, any alternative mine exists or explored or can be explored if this mine is otherwise found unsuitable? Please furnish details.	Not Required	-
18	Whether Permission taken or will be taken from Water Resource Authority or any	Permission has been taken from tehsildar	Annexure-4

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	concerned Authority of the road to be used for plying of the loaded with sand or empty vehicles for the same after the river bank.	for the same.	
19	(ii) Responsibility of perennial perpetual maintenance of these roads and the mechanism for the same.	Noted	
20	No and type of vehicles to be used daily and the frequency for the purpose of transportation and the time and duration of such transportation. Whether permission taken or will be taken for the appropriate authority for the purpose.	Noted	
21	Intersection point of the haulage road with the main SH/ NH/ public road and the traffic density study at appropriate locations by domain expert with remedial measures for decongestion and road safety.	Traffic study has been done and details are incorporated in EIA report.	Chapter-3
22	Any bridge (rail/ road) existing and the distance of it from the lease boundary.	Details are given in EIA report.	Annexure-3
23	Any culvert or small bridge will be used by the plying vehicles carrying the sand minerals.	Details are given in EIA report.	Annexure-3
24	Any high Transmission Electric line existing if yes, the distance of the same from the boundary of the lease.	Details are given in EIA report.	Annexure-3



Draft Environment Impact Assessment Report

Proposed project of Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) at Brahmani River with proposed excavation of 65786 m³/year sand, having an area of 8.7 ha, located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha.

Executive Summary

1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION OF PROJECT

Name of the project:	Kusupanga & Kurunti Brahmani Sand Quarry (Cluster)
Type of the project:	New & Existing
Proposed Production:	Proposed sand mine with proposed production capacity of 65,786 M ³ /Year.
Area of Lease	8.7 ha
Location of the project:	Kusupanga & Kurunti, 335 & 571, Kisam Nadi, Plot No. 1 Village: Kusupanga & Kurunti Tehsil: Odapada District: Dhenkanal (Odisha).
Identification of Proponent:	Tahasildar, Odapada Dist- Dhenkanal, Odisha-759013

1.2 TYPE OF PROJECT

- Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a cluster of existing & proposed mine located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha and has an area 8.7 ha falls under Category “B1”, 1(a), due to Mining lease area is more than 5.0 Ha as per honourable NGT order and as per OM dated 12.12.2018. Project will be assessed by SEIAA, Odisha. Lessee will have to take Environmental Clearance from SEIAA, Odisha as per EIA notification September, 2006 amended in December 2009 and April 2011 and amendment thereof to start the mining operation.

1.3 NEED FOR THE PROJECT

The basic objective of the project is to meet the utilization of mineral demand in the country and /or region. The urbanization and industrialization has enhanced the demand of building material. Mainly, in infrastructure projects-like highways, buildings, township etc. which has raised the demand of river sand. Sand is used to provide bulk, strength, and other properties to construction materials like concrete. It is also used as a decorative material in landscaping. River sand falls under the fine quality of construction sand which is found near river banks and streams and has smoother texture and better shape of grains. This can be also used for RCC, plastering, and much other brick work.

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1.4 BRIEF DESCRIPTION OF THE PROJECT

Table – 1 Brief Description of the Project

A. Project Proponent	
Project Proponent	Tahasildar, Odapada Dist- Dhenkanal, Odisha-759013
B. Nature of Project	
Proposed sand mine with proposed production capacity of 65786 M ³ /year.	
C. Size of the Project	
Project Name	Kusupanga & Kurunti Brahmani Sand Quarry (Cluster)
New/ existing / Renewal mine/ Lease Period	New & Existing
Area	8.7ha
D. Project Location	
Khata No.	Khata No. 335 &571
Location	Village: Kusupanga & Kurunti Tehsil: Odapada District: Dhenkanal (Odisha).
Survey of India Topo Sheet no.	73H/5
Lease Period	5 years
Available Movable Reserve	3,28,930 m ³
Water Requirement	5 KLD
Manpower Requirement	96 Nos.
Climatic Conditions	Annual Maximum Temperature: 42 °C Annual Minimum Temperature: 21 °C
Present land use at the proposed site	The area is a Non-Forest Govt. land
E. Environmental Settings Details	
Nearest village	Kusupanga about 0.6 km, W
Nearest Town/City	Dhenkanal about 38 km, SE
Nearest Railway Station	Budhapanka Railway Station 4.5 km, W
Nearest Airport	Biju Pattnaik International Airport, Bhubaneswar about 85 km, SE
Nearest Highway	NH-55 about 3.5 km, W
Nearest Water Body	Brahmani River – Project Site Area
Nearest Bridge	Lingara Bridge- 6.0 km, N
Nearest River Embankment	About 0.4 km, W
Nearest Archeological Site	Lokanath temple about 1km,NW
Nearest Sensitive Man-made Land use	Meramandali Government Hospital about 5 km, S Govt. High School Kusupanga about 0.6 km, W Lokanath temple about 1km,NW Meramandali Bus Stop about 7.5 km, S
Ecology Sensitive Zone	No national parks and sanctuary within 10 km radius

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Reserve Forest	Khalpal Reserve Forest- 11.5 Km, N
Topography	Gently sloping almost flat terrain
Seismic Zone	Zone – III as per IS: 1893 (Part-I): 2002
Survey of India Topo-Sheet no.	73H/5
Cost Details	
Project Cost	~20 lakh
Cost of EMP	Capital Cost-1,45,000 Recurring Cost- 75,000

Source: Site Visit & Pre-feasibility Report

1.5 LOCATION MAP

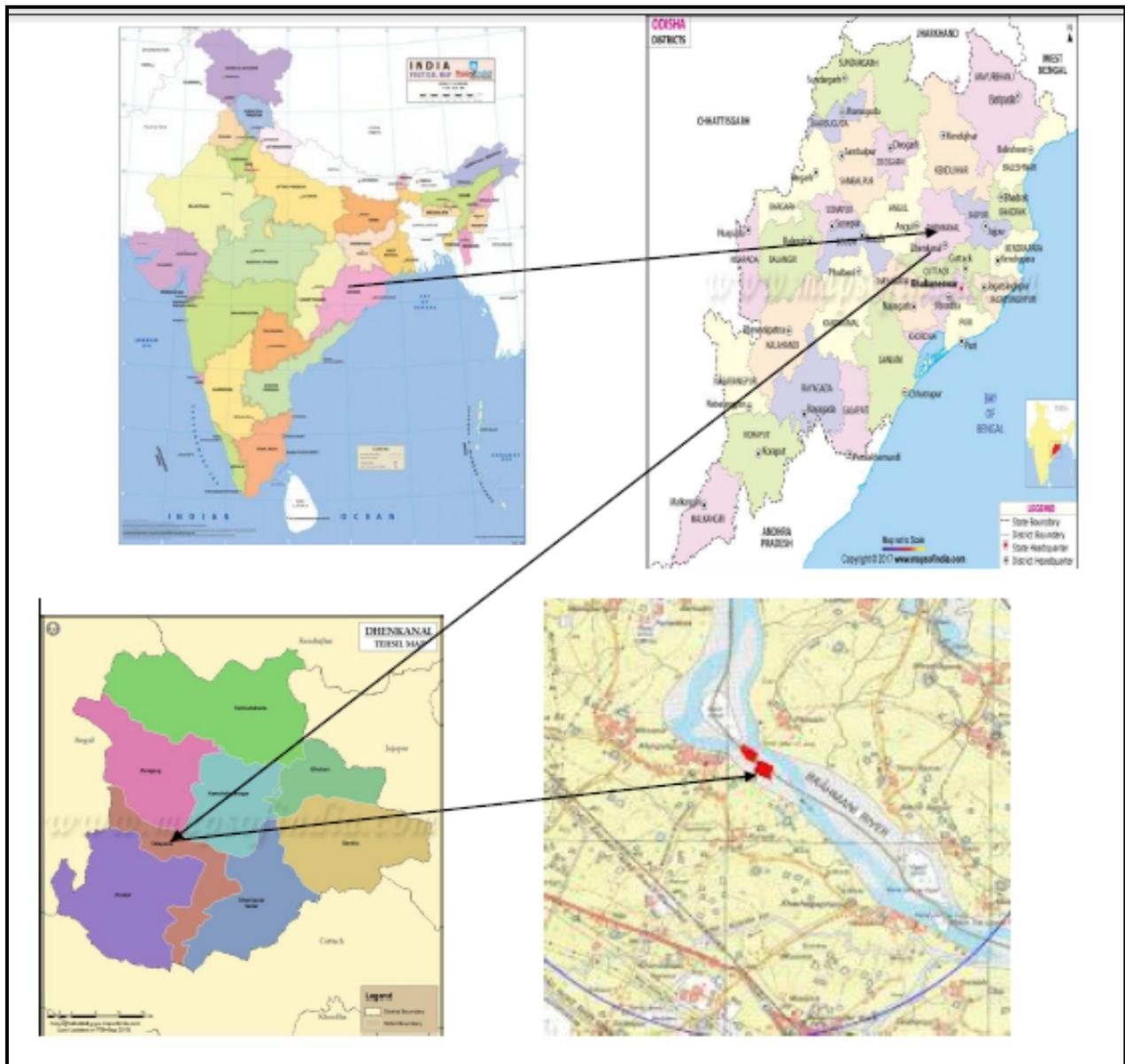


Figure-1: Location map (Showing general as well as specific location of the ML area)

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1.6 MINE DESCRIPTION

1.6.1 MINING LEASE STATUS

- Quarry lease is yet to be awarded, by Tehsildar of Odapada to the successful bidder.
- Mining Plan with Progressive Mine Closure Plan has been approved by Joint Director Geology Zonal Survey, Balangir, Dhenkanal vide letter no. Memo no.-762.Dt dated 04/08/2022

1.6.2 MINING DETAILS

Table – 2 Mining Details

Particulars	Details
Method of Mining	Manual opencast mining
Available Movable Reserve	3,28,930 m ³
Lease period	5 years
Ultimate Mine Working Depth	1 m
Water Requirement	5 KLD
Manpower Requirement	96 Nos.
Present land use at the proposed site	The area is a Non-Forest Govt. land

Source: Approved Mining Plan & Progressive Mine Closure Plan

1.6.3 METHOD OF MINING

Mining method to be adopted in the sanctioned lease area will be of manual manner. In which;

- ✓ The mining operation as proposed will be done by manual opencast method.
- ✓ Quarrying activities will be done following all the security majors. Rules and regulations of DGMS and IBM will be observed during the Quarrying operations to avoid unwanted circumstances.
- ✓ Mined out material of commercial use will be transported by trucks / dumpers. Haul road of suitable width is proposed for proper and smooth quarry operations.
- ✓ Quarrying / excavation will be done according to the proposed manual means, for mechanized way following machineries will be required to deploy on hire basis for loading and transport purpose.

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2.0 DESCRIPTION OF THE ENVIRONMENT

2.1 PRESENTATION OF RESULTS (AIR, NOISE, WATER & SOIL)

Baseline study of the study area was conducted during post-monsoon from 1st October 2023 to 31st December 2023 for Kusupanga & Kurunti Brahmani Sand Quarry (Cluster).

The concentrations of PM₁₀ and PM_{2.5} for all the 8 AAQM stations were found between 53.8 to 83.4 µg/m³ and 18.3 to 25.2 µg/m³ respectively. The concentrations of SO₂ and NO_x were found to be in range of range of 5.4 to 9.2 µg/m³ and 8.7 to 13.3 µg/m³ respectively.

Ambient noise levels were measured at 8 locations around the Mine site. Noise levels varied from 35.7 dB (A) Leq to 48.5 Leq dB (A) during day time and 35.7 dB (A) Leq to 44.0 Leq dB (A) during night time.

The ground water analysis for all the 7 sampling stations shows that all the samples meet the desirable standards (pH ranges from 6.8 to 7.2). TDS in samples ranges from 325 mg/L to 510 mg/L. All the samples meet the permissible limit of 2000 mg/L. Total Hardness in the water ranges from 270 mg/L to 45 mg/L. All the samples meet the permissible limit of 600 mg/L. Calcium content in the water ranges from 58.2 mg/L to 124 mg/L, all the samples meet the permissible limit of 200 mg/L. Magnesium content in the water ranges from 23.5 mg/L to 31.9 mg/L. All the samples meet the permissible limit of 100 mg/L.

The surface water analysis for all the 7 sampling stations shows that all samples meet the desirable standards (pH ranges from 6.8-7.3). TDS in samples ranges from 294 mg/L to 482 mg/L. all the samples meet the permissible limit of 2000 mg/L. Total hardness in the water ranges from 198 mg/L to 286 mg/L. all the samples meet the permissible limit of 600 mg/L. Calcium content in the water ranges from 53.7 mg/L to 75.6 mg/L, all the samples meet the permissible limit of 200 mg/L. Magnesium content in the water ranges from 14.7 mg/L to 24.4 mg/L, all the samples meet the permissible limit of 100 mg/L.

Samples collected from 8 identified soil locations indicate pH ranges from 6.7-7.3. Calcium content in the soil ranges from 183.1 mg/kg to 247.9 mg/kg. Magnesium content in the soil ranges from 141 mg/kg to 177 mg/kg. Organic Matter in the Soil samples ranges from 1.60 mg/kg to 2.07 mg/kg. Organic Carbon ranges from 0.92 mg/kg to 1.20 mg/kg. Phosphorus range from 0.0016 mg/L to 0.0023 mg/kg. Total Nitrogen range from 0.030 mg/kg to 0.047 mg/kg. Potassium range from 121.0 mg/kg to 136.7 mg/kg. Heavy metals like Lead, nickel, cadmium are well in all samples.

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2.2 BIOLOGICAL ENVIRONMENT

Flora: Species which are most commonly found in the study area are: *Alstoniascholaris*

Anogeissuslatifolia, *Artocarpushetrophyllus*, *Averrhoa carambola*, *Azadirachtaindica*, *Bauhinia variegata*, *Beideliaretusa*, *Bombax ceiba*, *Buchanania lanzan*, *Butea monosperma*, *Caricapapeya*, *Cassia fistula*, *Cassia siamia*, *Cleistanthuscollinus*, *Couropitaguianensis*, *Holarrhenapubescens*, *Abrusprecatorius*, *Argyreia nervosa*, *Aristolochiabracteata perculinaturpentum*, *Paederiafoetida* etc.

Fauna: Species which are most commonly found in the study area are

Mammal: *Herpestresedwardsii*, *Rattus rattus*, *Lepus nigricollis*, *Mus booduga*, *Macacamulata*, *Funambulus pennant* etc.

Reptiles: *Bangaruscaerulidus*, *Homodactylusflevirudis*, *Ptyasmucosus* etc.

Birds: *Milvus migrans*, *Corvussplendens*, *C. marorhynchos*, *Bubulcus ibis*, *Acridotherestrictis*, *Sturnus contra*, *Ardeolagrayerii*, *Dicrurusadsimilis*, *Streptopeliaspp*, *Alcedoatthis*, *Turboidescaudatus*, *Psittaculakrameri*, *Eudynamysscolopacea*, *Orthotomussutorius* etc.

2.3 SOCIO-ECONOMIC ENVIRONMENT

The total population as per 2011 Census records is 52418 (for 10 km radius buffer zone). Average SC population in the study area is 20.63% of the total population. In case of ST population, this number has decreased and reached to 6.09% of the total population. The percentage of total working population is 36 %, Remaining, 64 % of the total population is considered as non-workers.

3.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

➤ Impact on Air Environment

Due to Mining

The key air emissions from the mining activities (loading, and transportation) are Particulate Matter. Gaseous emissions will be generated from HEMM & transportation of vehicles. Use of proper mitigation measures will be taken like water sprinkling on haul roads & development of green area to control fugitive emissions. Better maintenance of equipments also helps to reduce such emissions.

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➤ **Impact on Water Environment**

Surface Water

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

Ground Water

At conceptual stage, ultimate working depth of the mining operation will be upto 1 m bgl only. Water table will not be intersected due to mining activities.

➤ **Impact of Noise–**

Due to Mining Activities

Major noise generating sources of the mining activity are HEMM movement. The plantation and the green belt along haul road and nearby areas will help in reducing noise level and proper mitigation measures will be carried out.

Total Mining Lease area is 8.7 ha. Thick plantation will be done.

Impact on Land Environment –

The sand is unconsolidated in nature will be collected carefully and loaded in dumpers manually. The land use pattern will not change permanently and will be reclaimed every year in the monsoon season. The land use pattern will only be changed by proposed green belt development plan in the study area. Mining activities will not affect land use pattern.

4.0 POST PROJECT ENVIRONMENTAL MONITORING PROGRAMME

Table 4 Post Project Monitoring

S. No.	DESCRIPTION	FREQUENCY OF MONITORING
1.	Ambient Air Quality monitoring	Half Yearly or as per consent
2.	Water Quality & Level monitoring	Half Yearly or as per consent
3.	Noise Level Monitoring	Half Yearly or as per consent
4.	Soil Analysis	Half Yearly or as per consent
5.	Medical Checkup of employees	Half Yearly or as per consent

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5.0 ADDITIONAL STUDIES

Additional Studies i.e. Risk Assessment & Disaster Management Plan, Land use and land cover study, Ecology and Biodiversity are covered with this Draft EIA/EMP Report as per the Terms of Reference was granted by SEIAA for file number File No. File No. SIA/OR/MIN/423255/2023 on 06/11/2023.

6.0 PROJECT BENEFITS

The proposed project will help the local economy directly as well as indirectly as it will generate substantial employment in the region. With the proposed development in and around the area, there will be supporting facilities/infrastructure eventually leading to the development of the area. The project will boost the overall growth of the region and in the State, the local economy will flourish due to income expenditure in the local market. Therefore, project is having great importance to the district and state economy.

Along with the contribution in employment generation and economic growth of the country project will also be helpful in the development of basic needs of the local area like education, Health & family welfare, women empowerment, water conservation, infrastructure development etc.

7.0 ENVIRONMENT MANAGEMENT PLAN

7.1 AIR QUALITY MANAGEMENT

Loading & Transportation

- Development of green belt/plantation along the haul road and other places will be carried out to control the air pollution.
- Haul Road will be sprayed with water.
- Proper maintenance of the HEMMs & transportation vehicles will be done.
- Vehicular emissions will be kept under norms.
- Personal Protective Equipment like dust masks will be provided to all employees.
- Periodic air quality monitoring will be carried out.

7.2 NOISE QUALITY MANAGEMENT

Transportation

- Adequate silencers in HEMM will be provided to reduce generation of noise.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.

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- The workers employed at HEMM will be provided with protective equipment, earmuffs and earplugs as a protective measure from the high noise level generated at the mine site and wherever required.
- Development of green belt & plantation along haul roads and other places will be carried out.
- Periodical monitoring of noise level will be carried out regularly.

7.3 WASTE WATER MANAGEMENT

Waste Water

- Portable toilets will be used for generated domestic waste water.
- No waste water will be generated from the mining operations.

7.4 LAND USE PATTERN

- At conceptual stage total excavated area will be 2.562ha and 2.956 ha,
- Greenbelt will be developed along the haul road and nearby areas.

7.6 GREENBELT DEVELOPMENT AND PLANTATION PROGRAM

- Greenbelt will be developed along the haul road and nearby areas.
- Native species will be planted like Neem, Mango, Teak, Jhaun and Jammu about 50 numbers of trees will be planted each year.



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Chapter 1 Introduction

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Chapter 1 Introduction

1.1 Purpose of the Report

Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a cluster of existing & proposed mine located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kism Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha. The mine is spread over an area of 8.7 ha. The Mining plan was authorized by the Geologist of Joint Director Geology, Zonal Survey, Dhenkanal. It is new proposed sand mine project with the excavation capacity of 65786m³/year sand. Terms of Reference was granted by SEIAA for file number File No.SIA/OR/MIN/423255/2023on06/11/2023.

The Environmental Impact assessment study was carried out to have an idea about the existing environmental condition related to physical environment, biological environment and social environment. Environmental Management Plan has been prepared to assess the current environmental scenario of the area and then based on the activities of mining proposed, to carry out Environmental Impact Assessment. The plan will identify and address the impacts, where the sea read verse in nature, and there after design mitigation measures to manage such impacts in a manner as to conserve environment and ecology of the area. The EMP has been prepared with a view to ultimately ensure that the adverse impacts are minimized if these cannot be prevented altogether.

The main purpose of this report is to provide a coherent statement after analyzing all significant impact of the proposed mining project and measures that should be taken to eliminate and mitigate them. It contains essential information for:

- The proponent to implement the proposal in an environmentally and socially responsible way;
- The responsible authority to make an informed decision on the proposal, including the terms and conditions that must be attached to an approval or authorization; and
- The public to understand the proposal and its likely impacts on people and the environment.

1.2 Identification of the Project & Project Proponent

1.2.1 Identification of the Project

A. Proposed project

Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a cluster of existing & proposed mine located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kism Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha.

B. Screening Category

Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a cluster of existing & proposed mine located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kism

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Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha and has an area 8.7 ha falls under Category “B1”, 1(a), due to Mining lease area is more than 5.0 Ha as per honorable NGT order and as per OM dated 12.12.2018. Project will be assessed by SEIAA, Odisha. Lessee will have to take Environmental Clearance from SEIAA, Odisha as per EIA notification September, 2006 amended in December 2009 and April 2011 and amendment thereof to start the mining operation.

C. Mining Lease Status

Quarry lease has not yet been auctioned for awarding by Tehsildar, Odapada. The period of lease would be 5 years, as mentioned in approved mining plan.

D. Mining Plan Status

Mining Plan with Progressive Mine Closure Plan has been approved by Joint Director Geology Zonal Survey, Dhenkanal vide letter no. Memo no.-762.Dt dated 04/08/2022

E. Environment Clearance status for proposed project.

It is a new proposed project. The chronology of the project activities undertaken so far with respect to the process of getting Environment clearance are as given in the table below-

Table 1-1 Status of proposal for Environmental clearance

S. No.	Project Activity	Date/Duration
1.	Approval of Mining Plan	Joint Director Geology Zonal Survey, Dhenkanal vide letter no. Memo no.-762.Dt dated 04/08/2022
2.	Quarry Lease	Yet to be awarded.
3.	ToR Letter issued by SEIAA, Orissa	Terms of Reference was granted by SEIAA for file number File No.SIA/OR/MIN/423255/2022 on 06/11/2023.
4.	Baseline monitoring & data collection	October 2023 to December 2023

1.2.2 Introduction of the Project Proponent

Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a cluster of existing & proposed mine located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha. The mine is spread over an area of 5 ha. The Mining plan was authorized by the Geologist of Joint Director Geology, Zonal Survey, Dhenkanal. It is new proposed sand mine project with the excavation capacity of 65786 m³/year sand.

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Table 1-2 General Information about Project Proponent

Name of the project proponent:	The mine lease is yet to be allotted. The EIA is being prepared under the name of the Tehsildar, Odapada (On behalf of Successful Bidder)
8 Address:	Tahasildar, Odapada Dist- Dhenkanal, Odisha-759013

1.3 Brief description of Nature, Size, location of the Project and its importance to the country and region.

1.3.1 Brief Description of Nature, Size, and location of the project

The brief description of the nature, size and location of the project is given in below table:

Table 1-3 Brief Description of the project

Project Proponent	Tahasildar, Odapada Dist- Dhenkanal, Odisha-759013
Project Name	Kusupanga & Kurunti Brahmani Sand Quarry (Cluster)
New/ existing / Renewal mine/ Lease Period	New
Lease Period	5 years
Total Geologic Reserve	7,98,130m ³
Available Movable Reserve	3,28,930m ³
Water Requirement	5KLD
Manpower Requirement	96 Nos.
Climatic Conditions	Annual Maximum Temperature: 42 °C Annual Minimum Temperature: 21 °C
Present land use at the proposed site	Non Forest Government Land
Nearest village	Kusupanga about 0.6 km, W
Nearest Town/City	Dhenkanal about 38 km, SE
Nearest Railway Station	Budhapanka Railway Station 4.5 km, W

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Proposed project of Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) at Brahmani River with proposed excavation of 65786 m³/year sand, having an area of 8.7 ha, located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha.

Chapter 1

Nearest Airport	Biju Patnaik International Airport, Bhubaneswar about 85km, SE
Nearest Highway	NH-55 about 3.5km, W
Nearest Water Body	Brahmani River – Project Site Area
Nearest Bridge	Lingara Bridge- 6.0 km, N
Nearest River Embankment	About 0.4 km, W
Nearest Archeological Site	Lokanath temple about 1km, NW
Nearest Sensitive Man-made Land use	Meramandali Government Hospital about 5 km, S Govt. High School Kusupanga about 0.6 km, W Lokanath temple about 1km, NW Meramandali Bus Stop about 7.5km, S
Ecology Sensitive Zone	No national parks and sanctuary within 10 km radius
Reserve Forest	Khalpal Reserve Forest- 11.5 Km, N
Topography	Gently sloping almost flat terrain
Sismic Zone	Zone – III as per IS: 1893 (Part-I): 2002
Survey of India Topo-Sheet no.	73H/5

1.3.2 Project importance to the Country and Region

The basic objective of the project is to meet the utilization of mineral demand in the country and /or region. The urbanization and industrialization has enhanced the demand of building material. Mainly, in infrastructure projects-like highways, buildings, township etc. which has raised the demand of river sand. Sand is used to provide bulk, strength, and other properties to construction materials like concrete. It is also used as a decorative material in landscaping. River sand falls under the fine quality of construction sand which is found near river banks and streams and has smoother texture and better shape of grains. This can be also used for RCC, plastering, and much other brick work.

River sand mining not only provides the building material but also provides employment and economic growth of the state that will also ultimately enhance the socio-economic status of the region / Country. Sand is used in almost every type of construction activity. The project lies on the bed of Brahmani River. The sediment in the form of river bed material deposited in the last many years has changed. It is necessary to remove the materials so that the stream gets channelized.

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1.4 Scope and Methodology of the Study

The scope of the EIA study is based on the generic structure of environmental impact assessment document as stated in the Appendix III of the EIA Notification 2006 (S.O. 1533), Ministry of Environment and Forests, Government of India.

The scope of the study includes a detailed characteristic of environment in the study area associated with the proposed development on various environmental components. For the purpose of environmental assessment of areas within 10 km radius of the project the following methodology will be adopted:

- Generation and collection of baseline data for valued environmental components as per the EIA guidelines.
- Identification and quantification of significant environmental impacts due to the project and associated activities.
- Evaluation of impacts due to proposed activities and preparation of an environmental impact statement.
- Preparation of appropriate Environmental Management Plan (EMP) encompassing strategies for minimizing identified adverse impacts along with budgetary provisions to be made by the project authorities for implementation of mitigation measures.
- Delineation of post Environmental Quality Monitoring Programme (EQMP) along with organizational setup required for monitoring the effectiveness of mitigation measures.

The project proposal was submitted to State Expert Appraisal Committee-SEAC for its appraisal. ToR was submitted on date **06September 2023**. Based on the data provided, the state Expert Appraisal Committee, SEIAA has issued the Terms of Reference to Proposal No **SIA/OR/MIN/423255/2023** on **06/11/2023**.

Table 1-4 Structure of the report

Executive Summary:	This chapter gives the summary of the EIA report.
Chapter 1 (Introduction):	This chapter describes objectives and methodology for EIA.
Chapter 2 (Project Description):	This chapter gives a brief description of the location, approachability, manufacturing processes, and details of raw materials, amenities, layout and utilities of the proposed project.
Chapter 3 (Description of the Environment):	This chapter presents details of the baseline environmental status for microclimate, air quality, noise, traffic, water quality, soil quality, flora, fauna and socio-economic status etc.
Chapter 4 (Anticipated	This chapter discusses the possible sources of pollution and

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Environmental Impact and Mitigation Measures):	environmental impacts due to the project during construction and operation phases and suggests the mitigation measures.
Chapter 5 (Analysis of Alternatives):	This chapter covers analysis of technology alternatives and site alternatives.
Chapter 6 (Environmental Monitoring Programme):	This chapter discusses the details about the environmental monitoring program during construction and operation phases.
Chapter 7 (Additional Studies):	This chapter covers information about Risk Assessment Studies for the construction and operation phase, the safety precautions that are taken during construction phase and Disaster Management Plan and Emergency Preparedness Plan onsite and offsite.
Chapter 8 (Project Benefits):	This chapter presents the benefits from this project.
Chapter 9 (Environmental Cost Benefit Analysis)	If recommended by EAC at the scoping stage, this chapter shall include the Environmental Cost benefit Analysis of the project.
Chapter 10 (Environmental Management Plan):	This chapter deals with the Environmental Management Plan (EMP) for the proposed Project and indicates measures proposed to minimize the likely impacts on the environment during construction and operation phases and budgetary allocation for the same.
Chapter 11 (Conclusion):	This chapter presents the conclusion made by the project proponent and developer.
Chapter 12 (Disclosure of Consultants engaged):	This chapter presents the details of the consultant.



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2.1 Type of the Project

Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a cluster of existing & proposed mine located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha. The mine is spread over an area of 8.7 ha. The Mining plan was authorized by the Geologist of Joint Director Geology, Zonal Survey, Dhenkanal. It is new proposed sand mine project with the excavation capacity of 65786 m³/year sand. Terms of Reference was granted by SEIAA for file number File No. SIA/OR/MIN/423255/2023 on 06/11/2023.

2.2 Need for the Project

River channels and their flood plains are important sources of construction grade aggregate materials like sand and gravel. The durability of river-borne coarser classics and their sorting by fluvial action make them best suitable raw materials/ingredients for building constructions. The market demand of river sand is high throughout the country for construction of infrastructure projects. The project lies on bed of Brahmani River. The sediments are deposited in the form of river bed material i.e., sand has deposited in the last many years as a process of sedimentation. Sand dunes have been formed at various places hindering the flow of water and excess deposition may change the shape of the river bed. Because of this, during monsoon season, the water may rise above the high flood level causing heavy and devastating floods. Such disasters may damage large tracts of land laying on both the banks of the river especially the agricultural lands. Hence, it is necessary to remove the materials so that the river gets channelized.

Apart from this the project will also serve the following:

- Generate various employment opportunities especially to the local people.
- Economic development of the state by contributing to state exchequer.

2.3 Location

Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a cluster of existing & proposed mine located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha. Co-ordinates of project site are given in below:

Site Co-ordinates

Table 0-1 Project Site Co-ordinates- Kusupanga & Kurunti Brahmani Sand Quarry

Pillar	Latitude	Longitude
1.	85°17'47.53"E	20°50'47.72"N
2.	85°17'45.55"E	20°50'41.64"N
3.	85°17'53.32"E	20°50'38.06"N
4.	85°17'54.73"E	20°50'44.44"N

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Pillar	Latitude	Longitude
1.	85°17'37.12"E	20°50'55.10"N
2.	85°17'39.09"E	20°50'53.98"N
3.	85°17'40.19"E	20°50'52.77"N
4.	85°17'40.60"E	20°50'51.72"N
5.	85°17'40.45"E	20°50'49.63"N
6.	85°17'44.19"E	20°50'47.20"N
7.	85°17'46.66"E	20°50'51.97"N
8.	85°17'38.22"E	20°50'57.44"N

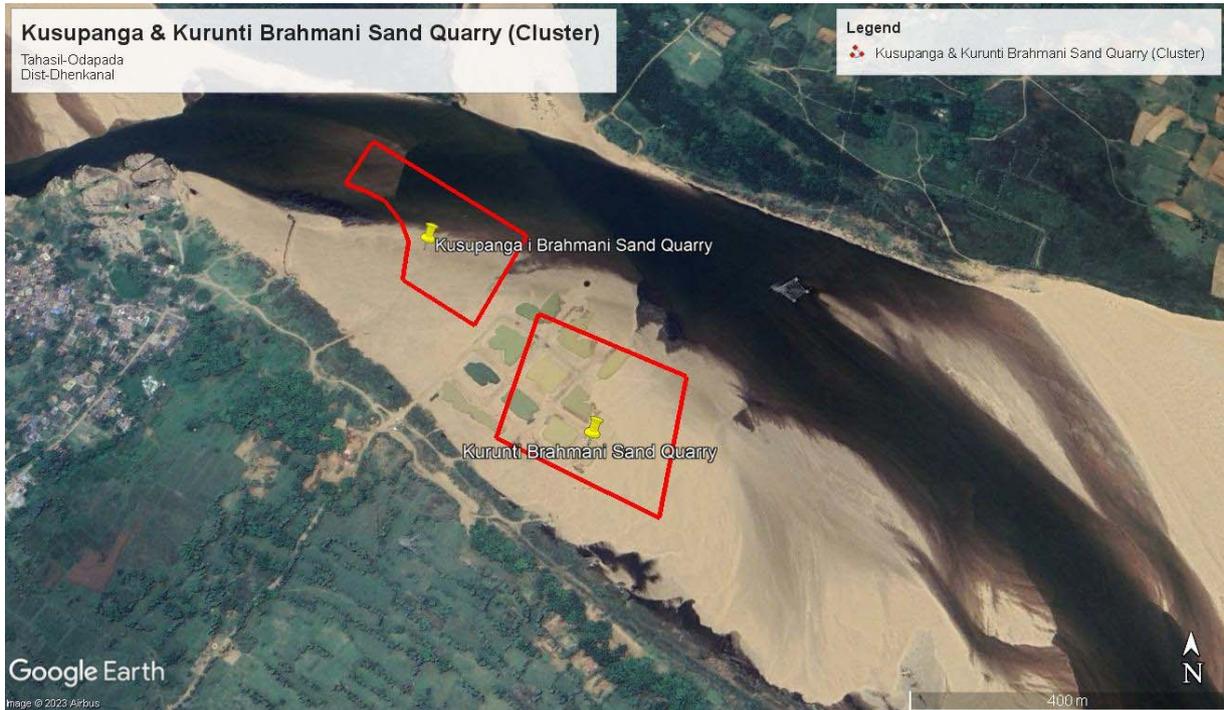


Figure 0-1 Project Site



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2.3.1 Location Map (General & Specific)



Figure 0-2 Location Map (General and Specific)

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2.3.2 Project Site Layout

• Land Details

Quarry lease will be granted for 5 years which is spread over an area of 8.7 ha. Topographically, the area is gently sloping to almost flat terrain with highest altitude of 52 mRL in Kusupanga & Kurunti Brahmani Sand Quarry (Cluster). The general slope is Northwest to Southwest.

Total mining area is 8.7 ha located at Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a cluster of existing & proposed mine located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha.

Table 0-2 Details of Land

S.No.	Tehsil	Village	Khasra	Area	Ownership	Land use
1.	Odapada	Kusupanga	Khata No. 335	3.884 ha	Non-Govt. land	Non-forest
2.		Kurunti	Khata No. 571	4.856 ha	Non-Govt. land	Non-forest

Existing features of the lease area:

- The area is approachable by fair weather road. The applied area is about 85 km away from Biju Patnaik International Airport, Bhubaneswar Airport. The nearest railway station is at Budhapanka Railway Station 4.5 km from the site.

Table 0-3 Environmental Settings near the project Site

Sr. No.	Particulars	Details
1.	Nearest Village	Kusupanga about 0.6 km, W
2.	Nearest city	Dhenkanal about 38 km, SE
3.	District headquarters	Dhenkanal about 38 km, SE
4.	Nearest railway station	Budhapanka Railway Station 4.5 km, W
5.	Nearest Airport	Biju Patnaik International Airport, Bhubaneswar about 85 km, SE
6.	Archaeological/Historically important site	Lokanath temple about 1km,NW
7.	Sanctuaries/National parks	No national parks and sanctuary within 10 km radius

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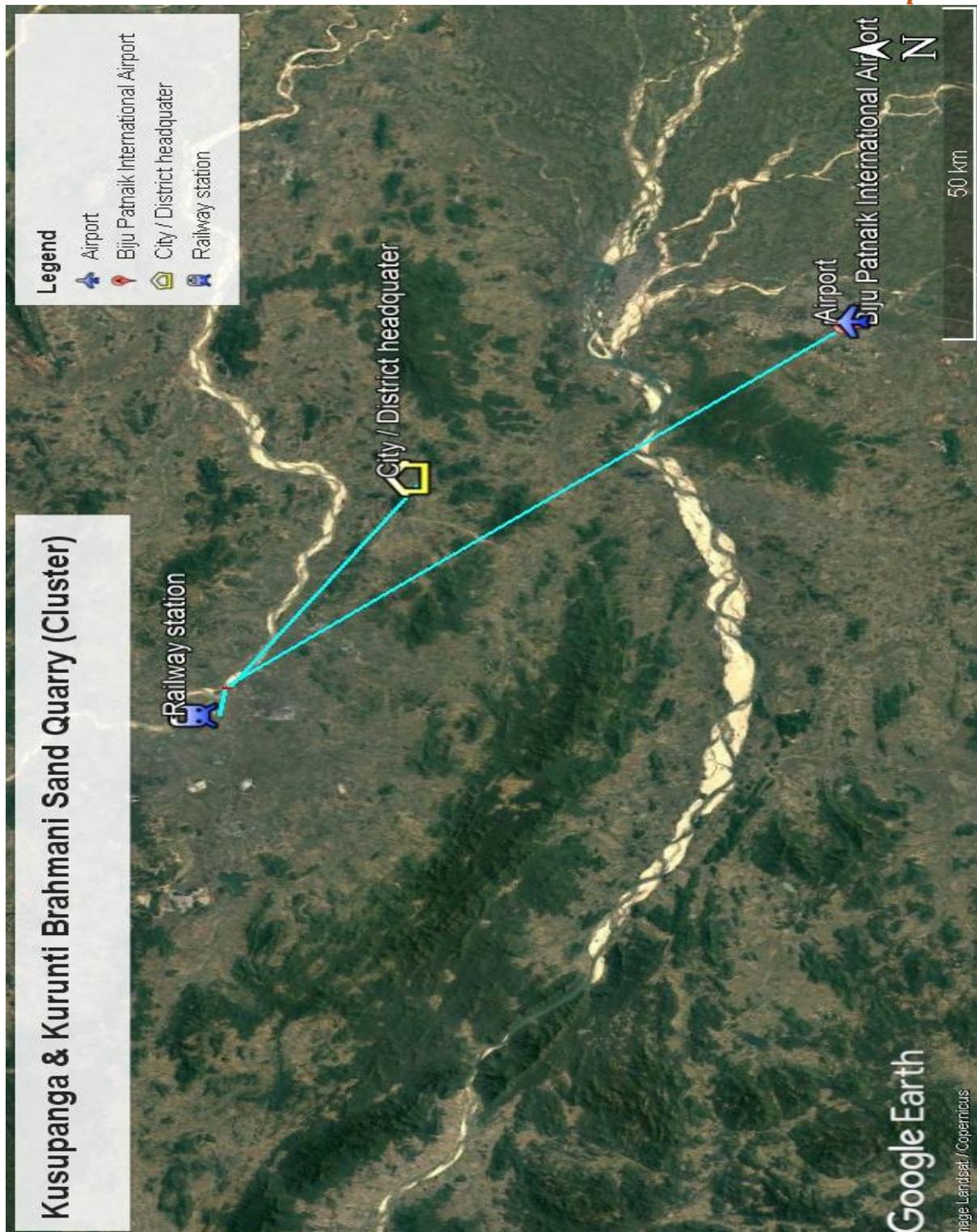


Figure 0-3 Environmental Settings near the Project Site

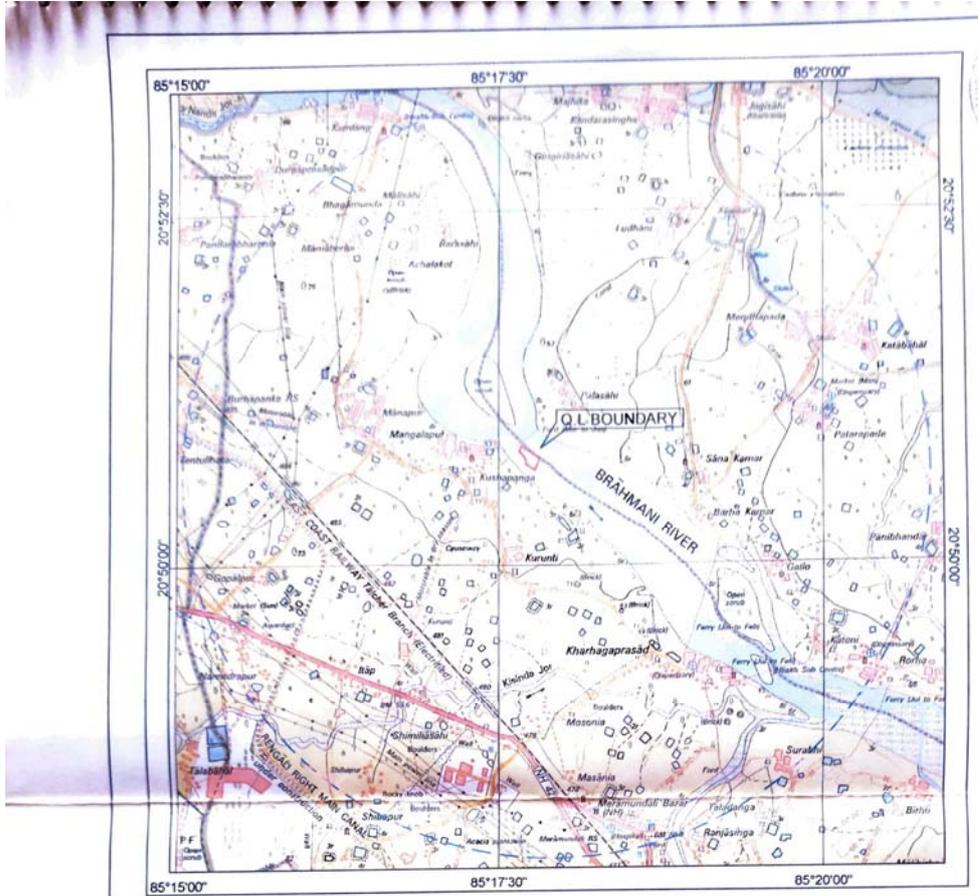
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	Q.L. BOUNDARY
	5 KM RADIUS

APPROVED

S.K. Panda

04/08/2016

Joint Director Geology
Zonal Survey, Dhenkanal

R.F. TOPOSHEET NO.-F45T5 PLATE - I

LOCATION PLAN

R.F.-1:50,000

KUSUPANGA BRAHMANI SAND QUARRY

OVER AN AREA OF 9.50ACRES UNDER ODAPADA TAHASIL
OF DHENKANAL DISTRICT, ODISHA.

TAHASILDAR ODAPADA

(ON BEHALF OF SUCCESSFUL BIDDER)

Certified that the plate is up-to-date & correct.

S.K. PANDA
 Regn. No. RQP / OD / 059 / 2016

CONVENTIONAL SYMBOLS	
Express highway with toll, with bridge, with distance sign	
Road marked according to importance	
Road double carriageway according to importance	
Unsurfaced road, Cart-track, Path-track and pass, Foot-path	
Stream, with track to back, unbridged, Canal	
Dam, masonry or masonry-arch, weirwork, Weir	
Water dry with water channel with stone & masonry, Fall, sluice	
Submerged rock, Shoal, Swamps, Sand, Silt, Mud, Sludge	
Wells, Bore, unbraked, Tank, Spring, Tanka, pond, dry	
Settlements, rural or village, town, Indian ground	
Hill-tops, small peaks, double ridge with station, under summit	
Hill-tops, other peaks, double ridge with station, under summit	
Mount, line of traverse, S.M., Cutting with tunnel	
Contours with auto-heights, Rocky slopes, Cliff	
Bound features (Shaded-tille groundwork) (Shaded-tille)	
Towns or Villages, inhabited, unincorporated	
Huts, permanent, temporary, Tower, Antenna, Mast	
Temples, Dharam, Church, Mosque, Lighthouse, Tower, Beacon	
Lighthouses, Lightships, Buoy, Signal, unlighted, Anchorage	
Mine, V.M. or India, Open, Sink	
Police stations, office, Post-office, Bank, Office, Store	
Boundaries, international, National, State, District, Taluk	
Boundaries, international, National, State, District, Taluk	
Boundary, others, unmarked, unmarked	
Height, spot, aneroid, aneroid	
Height, aneroid, aneroid, aneroid	
Post office, Telegraph office, Check post, Police station	
Post office, Telegraph office, Check post, Police station	
Camping ground, Forest, reserved, protected	
Special names, administrative, locality or other	
Hospital, Dispensary, Veterinary Hospital / Dispensary	
Aerodrome, Helipad, Tower, etc.	
Power line, with poles, unmarked, with poles, unmarked	

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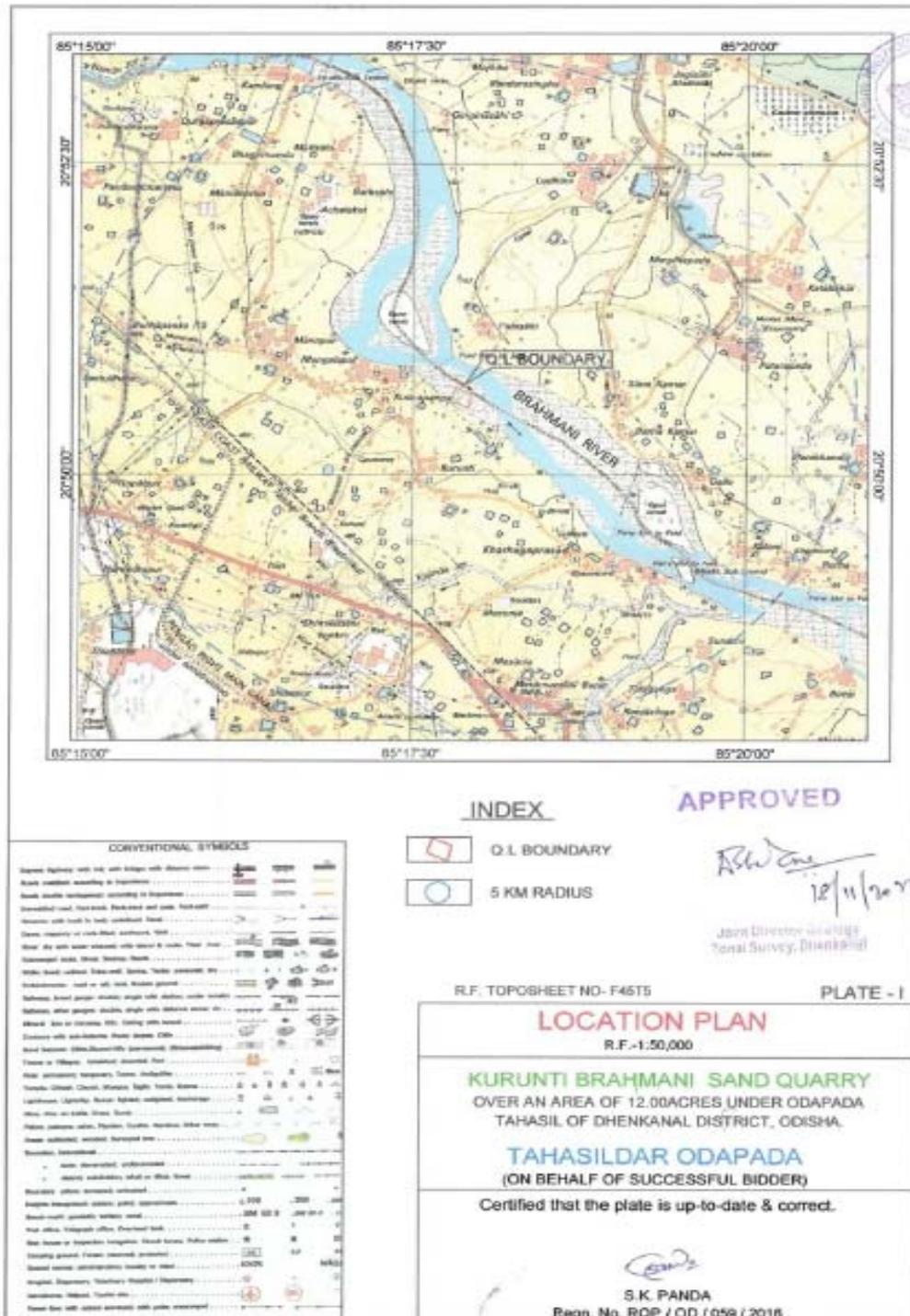


Figure 0-4 Key Map of the Study Area

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2.4 Size or Magnitude of the Operation

It is newly proposed sand quarry mine having lease area of 8.7 ha with proposed production capacity of 65786 m³/year of sand. The total lease area is non-forest Govt. land. The lease has been granted for 5 years.98 people would be employed in the project.

Table 0-4 Cost of the Project

Sr.No.	Particulars	Cost of each	Capital cost
1.	Cost of dumper (Buying and Hire)	~5,00,000/-	~5,00,000 /-
2.	EMP	~1,45,000	~1,45,000
3.	Other cost	-	~13,55,000/-
TOTAL COST			~20 Lakhs

2.5 Status of Statutory Clearances, Permissions, No Objection Certificates & Implementation

The mining project will be implemented after getting all the Statutory Clearances, Permissions, No Objection Certificates, and Consents etc. which is required/necessary for this project under various Acts, Rules and Regulations as given in table below:

Table 0-5 Status of Statutory clearances

Sr.No.	Particulars	Status
A. Statutory Clearances		
1.	Letter of Intent (LOI) for grant of mining lease	Yet to granted
2.	Approved Mining Plan along with Progressive Mine Closure Plan	Joint Director Geology Zonal Survey, Dhenkanal vide letter no. Memo no.-762.Dt dated 04/08/2022
3.	Mining Lease Status	Existing & New Mine

2.5.1 Implementation

Implementation of the proposed mining project will be done in accordance with the existing Acts and Rules applicable on mining operations as well as in accordance with any Act/Rule/Guidelines issued by Central or State Government from time to time. Implementation of the mining project will be done as per Approved Mining Plan and Progressive Mine Closure Plan approved by Directorate of Geology, Bhubaneswar including the following activities:

- Exploration
- Mine Development & Production

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2.6 Technology & Description

2.6.1 Basic requirements for the Project

The project requirements such as water, Power, Man Power, and Machinery are described in the sections below:

2.6.1.1 Water Requirement

The total water requirement for the project estimated to be 5 KLD for mining, spraying, greenbelt development and domestic uses and will be sourced from the nearby available water source and drinking water will be sourced from tanker water.

Table 0-6 Breakup of required water

S. No.	Particulars	Quantity (KLD)	Source
1.	Dust Suppression (drilling & on haul roads etc)	2.0	Water will be sourced from nearest available source.
2.	Green Belt Development/ Plantation	1.0	
3.	Drinking/Domestic & Sanitation	2.0	
Total		5.0	

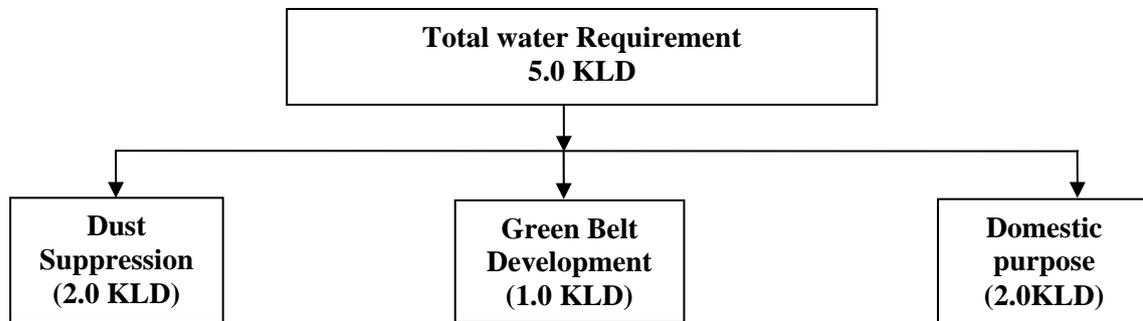


Figure 0-5 Water Balance Chart

2.6.1.2 Power Supply

No electrical power shall be required for mining operations.

2.6.1.3 Man power Requirement

Mine workers will be engaged from the nearby villages. Thus, there is no constraint regarding manpower.

Total man power of 98 people will be required for the proposed project.

Table 0-7 Man-power Details

Designation	Number of persons (Kusupanga & Kurunti Brahmani Sand Quarry (Cluster))
Supervisory Personnel/ Statutory Personnel	2
Skilled laborers (Operator and Helper)	4
Semi-skilled Laborer	4
Unskilled Laborer	88
Total	98

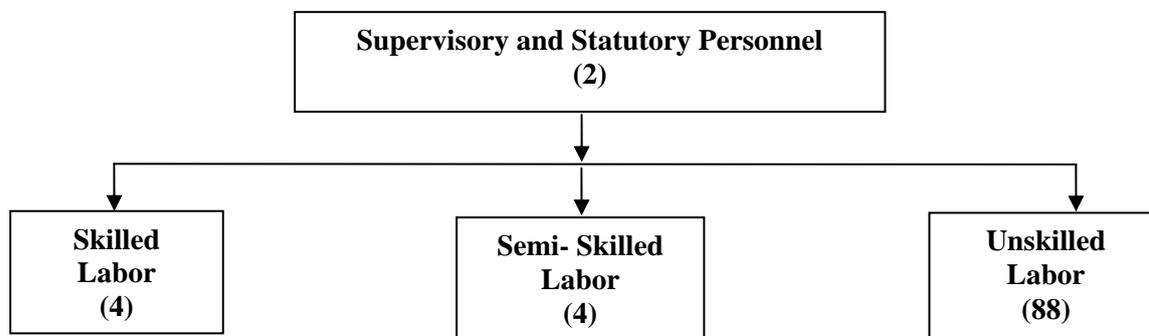


Figure 0-6 Manpower Requirement

Table 0-8 Responsibilities details

S. No.	Designation	Role/Responsibilities
1.	Supervisory Personnel and Statutory Personnel	<ul style="list-style-type: none"> ➤ Create awareness on potential environmental aspects & occupational hazards & risk. ➤ Ensure judicious use of all natural resources including energy, minerals, water etc. ➤ Ensure environment friendly operations with a view to keep the emissions/effluents within the prescribed norms. ➤ To Identify and comply with the applicable Statutory & Regulatory requirements. ➤ To identify, control and reduce the EHS hazards and risks. ➤ Training Need Assessment of Employees for effective implementation of the EMP ➤ Incident controller in case of any emergency. ➤ To plan for new equipment, minor modification etc. for betterment of Mine Working (i.e., Quality improvement,



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		<p>reduction of environmental impact & OHS Risk etc.).</p> <ul style="list-style-type: none"> ➤ Overall environmental performance of the Mines. ➤ Ensure the EMP is implemented and is effective. Assist the HSE Engineer with regulatory authorities and/or community consultation (i.e., complaints). ➤ Ensure that all the applicable environmental parameters are regularly monitored and measured as per defined interval and reports submitted to the concerned regulatory authorities ➤ Implement appropriate management programs to achieve the management objectives and goals. ➤ Assist operational staff with respect to clarifying or improving existing practices / procedures or adding more stringent requirements / controls) ➤ Ensure that any change in any of the activities/ equipment/ processes are duly evaluated in order to ensure No increase in or introduction of new environmental risks or impacts. ➤ Undertake routine environment monitoring as per schedule ➤ Ensure that regular water sprinkling is done on the haul roads for effective control of fugitive emissions ➤ Supervising the overall progress of environmental management programs put in place and ensuring they adhere to all applicable regulations. ➤ Developing greenbelt in line with stipulated guidelines
2.	Skilled Workers	<ul style="list-style-type: none"> ➤ Daily inspection of mining machineries. ➤ Regular maintenance of equipment as per OEM recommendations. ➤ Keeping maintenance logs. ➤ Ensure that the mining machineries conform to the applicable environmental norms. ➤ Ensure that the emission/noise levels from the mining machineries do not exceed the permissible levels
3.	Unskilled Workers	<ul style="list-style-type: none"> ➤ Responsible for carrying out general housekeeping of the area ➤ Regular disposal of office and other municipal waste ➤ Plantation of saplings ➤ Watering and maintenance of saplings ➤ Gardening and horticultural activities

		<ul style="list-style-type: none"> ➤ Assist personnel in carrying monitoring equipment at site ➤ Water spray on haul roads through tankers ➤ Mining operations ➤ Operating Machineries with care etc.
--	--	---

2.6.2 Level of Mechanization

Mining method to be adopted in the sanctioned lease area will be of manual manner. In which;

- ✓ The mining operation as proposed will be done by manual opencast method.
- ✓ Quarrying activities will be done following all the security majors. Rules and regulations of DGMS and IBM will be observed during the Quarrying operations to avoid unwanted circumstances.
- ✓ Mined out material of commercial use will be transported by trucks / dumpers. Haul road of suitable width is proposed for proper and smooth quarry operations.
- ✓ Quarrying / excavation will be done according to the proposed manual means, machineries will be required to deploy for transport purpose.

All the requisite NOC and permission regarding depth shall be obtained by the lease holder from the competent authorities.

Excavation and loading of sand into the transporting vehicles will be done by manual means. The transportation from the mine to the respective users shall be achieved by transporting vehicles. The number of fleets and their capacity is as below:

Table 0-9 Required Machineries

Sl. no	Name	Capacity	No. of Fleet
1	Transporting vehicles	6Cum/3Cum	8 tippers/24 tractors
2	Safety gears Helmets, safety shoes, Goggles, & Hand gloves	-----	As required

Some will be on hire basis

2.6.3 Process Description

2.6.3.1 Proposed Method of Mining

- It would be opencast manual mine. Sand shall be exploited manually and loaded in Truck & Tractors.
- Ground water table would not be intersected by the proposed mining.
- Mining shall be carried out without adoption of drilling & blasting.
- The extracted sand shall be loaded into tractor trolleys manually & dispatched to various parties.



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- Mined out material will be loaded into the dumpers manually and will be sent for commercial use as per the demand of the market. It will be transported by Covered trucks / dumpers to its final destination.
- No overburden or top soil will be generated as the area lies in river bed.

A. Excavation and loading

Sand will be excavated and loaded into dumpers from the lease area by manual means.

B. Transportation

The transportation of the material will be done with the help of dumpers/ tractors/ tippers. For transportation of materials suitable width of haul road will be provided and regular water sprinkling will be done to prevent the fugitive emission which can be caused due to the movement of the Vehicles.

2.7 Reserve Estimation

The Sand is well exposed in the entire area and no topsoil is found in the lease area.

The reserve has been estimated by considering the following parameters.

- Surface area method has been adopted for estimation of reserve of sand in Cu.m
- The reserve has been calculated under proved category only.
- Recovery factor is established as per the actual field practice as follows.
- Parameters Quantity
- Recovery factor:- 100%
- Out of total volume 100% of sand is assumed to be replenished in the absence of monitored database within the quarry lease area for the lease period of five years. Based on the above consideration & chosen local parameter, the reserve has been calculated for sand as per the present scenario. Depending upon the pattern of deposit, position and quantity of the river sand at present, it is impossible to estimate for the ensuing period. In order to overcome this, total area has been considered as potential zone for sand deposition of sand after excluding the area under water cover (if located any within the lease area, ref PLATE-IV). The geological reserve has been calculated by surface area method by multiplying total effective area multiplied with average thickness of sand in lease area to attain the volume and there by multiplying recovery factor to attain the volume and there by multiplying recovery factor to attain the geological reserves. The thickness of the sand varies from 1.75m to 2.25 mtr and the average thickness will be 2m. Total geological reserve has been calculated by the above calculated reserve.
- The resource of river sand has been categorized as probable reserve.
- It is assumed that the mineable reserve has been estimated in same manner as geological reserve after allowing for loss due to mining and safety of mine working including 7.5m safety zone all along the boundary and 100m restricted area from power line. Thus the mineable reserve for sand bed works out to 65786 cum/annum.

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- The resource of river sand has been categorized as probable reserve.
- The resource of river sand over the area has been categorized as probable reserve.
- The foreign particles in the sand such as wood and other floating waste have been considered as waste. However, the volume of waste is negligible in quantity and in practice the waste will not be separated during mining. So recovery factor has been taken as 100% for sand.
- Total volume of excavation of sand is saleable.

2.7.1 Mineable Reserve

- The sand resource within safety zone area of 7.5 m barrier all along the proposed area boundary and 10 m barrier around the water channel (if any) present within the proposed area have been excluded from the above calculation of geological resource for computation of mineable reserve.

2.7.2 Calculation of reserve

Based on the above considerations, site specificity and chosen local parameters the reserve has been calculated for river bed sand zone by surface area method.

Formula adopted for calculation of volume of river sand is $V=A*T$

Where,

V is total volume of river sand in m³

A is the surface area of potential sand patch.

T is the average thickness of sand bed in m

The total geological resource has been estimated as 1,59,626 Cum.

Similarly, the mineable reserve of river bed sand is worked out to be 65,786 Cum.

The geological reserve and mineable reserve of of Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) calculated under various categories are given:

Table 0-10 Geological Resource calculation of QL for the period of five years

GEOLOGICAL RESERVE CALCULATION OF KUSUPANGA					
QUARRY LEASE	SURFACE AREA OF SAND (m ²)	THICKNESS OF SAND (m)	GEOLOGICAL RESOURCE OF SAND (m ³)	Recovery Factor (100%)	Reserve in Cum
A	B	C	D=BXC		
Probable	31250	2	62500	1	62500
TOTAL					62500



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GEOLOGICAL RESERVE CALCULATION OF KURUNTI					
QUARRY LEASE	SURFACE AREA OF SAND (m²)	THICKNESS OF SAND (m)	GEOLOGICAL RESOURCE OF SAND (m³)	Recovery Factor (100%)	Reserve in Cum
A	B	C	D=BXC		
Probable	97126	2	97126	1	97126
TOTAL					97126

Table 0-11 Mineable Resource calculation of QL for the period of five years

MINEABLE RESERVE CALCULATION OF KUSUPANGA					
QUARRY LEASE	SURFACE AREA OF SAND (m²)	THICKNESS OF SAND (m)	REPLENISHMENT FACTOR (100%)	MINEABLE RESERVE OF SAND (m³)	EXTRACTABLE MINABLE RESERVE IN CUM
A	B	C	D	E=BXCXD	F=EX0.6
Probable	25262	2	1	50524	30314
TOTAL					30314

MINEABLE RESERVE CALCULATION OF KURUNTI					
QUARRY LEASE	SURFACE AREA OF SAND (m²)	THICKNESS OF SAND (m)	REPLENISHMENT FACTOR (100%)	MINEABLE RESERVE OF SAND (m³)	EXTRACTABLE MINABLE RESERVE IN CUM
A	B	C	D	E=BXCXD	F=EX0.6
Probable	29560	2	1	59120	35472
TOTAL					35472

2.8 Mining Details

2.8.1 Mining Method

Mining shall be undertaken to extract sand, mainly through an open pit spread over the river course devoid of water or nominal water that may be encountered.

The mode of the deposit, geomorphology of the area and its hydrological condition are some of the factors that favors the open cast mining. Mining will be done with manual excavation & loading into transporting vehicles and transported from project site to the users/destination through transporting vehicles. The mining will be undertaken on single shift basis. The local man power shall be engaged in the mine.

2.8.2 Blasting and benching Details

As the river sand is loose, no drilling or blasting is required.

Benching pattern is not feasible in case of sand, as the angle of repose of sand is 35°, based on this the Ultimate pit slope limits has been taken as 35°. The maximum depth of the mining will be of 1 m or up to water table, whichever is encountered first.

2.8.3 Face Lay Out

There will be no existing quarry within the proposed area after replenishment. Total available mineable reserve over the area has been estimated considering the probable zone of occurrence of the river sand bed within the proposed area as revealed during field visit and assuming uniform rate of year wise replenishment over the area. Year wise development of quarries for five-year plan period will be decided depending upon the occurrences of sand bed over the proposed area during the respective year to achieve the target production. Therefore, quarry lay out will be over the whole proposed area depending upon the probable sand bed after replenishment leaving stipulated safety zones.

2.9 Conceptual Mine Development Plan

The present level of the lease area is 52 mRL. During plan period, the quarry floor will be 51mRL or up to water table whichever is less in Kusupanga & Kurunti Brahmani Sand Quarry (Cluster).

2.9.1 Annual Production

Total available mineable reserve over the area has been estimated considering the probable zone of occurrence of river sand bed within the proposed area which will be extracted year wise during the plan period. Based on the total extractable mineable reserve, the MGQ has been fixed by the competent authority and this much quantity of sand has been planned to be extracted each year from the source as mentioned below:

Table 0-12 Annual Production of Sand

Kusupanga Brahmani Sand Quarry	
YEAR	PRODUCTION (m³)
1 st YEAR	30314
2 nd YEAR	30314
3 rd YEAR	30314

4 th YEAR	30314
5 th YEAR	30314
Total	151570
Kurunti Brahmani Sand Quarry	
YEAR	PRODUCTION (m³)
1 st YEAR	35472
2 nd YEAR	35472
3 rd YEAR	35472
4 th YEAR	35472
5 th YEAR	35472
Total	177360

2.9.2 Over Burden and Waste generation

Since the river bed sand deposit is devoid of any over burden, development of over-burden does not arise. No dump has been proposed as there will be no generation of waste in the case.

2.10 Mine Closure Plan

2.10.1 Mined Out Land

During the plan period the mined-out land will be 5.518 ha.

The Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) comprises of 8.7 hectares under Odapada Tahasil of Dhenkanal district. The entire area is of river bed and devoid of any forest growth. Since it is a sand quarry and the total mining activities will be confined to the Brahmani River sand bed, no reclamation measure is proposed for mine closure. Invariably, the volume of sand extracted in each year will be re-deposited in subsequent years during rainy season. The replenishment of sand in the mining lease area is sufficient to sustain the mining operations at prescribed levels, restricted to 1m. Therefore, only avenue plantation has been proposed @50 saplings per annum on the river bank adjacent to his leasehold.

The land use as well as proposed land use of are given:

Table 0-13 Proposed Land use Pattern

Kusupanga Brahmani Sand Quarry		
Type of land use	At Present (Existing)	At the end of Plan Period
	Area under excavation	---
Area under water	0.696	0.696
Safety zone	0.430	0.636
Unutilised area	2.562	---
Total	3.884	3.884



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Kurunti Brahmani Sand Quarry		
Type of land use	Area in Hectares	
	At Present (Existing)	At the end of Plan Period
Area under excavation	---	2.956
Safety zone	0.636	1.900
Unutilised area	1.900	---
Total	4.856	4.856

2.10.2 Post Mining Reclamation

- No reclamation measure is proposed for mine closure. In variably the volume of sand extracted in each year will be re-deposited in subsequent year during rainy season.
- The replenishment of sand in the mining lease area is sufficient to sustain the mining in prescribed land.
- There is no provision of waste dump in river bed. The clayey sand, if found, during production will be used for assessing road and plantation in river bank.
- The area is devoid of any top soil so no measures have to be taken for this.

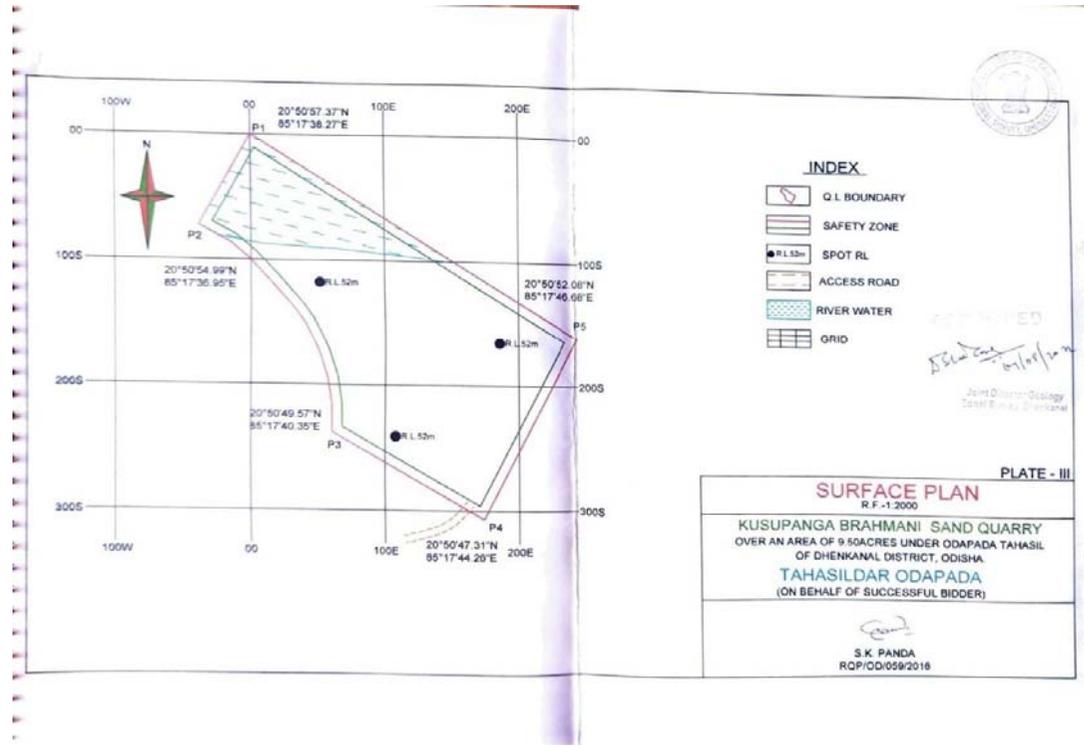
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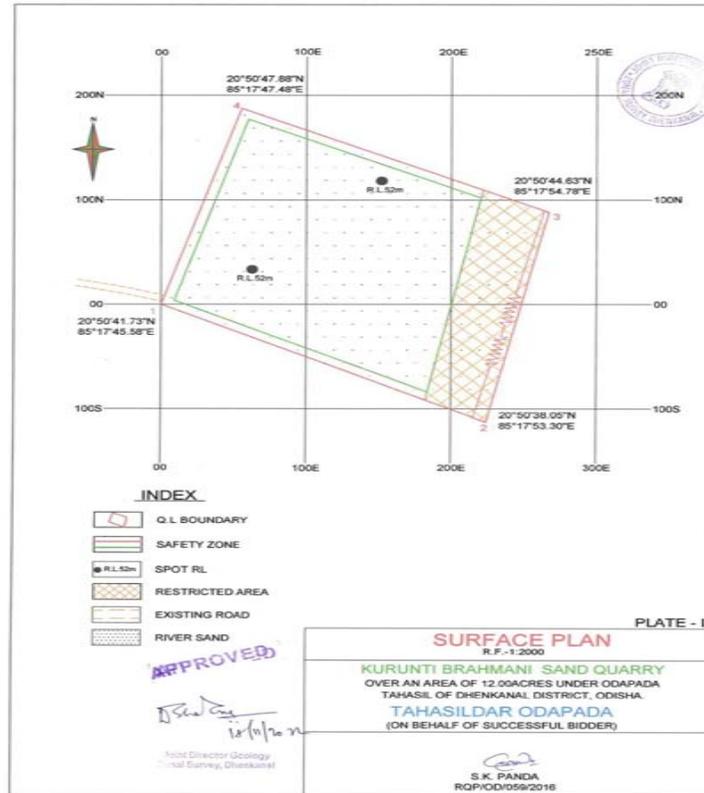


Figure 0-7 Surface Plan

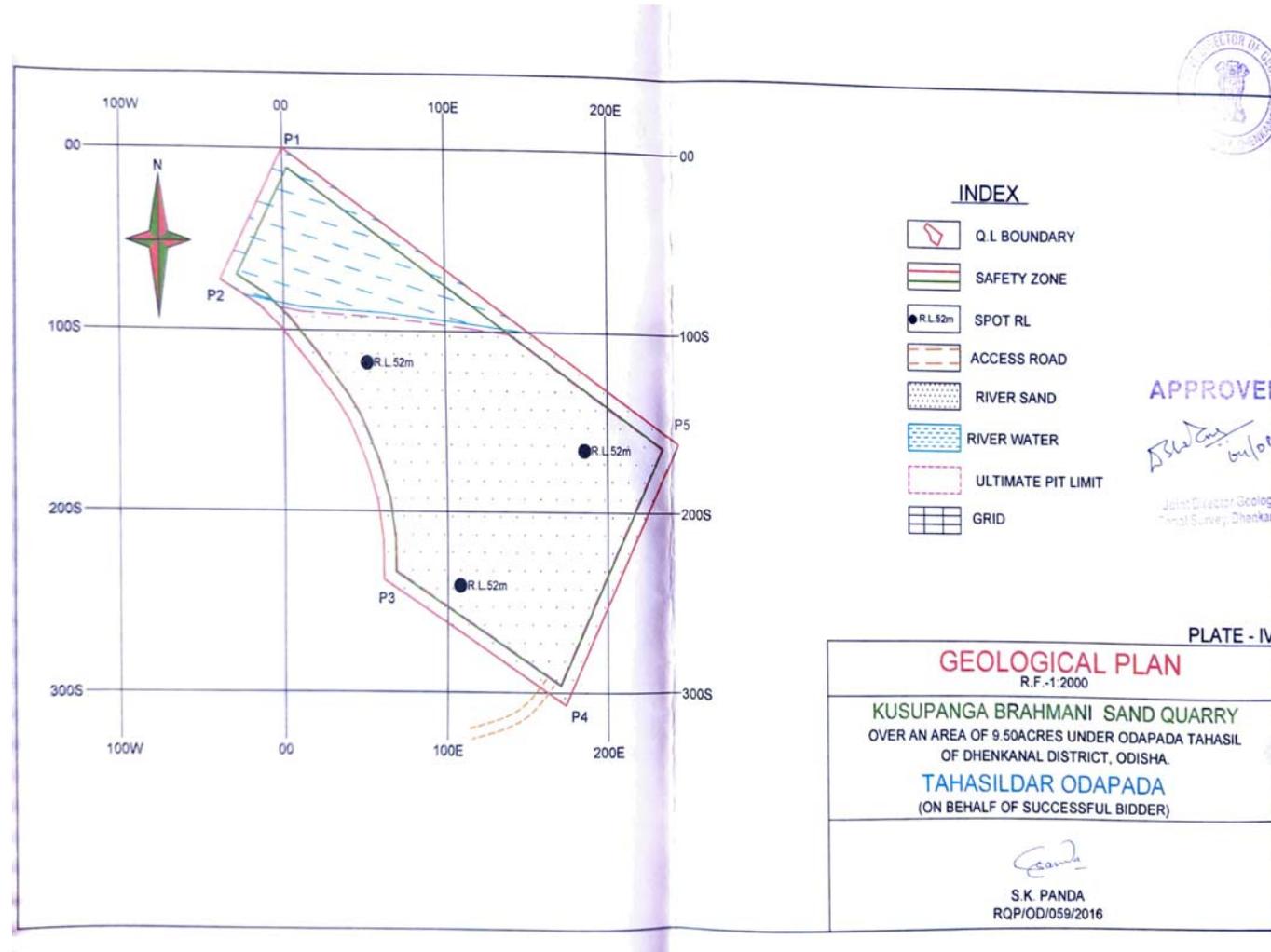
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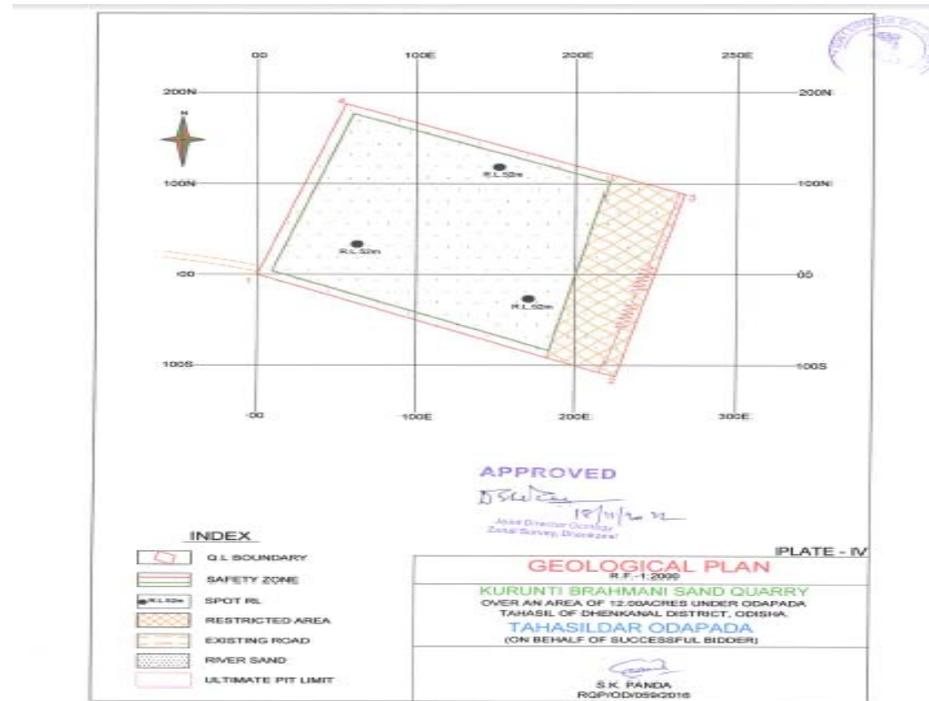


Figure 0-8 Geological plan

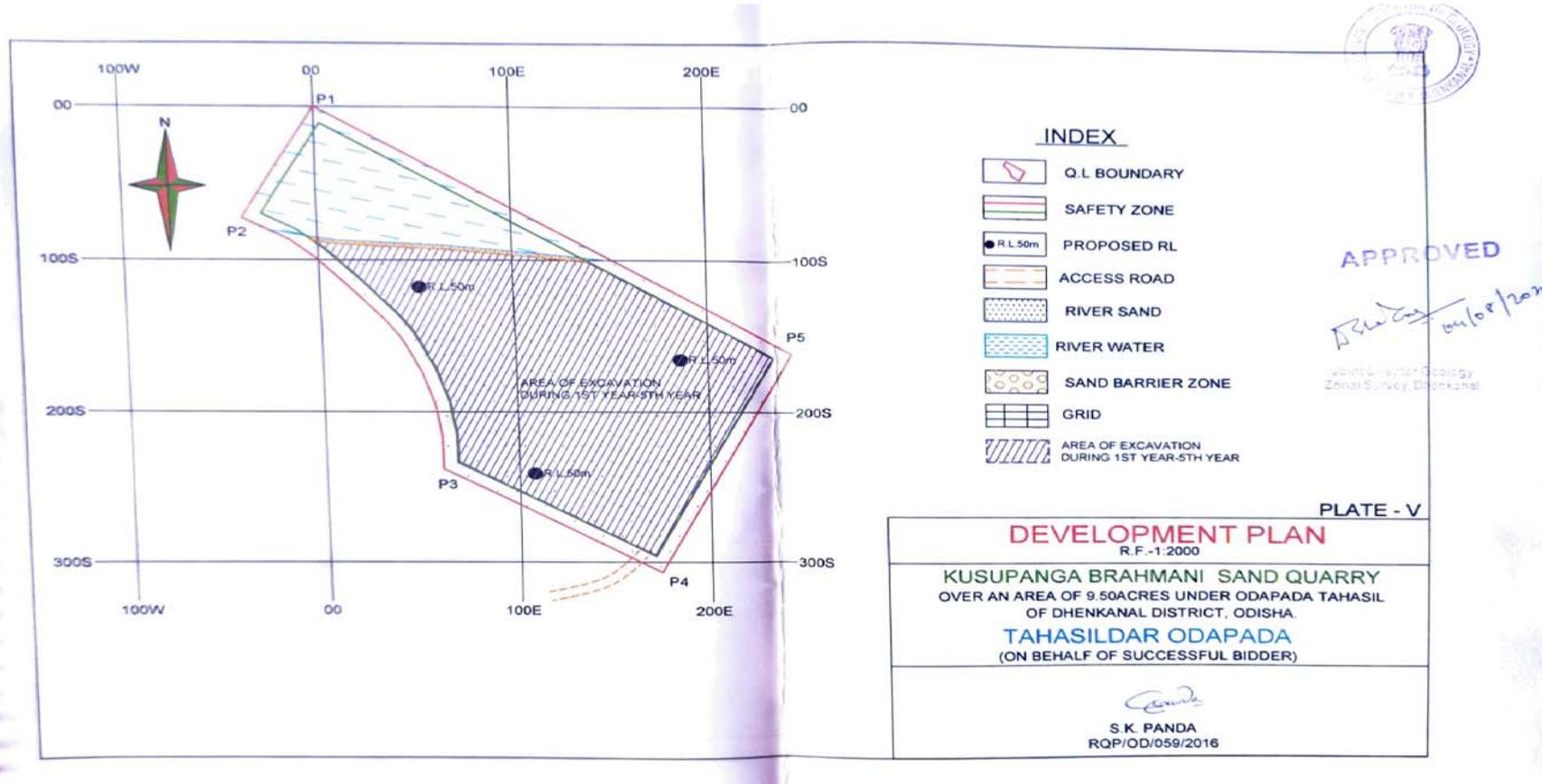
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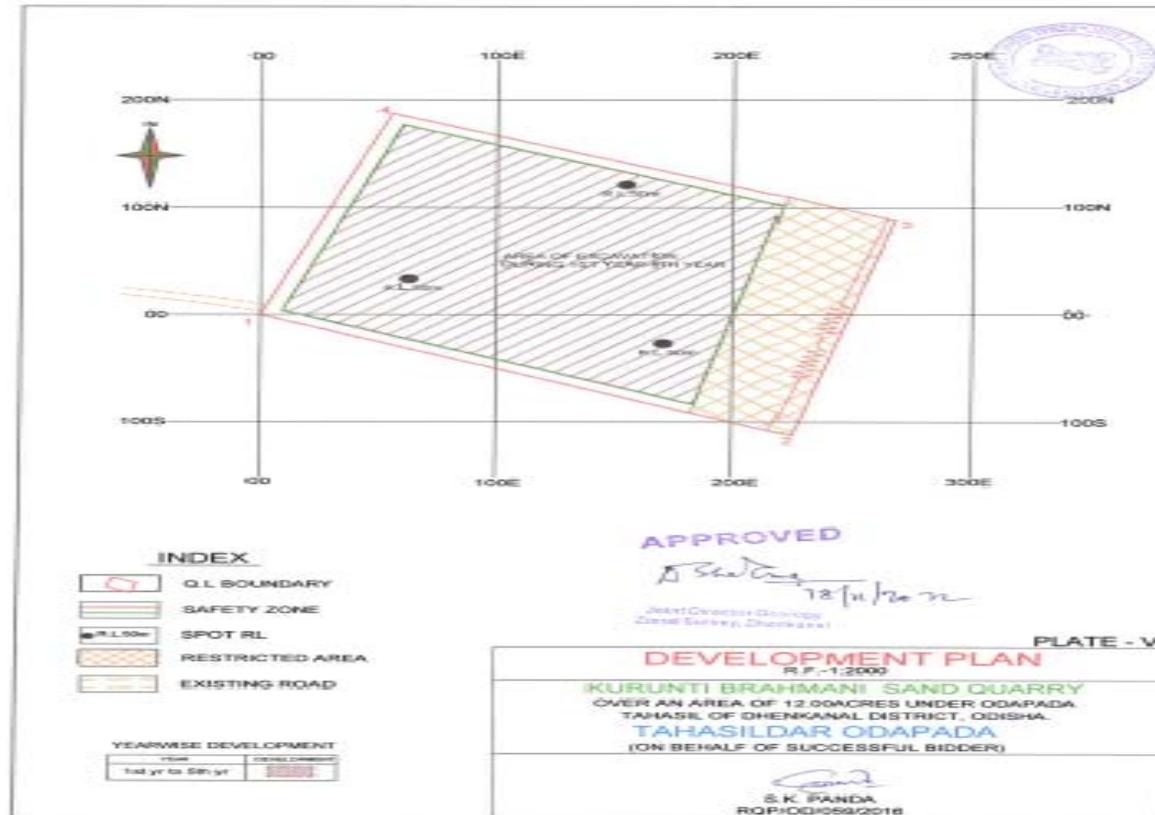


Figure 0-9 Development Plan

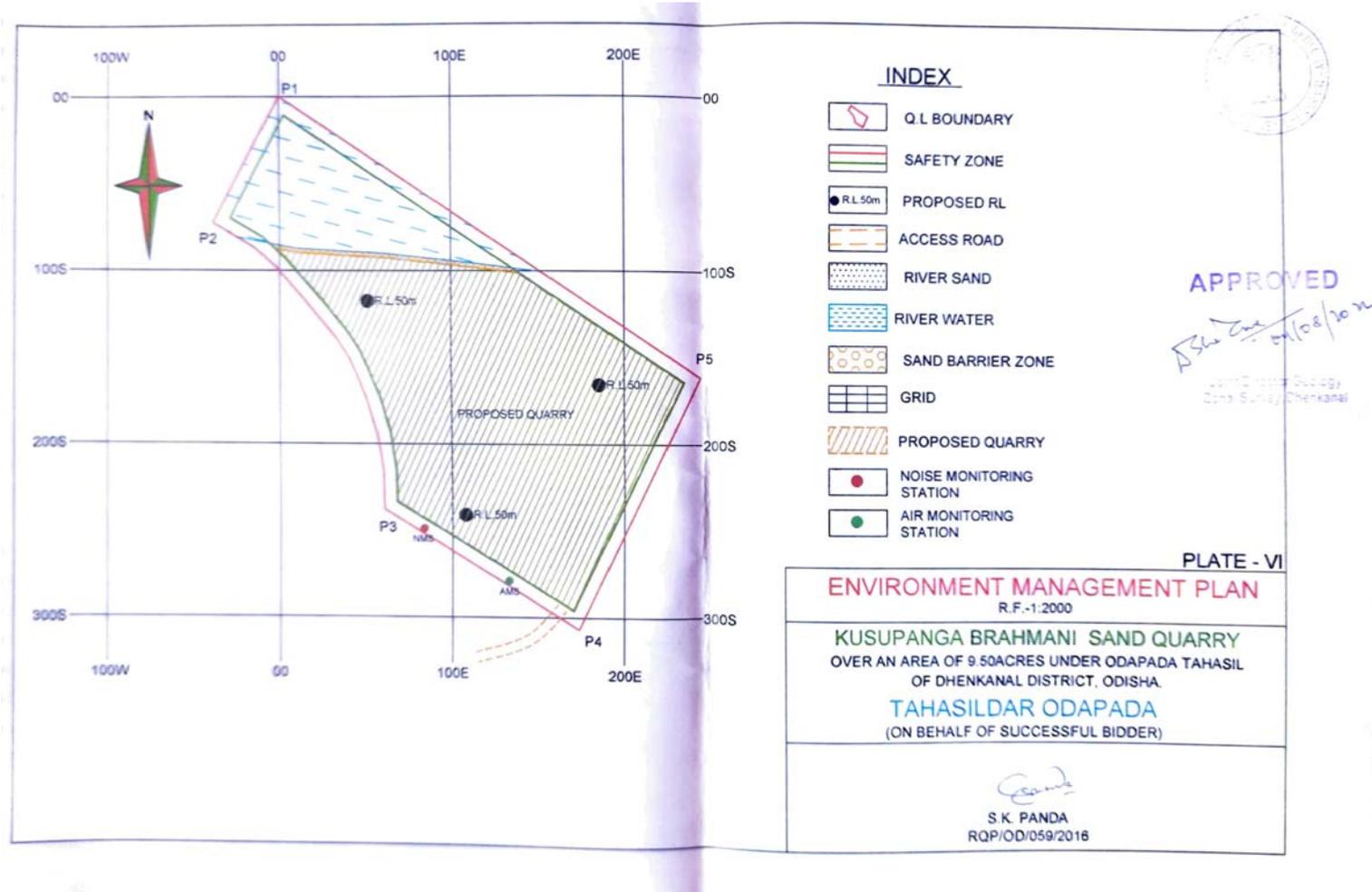
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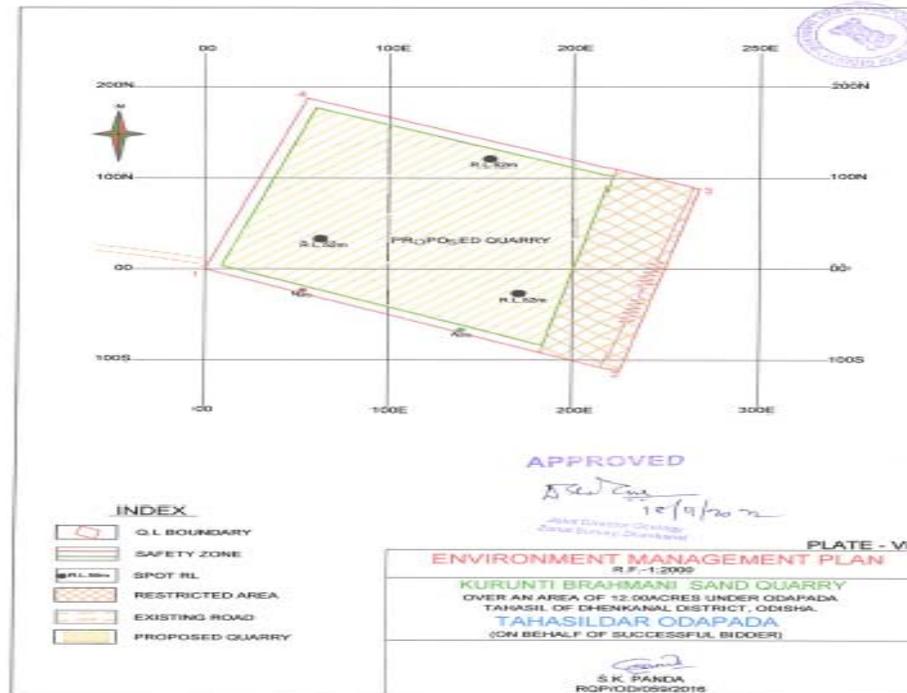


Figure 0-10 Environmental Management Plan

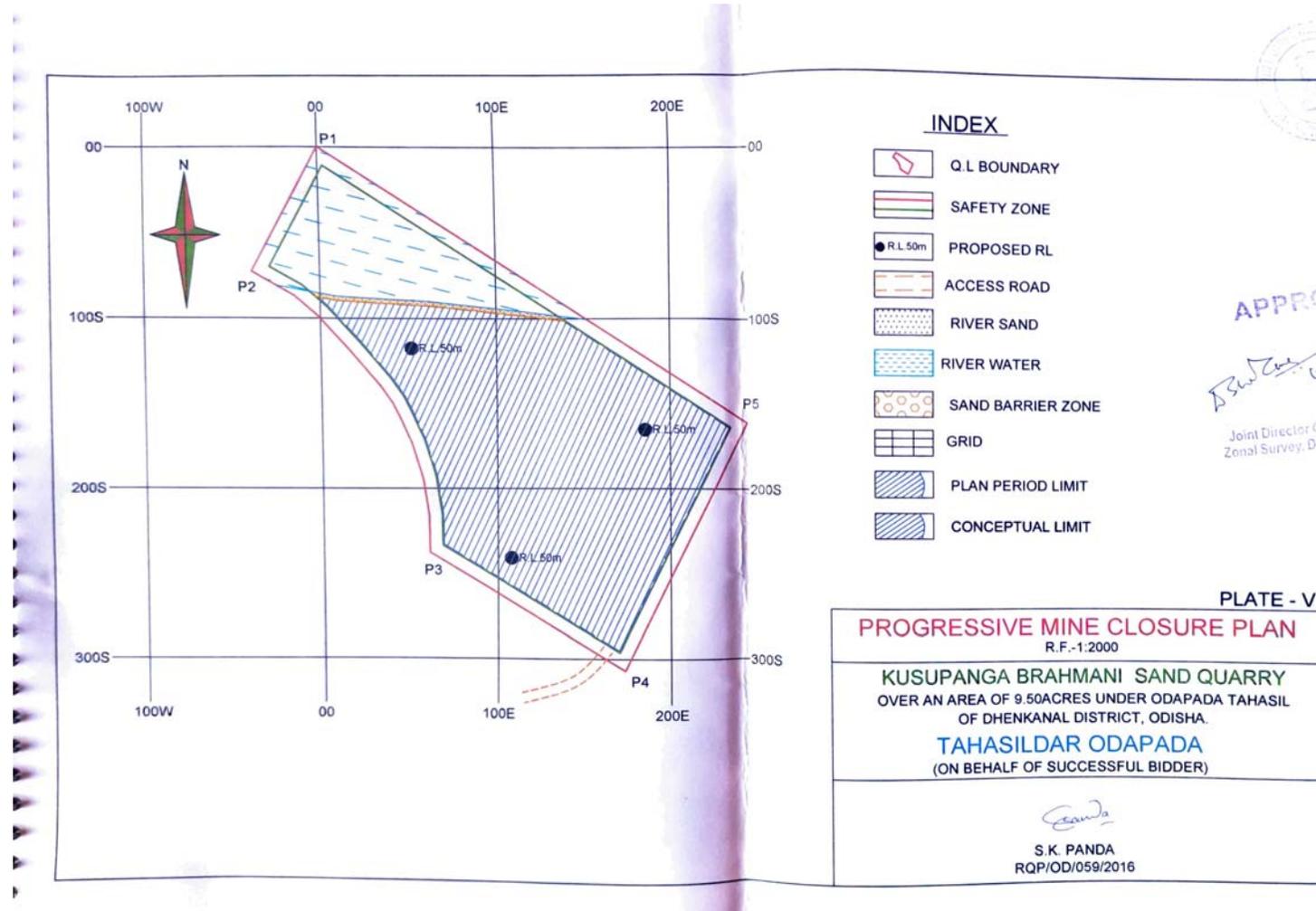
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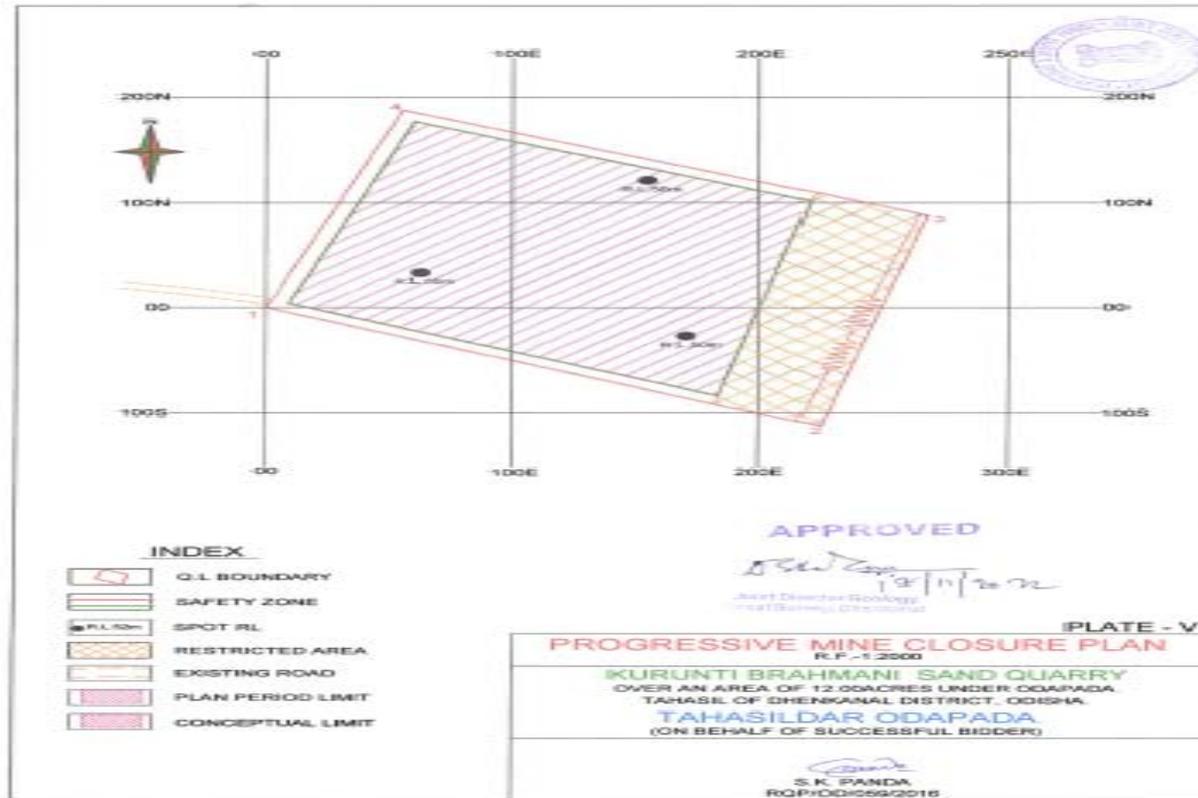


Figure 0-11 Progressive Mine Closure Plan

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2.11 Description of Mitigation Measures

The mitigation measures given in this section are for management of the emissions (particulate or gaseous), waste water & surface run-off and Noise pollution generated from the mining operations to meet the environmental standards and environmental operating conditions.

2.11.1 Air Quality Management

Loading & Transportation –

- All the mine roads from loading to hauling road will be maintained properly and watered regularly during the shift operation to prevent generation of dust due to the movement of dumper etc.
- Development of green belt/plantation along roads and other places will be carried out to control the air pollution.
- Proper maintenance of the HEMMs & transportation vehicles will be done.
- Vehicular emissions will be kept under norms.
- Personal Protective Equipment like dust masks will be provided to employees.
- Periodic air quality monitoring will be carried out.

2.11.2 Noise Quality Management

Loading and Transportation –

- Adequate silencers in HEMM will be provided to reduce generation of noise.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- The workers employed at HEMM will be provided with protective equipment, earmuffs and earplugs as a protective measure from the high noise level generated at the mine site and wherever required.
- Development of green belt & plantation around lease boundary, roads and other places will be carried out.
- Periodical monitoring of noise will be carried out regularly.

2.11.3 Waste Water Management –

Waste Water-

- Domestic wastewater so generated will be disposed-off in soak pit via septic tank.

2.11.4 Greenbelt/ Plantation

- Greenbelt will be developed along haul road.
- Plantation will be done along haul road and in villages nearby. Native Species will be preferred for the plantation.

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2.12 Assessment of New and Tested Technology for the Risk of Technological Failure

From the nature and extent of the deposit, the reserves and the quality have been proved with adequate degree of reliability. Considering the type of mineralization, manual method is the most feasible method for mining in the proposed mining lease area. It is also a matter of fact that the mining machineries are rapidly changing and therefore the Project Proponent would act fast to adopt more advanced equipment and automation for safe and environment friendly mining technology in the years to come.

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1 CHAPTER 3 DESCRIPTION OF THE ENVIRONMENT

1.1 Study Area & Period

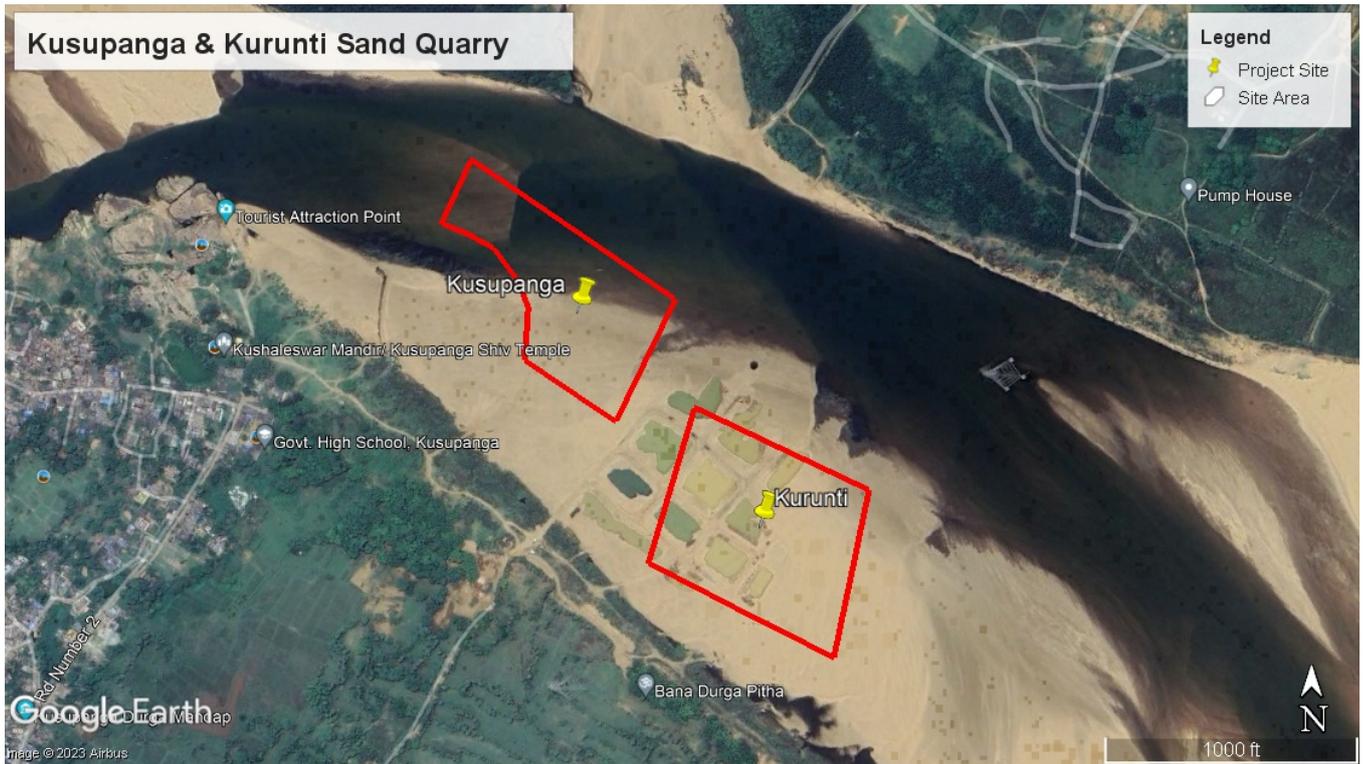
The baseline environmental qualities of various environmental components like air, noise, water, land, flora and fauna and socio-economic form an important and integral part of an EIA study. The baseline data forms the basis for predicting/assessing the environmental impacts of the proposed project. The baseline environmental quality is assessed through field surveys within the impact zone as well as the secondary data for various components of the environment, viz., air, noise, water, land and socio-economic.

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Co-ordinates of the Project Site:

Table 1.1-1 Co-ordinates of Project site

Pillar	Latitude	Longitude
1.	85°17'47.53"E	20°50'47.72"N
2.	85°17'45.55"E	20°50'41.64"N
3.	85°17'53.32"E	20°50'38.06"N
4.	85°17'54.73"E	20°50'44.44"N
Pillar	Latitude	Longitude
1.	85°17'37.12"E	20°50'55.10"N
2.	85°17'39.09"E	20°50'53.98"N
3.	85°17'40.19"E	20°50'52.77"N
4.	85°17'40.60"E	20°50'51.72"N
5.	85°17'40.45"E	20°50'49.63"N
6.	85°17'44.19"E	20°50'47.20"N
7.	85°17'46.66"E	20°50'51.97"N
8.	85°17'38.22"E	20°50'57.44"N



(Source: Google Earth Image)

Figure 1-1 Location Map of Study Area

The report presents the data collected during the sampling period of three months during Post-monsoon season from **October 2023 to December 2023**. Various environmental components were monitored and samples were analysed.

For The Baseline survey, data collected during the sampling period of three months during Post-monsoon season from October 2023 to December 2023, various environmental components were monitored and samples were analysed.

The baseline quality of various components of the environment viz., air, noise, water, land, biology, meteorological and socio- economic was assessed within the impact zone of about 10 km around the proposed site. Secondary data has also been incorporated from authentic sources viz., Government/Non-Governmental Agencies, Universities, Indian Meteorological Department (IMD), Ground Water Board etc. Various environmental components were monitored and samples were analysed.

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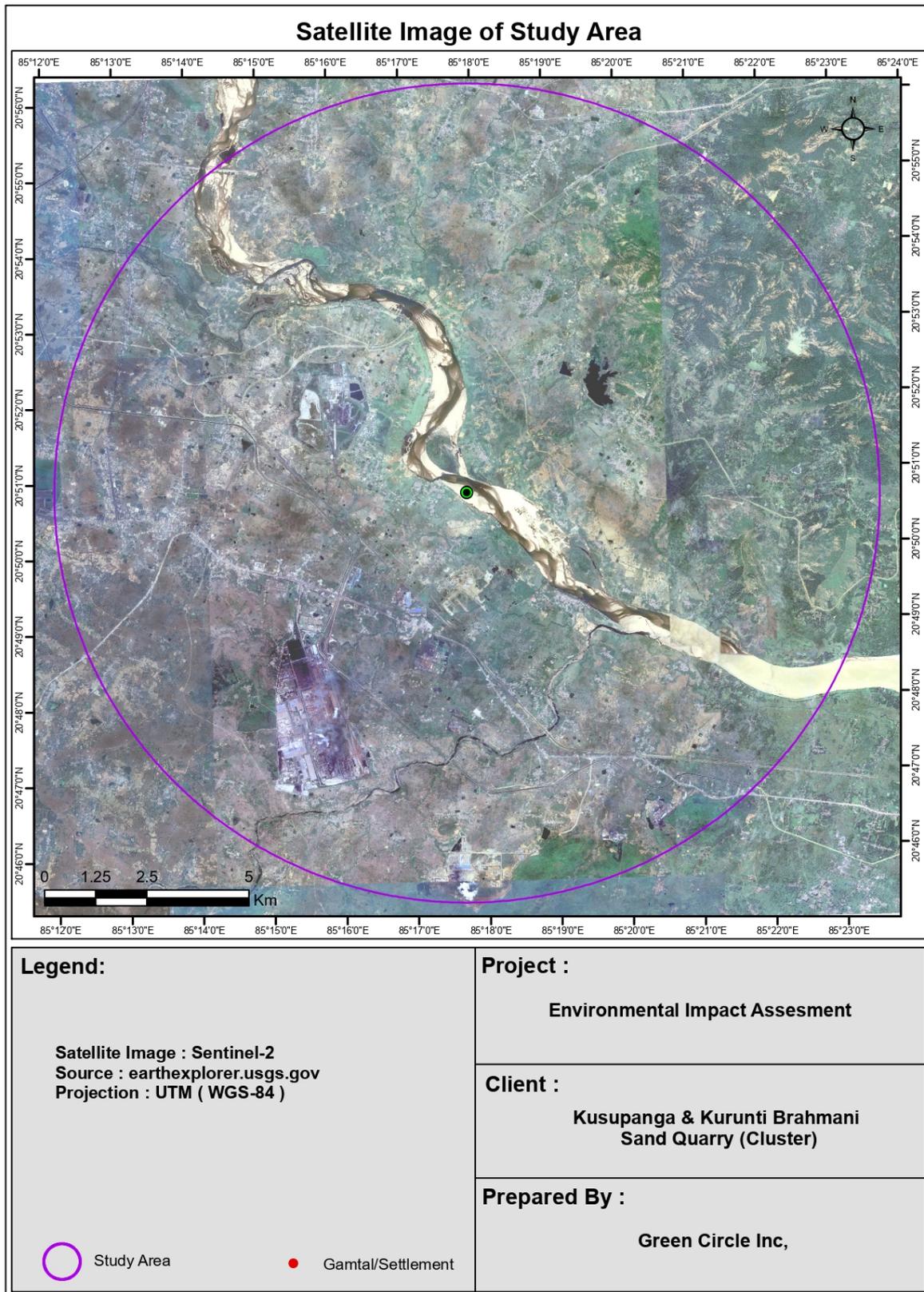


Figure 1-2 Satellite Image of Study Aria

1.2 Methodology

The methodology for conducting the baseline environmental survey has been obtained from the guidelines provided in the EIA Guidance Manual issued by the Ministry of Environment Forest and Climate Change (MoEF&CC). Environmental attributes and frequency of monitoring is given below in table:

Table 1.2-1 Location Details, Period and Methodology of Baseline Data Generation

Sr. No.	Attribute	Parameters	No. of Sampling Locations	Frequency of Monitoring / Data Collection
1	Meteorology	Wind speed & direction, temperature, relative humidity, rainfall.	Project Site	Data collected from IMD
2	Ambient air quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO, NH ₃ , Pb, Ozone, Benzene, Benzopyrene, Arsenic, Nickel.	08	24 hourly samples twice a week. CO and O ₃ hourly samples twice a week.
3	Noise levels	Noise levels in dB(A) Leq	08	At least one day in a season for day time and night time on a working & nonworking day.
4	Surface water quality	Physical, chemical and bacteriological parameters including pH, temperature, turbidity, Total hardness, total alkalinity, chloride, sulphates, fluoride, salinity, DO, BOD, COD, Heavy metals, Total coliforms, Fecal coliforms.	07	Once in a Monitoring Period.
5	Groundwater quality	Physical, chemical and bacteriological parameters including pH, temperature, turbidity, Total hardness, total alkalinity, chloride, sulphates, fluoride, Heavy metals.	07	Once in a Monitoring Period.
6	Biological Environment	Existing flora and fauna.	Study Area	Through field visits and substantiated through secondary data sources.

Sr. No.	Attribute	Parameters	No. of Sampling Locations	Frequency of Monitoring / Data Collection
7	Soil characteristics	Physical, chemical and biological parameters to assess agricultural and afforestation potential including pH, Permeability, Electrical conductivity, Nitrites, Phosphates, TPH, Fluorides, Heavy metals, SAR, Total hydrocarbons and cat-ion exchange capacity.	08	Once in a Monitoring Period.
8	Land use / Land Cover	Land use for different land use Classifications.	Study Area	Land use / Land Cover Analysis using satellite imaging and GIS Technique
9	Socio-economic Environment	Socio-economic characteristics, labour force characteristics, population statistics existing amenities in the study area and quality of life.	Study Area	Based on field survey and data collected from Census of India

1.3 Geology

The major parts of the district are underlain by Archean crystalline of the Eastern ghatgroup, Precambrian metasedimentaries, Gondwana sedimentaries and recent alluvium. The Archean occurring in the major part of the district include granite, granite gneisses and khondalites. The Precambrian occur in small patches as phyllites and micaschist. The Gondwana occupy the northwestern parts of the district and comprise a sequence of sandstone, shale and carbonaceous shale. The recent alluvium occurs in limited patches along the river courses. The generalized stratigraphic sequence is given in and the geological map of the study area is shown in.

Table -1 Generalized stratigraphic sequence in Dhenkanal district

Era	Group/Super group	Lithology
Quaternary Recent to sub-recent		Alluvium Sand, silt and clay in varying proportions
		Laterite sand lateritic gravels



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	Unconformity	
Upper Paleozoic to Mesozoic		Sandstone, shale, carbonaceous shale
	Unconformity	
Precambrian	Precambrian	Phyllite, Micaschist
Archean		Granite, granite gneisses, Khondalite

Archeans and Precambrian: The Archean formation belonging to the Eastern Ghats group are the oldest rocks exposed in the district. Khondalites are the common rock type consisting of quartz, feldspar, sillimanite and garnet with graphite and biotite as accessories. The abundance of garnet and sillimanite in the rocks indicates a high-grade metamorphism. Granite and gneisses occur widespread on either side of the Brahmani River including variants like hornblende gneiss, biotite gneiss with vein of pegmatite and quartz. Precambrian rocks exposed in the north western part of the district, consist of phyllite and mica schist.

Gondwana: Lower Gondwana sedimentaries are exposed in parts of Parjang and Kamakhya nagar blocks in the north western part of the district. These formations unconformably overlie the Precambrian or Archean Basements. This group consists of sandstone, shale and carbonaceous shale belonging to Talcher series. The sandstones at places are massive in nature.

Recent to Sub-recent: The laterites occur extensively as capping over the khondalite in topographic lows as also over granite gneiss. These are ferruginous in nature and highly porous having a spongy look and at places form a nodular mass. The recent to sub-recent alluvium occurs as flood plain sand channel deposits of the Brahmani river and its tributaries. It comprises of sand, gravel, silt and clay. The extent of this formation is limited and the maximum thickness is about 25m.

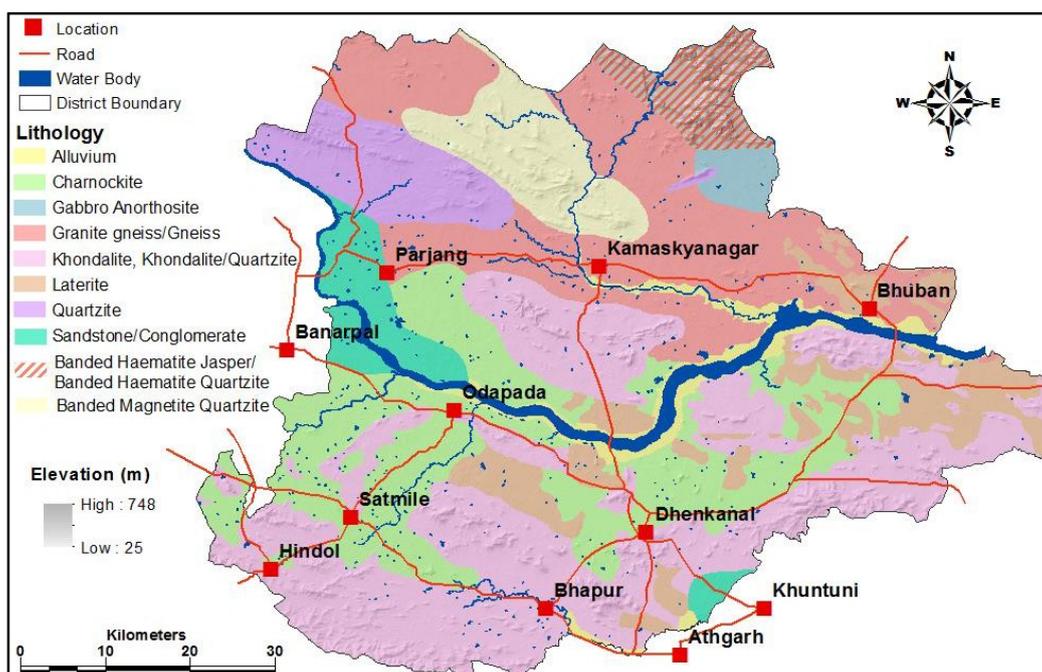


Figure 1-3 Geological Map of Dhenkanal District

Structure: The Archean trend NE-SW to E-W and are steeply dipping. The rock types are jointed with joint directions varying from NE-SW to NW-SE. The Gondwana sediments were deposited in the faulted troughs. The Gondwana have a gentle dip of 6 to 10° towards north. The faults detected in this formation trends NE-SW, N-S and NW-SE.

Khondalite Suite of Rocks: These comprise quartz-garnet-sillimanite schists and gneisses and calc-silicate rocks. The typical Khondalites are reddish brown in colour with specs of pink or red garnets and sillimanite needles aligned to schistosity of the rock units. The rocks strike ENE-WSW with subvertical dip. These have been extensively weathered with the depth of weathering varying from 8.5 to 30 m depending on the topography.

Charnockite Suite of Rocks: These occupy most of hilly areas of the district and more predominant than the Khondalites. These include acid, intermediate and basic Charnockites. They strike N35°E with vertical dips. These have undergone spheroidal weathering. The depth of weathering in the rocks ranges up to 15 m depending on the topographic situation.

Granite Gneiss: These are extensively found throughout the district occupying the low gradient plateau region towards the north. These include garnetiferous granite gneiss, biotite gneiss, medium to coarse grained porphyritic to porphyroblastic varieties. These rocks exhibit 3 sets of joints and are exposed in the hill ranges, in deep valleys as well as undulating plains. The depth of weathering is quite extensive and the thickness of weathered zone may be up to 32 m depending on the topographical situation.



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Pegmatite, Quartz veins, Anorthosites, Amphibolites: Occurrence of small veins of quartz and pegmatite traversing the granite gneisses, charnockites and khondalites is an important feature. These exhibit criss-cross cutting relationship with the country rocks and are limited in occurrence. The quartz veins have been sheared and fractured at places. The anorthosites and amphibolites have very isolated and limited occurrence. Due to limited extent and occurrence they have of least significance from the ground water point of view.

Lower Gondwana: This comprises of gritty sandstone, felspathic sandstone and carbonaceous shale and conglomerates and found as two isolated patches in the Kantamal block. The shales are greenish and highly friable and the sandstones are brownish and are medium to coarse grained. The formations have low easterly dips of 10° to 30°.

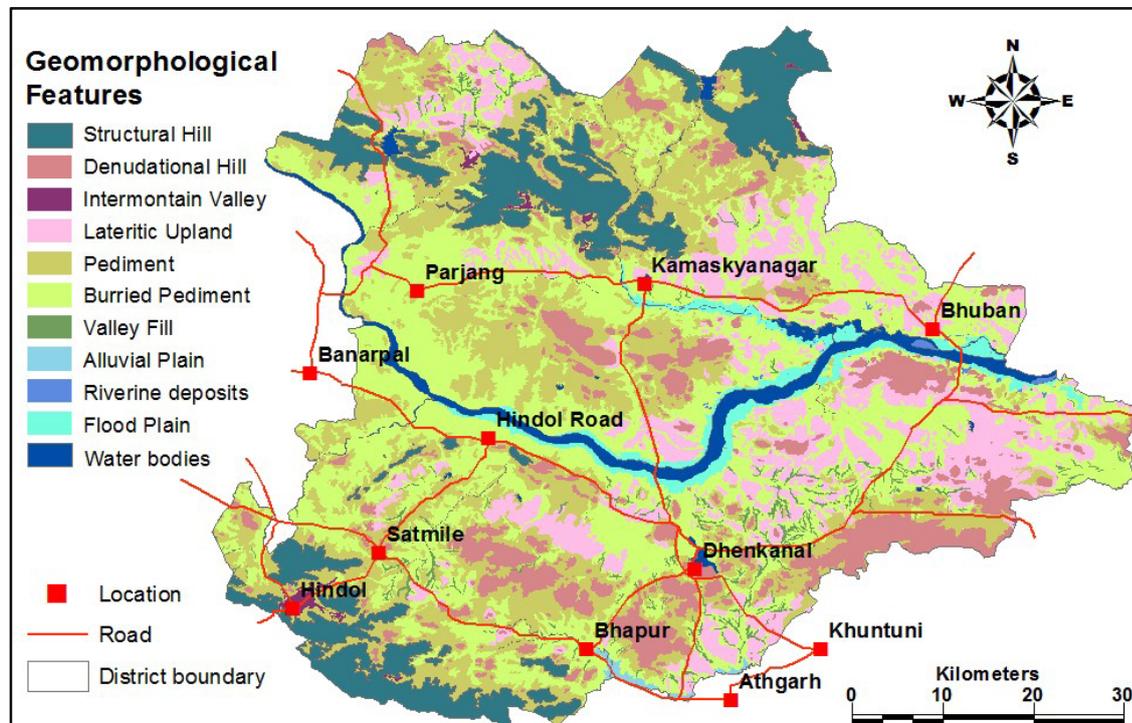
Laterite: The laterite occurs as a cap rock over all kinds of formations like granite gneisses, charnockites and khondalites in the undulating plains and low lying area as small patches. These are found below the soil cover with the depth ranging from 1 to 3.5 m. They are highly porous and permeable.

Valley Fill Deposits: They occur as narrow strips along the stream courses and intermontane valleys. These are heterogeneous in character comprising of pebble, gravel, coarse and fine sand, silt and clay. The width of the stripes varies from 10m to less than a km. and thickness of the deposit ranges from a few centimeters to a few metres.

Alluvium: These comprise of various grades of sand, gravel with subordinate silt and clay and occur in the northern part of Dhenkanal district, on the southern bank of river Mahanadi. The thickness of the alluvium varies from less than a metre along the fringe of rock exposures to more than 10m and is largely controlled by the topography of the basement crystallines. The alluvium as discontinuous patches are also encountered along the major streams.

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Structure: Granite gneisses and Khondalites exhibit well developed foliations while in Charnockites, it is less pronounced. Banding is prominent in the Gneisses and Khondalites. Various sets of joints occur in different



rock formations. Granite gneiss exhibit prominent parallel joints. The Khondalites in addition to high angle joints show prominent sub-horizontal joints. The rocks have been sheared and myonitised at places. Joints in granite gneiss are sub-vertical striking (i) along the trend of the rock, (ii) N55°E-S55°W and (iii) S40°W-N40°E. Sandstones and shales of lower Gondwana have fissile bedding planes and open joints. Carbonaceous shales are highly jointed.

Figure 1-4: Geomorphology of Dhenkanal district.

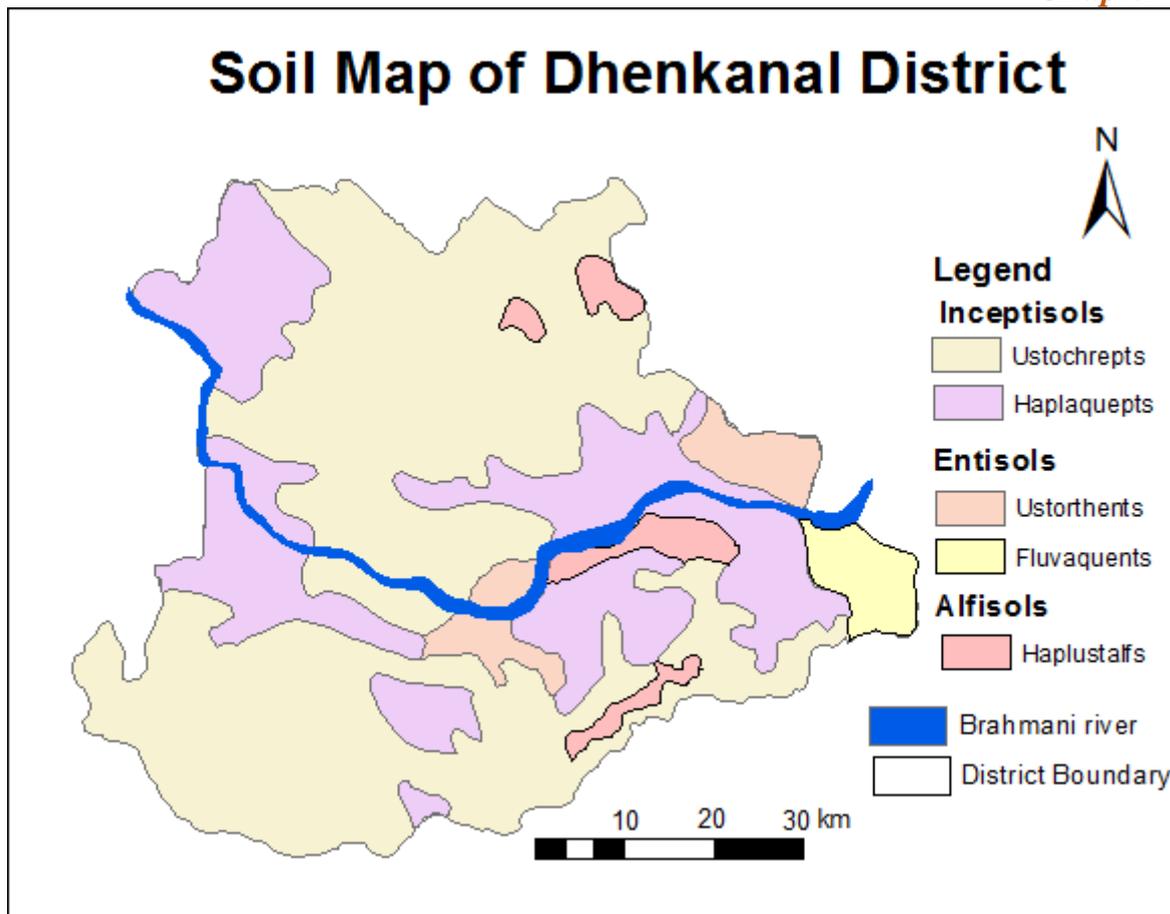


Figure 1-6 Soil Map of Dhenkanal district.

The soil characteristics of the district show wide variation depending upon their occurrence, physical and chemical properties. The soil of the district is broadly grouped into 1) Ultisols and 2) Alfisols 3) Entisols

Alfisol or Red Soil:

The Alfisols, in the district, include red sandy soils and red loamy soils. These soils predominantly occupy high and medium land throughout the Dhenkanal district. Alfisols are neutral to slightly acidic in nature (pH varies from 5.5 to 6.9). The characteristic features of red soils are (i) light texture, porous and friable structure, (ii) absence of lime kankar and free carbonates and (iii) soluble salts in small quantity usually not exceeding 0.05%. These are usually deficient in nitrogen, phosphate, organic matter and lime. These soils are suitable for cultivation of paddy and other crops



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Ultisols:

The ultisols comprises mainly of lateritic soils and red and yellow soils. These soils are mildly acidic in nature and deficient in nitrogen, phosphorous and potassium and organic matters.

Entisols:

These are younger alluvial soil occur along the Brahmani river on the eastern part of the district. The soils are deficient in nitrogen, phosphoric acid and humus but are not generally in potassium and lime. The PH of the soil is alkaline. The texture varies from sandy and loamy sand. The soils are most fertile and are suitable for variety of crops like paddy, wheat, sugarcane, cotton, banana and tobacco.

Table 1.3-2 soil classes

Soil Classes	Area_Ha
Matured, Red & Lateritic Soil(Alfisols)	36286.21
Mixed Grey Soil (Inceptisols)	237834.28
Unaltered Soils With Coarse Parent Materials (Entisols)	111022.43
Unclassified Soil	22324.53
Settlement	12339.68
Waterbody	10669.87
Total	430477.00

1.4 Land use

The study area shows wide variation in the pattern of land utilization. The forest area is 59% of total geographical area. The net sown area of the district is 132780 ha with maximum cropping intensity in Harbhanga block which is 169%. Agriculture is the main stay for the rural population of the district. The block-wise land use pattern is shown in Table.

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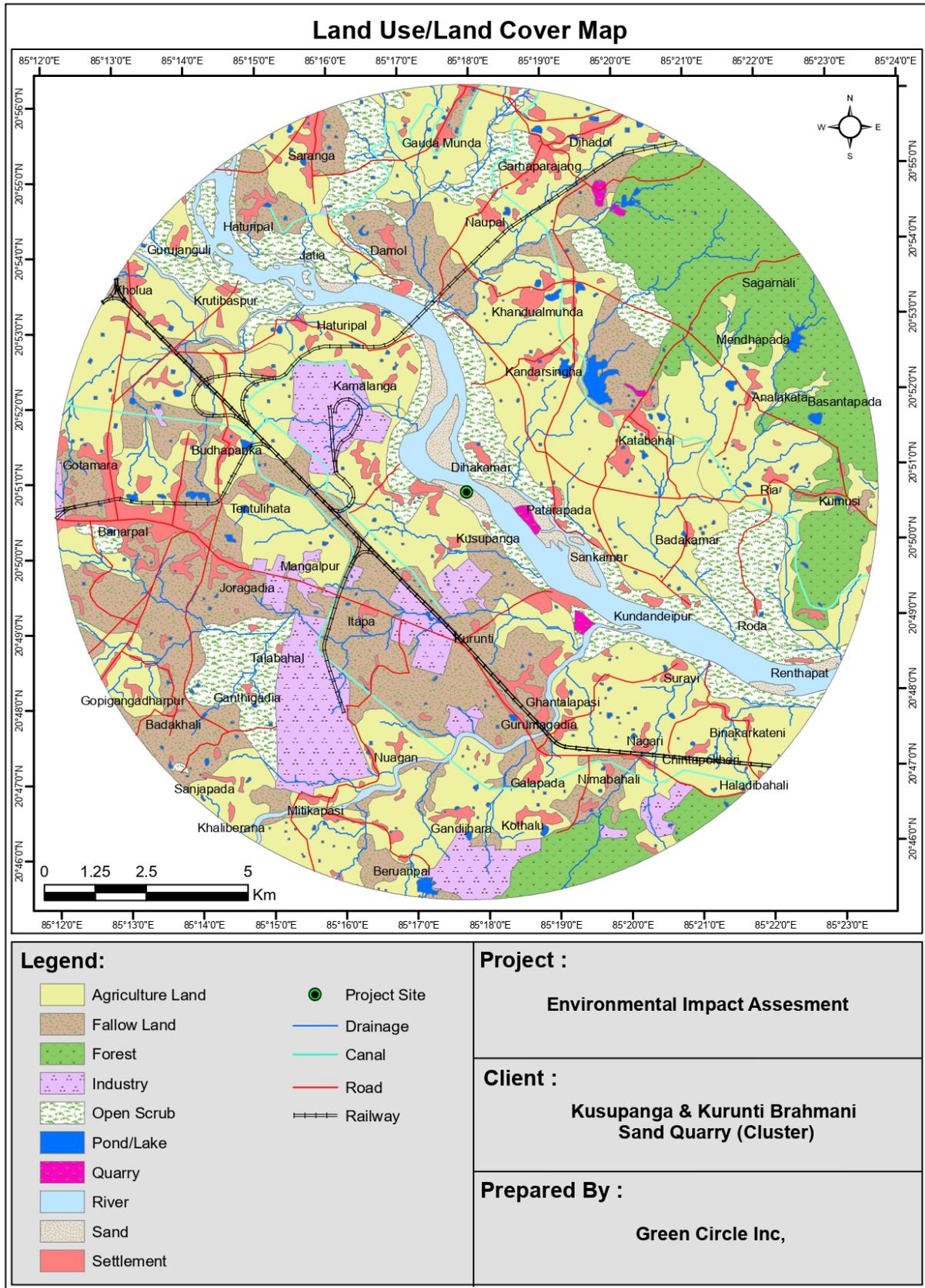


Figure 1-7 Land Use/Land Cover Map of Study Area

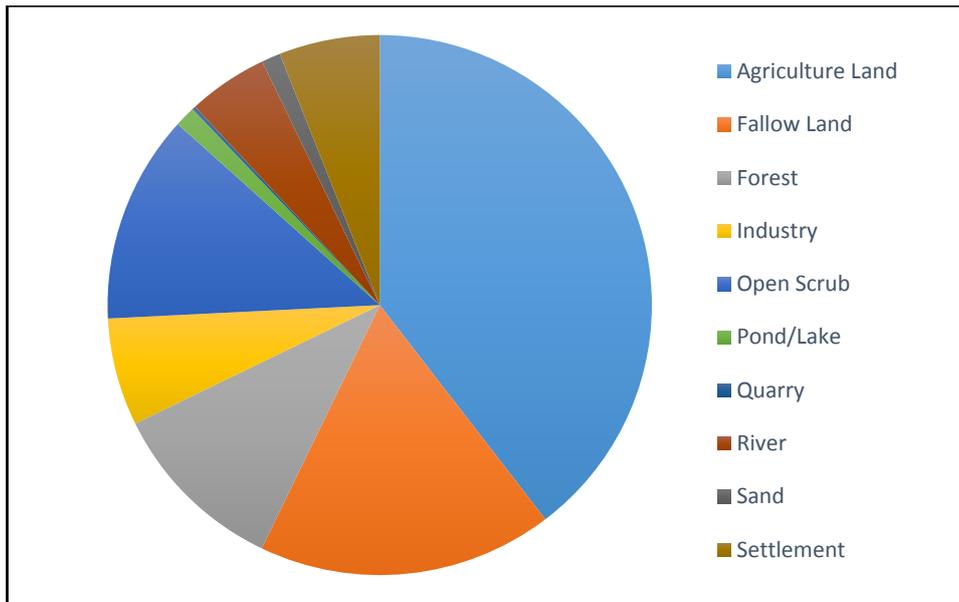
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Table 1-3 Land Use Pattern in the Study Area

LULC Class	Area in Ha.	% of Area
Agriculture Land	12487.73	39.58%
Fallow Land	5538.74	17.56%
Forest	3351.45	10.62%
Industry	2031.39	6.44%
Open Scrub	3937.09	12.48%
Pond/Lake	389.02	1.23%
Quarry	67.26	0.21%
River	1500.82	4.76%
Sand	354.86	1.12%
Settlement	1888.35	5.99%



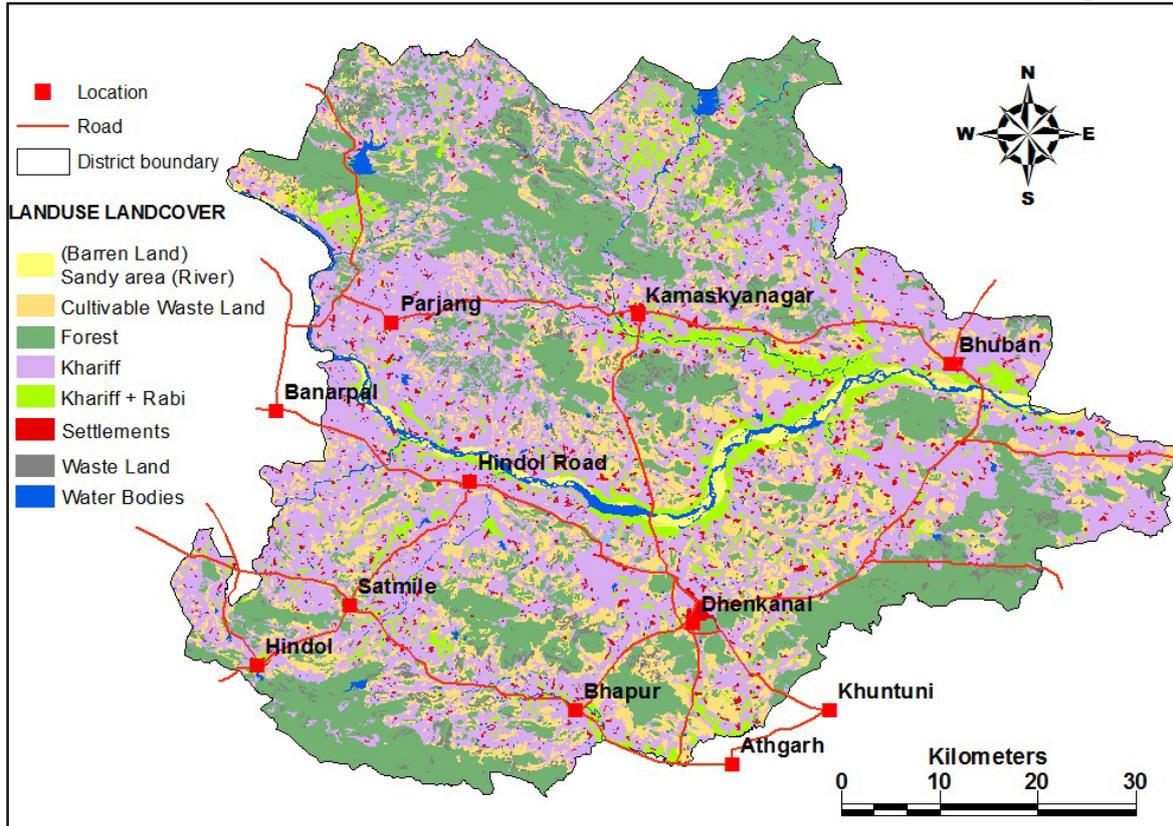


Figure 1-8 Land use in the NAQUIMA Area in Dhenkanal district

The cultivation is mainly in the Kharif season. Rabi cultivation is restricted to areas with irrigation facilities. The different crops grown in the area are paddy, pulses (Arhar, Green and Blackgram) and vegetables (potato, onion, garlic, turmeric, ginger and seasonal vegetables), fruits (mango, coconut, guava) etc. The major crop of the district is paddy. The paddy area in the district covers 59335 ha. The productivity of rainfed paddy and irrigated paddy in kharif season is 27.54qt/ha and 41.75 qt/ha respectively. The productivity of irrigated paddy in rabi season is 45.37qt/ha. The area under cereals, coarse cereals, pulses, oilseeds, fibres, vegetables, spices constitute 68270ha, 610ha, 37310ha, 6880ha, 250ha, 17440 ha and 1900ha respectively in the district

Table 1.4-4 Land use pattern in Dhenkanal district

Sl. No.	Block	Geog. area in ha	Gross cropped area in ha	Net sown area in ha	Area sown more than once	Cropping intensity (%)	Area under forest in ha	Area under wasteland in ha	Area under other uses in ha
1	Dhenkanal Sadar	46569	43729	30607	13122	143	10580	78	556
2	Odapada	34056	30632	21625	9007	142	6571	130	383
3	Gondia	47933	35638	23115	12523	154	16585	167	469
4	Hindol	81370	42600	31689	10911	134	41097	788	931



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Sl. No.	Block	Geog. area in ha	Gross cropped area in ha	Net sown area in ha	Area sown more than once	Cropping intensity (%)	Area under forest in ha	Area under wasteland in ha	Area under other uses in ha
5	K.Nagar	46865	31420	19381	12039	162	21821	138	130
6	Bhubana	29216	32746	19757	12989	166	6000	678	290
7	Parjang	50497	33762	20771	12991	163	24319	511	145
8	Kankadahada	93971	31141	19341	11800	161	65726	1983	326
	Total	430477	281668	186286	95382	153	192699	4473	3230

1.5 Hydrogeology Study

Hydrogeologically the district can be divided into consolidated formations belonging to Eastern Ghats, semi-consolidated formations belonging to Lower Gondwana and shallow unconsolidated alluvial formations occupying the southern bank of Mahanadi and course of Tal and other major rivers. The hydrogeological map of the area is presented in the major part of district groundwater occurs under phreatic and semi-confined conditions, the water being stored in these secondary conduits viz. weathered mantle, fractures and

The depth of exploratory bore hole drilled in khondalite varies from 82 to 169 m and the thickness of weathered zone varied from 16 to 26 m. The depth of the saturated fracture varied from 21 to 72 m and yield varied from 0.5 to 9.55 lps. The static water level varied from 2.6 to 4.96 mbgl.

The granitic rock is having yield up to 10 lps with average of 3 to 5 lps. The fracture zones are mostly confined within 75 to 100 m depth and within this depth 2 to 3 fractures are generally encountered. The yield from bore wells in charnokite is generally restricted within 2 lps.

joint planes etc. Infiltration of atmospheric precipitation is the principal source of ground water recharge. Besides other contributory sources are the seepage from irrigation canals, return seepage from applied irrigation and seepage from the reservoirs. Most of the rainfall in the hilly terrain goes as surface run-off where as in the moderately undulating plains and valley areas, rainfall contributes significantly to the ground water recharge to form potential aquifers under favourable conditions and within this depth 2 to 4 sets of fractures were encountered. It was noted that prominent saturated fractures commonly occur within hard and compact ferruginous sandstone. The depth of the static water level varies from 0.6 to 26.35 mbgl.

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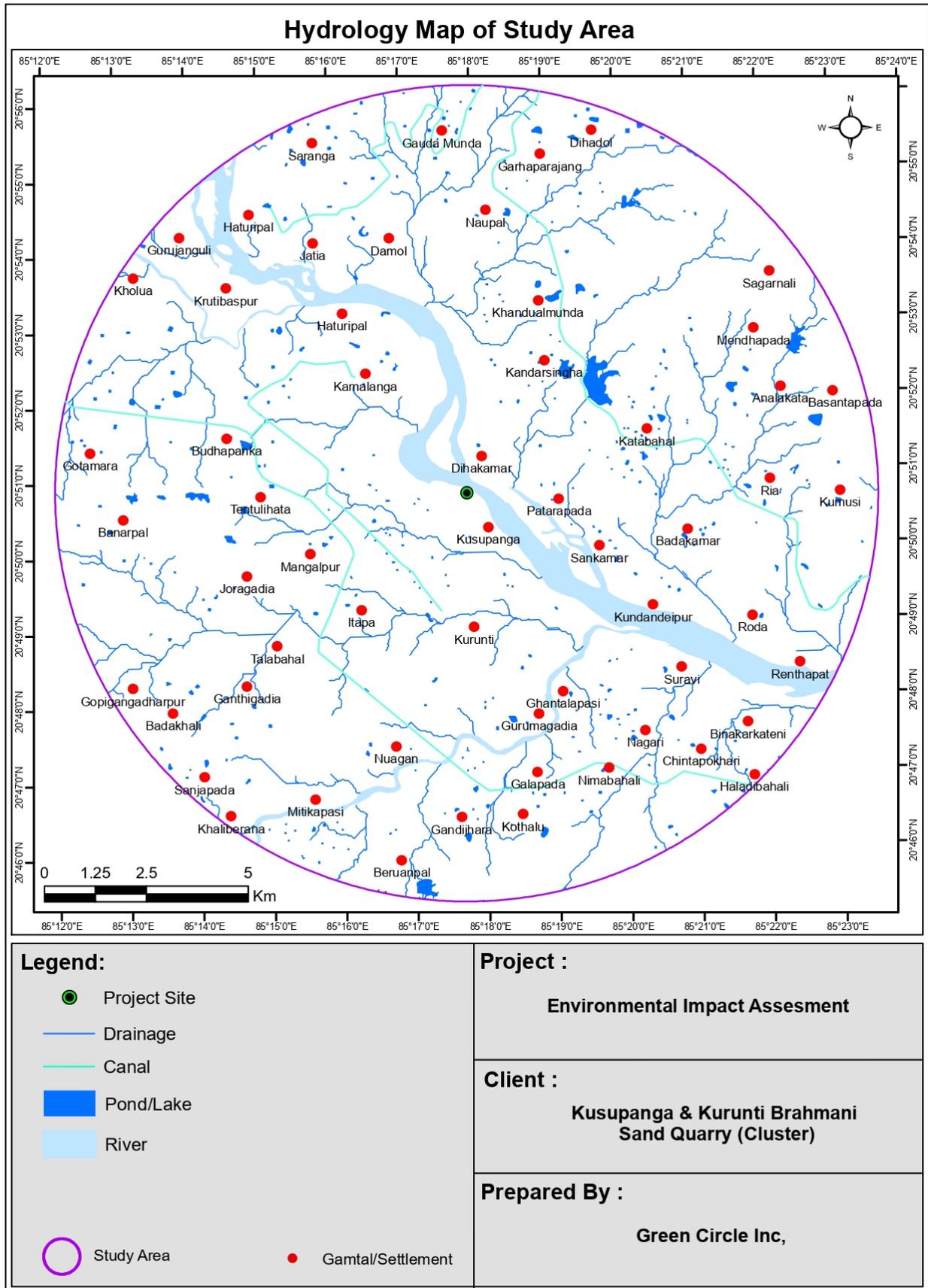


Figure 1-9 Hydrology Map of Study Aria

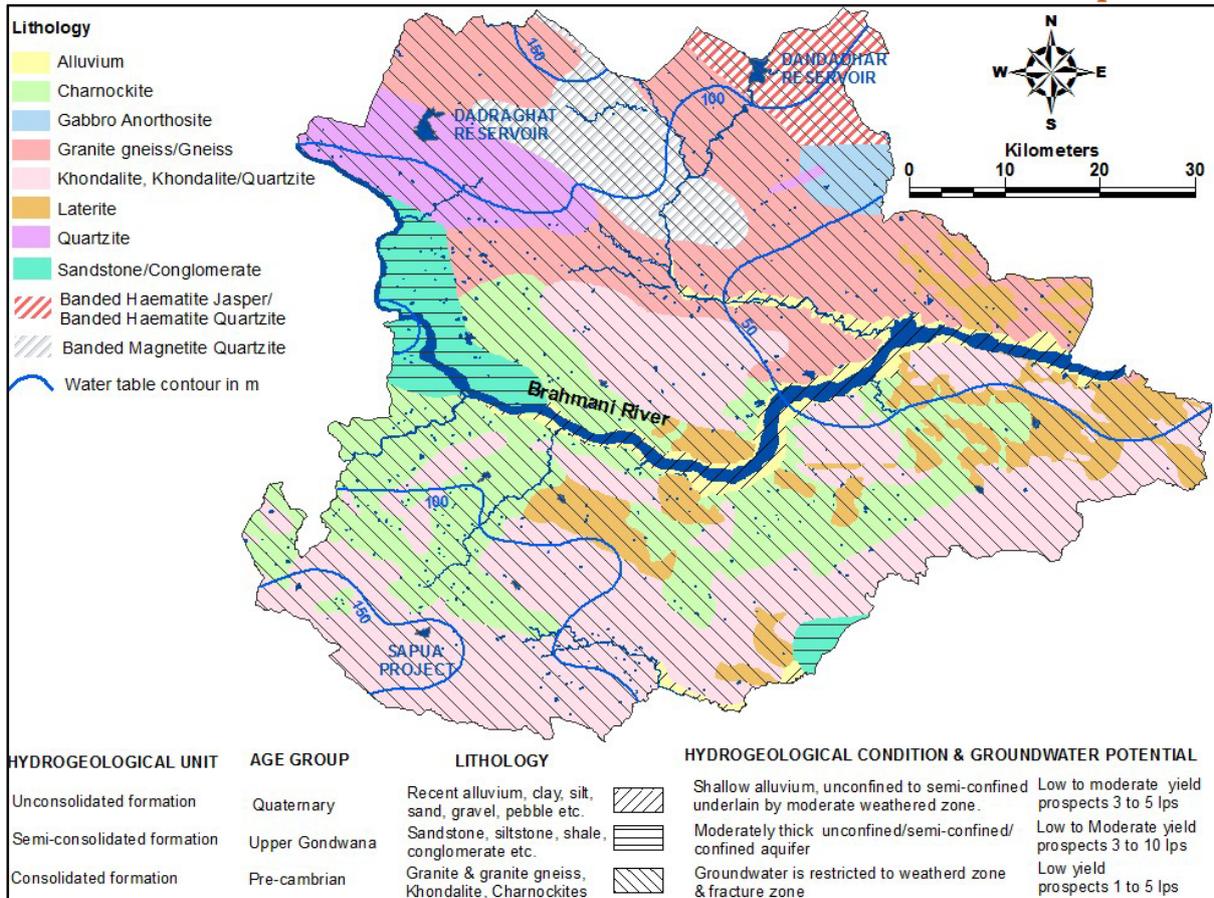
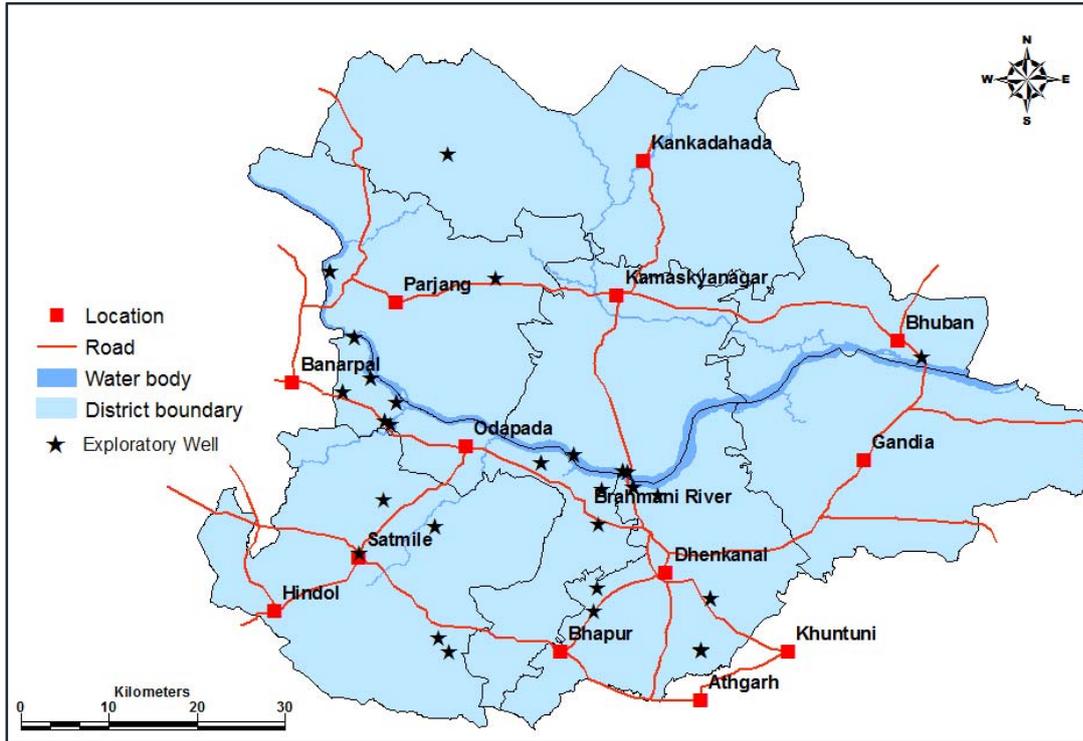


Figure 1-10 Hydrogeological Map of Dhenkanal district

1.6 Groundwater Exploration

In order to decipher the aquifers system of the area, CGWB has constructed numerous exploratory wells and observation wells which are shown in Fig. The details of data generated from this exploration are shown in Fig. . The details of data generated from this exploration are given in table.



**Figure 1-11 Locations of Exploratory Wells Drilled by CGWB in Dhenkanal District
Depth to Water Level Pre-Monsoon 2016**

A perusal of the water table data for the year 2018-19 indicates that the depth to water level in the district ranges from 4.1 to 9.98 m below ground level during pre-monsoon period and from 1.19 to 6.99 m below ground level during post monsoon period respectively. It is observed that during the pre monsoon period the depth to water table values are more than 6m in nearly fifty two percent of the NHS station. Baulpur, Dhenkanal, Saptasaja, Shankarpur are the area where water level is below 4m during pre monsoon period. In post monsoon period water level is generally found below 4m in most parts of the district. Areas like Kankadahad, Joranda, Baisingha and Lambodarapur have water level more than 6 m below ground level during post monsoon period.

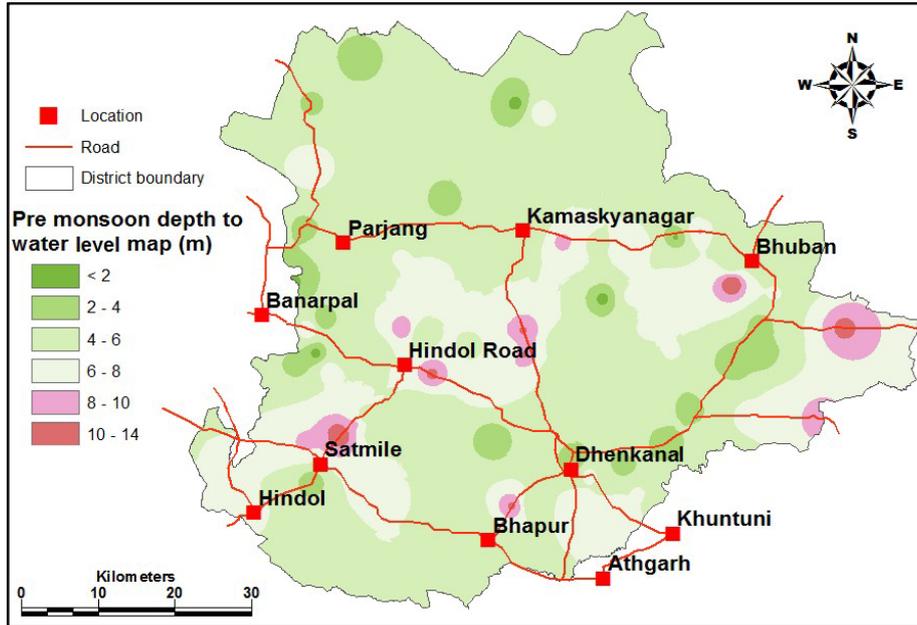


Figure 1-12 Depth to water level in phreatic aquifer during pre-monsoon

Depth to Water Level Post-Monsoon

Depth to water level in post-monsoon period (Nov 2018) varies from 0.45 mbgl (Dholpur) to 6.73(Tileswar) mbgl, the average being 2.80 m bgl. The depth to water level of the study area during Nov 2018 is in general within 3 mbgl. The areas around Dhenkanal on bank of Mahanadi and the valley fill areas between the highway and Salkir rivers show shallow water level of less than 3.0 mbgl. In Harbhanga block, the valley areas within Charichhak, harbhanga and Kusang have shallow water level of less than 3 mbgl. Southern parts of Dhenkanal block, mainly the medium high land areas south of Dhenkanal canal, Eastern parts of Kantamal block and one or two patches in Harbhanga block show relatively deeper water level of 3 to 6 mbgl. The locations where the depth to water level is more than 4.5 m bgl are Kusang (4.66), Tileswar (6.6 & 6.73) in Harbhanga block and Jaimumal (4.5) and Dopla (4.95 mbgl) in Kantamal block. The post-monsoon depth to water level map is shown below in .

Based on the chemical analysis of water samples from different sources, it was observed that ,almost all chemical parameters lie within permissible limit for drinking and irrigation purpose except few samples of some isolated pockets. For example, fluoride in excess of permissible limit has been found certain villages, which is discussed in details.

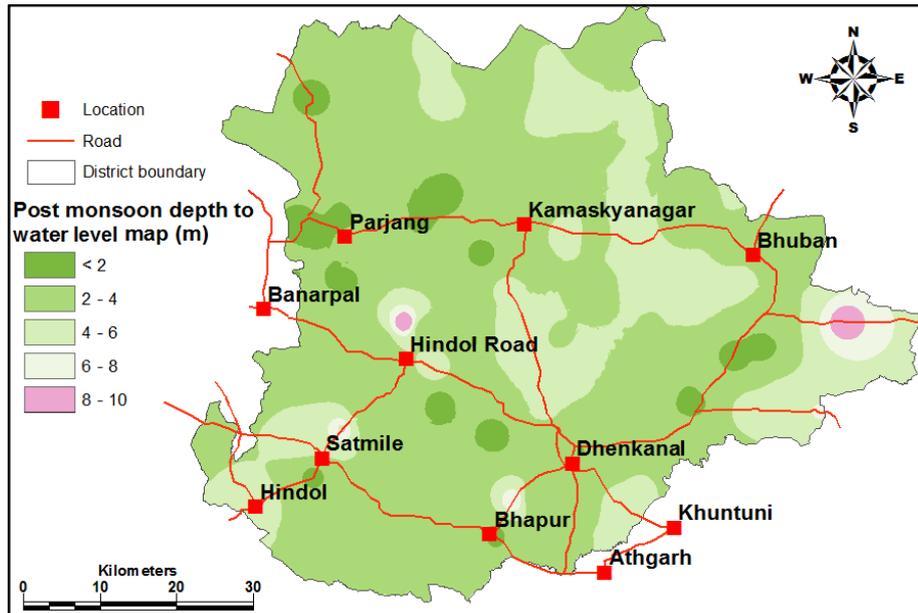


Figure 1-13 Depth to water level in phreatic aquifer during post-monsoon.

1.6.1 Ground Water Quality

The chemical quality of ground water in the district is monitored annually on a routine basis by CGWB through its national Hydrograph Network Stations. Quality of ground water from deeper aquifers was assessed during the exploration activities like drilling and pumping tests. The suitability of ground water for drinking/irrigation/industrial purposes is determined keeping in view the effect of various chemical constituents present in water.

Taking the results of chemical analysis during NAQUIM work and the available historical chemical data, the aquifer wise ranges of different chemical constituents present in ground water, are determined and shown in Table.

Table 1.6-1 Aquifer-wise ranges of chemical constituents in Dhenkanal district

Parameter	Unit	Shallow(Aquifer-I)		Deep(Aquifer-II)	
		Minimum	Maximum	Minimum	Maximum
pH	-	7.37	8.3	6.9	8.3
EC	μS/cm	290	2760	290	1190
TDS	mg/L	143	1477	194	476
TH	mg/L	110	970	120	410
TA	mg/L	94	558	-	-
Ca ⁺⁺	mg/L	20	263	10	112
Mg ⁺⁺	mg/L	5	151	4.9	77
Na ⁺	mg/L	2	172	12	193
K ⁺	mg/L	0.3	89.4	0.4	49



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Parameter	Unit	Shallow(Aquifer-I)		Deep(Aquifer-II)	
		Minimum	Maximum	Minimum	Maximum
CO ₃ ⁻	mg/L	0	0	0	0
HCO ₃ ⁻	mg/L	115	681	88	421
NO ₃ ⁻	mg/L	0.23	120	0.3	65
Cl ⁻	mg/L	10	490	10.6	220
SO ₄ ⁻	mg/L	0	114	0	80.5
F ⁻	mg/L	0.13	3.3	0	1.58
Fe	mg/L	-	-	0	1.04
SAR	-	0.1	3.7	7	153

1.7 Climate and Rainfall

The district enjoys tropical climate characterized by hot and dry summer, cold winter and erratic rainfall in monsoon. The winter season extends from November to end of February, which is followed by summer season from March to the middle of June, and rainy season from middle of June to middle of October.

Southwest monsoon is the principal source of precipitation in the district. The normal annual rainfall of the district is 1048.0 mm, out of which about 85% is received during monsoon season (mid June to mid October). The month of July and August gets the heaviest rainfall of the year, though rainfall is not very regular throughout the season but fairly uniform throughout the district. There are on the average 60 – 85 rainy days in a year. Besides, the relative humidity varies between 30 % to 86%. The district faces occasional flash floods, which, because of the terrain, cause heavy damage to roads and crops. Drought is an almost constant feature that visits the district almost every alternate year. The rainfall data of Dhenkanal district is shown in Table and the isohyets map of Dhenkanal district is shown in Fig.

Temperature and Humidity: During summer months the maximum temperature rises up to 46.1°C and May is the hottest month. December is the coldest month of the year when the average daily temperature drops down to 6.7 ° C. Relative humidity is around 26-82% throughout the year. The highest and lowest monthly mean relative humidity so far recorded is 82% (Dec) and 26%(April). Humidity of the air is generally high during southwest monsoon season and decreases from the end of November due to cold wave.

Wind: Wind is generally light to moderate. During summer and southwest monsoon season, wind velocity increases. In the post-monsoon months and in winter, wind is mainly from the north and east. During summer wind direction is variable and in rainy season wind from southwest direction is very common. The southern part of the district is prone to cyclonic storms.

Table 1.7-1 Rainfall data of Dhenkanal district

Sl.No.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Total	year
1	0.0	0.0	0.5	96.8	115.9	171.2	422.4	265.3	359.0	154.6	0.0	34.3	1620.1	2018
2	0.0	0.0	81.4	24.0	109.7	195.8	345.9	463.2	200.9	195.5	70.7	0.0	1687.2	2017
3	5.5	12.3	15.0	4.8	30.0	125.3	219.0	284.3	292.1	56.6	0.2	0.0	1045.1	2016
4	20.8	2.4	12.6	95.1	91.3	140.6	459.4	186.9	97.1	37.6	1.8	12.4	1158.0	2015
5	3.1	15.0	8.8	10.3	157.0	70.5	573.8	339.3	204.6	29.2	0.0	0.0	1411.6	2014
6	0.0	0.0	0.0	5.0	14.3	274.0	266.2	185.0	147.9	277.6	0.0	0.0	1170.2	2013
7	76.2	0.0	0.0	24.5	23.8	149.7	446.1	442.1	207.5	110.9	156.9	0.0	1637.5	2012
8	0.0	4.4	2.9	40.4	55.0	133.6	249.4	312.8	513.5	42.1	0.0	0.0	1354.0	2011
9	0.0	0.0	9.1	14.9	118.3	187.3	212.1	226.6	185.6	121.4	9.5	42.8	1127.4	2010
10	0.0	0.0	17.7	13.8	43.0	131.3	372.8	271.5	166.2	79.4	53.9	0.0	1149.4	2009
11	3.8	11.6	21.5	19.4	61.9	192.3	225.6	275.0	303.4	27.5	19.9	0.0	1162.0	2008

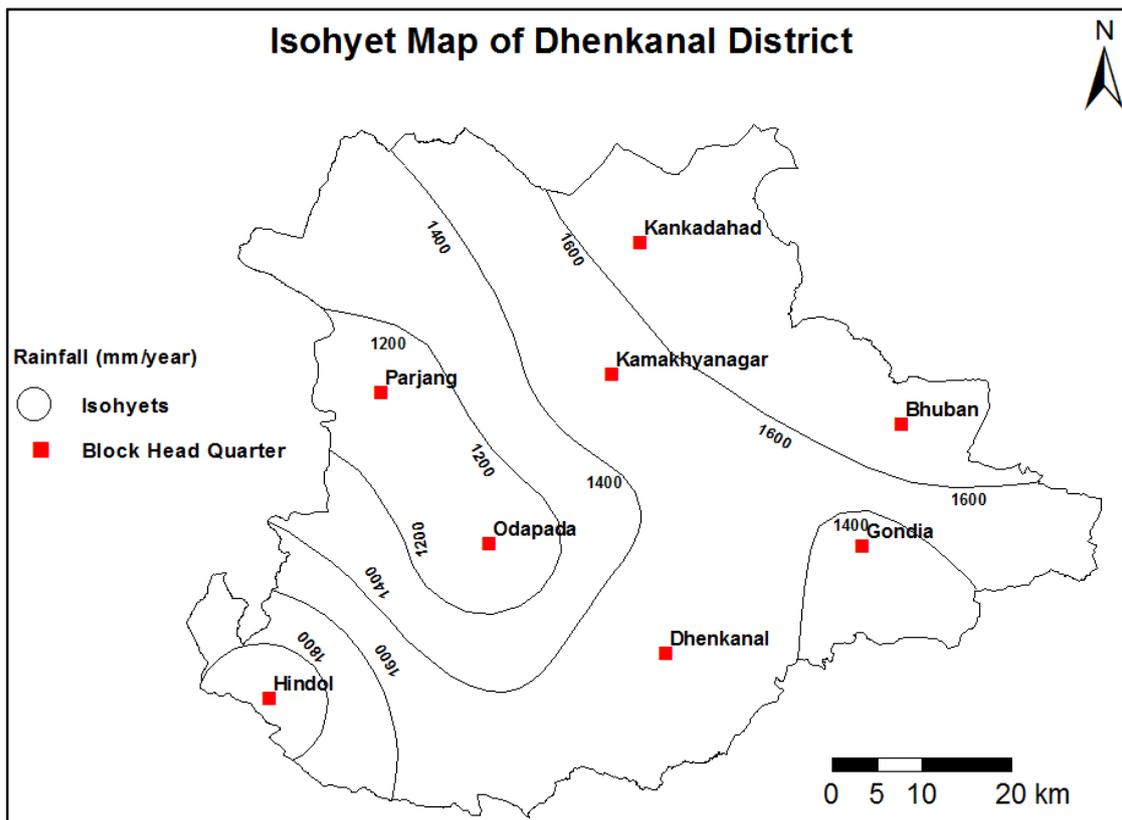


Figure 1-14 Isohyet Map of Dhenkanal district.

1.8 Meteorology

Micro meteorological data within the study area, during air quality survey period. Meteorological data recorded during the monitoring period is very useful for proper interpretation of the baseline information as well as for the input to the predictive air pollutants dispersion models. Historical data on



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meteorological parameters will also play an important role in identifying the general meteorological status of the region. Site specific data can be compared with the historical data in order to identify changes, which may have taken place due to the rapid industrialization in the area.

The micro-meteorological parameters regulate the transport and diffusion of pollutants released into the atmosphere. The principle variables which affect the micrometeorology are horizontal connective transport (average wind speed and direction), vertical connective transport (atmospheric stability and inversion conditions) and topography of the area.

The year may broadly be divided into four seasons.

Winter season	:	December to February
Pre-monsoon season	:	March to May
Monsoon season	:	June to September
Post Monsoon season	:	October to December

Table 1.8-1 Meteorological Data (2022)

Month	Maximum temperature (Deg. C)	Minimum temperature (Deg. C)	Average temperature (Deg. C)	Average Humidity (%)	Wind Speed (Kmph)	Rainfall (mm)
January	34	14	23	71	7.1	2.7
February	40	14	25	61	8.2	0
March	44	21	30	68	11.8	2.4
April	42	24	31	70	14.8	17.3
May	39	23	30	78	16.1	374.17
June	38	24	29	87	12.6	337.9
July	35	25	29	87	11.6	317.54
August	35	25	29	89	10.2	256.51
September	33	25	28	92	9.5	315.8
October	34	21	28	86	7.5	80.58
November	31	16	25	82	7.1	39
December	28	11	21	80	7.7	132.9

Source: <https://www.timeanddate.com/weather/india/>) (<https://www.worldweatheronline.com/>)

1.8.1 Met Data Generated at Site

Site specific climatic condition refers to average weather comprising of temperature, relative humidity, wind speed, rainfall, cloud cover etc. This determines the baseline conditions and probable impacts on environmental parameters with respect to the Project. Monitoring duration (1st October 2023 to 31st December 2023)

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Ambient Temperature:

Month	Temperature (°C)		
	October, 2023	November, 2023	December, 2023
Maximum	36	30	28
Minimum	24	22	17
Average	28	25	22

Precipitation:

Month	Total Precipitation (mm)
October, 2023	0.0
November, 2023	
December, 2023	

Humidity:

Month	Humidity (%)		
	October, 2023	November, 2023	December, 2023
Average	78	57	41

Wind Speed:

Month	Wind Speed (km/hr.)		
	Maximum	Minimum	Average
October, 2023	17.7	Calm	11.2
November, 2023	16.5	Calm	10.6
December, 2023	13.8	Calm	8.3

1.8.2 Wind Rose

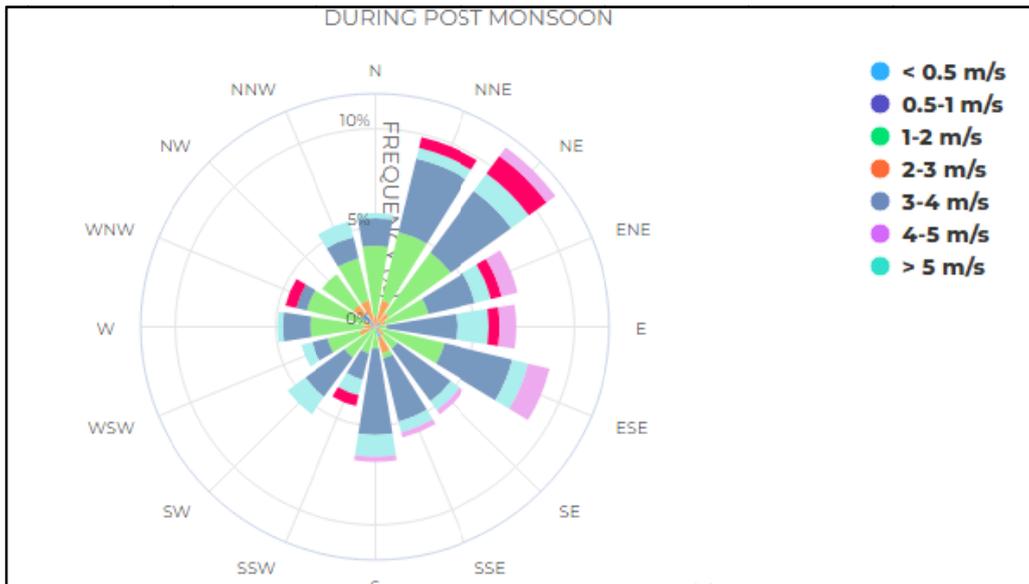


Figure 1-15 Wind Rose (October 2023 to December 2023)

1.9 Ambient Air Quality:

Reconnaissance: The quality of ambient air depends upon the background concentrations of specific contaminants, the emission sources and meteorological conditions. The study on baseline ambient air quality status in the project area is an essential and primary requirement for assessing the impacts on air environment due to any proposed developmental activity.

The baseline studies on air environment include identification of specific air pollution parameters expected to have significant impacts and assessing their existing levels in ambient air within the impact zone. To assess the baseline status of ambient air quality in the study area monitoring is undertaken to ascertain the baseline pollutant concentrations in ambient air.

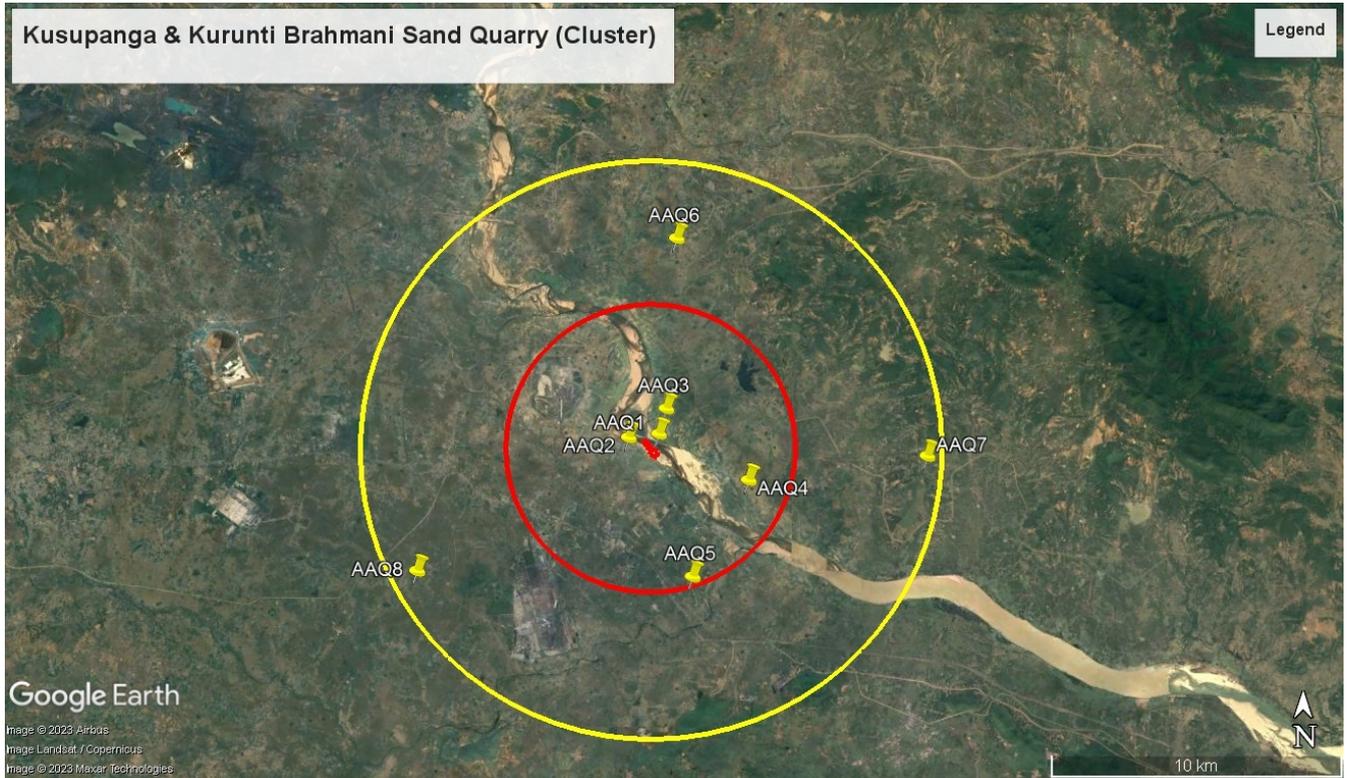
Methodology for air Monitoring: AAQM was carried out and AAQM locations were monitored on 24 hourly average bases twice in a week as per guidelines of CPCB and NAAQS. The conventional and project specific parameters such as particulate matter PM₁₀ (size less than 10 μm), particulate matter PM_{2.5} (size less than 2.5 μm), Sulphur Dioxide (SO₂) & Oxides of Nitrogen (NO_x) were monitored.

Selection of Stations for Sampling: Depending upon the purpose of the study IS: 5184 (part XIV) lays down various criteria for selection of sampling stations. For EIA/ EMP, the purpose is to ascertain the baseline pollutant concentrations in ambient air. Accordingly, the criterion has been selected to ascertain quality of air on human settlements or environmentally sensitive areas if any located in the 10 km radius study area.

Air Monitoring Stations

The locations for AAQM study were selected within the 10 km radius of the proposed plant installation. Ambient air quality was monitored on 08 locations to generate representative ambient air quality data.

The sampling locations are shown in Figure and listed in Table:



(Source: Google Image)

Figure 1-16 Ambient Air Quality Monitoring Locations on Google Map



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Table 1.9-1 Ambient Air Quality Monitoring Locations

Sr. No.	Location	Justification	Distance (km)	Directions	Coordinates	
AAQ1	Project Site	-	-	-	20°50'49.80"N	85°17'51.75"E
AAQ2	Kuspunga	Lateral	0.84	W	20°50'46.11"N	85°17'15.74"E
AAQ3	Palasahi	Upwind	1.00	N	20°51'18.19"N	85°18'00.40"E
AAQ4	Parjanga	Cross wind	3.50	E	20°49'58.22"N	85°19'39.44"E
AAQ5	Matanga	Cross wind	5.50	S	20°48'10.42"N	85°18'32.74"E
AAQ6	Janhapada	Upwind	7.25	N	20°54'30.89"N	85°18'12.14"E
AAQ7	Kusumi	Cross wind	9.37	E	20°50'26.67"N	85°23'13.49"E
AAQ8	Nalachandrapur	Downwind	8.91	SW	20°48'16.87"N	85°13'04.49"E

(Source: Analysis during study period, GCI)



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Table 1.9-2 Ambient Air Quality Monitoring Results (24-hour average)

Locations		PM10 (µg/m ³)	PM2.5 (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	CO (mg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	O ₃ (µg/m ³)	As (ng/m ³)	Ni (ng/m ³)	Benzo (a) Pyrene (ng/m ³)	Benzen e (µg/m ³)
AAQ1	Maximum	82.6	24.9	7.9	13.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Minimum	65.3	22.6	6.3	10.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Average	73.9	23.8	7.1	11.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	98percentile	80.9	24.4	7.7	12.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
AAQ2	Maximum	69.4	21	8.2	13.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Minimum	58.6	19.1	6.7	10.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Average	64.0	20.0	7.4	12.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	98percentile	68.0	20.5	8.0	13.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
AAQ3	Maximum	59.8	21.2	8.6	11.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Minimum	53.8	18.3	7.1	9.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Average	56.8	19.7	7.9	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	98percentile	58.6	20.7	8.5	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
AAQ4	Maximum	82.1	24.8	6.5	10.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Minimum	69.3	20.9	5.4	8.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Average	75.7	22.9	6.0	9.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	98percentile	80.5	24.3	6.4	10.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
AAQ5	Maximum	80.3	24.3	7.2	11.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Minimum	78.2	23.6	5.9	9.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1



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Locations		PM10 (µg/m ³)	PM2.5 (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	CO (mg/m ³)	NH ₃ (µg/m ³)	Pb (µg/m ³)	O ₃ (µg/m ³)	As (ng/m ³)	Ni (ng/m ³)	Benzo (a) Pyrene (ng/m ³)	Benzen e (µg/m ³)
	Average	79.3	23.9	6.5	10.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	98percentile	78.7	23.8	7.0	11.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
AAQ6	Maximum	80.1	24.2	8.1	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Minimum	73.5	22.2	6.6	10.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Average	76.8	23.2	7.3	11.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	98percentile	78.5	23.7	7.9	11.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
AAQ7	Maximum	83.4	25.2	9.2	13.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Minimum	69.2	20.9	7.5	10.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Average	76.3	23	8.4	12.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	98percentile	81.7	24.7	9.0	12.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
AAQ8	Maximum	82.0	24.8	7.3	12.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Minimum	72.5	21.9	6.0	9.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	Average	77.3	23.3	6.6	10.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
	98percentile	80.4	24.3	7.1	11.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1

(Source: Primary Data Collection and analysis during study period by Laboratory)



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Table 1.9-3 National Ambient Air Quality Standards and Methods of Measurement

Sr. No.	Pollutants	Time Weighted Average	National Ambient Air Quality Standards (NAAQS)		
			Industrial, Residential, Rural and other area	Ecologically Sensitive Area	Methods of measurement
1	SO ₂ (µg/m ³)	24 hours	80	80	Improved West and Gaeke method.
2	NO _x (µg/m ³)	24 hours	80	80	Modified Jacob & Hochheiser (Sodium Arsenite).
3	PM ₁₀ (µg/m ³)	24 hours	100	100	Gravimetric Method
4	PM _{2.5} (µg/m ³)	24 hours	60	60	Gravimetric Method
5	CO (mg/m ³)	8 hours	2	2	Non Dispersive Infra-Red Spectroscopy
6	Ammonia (µg/m ³)	24 hours	400	400	Indophenol Blue Method
7	Ozone (µg/m ³)	8 hours	100	100	UV Photometric Chemical Method
8	Lead (µg/m ³)	24 hours	1.0	1.0	AAS
9	Arsenic (ng/m ³)	Annual	6.0	6.0	AAS
10	Nickel (ng/m ³)	Annual	20.0	20.0	AAS
11	Benzopyrene (ng/m ³)	Annual	1.0	1.0	Gas Chromatography

(Source: http://cpcb.nic.in/National_Ambient_Air_Quality_Standards.php)



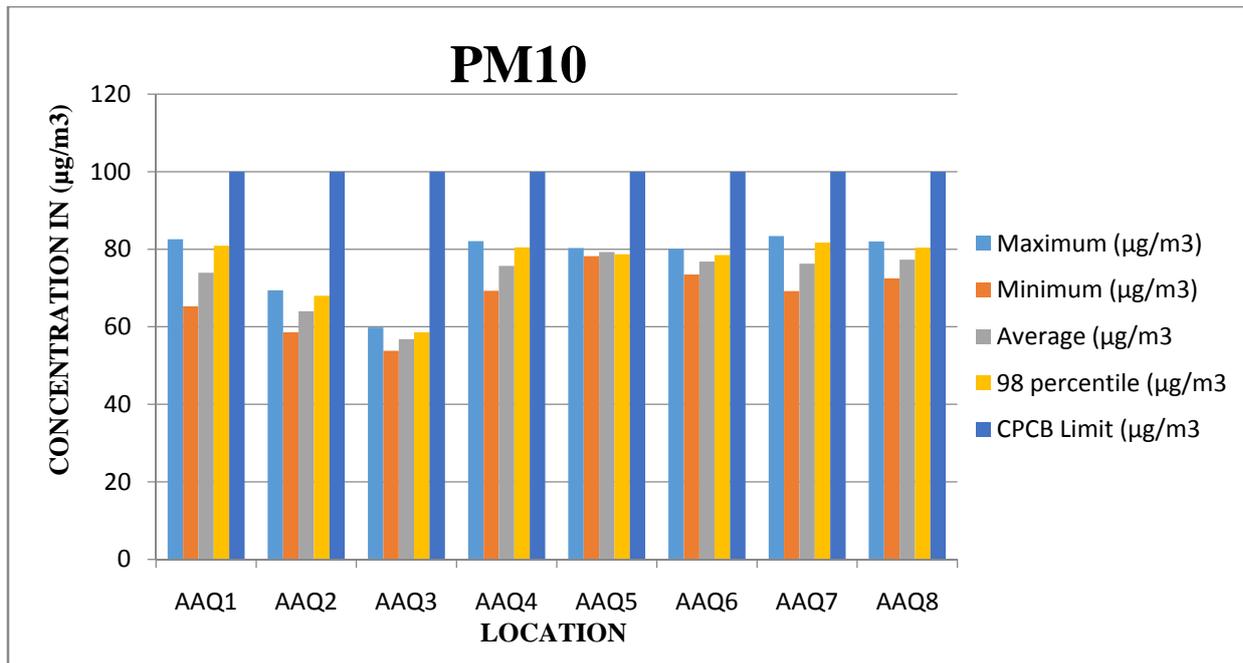
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1.9.1 Observations on Ambient Air Quality:

Particulate Matter (PM₁₀):

PM₁₀ levels were ranging from 53.8 to 83.4 μg/m³. The highest PM₁₀ level was found at Kusumi as wind is blowing from North to South and this location is located in East. Due to Mining activity in downwind which contain pollution load and lowest PM₁₀ level were observed at Palasahi. PM₁₀ concentration was within the NAAQS level (i.e.100 μg/m³) at all locations.



(Source: Analysis GCI)

Figure 1-17 Graphical representation of PM₁₀ concentration at different locations

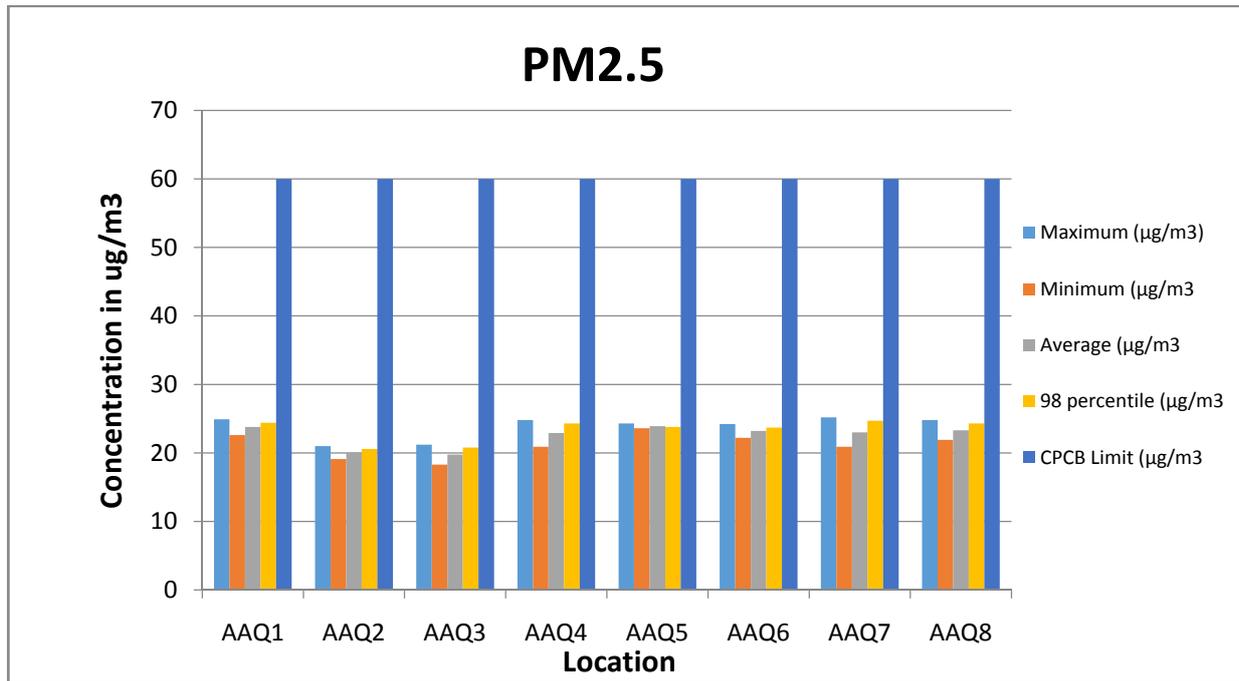


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Particulate Matter (PM_{2.5}) :

PM_{2.5} levels were ranging from 18.3 to 25.2µg/m³. The highest PM_{2.5} level was found at Kusumi as wind is blowing from North to South and this location is located in East. Due to Mining activity in downwind which contain pollution load and lowest PM_{2.5} level was observed at Palasahi. PM_{2.5} concentration was found within the NAAQS level (i.e.60 µg/m³) at all the locations.



(Source: Analysis GCI)

Figure 1-18 Graphical representation of PM_{2.5} concentration at different location

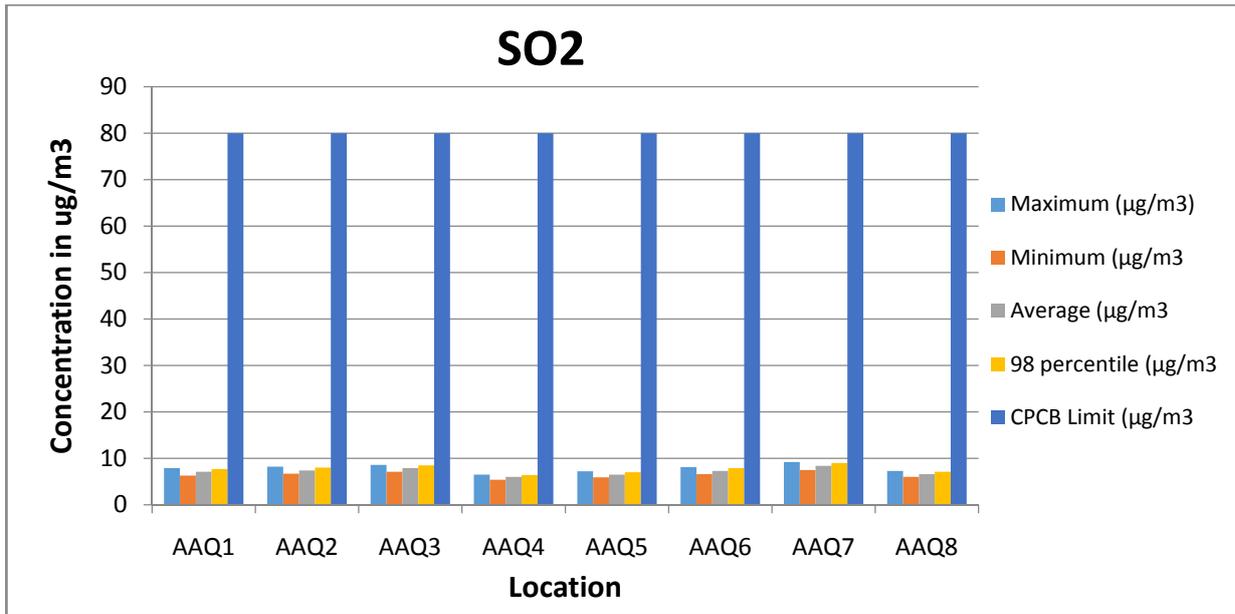


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Sulphur Dioxide (SO₂):

SO₂ levels were ranging from 5.4 to 9.2µg/m³. The highest SO₂ level was found at Kusumi as wind is blowing from North to South and this location is located in East. Due to Mining activity in downwind which contain pollution load and lowest SO₂ level was observed at Parjanga. The SO₂ level in all the monitoring locations is within permissible limit i.e. NAAQS level 80µg/m³.

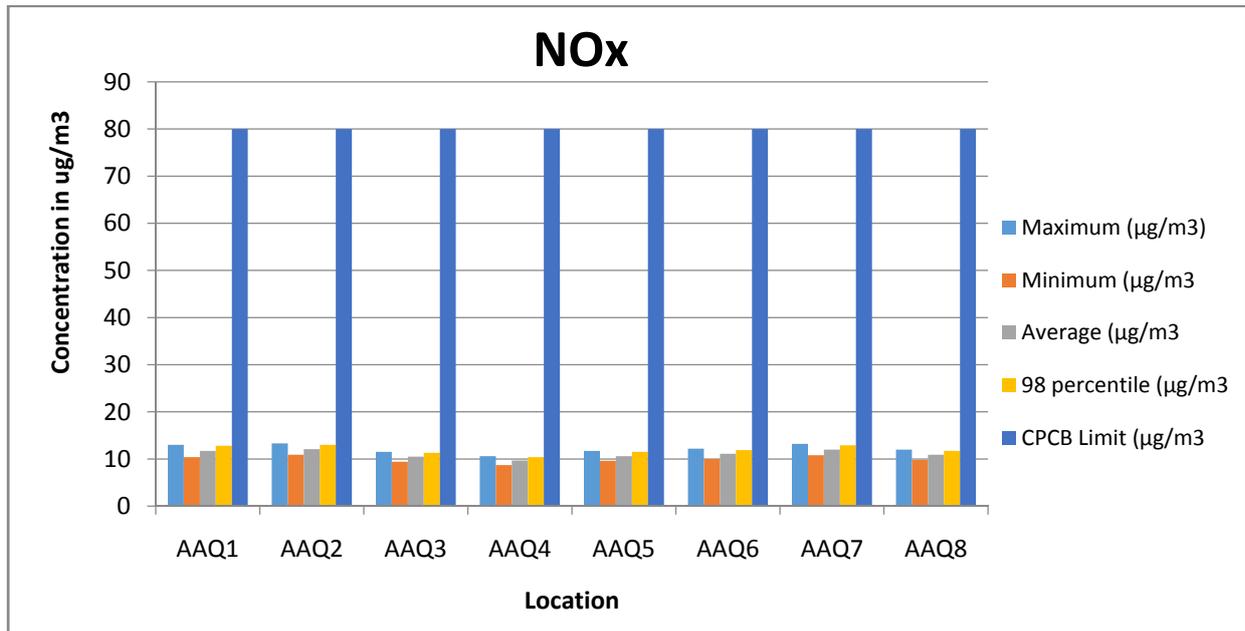


(Source: Analysis GCI)

Figure 1-19 Graphical representation of SO₂ concentration at different locations

Oxides of Nitrogen (NO_x):

NO_x levels were found ranging from 8.7 to 13.3µg/m³. The highest NO_x level were found at Kuspunga as wind is blowing from North to South and this location is located in West. Due to Mining activity in downwind which contain pollution load and lowest NO_x level were observed at Parjanga. The NO_x level in all monitoring locations was under permissible limit i.e. NAAQS level 80 µg/m³.



(Source: Analysis GCI)

Figure 1-20 Graphical representation of NO_x concentration at different locations

1.10 Noise Environment

Noise can be defined as an unwanted sound. It interferes with speech and hearing. The definition of noise as unwanted sound implies that it has an adverse effect on human beings and their environment. Noise can also disturb natural wildlife and ecological system.

The objective of the noise pollution survey in the study area is to identify existing noise sources and to measure background noise levels.



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Reconnaissance

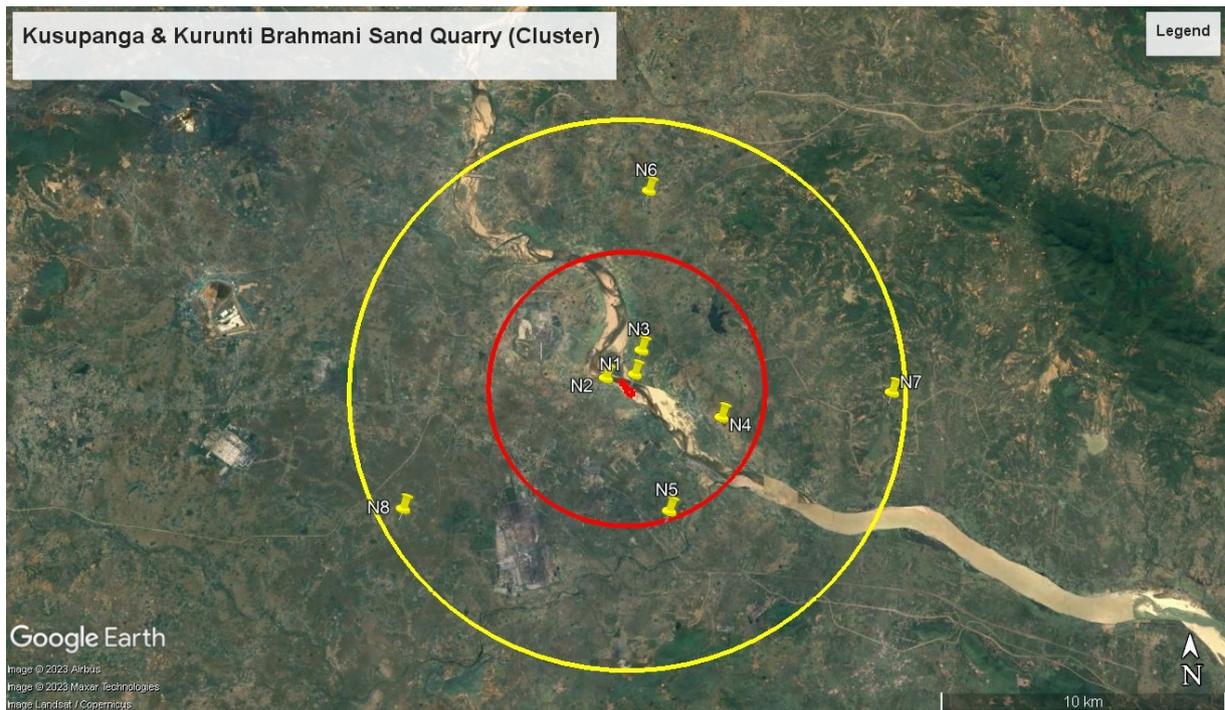
In order to measure the existing noise sources and to identify the background noise levels, the noise pollution survey around the proposed site was carried out. The collection of baseline noise environment data included Identification of noise sources and to measure background noise levels and Measurement of noise levels due to transportation and other local activity.

Methodology for Noise Monitoring

Noise standards have been designated as per the Noise Pollution (Regulation & Control) Rules, 2000 Notified by Ministry of Environment and Forests, New Delhi, February 14, 2000. The ambient noise standards are presented in Equivalent noise levels (Leq.) have been measured twice a week during study period. The measurements were carried out at each monitoring location during day time and night time.

Noise Monitoring Locations

A total of 08 locations were identified for ambient noise monitoring in the study area.



(Source: Google Image)

Figure 1-21 Google Image showing Ambient Noise Monitoring Locations

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Table 1.10-1 Noise Monitoring Locations

Sr. No.	Location	Distance (KM)	Directions	Coordinates	
N1	Project Site	-	-	20°50'49.80"N	85°17'51.75"E
N2	Kuspunga	Downwind	0.84	20°50'46.11"N	85°17'15.74"E
N3	Palasahi	Upwind	1.00	20°51'18.19"N	85°18'00.40"E
N4	Parjanga	Upwind	3.50	20°49'58.22"N	85°19'39.44"E
N5	Matanga	Cross wind	5.50	20°48'10.42"N	85° 18'32.74"E
N6	Janhapada	Down wind	7.25	20°54'30.89"N	85°18'12.14"E
N7	Kusumi	Downwind	9.37	20°50'26.67"N	85°23'13.49"E
N8	Nalachandrapur	Lateral	8.91	20°48'16.87"N	85°13'04.49"E

(Source: Analysis during study period, GCI)

Table 1.10-2 Ambient Noise Quality in the Study Area

Sr. No.	Location name	Zone	Units	Day Time		Night Time	
				Result	CPCB Permissible Limit	Result	CPCB Permissible Limit
N1	Project Site	Industrial	dB(A) Leq	48.5	75	44.0	70
N2	Kuspunga	Residential	dB(A) Leq	42.0	55	37.1	45
N3	Palasahi	Residential	dB(A) Leq	40.9	55	39.2	45
N4	Parjanga	Residential	dB(A) Leq	35.8	55	33.3	45
N5	Matanga	Residential	dB(A) Leq	39.2	55	30.9	45
N6	Janhapada	Residential	dB(A) Leq	35.7	55	37.1	45
N7	Kusumi	Residential	dB(A) Leq	41.9	55	32.5	45
N8	Nalachandrapur	Residential	dB(A) Leq	36.1	55	33.7	45

(Source: Monitoring during Study period by GCI)



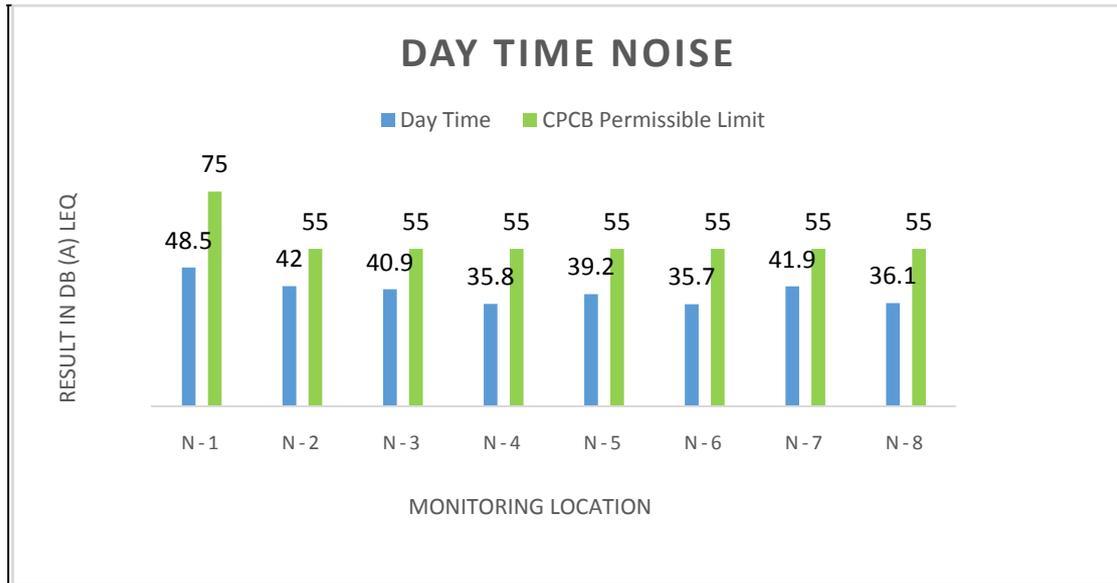
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Observation on Ambient Noise Quality:

Day Time:

The noise levels varied in the study area during day time from 35.7 dB(A) Leq at Janhapada to 48.5Leq dB(A) at Project site, as this site have Mining activity and traffic load which increase Noise level.



(Source: Analysis GCI)

Figure 1-22 Graphical Representation of Day time Noise Level in the study area

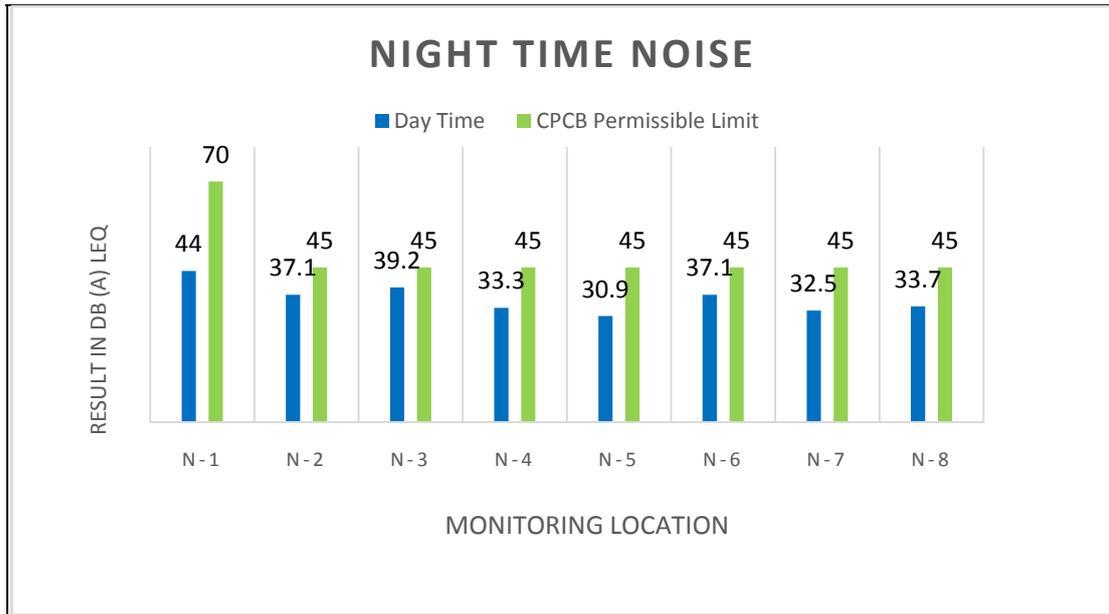
Night Time:

The night time noise level in the study area is in the range of 35.7 dB (A) Leq at Matanga. To 44 Leq dB (A) at Project Site as this site have Mining activity and traffic load which increase Noise level.



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(Source: Analysis GCI)

Figure 1-23 Graphical Representation of Night time Noise Level in the study area

Table 1.10-3 Applicable Noise Standards

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

(Source: Noise Pollution Rules, 2000)

Note:

- ✓ Day time is reckoned in between 6 am and 10 pm.
- ✓ Night time reckoned in between 10 pm and 6 am.
- ✓ Silence zone is defined as areas up to 100 meters around such premises as hospitals, education, institutions and courts. The silence zones are to be declared by the Competent Authority.
- ✓ Mixed categories of areas should be declared as one of the four above-mentioned categories by the Competent Authority and the corresponding standard shall apply.



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1.11 Water Quality

Reconnaissance Survey

Reconnaissance survey has been done for water quality monitoring in the Study Area. The baseline water quality of ground water / surface water in the region is obtained by collecting sample from villages in the area considering the 10 km radius for the baseline study.

Methodology of Monitoring

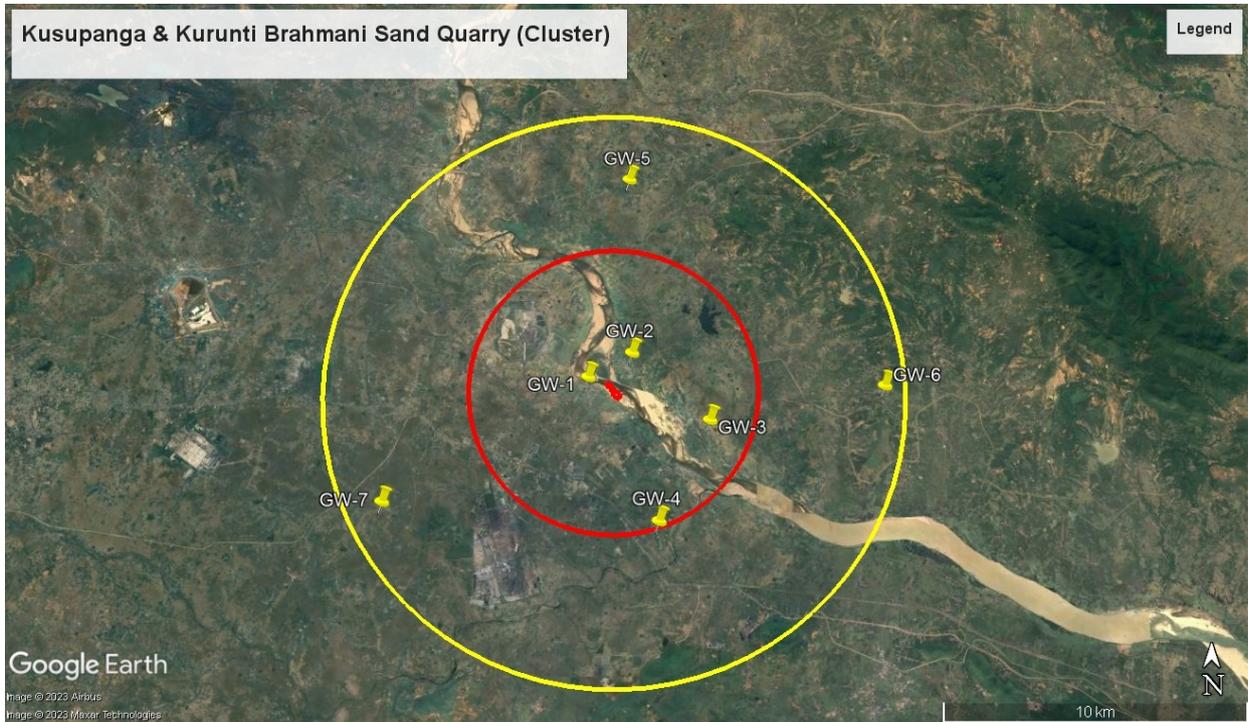
In order to establish the baseline water quality, ground water and surface water sampling locations were selected based on availability, following standard norms and requirement. Ground water samples were collected from the identified hand pumps and bore wells for the characterization of water quality. Selection of surface water sampling locations has been considered as per the utilization pattern of the villagers for domestic / drinking purposes.

The samples collected were preserved, stored and analysed as per standards methods of Analysis of Water and Waste Water (APHA, 2017).

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1.11.1 Ground Water Quality:

Ground water samples were collected from 07 locations during the study period and analysed for a number of physico-chemical parameters.



(Source: Google Image)

Figure 1-24 Google Image showing Ground Water Monitoring Locations

Table 1.11-1 Ground Water Sampling Locations

Sr. No.	Village Name	Source	Distance (km)	Direction	Co-ordinate	
GW 1	Kuspunga	Tap Water	0.84	W	20°50'50.17"N	85°17'12.24"E
GW 2	Palasahi	Tap Water	1.00	N	20°51'17.78"N	85°18'04.74"E
GW 3	Parjanga	Tap Water	3.50	N	20°50'01.24"N	85°19'36.86"E
GW 4	Matanga	Tap Water	5.50	SW	20°48'09.56"N	85°18'36.07"E
GW 5	Janhapada	Tap Water	7.25	S	20°54'43.07"N	85° 18'01.44"E
GW 6	Kusumi	Tap Water	9.37	S	20°50'40.16"N	85°23'06.49"E
GW 7	Nalachandrapur	Tap Water	8.91	E	20°48'31.55"N	85°13'11.94"E



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Table 1.11-2 Ground Water Quality in the Study Area

No.	Parameter	Units	Results							Permissible Limit as Per IS 10500:2012	Reference Method
			GW1	GW2	GW3	GW4	GW5	GW6	GW7		
1	pH	---	7.2	7.1	7.0	6.8	7.0	7.2	6.9	6.5-8.5	APHA 4500 H+
2	Conductivity	µs/cm	560	680	550	770	790	680	650	-	APHA 2510
3	Turbidity	NTU	<2	<2	<2	<2	<2	<2	<2	5	APHA 2130
4	Colour	Hazen	<5	<5	<5	<5	<5	<5	<5	15	APHA 2120
5	Odour	-	Agreeable							APHA 2150	
6	Total Dissolved Solid	mg/L	325	420	335	500	510	380	405	2000	APHA 2540 C
7	Total Suspended Solid	mg/L	<2	<2	<2	<2	<2	<2	<2	-	APHA 2540 B
8	Sulphate	mg/L	4.5	5.7	5.2	4.5	6.4	6.3	5.9	400	APHA 4500- SO42-
9	Chloride	mg/L	25.8	21.6	30.6	28.4	32.0	38.2	35.5	1000	APHA 4500 – Cl-
10	Total Hardness	mg/L	270	390	310	400	450	295	325	600	APHA 2340
11	Calcium as Ca	mg/L	58.2	95.5	82.4	110	124	59.2	88.3	200	APHA -3500 Ca
12	Magnesium Mg	mg/L	25.1	29.8	23.5	29.7	31.9	27.2	25.3	100	APHA 3500-Mg
13	Alkalinity	mg/L	45	49	55	67	77	53	51	600	APHA 2320
14	Copper	mg/L	0.02	0.02	0.04	0.05	0.03	0.02	0.02	1.5	APHA 3111-B
15	Zinc	mg/L	0.04	0.03	0.02	0.01	0.06	0.02	0.02	15	APHA 3111-B
16	Iron	mg/L	<0.2							0.3	APHA 3111-B



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No.	Parameter	Units	Results							Permissible Limit as Per IS 10500:2012	Reference Method
			GW1	GW2	GW3	GW4	GW5	GW6	GW7		
				<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
17	Lead	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	APHA 3111-B
18	Nickel	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	APHA 3111-B
19	Cadmium	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	APHA 3111-B
20	Calcium Hardness as CaCO ₃	mg/L	149	257	181	277	317	152	234	-	APHA 3500-Ca
21	Magnesium Hardness as CaCO ₃	mg/L	109	131	92	125	140	117	102	-	APHA 3500-Mg
22	Phenolic compound	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	APHA 5530
23	Fluoride	mg/L	0.11	0.09	0.12	0.10	0.13	0.12	0.11	1.5	APHA 4500-F

(Source: Water Analysis during study period)

Observation of ground water monitoring results:

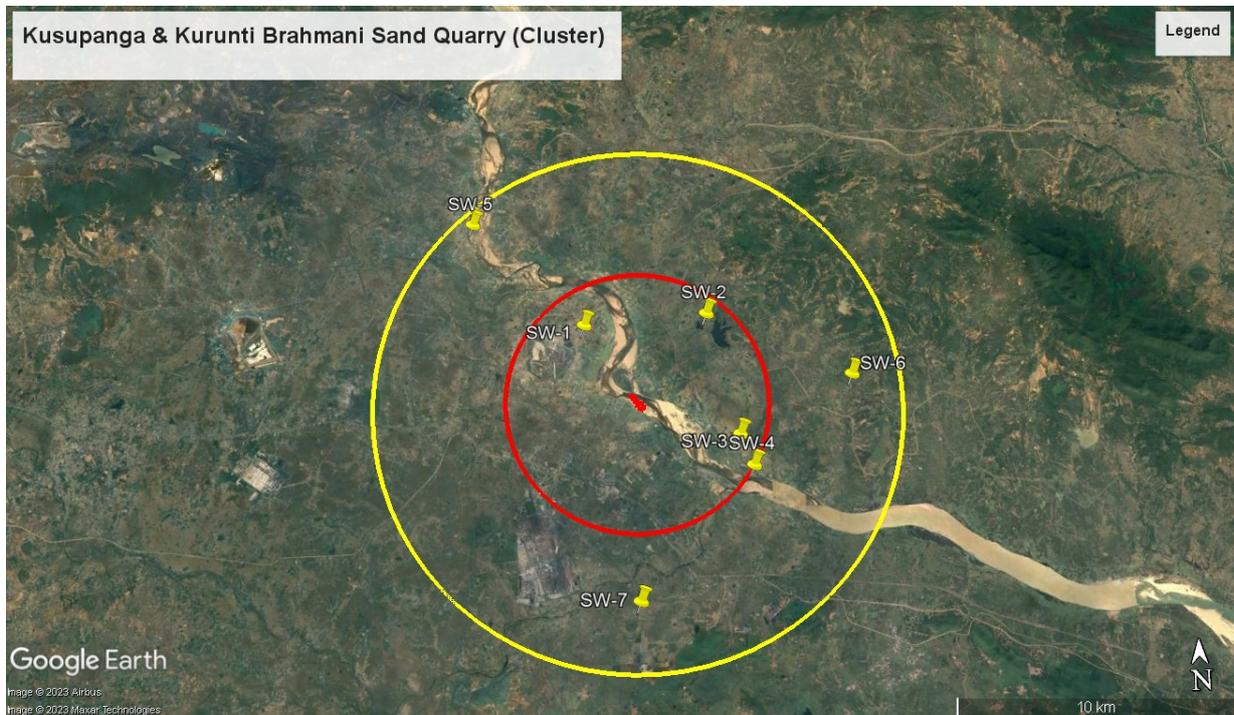
All the samples were colourless meeting desirable norms (<5 Hazen). All the samples meet the desirable standards (pH ranges from 6.8 to 7.2). TDS in samples ranges from 325 mg/L to 510mg/L. All the samples meet the permissible limit of 2000 mg/L. Total Hardness in the water ranges from 270 mg/L to 45mg/L. All the samples meet the permissible limit of 600 mg/L. Calcium content in the water ranges from 58.2mg/L to 124 mg/L, all the samples meet the permissible limit of 200 mg/L. Magnesium content in the water ranges from 23.5 mg/L to 31.9 mg/L. All the samples meet the permissible limit of 100 mg/L.

Total alkalinity in the water samples ranges from 45 mg/L to 77 mg/L. All the samples are within the permissible limit of drinking water (600 mg/L). Chlorides range from 21.6 mg/L to 38.2 mg/L, which are below permissible limits (1000 mg/L). Heavy metals like Copper, Nickel, Cadmium and Zinc are well below the limit in all samples.

Hence, it can be observed that ground water qualities in terms of various essential and desirable characteristics are found within the limits specified by IS 10500:2012.

1.11.2 Surface Water Quality:

Surface water samples were collected from 07 locations during the study period and analysed for a number of physico-chemical parameters.



(Source: Google Image)

Figure 1-25 Google Image showing Surface Water Monitoring Locations



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Table 1.11-3 Surface Water Sampling Locations

Sr. No.	Location Name	Distance (km)	Direction	Co-ordinate	
SW-1	Maniabeda	3.23	NW	20°52'13.60"N	85° 16'35.07"E
SW-2	Lodhani	3.96	NE	20°52'22.20"N	85° 19'18.37"E
SW-3	Parjanga	4.25	SE	20°49'48.66"N	85° 19'53.61"E
SW -4	Brahmani River (Downstream)	5.35	SE	20°49'09.40"N	85° 20'08.25"E
SW-5	Brahmani River (Upstream)	8.93	N	20°54'32.33"N	85° 14'10.00"E
SW-6	Kumusi	7.8	E	20°50'57.28"N	85° 22'25.31"E
SW-7	Galapada	7.41	S	20°46'33.73"N	85° 17'33.08"E

(Source: Analysis during study period, GCI)



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Table 1.11-4Surface Water Quality in the Study Area

Sr. No	Parameter	Units	Result							Reference Method
			SW1	SW2	SW3	SW4	SW 5	SW 6	SW7	
Sample Identification			SW1	SW2	SW3	SW4	SW 5	SW 6	SW7	
1.	pH	---	7.0	7.1	7.3	6.9	6.8	6.8	7.1	APHA 4500 H+
2.	Conductivity	µS/cm	465	620	535	690	755	630	590	APHA 2510
3.	Turbidity	NTU	<2	<2	<2	<2	<2	<2	<2	APHA 2130
4.	Colour	Hazen	<5	<5	<5	<5	<5	<5	<5	APHA 2120
5.	Odour	-	Agreeable							APHA 2150
6.	Total Dissolved Solid	mg/L	294	441	360	420	482	415	380	APHA 2540 C
7.	Total Suspended Solid	mg/L	26	30	23	25	31	20	21	APHA 2540 B
8.	Sulphate	mg/L	9.1	9.0	8.2	9.5	10.0	76	8.6	APHA 4500- SO42-
9.	Chloride	mg/L	27	29	30	32	31	35	27	APHA 4500 – Cl-
10.	Total Hardness	mg/L	217	235	198	277	286	257	208	APHA 2340
11.	Calcium as Ca	mg/L	59.2	64.7	53.7	64.1	75.6	60	57.3	APHA -3500 Ca
12.	Magnesium Mg	mg/L	17.2	17.4	14.7	25.4	22.9	21.7	13.5	APHA 3500-Mg
13.	Alkalinity	mg/L	77	70	87	51	57	60	75	APHA 2320
14.	Copper	mg/L	0.12	0.07	0.08	0.10	0.14	0.12	0.06	APHA 3111-B
15.	Zinc	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	APHA 3111-B
16.	Iron	mg/L	0.12	0.14	0.16	0.20	0.10	0.08	0.06	APHA 3111-B
17.	Lead	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	APHA 3111-B



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Sr. No	Parameter	Units	Result							Reference Method
			SW1	SW2	SW3	SW4	SW 5	SW 6	SW7	
Sample Identification			SW1	SW2	SW3	SW4	SW 5	SW 6	SW7	Reference Method
18.	Nickel	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	APHA 3111-B
19.	Cadmium	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	APHA 3111-B
20.	Total Coliform	MPN/100 ml	345	277	216	277	201	228	234	APHA 9221 B
21.	Faecal Coliform	MPN/100 ml	80	67	52	69	90	57	45	APHA 9221 E
22.	E. Coli	MPN/100 ml	18	21	23	26	24	21	25	APHA 9221 F
23.	Calcium Hardness as CaCO ₃	mg/L	147	166	134	163	189	161	149	APHA 3500-Ca
24.	Magnesium Hardness as CaCO ₃	mg/L	74	75	60	118	99	95	62	APHA 3500-Mg
25.	Phenol	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	APHA 5530
26.	Fluoride	mg/L	0.35	0.37	0.41	0.43	0.45	0.33	0.39	APHA 4500-F-
27.	Salinity	mg/L	413	39.8	48.7	43.5	51.3	59.1	41.5	APHA 2520 B
28.	Pesticides	P/A	Absent							Gas Chromatography
29.	Chemical Oxygen Demand	mg/L	17	19	18	21	18	16	22	APHA 5220
30.	Biochemical Oxygen Demand	mg/L	7	6	8	7	6	5	7	APHA 5210
31.	Dissolved Oxygen	mg/L	6.7	6.5	6.3	6.1	6.5	6.3	6.1	APHA 4500-O-C

(Source: Water Analysis by GCI Laboratory)

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Observation of Surface water monitoring results:

All samples were colourless. All samples meet the desirable standards (pH ranges from 6.8-7.3). TDS in samples ranges from 294mg/L to 482mg/L. all the samples meet the permissible limit of 2000 mg/L. Total hardness in the water ranges from 198mg/L to 286mg/L. all the samples meet the permissible limit of 600mg/L. Calcium content in the water ranges from 53.7 mg/L to 75.6 mg/L, all the samples meet the permissible limit of 200 mg/L. Magnesium content in the water ranges from 14.7mg/L to 24.4mg/L, all the samples meet the permissible limit of 100 mg/L.

Total alkalinity in the water samples ranges from 51mg/L to 87mg/L. all the samples are within the permissible limit 600 mg/L. Chloride ranges from 27mg/L to 35mg/L, which are below the permissible limits (1000 mg/L). Heavy metals like copper, nickel, cadmium and zinc are well below the limit in all samples.

Hence it can be observed that surface water qualities in terms of various essential and desirable characteristics are found within the limits.

Table 1.11-5 Standard Water Quality Criteria

Class of Water	Designated best use	Criteria
A	Drinking Water Source without conventional treatment but after disinfection	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
B	Outdoor bathing (Organized)	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
C	Drinking water source after conventional treatment and disinfection	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
D	Propagation of Wild life and Fisheries	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
E	Irrigation, Industrial Cooling, Controlled Waste disposal	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

(Source: http://cpcb.nic.in/Water_Quality_Criteria.php)



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1.12 Soil

Soil is our most important natural resource and a natural resource is anything that comes from the earth and is used by us. We depend on the soil for food, clothing, shelter, minerals, clay & water. Soil is the seat of many macro and micro flora like algae, fungi, earthworms, bacteria etc. These are very beneficial in promoting soil reactions and decomposing the organic matter by which essential nutrients for plants are liberated. Most of the soil is made-up of two main parts:

Tiny bits of mineral particles which come from larger rocks, and humus, which is dark brown in colour and consists of decaying remains of plants and animals.

Soil also contains water, air and living organisms, such as fungi, bacteria, earthworms, roundworms, insects, etc. Actually more living organisms live in the soil than above it.

Methodology

The soil samples were collected from 08 selected locations during Post-monsoon season. The samples collected were homogeneous representative of each sampling location. At random sub-locations were identified at each location and soil samples were collected from 5 to 15 cm below the surface. It was uniformly mixed before homogenizing the soil samples. The samples about 500-gms were packed in polythene bags labelled in the field with location, number and sent to the laboratory for the analysis of physicochemical parameters.

Soil Sampling Locations

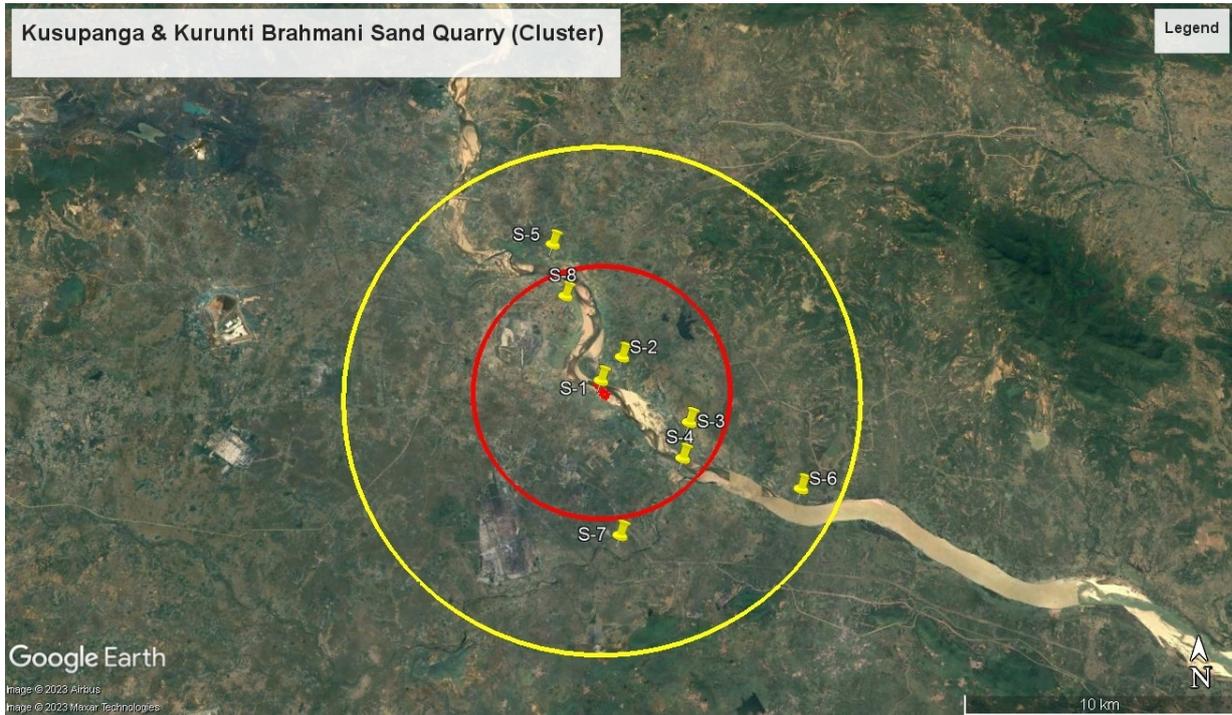
Soil sampling was conducted once during the study period of Post-monsoon season. 08 soil samples were collected from selected locations in the vicinity of the proposed project. For studying soil quality environment in the study area, sampling locations were selected to assess the existing soil conditions in and around the existing plant area representing various land use conditions. The homogenized samples were analysed for physicochemical characteristics.

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(Source: Google Image)

Figure 1-26 Google Image showing Soil Sampling Location

Table 1.12-1 Soil Sampling Locations

Sr. No.	Location	Justification	Distance (km)	Directions	Co-ordinates	
Soil 1	Project Site	Barren	-	-	20°50'45.33"N	85°17'40.46"E
Soil 2	Palasahi	Agricultural	1.10	NE	20°51'14.92"N	85°18'09.15"E
Soil 3	Parjanga	Barren	3.55	S	20°49'50.64"N	85°19'37.89"E
Soil 4	Khargaprasad	Agricultural	4.35	SE	20°49'05.52"N	85°19'28.19"E
Soil 5	Damol	Agricultural	5.75	N	20°53'44.97"N	85°16'35.80"E
Soil 6	Panigengutia	Agricultural	8.40	S	20°48'25.58"N	85°22'03.49"E
Soil 7	Chitipada	Agricultural	6.20	SW	20°47'31.28"N	85°18'03.33"E
Soil 8	Kamalanga	Agricultural	3.49	N	20°52'35.71"N	85°16'053.08"E

(Source: Analysis during study period, GCI)

Analysis of Soil Samples

The soil samples were examined for various physicochemical parameters, to determine the existing soil characteristics of the study area. Physicochemical characteristics of soil are presented as follows:

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Table 1.12-2 Physiochemical Characteristics of Soil

Sr. No.	Parameters	Unit	Results								Reference Method
			S1	S2	S3	S4	S5	S6	S7	S8	
1	pH	-	6.9	7.1	7.0	6.9	7.1	6.7	7.1	7.3	IS 2720 : Part 26 : 1987
2	Electrical Conductivity	µs/cm	460	500	411	520	424	457	410	493	IS 14767: 2000
3	Soil Moisture Content	%	12.0	12.5	10.1	11.5	14.3	15.1	13.5	13.1	IS 2720 – Part – 2
4	Organic Carbon	%	0.93	1.00	1.11	1.13	1.01	1.15	1.20	0.92	IS 2720 : Part 22 : 1972
5	Organic Matter	%	1.60	1.70	1.90	1.93	1.70	2.01	2.07	1.65	IS 2720 : Part 22 : 1972
6	Phosphorus	mg/kg	0.0017	0.0020	0.0016	0.0021	0.0023	0.0018	0.0023	0.0021	APHA 4500 – P
7	Total Nitrogen	mg/kg	0.030	0.041	0.035	0.047	0.033	0.031	0.043	0.037	APHA 4500-NORG
8	Potassium as K	mg/kg	124.0	130.7	125.4	136.7	133.1	141.3	121.0	127.9	APHA 3500 – K - B
9	Calcium	mg/kg	229.0	247.9	183.1	222.7	241.1	237.0	221.8	201.9	APHA 3500 –Ca– B
10	Magnesium	mg/kg	157	160	141	167	177	142	150	153	APHA 3500 –Mg
11	Chloride	mg/kg	177	143	151	126	140	167	129	155	IS 6925: 1973
12	Copper as Cu	mg/kg	99	120	147	129	153	103	111	125	APHA 3111 B
13	Zinc as Zn	mg/kg	62.0	77.9	77.5	78.2	75.9	70.0	87.4	67.5	APHA 3111 B
14	Iron as Fe	mg/kg	100.2	117.5	126.7	129.3	127.9	127.7	122.5	135.5	APHA 3111 B
15	Lead as Pb	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 3111 B
16	Nickel as Ni	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 3111 B

(Source: Analysis Report)

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1.12.1 Observation of Soil monitoring results:

pH ranges from 6.7-7.3. Calcium content in the soil ranges from 183.1 mg/kg to 247.9 mg/kg. Magnesium content in the soil ranges from 141 mg/kg to 177 mg/kg. Organic Matter in the Soil samples ranges from 1.60 mg/kg to 2.07 mg/kg. Organic Carbon ranges from 0.92 mg/kg to 1.20 mg/kg. Phosphorus range from 0.0016 mg/L to 0.0023 mg/kg. Total Nitrogen range from 0.030 mg/kg to 0.047 mg/kg. Potassium range from 121.0mg/kg to 136.7 mg/kg. Heavy metals like Lead, nickel, cadmium are well in all samples.

Hence it can be observed that Soil qualities in terms of various essential and desirable characteristics are found within the limits.

1.13 Traffic Study

LOCATION OF SURVEY POINT: To and fro traffic count is done at a Junction point (20°50'25.36"N, 85°17'28.71"E).

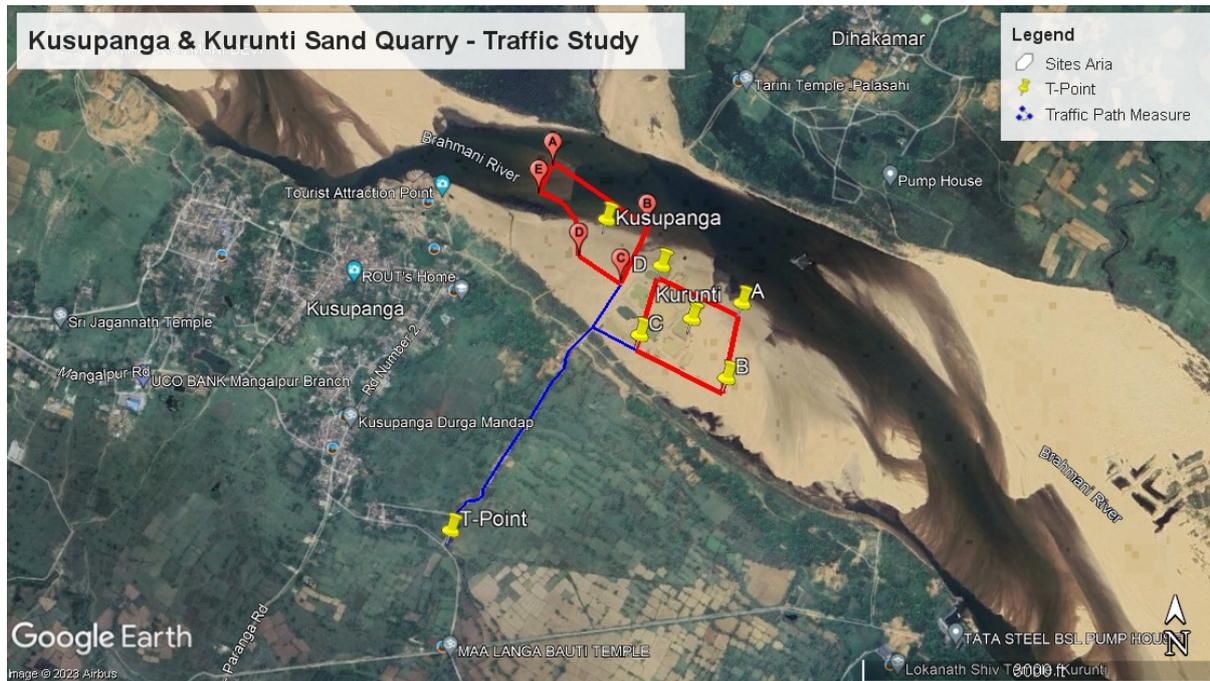


Figure 1-27 Traffic Survey Point

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Table 1-3 Interpretation of Traffic Study (Before project)

Sr. No.	Vehicle	Equivalency	9 to 10 am	Calculated PCU /Hr.	10 to 11 am	Calculated PCU /Hr.	11 to 12 am	Calculated PCU /Hr.	5 to 6 pm	Calculated PCU /Hr.	6 to 7 pm	Calculated PCU /Hr.	7 to 8 pm	Calculated PCU /Hr.
Morning Hours									Evening Hours					
Fast vehicle														
1	2-Wheeler	0.5	6	3	5	2.5	4	2	6	3	4	2	5	2.5
2	Passenger car, pickup van	1	4	4	2	2	2	2	2	2	3	3	2	2
3	Auto rickshaw	1	2	2	1	1	0	0	1	1	2	2	2	2
4	LCV (Light Commercial Vehicles)	1.5	1	1.5	2	3	0	0	1	1.5	0	0	0	0
5	Truck/bus	3	1	3	2	6	0	0	3	9	0	0	0	0
6	Agricultural tractor trailer	4.5	3	13.5	4	18	1	4.5	6	27	4	18	1	4.5
Slow vehicle														
7	Cycle	0.5	8	4	10	5	2	1	12	6	10	5	0	0
8	Cycle Rickshaw	2	2	4	0	0	3	6	0	0	4	8	0	0
9	Horse drawn vehicle	4	0	0	0	0	0	0	0	0	0	0	0	0
10	Hand cart	3	2	6	1	3	0	0	3	9	0	0	0	0
Total No. of vehicle / Total PCU/Hr.			29	41	27	40.5	12	15.5	34	58.5	27	38	10	11

Table 1-4 Level of Service of Service road- With proposed project at Internal Road

Road	Typology of road	Road Width	Road Capacity (PCU/Hr.)	Max. Traffic volume (PCU/Hr.)	V/C ratio	LOS
Savli & Jarod, SH – 63	2way(2 lane)	~7	2400	58.5	0.024	A

Observation

Level of Service will be “A” i.e. Excellent internal road connecting with the proposed project of M/s. Kusupanga & Kurunti Sand Quarry.

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TRAFFIC STUDY OF AFTER PROPOSED PROJECT

Table 1-5 Interpretation of Traffic Study (After Proposed project)

Sr. No.	Vehicle	Equivalency	9 to 10 am	Calculated PCU /Hr.	10 to 11 am	Calculated PCU /Hr.	11 to 12 am	Calculated PCU /Hr.	5 to 6 pm	Calculated PCU /Hr.	6 to 7 pm	Calculated PCU /Hr.	7 to 8 pm	Calculated PCU /Hr.
					Morning Hours									
					Evening Hours									
Fast vehicle														
1	2-Wheeler	0.5	7	3.5	6	3	5	2.5	8	4	6	3	6	3
2	Passenger car, pickup van	1	4	4	4	4	3	3	4	4	4	4	3	3
3	Auto rickshaw	1	3	3	3	3	1	1	3	3	2	2	4	4
4	LCV (Light Commercial Vehicles)	1.5	1	1.5	2	3	0	0	2	3	0	0	0	0
5	Truck/bus	3	3	9	2	6	0	0	5	15	2	6	0	0
6	Agricultural tractor trailer	4.5	3	13.5	5	22.5	4	18	8	36	5	22.5	3	13.5
Slow vehicle														
7	Cycle	0.5	10	5	12	6	3	1.5	14	7	12	6	2	1
8	Cycle Rickshaw	2	2	4	0	0	4	8	2	4	5	10	0	0
9	Horse drawn vehicle	4	0	0	0	0	0	0	0	0	0	0	0	0
10	Hand cart	3	2	6	2	6	1	3	3	9	0	0	2	6
Total No. of vehicle / Total PCU/Hr.			35	49.5	36	53.5	21	37	49	85	36	53.5	20	30.5

Table 1-6 Level of Service of Service road- With proposed project at Internal Road

Road	Typology of road	Road Width	Road Capacity (PCU/Hr.)	Max. Traffic volume (PCU/Hr.)	V/C ratio	LOS
Internal Village road	One Way	~7	2400	85	0.035	A

Observation

Level of Service will be "A" i.e. Excellent internal road connecting with the proposed project of M/s. Kusupanga & Kurunti Sand Quarry.

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Table 1-7 Vehicle type Equivalency according to IRC: 64-1990

Fast vehicle	Vehicle type	Equivalency
Fast vehicle		
1	2-Wheeler	0.5
2	Passenger car, pickup van	1.0
3	Auto rickshaw	1.0
4	LCV	1.4
5	Truck/bus	3.0
6	Agricultural tractor trailer	4.5
Slow vehicle		
7	Cycle	0.5
8	Cycle Rickshaw	2.0
9	Horse drawn vehicle	4.0
10	Hand cart	3.0

Table 1-8 Capacity in PCU/hour for various traffic conditions

No. of traffic lanes and widths	Traffic flow	Roads with no frontage access, no standing vehicles, very little cross traffic	Roads with frontage access but no standing vehicle and high capacity intersections	Roads with free frontage access, parked vehicle and heavy cross traffic
2-lane	One way	2400	1900	1400
2-lane	Two way	1500	1200	900
3-lane	One way	3600	2900	2200
4-lane	Undivided Two way	3000	2400	1800
4-lane	Divided Two way	3600	2900	--
6-lane	Undivided Two way	4800	3800	--
6-lane	Divided Two way	5400	4300	--
8-lane	Divided Two way	7200	--	--

Table 1-9 As per IRC: 64-1990 Level of Service is defined

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



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CONCLUSION

The max. PCU/hr. at Study Area without project development during morning and evening was found to be 41 and 58.5 respectively. In worst case scenario, future after proposed project during morning and evening, increase in PCU/hr. will be 53.5 and 85 PCU/hr. However, recommended PCU/hr. as per IRC 64-1990 standards for urban roads in plains (for One way roads) is 2400. Hence, the additional load on the carrying capacity of the concern roads is not likely to have any significant adverse effect.

Level of Service will be 'A' i.e. Excellent, Internal road connecting with the proposed project of M/s. Kusupanga & Kurunti Sand Quarry. The Management is committed to contribute in maintaining road so that quality of road remains fair.

1.14 Biological Environment

Biological resources of the area are an indicator of quality/health of the environment of the area. Therefore, the study of the same is an important aspect to minimize the distribution due to the intervention of the proposed project to accept in a sustainable approach. To achieve the goal, EIA study was conducted during October 2022 to December 2022 to cover all the biological parameters.

Nature supports a great variety of living beings under a structural and functional unit called ecosystem. In any natural ecosystem, there are several components which exist in harmony and survive only by interdependence. These components may be either biotic or abiotic. Developmental activities often have great impacts on the biodiversity both ecosystems as well as species level. Present study has been carried out to inventories the biodiversity exist in the study area of present project, to evaluate the possible impacts on biodiversity due to project activities and suggest effective mitigation measures against the negative impacts.

The ecological study was undertaken to understand the present status of ecosystem of the area, to predict changes as a result of proposed activities and to suggest measures for maintaining the conditions. This carried through primary survey and secondary data collected from various Government agencies like Forest Department, Agriculture Department, Scientific literatures etc.

The animal and plant communities co-exist in a well-organized manner. Their natural settings can get disturbed by any externally induced anthropological activities or by naturally occurring calamities or disaster. So, once this setting is disturbed, it sometimes is either practically impossible or may take a longer time to come back to its original state. Hence changes in the status of flora and fauna are an elementary requirement of Environmental Impact Assessment studies, in view of the need for conservation of environmental quality and biodiversity. Information on flora and fauna was collected within the study area.

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Floral Compositions

The study includes both aquatic and terrestrial ecosystems. Diverse systems such as scrub forest, cultivated lands and kitchen gardens of villages were visited and floral species identified. The identified plant species with scientific name, family, habit, habitat and type are given in Table.

Table 1.14-1List of Flora

Sr No	Name of the Plant	Family	Local Name
TREESPECIES			
1.	Acacia leucophloea (Roxb.) Willd.	<i>Mimosaceae</i>	Gahira
2.	Acacia nilotica (L.) Delile	<i>Mimosaceae</i>	Babool
3.	Acacia sps	<i>Mimosaceae</i>	Acasia
4.	Aegle marmelos (L.) Correa	<i>Rutaceae</i>	Bela
5.	Ailanthus variegata Roxb.	<i>Simaroubaceae</i>	Mahaneem
6.	Alangium salvifolium (L.f.) Wang	<i>Alangiaceae</i>	Ankula
7.	Albizia procera (Roxb.) Benth.	<i>Mimosaceae</i>	Sirisa
8.	Alstonia scholaris (L.) R.Br.	<i>Apocynaceae</i>	Chatiana
9.	Anacardium occidentale	<i>Anacardiaceae</i>	Kaju
10.	Annona squamosa L.	<i>Annonaceae</i>	Ata
11.	Anogeissus latifolia (Roxb. Ex DC.) Wall. Ex Guill.	<i>Combretaceae</i>	Dhau
12.	Anthocephalus kadamba	<i>Rubiaceae</i>	Kadamba
13.	Antidesma acidum Retz.	<i>Euphorbiaceae</i>	Naharakoli
14.	Artocarpus heterophylla Lam.	<i>Moraceae</i>	Panas
15.	Azadirachta indica A. Juss.	<i>Meliaceae</i>	Nima
16.	Bambusa sps	<i>Poaceae</i>	Baunsa
17.	Bauhinia racemosa Lam.	<i>Caesalpinaceae</i>	Kanchana
18.	Bauhinia variegata L.	<i>Caesalpinaceae</i>	Siali
19.	Bombax ceiba L.	<i>Bombacaceae</i>	Simili
20.	Borassus flabellifer L.	<i>Arecaceae</i>	Tala
21.	Bridelia retusa (L.) Spreng.	<i>Euphorbiaceae</i>	Kasi
22.	Buchanania lanzan Spreng.	<i>Anacardiaceae</i>	Chara
23.	Butea monosperma (Lam.) Taub.	<i>Fabaceae</i>	Palasa
24.	Cassia fistula L.	<i>Caesalpinaceae</i>	Sunari
25.	Cleistanthus collinus (Roxb.) Benth. Ex Hook.	<i>Euphorbiaceae</i>	Karada
26.	Dalbergia lanceolaria L.f.	<i>Fabaceae</i>	Sisoo
27.	Dalbergia latifolia Roxb.	<i>Fabaceae</i>	Sisoo
28.	Dillenia pentagyna Roxb.	<i>Dilleniaceae</i>	Ou
29.	Diospyros malabarica (Desr.) Kostel.	<i>Ebenaceae</i>	Kendu
30.	Diospyros melanoxylon Roxb.	<i>Ebenaceae</i>	Mankada kendu



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31.	Erythrina variegata	<i>Fabaceae</i>	Paladhua
32.	Eucalyptus citridora	<i>Myrtaceae</i>	Eucalyptus
33.	Ficus benghalensis L.	<i>Moraceae</i>	Bara
34.	Ficus hispida L.f.	<i>Moraceae</i>	Dimiri
35.	Ficus religiosa L.	<i>Moraceae</i>	Osta
36.	Gardenia gummifera L.f.	<i>Rubiaceae</i>	Ghurudu
37.	Garuga pinnata Roxb.	<i>Burseraceae</i>	Kukurdanti
38.	Gmelina arborea Roxb.	<i>Verbenaceae</i>	Gambhari
39.	Haldina cordifolia (Roxb.) Ridsdale	<i>Rubiaceae</i>	Kuruma
40.	Holarrhena pubescens (Buch.-Ham.) Wall. Ex	<i>Apocynaceae</i>	Kutaja
41.	Lagerstroemia parviflora Roxb.	<i>Lythraceae</i>	Sidha
42.	Limonia acidissima L.	<i>Rutaceae</i>	Kaitha
43.	Madhuca longifolia (Koen.)Macbr.var.	<i>Sapotaceae</i>	Mahua
44.	Mallotus philippensis (L.) Muell.-Arg.	<i>Euphorbiaceae</i>	Kukuma
45.	Mangifera indica L.	<i>Anacardiaceae</i>	Amba
46.	Melia azedarach L.	<i>Meliaceae</i>	Mahanimba
47.	Michelia champaca L	<i>Magnoliaceae</i>	Champa
48.	Mimusops elengii L.	<i>Sapotaceae</i>	Baula
49.	Nyctanthes arbor-tristis L.	<i>Nyctanthaceae</i>	Gangasiuli
50.	Oroxylum indicum (L.) Vent.	<i>Bignoniaceae</i>	Phanaphana
51.	Phyllanthus emblica L.	<i>Euphorbiaceae</i>	Amla
52.	Pongamia pinnata (L.) Pierre	<i>Fabaceae</i>	Karanja
53.	Psidium guajava	<i>Myrtaceae</i>	Pijuli
54.	Schleichera oleosa (Lour.) Oken	<i>Sapindaceae</i>	Kusuma
55.	Semecarpus anacardium L.f.	<i>Anacardiaceae</i>	Bhalia
56.	Shorea robusta Gaertn.f.	<i>Dipterocarpaceae</i>	Sal
57.	Sterculia urens Roxb.	<i>Sterculiaceae</i>	Genduli
58.	Syzygium cumini (L.) Skeels	<i>Myrtaceae</i>	Jamun
59.	Tamarindus indica	<i>Fabaceae</i>	Tentuli
60.	Tectona grandis	<i>Verbenaceae</i>	Saguan
61.	Terminalia alata Heyne ex Roth	<i>Combretaceae</i>	Asana
62.	Terminalia arjuna (Roxb. ex DC.) Wight &	<i>Combretaceae</i>	Arjuna
63.	Terminalia bellirica (Gaertn.) Roxb.	<i>Combretaceae</i>	Bahada
64.	Terminalia catappa L.	<i>Combretaceae</i>	Desi badam
65.	Terminalia chebula Retz.	<i>Combretaceae</i>	Harida
66.	Ziziphus jujuba (Retz.) Willd.	<i>Rhamnaceae</i>	Barakoli
CLIMBERS			
1.	Abrusprecatorius	<i>Faceae</i>	Kaincha
2.	Acaciasinuata(Lour.)Merr.	<i>Mimosaceae</i>	
3.	Aristolochia indica	<i>Aristolochiaceae</i>	Panairi
4.	ClitoriaternateaL.	<i>Fabaceae</i>	Aparajita

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5.	DalbergiavolubilisRoxb.	<i>Fabaceae</i>	
6.	AsparagusracemosusWilld.	<i>Liliaceae</i>	Satabari
7.	Atylosiascrabaeoides(L.) Benth.	<i>Fabaceae</i>	Banakolatha
8.	Caesalpiniaabonduc(L.)Roxb.	<i>Caesalpinaceae</i>	Gila
9.	CelastruspaniculataWilld.	<i>Celastraceae</i>	Pingu
10.	Cissampelos pareiraL.	<i>Menispermaceae</i>	Akanabindhi
11.	Cissus quadrangularisL.	<i>Vitiaceae</i>	Hadajoda
12.	CuscutareflexaRoxb.	<i>Convolvulaceae</i>	Nirmuli
13.	Cryptolepis buchananiiRoem. &Schultes	<i>Periplocaceae</i>	Gopakanhu
14.	DioscoreabulbiferaL.	<i>Dioscoreaceae</i>	Pita alu
15.	DioscoreapentaphyllaL.	<i>Dioscoreaceae</i>	Pita alu
16.	DioscoreawallichiiHook.f.	<i>Dioscoreaceae</i>	Pita alu
17.	Hemidesmusinducus (L.) R.Br.	<i>Periplocaceae</i>	Anantamool
18.	Jasminum arborescensRoxb.	<i>Oleaceae</i>	Banamalli
19.	Luffaacutangula(L.) Roxb var. amara	<i>Cucurbitaceae</i>	Pitatarada
20.	Mucunapuriens	<i>Fabaceae</i>	Baidonka
21.	Pergulariadaemia(Forssk.) Chiov.	<i>Asclepiadaceae</i>	Uturuli
22.	Scindapsus officinalis(Roxb.) Schott	<i>Araceae</i>	Gajapippali
23.	SmilaxzeylanicaL.	<i>Smilacaceae</i>	Muturi
24.	Tinosporacordifolia(Willd.) Miers exHook.f. &Thoms.	<i>Menispermaceae</i>	Guluchi
25.	TragiainvolucrateL.	<i>Euphorbiaceae</i>	Bichhuati
26.	Tylophora indica (Burm.f.)Merr.	<i>Asclepiadaceae</i>	Anantamool
27.	Ziziphusoenoplia(L.) Mill.	<i>Rhamnaceae</i>	Kanteikoli
SHRUBS			
1.	Agave Americana	<i>Agavaceae</i>	Murga
2.	Calotropisgigantea(L.)R.Br.	<i>Asclepiadaceae</i>	Arakha
3.	Clerodendrum viscosum Vent	<i>Verbenaceae</i>	Nagari
4.	Clerodendrum serratum(L.) Moon	<i>Verbenaceae</i>	Samarkana
5.	Clistanthus collinus	<i>Euphorbiaceae</i>	Karada
6.	Datura metel L.	<i>Solanaceae</i>	Dudura
7.	Dendrocalamus strictus (Roxb.) Nees	<i>Poaceae</i>	Kani Baunsa
8.	Desmodium gangeticum (L.) DC.	<i>Fabaceae</i>	Salaparni
9.	Desmodium pulchellum (L.) Benth.	<i>Fabaceae</i>	Masaparni
10.	Euphorbia neriifolia auct. non L.	<i>Euphorbiaceae</i>	Trikon siju
11.	Flemingia chappar Buch.-Ham.ex. Benth.	<i>Fabaceae</i>	Ranikathi
12.	Helicteres isora L.	<i>Sterculiaceae</i>	Modimodica
13.	Hibiscus rosa-sinensis	<i>Malvaceae</i>	Mandara
14.	Ipomoea carnea Jacq.	<i>Convolvulaceae</i>	Ammari
15.	Jatropha gossypifolia L.	<i>Euphorbiaceae</i>	Nalibaigaba
16.	Justicia adhatoda	<i>Acanthaceae</i>	Basanga

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17.	Lantana camara L. Var. Aculeata (L.) Mold.	<i>Verbenaceae</i>	Nagairi
18.	Lawsonia inermis L.	<i>Lythraceae</i>	Manjuati
19.	Nerium oleander	<i>Apocyanaceae</i>	Kaniar
20.	Opuntia stricta (Haw.) Haw. var. dillenii (Ker-		
21.	Pavetta tomentosa Roxb. Ex. Sm.	<i>Rubiaceae</i>	Kukurdanti
22.	Phoenix acaulis Roxb. Ex Buch.-Ham.	<i>Arecaceae</i>	Khajuri
23.	Phyllanthus reticulatus Poir	<i>Euphorbiaceae</i>	Jajanga
24.	Ricinus communis	<i>Euphorbiaceae</i>	Gaba
25.	Vitex nigundo	<i>Verbenaceae</i>	Begunia
26.	Woodfordia fruticosa (L.) Kurz	<i>Lythraceae</i>	Dhataki
HERB			
1.	Abelmoschusmanihot(L.) Medic.	<i>Malvaceae</i>	Banabhendi
2.	AcalyphaindicaL.	<i>Euphorbiaceae</i>	Indramaris
3.	Alternantherasessilis(L.)R.Br.	<i>Amaranthaceae</i>	Madarnga saga
4.	AchyranthesasperaL.	<i>Amaranthaceae</i>	ApBandalo
5.	Aervalanata(L.) Juss. ExSchultes	<i>Amaranthaceae</i>	Torania
6.	AgeratumconyzoidesL.	<i>Asteraceae</i>	Pokasungha
7.	Amaranthus viridisL.	<i>Amaranthaceae</i>	
8.	Amaratnus spinosus	<i>Amaranthaceae</i>	Kanta leutia
9.	Andrographispaniculata(Burm.f.) Wall. Ex Nees	<i>Acanthaceae</i>	Bhuin neem
10.	Argemone54 mexicanaL.	<i>Papavaraceae</i>	Agara
11.	BarleriacristataL.	<i>Acanthaceae</i>	Daskerenda
12.	BoerhaviadiffusaL.	<i>Nyctaginaceae</i>	Puruni
13.	CassiaoccidentalisL.	<i>Caesalpinaceae</i>	Jadumari
14.	Centella asiatica (L.) Urban	<i>Apiaceae</i>	Thalakudi
15.	Chrysopogon aciculatus (Retz.) Trin.	<i>Poaceae</i>	Guguchia
16.	Cleome viscosa L.	<i>Capparaceae</i>	Bana sorish
17.	Colocasia esculenta (L.) Schott	<i>Araceae</i>	Banasaru
18.	Commelina benghalensis L.	<i>Commelinaceae</i>	Kanasiri
19.	Costus speciosus (Koenig) Sm.	<i>Zingiberaceae</i>	Keu
20.	Crotalaria albida Heyne ex Roth	<i>Fabaceae</i>	
21.	Curculigo orchiodes Gaertn.	<i>Hypoxidaceae</i>	Talamuli
22.	Curcuma pseudomontana Graham	<i>Zingiberaceae</i>	Banahaladi
23.	Cynodon dactylon (L.) Pers.	<i>Poaceae</i>	Duba
24.	Cyperus rotundus L.	<i>Cyperaceae</i>	Mutha
25.	Eclipta prostrate (L.) L.	<i>Asteraceae</i>	Bhrungaraja
26.	Elephantopus scaber L.	<i>Asteraceae</i>	Mayurchulia
27.	Eleusine indica (L.) Gaertn.	<i>Poaceae</i>	Ghasa
28.	Eragrostis ciliaris (L.) R.Br.	<i>Poaceae</i>	Ghasa

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29.	<i>Evolvulus alsinoides</i> (L.) L.	<i>Convolvulaceae</i>	Jyotismati
30.	<i>Evolvulus nummularius</i> (L.) L.	<i>Convolvulaceae</i>	Bichamalia
31.	<i>Glinus oppositifolius</i> (L.) A. DC.	<i>Molluginaceae</i>	Pitasaga
32.	<i>Hygrophilla auriculata</i>	<i>Acanthaceae</i>	Koilekha
33.	<i>Justicia glauca</i> Rottl.	<i>Acanthaceae</i>	
34.	<i>Leucas aspera</i> (Willd.) Link	<i>Lamiaceae</i>	Gayasa
35.	<i>Mimosa pudica</i>	<i>Mimoceae</i>	Lajakuli
36.	<i>Ocimum americanum</i> L.	<i>Lamiaceae</i>	Banatulasi
37.	<i>Ocimum canum</i> Sims	<i>Lamiaceae</i>	Sree tulasi
38.	<i>Oldenlandia corymbosa</i> L.	<i>Rubiaceae</i>	Gharapudia
39.	<i>Orthosiphon rubicundus</i> (D.Don) Benth.	<i>Lamiaceae</i>	
40.	<i>Oxalis corniculata</i> L.	<i>Oxalidaceae</i>	Ambiliti
41.	<i>Phyllanthus amarus</i> Schum. & Thonn.	<i>Euphorbiaceae</i>	Badi anala
42.	<i>Phyllanthus urinaria</i> L.	<i>Euphorbiaceae</i>	Badi anala
43.	<i>Phyllanthus virgatus</i> Forst. F.	<i>Euphorbiaceae</i>	Badi anala
44.	<i>Rauvolfia tetraphylla</i>	<i>Apocyanaceae</i>	Patalagaruda
45.	<i>Rungia pectinata</i> (L.) Nees	<i>Acanthaceae</i>	Sankhasaga
46.	<i>Scoparia dulcis</i> L.	<i>Scrophulariaceae</i>	Badijustimadhu
47.	<i>Sida acuta</i> Burm.f.	<i>Malvaceae</i>	Bajramuli
48.	<i>Sida cordata</i> (Burm.f.) Borssum	<i>Malvaceae</i>	Brhmanajhatia
49.	<i>Solanum virginianum</i> L	<i>Solanaceae</i>	Ankaranti
50.	<i>Sphaerathus indicus</i>	<i>Rubiaceae</i>	Bhuin Kadamba
51.	<i>Tridax procumbens</i> L.	<i>Asteraceae</i>	Bisayakarani
52.	<i>Uraria lagopodiodes</i> (L.) Desv. ex. DC.	<i>Fabaceae</i>	Krushanaprani
53.	<i>Vanda tessellata</i> (Roxb.) Hook. ex G.Don	<i>Orchidaceae</i>	Rasna



Polyalthia cerasoids *Vitex species*



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Figure 1-28 Example of Flora in Study Area

The various animal species in the study area are reported in below table. Richness of plant species of the region is the prime cause for animal richness.

Table 1.14-2 List of Fauna-birds, reptiles and rodents, amphibians

Sr. No	Common Name	Scientific Name	Schedule As per Wild life Protection Act, 1972
Mammal			
1.	Common Mongoose	<i>Herpestresedwardsii</i>	IV
2.	Common house rat	<i>Rattus rattus</i>	V
3.	Indian Field Mouse	<i>Mus booduga</i>	V
4.	Rhesus Monkey	<i>Macacamulata</i>	II
5.	Squirrel	<i>Funambulus pennant</i>	IV
6.	Wild Dog	<i>Lycaon pictus</i>	II
Reptiles			
7.	Common krait	<i>Bangaruscaerulidus</i>	II
8.	Common Indian House Geiko	<i>Homodactylusflevirudis</i>	IV
9.	Yellow Rat Snake	<i>Ptyasmucosus</i>	IV
10.	Oriental garden lizard	<i>Calotes versicolor</i>	IV
Birds			
11.	Common Crow	<i>Corvussplendens</i>	V
12.	Jungle Crow	<i>C. marorhynchos</i>	IV
13.	Cattle Egret	<i>Bubulcus ibis</i>	IV
14.	Common Mynah	<i>Acridotherestrictis</i>	IV
15.	Drongo	<i>Dicrurusadsimilis</i>	IV
16.	Doves	<i>Streptopeliaspp</i>	IV
17.	Common Babbler	<i>Turboidescaudatus</i>	IV
18.	Crow-Pheasant	<i>Psittaculakrameri</i>	IV
19.	Koel	<i>Eudynamysscolopacea</i>	IV
20.	Pied Mynah	<i>Sturnus contra</i>	IV
21.	Tailor Bird	<i>Orthotomussutorius</i>	IV

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Sr. No	Common Name	Scientific Name	Schedule As per Wild life Protection Act, 1972
Amphibians			
22.	Common Indian toad	<i>Duttaphrynus melanostictus</i>	Not Listed
23.	Verrucose frog	<i>Fejervarya keralensis</i>	Not Listed
24.	Short webbed frog	<i>Fejervarya brevipalmata</i>	Not Listed
25.	Indian bull frog	<i>Hoplobatrachus tigerinus</i>	Not Listed
26.	Ornate narrow-mouthed frog	<i>Microhyla ornata</i>	Not Listed



Ring dove



Koel

1.15 Socio Economic Assessment

Socio-economic environment is an essential part of environmental study which incorporates various facts related to socio-economic conditions in the area and deals with the total environment.

Socio - economic study includes demographic structure of the area, provision of basic amenities viz. housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature of aesthetic significance such as temples, historical monuments etc. at the baseline level. This would help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project. Socio-economic study of an area provides a good opportunity to assess the socio-economic conditions of an area.

This study will possibly estimate the change in living and social standards of the particular area benefitted due to the project. The gross economic production of the area will be increased substantially due to the existence of this project. It can undoubtedly be said that this project will provide direct and indirect employment and improve the infrastructural facilities and living standards of the area.



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1.15.1 Socio Economic Assessment

The objective of the study is to know the current socio-economic situation in the region, to recommend practical strategic interventions in the sector and to help in providing better living standards

Scope of work is to study the Socio-economic Environment of area, prediction of project impact and suggesting mitigation measures.

Collection of Data:

Data for this project were collected via primary sources (field survey) and secondary sources (i.e. Government department, maps, literature research etc.) in the study area.

Presentation of Data and Analysis:

The data collected were presented in a suitable, concise form for further analysis. The collected data were presented in the form of tabular or diagrammatic or graphic form. These tabulated data were interpreted and analysed with the help of various qualitative techniques and ideographic approaches.

- A mixture of both quantitative and qualitative approach has been adopted in the current socio-economic study.
- The study has been conducted based on primary and secondary data. While primary data has been collected through a sample survey of selected households, the secondary data has been collected from the administrative records Census 2011, district hand books etc.
- The details regarding population composition, number of literates, workers etc. have been collected from secondary sources and analysed. Also village/city/town wise details regarding amenities available in the study area have been collected from secondary sources and analysed.
- Two stage sampling design has been adopted to select the sampling units. The first stage units are census villages in the rural areas and towns/cities in urban areas. The ultimate stage units are households in the selected villages and towns/cities. Simple Random Sampling without Replacement (SRSWOR) has been adopted to select the sampling units.
- Estimation of various parameters has been made based on sample data and bottom top approach has been adopted.
- On the basis of a preliminary reconnaissance survey, two questionnaires were developed to make it suitable to fulfil the objectives of the study. The questionnaires contained both open ended and close ended questions
- The data collected during the above survey was analysed to evaluate the prevailing socio-economic profile of the area.

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

1.15.2 Background of the Study area

Cuttack District is one of the oldest Districts of Odisha. It is an important city and District headquarters. Cuttack, which lends its name to the District, is known as the business capital of Odisha. The word Cuttack derives its name from the anglicized sanskrit word Kataka, which has two meanings-one being military camp and the other being the seat of government, protected by the army. Literally, it also means the fort, referring to the ancient Barabati Fort, around which the city developed. This city takes pride in the fact that it had been the capital of Odisha, before its shifting to Bhubaneswar, the new capital.

Geographically, it is located at a latitude of 20 degree 03" to 20 degree 40" N and a longitude of 84 degree 58" to 86 degree 20" E. Cuttack city is flanked by Mahanadi river on the north and Kathajodi river on the south. Covering a geographical area of 3932 sq kms, the District is highly populated. The District experiences tropical climate, with the summer being hot and the winter cold. The maximum temperature that this District experiences is well above 40 degree Celsius (during summer) and the minimum is as low as 10 deg C (during winter). Summer generally lasts from March to June and winter, from October to February. Rainfall is generally heavy during the monsoons, which occur during the months of July and August. The average rainfall received is around 1892.55 mm in the District. South West monsoon is primarily responsible for the rainfall.

1.15.3 Demographics

As per 2011 Census, total population of the district is 2624470 which consists of 1352760 (Male) and 1271710 (Female). The population density of the district is 667 per Sq. Km. and the Literacy Rate is 85.5 percent. Sex ratio of the district is 940 female per 1000 male.

There are 15 villages in the study area. The demographic pattern of all the settlements as per 2011 census is given in below table. A study has been undertaken with respect to demography, occupational pattern, literacy rate and other important socio-economic indicators of these Villages to reveal the socioeconomic structure of the entire project area

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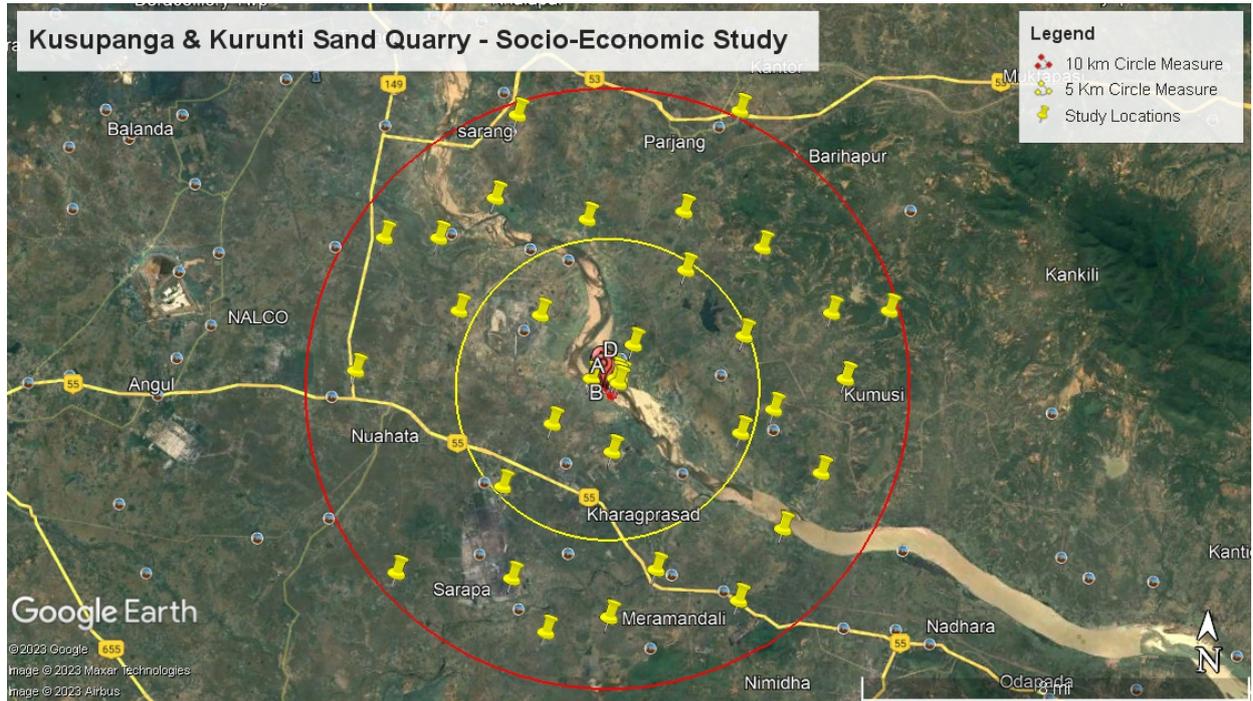


Figure 1-29 Socio-Economy Study

Table 1.15-1 List of villages present in the study area

Sr. No.	Name of Village	Distance from the Project Site	Direction from the Project Site
1.	Kusupanga	0.94	wsw
2.	Kurunti	2.64	S
3.	Narendrapur	5.33	SSW
4.	Sanjapada	9.86	SW
5.	Mangalpur	2.68	WSW
6.	Kamalanga	2.85	WNW
7.	Kandarasingha	3.85	NNE
8.	Katabahal	4.42	ENE
9.	Badakamar	5.46	ESE
10.	Kumusi	7.7	E
11.	Analakata	7.42	ENE
12.	Basantapada	9.3	ENE
13.	Palasahi	0.82	NNE
14.	Saranga (CT)	8.92	NNW



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15.	Khandualmunda	5.38	NNE
16.	Dihadol	9.51	NNE
17.	Damol	4.93	NNW
18.	Jatia	6.82	NNW
19.	Chainpur	8.73	NNW
20.	Meramandali	8.7	SSE
21.	Galapada	8.22	S
22.	Chitipada	6.78	SSE
23.	Sarapa	7.77	SSW
24.	Beruanpal	9.01	SSW
25.	Biswanathapur	8.53	W
26.	Budhapanka	5.55	WNW
27.	Tolakalundi	7.18	WNW
28.	Bido	7.66	ESE
29.	Roda	7.65	ESE
30.	Gailo	4.63	ESE
31.	Khalibahal	6.33	ENE

1.15.4 Population

There are 12108 households in the study area consisting of total population of 52418. A group of people who normally live together and take their meals from a common kitchen are called a household. Persons living in a household may be related or unrelated or a mix of both. However, if a group of related or unrelated people live in a house but do not take their meals from the common kitchen, then they are not part of a common household. Each such person is treated as a separate household. There may be one member households, two member households or multimember households. Average number of people in one household is 4.33 in the study area. Village wise details of the population are given in table below.

Table 1.15-2 Village-wise details of Population

Sr. No	Village	No of Households	Total Population	Male	Female	Sex Ratio (females/males)*1000
1.	Kusupanga	450	1911	1013	898	886
2.	Kurunti	673	2910	1737	1173	675
3.	Narendrapur	509	1940	1078	862	800

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4.	Sanjapada	421	1927	992	935	943
5.	Mangalpur	1209	5448	3188	2260	709
6.	Kamalanga	1025	4520	2570	1950	759
7.	Kandarasingha	98	404	200	204	1020
8.	Katabahal	633	2372	1209	1163	962
9.	Badakamar	139	521	273	248	908
10.	Kumusi	598	2525	1302	1223	939
11.	Analakata	179	830	427	403	944
12.	Basantapada	174	691	334	357	1069
13.	Palasahi	333	1283	594	689	1160
14.	Saranga (CT)	1126	6426	3573	2853	798
15.	Khandualmunda	300	1283	669	614	918
16.	Dihadol	358	1429	755	674	893
17.	Damol	459	1953	996	957	961
18.	Jatia	428	1948	1008	940	933
19.	Chainpur	214	944	478	466	975
20.	Meramandali	351	1377	701	676	964
21.	Galapada	320	1222	622	600	965
22.	Chitipada	72	256	153	103	673
23.	Sarapa	118	486	255	231	906
24.	Beruanpal	325	1217	616	601	976
25.	Biswanathapur	259	1130	592	538	909
26.	Budhapanka	175	669	358	311	869
27.	Tolakalundi	94	373	186	187	1005
28.	Bido	319	1407	661	746	1129
29.	Roda	564	2190	1171	1019	870
30.	Gailo	71	288	142	146	1028
31.	Khalibahal	114	538	283	255	901
Total		12108	52418	28136	24282	918

1.15.5 Sex Ratio

Sex ratio is number of females per 1000 males. As per the census 2011, the number of females per 1000 males is around 918. This is a good sex ratio..

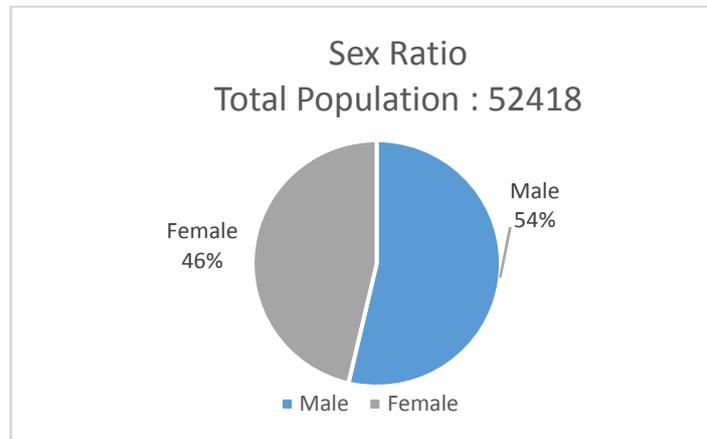


Figure 1-30 Population of the study area

1.15.6 Social Structure

The study area has a predominant Hindu population. Hindus in the project area as elsewhere, is based on the traditional four-fold caste system of Brahmin, Kshatriya, Vaishyas and Shudras. The first three categories belong to higher caste whereas the last category generally belongs to Scheduled caste and Tribes. As per Census 2011, average SC population in the study area is 20.63% of the total population. In case of ST population, this number has decreased and reached to 6.09% of the total population. Scheduled tribes are vulnerable minority of the area and many a times, are excluded from the village activities and treated as inferiors. The category others stated in the graph represents higher Hindu Categories, Muslims, Christians, Jains etc. The statistics regarding the Social Characteristics of villages in the study area are given below.



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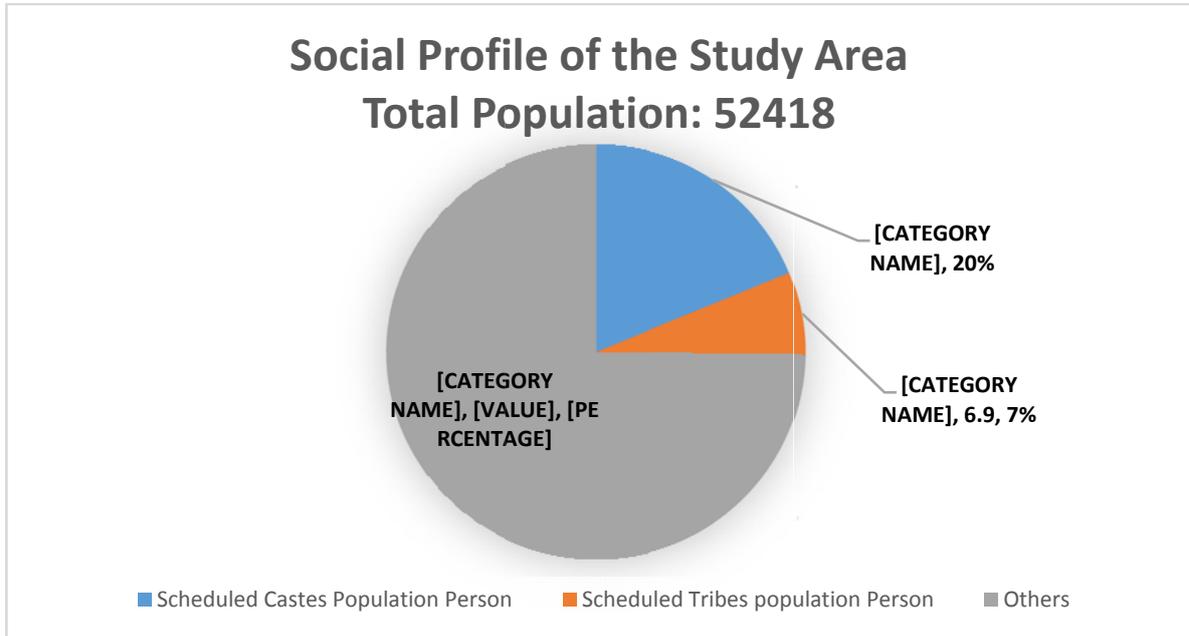


Figure 1-31 Social profile of the study area



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Sr. No.	Name	Total Population Person	Scheduled Caste population Person	Scheduled Caste population Male	Scheduled Caste population Female	Scheduled Tribes population Person	Scheduled Tribes population Male	Scheduled Tribes population Female
1.	Kusupanga	1911	434	229	205	0	0	0
2.	Kurunti	2910	309	166	143	140	84	56
3.	Narendrapur	1940	297	154	143	810	425	385
4.	Sanjapada	1927	474	244	230	19	10	9
5.	Mangalpur	5448	1210	602	608	241	145	96
6.	Kamalanga	4520	1110	594	516	540	285	255
7.	Kandarasingha	404	65	32	33	142	74	68
8.	Katabahal	2372	291	151	140	0	0	0
9.	Badakamar	521	100	53	47	0	0	0
10.	Kumusi	2525	662	334	328	156	78	78
11.	Analakata	830	221	111	110	0	0	0
12.	Basantapada	691	72	38	34	0	0	0
13.	Palasahi	1283	88	40	48	0	0	0
14.	Saranga (CT)	6426	1028	548	480	449	266	183
15.	Khandualmunda	1283	80	44	36	90	52	38
16.	Dihadol	1429	81	38	43	46	18	28
17.	Damol	1953	333	165	168	7	5	



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18.	Jatia	1948	369	194	175	47	21	26
19.	Chainpur	944	234	113	121	83	41	42
20.	Meramandali	1377	487	249	238	0	0	0
21.	Galapada	1222	621	315	306	0	0	0
22.	Chitipada	256	0	0	0	0	0	0
23.	Sarapa	486	218	115	103	34	18	16
24.	Beruanpal	1217	513	252	261	76	40	36
25.	Biswanathapur	1130	102	51	51	192	91	101
26.	Budhapanka	669	184	102	82	0	0	0
27.	Tolakalundi	373	67	33	34	104	54	50
28.	Bido	1407	411	203	208	0	0	0
29.	Roda	2190	507	251	256	16	11	5
30.	Gailo	288	106	46	60	0	0	0
31.	Khalibahal	538	140	64	76	0	0	0
Total		52418	10814	5531	5283	3192	1718	1474

Table 1.15-3 Social Distribution

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1.15.7 Literacy

The overall percentage of literate in the area is 72.12%. Total literate population is 37806. Most of the literate people have studies till middle schools and not attended higher school and college because of lack of institutions of higher education. Out of total literate population, 58.67% is male population whereas 41.33% is female population.

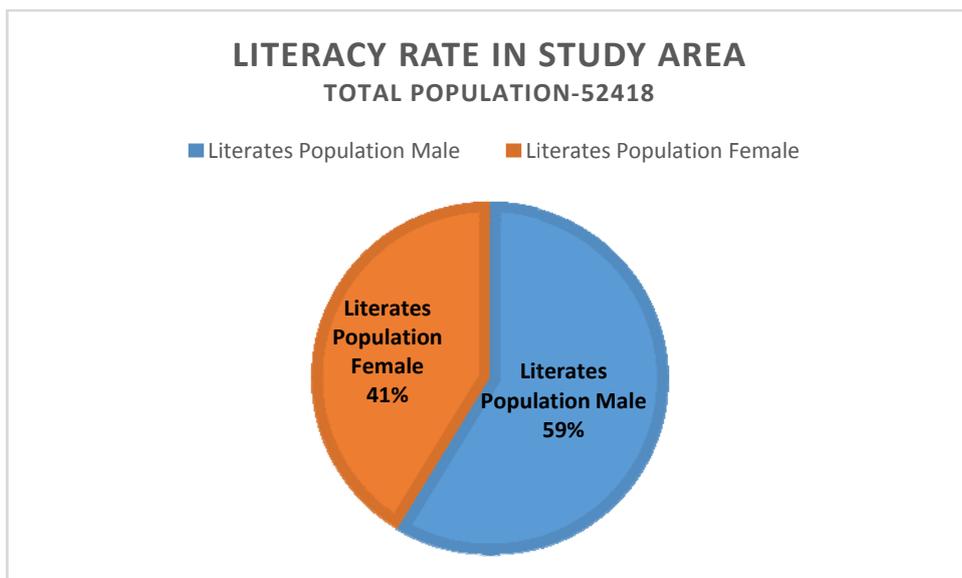
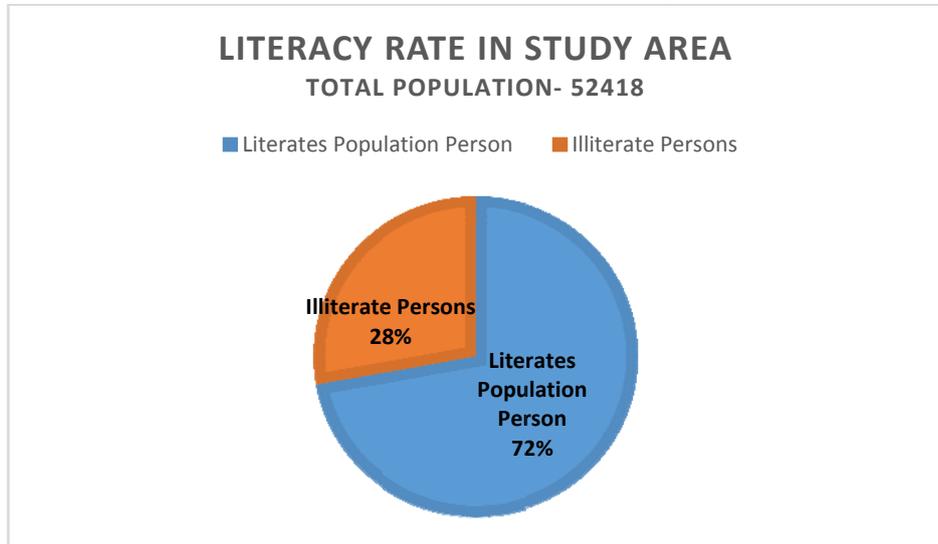


Figure 1-32 Population Literacy of the study area

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Table 1.15-4 Literacy Rate

Sr. No.	Name	Total Population Person	Literates Population Person	Literates Population Male	Literates Population Female	Illiterate Persons	Illiterate Male	Illiterate Female
1.	Kusupanga	1911	444	386	453	150	303	444
2.	Kurunti	2910	3151	2292	983	422	561	3151
3.	Narendrapur	1940	517	351	415	152	263	517
4.	Sanjapada	1927	660	507	262	95	167	660
5.	Mangalpur	5448	757	614	582	239	343	757
6.	Kamalanga	4520	837	690	421	171	250	837
7.	Kandarasingha	404	364	297	283	114	169	364
8.	Katabahal	2372	553	402	422	148	274	553
9.	Badakamar	521	437	298	487	185	302	437
10.	Kumusi	2525	119	66	71	34	37	119
11.	Analakata	830	207	147	132	48	84	207
12.	Basantapada	691	457	342	418	159	259	457
13.	Palasahi	1283	455	331	344	137	207	455
14.	Saranga (CT)	6426	310	248	111	48	63	310
15.	Khandualmunda	1283	126	107	140	60	80	126
16.	Dihadol	1429	482	448	477	179	298	482
17.	Damol	1953	878	632	680	293	387	878
18.	Jatia	1948	120	112	56	22	34	120
19.	Chainpur	944	249	182	107	34	73	249
20.	Meramandali	1377	444	386	453	150	303	444
21.	Galapada	1222	3151	2292	983	422	561	3151
22.	Chitipada	256	517	351	415	152	263	517
23.	Sarapa	486	660	507	262	95	167	660
24.	Beruanpal	1217	757	614	582	239	343	757
25.	Biswanathapur	1130	837	690	421	171	250	837

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26.	Budhapanka	669	364	297	283	114	169	364
27.	Tolakalundi	373	553	402	422	148	274	553
28.	Bido	1407	437	298	487	185	302	437
29.	Roda	2190	119	66	71	34	37	119
30.	Gailo	288	207	147	132	48	84	207
31.	Khalibahal	538	457	342	418	159	259	457
Total		52418	22181	15625	14612	5955	8657	22181



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Table 1.15-5 Occupational Pattern

Sr. No.	Name	Total Population Person	Total Worker Population Person	Total Worker Population Male	Total Worker Population Female	Main Working Population Person	Main Cultivator Population Person	Main Agricultural Labourers Population Person	Main Household Industries Population Person	Main Other Workers Population Person	Marginal Worker Population Person	Non-Working Population Person	Non-Working Population Male	Non-Working Population Female
1.	Kusupanga	1911	553	527	26	409	31	8	0	370	144	1358	486	872
2.	Kurunti	2910	1423	1225	198	1317	160	34	21	1102	106	1487	512	975
3.	Narendrapur	1940	1017	787	230	920	18	5	2	895	97	923	291	632
4.	Sanjapada	1927	598	553	45	446	71	139	13	223	152	1329	439	890
5.	Mangalpur	5448	2072	1960	112	1934	163	26	16	1729	138	3376	1228	2148
6.	Kamalanga	4520	1735	1641	94	1190	121	128	46	895	545	2785	929	1856
7.	Kandarasingha	404	119	110	9	98	14	41	24	19	21	285	90	195
8.	Katabahal	2372	1138	699	439	546	238	107	19	182	592	1234	510	724
9.	Badakamar	521	174	163	11	69	24	9	0	36	105	347	110	237
10.	Kumusi	2525	1023	771	252	854	135	319	22	378	169	1502	531	971
11.	Analakata	830	267	249	18	9	0	1	0	8	258	563	178	385
12.	Basantapada	691	469	226	243	198	99	56	21	22	271	222	108	114
13.	Palasahi	1283	366	330	36	330	154	13	2	161	36	917	264	653
14.	Saranga (CT)	6426	1624	1376	248	1186	161	101	38	886	438	4802	2197	2605
15.	Khandualmunda	1283	401	371	30	166	42	32	4	88	235	882	298	584
16.	Dihadol	1429	393	363	30	332	190	52	5	85	61	1036	392	644
17.	Damol	1953	770	580	190	535	46	132	56	301	235	1183	416	767
18.	Jatia	1948	581	525	56	556	106	278	36	136	25	1367	483	884



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19.	Chainpur	944	361	273	88	248	36	22	39	151	113	583	205	378
20.	Meramandali	1377	482	406	76	459	95	13	2	349	23	895	295	600
21.	Galapada	1222	575	374	201	179	25	6	64	84	396	647	248	399
22.	Chitipada	256	92	89	3	77	18	0	1	58	15	164	64	100
23.	Sarapa	486	151	134	17	109	2	0	0	107	42	335	121	214
24.	Beruanpal	1217	414	353	61	372	72	8	5	287	42	803	263	540
25.	Biswanathapur	1130	406	334	72	363	97	40	17	209	43	724	258	466
26.	Budhapanka	669	263	193	70	237	26	82	83	46	26	406	165	241
27.	Tolakalundi	373	125	108	17	116	25	65	0	26	9	248	78	170
28.	Bido	1407	376	330	46	327	111	7	31	178	49	1031	331	700
29.	Roda	2190	667	614	53	538	92	86	113	247	129	1523	557	966
30.	Gailo	288	99	78	21	91	7	48	0	36	8	189	64	125
31.	Khalibahal	538	123	119	4	103	5	70	3	25	20	415	164	251
Total		52418	18857	15861	2996	14314	2384	1928	683	9319	4543	33561	12275	21286

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1.15.8 Occupational Pattern

The occupational profile has been classified based on the available 2011 census classification. A person is treated as main worker if the person has worked for a major part of the year (180 days or more). A marginal worker is a person who has worked for some time during a year but adding up to 180 days in a year. Those who have not worked throughout the year are treated as non-workers.

Total Worker:

Work is defined as economically productive activity with or without compensation or wages. Such participation may be physical or mental in nature, also, it includes both working and supervising and directing the work. It even includes part time help or unpaid work on farm, family enterprise or its economic activity. Number of total workers in the study area is 18857 which is 35.97% of the total population. The total working population is further divided into main and marginal working population.

Cultivator:

A person is called cultivator if he or she is engaged in cultivation of land own or from government or held from private persons or institutions for payment in money, kind or share. Cultivation work includes effective supervision or direction in cultivation. A person who has given out her/his land to another person or institution(s) for cultivation for money, kind or share of crop and who does not even supervise or direct cultivation process is not treated as cultivator. Similarly, a person working on another person's land for wages in cash or kind or combination of both is not treated as cultivator. Total cultivators in study area are 2384 which is approx. 12.64% of the total workers.

Agricultural Labourers:

People working on the land of others for wages or share in the yield have been treated as agricultural labourers. The total workers of this category are about 1928 which is 10.22% of the total working population.

Household Workers:

Household industry is defined as an industry conducted by one or more members of the household at home or near area and only within the precincts of the house where the household lives in urban areas. The larger proportion of the household industry consists of the members of the household. The industry is not run on the scale of a register company or qualifies or has to be registered under the Indian Factories Act. Household industry relates to production, processing, servicing, repairing or making and selling but not includes professions such as a pleader, Doctor, Musician, Dancer, Waterman, Astrologer, Dhobi, Barber, even if such professions, trade or services are run at home by members of the household. The total workers of this category are about 683 which is 3.62% of the total working population.

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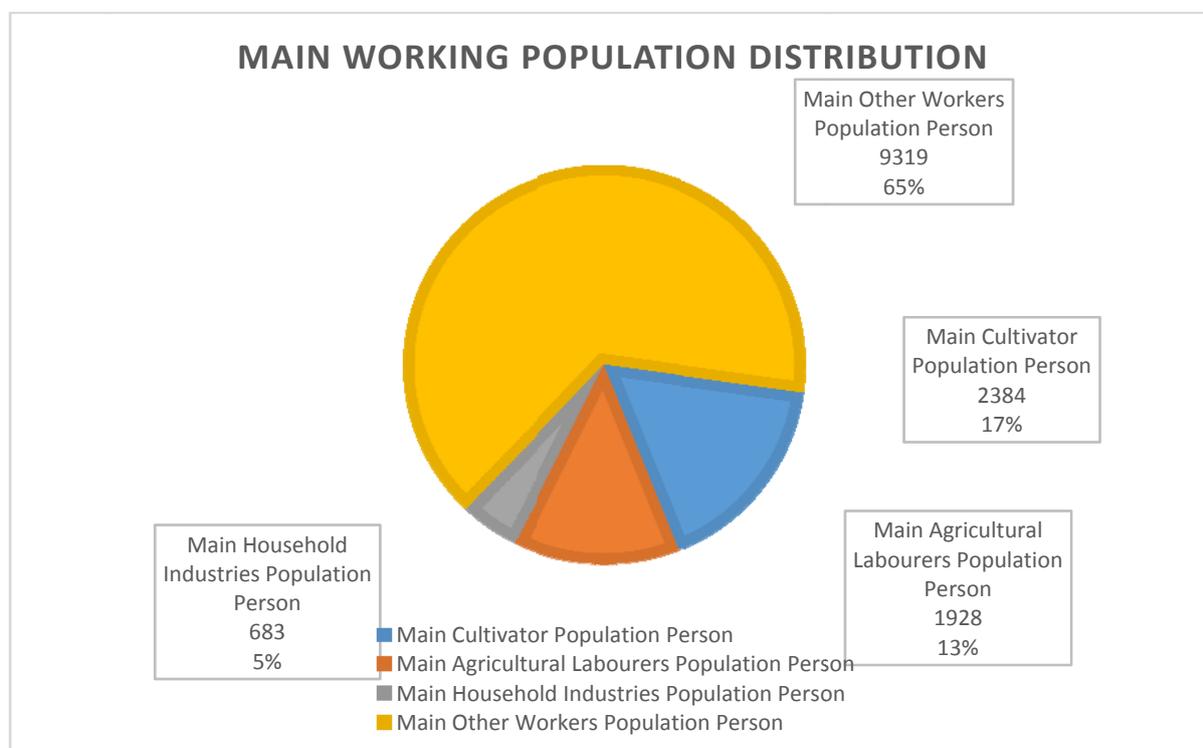
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Other Workers:

All workers, i.e., those who have been engaged in some economic activity during the last one year are other workers. The type of workers that come under this category is government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trading, transport, banking, mining, construction, political or social work, priests, entertainment artist, etc. In effect, all workers except cultivators or agricultural labourers or household industry workers are other workers. The total workers of this category are about 9319 which is 58.75% of total workers.

Non-workers:

The non-workers include those engaged in unpaid household duties, students, retired people, dependants, beggars etc. The total number of non-workers population is 33561 which 64.03% of the total population.



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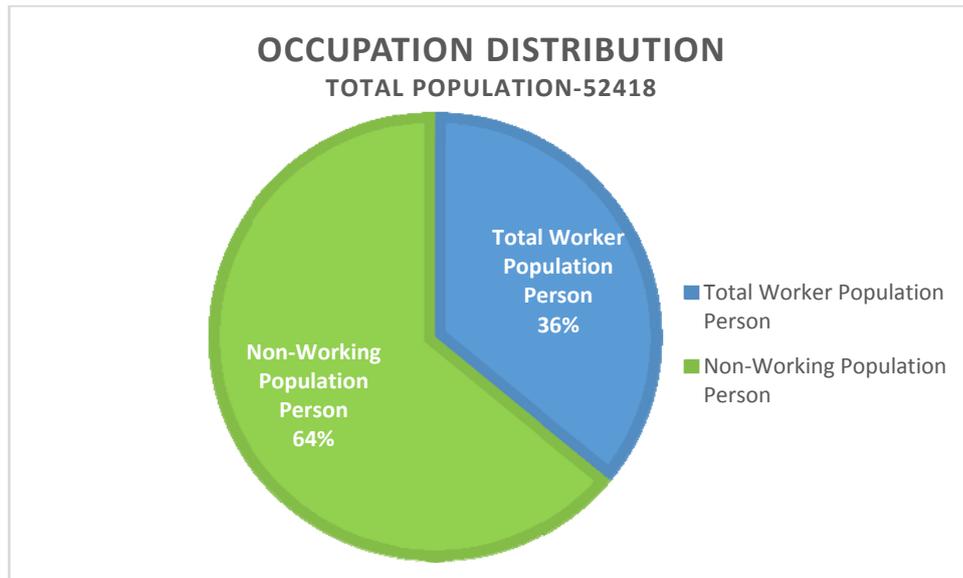


Figure 1-33 Occupational Pattern of the study area



Chapter 4 Anticipated Impacts and Mitigation Measures

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Chapter 4 Anticipated Impacts and Mitigation Measures

4.1 Introduction

The environmental parameters likely to be affected by mining are related to many factors, i.e. physical, social, economic, agriculture and aesthetic value. The proposed mining activity involves Excavation, loading and transport of minerals. The operations may disturb the environment of the area in various ways, such as removal of mass, change of landscape, flora and fauna of the area, surface drainage, and change in air, water and soil quality. While for the purpose of development and economic upliftment of people, there is need for establishment of mining industries, but these should be environment friendly. Therefore, it is essential to assess the impacts of mining on different environmental parameters, before starting the mining operations, so that abatement measures could be planned in advance for eco - friendly mining in the area. Identification of all potential environmental impacts due to any proposed project is an essential step of Environmental Impact Assessment. Open cast mines, which are more, preferred now for rapid increase is mineral production and safety reasons, cause significant impacts on land use, drainage, air quality, ecology, noise etc., if adequate control measures are not taken to prevent/mitigate the adverse environmental impacts. On the other hand, there is continues urge of new industries establishment and mining for economic upliftment and development, therefore, it is essential to assess the impacts of every project on different environmental parameters, before starting the operations. It facilitates in advance planning of pollution abatement measures for eco- friendly development in the area.

4.2 Methodology of Impact Assessment

The impact assessment has been undertaken following a systematic process that identifies, predicts and evaluates the impacts, the project could have on aspects of the physical, biological, social/ socio-economic and cultural environment, and identifies measures that the project will take to avoid, minimize/reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable. The stages of the impact assessment process comprise of the following:

- **Impact identification:** To identify the potential impact of the project on the various environmental parameters.
- **Impact prediction:** To determine what could potentially happen to resources/receptors as a consequence of the project and its associated activities.
- **Impact evaluation:** To evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resources/ receptors.
- **Impact mitigation:** To identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.

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4.3 Basics of Impact Assessment

The impact of the proposed project will be assessed on the basis of their characteristics i.e. nature, type, extent, duration, intensity & frequency and its significance.

Characteristics of Impacts

The impact is described in terms of its characteristics such as nature, type etc. Impact characteristics are given in **Table - 4.1**.

Table 4-1 Impact Characteristics

Characteristic	Classification	Description
Nature	Positive impact	When impact is considered to represent improvement to baseline or introduce a new positive factor/change.
	Negative impact	When impact is considered to represent adverse change from the baseline or introduce a new undesirable factor/change.
	Neutral	When there is no impact to represent any change from the baseline and not introducing any new factor/change.
Type	Direct impact	Resulting from a direct interaction between a project activity and the receiving environment / receptors.
	Indirect impact	Resulting from other activities that happened as a consequence of the project.
	Cumulative impact	Impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project.
Extent	Project Area	When impact due to the project related activities is restricted within the premises of project area i.e. core zone.
	Local	When impact due to the project related activities is restricted within the immediate surroundings i.e. upto 3 km radius.
	Zonal	When impact due to the project related activities is restricted within the study area i.e. up to 10 km radius.

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Characteristic	Classification	Description
	Regional	When an impact due to the project activity extends within as well as beyond 10 km radius.
Duration	Short – term	When the impact is usually temporary or last for a short time or will have an effect soon rather than in the distant future.
	Long- term	When impact would occur during the development of the project and either takes a long time or lasts a long time or cause a permanent change in the affected receptor/resource.
Intensity	Low	When resulting in slight changes of prevailing baseline conditions and quality of existing physical environment is good. Ecological environments as well as human receptors are not likely to be affected due to the proposed project activity.
	Medium	When resulting in changes of prevailing baseline conditions which are within the benchmark norms and quality of existing physical environment shows some signs of stress. Ecological environment as well as human receptors could be sensitive to change in quality of prevailing baseline condition, but human receptors retain an ability to adapt to change.
	High	When resulting in changes of prevailing baseline conditions which are exceeding the benchmark norms and quality of existing physical environment is already under stress. Ecological environment as well as human receptors would be impacted to the larger extent and the ability of human receptors to adapt to changes would be undermined.
Frequency	Remote (R)	When resulting in remote or one-off chance of an event due to an activity on a receptor/ resource.
	Occasional	When an impact due to an activity is occurring

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Characteristic	Classification	Description
	(O)	intermittently from time to time on a receptor/resource.
	Periodic (P)	When an impact due to an activity is resulting on periodic basis for a week or a month on a resource/receptor.
	Continuous (C)	When an impact due to an activity is continuously resulting on a resource/receptor.

Significance of Impacts

Impacts are described in terms of 'significance'. Significance is a function of the magnitude & sensitivity / importance of the impact.

Classification of impact significance is given in Table - 4.2.

Table 4-2 Significance of Impact

Significance	Description
Insignificant	Negligible impact or where a resource or receptor (including people) will not be affected in any way by a particular activity, or the predicted effect is deemed to be 'negligible' or 'imperceptible' or is indistinguishable from natural background variations.
Minor	Where an effect will be experienced, but the impact is well within accepted standards/guidelines with or without mitigation.
Moderate	Where an effect will be experienced and the impact is within accepted standards/guidelines with mitigation.
Major	Impact where an accepted limit or standard may be exceeded or the impact occur to the highly valued/sensitive resource/receptors.

Irreversible and Irretrievable commitments of environmental components

Determining the irreversible and irretrievable commitments of the resources is one of the major stages of impact evaluation, which gives an understanding about the potential impacts that are likely to affect future generations of the area and facilitates for adoption of proper mitigation measures regarding the same.

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Table 4-3 Irreversible and Irretrievable commitments of environmental Components

Commitment of resources	Description
Irreversible	Irreversible commitments of resources refer to the impact or loss of the resources that cannot be recovered or reversed. Irreversible is a term that describes the loss of future options. It applies primarily to the impacts of use of nonrenewable resources or to those factors that are renewable only over long periods of time.
Irretrievable	Irretrievable is a term that applies to the loss of production, harvest, or use of natural resources. Irretrievable commitment of resources may be considered as the loss of resources as a result of change (both reversible & irreversible) due to any project activity that cannot be regained or recovered.

4.4 Interaction Matrix

The interaction matrix enables a methodical identification of the potential interactions each project activity may have on the range of resources/receptors within the Area of Influence for the Project.

The interaction matrix for the project activities and likely impacted resources/receptors is presented in Table - 4.4 which covers potential interactions, regardless of probability of occurrence. The matrix consists of a list of resources/ receptors that could be affected against a list of project activities.

Entries in the matrix cells are tick marked to indicate whether:

- An interaction is not reasonably expected (blank);
- The interaction is reasonably possible and may lead to potential impact (tick marked).

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Table 4-4 Interaction Matrix

S. No.	Project Activity Likely Impacted Resources / Receptors	Mine development & Process		Reclamation and Greenbelt/plantation	Miscellaneous
		Mining (excavation)	Operation Loading and unloading of Sand	Greenbelt Development and along roads. Plantation at conceptual stage	Meeting points of workers/ employees i.e. Rest shelter, canteen
A. Physical					
1.	Air	√	√		
2.	Noise & / Vibration	√	√	√	√
3.	Land Use			√	
4.	Topography				
5.	Geology				
6.	Drainage Pattern				
7.	Surface Water	√			√
8.	Ground Water				
9.	Soil		√	√	√
B. Biological					
1.	Flora	√	√	√	
2.	Fauna	√		√	
3.	NP/WLS/BR/reserves/Forests etc.				
C. Social / Socio-Economic					
1.	Demography				
2.	Physical Displacement				
3.	Land Use (w.r.t. Population influx)				
4.	Habitation				
5.	Economy & Livelihood	√			
6.	Social & Cultural Structure				

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7.	Infrastructure & Public Services	√			
8.	Public Health		√	√	
9.	Agriculture	√	√		
10.	Transport Infrastructure				
D.	Occupational Health				
1.	Injury		√		
2.	Health				
3.	Non - routine risk		√		
	Legends	(_)Show no interactions is reasonably	(√)Show interactions reasonably possible with one of the outcomes may lead to potential impact		

According to the interactions identified between project activities and resource/receptors as described in the above Table, it is evident that the following aspects are likely to have impact due to the mining project (Table - 4.5) and therefore, to be considered for Impact Assessment:

Table 4-5 Likely Impacted Resources/ Receptors

S. No.	Likely Impacted Resources / Receptors	
A.	Physical	Air Quality
		Noise Level, ground vibrations
		Water environment (Surface)
		Soil Environment
		Land Use
		Geology & Topography
B.	Biological environment	Flora
		Fauna
C.	Socio economic environment	Habitation & Demography
		Physical Displacement
		Land use (w.r.t. population influx)
		Economy & Livelihood

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		Social & Cultural Structure
		Infrastructure & Public Services
		Public Health
		Agriculture
		Transport Infrastructure
D.	Occupation Health & Safety	Injury
		Health
		Non Routine Risk

4.5 Environmental Impact Assessment and Mitigation Measures

The proposed mining activities may disturb environment in various ways such as degradation of land, dust generation, deterioration of water and soil quality, affecting the biological and socio-economic environment of the area. The impacts of mining on various environmental parameters were assessed and are given below:

4.5.1 Air Pollution

i) Gaseous Pollution

Gaseous pollutants are anticipated from HEMMs like dumpers and other vehicles.

ii) Particulate Matter

The generation of dust is anticipated from various mining activities like excavation, loading, transportation, and other mining related activities. The ambient air quality monitored during Pre-monsoon season from 1stOctober 2023 to 31stDecember 2023. Table- 3.8 shows that the PM concentration in the surrounding villages are within the prescribed limits, which indicates negligible or no impact from proposed mining activities on ambient air quality.

4.5.1.1 Ambient Air Quality Impact Prediction Modelling

Impact Prediction is an important part of Environmental Impact Assessment Study. There are various techniques available to predict the impacts. Mathematical modeling is an established and accepted technique for the same.

The ambient air quality depends upon emission sources, meteorological conditions and the topographical features of the study area. The impact of any future emission activities can be accessed through air quality modeling. Air quality modeling is a mathematical replication of how air pollutants disperse and transport to the receptor considering the effect of meteorology and site terrain. An air quality models reflects a mathematical description of hypothesis conveying the

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behavior of some physical process or other and not exact replica but contain some of nature's essential elements. Air quality managers use models to identify source contributions to air quality problems and assist in the design of effective strategies to reduce harmful air pollutants. This report gives the cumulative peak incremental concentration of Particulate Matter to a distance of 10 km, due to the mining & allied activity. The concentrations have been predicted in all directions covering study period. Spatial distributions of all the pollutants are also presented in the form of Isopleths.

4.5.1.1.1 Air Quality Dispersion Modelling

Due to complexity in the mining activities, high source roughness and different types of sources, USEPA regulatory model i.e. AERMOD is one of the suitable models which can take care all the sources and predict the pollutant concentration more satisfactorily. Prediction of incremental ground level concentrations (GLC's) due to Sand Quarry has been made by AERMOD CLOUDE as per CPCB guidelines.

It is US-EPA approved model for prediction of the air quality. The model uses rural dispersion and regulatory default options as per guidelines on air quality models (PROBES/70/1997-1998). USEPA has replaced the ISCST3 model with AERMOD as regulatory model.

4.5.1.1.2 Meteorological Data/Input Parameters

Data at the weather monitoring station on wind speed, direction, and temperature at one-hour interval for the monitoring period has been used as meteorological input

4.5.1.1.3 Ambient Air Quality Standards

Ambient air quality standards promulgated by National Ambient Air Quality Standards for different areas are as follows:

Table 4-6 Ambient Air Quality Standards

Area	Time Weighted Average	Concentration (µg/m ³) PM ₁₀
Industrial Area, Residential Rural and Other Areas	Annual Average *	60
	24 hours **	100
Ecologically Sensitive Area (Notified by Central Govt.)	Annual Average *	60
	24 hours **	100

4.5.1.1.4 Presentation of Results

In the present case, model simulations have been carried out for mining project to obtain an optimum description of variations in concentration over the site in 10 km radius covering 12 directions.

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The incremental concentrations have been estimated based on mathematical emission data-based modeling. For each time scale, i.e. for 24 hrs, the model computes the maximum GLC observed during the period over all the measurement points. Existing value has been covered in the Background Ambient Air Quality Monitoring. Details are given as under:

For volume Source

The maximum incremental GLCs due to the mining project operation for PM, is superimposed on the maximum baseline PM, concentration recorded at the monitoring locations during the field monitoring period. The maximum incremental GLCs due to the Mining Project for PM is 1.7µg/m³. Isopleth showing the max. GLC is given below.

Mainly fugitive emission will be generated from mining operation which will be restricted nearby the lease boundary by using proper dust suppression measures.

Dust emissions generated due to area source will be controlled by various measures viz Preventive maintenance of HEMMs and development of green belt will be adopted.

For Line Source:

Dust emissions due to transportation of material will be generated and pollution control measures like water sprinkling on haul roads, development of green belt will be adopted.

Gaseous emission i.e. SO₂& NO_x will be generated due to combustion of fuel in transportation and pollution control measures will be adopted like, proper maintenance of vehicles. Also, emission levels will be maintained as per EuroVI standards.

4.5.1.2 Meteorological Data

Meteorological file comprising wind direction, wind speed, ambient temperature, has been prepared for modelling purpose. Details of the same are given in chapter 3.

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1. Particulate Matter (PM₁₀):

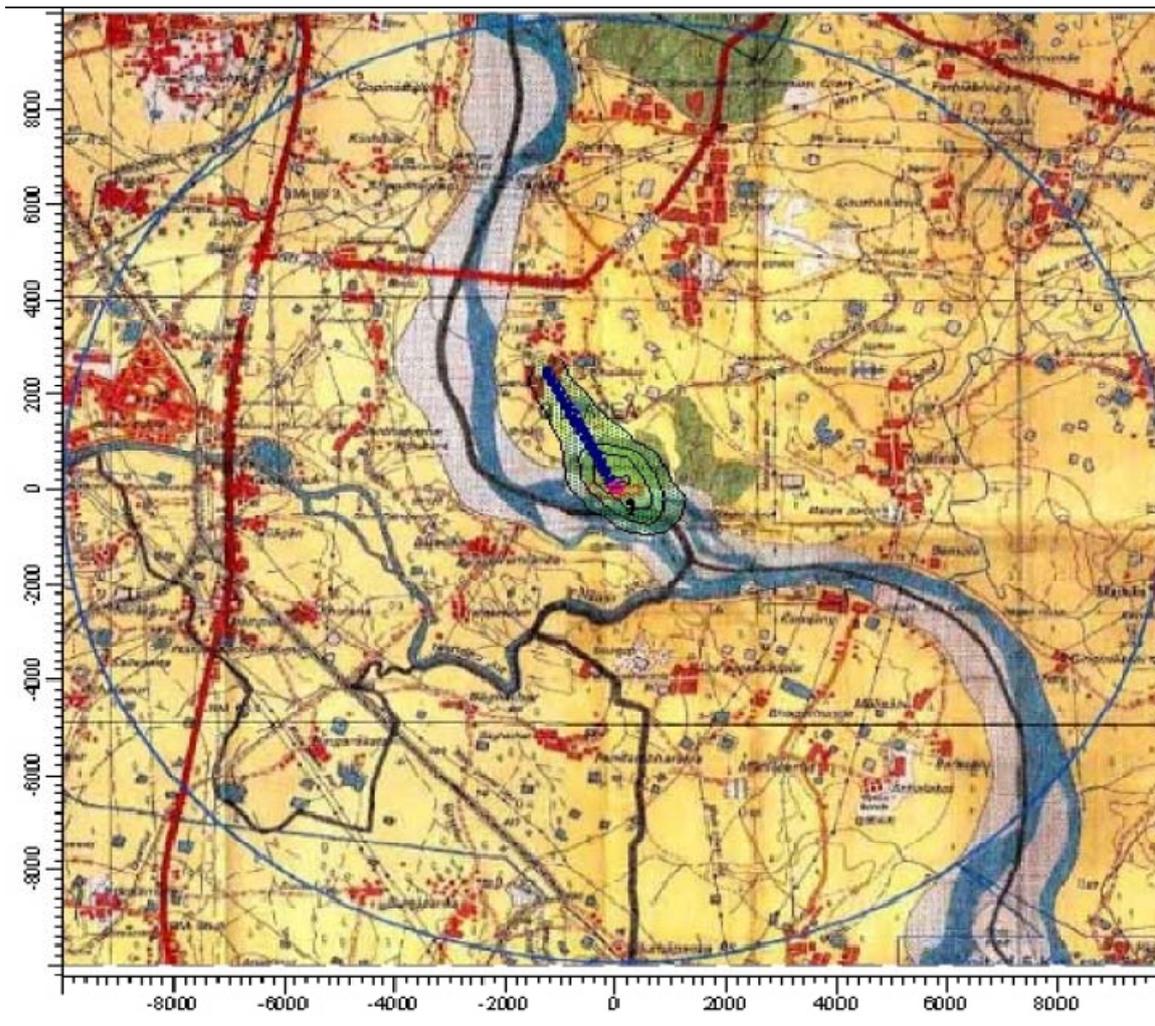


Figure 4-1 Isopleth for PM₁₀

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2. NO_x:

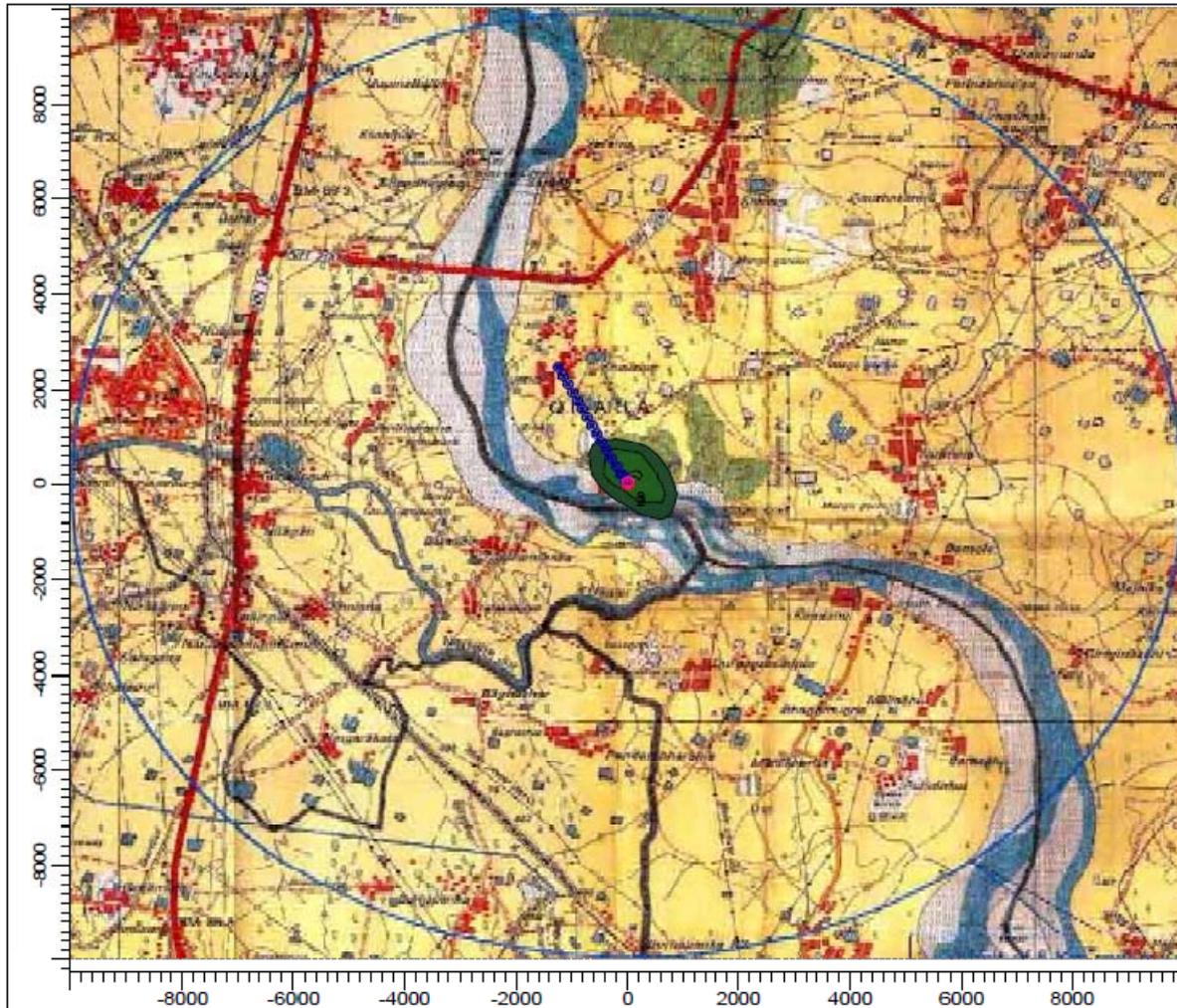


Figure 4-2 Isopleth for NO_x

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3. PM_{2.5}:

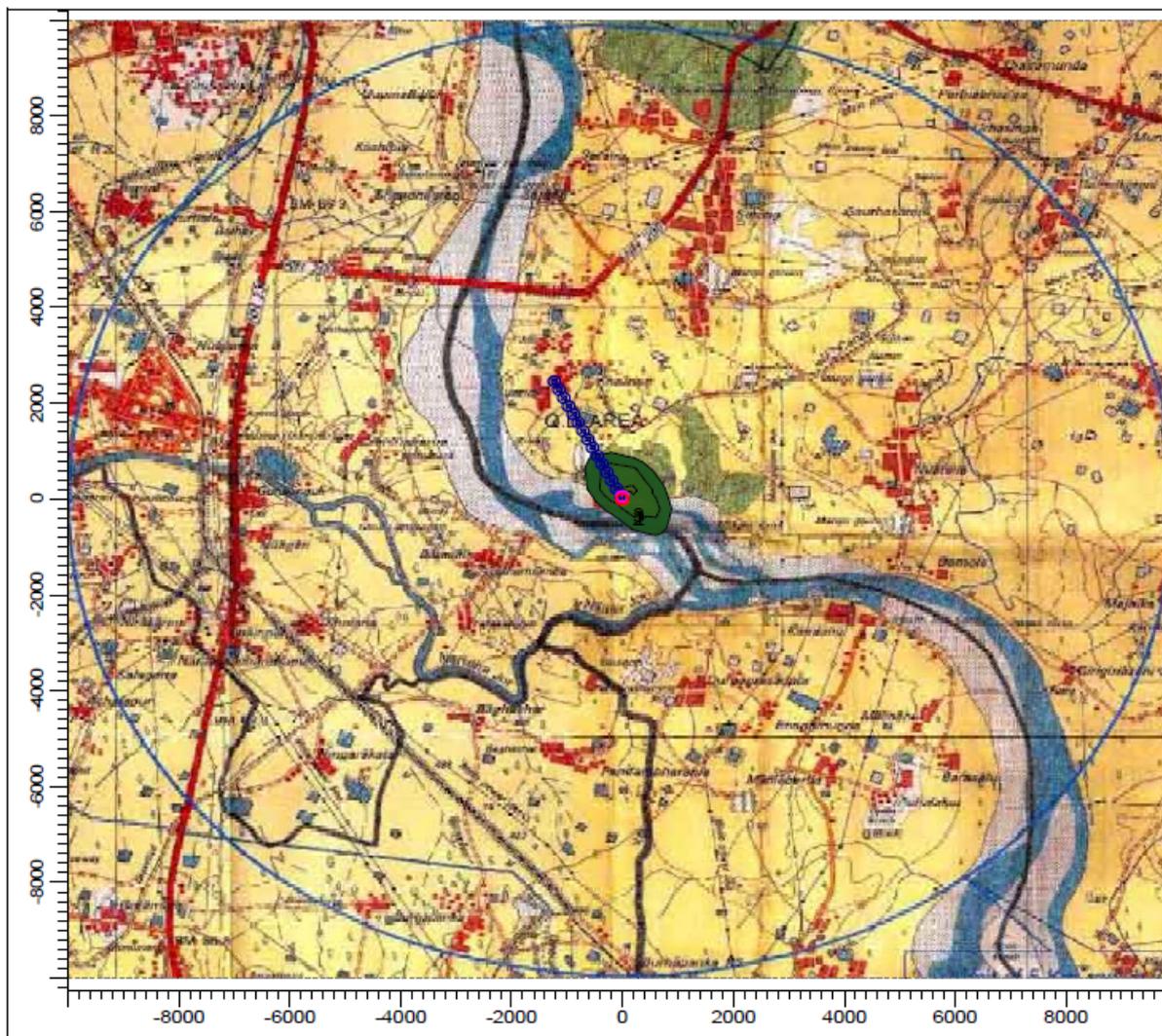


Figure 4-3 Isopleth for SO₂

Table 4-7 Impact Prediction due to Mining Activity

S.no.	Pollutants	Concentration (µg/m ³)			CPCB NAAQS Standards
		Baseline Value	Incremental Value	Resultant	
1.	PM ₁₀	82.6	1.52	84.12	100
2.	NO _x	13.0	0.14	13.14	80
3.	PM _{2.5}	24.9	0.02	24.92	80



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4.5.1.3 Safeguard/Mitigation Measures

The following mitigation measures will be adopted to mitigate air pollution generated due to the mining activities:

- Regular Water sprinkling will be done on haulage roads to arrest dust from becoming air borne.
- Care will be taken to prevent spillage by covering the carrying vehicles with tarpaulin and sprinkling of water, if dry.
- Proper maintenance (preventive as well as scheduled maintenance), oiling and greasing of vehicles will be done to minimize gaseous pollutants.
- Planning transportation routes of mined material so as to reach the nearest paved roads by shortest route. (minimize transportation over unpaved road);
- Speed limit will be enforced to reduce airborne fugitive dust from vehicular traffic.
- Deploying PUC certified vehicles to reduce their noise emission.
- Development of green belt/plantation in nearby places and roads will be carried out to control the air pollution.
- Personal protective equipments i.e. Dust mask will be provided to all employees & workers.
- Periodic air quality monitoring will be carried out.
- Overloading will be kept under check by giving prior awareness.
- Speed limit will be enforced to reduce airborne fugitive dust from vehicular traffic.

4.5.1.4 Impact Evaluation

Ambient Air Quality monitoring results are given in Table 3-8 of Chapter 3 of this Final EIA/EMP Report. From this it is evident that AAQ results are well within the prescribed norms. Impact evaluation is given in table below.

Table 4-8 Impact Evaluation for Ambient Air Quality

Impact Element	Evaluation	Change of Air Quality Due to the Proposed Mining Project		
Potential Concern	Effect/	Impact on health of humans and nearby biological/ecological receptors due to line and point sources of air emissions including fugitive dust emissions during Sand mining activities from the proposed Project.		
Characteristics of Impacts				
Nature		Positive	<i>Negative</i>	Neutral
			√	
Type		<i>Direct</i>	Indirect	Cumulative
		√		
Extent		Project Area	Local	<i>Zonal</i> Regional

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			√	
Duration	Short – term	Long- term		
		√		
Intensity	Low	<i>Medium</i>	High	
		√		
Frequency	Remote (R)	Occasional (O)	Periodic (P)	<i>Continuous (C)</i>
				√
Significance of Impact				
Significance	Insignificant	Minor	<i>Moderate</i>	Major
			√	

4.5.2 Noise Environment

With the mining operations for mine development, excavation and transportation of Sand, it is imperative that noise levels would increase. However, pronounced effect of above noise levels is felt only near the active working area

1. Noise Generated due to Excavation & Transportation:

Noise would be generated mainly by vehicles transporting the sand. The noise levels in the working environment will be maintained within the standards prescribed by Occupational Safety and Health Administration (OSHA). The permissible limits, as laid down by CPCB, are presented in following table.

Table 4-9 Permissible Exposure in Cases of Continuous Noise (CPCB, Govt. of India)

S. No.	Sound Level (dB A)	Continuous Duration (Hours)
1.	85	8
2.	88	4
3.	91	2
4.	94	1
5.	97	0.5
6.	100	0.25

Source: CPCB (Govt of India)

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2. Noise Generated due to Transportation:

It is likely that mining companies will use the same main haul road to transport product out of the study area and through road networks. This will result in an increase in the number of trucks utilizing the road, the actual predicted noise level.

3. Noise Impact Analysis on Community

High noise levels will be confined to work zone areas only. It can be seen that noise levels get diffused rapidly with distance. Noise level in the study area varies from 35.7dB (A) Leq to 48.5 Leq dB (A) during day time and 35.7 dB (A) Leq to 44.0 Leq dB (A) during night time. The predicted noise levels indicate that there will be no significant increment to the ambient noise levels.

4.5.2.1 Mitigation Measures

The following control measures will be adopted to keep the ambient noise levels well below the limits.

- Proper maintenance (preventive as well as scheduled maintenance), oiling and greasing of vehicles will be done to minimize generation of noise.
- The workers employed at vehicles will be provided with protective equipment, earmuffs and earplugs as a protective measure from the high noise level generated at the mine site and wherever required.
- Green Belt and Plantation will be developed along haul roads and nearby places. The plantation checks propagation of noise.
- Periodical monitoring of noise will be carried out.

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

- Haulage route for transportation of the excavated minor mineral will be opted & constructed away from the habitation, schools, hospitals & other social areas.
- Minimum use of horns in the village area will be promoted and silence zone (if any) will be marked as applicable.
- Care will be taken to produce minimum sound during loading.
- Labor will be provided with personal hearing protection device i.e.; ear plugs or ear muffs if required.

4.5.2.2 Impact Evaluation of Noise

Ambient Noise Level monitoring results are given in Chapter 3 of this Final EIA report. From this it is evident that results are well within the prescribed norms. Impact evaluation is given in table below:

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Table 4-10 Impact Evaluation for Noise

Impact Element	Evaluation	Change of Noise Level due to the Proposed Mining Project			
Potential Concern	Effect/	Impact on health of humans and biological factors/receptors due to noise generated due to mining activities during day and night time and also on occupational health of the workers exposed to noise.			
Characteristics of Impacts					
Nature		Positive		<i>Negative</i>	Neutral
				√	
Type		<i>Direct</i>	Indirect	Cumulative	
		√			
Extent		<i>Project Area</i>	Local	Zonal	Regional
		√			
Duration		Short – term		Long- term	
		√			
Intensity		Low		<i>Medium</i>	High
				√	
Frequency		Remote (R)	Occasional (O)	<i>Periodic (P)</i>	Continuous (C)
				√	
Significance of Impact					
Significance		Insignificant	<i>Minor</i>	Moderate	Major
			√		

4.5.3 Water Environment

The mining process will not divert and utilize the surface & ground water. Quantity of water will remain the same. The existing background level of water quality as indicated by the baseline data revealed that impact on water environment will not be significant in this project. Ground water table will not be intersected. The impact on surface water will be positive as the river gets channelized and the flow of the water will not be hindered.

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4.5.3.1 Mitigation Measures

- Green belt area will be developed along haul road and in nearby villages.
- Mining of sand does not have any significant negative impact on the water quality and parameters as the mining does not intersect with the ground water level.
- No diversion/modification has been proposed in the drainage pattern.
- Mining activities will be restricted to 1 m or water table, whichever is encountered first.
- Safety zone of area of 7.5 m has been left out.
- Mining below sub terrain level will be avoided to safeguard any water contamination.
- Taking the above mentioned measures, any deviation from mining plan will not be done so that natural free flow of the water is not disturbed.

4.5.3.2 Impact Evaluation

Impact evaluation is given in table below:

Impact Evaluation Element	Change in Water Environment due to the Proposed Mining Project			
Potential Concern	Effect/	Impact on Surface water environment will be positive as the river gets channelized and the flow remains unhindered.		
Characteristics of Impacts				
Nature	<i>Positive</i>		Negative	Neutral
	√			
Type	<i>Direct</i>	Indirect	Cumulative	
	√			
Extent	Project Area	<i>Local</i>	Zonal	Regional
		√		
Duration	<i>Short – term</i>		Long- term	
	√			
Intensity	Low		<i>Medium</i>	High
			√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	<i>Continuous (C)</i>
				√
Significance of Impact				
Significance	Insignificant	Minor	<i>Moderate</i>	Major
			√	

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4.5.4 Land Environment

The sand is unconsolidated in nature will be collected carefully and loaded in dumpers manually. The land use pattern will not change permanently and will be reclaimed every year in the monsoon season. The land use pattern will only be changed by proposed green belt development plan, which is a positive impact. Mining activities will not affect land use pattern.

4.5.4.1 Land Use Pattern

Table 4-11 Land use pattern of the Project Site

Type of land use	Turkel sand Quarry-2 Area (Ha)	Turkel sand Quarry-2 Area (Ha)
Water channel area	Nil	Nil
Left over area adjacent to water channel	Nil	Nil
Quarry Safety zone area	0.67	0.67
Potential Mineable surface area within the plan period	4.33	4.33
Total	5.00	5.00

Source: Approved Mining plan & Progressive Mine Closure Plan

4.5.4.2 Reclamation Plan for Land

- No reclamation is proposed for mine closure. In variably the volume sand extracted in each year will be re-deposited in the subsequent year during rainy season.
- The replenishment of sand in the mining lease area is sufficient to sustain the mining in prescribed area.
- The area is devoid of top soil and therefore no waste dump would be generated.

4.5.4.3 Impact Significance

Impact significance is given in table below:

Table 4-12 Impact Evaluation to determine the significance (Land use- During operation Phase)

Impact Element	Evaluation	Change in the land use due to mine development & operation
Potential Concern	Effect/	Change in the land use of core zone due to mining activities (during operation) due to proposed Sand quarry Mine development & operation activities
Characteristics of Impacts		

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Nature	Positive		Negative	<i>Neutral</i>
				√
Type	<i>Direct</i>	Indirect	Cumulative	
	√			
Extent	<i>Project Area</i>	<i>Local</i>	Zonal	Regional
	√			
Duration	<i>Short – term</i>		Long- term	
	√			
Intensity	Low		<i>Medium</i>	High
			√	
Frequency	Remote (R)	Occasional (O)	Periodic (P)	<i>Continuous (C)</i>
				√
Significance of Impact				
Significance	Insignificant	Minor	<i>Moderate</i>	Major
			√	

**Change in land use due to the mining activity at the conceptual stage will be positive as sand mining will channelize the river.*

4.5.5 Socio-economic Environment

The potential impact on socio-economic environment due to this mining project is given in following heads.

4.5.5.1 Positive Impacts

Employment

Direct and indirect employment opportunities will be generated during mining operation.

Community Skills Development

Community Skill Development courses can be provided under the CER Activities which will be conducted by the project proponent. Many CER activities would help the local inhabitants to improve their skills and it can also help in women empowerment, better education facility, health facility etc.

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Improved Standard of Living

Employment opportunities created by the project and skill development activities carried out under CER, will increase income of local community and therefore improve the overall standard of living in the area.

Economic Exposure and Development

Implementation of the project will make opportunities for sustainable livelihood, better infrastructure facilities and services available to the people. This will expose and introduce the local population to factors of economic development including the banking system, financial services and credit and investment schemes.

4.5.6 Other Impacts on Biological Environment

4.5.6.1 Impact on Biodiversity

Habitat loss, degradation, and fragmentation are important causes of known species-population extinctions. The main cause of degradation and depletion of forests and wildlife are the human activity (anthropogenic pressure). Population explosion, over exploitation of forest resources, urbanization, unscientific management, encroachment of forest land, illicit felling, lack of regeneration of forests and outdated laws are major factors responsible for the degradation and depletion of forests.

There are no endangered species, wildlife sanctuary, wildlife corridors, faunal migratory routes or eco sensitive area near the whole study area.

Impact on Flora

No adverse impact is envisaged on the existing flora, as there will be no deforestation by mining operation. Plantation will be developed in the lease area as per plantation programme. These activities help to improve the floral cover of the area.

Impact on Fauna

There is no National Park, Wildlife Sanctuary, and Biosphere Reserve, Wildlife Corridors, Tiger/Elephant Reserves, Protected Forest etc. within 10 km radius of the Mine site.

So, there would be not any significant effect on Bio-diversity of flora and fauna.

Impact on Agriculture

Agricultural activities may be impacted because of dust generation due to activities such as;

1. Transportation of sand from ML area.
2. Mining operations.

These effects can be minimized by adopting the proper mitigation measures as mentioned earlier.

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4.5.7 Occupation Health & Safety

Occupational health and safety (OHS) is multidisciplinary field concerned with the safety, health and welfare of people at work. The goal of occupational safety and health programs includes fostering a safe and healthy work environment. OHS may also protect co-workers, family members, employers, customers, and many others who might be affected by the workplace environment.

This mining project does not contain any toxic elements. Further this being a manual mine, sand production and waste material handling is by manual means so there shall be marginal impact on air and noise qualities. Therefore; the possibilities of any health hazards are minimal.

Impacts;

The most significant occupation healthy treats are Noise Induced Hearing Loss (NIHL) and Occupational Lung Disease (OLD) due to inhalation of dust.

Mitigation measures;

1. Employees will be adequately trained and educated for involvement and commitment into the implementation of health and safety guidelines
2. Monitoring the effects of mining activities on safety and health and conducting regular performance reviews through periodical health check-up.
3. First Aid facility and training to workers.
4. PPEs will be provided to the workers likely hand gloves, safety shoes etc.
5. Working of mine will be done as per approved mining plan.



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Chapter 5 Analysis of Alternatives

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Chapter 5 Analysis of Alternatives

5.1 Introduction

A comparison of alternatives like proposed project site & proposed technology etc will facilitate in selection of best available option for project development, this leads to minimum environmental impacts and adoption of most environment friendly and cost-effective options. Every mine needs to be planned in a way that project's objective gets achieved with maximum resource utilization and without causing any environmental damages upto the maximum extent possible. Mineral deposits are site specific, and it is an existing mine. So, therefore no alternate site has been selected.

5.2 Alternative of Site

Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a newly proposed mine and as Mining is site specific and guided by deposit geology; hence alternative site is not applicable. The selected site has the following advantages.

1. Analysis of Technology: Mineral processing will not be carried out. No other alternative technologies can be used because of the nature and occurrence of the deposit, cost of operation, capacity of the mine and specification laid by the consumer industry. The mining activity has been planned for maximum mineral utilization, safety of the mine and scientific mining.
2. Outcome of geological mapping: Fresh patches of unexploited river sand occurrences are also observed within the area.
3. Short distance to main Approach road from Mine site.
4. No endangered species around the mine site.
5. Availability of labor from nearby villages.

5.3 Conclusion

No change in use of mineral is envisaged. With implementation of various environmental protection measures this site is found to be most suitable as per Cost Benefit ratio and environment is concerned.



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Chapter 6 Environmental Monitoring Program

6.1 Introduction

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

- Status of Pollution at the mine site and in its vicinity.
- To generate data for predictive or corrective purpose in respect of pollution.
- To examine the efficiency of pollution control system adopted at the site.
- To assess environmental impacts.
- Monitoring will be carried out at the site as per the norms of CPCB.

6.2 Environment Monitoring Cell

A centralized Environmental Monitoring Cell will be established for setting up monitoring programme for important and crucial environmental parameters which are of immense importance to assess the status of environment during mine operation. With the knowledge of initial parameters, deviations in environmental conditions due to operation of the mine will be assessed and suitable mitigation steps will be taken to safeguard the environment. The routine monitoring program will be implemented under the project monitoring as per CPCB and MoEF&CC guidelines.

The responsibilities of the Environmental Monitoring Cell will be: -

To develop and implement Environmental Monitoring Programme for core and buffer Zone.

To verify that all or selected parameters measured by Environmental Monitoring Program are in compliance with regulatory requirements, internal policies and standards, and established environmental quality performance limits.

- To assess effectiveness of the environmental management system, practices and procedures.
- To develop greenbelt.
- To coordinate the environment related activities to the top management within as well as with outside concerned agencies.

6.2.1 Environmental Monitoring Program

Post project monitoring will be carried out as per conditions stipulated in Environmental Clearance Letter, issued by SEIAA; Consent to operate of SPCB as well as according to CPCB guidelines. The post project environmental monitoring for the proposed mining operations shall be conducted for following parameters:

- Air quality
- Water quality
- Noise levels
- Soil quality and
- Medical Check-up of the employees

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Chapter 6

The location of the monitoring stations will be selected on the basis of prevailing micro-meteorological conditions of the area. AAQM stations will be selected (including minimum 1 location in core zone, upwind side, more sites in downwind side/impact zone) to assess ambient air quality of the area and at site.

Noise level monitoring will be carried out on lease boundary & at high noise generating area within the lease. Water & soil monitoring locations will be decided on the basis of general slope of the area & drainage.

Table 6-1 Post Project Monitoring Program

S. No.	Attributes	Parameters	Frequency	Locations
1	Air Quality & Meteorological			
1.1	Ambient Air Quality at mine site	PM _{2.5} , PM ₁₀ , SO ₂ , NO _x and CO	Half yearly/As per consent	Locations in the project impact area (Minimum 1 Locations in upwind side, more sites in downwind side / impact zone)
2	Water and Ground Quality Monitoring			
2.1	Ground Water Quality	Drinking Water Parameters, As per IS-10500:2012	Half yearly/As per consent	Set of grab samples during pre and post monsoon for ground and surface water in nearby villages
2.2	Surface Water Quality	Class will be assessed as per the CPCB Guidelines	Half yearly/As per consent	
3	Soil Quality			
3.1	Soil Quality	Colour, textural class, grain size, distribution, pH, Electrical Conductivity, Bulk Density, Porosity, Infiltration rate, Moisture retention capacity, Wilting Co-efficient, Organic matter Na, K, PO ₄ , SO ₄ , SAR, Base Exchange Capacity, Pb, Cu, Zn, Cd, Fe.	Half yearly/As per consent	Mining Site and in buffer zone



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S. No.	Attributes	Parameters	Frequency	Locations
4.	Noise Level Monitoring			
4.	Noise Level Monitoring	Noise level in dB(A) Quarterly/half yearly	Half yearly/As per consent	Mine Boundary, High noise generating areas within the Mine boundary and Study area.
5.	Medical Check-up of the Employees			
5.	Medical Check-up of Employee	-	Medical examination: Age of workers < 45 years: After every 5 years Age of workers > 45 years: After every 3 years	

6.2.2 Instruments to be used

The post project environmental monitoring work will be carried out by recognized laboratory registered with MoEF&CC the following instruments shall come into use for data collection work in the monitoring schedule:

- Respirable Dust Sampler (RDS)
- Fine Particulate Sampler (FPS)
- Sound Level Meter (Type-A)

6.2.3 Methodology Adopted

Any reputed organization with MoEF&CC recognition under EP act shall be engaged for carrying out the post project environmental monitoring (PPM) and timely compliance report submission to various regulatory authorities. Standard methods for sampling and analysis shall be followed. All environmental monitoring and relevant operational data shall be stored in the database.

6.2.4 Reporting Schedule

Environmental Monitoring Program (EMP) will be designed considering conditions stipulated in the Environmental Clearance issued by the SEIAA, Bhubaneswar & consent to establish and operate by SEIAA, Bhubaneswar. Six monthly compliance reports will be submitted to the concerned regulatory authorities.

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6.2.5 Corrective and Preventive Action for Non- Compliance/Non- Compliance

The company would detail the process for identification of non- Conformances and address these through mid – course corrective action plan. The measures include-

- To identify non – compliance/ non- conformances.
- To record non-compliance/Non conformances.
- To evaluate the non-Compliance/ Non conformation, to determine specific corrective and preventive action.
- To address the Non-compliance / Non-conformances.
- To review the corrective actions by the senior Management for effective implementation.
- Reporting of any statutory non-compliance if any, to board at regular interval as per Corporate Environment Policy.

6.2.6 Budget details for Environmental Monitoring Program

The monitoring of the environment parameters will be outsourced and carried out by the lab having accreditation of MoEF&CC & NABL.

The total budget for Environment Monitoring Program for the proposed project is Rs. 50,000 per year.

**This is estimated cost; the actual expenditure may vary at the time of execution and implementation.*



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7.1 Public Consultation

All the issues of environmental concerns to be expressed during the proceedings of Public Consultation/Public Hearing will be addressed in final EIA Report.

7.2 Rehabilitation and Resettlement Plan

No rehabilitation or resettlement plan is proposed as there are no habitations in the project site.

7.3 Risk Assessment & Disaster Management Plan

The main objective of the Risk assessment study is to identify the potential hazards, assess the effect/consequence of all probable accidental releases and risk mitigating measures to reduce hazards of the proposed facilities.

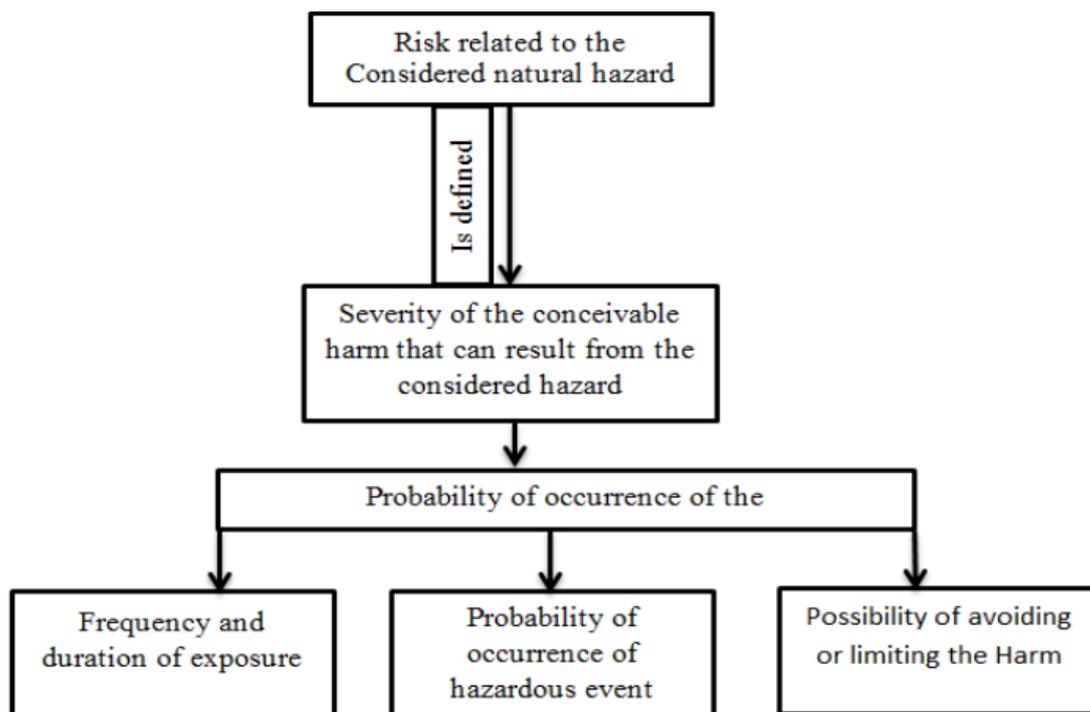


Figure 0-1 Outline representation of Hazard and Risk identification

The river bed mines have risks which need to be addressed for which a disaster management plan has been formulated with an aim of taking precautionary steps to avert disasters and also take

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such action after disaster which limits the damage to minimum. In the sections below, the identification of various hazards, probable risks during the operational phase of the mining, are addressed either qualitatively or quantitatively.

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

- ❖ Inundation: Filling of the mine area due to excessive rains
- ❖ Quick sand condition
- ❖ Drowning
- ❖ Accidents due to vehicular moments
- ❖ Accidents due to material handling
- ❖ Fugitive Emission
- ❖ Diesel fumes from diesel operated mechanization.
- ❖ Soil Erosion

As per proposal made under the mining plan the area will be developed by means of opencast mining method. Extraction of minerals is to be carried out by manual means. Water table will not be intersected during the mining process. No high risk accidents like landslides, subsidence flood etc. have been apprehended.

7.3.1 Types of hazard identified

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

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

7.4 Risk analysis

In order to assess the risk, identifying its assets, threat and vulnerability is important and also calculating its level by evaluating its consequences & likelihood is highly significant.

7.4.1 Purpose of the risk analysis:

- Forecasting any unwanted situation
- Estimating damage potential of such situation

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- Decision making to control such situation
- Evaluating effectiveness of control measures
- Eliminating the potential risk factors and mechanisms

7.4.1.1 Approach

A logical systematic process is usually followed during risk assessment to identify the key risk events and to assess the consequences of the events occurring and the likelihood of their occurrence and frequency. Further scaling is done to determine the level of Risk.

Table 0-1 Risk likelihood and Consequences

Step 1: Assess the Likelihood				Step 2: Assess the consequences		
L1	Happens every time we operate	Almost certain	Common or repeating occurrence	C1	Fatality	Catastrophic
L2	Happens regularly (often)	Likely	Known to have occurred "has happened"	C2	Permanent disability	Major
L3	Has happened (occasionally)	Possible	Could occur or heard of it happening	C3	Medical/hospital or lost time	Moderate
L4	Happens irregularly (almost never)	Unlikely	Not likely to occur	C4	First aid or no lost time	Minor
L5	Improbable (never)	Rare	Practically impossible	C5	No injury	Insignificant

7.4.1.2 Assessment methodology

A simple risk assessment way is adopted to calculate the risk level and the matrix is determined through multiplication and risk rating Index is identified.

Simple Risk Assessment: Consequences (C1-C5) X Likelihood (L1-L5)

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Table 0-2 Risk Assessment

Risk Rating Index			Likelihood High to low				
High 1-4	Medium 4-9	Low 10-25	L1	L2	L3	L4	L5
Consequences			1	2	3	4	5
High To low	C1	1	1	2	3	4	5
	C2	2	2	4	6	8	10
	C3	3	3	6	9	12	15
	C4	4	4	8	12	16	20
	C5	5	5	10	15	20	25

7.4.1.3 Risk Assessment Analysis:

On the basis of above rating index following level of risk for hazards identified are determined as shown in figure given below:

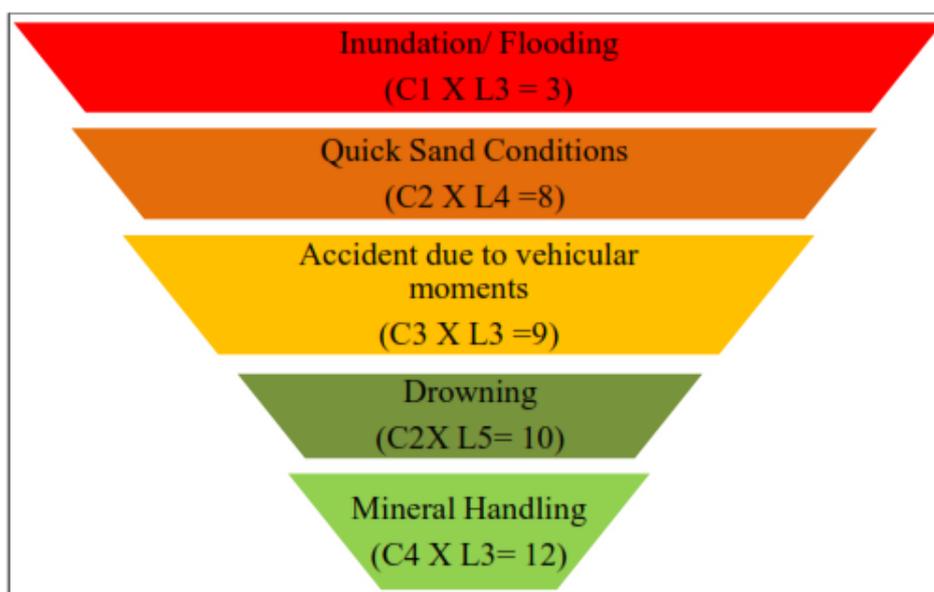


Figure 0-2 Risk Assessment Analysis

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7.4.2 Risk Level Identified:

Following interpretation can be drawn from the above analysis given in Table.

Table 0-3 Interpretations

S. No.	Hazards	Human Risk		
		Probability of Occurrence	Consequence	Risk Level
1	Inundation/Flooding	Possible	Catastrophic	High
2	Quick sand condition	Unlikely	Major	Medium
3	Minerals Transport/ Vehicular Movement	Possible	Moderate	Medium
4	Drowning	Rare	Major	Medium
5	Minerals Loading Dumping and Storage	Possible	Minor	Low

7.4.2.1 Inundation / Flooding:

The risk rating depicted for it is 3 which reveal that it is possible and will have catastrophic with major consequences, if work started without assessment of the river bed condition especially during monsoon season.

- The possibility of inundation/flooding of the sand mines are very high during monsoon or during heavy rains in lean season as the mine area lies over the sand dunes of a riverbed.
- There are dangers to the trucks and other machineries due to flooding.
- There are dangers to the workers working in the sand dunes.

7.4.2.2 Quick Sand Condition

- The risk rating depicted for it is 8 which reveal that it is an unlikely event with major consequences as frequency of this risk is less likely to occur.
- This condition occurs when the working crosses the water table at a certain depth and the Permeability of the strata is very high.
- This condition occurs when the effective stress in the sand becomes zero due to influx of water.
- This creates danger condition to the trucks and other machineries plying over the sand dunes.

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7.4.2.3 Drowning

The risk rating depicted for it is 10 which reveal that it is a rare accident but will have major Consequences, if occurred.

- This may occur due to flash floods etc. due to which the workers at the site may get seriously injured or drowned.
- There are possibilities of drowning in the deeper part of the river. However safety jackets, floating tube will be kept at the site office to prevent any mishap.

7.4.2.4 Accident due to vehicular moments

The risk rating depicted for it is 9 which reveal that it is possible event with moderate consequences as frequency of this operation is more but the predicted/assumed intensity is less like minor cuts, bodily injury.

- The possibilities of road accidents are due to reckless or untrained driver or overloading of trucks or in case pathway is not compacted suitably, etc.

7.4.2.5 Accident during Sand Handling: Loading/ Transportation and Dumping

The risk rating depicted for it is 12 which reveal that it is possible event with minor consequences, as frequency of this operation is more but the predicted/assumed intensity is less like minor cuts, abrasion, etc. may be due to river bank collapse, over thrown boulders/pebbles, injuries due to carelessness use of hand tools, etc.

7.4.2.5.1 Sand Loading

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

- There are possibilities that the workers standing on the other side of loading may get injury due to over thrown sands with pebbles.
- There are possibilities of workers getting injured during opening of side covers of the trucks to facilitate sand loading.
- Chance of workers getting injured due to improper balancing of truck while loading.

7.4.2.5.2 Sand Transport

The sands loaded in trucks is being sent through public roads.

All likelihoods of road accidents are possible.

- Accident may also occur during movement in the mine (sand dunes).
- There are possibilities that due to overloading, some pebbles or big boulder may injure the passerby public.

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7.4.2.5.3 Sand Dumping and Storage

- There are possibilities of the trucks rolling/ sliding down the sand bunker during dumping operation.
- The dumper /trucks may cause injury to the workers working near the stowing plant.
- Dumping the sand in an empty sand bunker may cause injury to the stowing operator if the bunker chute is in open condition.

7.5 Other risks involved and its control/ prevention measures

7.5.1 Risks Due to Failure of Pit Slope

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

7.5.2 Risks due to Failure of Waste Dumps

Also during extraction of sand there is no over burden or soil cover. All the ROM produce will be used as raw material source for aggregate. Therefore there is no risk associated with failure of waste dumps.

7.5.3 Risk due to Fugitive Emission

Due to loading /unloading operation of sand Fugitive Emissions create, due to loading causes impact on health of mine workers. Water sprinkling will be provided for dust settlement.

7.5.4 Risk due to diesel fumes from diesel operated mechanization

Health impact due to diesel particulates from emission of diesel operated vehicles which are used for transportation and loading /unloading purposes of sand. Regular check and proper maintenance of vehicles should be done to avoid such instances we will talk to the workers and their representatives and will involve them in the risk assessment process and tell them what to do, to reduce risk. All transportation within the mine lease area should be carried out directly under the supervision and control of management.

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

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7.5.5 Soil Erosion

No mining will be done within safety zone in either side of river banks to maintain its protection. Mining will proceed along the river in the direction from downstream to upstream in each block. No mining will be done across the river.

7.6 Mitigation of Hazards

7.6.1 Measures to Prevent Dangerous Incidents during Inundation/Flooding

- Inundation or flooding is expected in sand mines as during monsoon only the sand reserve gets replenished.
- During monsoon months and heavy rains the sand mining operations are ceased.
- The Trucks and other vehicle plying over the dunes will be kept on the river banks beyond HFL.
- The workers are not allowed to go over the dunes during heavy rains.

7.6.2 Measures to Prevent Quick Sand Condition

- The only way to avoid quick sand condition is by avoiding sand lifting below water table.
- The critical hydraulic gradient will be maintained at less than 1 to prevent high artesian pressure in a coarse sand area.

7.6.3 Measures to Prevent Drowning

- The sand mining will be done under strict supervision.
- The workers are not allowed to go to the deeper areas of the rivers.
- Fishing by workers will not be allowed in the river during working hours.
- In case it is required to cross the river, it is done under strict supervision and over the shallow area using life lines.
- Few life jackets, inflated tubes will be kept near the mine site.

7.6.4 Measures to Prevent Accidents due to Transportation.

- All transportation within applied mining lease working will be carried out directly under the supervision and control of the management.
- The vehicles will be maintained in good condition and checked thoroughly at least once a month by the competent person authorized for the purpose by the management.
- Road signs will be provided at turning point at haul road up to the main road (wherever required).

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- To avoid danger while reversing the equipment's/ vehicles especially at the working place / loading points, stopper will be posted to properly guide reversing/ spotting operating.
- A statutory provision of constant education, training etc. will go a long way in reducing the incidents of such accidents.
- Regular training will be provided to the operators by the management.
- Overloading will not be permitted and will be covered with tarpaulin.
- The maximum permissible speed limit will be ensured. The truck drivers will have valid driving license.

7.6.5 Measures to Prevent Accidents during Sand Loading/ Transportation and Dumping.

7.6.5.1 Sand Loading

- The trucks will be brought to a level so that the sand loading operation suits to the ergonomic condition of the workers.
- The loading will be done from one side of the truck only.
- The workers will be provided with gloves and safety shoes during loading.
- Opening of the side covers (pattas) will be done carefully and with warning to prevent injury to the loaders.
- No sand will be collected within safety zone of the river, especially from outer bank of the meandering river. Safe clearance will be mainly determined by the height of the river bank and thickness of sand to be extracted from the close vicinity of that bank.
- Developing pond in the river bed shall not be allowed.
- Operations will be carried out during daylight only.
- No foreign material (garbage) will be allowed to remain/spill in river bed and catchment area, or no pits/pockets are allowed to be filled with such material.
- Stockpiling of harvested sand on the river bank will be avoided.
- For particular operations, approaching river bed from both the banks will be avoided.

7.6.5.2 Sand Transportation.

- All transportation within the main working will be carried out directly under the supervision and control of the management.
- The Vehicles must be maintained in good repairs and checked thoroughly at least once a week by the competent person authorized for the purpose by the Management.
- Road signs will be provided at each and every turning point especially for the guidance of the drivers at the evening.

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- To avoid danger while reversing the trackless vehicles especially at the embankment and tipping points, all workers will be removed from all areas for reversing of Lorries, and the vehicle will have audio-visual alarm during reversing.
- A statutory provision of the fences, constant education, training etc. will go along way in reducing the incidents of such accidents.
- Generally, overloading will not be permitted. This is unsafe and may damage equipment.
- The truck will be covered and maintained to prevent any spillage.
- The maximum permissible speed limit will be ensured.
- The truck drivers will have proper driving license.

7.6.6 Disposal of Mining Machinery

Machinery is proposed on hire basis. Hence no de-commissioning of mining machinery is proposed.

7.7 Occupational health hazards

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

7.7.1 Occupational Health and Safety program

The goal of all occupational health and safety programs is to foster a safe work environment. Excessive dust, noise and vibration are the chief health hazards for the miners. Possible physical hazards are as below mention:

- Physical Hazards (Occupational hazard due to sand mining mainly comes under the physical hazards).
- Exposure to dust
- Noise exposure

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Table 0-4 Impacts and Mitigation

Sr. No.	Particulars	Impact	Personal Protective Equipment
1	Sun Light & Fugitive dust	Eye Strain, Headache, Eye Pain, Watering of Eyes, Itching	Protective Goggles will be provided for direct sunlight and fugitive dust
2	Heat & Head Injury	Heat Exhaustion, Heat Stroke, Brain stroke.	Helmets will be provided.
3	Exposure to Dust	Respiratory problem	Mask Respirators will be provided.
4	Noise Exposure	Hearing problems due to the operation machineries.	Earplugs or Earmuffs
5	Foot injury	Foot burn in sand, bite of insects etc.	Safety foot wears

7.7.2 Physical Hazards Due To Mining Operations

Following health related hazards were identified due to riverbed sand mining operations to the workers:

7.7.2.1 Light

The workers may be exposed to the risk of poor illumination or excessive brightness. The effects are eye strain, headache, eye pain and congestion around the cornea and eye fatigue.

7.7.2.2 Heat and Humidity

The most common physical hazard is heat. The direct effects of heat exposure are burns, heat exhaustion, heat stroke and heat cramps; the indirect effects are decreased efficiency, increased fatigue and enhanced accident rates. Heat and humidity are encountered in hot and humid condition when temperature increases in summer time.

7.7.2.3 Exposure to Dust

Exposure to fine particulates is associated with work in most of the dust generating stages notably from sand handling, and transportation. It may cause

- Eye Irritation as during the high windy days in summer the sand could be the problems for eyes like itching and watering of eyes.

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- **Respiratory Problems:** Large amounts of dust in air can be a health hazard, leading to respiratory disorders such as asthma and irritating the lungs and bronchial passages.

7.7.2.4 Noise exposure

Long time exposure of Noise from machinery may induce hearing loss. Machinery is the main source of noise pollution at the mine site.

7.8 Disaster management plan

Mining and allied activities are associated with several potential hazards to both the employees and the public at large. A worker in a mine will be able to work under conditions, which are adequately safe and healthy. At the same time the environmental conditions also will not impair his working efficiency. This is possible only when there is adequate safety in mines. Hence mine safety is essential aspects of any working mine. The safety of the mine and the employees is taken care of by the Mines Act 1952.

The main objectives of the Disaster Management Plan would be:-

- Ensure that loss of life and injuries to persons are minimized.
- Damage to environment is minimized.
- Property loss is minimized.
- Relief and rehabilitation measures are effective and prompt.
- Pre planning a proper sequence of response actions.
- Identify casualties.
- First aid and medical facilities
- System of communication
- The general order of priority for involving measures during the course of emergency would be follows:
 - Safeguard Life
 - Safeguard Environment
 - Safeguard Property

7.8.1 Anticipated disasters:

The study area mainly prone to flood.

7.8.1.1 Floods

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

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7.8.2 Emergency plan & responsibilities

In case of an emergency at Mine site, the on-site Emergency Plan will come into action. Effective emergency plan requires that, in the event of an accident, nominated functionaries to be given specific responsibilities, often separate from their day-to-day activities.

Overall objectives are as follows:

- To promptly control problems as they develop at the scene.
- To prevent or limit the impact on other areas and offsite.
- To provide emergency personnel, selecting them for duties compatible with their normal work functions wherever feasible.

7.8.3 Disaster awareness

7.8.3.1 Public Awareness System

The safety measures to be taken in the event of an emergency shall be made known to the general public who are likely to be affected.

For disclosure of information to the public of the mine site they are briefed about our preparedness and measures taken to face any disaster situation. They are also explained about the Disaster Warning Signals and measures to be taken in case of any disaster in the location and any possible emergency.

7.8.3.2 Training and Human Resources Development

- Appointment and delegating qualified and experienced personnel in various disciplines.
- Adequate training/refresher training will be provided to the supervisors, workers keeping in view provisions of Mines Vocational Training Rules, 1966; Mine Rules, 1955, Mines Rescue Rules, 1985.
- Personnel who have to operate and maintain Trucks etc. are to be trained regarding accidents in opencast mines.
- The training of mine personnel shall be provided regularly with respect to environmental protection

7.8.3.3 Safety Features Required in Tippers/Trucks

- Exhaust/ Retard Brake: Required as per DGMS circular 02 of 2004.
- Propeller shaft guard: Propeller shaft guard as per DGMS circular 10 of 1999.
- Tail gate protection: Protection of cabin against collision either by head to head or head to tail.
- Limiting speed device: To ensure speed limits as decided by management. The device may be Electronic or mechanical type speed governors.

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- Reverse gear for audio-visual alarm: The audio-visual alarm provided for equipment will confirm to DGMS (Tech.)
- Provision of two brakes: One of brakes shall be fail safe and for details refer DGMS circular 09 of 1999.
- Body lifting position locking arrangement: A hooter along with an indication may be provided to show the body is lifted.
- Fire suppression System: Semi-automatic fire suppression system. For details refer DGMS circular 10 of 2004. The fire suppression system shall be a factory fitment.
- Blind spot mirror: Better view of front blind spot by operator.
- Seat belt reminder: To alert operator for using the seat belt
- Rear Vision System: For assisting operator to have back view during reversing.
- Load Indicator and Recorder: Enables management to detect and prevent over loading.
- Global Positioning system: To prevent illegal transport and selling of sand, restricting short-cut routes other than stipulated routes and computerized monitoring. It is the responsibility of the Project Proponent to mention these terms and conditions in the tender document.

7.9 Time Scheduling for Abandonment

The mining area has enormous potential for continuance of operations even after the expiry of the awarded period. The details of time schedule of all abandonment will be given at the time of final closure plan. Mining activities are confined to river bed, up to 1.0 m. depth, relatively shallow depth of workings. Partial replenishment of the Sand being removed from the river bed is a natural process particularly during monsoon periods.



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Chapter 8 Projects Benefits

8.1 Purpose of the Report

The execution of the project brings overall improvement in the locality, neighborhood and the State by bringing industry, roads, employment and hence improving living standard and economic growth. All the baseline data is collected, and all the measures have been proposed for sustainable mining. In this chapter benefits of the proposed project will be discussed. Benefits will include the social, environmental and economic aspect of the project.

8.2 Physical Benefits, Employment Potential and Economic Upliftment

The opening of the proposed project will enhance the physical infrastructure facilities in the adjoining areas. This land is not being used for any purpose and through this land no economic or environmental benefit is proposed if the land remains as such. Also, the deposition of excess sand, if not removed timely may become a reason of flooding. The area surrounding the Mining site is economically backward. The project will give direct employment to 96 people. Local people will be preferred for providing job opportunity. The mine management will recruit skilled, semi-skilled & unskilled workers. The overall effect will improve the buying power of employees up to some extent and thus a higher standard of living viz. better education, improved health and sanitation facilities, housing and acquisition of consumer durables.

Royalty will be paid to the government against the mineral so it will increase the exchequer of the government leading to improvement in economic condition of the area including the transport structure, medical infrastructure, educational infrastructure and improvement of other civic amenities and will get a gradual boost in future. This is envisaged as a major positive benefit.

8.3 Social Benefits

8.3.1 Market

By improving the economic status of local habitants through employments will attract market to develop their facilities and services near to the project site it's a part of indirect employment which will be developed due to the proposed project. Infrastructure: Proposed project will provide the raw material for the infrastructure development like road, building etc.

8.3.2 Local Employment:

This project will enhance the opportunities of employment for the local villagers due to which their economic status will become better. Around 96 direct employments will be generated and several other indirect employments will be developed.

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8.4 Environmental Benefits

As mentioned above, currently the mining lease area is completely waste land no vegetation or agricultural activities can be proposed here as such, as it is filled with sand deposited from the River. After mining of mineral from the area, the whole area will be reclaimed naturally every year during monsoon season, as the sediments are abundantly deposited, especially sand, in meandering and maturing stage of the river. Plantation is the need of this hour. It has been proposed that 50 trees per year would be planted during the five years of the mining activity.

Afforestation programme is of paramount importance for Eco-friendly development. The proposed plantation programme benefits the environment through supplementing oxygen to the atmosphere and combat air pollution effectively. It not only improves the aesthetic beauty and land scape resulting in harmonizing and amalgamating the physical structures of the mines with surrounding environment, but also acts as pollution sink. It also checks soil erosion, make the ecosystem more complex and functionally stable and make the climate more conducive.

All measures will be adopted at each project development phase for environment management and have been described in previous chapters. Therefore, 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 maintain the various pollutants within permissible limits.

8.5 Corporate Environment Responsibility (CER)

The CER activities by the management of proposed mine can be considerably beneficial for the people. These along with the economic benefits of the proposed project will result in further benefits in terms of the literacy level and on health facilities.

Table 8-1 Proposed CER activities with Budget.

Village	Cost	Duration	Particular
Kusupanga	Rs. 50,000	1 st year	Activities for CER would be finalised based on outcome of Public Hearing. Suggested Activities: <ul style="list-style-type: none">• Distribution of Sanitizers and masks in the village• Conducting health awareness program

8.6 Conclusion

The management will recruit the semi-skilled & unskilled workers from the nearby villagers. The project activity and the management will support the local panchayat and provide other form of assistance for the development of public amenities in this region. The Mine management will contribute to the local schools, dispensaries for the welfare of the villagers through the contribution given to the village Panchayat. Green belt development / Plantation will be taken up along the approach roads, etc.



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Chapter 9 Environmental Cost Benefit Analysis

9.1 Environmental Cost Benefit Analysis

As per EIA Notification dated September 14th 2006, the Chapter on the 'Environmental Cost Benefit Analysis' is applicable only if, the same is recommended at the Scoping stage.

As per the ToR points issued by SEIAA, Bhubaneswar dated 06/11/2023, proposal no. **SIA/OR/MIN/423255/2023** for the mining project activity, the 'Environmental Cost Benefit Analysis' is not required.



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Chapter 10 Environmental Management Plan

10.1 Introduction

The environmental management plan (EMP) is required to minimize adverse environmental impacts by implementing suggested mitigation measures with timelines and responsibilities during the project life cycle.

EMP consists of a set of mitigation, management and institutional measures to be taken up during implementation and operation of a project to eliminate adverse environmental impacts or reduce them to an acceptable level. Chapter IV dealt with environmental impacts of this project and proposed mitigation measures to minimize adverse impacts as well as to improve the existing environment quality. This chapter mainly discusses the administrative aspects of ensuring that mitigation measures are implemented and their effectiveness is monitored after approval of EMP. It comprises of Corporate Environment Policy (CEP) of company, establishment of an Environment Management Cell (EMC) and developing mechanism of reporting of non-compliances, if any to company board, conduct root cause analysis of non-compliances and propose appropriate mitigation measures to ensure avoidance of adverse Penal action arising out of environment and other statutory regulation.

Good practices of EMP will be ensured to keep all the environmental parameters of the project w.r.t. Air, Water quality, soil, biological diversity of the area Socio economic improvement, standards, biological diversity of the area within statutory limits and sustainable manner.

10.2 Elements of EMP

EMP includes four major elements: -

1. **Planning:** This includes identification of environmental impacts, legal requirement, commitments and policies, setting environmental objectives and environment, health, safety and social compliance requirements;
2. **Implementation:** This comprises of resources available for the project, accountability of employees, contractors and documentation of measures to be taken;
3. **Checking: Measurement & Evaluation:** This includes regular inspection, audits, monitoring corrective actions and record keeping; and
4. **Management Review:** Actions are taken to continually improve the environment, health, safety, and social performance of the organization.

The following Policy & programs have been developed to ensure proper implementation of EMP for the proposed mining project:

- Formulating Corporate Environment Policy (CEP)
- Formation of Environment Management Cell (EMC)
- Greenbelt Development/plantation programme
- Occupational Health and Safety
- Budgeting of Environmental mitigation measures

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10.3 Corporate Environment Policy

Corporate Environment Policy (CEP) has been formulated and adopted by the Project Proponent to provide a framework to become an environmental sustainable company. The hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions etc. has been given in the Corporate Environmental Policy of the company.

Corporate Environmental Policies of the Company:

1. Consider ways of demonstrating commitments to comply with the environmental legislations where practical.
2. To mount pollution control equipment and carrying out performance evaluation on regular basis.
3. Encourage and enhance biodiversity and ecology.
4. To coordinate the environment related activities to the top management within as well as with outside concerned agencies.
5. Ensure that key employees are aware of this policy and trained in their environmental responsibilities.
6. Regular review environmental performance and set targets to achieve continuous improvement.

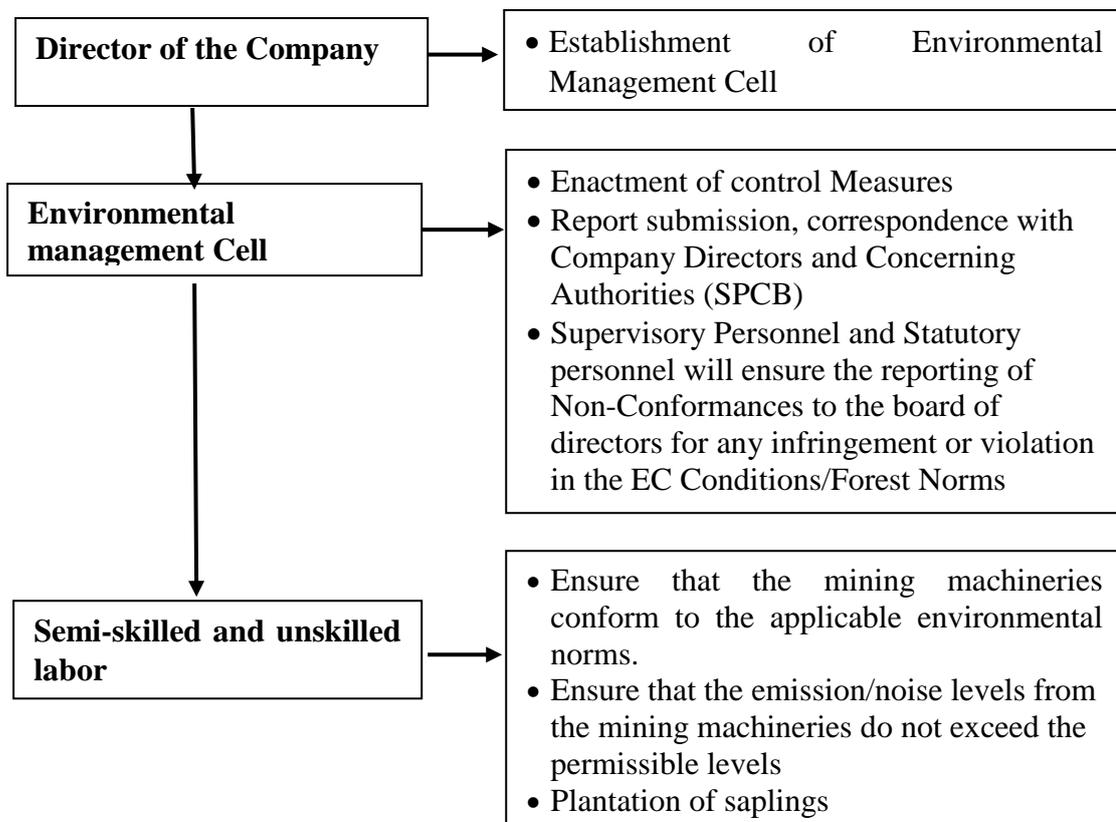


Figure 10-1 Corporate Environmental Policy

10.4 Proposed Plantation Scheme

About 50 trees will be planted each year as indicated below. Optimum sizes of green belt will be chosen to alter pollutants from fugitive sources. The prime factors to be taken into consideration for green belt plantation scheme shall be the nature of pollutants, emission levels and the maximum impacted zones. As plantation is not possible in the safety zone because soil is not suitable for plantation therefore plantation will be done along the haul road and in nearby villages, outside the lease area. Following species are recommended and given in table;

Table 10-1 List of tree Species for Green Belt Development

Name of Species	Botanical name
Neem	<i>Azadirachta indica</i>
Mango	<i>Mangifera indica</i>
Teak	<i>Tectona grandis</i>
Jhaun	<i>Casuarina</i>
Jammu	<i>Syzygium cumini</i>

Table 10-2 Year wise Plantation Program (Kusupanga & Kurunti)

Year	Number of saplings purposed	Location	Type of saplings
1st Year	50	Plantation is carried out safety zone of the lease area (river bank areas)	Teak, Mango, Jammu, Jhaun, Neem etc.
2nd Year	50		
3rd Year	50		
4th Year	50		
5th Year	50		
Total	250		

10.5 Detailed Budget for EMP

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.



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Table 10-3 Budget for EMP for Proposed Project(Kusupanga & Kurunti)

S.no	Particulars	Capital Cost	Annual Recurring cost
1	Pollution Control	55,000	20,000
2	Pollution Monitoring	25,000	10,000
3	Afforestation along Approach road	35,000	25,000
4	Occupational health and safety	30,000	20,000
5	Reclamation /Rehabilitation of mined out area	-	-
Total		1,45,000	75,000



Chapter 11 Summary & Conclusion

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Chapter 11 Summary & Conclusion

11.1 Introduction

Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) is a cluster of existing & proposed mine located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha. The mine is spread over an area of 5 ha. The Mining plan was authorized by the Geologist of Joint Director Geology, Zonal Survey, Dhenkanal. It is new proposed sand mine project with the excavation capacity of 65786 m³/year sand.

11.2 Project Details

Table 11-1 Project Details

A. Project Proponent	
Project Proponent	Tahasildar, Odapada Dist- Dhenkanal, Odisha-759013
B. Nature of Project	
	Proposed sand mine with proposed production capacity of 65786m ³ /year.
C. Size of the Project	
Project Name	Kusupanga & Kurunti Brahmani Sand Quarry (Cluster)
New/ existing / Renewal mine/ Lease Period	New & Existing
Area	8.7ha
D. Project Location	
Khata No.	Khata No. 335 &571
Location	Village:Kusupanga & Kurunti Tehsil: Odapada District: Dhenkanal(Odisha).
Survey of India Topo Sheet no.	73H/5
Lease Period	5 years
Available Movable Reserve	3,28,930 m ³
Water Requirement	5 KLD
Manpower Requirement	96 Nos.
Climatic Conditions	Annual Maximum Temperature: 42 °C Annual Minimum Temperature: 21 °C
Present land use at the proposed	The area is a Non-Forest Govt.land
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site	
E. Environmental Settings Details	
Nearest village	Kusupanga about 0.6 km, W
Nearest Town/City	Dhenkanal about 38 km, SE
Nearest Railway Station	Budhapanka Railway Station 4.5 km, W
Nearest Airport	Biju Patnaik International Airport, Bhubaneswar about 85 km, SE
Nearest Highway	NH-55 about 3.5 km, W
Nearest Water Body	Brahmani River – Project Site Area
Nearest Bridge	Lingara Bridge- 6.0 km, N
Nearest River Embankment	About 0.4 km, W
Nearest Archeological Site	Lokanath temple about 1km,NW
Nearest Sensitive Man-made Land use	Meramandali Government Hospital about 5 km, S Govt. High School Kusupanga about 0.6 km, W Lokanath temple about 1km,NW Meramandali Bus Stop about 7.5 km, S
Ecology Sensitive Zone	No national parks and sanctuary within 10 km radius
Reserve Forest	Khalpal Reserve Forest- 11.5 Km, N
Topography	Gently sloping almost flat terrain
Seismic Zone	Zone – III as per IS: 1893 (Part-I): 2002
Survey of India Topo-Sheet no.	73H/5
Cost Details	
Project Cost	~20 lakh
Cost of EMP	Capital Cost-1,45,000 Recurring Cost-75,000

11.3 Mining Details

Particulars	Details
Method of Mining	Manual opencast mining
Available Movable Reserve	3,28,930 m ³

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Lease period	5years
Ultimate Mine Working Depth	1 m
Water Requirement	5 KLD
Manpower Requirement	96Nos.
Present land use at the proposed site	The area is a Non-Forest Govt. land

Source: Mining Plan & Progressive Mine Closure Plan

11.4 Mitigation Measures

11.4.1 Air Pollution Control Measures

- Regular water sprinkling on the Haul roads with the help of water tanker.
- Development of green belt/plantation along haul roads and outside lease area will be carried out to control the air pollution.
- Regular maintenance of transportation vehicles.
- Vehicular emissions will be kept under norms.
- Personal Protective Equipment like dust masks will be provided to all employees.
- Periodic air quality monitoring will be carried out.

11.4.2 Noise Pollution Control Measures

- Adequate silencers in vehicles will be provided to reduce generation of noise.
- Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
- The workers employed at HEMM will be provided with protective equipment, earmuffs and earplugs as a protective measure from the high noise level generated at the mine site and wherever required.
- Development of green belt & plantation along haul road and nearby areas, roads and other places will be carried out.
- Periodical monitoring of noise will be carried out regularly.

11.4.3 Waste water management

Waste Water

- No liquid waste will be generated from mining activities. A small amount of domestic wastewater from office toilet will be discharged into the soak pits/septic tank. No toxic effluent expected to be generated in the form of solid, liquid or gases therefore treatment of waste will not be required.
- Periodical monitoring of Surface water quality will be carried out.

11.4.4 Reclamation plan for Land use

- The mining activity will affect the present landscape of the ML area. However, at conceptual stage, the area will be naturally reclaimed every year after monsoon season.

11.4.5 Green Belt development & Plantation

- 50 plants per year will be planted as per the plantation program.

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- Local plant species will be selected for the green belt development.

11.5 Additional Studies

Additional Studies i.e. Risk Assessment & Disaster Management Plan, Ecology and Biodiversity are covered with this EMP Report as per the Terms of Reference granted by SEIAA, Bhubaneswar dated 06/11/2023 to file number: **SIA/OR/MIN/423255/2023**.

11.6 Project Benefits

The proposed project will help the local economy directly as well as indirectly as there is going to be capital expenditure for this unit and it will generate employment in the region. The project will contribute to the District as well as to State exchequer by way of various taxes and duties. With the proposed development in and around the area, there will be supporting facilities/infrastructure eventually leading to the development of the area. The project will boost the overall growth of the region and in the state, the local economy will flourish due to income expenditure in the local market. Therefore, project is having great importance to the state and national economy.

Along with the contribution in employment generation and economic growth of the country project will also be helpful in the development of basic needs of the local area like education, Health & family welfare, women empowerment, Natural resource management, infrastructure development etc.

11.7 Conclusion

The proposed Sand Quarry Mine project will prove beneficial to the local people as direct and indirect employment opportunities will be generated. There will be increase in revenue generation to the government through government taxes etc. Further improvement in infrastructure will take place like education, roads, availability of drinking water, medical facilities in adjacent villages.

There will be no significant pollution of air, water, soil and noise. Regular monitoring of all the components of environment will be done and according to that the proposed mitigation measures will be adopted. Increased social welfare measures taken by the proponent will bring development in the near-by villages.



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Chapter 12 Disclosure of Consultants

12.1 Company Details & Organization of Company

Name : *Green Circle, Inc.*
Corp. Office & R & D Address : *Green Empire (Anupusham), Above Axisbank, near Yash Complex, Gotri Road, Vadodara, 390021 Gujarat.*
Telephone : *02652371269, 0919998036028*
Email : *info@greencircleinc.com*

12.2 Company Profile

Green Circle. Inc. is a leading IMS(ISO9001,14000,45001) & Integrated HSEQR Consulting, Engineering, Scientists and training organization in the field of Environmental, Safety, Health & Hygiene, Risk Engineering & Quality Systems.

GCI offers One Stop Solution for all industrial & commercial requirements in the field of Environment, risk and safety, having Business Operations in India and Abroad.

GCI is committed to deliver the best practical solution to all sectors of business with an aim to have Pollution Free & Healthy Environmental along with Sustainable development.

12.3 Service Provided

M/s. Green Circle, Inc. offers following specialized services in 8 verticals as:

- ✓ *Risk Management Services (with Fire & Safety)*
- ✓ *Electrical Safety Services*
- ✓ *Industrial Hygiene Services*
- ✓ *Business Management Services*
- ✓ *EIA & Environmental Consulting*
- ✓ *Environmental Laboratory Services*
- ✓ *Training & Seminars*
- ✓ *Engineering Services*

12.4 Vision Statement

Our Mission

Our mission is to provide outstanding HSE consulting service with an integrated strategic and technical approach that delivers excellent, long lasting and sustainable impact for our clients.”

Our Vision

“To become the leading total sustainable EHS solution provider in the country.”

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12.5 EIA Team Members

The EIA team engaged in the preparation of EIA report consists of professionals with multidisciplinary skills and experience required for undertaking this project. The EIA involved in various stages of planning to final report preparation is given below in table:

“I, hereby, certify that I was a part of the EIA team in the following capacity that developed this Report”.

The EIA team engaged in the preparation of EIA report consists of professionals with multidisciplinary skills and experience required for undertaking this project. The EIA involved in various stages of planning to final report preparation is given below in table:

Project Name: Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) Project		
Name and address of the consultant	Green Circle Inc. Green Empire Anupushpam, Above Axis Bank, Near Yash Complex, Gotri Main Road	QCI-NABET Accredited NABET/EIA/2124/RA0219 (Valid till-26/01/2024)
EIA Coordinator and Team Leader	Mr. Nanjunda Swamy Raman	

12.6 EIA coordinator

Name	Mr. Nanjunda Swamy Raman
Signature & Date	
Involvement	<ul style="list-style-type: none">• Obtaining information like the PFR that provides the essential project related information for EIA purpose• Ensuring the quality of base line data through FAEs• Explaining the client the local environmental issues• Developing the environmental management plan including its implementation the monitoring plan• Finalization of EIA/ EMP report

PROJECT PROPONENT	ENVIRONMENT CONSULTANT	Page 183
KUSUPANGA & KURUNTI BRAHMANI SAND QUARRY (CLUSTER) AT BRAHMANI RIVER	M/S GREEN CIRCLE INC. NABET/EIA/2124/RA 0219	



Draft Environment Impact Assessment Report

Proposed project of Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) at Brahmani River with proposed excavation of 65786 m³/year sand, having an area of 8.7 ha, located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha.

Chapter 12

12.7 Functional area experts

Functional Areas	Name of The Expert	Involvement(Period & Task**)	Signature & Date
Meteorology, air quality modelling, and prediction(AQ)	Mr.Pradeep Joshi	Site visit, finalization of monitoring locations, checking air quality data, evaluation of results of Ambient Air Quality Monitoring (AAQM), supervision of air quality modeling and prediction, identification of impacts, suggestion and finalization of mitigation measures with client, and contribution to EIA documentation.	
Air pollution monitoring, prevention and control (AP)	Mr. Ram Raghav	Site visit, finalization of monitoring locations, checking air quality data, evaluation of results of Ambient Air and identification of impacts, suggestion and finalization of mitigation measures with client, and contribution to EIA documentation.	
Water Pollution(WP)	Miss. Sheetal Parmar	Site visit and finalization of sampling locations for water sampling, water balance for the project, evaluation of water pollution control management, identification of impacts, suggestion and finalization of mitigation measures, contribution to EIA documentation.	
Water Pollution(WP)	Mr. Sumant Kumar	Finalization of sampling locations for water sampling, water balance for the project, evaluation of water pollution control management, identification of impacts, suggestion and finalization of mitigation measures, contribution to EIA documentation.	
Water Pollution(WP)	Mr. Nanjunda Swamy Raman	Finalization of sampling locations for water sampling, water balance for the project, evaluation of water pollution control management, identification of impacts, suggestion and finalization of mitigation measures, contribution to EIA documentation.	 r. Raman

PROJECT PROPONENT	ENVIRONMENT CONSULTANT	Page 184
KUSUPANGA & KURUNTI BRAHMANI SAND QUARRY (CLUSTER) AT BRAHMANI RIVER	M/S GREEN CIRCLE INC. NABET/EIA/2124/RA 0219	



Draft Environment Impact Assessment Report

Proposed project of Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) at Brahmani River with proposed excavation of 65786 m³/year sand, having an area of 8.7 ha, located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha.

Chapter 12

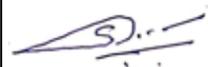
Solid and Hazardous waste Management (SHW)	Mr. Pradeep Joshi	Identification of the waste generated from the mining activity, studying its management and mitigation.	
Socio-Economic (SE)	Mr. Gunesh Deosthali	Secondary data collection, site visit, evaluation of Socio-Economic status of the study area, assessment of the possible changes to socio-economic issues arising out of the proposed activity, contribution to the EIA documentation.	
Noise and Vibration (NV)	Mr. Pradeep Joshi	Supervision of noise sampling programme, analysis of data, identification of impact sand mitigation measures, contribution to EIA documentation.	
Noise and Vibration (NV)	Mr. Arun Kumar Shrivastav	Supervision of noise sampling programme, analysis of data, identification of impact sand mitigation measures, contribution to EIA documentation.	
Noise and Vibration (NV)	Mr. Ram Raghav	Supervision of noise sampling programme, analysis of data, identification of impact sand mitigation measures, contribution to EIA documentation.	
Risk & hazard (RH)	Mr. Pradeep Joshi	Identification, finalization of DMP, contribution to RA/DMP documentation.	
Ecology and biodiversity (EB)	Mrs. Pooja Sharma	Ecosystem analysis and evaluation, landscape ecology, assessment of impacts on ecological and biodiversity impact assessment on ecology/biodiversity	
Hydrology, ground water and water conservation (HG)	Mr. Syed Iqtadar Tanweer	Supervision in undertaking study related to Hydro-Geology and preparation of drainage pattern. Analysis of surface hydrological data pertaining to flow fluctuation, , designing of ground water table measurement and monitoring network, computation of ground water recharge, flow rate and direction	



Draft Environment Impact Assessment Report

Proposed project of Kusupanga & Kurunti Brahmani Sand Quarry (Cluster) at Brahmani River with proposed excavation of 65786 m³/year sand, having an area of 8.7 ha, located at Village: Kusupanga & Kurunti, Khata No.335 & 571, Plot No.1, Kisam Nadi, Tehsil: Odapada, District: Dhenkanal, Odisha.

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Geology (Geo)	Mr. Syed Iqtadar Tanweer	Supervision in undertaking Geology and Geo morphological analysis, studying Stratigraphy/Lithology, Vibration analysis in relation to mining operations, Developing geological maps.	
Soil Conservation (SC)	Mr. Shirish Vishwasrao Bhoite	Supervision in sampling, analysis and characterization of soil, assessment of fertility/productivity of soil, nutrient availability, assessment and minimizing of impact of gaseous, liquid and solid pollutants on soil.	

12.8 Team Members

Sr. No.	Name	Signature
1.	Mr. Ruchit Jayswal	
2.	Ms. Yashashri Pakhale	
3.	Ms. Prachi Trivedi	
4.	Ms. Hetvi Dani	

Annexure 1: Granted ToR



STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY, ODISHA

5RF-2/1, Unit-IX, Bhubaneswar-751022, Tel: 0674-3510075, Email: seiaaodisha@gmail.com

A statutory body constituted by Ministry of Environment, Forest & Climate Change under Environment (Protection) Act, 1986

File No. SIA/OR/MIN/423255/2023

Dated 06th November, 23
Bhubaneswar

To

Tahasildar, Odapada,
Tahasil-Odapada, Dist-Dhenkanal

Subject: Proposal of Tahasildar, Odapada for grant of Term of Reference (ToR) for mining of sand from Kusupanga & Kurunti Brahmani Sand Quarry (Cluster), over an area 8.7 Ha, at- Kusupanga & Kurunti, Tahasil- Odapada, Dist- Dhenkanal, Odisha - Reg.

The Project Proponent Tahasildar, Odapada, on behalf of the lessee/successful bidder has submitted an application for ToR to SEIAA, Odisha through the Parivesh portal of MOEF&CC, GOI vide online application no. SIA/OR/MIN/423255/2023 dated 06.09.2023 for grant of Term of Reference (ToR) for mining of sand from Kusupanga & Kurunti Brahmani Sand Quarry (Cluster), over an area 8.7 Ha, at- Kusupanga & Kurunti, Tahasil-Odapada, Dist- Dhenkanal, Odisha.

2. Proposal in brief:

Proposal No.	SIA/OR/MIN/423255/2023
Date of Application	06.09.2023
File No.	423255/834-MINB1/09-2023
Project Type	Proposal for ToR
Category	B1
Project/Activity including Schedule No.	1(a) Mining of minerals
Name of the Project	Proposal for grant of EC for Kusupanga & Kurunti Brahmani Sand Quarry (Cluster), over an area 8.7 Ha, at- Kusupanga & Kurunti, Tahasil- Odapada, Dist- Dhenkanal, Odisha
Name of the company/Organization	Tahasildar, Odapada
Location of Project	At- Kusupanga & Kurunti, Tahasil- Odapada, Dist- Dhenkanal, Odisha



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ToR Date	N/A
Name of Consultant	M/s Green Circle Inc.

3. **Project details:** The highlights of the project, as ascertained from the application and as revealed from the proceedings/ discussions held during the meetings of SEAC/SEIAA, are given as under:

- (i) This is a proposal submitted for Terms of Reference (ToR) for mining of sand from Kusupanga & Kurunti Brahamani Sand Quarry (Cluster), over an area 8.7 Ha, at Kusupanga & Kurunti, Tahasil- Odapada, Dist- Dhenkanal, Odisha.
- (ii) The mining area is a part of Survey of India Toposheet No. : F45T5, and the lease area bounded by Latitude: 20°50'47.31" N to 20°50'57.37" N and Longitude: 85°17'36.95" E to 85°17'46.68" E (Kusupanga) and lease area bounded by Latitude: 20°50'38.05" N to 20°50'17.88" N and Longitude: 85°17'45.58" E to 85°17'54.78" E
- (iii) The mining lease is an identified sairat source in the DSR. The Kusupanga & Kurunti Brahamani Sand Quarry (Cluster) sairat source will be leased out under the OMMC Rules, 2016 by Tahasildar, Odapada to the successful bidder (lessee) on the basis of public auction for a lease period of 5 years.
- (iv) Documents submitted: -Form-1, PFR, checklist, Mining Plan and approval letter, DSR, Village sheet, Cluster certificate from Tahasildar, topo map etc.
- (v) Whether submitted KML file of the lease area-Yes
- (vi) Whether submitted scrutiny fee-Non as Tahasildar is the applicant
- (vii) Distance from nearest sanctuary/ESZ- Tikarpada-45.00 Km
- (viii) Whether the lease area coming in DLC report-No, N/A
- (ix) Whether the lease area reflecting in DSR-Yes
- (x) Method of mining-Manual
- (xi) River-Brahamani, Depth of Sand deposition-2.0 meter
- (xii) Distance from nearest road bridge-6.0 km, Village road-0.6km
- (xiii) Whether it is part of cluster -Yes, both kurunti and Kusupanga asand beds are coming under single cluster over total cluster area 8.70 Ha the details as follows:

Sl. No.	Name of source	Khata No.	Plot No.	Area in Ha	Present status of quarry
1.	Kusupanga Brahamani Sand Quarry	335	01	3.84	To be operated newly
2.	Kurunti Brahamani Sand Quarry	571	01	4.85	Operated for last 5 years
Total				8.70	

- (xiv) Whether EC obtained earlier for this project-Yes, EC obtained for Krunti sand bed and Kusupanga is a new source.

[Handwritten signature]



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- (xv) Date of approval of mining plan- the Joint Director of Geology, Zonal Survey, Dhenkanal vide letter no. 762 dt. 04.08.2022
- (xvi) As per the approved mining plan the geological reserve is 62500 cum, Mineable reserve is 30314 cum and proposed for annual production 30314 cum/annum and total production in 5 years will be 151570 cum with 2.0 m depth of mining for Kusupanga sand bed. The geological reserve is 97126 cum, Mineable reserve is 35472 cum and proposed for annual production 35472 cum/annum and total production in 5 years will be 177360 cum with 2.0 m depth for Kurunti sand bed
- (xvii) Whether the DSR has been prepared as per the MoEF& CC, Govt. of India Notification S.O. 3611(E) dated 25.07.2018, Sustainable sand mining guidelines-2016 and Enforcement & Monitoring Guideline for sand mining-2020- **No**
- (xviii) Any deficiencies/omission have been noticed in the above documents-There is a NGT case pending with respect to Kurunti sand bed on transporting of sand. ToR application was made on 24.03.2023 and NGT order came on 18.05.2023 on OA. 55 of 2023
4. This proposal conforms to the item no. 1(a) in the schedule of EIA Notification, 2006 as amended time to time, and the minor mineral extraction project falls under Category B1 as the mining lease area is more than 5 ha.
5. Whether SEAC recommended the proposal – Yes, SEAC have already recommended the specific ToR for such proposals (<25Ha) in its meeting dated 17.11.2020 and have also recommended that the SEIAA will consider such proposals in its meeting for issue of ToR.
6. The matter was examined in the State Environment Impact Assessment Authority (SEIAA), Odisha in its 138th meeting held on 10.10.2023 & 12.10.2023 in accordance with the EIA Notification, 2006 and further amendments thereto.
7. **The Violation Terms of Reference (ToR) is granted under the provisions of EIA Notification No. S.O. 1533 (E) dated the 14th September, 2006 of the Government of India in the erstwhile Ministry of Environment and Forests, as amended from time to time for mining of sand from Kusupanga & Kurunti Brahmani Sand Quarry (Cluster), over an area 8.7 Ha, at- Kusupanga & Kurunti, Tahasil- Odapada, Dist- Dhenkanal, Odisha for EIA studies with the specific conditions mentioned below along with standard conditions (attached in annexure-I) along with Public Hearing.**

Specific Conditions

- (i) PP shall submit details case status of Hon'ble NGT on O.A. 55/2023/EZ filed by Harihar Samal Vrs State of Odisha & Ors during EC application.
- (ii) 1:50,000 scale topomap with indicate the working area boundaries of the proposed sand bed, transporting route, bridge, water intake point and area proposed for



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- plantation etc.
- (iii) NABET accredited consultant certificate along with consent letter that he has prepared the EIA & EMP report and also replenishment study of the proposed sand bed.
- (iv) The project proponent has to carry out Annual Rate of Replenishment Study (ARRS) of Sand through ORSAC empanel agency, a study of the annual replenishment rate of sand by collecting pre monsoon & post monsoon data from the field to know the quantum of volume of sand deposited/replenished & extracted in the mining lease area. The detailed comparison of both pre-monsoon and post-monsoon elevation data shall be included in the study report. As per the MOEF&CC, Govt. of India's Enforcement and Monitoring Guideline for Sand Mining, 2020, there are two methods prescribed for the study of rate of replenishment of sand on a stretch of river bed. These are (1) physical survey of the field by the conventional method and (2) use of UAV / Drone and other image data processing techniques. The second method UAV/ Drone method is the one which has been found suitable for the above purpose and recommended by the ORSAC, Bhubaneswar and there are some organization in Odisha state who are empanel by ORSAC to conduct such survey. The details of UAV / Drone method is attached a separate sheet. The finding of the study shall be submitted to SEIAA to assess the rate of replenishment of mined out sand in the lease **area with geo-coordinating photographs during data collection**. The finding of the study shall be submitted to SEIAA along with the final EIA / EMP report to assess the rate of replenishment of mined out sand.
- (v) Details procedure of sand replenishment study, date of study, pre-monsoon sand deposit and post-monsoon deposit and quantum of sand replenished with attaching real-time geo-coordinating photographs in field of different period of study and data collection.
- (vi) Area of the 'no mining zone' specially demarcated within the lease out area for safety of the river bank / any bridge or such other structure nearby; and the **dimensions and geo-co-ordinates of this zone** w.r.t lease boundary.
- (vii) Study of river ecology (i.e. aquatic habitat, fish catching area for nearest villagers, turtle habitat and birthing place for villagers, or any other eco-sensitive area that hamper the river ecology due to sand mining if any) should be mention in the EIA report and accordingly prepare for EMP.
- (viii) Any approach road existing or will be constructed inside the safety zone?
- (ix) Mitigation measures to be taken to ensure not to disturb free flow of river.



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- (x) Distance of the river bank / embankment from the lease boundary. It is a river bank or embankment?
- (xi) Any ramp existing or will be constructed on the river bank / embankment for movement of vehicles to reach the nearest road.
- (xii) Distance of the village road / city road / district road / public road for the river bank. Is this road single road / double road?
- (xiii) No. of village (s) and name of village (s) or the city (s) or urban place (s) or semi urban place (s) through which the sand carrying vehicles will ply and the distance of it from the river bank or embankment whether there is any forest land in the intervening area through which the sand carrying trucks will ply.
- (xiv) Whether schools / colleges / hospitals / health centers / bus stops / religious places existing nearby and if so, the distances of it from the bank or the road through which the vehicle will ply or existing alongside the road?
- (xv) Any plantation done in the safety zone or embankment in case of an existing mines and if so, the area of plantation, number of species? If not, the plan for it to arrest bank erosion.
- (xvi) Any stone packing in the river bank / embankment existing in case of existing mines and if not, the plan for it.
- (xvii) Whether, any alternative mine exists or explored or can be explored if this mine is otherwise found unsuitable? Please furnish details.
- (xviii) Whether permission taken or will be taken from Water Resource Authority or the concerned Authority of the roads to be used for plying of vehicles loaded with sand or empty vehicles for the same after the river bank.
- (xix) Responsibility of perennial perpetual maintenance of these roads and the mechanism for the same.
- (xx) No and type of vehicles to be used daily and the frequency for the purpose of transportation and the time and duration of such transportation. Whether permission taken or will be taken for the appropriate authority for the purpose.
- (xxi) Intersection points of the haulage roads with the main SH / NH / public road and the traffic density study at appropriate locations by domain expert with remedial measures for decongestion and road safety.
- (xxii) Any bridge (road / rail) existing and the distance of it from the lease boundary.
- (xxiii) Any culvert or small bridge will be used by the plying vehicles carrying the sand minerals.



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- (xxiv) Any High Transmission Electric line existing and if yes, the distance of the same from the boundary of the lease.

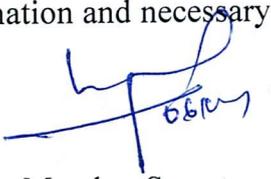
Yours Faithfully,


Member Secretary

Copy to

1. Additional Chief Secretary, Forest, Environment & Climate Change Dept., Government of Odisha for information.
2. Member Secretary, State Pollution Control Board, Odisha, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-8, Bhubaneswar for information.
3. Member Secretary, SEAC, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar for information.
4. Deputy D.G.Forest., Integrated Regional Office (IRO), Ministry of Environment & Forests, A-31, Chandrasekharpur, Bhubaneswar for information.
5. Director of Mines, Govt. of Odisha
6. Collector & DM, Dhenkanal /Sub Collector, Dhenkanal for Information and necessary action.
7. Guard file for record/Website/Parivesh Portal.




Member Secretary

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

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

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

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

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

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

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

the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).

- 5) Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.
- 6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.
- 7) It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.
- 8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.
- 9) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.
- 10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
- 11) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
- 12) A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
- 13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.

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

- 14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
- 15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
- 16) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.
- 17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.
- 18) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan alongwith budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.
- 19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.
- 20) Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).
- 21) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.

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

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

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

under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.

- 32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.
- 33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.
- 34) Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.
- 35) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.
- 36) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.
- 37) Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.
- 38) Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.
- 39) Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.
- 40) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- 41) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- 42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.

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

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

Annexure 2: Mining Plan

GOVERNMENT OF ODISHA
OFFICE OF THE JOINT DIRECTOR, GEOLOGY,
ZONAL SURVEY, DHENKANAL

No. 762 /DZ/Dt. 09.08.2022

From

Sri D Sharma, JDG & Authorized Officer
O/o- Joint Director Geology
Zonal Survey, Dhenkanal, Odisha

To

The Tahasildar, Odapada
Dist- Dhenkanal, Odisha

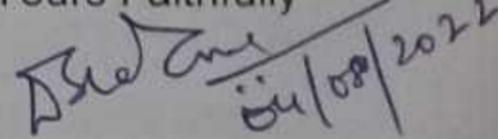
Sub: Approval of mining plan in respect of Kusupanga Brahmani River Sand Quarry over an area of 9.50 Acres or 3.884 Hectares in village Kusupanga under Odapada Tahasil of Dhenkanal District of Odisha.

Sir,

In exercise of powers conferred by under Sub Rule- 5 of rule 28 of OMMC Rules, 2016, the mining plan submitted by Sri S. K. Panda, RQP, in respect of Kusupanga Brahmani River Sand Quarry over an area of 9.50 Acres or 3.884 Hectares in village Kusupanga under Dhenkanal Tahasil is here by Approved for the Period of 5 years subject to the following conditions.

1. This mining plan is approved without prejudice to any other laws applicable to the quarry lease area from time to time whether made by the Central Govt./State Govt./ any other authority.
2. The approval of aforesaid mining plan does not in any way imply the approval of Govt. in terms of any other provisions under OMMC Rules, 2016 or any other laws.
3. The Mining Plan is approved subjected to correctness of the precise area authenticated by the competent authority and terms and conditions fixed by him.
4. The boundary pillars should be erected before the quarry operation under the guidance of competent authority.
5. The approval shall be effective from the date of issue.
6. Under no circumstance excess production than the approved limit would be allowed beyond the proposed depth of mining.

Yours Faithfully


09/08/2022

Sri D Sharma

Joint Director, Geology & AO

Memo No.

/SZ/Dt.

Copy to Sri S. K. Panda, RQP, At- Barimundei, Po- Badaninigaon, Dist- Puri Odisha for information.

Sri D Sharma
Joint Director, Geology & AO

FORM - 0

Under rule 28(4) of OMMC, Rules- 2016

MINING PLAN

OF

KUSUPANGA BRAHMANI SAND QUARRY

Over an area of 9.50 Acre or 3.844 ha in Village Kusupanga under
Odapada Tahasil of Dhenkanal District, Odisha

PLAN PERIOD- 5 YEARS

For & on behalf of

TAHASILDAR ODAPADA

(On Behalf of Successful Bidder)

At/Po- Odapada

Dist- Dhenkanal

Odisha

APPROVED

S. K. Panda
04/08/2022

Joint Director Geology
Zonal Survey, Dhenkanal

Prepared by

SRI S. K. PANDA

RQP/OD/059/2016

At- Barimunde,

Po- Badaninigaon

Dist- Puri, Odisha

PIN- 752121

Ph: 9861763774

Email: santoshpandageo@gmail.com



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S. K. Panda
RQP/OD/059/2016

CONSENT LETTER



The Mining Plan in respect of Kusupanga Brahmani sand Quarry over an area of 9.50 acres or 3.884 hectares of Tahasil Odapada, district Dhenkanal, State Odisha has been prepared by Sri. S. K. Panda, Regd. No. RQP/OD/059/2016 as per "Form-O" prescribed under OMMC Rules 2016. I request the concern authorities of Joint Director Geology, Zonal Survey, Dhenkanal to make further correspondence regarding modification of the Mining Plan with the said recognized person on his following address:

Sri S. K. Panda
RQP/OD/059/2016
At- Barimundei
Po- Badaninigaon
Dist-Puri, Odisha
Mail ID: santoshpandageo@gmail.com
Ph: 9861763774

I hereby undertake that all the modification so made in the Mining Plan by the recognized person be deemed to have been made with my knowledge and consent and shall be acceptable to me and binding on me in all respects.

Place: Odapada
Date: 15.07.2022

Banuvedita Swain
Signature of the Applicant in full
15.07.22

Tahasildar, Odapada
(On behalf of successful bidder)



CERTIFICATE FROM THE APPLICANT

"The provisions of mines act, rules and regulations made there under have been observed in the **Mining Plan** in respect of **Kusupanga Brahmani sand Quarry** over an area of **9.50 acres or 3.884 hectares** in village **Kusupanga, Tahasil Odapada, District Dhenkanal, Odisha of Tahasildar, Odapada** (On behalf of successful highest bidder) and wherever specific permissions are required, the Sand quarry Lessee/applicant will approach the DGMS and the State Government as the case may be.

Further, standards prescribed by the DGMS in respect of Miners health will be strictly implemented".

BANINIVEDITA SWAIN
Dt. 15.07.22

Full name in block letters:

TAHASILDAR, ODAPADA

(On behalf of successful highest bidder)

CERTIFICATE FROM THE RQP



Certified that **Mining Plan** in respect of **Kusupanga Brahmani sand Quarry** over an area of **9.50 acres or 3.884 hectares** in village **Kusupanga of Odapada Tahasil of Dhenkanal District, Odisha** of Tahasildar, Odapada (On behalf of successful highest bidder) is prepared basing on various aspects such as quarrying under OMMC Rules, 2016 and wherever specific permissions are required the **Lessee/Applicant** will approach the concerned statutory authorities.

Certified that the information furnished in this **Mining Plan** is correct to the best of my knowledge.

S. K. Panda
RQP/OD/059/2016



LIST OF PLATES

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3	Surface Plan	III	1:2000
4	Geological Plan	IV	1:2000
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6	Environment Management Plan	VI	1:2000
7	Progressive Mine Closure Plan	VII	1:2000

S. K. Panda
RQP/OD/059/2016

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S. K. Panda
RQP/OD/059/2016



LIST OF ANNEXURE

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2	Copy of Land schedule & MGQ	II	23-23
3	Certificate from RI	III	24-24
4	RQP Certificate	IV	25-25

S. K. Panda
RQP/OD/059/2016



INTRODUCTION

The applications will be invited by the Tahasildar, Odapada for grant of long term quarry lease in respect of Kusupanga Brahmani sand Quarry in the village Kusupanga under Odapada Tahasil of District: Dhenkanal, Odisha. The quarry lease of the Kusupanga sand quarry in Brahmani River at Kusupanga, held in accordance with the provisions of the OMMC Rules, 2016. The Tahasildar Odapada, has entrusted the work of preparation of mining plan of said quarry to Sri S. K. Panda, RQP, At- Barimundei, PO- Badaninigaon, Dist-Puri, vide letter no. 3611 on dated 11.07.2022. The copy of the said letter is enclosed as **Annexure-I**.

The Kusupanga Sand bed over an area of 9.50 acres or 3.884 ha comes on Plot no. 1 of khata no 335, Kissam: Nadi of Tahasil: Odapada, District : Dhenkanal of Odisha. The entire lease area comprises of Govt. land. The copy of the land schedule is enclosed as **Annexure-II**.

The area under reference featured in the Survey of India Toposheet No. F45T5 and the area bounded between the latitudes 20°50'47.31" N to 20°50'57.37" N and longitudes of 85° 17'36.95" E to 85°17'46.68" E. Geologically, the lease area belongs to Quaternary deposit from Holocene period which located in the Brahmani River bed at Kusupanga, under Odapada Tahasil of Dhenkanal district of Odisha. The quaternaries overlies directly on the Tertiaries and are composed of younger and older alluvia. The sediments of older alluvia are grayish to brownish in colour, unfossiliferous, but contain calcareous concretions. Thin younger alluvial deposits of recent age are found in the flood plains and by the side of the river. They also consist of sand, silt, clay and gravel.

The area as shown by the Revenue authority has been surveyed through hand held GPS for obtaining the co-ordinates and RL's of the required points within the lease. The co-ordinates of boundary corner points are mentioned in the Surface Plan (Plate No. III). The proposed rate of production has been worked out at 30000cu.m/annum depending upon the present market demand of the sand. However, the rate of production may be increased or decreased in future depending on the market demand. The total geological reserve have been estimated around 62500 Cu.m/annum. The mineable reserve of sand has been estimated at 50524 cu.m/ annum and extractable mineable reserve is 30314



cum/annum. Considering the present proposed production target at a rate of 30000 cu.m of sand is feasible for excavation. The quantity excavated in a year in ideal condition the same quantity may be replenished during the subsequent flood /rainy season.

Looking into the potential mineable resources of Kusupanga sand deposit, the main objective is to develop this mineable property scientifically and systematically for commercial benefit of indigenous industries and secondly for increase of state exchequer by paying the royalties to the State Government, Odisha and thirdly to boost up the socio-economic status of the poor inhabitants of this area by producing employment opportunity to earn more and live a better life.

APPROVED

[Handwritten signature]
05/08/2016

Joint Director Geology
Zonal Survey, Dhenkanal

[Handwritten signature]

S. K. Panda
RQP/OD/059/2016

FORM-O

(See Rule 28(4) of the Odisha Minor Mineral Concession Rules, 2016)



MINING PLAN FOR WINNING OF RIVER SAND FROM KUSUPANGA BRAHMANI SAND QUARRY (BRAHMANI RIVER) IN VILLAGE KUSUPANGA OF KUSUPANGA GRAMPANCHAYAT UNDER ODAPADA TAHASIL OF DHENKANAL DISTRICT, ODISHA.

(Category: B2)

1. Name & Address of the Lessee : Tahasildar, Odapada
On behalf of successful highest bidder
Dist - Dhenkanal
State- Odisha
2. Particulars of the area (Acreage, Boundary Description & Land Schedule): (Attach location map and surface plan showing the existing features of the area with counters at 2 m interval) : Name of the Quarry-
Kusupanga Brahmani Sand Quarry
Area - 9.50 acres or 3.884 hectares
Location Map- Ref. Plate no- I,
Surface Plan - Ref. Plate no- III

Village	Khata No.	Plot No	Kissam	Area in Ha.
Kusupanga	335	1	Nadi	3.884

3. Status of the Lessee : Status will be finalized after auction.
(Private individual/ Private Company/
Public sector Undertaking/ Joint sector
Undertaking/ Others)
4. Period of Concession : 5 Years from date of agreement
5. Mineral intended to be won : River Sand
6. Name, Address & Regn. No. : Sri S. K. Panda,
of RQP preparing the mining plan with
validity of Recognition : At- Barimundei,
Po- Badaninigaon,
Dist- Puri, Odisha
Phone: 9861763774
Mail. Id: santoshpandageo@gmail.com
- Registration No : RQP/OD/059/2016
- Date of Grant : 03.08.2016
- Valid Up to : 02.08.2026


S. K. Panda
RQP/OD/059/2016

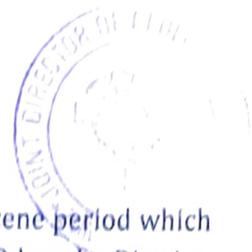


7. Order No. & date of Competent Authority granting the Concession : Letter No. 3611 dtd. 11.07.2022
(Copy of the Order to be attached) : Copy attached as Annexure-I
8. If, forest area, whether forest clearance : The Quarry lease area comprises of
Obtained: (attach copy of forest revenue land, so no forest clearance is
clearance): required.
9. Reserve :
(Estimation to be based on the exploration,
If any, carried out in the area or on local
Parameters)

The area under reference featured in the Survey of India Toposheet No. F45T5 and the area bounded between the latitudes 20°50'47.31" N to 20°50'57.37" N and longitudes of 85°17'36.95" E to 85°17'46.68" E. The area is located at a distance of 45 Km from the district head quarter Dhenkanal and is at a distance of 101 Km from the state capital Bhubaneswar. The quarry lease area belongs to recent quaternary River bed deposits consisting of sand, silt, clay, gravel and alluvial deposits.

a. Physiography:

The Sand bed is on the River Brahmani. The Brahmani is formed by the confluence of the Sankh and South Koel rivers, and flows through the districts of Sundargarh, Deogarh, Angul, Dhenkanal, Cuttack, Jajpur & Kendrapara. It is the second largest river in Odisha. Two major rivers, the Sankh and the Koel, originate from the Chhotanagpur Plateau and join at Vedavyasa near Rourkela in Sundargarh district of Odisha to form a major river called the Brahmani. It flows through Sundargarh, Keonjhar, Dhenkanal, Cuttack and Jajpur districts in the Coastal Plains and enters into the Bay of Bengal at Dhamra. The Brahmani is 799 km long. There are 45 major tributaries of the Brahmani, of which the important ones are Sankha, Chandrinalla, Katangamundanalla, Rukura, Badjore, Kaunishnalla, Kalanalla, Usthalinalla, Chudakhainallah, Gohira, Chilanti river, Tikira, Singadajore, Bangaru river, Nandiranalla, Nigra river, Bangusinghanalla, Barha, Daunri, Kumaria, Kelua river, Birupa, Hansua, Kharsuan, Patasala in right side and Koel, Suidihi, Champalijore, Kuradihi, Amrudi, Korapani, Mankada, Ambahari, Samakoi, Gambhiria, Raijore, Indrajeet, Ramiala, Pandra, Kharasuan, Daudi in the left side.



b. Regional Geology:

Geologically, the Lease area belongs to Quaternary deposit from Holocene period which located in the Brahmani River bed in Kusupanga village of Tahasil- Odapada, District- Dhenkanal. The quaternaries overlie directly on the Tertiaries and are composed of younger and older alluvia. The sediments of older alluvia are grayish to brownish in colour, unfossiliferous, but contain calcareous concretions. Thin younger alluvial deposits of recent age are found in the flood plains and by the side of the river. They also consist of sand, silt, clay and gravel.

c. Local Geology

The sand deposit in Brahmani River near Kusupanga belongs to recent deposits of Holocene age. Beach sand, younger and older alluvium also belongs to the same age. The auction area is occupied by a gently sloping to almost flat deposits of sand. The basement consists of Tertiary deposits and the sequence of litho-units encountered in the Lease area is as follows:

Sand
Alluvium

d. Lithology:

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

Sand: Grey to white sand deposits is mainly covered with 1.75 m to 2.25 m thickness throughout the area. Sand by definition is a loose, incoherent mass of mineral materials and is a product of natural processes. These processes are the disintegration of rocks and corals under the influence of weathering and abrasion. When sand is freshly formed the particles are usually angular and sharply pointed but they grow gradually smaller and more rounded as they become constantly worn down by the wind or water. Clean sand is indeed a rare commodity on land, but common in sand dunes and beaches.

The composition of sand is highly variable, depending on the local rock sources and conditions, but the most common constituent of sand in inland continental settings and non-tropical coastal settings is silica (silicon dioxide or SiO_2), usually in the form of quartz which because of its chemical inertness and considerable hardness, is the most common mineral resistant to weathering.

Alluvium: Alluvial deposits sometimes underlain by the sand bed with some clayey matter.

e. Reserve:

The reserve has been estimated by considering the following parameters.

- i) Surface area method has been adopted for estimation of reserve of sand in Cu.m.
- ii) The reserve has been calculated under proved category only
- iii) Recovery factor is established as per the actual field practice as follows.



<u>Parameters</u>	<u>Quantity</u>
Recovery factor: -	100%

- iv) Out of total volume 100% of sand is assumed to be replenished in the absence of monitored database within the quarry lease area for the lease period of five years. Based on the above consideration & chosen local parameter, the reserve has been calculated for sand as per the present scenario. Depending upon the pattern of deposit, position and quantity of the river sand at present, it is impossible to estimate for the ensuing period. In order to overcome this, total area has been considered as potential zone for sand deposition of sand after excluding the area under water cover (if located any within the lease area, ref PLATE-IV). The geological reserve has been calculated by surface area method by multiplying total effective area multiplied with average thickness of sand in lease area to attain the volume and there by multiplying recovery factor to attain the geological reserves. The thickness of the sand varies from 1.75 m to 2.25 mtr and the average thickness will be 2 m. Total geological reserve has been calculated by doubling the above calculated reserve.
- v) The resource of river sand has been categorized as probable reserve.
- vi) it is assumed that the mineable reserve has been estimated in same manner as geological reserve after allowing for loss due to mining, and safety of mine working including 7.5m safety zone all along the boundary and 10m barrier around the water channel area. Thus the mineable reserve for Sand bed works out to 30314 cu.m/annum.
- vii) The resource of river sand has been categorized as probable reserve.
- viii) The total area is 3.884 ha out of which the effective surface after excluding safety zone area and the area covered under water, the surface area considered for mineable reserve is 2.526ha.
- The geological reserve & mineable reserve of sand quarry calculated under various categories are given in table no.1&2 respectively as follows:

Table.No.1
GEOLOGICAL RESERVE OF SAND BED (EXISTING AT PRESENT)

Category	Surface area in Sq.mt	Thickness of sand in mtr	Volume of ore in Cu.m	Recovery Factor (100%)	Reserve in Cu m
Probable	31250	2	62500	1	62500
Total					62500

S. K. Panda
RQP/OD/059/2016



Table.No.2
CATEGORY WISE MINEABLE RESERVE OF SAND BED

Category	Potential Surface area excluding safety zone in Sq.mt	Thickness of sand in m	Replenishment factor (100%)	Mineable reserve of Sand in cum	Extractable mineable reserve
A	B	C	D	E= BxCxD	F= Ex0.6
Probable	25262	2	1	50524	30314
Total					30314

10. Mining :

- a. Whether manual or semi-mechanized or mechanized : The mining will be done by manual method.

Most of the methodologies and guidelines undertaken for hard rock quarries are not applicable to river bed mining. However, the major differences include higher incidence of landuse changes and relatively shallow depths of workings, which cause more environmental imbalances for riverbed mining. The most applicable practices of sand/gravel mining are given below :

- 1. Dry pit mining:** Pits excavated on dry ephemeral stream beds and exposed channel/ point bars, with conventional bulldozers, scrapers and loaders.
- 2. Wet pit mining:** This involves the use of a dragline or hydraulic excavator to remove sand or gravel from below the water table or in a perennial stream channel generally during lease period. In wet pits dewatering or partial dewatering is frequently undertaken to allow the site to be more easily excavated. The decision to dewater or not will depend on the deposit thickness, permeability of the sand and gravel, the use of ground water aquifer and the intended after-use and restoration requirements.
- 3. Bar skimming or scraping :** Scraping of top portion of the bar deposits are generally undertaken for sustainable mining of sand/gravel grade material.



4. **Pits on the adjacent floodplain or river terrace:** In this case dry or wet pitting/ mining are involved depending upon geomorphology of the area. Dry pits are located above the water table and wet pits are developed below the groundwater table, depending on the elevation of the floodplain or terrace relative to baseflow water elevation of the channel.

5. **Existing Mining Method:**

The mining operation at Kusunpanga Sand bed has been started earlier and as a result of which pits have been developed. The mode of the deposits, geomorphology of the area and its hydrological condition are some of the factors that favours the open cast method of mining. In this deposit, the mining is done by manual dry-pit mining method. The sands are extracted, loaded and transferred from pits to the users through trucks. The mining is done on single shift basis. The local man power has been engaged in the mine.

b. If semi-mechanized or mechanized, number, type and capacity of machines to be used:

In this deposit, the mining will be done by manual opencast dry pit mining method.

No machineries shall be used as it is a river bed mining project except tippers/tractors for the haulage /transportation of sand from the lease area to the consumer.

The number, type and capacity of machines to be used are described in the table below;

Table- 3 (Machineries to be used)

Type of Machines	Capacity	No. of Machines
Tipper/Tractor	6Cu.m./3 Cu.m.	4 tippers/12tractors
Safety equipment such as Helmets, Safety Shoes, Goggles & Hand Gloves	---	As required



- c. Whether drilling and blasting will be made use of, If yes, state monthly quantity of explosive consumed : No
- d. Benching pattern (Height x Width) :
Benching pattern is not feasible in case of sand mining. The maximum depth of mining will be of 2m or up to water table whichever is less.
- e. Face lay out (attach development plan):
During Plan period the following geoscientific considerations have been suggested to be taken into account for sand/ gravel mining:-
1. Abandoned stream channels on terrace and inactive floodplains has been preferred rather than active channels and their deltas and floodplains. Replenishment of ground water has to be ensured if excessive pumping out of water is required during mining.
 2. Stream will not be diverted to form inactive channel,
 3. Mining below subterranean water level will be avoided as a safeguard against environmental contamination and over exploitation of resources,
 4. Scraping of sediment bars above the water flow level in the lean period have been preferred for sustainable mining,
 5. Mining of sand from the riverbed has been restricted to a maximum depth of 3m from the surface. For surface mining operations beyond this depth of 3m, it is imperative to adopt quarrying in a systematic bench- like disposition, which is generalry not feasible in riverbed mining. Hence, for safety and sustainability restriction of mining of riverbed material to maximum depth of 3m. has been recommended,
- f. Quarry Floor Level (RL) at the end of the year or period of the concession:
During plan period one pit will be developed. The average production for these years will be around 30314 cu.m. The quarry floor will be 50 mRL. The proposed pit lay out have been shown in the development plan and also in environment management plan (ref Plate V & Plate - VI).
- g. Quantity of mineral to be won (Annual Level of Production) :
Based on the present market demand, the year wise production schedule for ensuring five years has been formulated at a steady and uniform rate of 30314

cu.m/annum for sand. As the sand sized particles will be produced, the production has been calculated and represented in cubic meter irrespective of the tonnage factor, to facilitate to get the correct quantity of sand. Based on the past experience, the geo-mining parameters taken in to consideration for mine planning are as follows:

Geo-Mining parameters	Quantitative Description
Sand recovery factor	100%
Bench height	Benching pattern is not feasible in case of sand mining. The maximum depth of mining is 2m
Sand to waste/rejects	Nil

On the basis of the above data, year wise production of sand is estimated as per the following formula: $M = CLI$

Where,

M = Quantity of sand in cu.m.

C = Surface area in square meters.

L = Depth of sand in meters.

I = Recovery factor of sand deposits

The year wise production of sand during plan period are given in table no.4 as follows:

Table No.4
YEAR WISE PRODUCTION OF SAND DURING PLAN PERIOD

Year	Production of sand in cu.m /Annum
1 st year	30314
2 nd Year	30314
3 rd Year	30314
4 th year	30314
5 th year	30314
Total	151570

APPROVED

[Signature]
04/08/2022

Joint Director Geology
Zonal Survey, Dhenkanal

[Signature]
S. K. Panda
RQP/OD/059/2016

The average production /excavation sand is 30314 Cu.m/ annum. If the reserve of sand is not sufficient and to meet the production quantity, the lessee may modify the plan within the lease period after seeking permission from the competent authority just after the monsoon of substantial year.

- h. Quantity of overburden to be removed
(Show location of such disposal in development plan) : Nil
Whether heavy blasting to be adopted: No blasting will be required.
If yes, location of nearest habitation
(to be shown in the surface plan)
- i. Safety precautions to be adopted : No safety measures are to be taken as there will no blasting operations
- j. Brief description on the method of
Procurement and storage of
Explosives : Explosives are not used.

11. Waste disposal:

- a. Location (show in development Plan) : No proposed dump has been suggested in the quarry as there will no significant quantity of waste.
- b. Area covered : There will be no provision for dumping within the quarry or river.
- c. Environmental safeguards for such disposal : River sand will be automatically reclaimed during flood or rainy season.

12. Mine drainage :

(Give details of total make of water during dry and rainy season and its method of handling) The surface run-off and drainage of the river will not be disturbed. Shallow depth excavation towards the river has been proposed which will have negligible or no impact on the mining process. Abandoned stream channels on terrace and inactive flood plains has been preferred rather than active channels and their deltas and floodplains. Replenishment of ground water has to be ensured if excessive pumping out of water is required during mining. Stream will not be diverted to form inactive channel. Mining below subterranean water level will be avoided as a safeguard against environmental contamination and over exploitation of resources, Segments of braided river system has been used preferably falling within the lateral migration area of the river regime that enhances the feasibility of



sediment replenishment. Mining at the concave side of the river channel have been avoided to prevent bank erosion.

It is observed from the dug well in the adjacent plain area and in village, the ground water table varies between 4m to 8 m from the surface level depending upon seasonal variations. During dry season the water table falls to 10m from the surface where as during rainy season the water table remains at 4m from the surface. As the mining activities presently proposed are maximum up to 2m so there will be no effect on ground water table.

13. Mineral Processing

(Give details of processing including sizing, Sorting, generation of rejects/fines etc) :

Mineral processing in case of Riverbed mining of the sandy, gravelly material may consist of simple washing to remove clay and silty area. It may involve crushing, grinding and separation of valueless rock fragments from the desirable material. The Kusupanga sand bed also do not contain valuable heavy minerals or any trace elements for which any separation of such mineral is required. The sand excavated from the Kusupanga sand bed would not require such processing. The sand will be supplied directly to the user as per the demand of construction materials.

14. (a) No. of trees to be uprooted due to mining operation : Nil

(b) Programme of Plantation : Nil

15. Manpower : All total 49 persons will be employed in this quarry.

a. Supervisory: (inclusive of statutory personnel's) : One number of supervisory personel will be employed. The details are given as follows

Table.No.4

Management (Supervising personnel):

Designation	Qualification	Nos.
Supervisor	As per DGMS norm	1
Total		1

b. Non- Supervisory (skilled, semi-skilled

& unskilled)

: Around 48 numbers of non-supervisory personnel's will be employed. The details are given as follows:

(ii) LABOURERS(Skilled/Semi-Skilled/Un-Skilled)

Category	Post	Nos.	Total
Skilled	Loading supervisor	2	2
Semi-Skilled	Assistant Loading supervisor	2	2
Unskilled	Labourers	44	44
Total	---	48	48

c. OMS

Total production during plan period : 151570 cum

Average production of sand /annum : 30314 cum

Working days in the year : 210 days (in an average)

Production per day : $30314 / 210 = 144.35$ or say 144Cu.m

Output per man shift (O.M.S.) :

O.M.S can be calculated by Production per day divided by manpower.

O.M.S = $144\text{Cu.m} / 48 \text{ No.} = 3 \text{ cum}$

16. Use of Mineral :

(Specification and monthly quantity to be dispatched be furnished)

a. For domestic use :

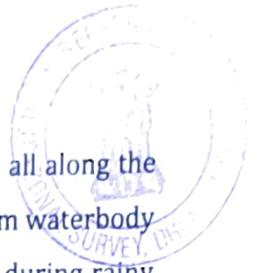
For construction purpose the sand of Kusupanga will be used. Around 4320 cu.m of sand on monthly basis will be sold in domestic market.

b. For export : No material will be exported at present

17. Mine Closure Plan:

(a) Describe the process/activities to be Undertaken for reclamation and Rehabilitation in respect of the following

i. Mined out land:



During plan period the mined out land will be 2.562 ha. The safety zone all along the quarry lease area will be maintained as 7.5 meter width and 10meter from waterbody which will cover 0.884ha. The area will reclaimed naturally every year during rainy season . The river will carry sand and sediments which will be eventually filled in the pits. No further reclamation proposal is required.

The existing land use as well as proposed land use of the area is given in table no.5 as below

Table.No.5

Sl. No.	Type of Land Use	Area in Hectares	
		At Present (Existing)	At the end of Plan Period
1	Area under excavation	---	2.562
2	Area under water	0.696	0.696
3	Safety zone.	0.430	0.636
4	Unutilised area	2.562	---
	Total	3.884	3.884

ii Waste/reject dump:

There will be no proposed dump during the plan period so no reclamation and rehabilitation measures have been suggested.

iii. Topsoil stack and its utilization

There will be no generation of top soil in this quarry since the mining will be carried out in river bed sand.

(b) Financial assurance:

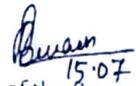
(To be furnished as a bank guarantee in respect of the area to be put to use at the rate of Rs. per hectare) : The financial assurance will be submitted by the successful bidder as decided by the competent authority.

S.K. Panda
S. K. Panda
 RQP/OD/059/2012



18. Certificate:

I/We the holder of Kusupanga Sand for River Sand over 3.884 hecets. of Kusupanga village, under Odapada Tahasil of Dhenkanal District hereby solemnly affirm that the plans and programmes in this mining plan will be scrupulously implemented by me/us and I/we will be strictly held responsible for any deviation thereof. I/we also hereby certify that the provisions of Mines and Minerals (Development & Regulation) act, 1957 and the minesact 1952 and Rules and regulations made under these acts, along with the provisions of Orissa Minor Mineral Concession Rules, 2016 will be strictly adhered to while implementing this mining plan and wherever specific permissions will be required I/We will approach the concerned authorities of the State Government as the case may be.


15.07.22

(Signature of the Concessionaire)

Tahasildar, Odapada

(On behalf of successful highest bidder)



S. K. Panda
RQP/OD/059/2016

Annexure - 1
OFFICE OF THE TAHASILDAR, ODAPADA
Letter No. 3611 /Dt. 11.7.2022



To

Sri Santosh Kumar Panda,
At-Barimunde,
P.O.-Badaninigaon,
Dist-Puri, Pin-752121,
Registered qualified person,
Regd. No. RQP/OD/059/2016

Sub: - Preparation of mining plan of the following sairat sources.

Sir,

With reference to the subject cited above I am to say that, the feasible sairat sources which have been approved and placed in the District Survey Report (DSR) for which mining plan is required to be prepared for getting Environmental Clearance & GTO for operation of the source. The details of the sources along with Land Plan, Land Schedule are enclosed herewith for preparation of mining plan.

I would, therefore request you, kindly prepare the mining plan of the following sairat sources and approve the same from the authorized officer i.e. Joint Director, Geology, Dhenkanal within 7 days for extraction of minor minerals by the lessee from 2022-23 onwards.

Yours faithfully

Buwan
11.07.22
Tahasildar, Odapada

Memo No. 3612 /Dt. 11.7.2022

Copy submitted to the Joint Director, Geology, Dhenkanal for favour of kind information and necessary action.

Buwan
11.07.22
Tahasildar, Odapada

Memo No. 3613 /Dt. 11.7.2022

Copy submitted to the Additional District Magistrate, Revenue Dhekanal/Sub-Collector, Dhenkanal for favour of kind information and necessary action.

Buwan
11.07.22
Tahasildar, Odapada

Anneymurthi



CERTIFICATE FROM R.I.

This is to certify that the area proposed to be granted for quarry lease for mining of river sand in respect of Kusupanga Brahmani Sand Quarry, on plot no. 1 of Khata No- 335, KISSAM- NADI over an area of 9.50 Acre or 3.884 Ha. in Village Kusupanga, Tahasil Odapada, district Dhenkanal Odisha has been demarcated on field by the Revenue Inspector, Motanga circle of Odapada Tahasil with the help of existing revenue village sheets of the adjoining area for the purpose of preparation of Mining Plan.

Date: 15.07.2022

Place: Motanga



Signature

Revenue Inspector



GOVERNMENT OF ODISHA
DEPARTMENT OF STEEL AND MINES
DIRECTORATE OF MINES

CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON

(Under sub-rule (2) of rule 20 of Odisha Minor Mineral Concession Rules, 2004)

Sri Santosh Kumar Panda, s/o Sri Bauribandhu Panda, R/o Barimundei, P.O: Badaninigaon, P.S. Balanga, Dist: Puri - 752121, whose photograph and signature are affixed herein, having given satisfactory evidence of his qualification and experience, is hereby **recognised** under sub-rule (2) of rule 20 of Odisha Minor Mineral Concession Rules, 2004 as a **qualified person** to prepare Mining Plans for Minor Minerals within the State of Odisha, India.



Santosh Kumar

His Registration No. is

RQP/OD/059 /2016

This Recognition is valid for a period of 10 years ending on 02-08-2026.
This certificate will be liable to be withdrawn/ cancelled in the event of furnishing wrong information/ documents in the Mining Plans to be submitted by him.

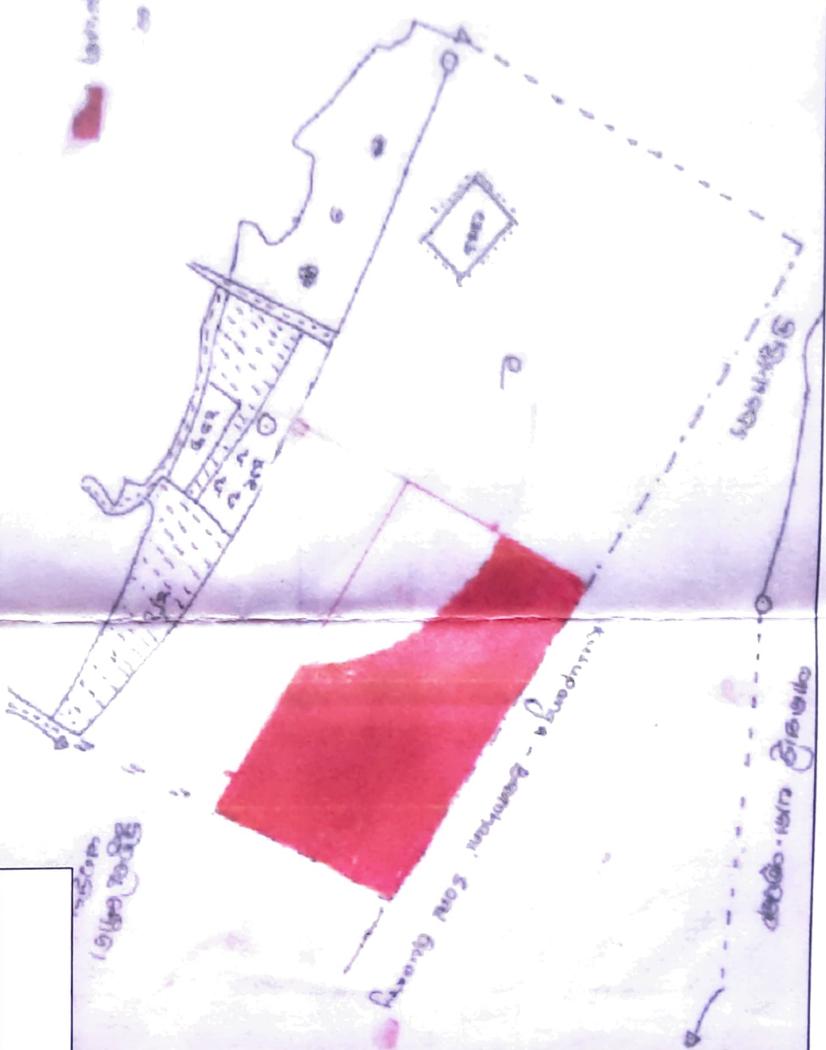
Place: Bhubaneswar

Date: 03-08-2016

[Signature]
DIRECTOR OF MINES, ODISHA
BHUBANESWAR



ଉପର - ଦୁର୍ଗାପୁରୀ
 ଡାହାଣ - ବାଲିଖଣ୍ଡ
 ଡାହାଣ - ଡାହାଣ
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APPROVED
 Joint Director, Geology
 Zonal Survey, Bhubaneswar

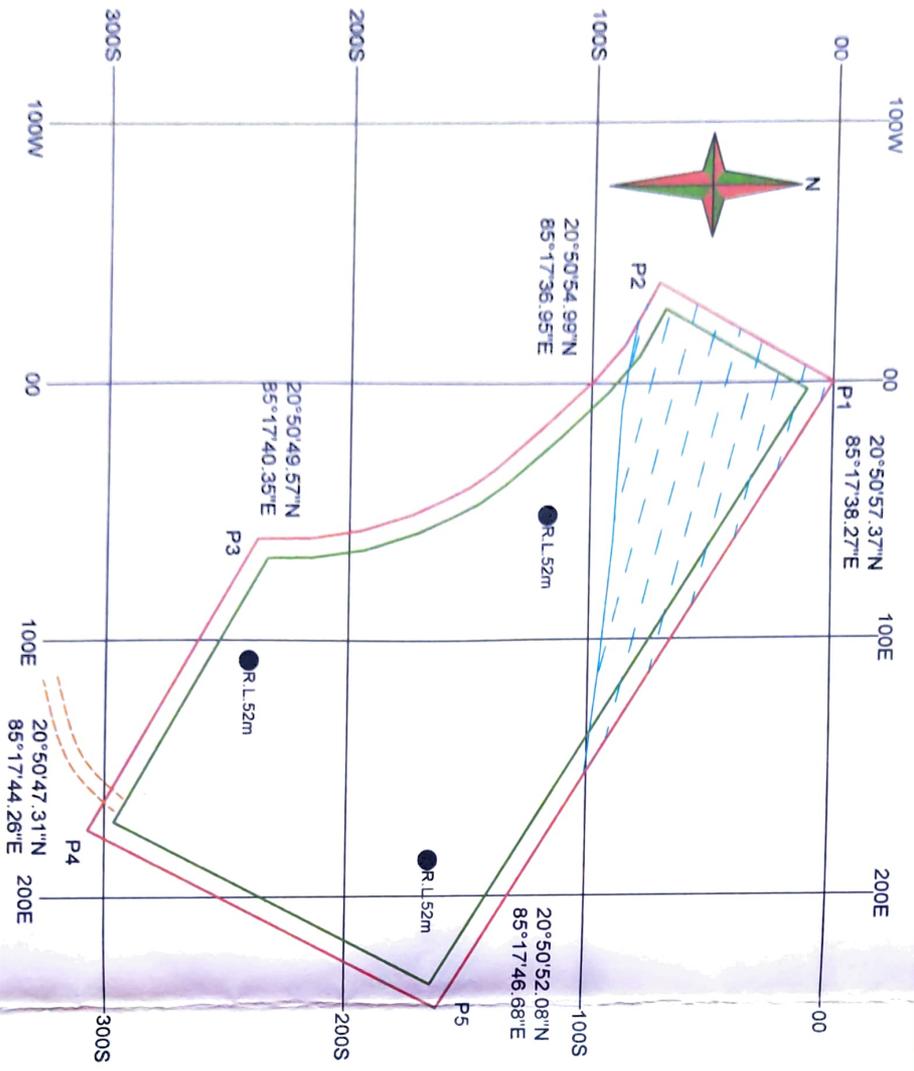
PLATE - II

LEASE PLAN

R.F. - 1" = 1 mile

KUSUPANGA BRAHMANI SAND QUARRY
 OVER AN AREA OF 9.50 ACRES UNDER ODAPADA TAHASIL
 OF DHENKANAL DISTRICT, ODISHA.
TAHASILDAR ODAPADA
 (ON BEHALF OF SUCCESSFUL BIDDER)


 S.K. PANDA
 RQP/OD/059/2016



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-  Q.L BOUNDARY
-  SAFETY ZONE
-  SPOT RL
-  ACCESS ROAD
-  RIVER WATER
-  GRID

APPROVED

S. K. Panda

Joint Director, Geology
Zonal Survey, Dhenkanal

PLATE - III

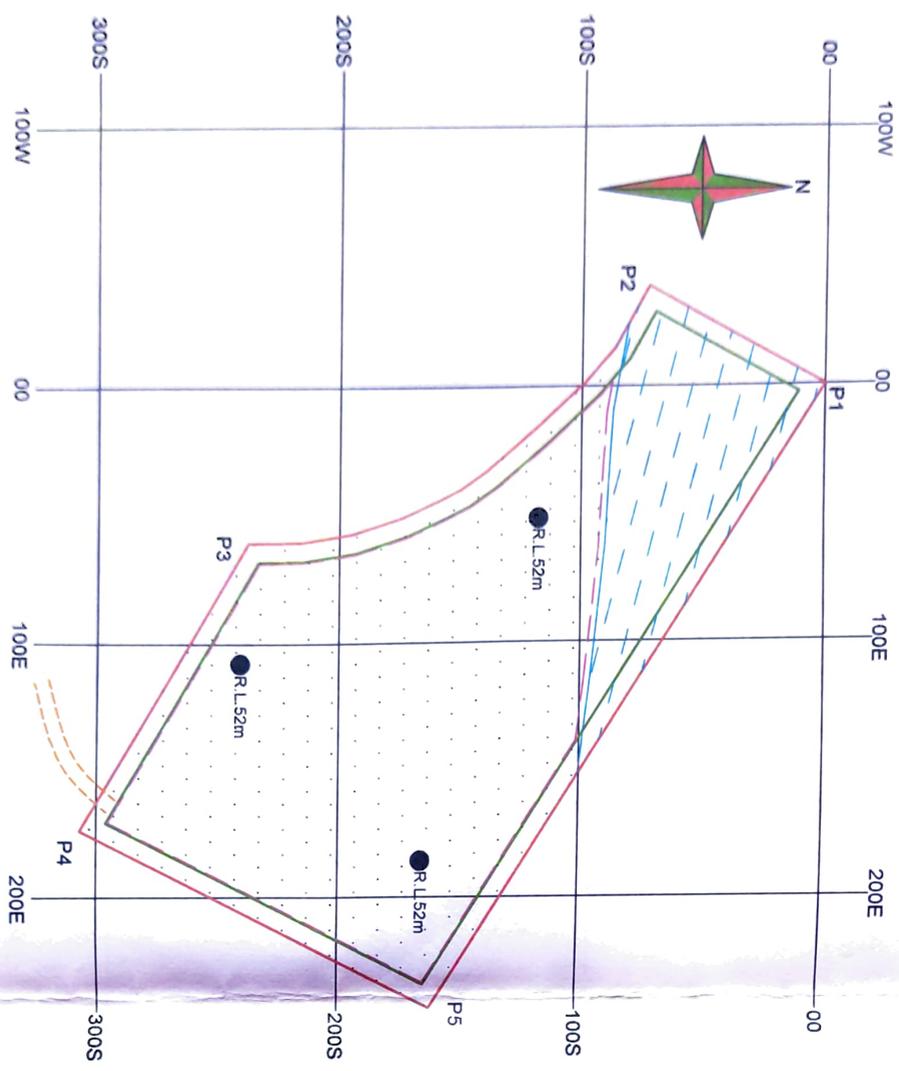
SURFACE PLAN

R.F.-1:2000

KUSUPANGA BRAHMANI SAND QUARRY
OVER AN AREA OF 9.50ACRES UNDER ODAPADA TAHASIL
OF DHENKANAL DISTRICT, ODISHA.
TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

S. K. Panda

S K PANDA
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-  RIVER WATER
-  ULTIMATE PIT LIMIT
-  GRID

APPROVED

Signature

Joint Director Geology,
Tribal Survey, Dhenkanal



GEOLOGICAL PLAN

PLATE - IV

R.F. - 1:2000

KUSUPANGA BRAHMANI SAND QUARRY
OVER AN AREA OF 9.50ACRES UNDER ODAPADA TAHASIL
OF DHENKANAL DISTRICT, ODISHA.
TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

Signature

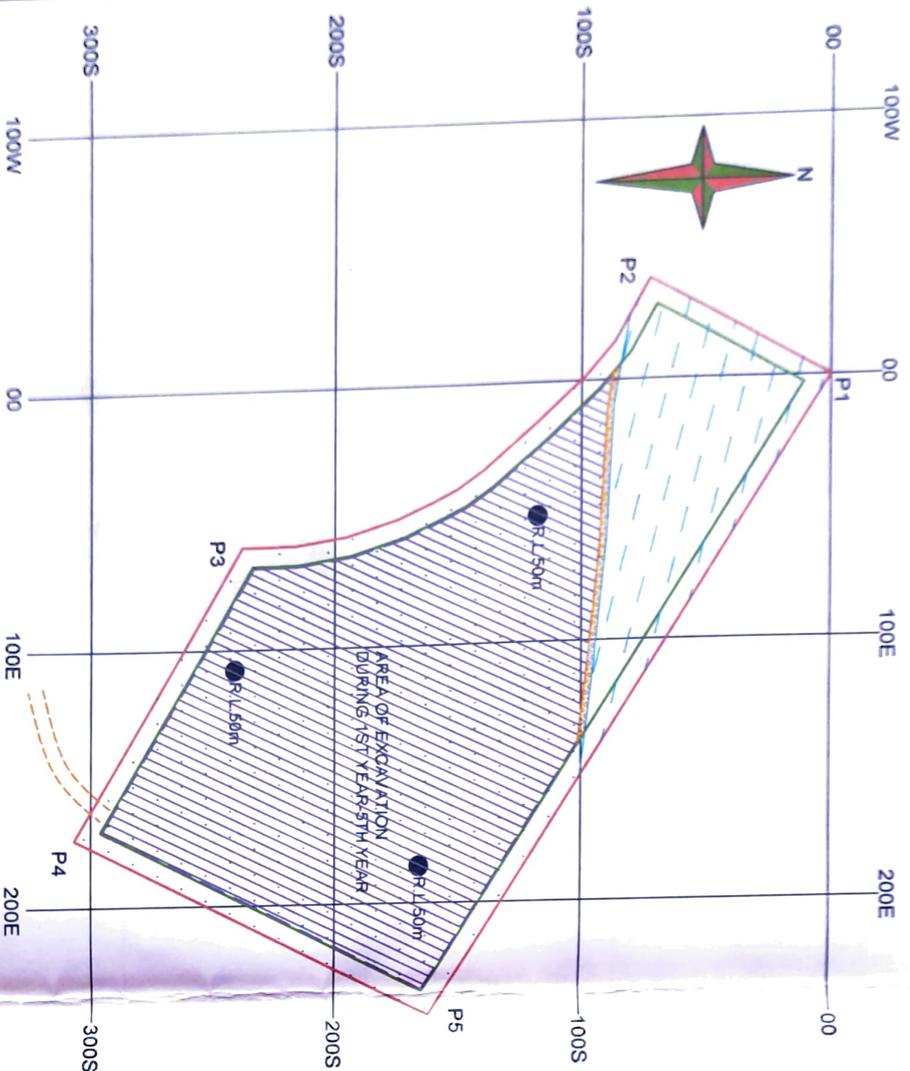
S.K. PANDA
RQP/IOD/059/2016



Approved
20/05/2016

Joint Director Geology,
Zonal Survey, Dhenkanal

APPROVED



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 - RIVER SAND
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 - AREA OF EXCAVATION DURING 1ST YEAR-5TH YEAR

PLATE - V

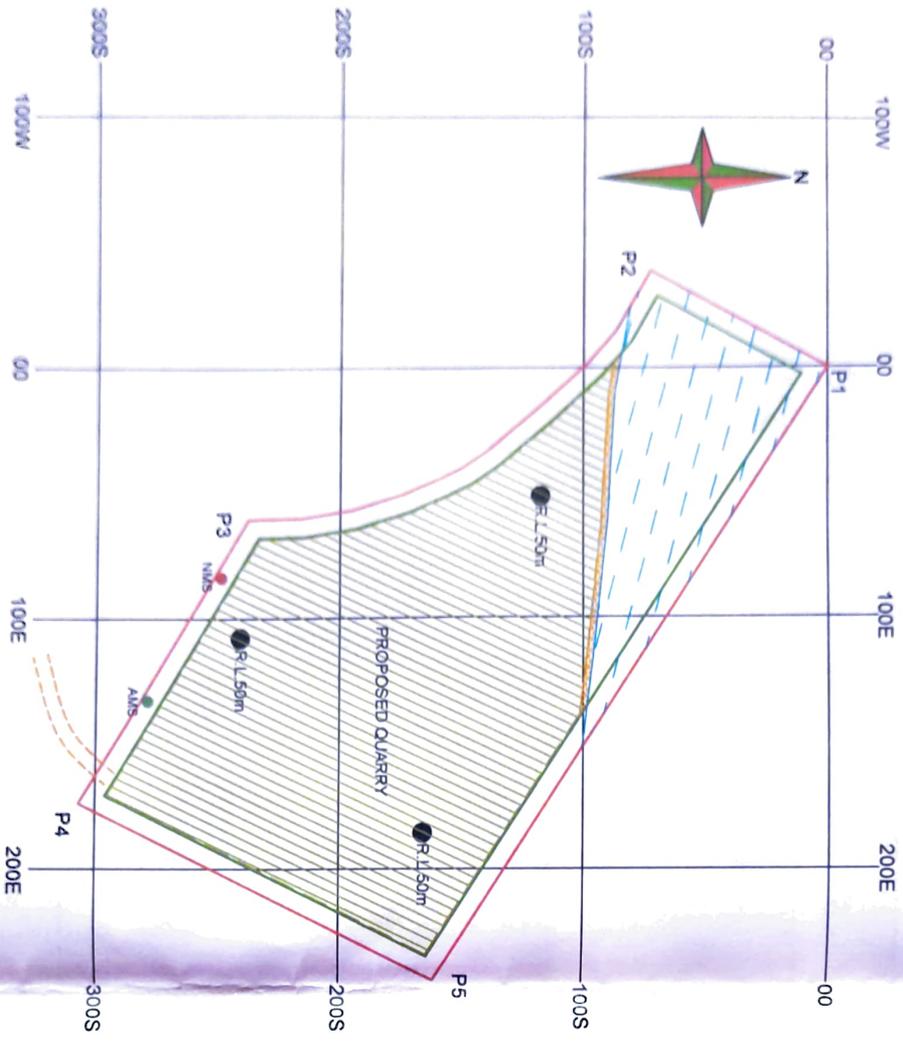
DEVELOPMENT PLAN

R.F. - 1:2000

KUSUPANGA BRAHMANI SAND QUARRY
OVER AN AREA OF 9.50ACRES UNDER ODAPADA TAHASIL
OF DHENKANAL DISTRICT, ODISHA.
TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

S.K. Panda

S. K. PANDA
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-  PROPOSED QUARRY
-  NOISE MONITORING STATION
-  AIR MONITORING STATION

PLATE - VI

ENVIRONMENT MANAGEMENT PLAN

R.F.-1:2000

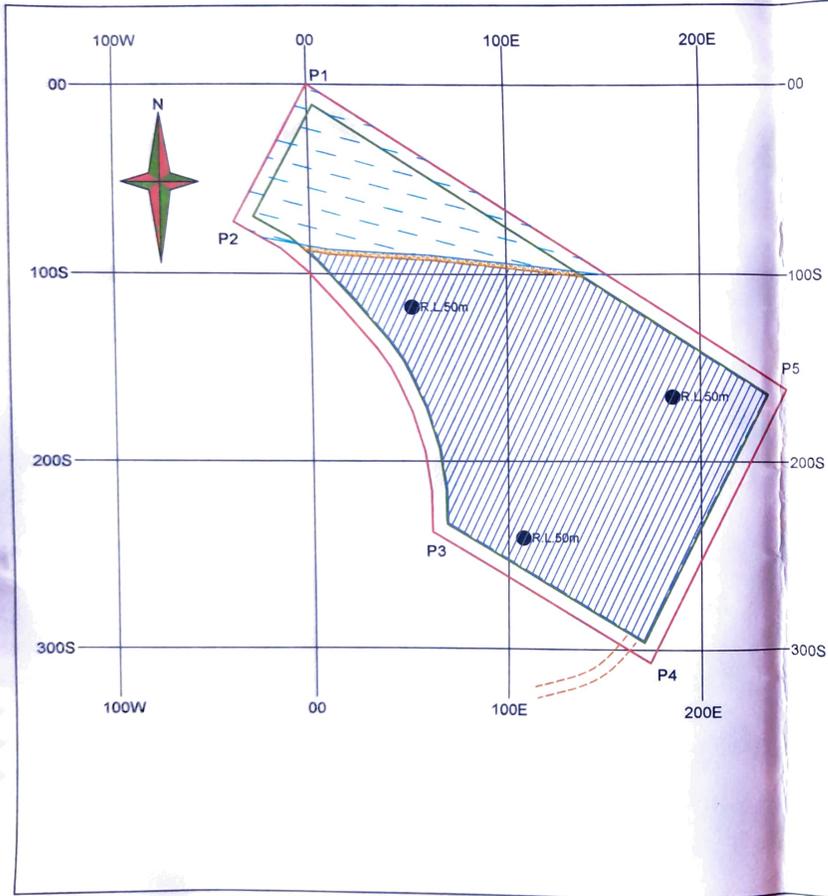
KUSUPANGA BRAHMANI SAND QUARRY
 OVER AN AREA OF 9.50ACRES UNDER ODAPADA TAHASIL
 OF DHENKANAL DISTRICT, ODISHA
TAHASILDAR ODAPADA
 (ON BEHALF OF SUCCESSFUL BIDDER)


 S.K. PANDA
 RQP/OD/059/2016

APPROVED

Signature
 Joint Project Director
 Zonal Survey, Dhenkanal





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-  RIVER WATER
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-  GRID
-  PLAN PERIOD LIMIT
-  CONCEPTUAL LIMIT

APPROVED
S.K. Panda
Joint Director Geology
Zonal Survey, Dhenkanal

PLATE - VII

PROGRESSIVE MINE CLOSURE PLAN

R.F.-1:2000

KUSUPANGA BRAHMANI SAND QUARRY
OVER AN AREA OF 9.50ACRES UNDER ODAPADA TAHASIL
OF DHENKANAL DISTRICT, ODISHA.
TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

S.K. Panda
S.K. PANDA
RQP/OD/059/2016

FORM - 0

Under rule 28(4) of OMMC, Rules- 2016

MINING PLAN

OF

KURUNTI BRAHMANI SAND QUARRY

Over an area of 12.00 Acre or 4.856 ha in Village Kurunti under
Odapada Tahasil of Dhenkanal District, Odisha

PLAN PERIOD- 5 YEARS

For & on behalf of

TAHASILDAR ODAPADA

(On Behalf of Successful Bidder)

At/Po- Odapada

Dist- Dhenkanal

Odisha

APPROVED

AShe June
18/11/2022
Joint Director Geology
Zonal Survey, Dhenkanal

Prepared by

SRI S. K. PANDA

RQP/OD/059/2016

At- Barimunde,

Po- Badaninigaon

Dist- Puri, Odisha

PIN- 752121

Ph: 9861763774

Email: santoshpandageo@gmail.com



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S. K. Panda
RQP/OD/059/2016

CONSENT LETTER



The Mining Plan in respect of Kurunti Brahmani sand Quarry over an area of 12.00 acres or 4.856 hectares of Tahasil Odapada, district Dhenkanal, State Odisha has been prepared by Sri. S. K. Panda, Regd. No. RQP/OD/059/2016 as per "Form-O" prescribed under OMMC Rules 2016. I request the concern authorities of Joint Director Geology, Zonal Survey, Dhenkanal to make further correspondence regarding modification of the Mining Plan with the said recognized person on his following address:

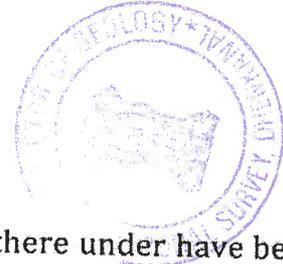
Sri S. K. Panda
RQP/OD/059/2016
At- Barimundei
Po- Badaninigaon
Dist-Puri, Odisha
Mail ID: santoshpandageo@gmail.com
Ph: 9861763774

I hereby undertake that all the modification so made in the Mining Plan by the recognized person be deemed to have been made with my knowledge and consent and shall be acceptable to me and binding on me in all respects.

Place: Odapada
Date: 08.11.2022

Banmivedita Swain
Signature of the Applicant in full
Tahasildar, Odapada
(On behalf of successful bidder)

CERTIFICATE FROM THE APPLICANT



"The provisions of mines act, rules and regulations made there under have been observed in the **Mining Plan** in respect of **Kurunti Brahmani sand Quarry** over an area of **12.00 acres or 4.856 hectares** in village **Kurunti, Tahasil Odapada, District Dhenkanal, Odisha** of **Tahasildar, Odapada** (On behalf of successful highest bidder) and wherever specific permissions are required, the Sand quarry Lessee/applicant will approach the DGMS and the State Government as the case may be.

Further, standards prescribed by the DGMS in respect of Miners health will be strictly implemented".

BANINIVEDITA SWAIN

Full name in block letters:

TAHASILDAR, ODAPADA

(On behalf of successful highest bidder)

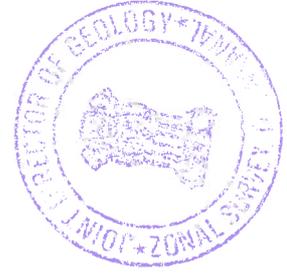
CERTIFICATE FROM THE RQP



Certified that **Mining Plan** in respect of **Kurunti Brahmani sand Quarry** over an area of **12.00 acres or 4.856 hectares** in village **Kurunti of Odapada Tahasil of Dhenkanal District, Odisha** of Tahasildar, Odapada (On behalf of successful highest bidder) is prepared basing on various aspects such as quarrying under OMMC Rules, 2016 and wherever specific permissions are required the **Lessee/Applicant** will approach the concerned statutory authorities.

Certified that the information furnished in this **Mining Plan** is correct to the best of my knowledge.

S. K. Panda
RQP/OD/059/2016



LIST OF PLATES

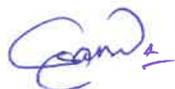
SL.NO	PARTICULARS	PLATE NO.	SCALE
1	Location Plan	I	1:50,000
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3	Surface Plan	III	1:2000
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S. K. Panda
RQP/OD/059/2016

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S. K. Panda
RQP/OD/059/2016



LIST OF ANNEXURE

SL. NO.	DESCRIPTION	ANNEXURE NO.	PAGE NO.
1	Copy of the letter no. 5775 dtd 07.11.2022 of Tahasildar, Odapada	I	22-22
2	Certificate from RI	II	23-23
3	RQP Certificate	III	24-24

S. K. Panda
RQP/OD/059/2016

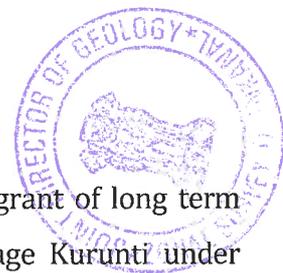
INTRODUCTION

The applications will be invited by the Tahasildar, Odapada for grant of long term quarry lease in respect of Kurunti Brahmani sand Quarry in the village Kurunti under Odapada Tahasil of District: Dhenkanal, Odisha. The quarry lease of the Kurunti sand quarry in Brahmani River at Kurunti, held in accordance with the provisions of the OMMC Rules, 2016. The Tahasildar Odapada, has entrusted the work of preparation of mining plan of said quarry to Sri S. K. Panda, RQP, At- Barimunde, PO- Badaninigaon, Dist-Puri, vide letter no. 5775 on dated 07.11.2022. The copy of the said letter is enclosed as **Annexure- I**.

The Kurunti Sand bed over an area of 12.00 acres or 4.856 ha comes on Plot no. 1 of khata no. 571, Kissam: Nadi of Tahasil: Odapada, District : Dhenkanal of Odisha. The entire lease area comprises of Govt. land.

The area under reference featured in the Survey of India Toposheet No. F45T5 and the area bounded between the latitudes 20°50'38.05" N to 20°50'47.88" N and longitudes of 85°17'45.58" E to 85°17'54.78" E. Geologically, the lease area belongs to Quaternary deposit from Holocene period which located in the Brahmani River bed at Kurunti, under Odapada Tahasil of Dhenkanal district of Odisha. The quaternaries overlies directly on the Tertiaries and are composed of younger and older alluvia. The sediments of older alluvia are grayish to brownish in colour, unfossiliferous, but contain calcareous concretions. Thin younger alluvial deposits of recent age are found in the flood plains and by the side of the river. They also consist of sand, silt, clay and gravel.

The area as shown by the Revenue authority has been surveyed through hand held GPS for obtaining the co-ordinates and RL's of the required points within the lease. The co-ordinates of boundary corner points are mentioned in the Surface Plan (Plate No. III). The proposed rate of production has been worked out at 35472cu.m/annum depending upon the present market demand of the sand. However, the rate of production may be increased or decreased in future depending on the market demand. The total geological reserve have been estimated around 97126 Cu.m/annum. The mineable reserve of sand has been estimated at 59120 cu.m/ annum and extractable mineable reserve is 35472 cum/annum. Considering the present proposed production target at a rate of 35472 cu.m of sand is feasible for excavation. The quantity excavated in a year in ideal




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condition the same quantity may be replenished during the subsequent flood /rainy season.



Looking into the potential mineable resources of Kurunti sand deposit, the main objective is to develop this mineable property scientifically and systematically for commercial benefit of indigenous industries and secondly for increase of state exchequer by paying the royalties to the State Government, Odisha and thirdly to boost up the socio-economic status of the poor inhabitants of this area by producing employment opportunity to earn more and live a better life.

APPROVED

[Handwritten Signature]
18/11/2022

Joint Director Geology
Zonal Survey, Dhenkanal

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FORM-O

(See Rule 28(4) of the Odisha Minor Mineral Concession Rules, 2016)



MINING PLAN FOR WINNING OF RIVER SAND FROM KURUNTI BRAHMANI SAND QUARRY (BRAHMANI RIVER) IN VILLAGE KURUNTI OF KURUNTI GRAMPANCHAYAT UNDER ODAPADA TAHASIL OF DHENKANAL DISTRICT, ODISHA.

(Category: B2)

1. Name & Address of the Lessee : Tahasildar, Odapada
On behalf of successful highest bidder
Dist - Dhenkanal
State- Odisha
2. Particulars of the area (Acreage, Boundary Description & Land Schedule): (Attach location map and surface plan showing the existing features of the area with counters at 2 m interval) : Name of the Quarry-
Kurunti Brahmani Sand Quarry
Area - 12.00 acres or 4.856 hectares
Location Map- Ref. Plate no- I,
Surface Plan - Ref. Plate no- III

Village	Khata No.	Plot No	Kissam	Area in Ha.
Kurunti	571	1	Nadi	4.856

3. Status of the Lessee (Private individual/ Private Company/ Public sector Undertaking/ Joint sector Undertaking/ Others) : Status will be finalized after auction.
 4. Period of Concession : 5 Years from date of agreement
 5. Mineral intended to be won : River Sand
 6. Name, Address & Regn. No. of RQP preparing the mining plan with validity of Recognition : Sri S. K. Panda,
At- Barimundei,
Po- Badaninigaon,
Dist- Puri, Odisha
Phone: 9861763774
Mail. Id: santoshpandageo@gmail.com
- Registration No : RQP/OD/059/2016
Date of Grant : 03.08.2016
Valid Up to : 02.08.2026


S. K. Panda
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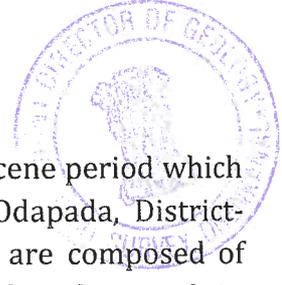
7. Order No. & date of Competent Authority granting the Concession : Letter No. 5775 dtd. 07.11.2022
(Copy of the Order to be attached) : Copy attached as Annexure-I
8. If, forest area, whether forest clearance : The Quarry lease area comprises of
Obtained: (attach copy of forest revenue land, so no forest clearance is
clearance): required.
9. Reserve :
(Estimation to be based on the exploration,
If any, carried out in the area or on local
Parameters)

The area under reference featured in the Survey of India Toposheet No. F45T5 and the area bounded between the latitudes 20°50'38.05" N to 20°50'47.88" N and longitudes of 85° 17'45.58" E to 85°17'54.78" E. The area is located at a distance of 45 Km from the district head quarter Dhenkanal and is at a distance of 101 Km from the state capital Bhubaneswar. The quarry lease area belongs to recent quaternary River bed deposits consisting of sand, silt, clay, gravel and alluvial deposits.

a. Physiography:

The Sand bed is on the River Brahmani. The Brahmani is formed by the confluence of the Sankh and South Koel rivers, and flows through the districts of Sundargarh, Deogarh, Angul, Dhenkanal, Cuttack, Jajpur & Kendrapara. It is the second largest river in Odisha. Two major rivers, the Sankh and the Koel, originate from the Chhotanagpur Plateau and join at Vedavyasa near Rourkela in Sundargarh district of Odisha to form a major river called the Brahmani. It flows through Sundargarh, Keonjhar, Dhenkanal, Cuttack and Jajpur districts in the Coastal Plains and enters into the Bay of Bengal at Dhamra. The Brahmani is 799 km long. There are 45 major tributaries of the Brahmani, of which the important ones are Sankha, Chandrinalla, Katangamundanalla, Rukura, Badjore, Kaunishnalla, Kalanalla, Usthalinalla, Chudakhainallah, Gohira, Chilanti river, Tikira, Singadajore, Bangaru river, Nandiranalla, Nigra river, Bangusinghanalla, Barha, Daunri, Kumaria, Kelua river, Birupa, Hansua, Kharsuan, Patasala in right side and Koel, Suidihi, Champalijore, Kuradihi, Amrudi, Korapani, Mankada, Ambahari, Samakoi, Gambhiria, Raijore, Indrajeet, Ramiala, Pandra, Kharasuan, Daudi in the left side.

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b. Regional Geology:

Geologically, the Lease area belongs to Quaternary deposit from Holocene period which located in the Brahmani River bed in Kurunti village of Tahasil- Odapada, District- Dhenkanal. The quaternaries overlies directly on the Tertiaries and are composed of younger and older alluvia. The sediments of older alluvia are grayish to brownish in colour, unfossiliferous, but contain calcareous concretions. Thin younger alluvial deposits of recent age are found in the flood plains and by the side of the river. They also consist of sand, silt, clay and gravel.

c. Local Geology

The sand deposit in Brahmani River near Kurunti belongs to recent deposits of Holocene age. Beach sand, younger and older alluvium also belongs to the same age. The auction area is occupied by a gently sloping to almost flat deposits of sand. The basement consists of Tertiary deposits and the sequence of litho-units encountered in the Lease area is as follows:

Sand
Alluvium

d. Lithology:

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

Sand: Grey to white sand deposits is mainly covered with 1.75 m to 2.25 m thickness throughout the area. Sand by definition is a loose, incoherent mass of mineral materials and is a product of natural processes. These processes are the disintegration of rocks and corals under the influence of weathering and abrasion. When sand is freshly formed the particles are usually angular and sharply pointed but they grow gradually smaller and more rounded as they become constantly worn down by the wind or water. Clean sand is indeed a rare commodity on land, but common in sand dunes and beaches.

The composition of sand is highly variable, depending on the local rock sources and conditions, but the most common constituent of sand in inland continental settings and non-tropical coastal settings is silica (silicon dioxide or SiO_2), usually in the form of quartz which because of its chemical inertness and considerable hardness, is the most common mineral resistant to weathering.

Alluvium: Alluvial deposits sometimes underlain by the sand bed with some clayey matter.

e. Reserve:

The reserve has been estimated by considering the following parameters.

- i) Surface area method has been adopted for estimation of reserve of sand in Cu.m.
- ii) The reserve has been calculated under proved category only
- iii) Recovery factor is established as per the actual field practice as follows.



Table.No.2
CATEGORY WISE MINEABLE RESERVE OF SAND BED

Category	Potential Surface area excluding safety zone in Sq.mt	Thickness of sand in m	Replenishment factor (100%)	Mineable reserve of Sand in cum	Extractable mineable reserve
A	B	C	D	E= BxCxD	F= Ex0.6
Probable	29560	2	1	59120	35472
Total					35472

10. Mining :

- a. Whether manual or semi-mechanized or mechanized : The mining will be done by manual method.

Most of the methodologies and guidelines undertaken for hard rock quarries are not applicable to river bed mining. However, the major differences include higher incidence of landuse changes and relatively shallow depths of workings, which cause more environmental imbalances for riverbed mining. The most applicable practices of sand/gravel mining are given below :

- 1. Dry pit mining:** Pits excavated on dry ephemeral stream beds and exposed channel/ point bars, with conventional bulldozers, scrapers and loaders.
- 2. Wet pit mining:** This involves the use of a dragline or hydraulic excavator to remove sand or gravel from below the water table or in a perennial stream channel generally during lease period. In wet pits dewatering or partial dewatering is frequently undertaken to allow the site to be more easily excavated. The decision to dewater or not will depend on the deposit thickness, permeability of the sand and gravel, the use of ground water aquifer and the intended after-use and restoration requirements.
- 3. Bar skimming or scraping :** Scraping of top portion of the bar deposits are generally undertaken for sustainable mining of sand/gravel grade material.

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4. **Pits on the adjacent floodplain or river terrace:** In this case dry or wet pitting/ mining are involved depending upon geomorphology of the area. Dry pits are located above the water table and wet pits are developed below the groundwater table, depending on the elevation of the floodplain or terrace relative to baseflow water elevation of the channel .

5. **Existing Mining Method:**

The mining operation at Kurunti Sand bed has been started earlier and as a result of which pits have been developed. The mode of the deposits, geomorphology of the area and its hydrological condition are some of the factors that favours the open cast method of mining. In this deposit, the mining is done by manual dry-pit mining method The sands are extracted, loaded and transferred from pits to the users through trucks. The mining is done on single shift basis. The local man power has been engaged in the mine.

b. If semi-mechanized or mechanized, number, type and capacity of machines to be used:

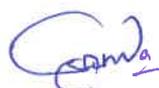
In this deposit ,the mining will be done by manual opencast dry pit mining method.

No machineries shall be used as it is a river bed mining project except tippers/tractors for the haulage /transportation of sand from the lease area to the consumer.

The number, type and capacity of machines to be used are described in the table below;

Table- 3 (Machineries to be used)

Type of Machines	Capacity	No. of Machines
Tipper/Tractor	6Cu.m./3 Cu.m.	4 tippers/12tractors
Safety equipment such as Helmets, Safety Shoes, Goggles & Hand Gloves	---	As required


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c. Whether drilling and blasting will be made use of, If yes, state monthly quantity of explosive consumed : No

d. Benching pattern (Height x Width) :
Benching pattern is not feasible in case of sand mining. The maximum depth of mining will be of 2m or up to water table whichever is less.

e. Face lay out (attach development plan):

During Plan period the following geoscientific considerations have been suggested to be taken into account for sand/ gravel mining:-

1. Abandoned stream channels on terrace and inactive floodplains has been preferred rather than active channels and their deltas and floodplains. Replenishment of ground water has to be ensured if excessive pumping out of water is required during mining.
2. Stream will not be diverted to form inactive channel,
3. Mining below subterranean water level will be avoided as a safeguard against environmental contamination and over exploitation of resources,
4. Scraping of sediment bars above the water flow level in the lean period have been preferred for sustainable mining,
5. Mining of sand from the riverbed has been restricted to a maximum depth of 3m from the surface. For surface mining operations beyond this depth of 3m, it is imperative to adopt quarrying in a systematic bench- like disposition, which is generalry not feasible in riverbed mining. Hence, for safety and sustainability restriction of mining of riverbed material to maximum depth of 3m. has been recommended,

f. Quarry Floor Level (RL) at the end of the year or period of the concession:

During plan period one pit will be developed. The average production for these years will be around 35472 cu.m. The quarry floor will be 50 mRL. The proposed pit lay out have been shown in the development plan and also in environment management plan (ref Plate V & Plate – VI).

g. Quantity of mineral to be won (Annual Level of Production) :

Based on the present market demand, the year wise production schedule for ensuring five years has been formulated at a steady and uniform rate of 35472



cu.m/annum for sand. As the sand sized particles will be produced, the production has been calculated and represented in cubic meter irrespective of the tonnage factor, to facilitate to get the correct quantity of sand. Based on the past experience, the geo-mining parameters taken in to consideration for mine planning are as follows:

Geo-Mining parameters	Quantitative Description
Sand recovery factor	100%
Bench height	Benching pattern is not feasible in case of sand mining. The maximum depth of mining is 2m
Sand to waste/rejects	Nil

On the basis of the above data, year wise production of sand is estimated as per the following formula: $M = CLI$

Where,

M = Quantity of sand in cu.m.

C = Surface area in square meters.

L = Depth of sand in meters.

I = Recovery factor of sand deposits

The year wise production of sand during plan period are given in table no.4 as follows:

**Table No.4
YEAR WISE PRODUCTION OF SAND DURING PLAN PERIOD**

Year	Production of sand in cu.m /Annum
1 st year	35472
2 nd Year	35472
3 rd Year	35472
4 th year	35472
5 th year	35472
Total	177360

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The average production /excavation sand is 35472 Cu.m/ annum. If the reserve of sand is not sufficient and to meet the production quantity, the lessee may modify the plan within the lease period after seeking permission from the competent authority just after the monsoon of substantial year.

- h. Quantity of overburden to be removed
(Show location of such disposal in development plan) : Nil
Whether heavy blasting to be adopted: No blasting will be required.
If yes, location of nearest habitation
(to be shown in the surface plan)
- i. Safety precautions to be adopted : No safety measures are to be taken as there will no blasting operations
- j. Brief description on the method of Procurement and storage of Explosives : Explosives are not used.

11. Waste disposal:

- a. Location (show in development Plan) : No proposed dump has been suggested in the quarry as there will no significant quantity of waste.
- b. Area covered : There will be no provision for dumping within the quarry or river.
- c. Environmental safeguards for such disposal : River sand will be automatically reclaimed during flood or rainy season.

12. Mine drainage :

(Give details of total make of water during dry and rainy season and its method of handling) The surface run-off and drainage of the river will not be disturbed. Shallow depth excavation towards the river has been proposed which will have negligible or no impact on the mining process. Abandoned stream channels on terrace and inactive flood plains has been preferred rather than active channels and their deltas and floodplains. Replenishment of ground water has to be ensured if excessive pumping out of water is required during mining. Stream will not be diverted to form inactive channel. Mining below subterranean water level will be avoided as a safeguard against environmental contamination and over exploitation of resources, Segments of braided river system has been used preferably falling within the lateral migration area of the river regime that enhances the feasibility of



sediment replenishment. Mining at the concave side of the river channel have been avoided to prevent bank erosion.

It is observed from the dug well in the adjacent plain area and in village, the ground water table varies between 4m to 8 m from the surface level depending upon seasonal variations. During dry season the water table falls to 10m from the surface where as during rainy season the water table remains at 4m from the surface. As the mining activities presently proposed are maximum up to 2m so there will be no effect on ground water table.

13. Mineral Processing

(Give details of processing including sizing, Sorting, generation of rejects/fines etc) : Mineral processing in case of Riverbed mining of the sandy, gravelly material may consist of simple washing to remove clay and silty area. It may involve crushing, grinding and separation of valueless rock fragments from the desirable material. The Kurunti sand bed also do not contain valuable heavy minerals or any trace elements for which any separation of such mineral is required. The sand excavated from the Kurunti sand bed would not require such processing. The sand will be supplied directly to the user as per the demand of construction materials.

14. (a) No. of trees to be uprooted due to mining operation : Nil

(b) Programme of Plantation : Nil

15. Manpower : All total 49 persons will be employed in this quarry.

a. Supervisory: (inclusive of statutory personnel's) : One number of supervisory personnel will be employed. The details are given as follows

Table.No.4

Management (Supervising personnel):

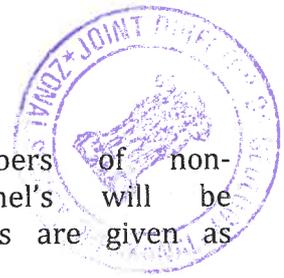
Designation	Qualification	Nos.
Supervisor	As per DGMS norm	1
Total		1

b. Non-Supervisory (skilled, semi-skilled

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& unskilled)

: Around 48 numbers of non-supervisory personnel's will be employed. The details are given as follows:



(ii) LABOURERS(Skilled/Semi-Skilled/Un-Skilled)

Category	Post	Nos.	Total
Skilled	Loading supervisor	2	2
Semi-Skilled	Assistant Loading supervisor	2	2
Unskilled	Labourers	44	44
Total	---	48	48

c. OMS

Total production during plan period : 177360 cum

Average production of sand /annum : 35472 cum

Working days in the year : 210 days (in an average)

Production per day : $35472 / 210 = 168.91$ or say 169Cu.m

Output per man shift (O.M.S.) :

O.M.S can be calculated by Production per day divided by manpower.

O.M.S = $169\text{Cu.m} / 56 \text{ No.} = 2.96 \text{ cum}$

16. Use of Mineral :

(Specification and monthly quantity to be dispatched be furnished)

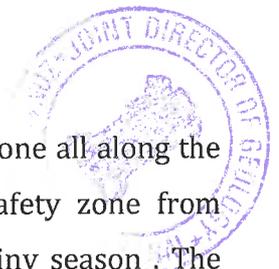
a. For domestic use :

For construction purpose the sand of Kurunti will be used. Around 5010 cu.m of sand on monthly basis will be sold in domestic market.

b. For export : No material will be exported at present

17. Mine Closure Plan:

(a) Describe the process/activities to be Undertaken for reclamation and Rehabilitation in respect of the following



i. Mined out land:

During plan period the mined out land will be 2.956 ha. The safety zone all along the quarry lease area will be maintained as 7.5 meter width and safety zone from powerline. The area will reclaimed naturally every year during rainy season. The river will carry sand and sediments which will be eventually filled in the pits. No further reclamation proposal is required.

The existing land use as well as proposed land use of the area is given in table no.5 as below

Table.No.5

Sl. No.	Type of Land Use	Area in Hectares	
		At Present (Existing)	At the end of Plan Period
1	Area under excavation	---	2.956
2	Safety zone.	0.636	1.900
3	Unutilised area	1.900	---
	Total	4.856	4.856

ii Waste/reject dump:

There will be no proposed dump during the plan period so no reclamation and rehabilitation measures have been suggested.

iii. Topsoil stack and its utilization

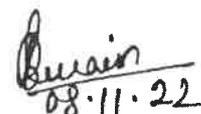
There will be no generation of top soil in this quarry since the mining will be carried out in river bed sand.

(b) Financial assurance:

(To be furnished as a bank guarantee in respect of the area to be put to use at the rate of Rs. per hectare) : The financial assurance will be submitted by the successful bidder as decided by the competent authority.

18. Certificate:

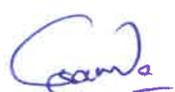
I/We the holder of Kurunti Sand for River Sand over 4.856 hec. of Kurunti village, under Odapada Tahasil of Dhenkanal District hereby solemnly affirm that the plans and programmes in this mining plan will be scrupulously implemented by me/us and I/we will be strictly held responsible for any deviation thereof. I/we also hereby certify that the provisions of Mines and Minerals (Development & Regulation) act, 1957 and the minesact 1952 and Rules and regulations made under these acts, along with the provisions of Orissa Minor Mineral Concession Rules, 2016 will be strictly adhered to while implementing this mining plan and wherever specific permissions will be required I/We will approach the concerned authorities of the State Government as the case may be.


08.11.22

(Signature of the Concessionaire)

Tahasildar, Odapada

(On behalf of successful highest bidder)


S. K. Panda
RQP/OD/059/2016

OFFICE OF THE TAHASILDAR, ODAPADA

Letter No. 5775 /Dt. 7.11.2022



To

Sri Santosh Kumar Panda,
At-Barimundei,
P.O.-Badaninigaon,
Dist-Puri, Pin-752121,
(Registered qualified person),
Regd. No. RQP/OD/059/2016

Sub: - Preparation of mining plan for the source Kurunti Brahmani Saand Quarry.

Sir,

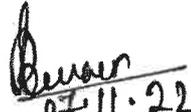
With reference to the subject cited above I am to say that the additional charge and MGQ for the source has been fixed by the Dist level committee for the source Kurunti Brahmani Sand Quarry. Hence you are requested to prepare the mining plan for the source in order to put the source into tender process

LAND SCHEDULE

Mouza	Khata No.	Plot No.	Area (in acre)	Kissam	Annual MGQ (As proposed by committee)
Kuruti	571	1	12.00	Nadi	35,000 CuM
Total		1 Plot	12.00		

This is for favour of your information and necessary action.

Yours faithfully


07.11.22
Tahasildar, Odapada





GOVERNMENT OF ODISHA
DEPARTMENT OF STEEL AND MINES
DIRECTORATE OF MINES



CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON

(Under sub-rule (2) of rule 20 of Odisha Minor Mineral Concession Rules, 2004)

Sri Santosh Kumar Panda, S/o Sri Bauribandhu Panda, R/o Barimunde, P.O: Badaninigaon, P.S. Balanga, Dist: Puri - 752121, whose photograph and signature are affixed herein, having given satisfactory evidence of his qualification and experience, is hereby **recognised** under sub-rule (2) of rule 20 of Odisha Minor Mineral Concession Rules, 2004 as a **qualified person** to prepare Mining Plans for Minor Minerals within the State of Odisha, India.



Santosh Kumar Panda

His Registration No. is

RQP/OD/059/2016

This Recognition is valid for a period of 10 years ending on 02.08.2026.
This certificate will be liable to be withdrawn/ cancelled in the event of furnishing wrong information/ documents in the Mining Plans to be submitted by him.

Place: Bhubaneswar

Date: 03.08.2016

[Signature]
DIRECTOR OF MINES, ODISHA

BHUBANESWAR



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Zonal Survey, Dhenkanal

CONVENTIONAL SYMBOLS	
Express highway: with toll; with bridge; with distance stone	
Roads metalled: according to importance	
Roads double carriageway: according to importance	
Unmetalled road. Cart-track. Pack-track and pass. Foot-path	
Streams: with track in bed; undefined. Canal	
Dams: masonry or rock-filled; earthwork. Weir	
River: dry with water channel; with island & rocks. Tidal river	
Submerged rocks. Shoal. Swamp. Reeds	
Wells: lined; unlined. Tube-well. Spring. Tanks: permanent; dry	
Embankments: road or rail; tank. Broken ground	
Railways, broad gauge: double; single with station; under constn.	
Railways, other gauges: double; single with distance stone; do	
Mineral line or tramway. Kin. Cutting with tunnel	
Contours with sub-features. Rocky slopes. Cliffs	
Sand features: (1)flat. (2)sand-hills (permanent). (3)dunes/shifting.	
Towns or Villages: inhabited; deserted. Fort	
Huts: permanent; temporary. Tower. Antiquities	
Temple. Chhatra. Church. Mosque. Idgah. Tomb. Graves	
Lighthouse. Lightship. Buoy: lighted; unlighted. Anchorage	
Mine. Vine on trails. Grass. Scrub	
Palms: palmyra; other. Plantain. Conifer. Bamboo. Other trees	
Areas: cultivated; wooded. Surveyed tree	
Boundary, international	
state: demarcated; undemarcated	
district: subdivision, tahsil or taluk; forest	
Boundary pillars: surveyed; unlocated	
Heights triangulated: station; point; approximate	
Bench-mark: geodetic; tertiary; canal	
Post office. Telegraph office. Overhead tank	
Rest house or inspection bungalow. Circuit house. Police station	
Camping ground. Forest: reserved; protected	
Spaced names: administrative; locality or tribal	
Hospital. Dispensary. Veterinary Hospital / Dispensary	
Aerodrome. Helipad. Tourist site	
Power line: with pylons surveyed; with poles unsurveyed	

- Q.L. BOUNDARY
- 5 KM RADIUS

R.F. TOPOSHEET NO- F45T5

PLATE - I

LOCATION PLAN

R.F.-1:50,000

KURUNTI BRAHMANI SAND QUARRY
OVER AN AREA OF 12.00ACRES UNDER ODAPADA
TAHASIL OF DHENKANAL DISTRICT, ODISHA.

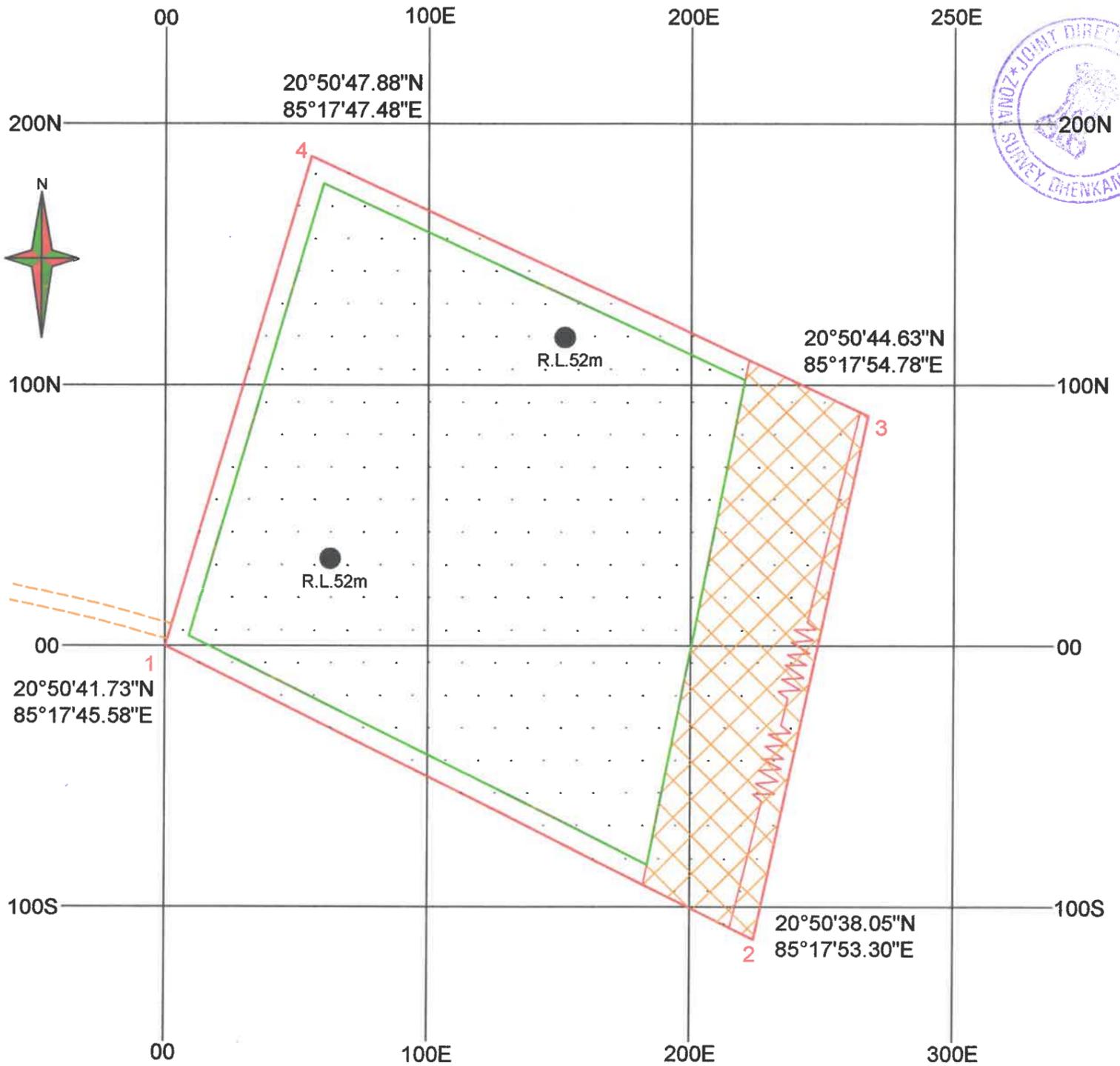
TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

Certified that the plate is up-to-date & correct.

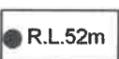
S.K. Panda

S.K. PANDA

Regn. No. RQP / OD / 059 / 2016



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-  Q.L BOUNDARY
-  SAFETY ZONE
-  SPOT RL
-  RESTRICTED AREA
-  EXISTING ROAD
-  RIVER SAND

APPROVED

[Signature]
18/11/2016

Joint Director Geology
Zonal Survey, Dhenkanal

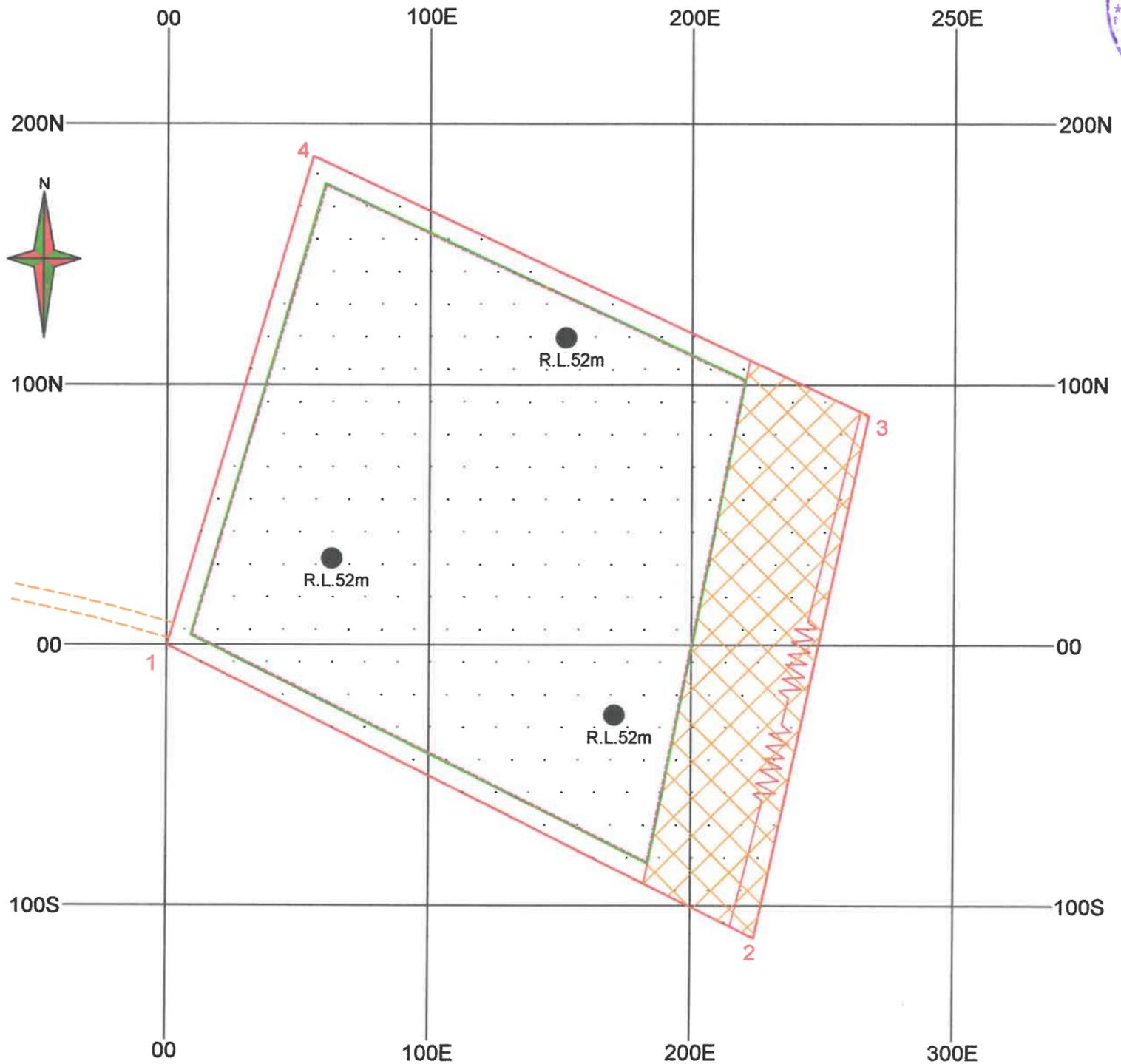
PLATE - III

SURFACE PLAN
R.F.-1:2000

KURUNTI BRAHMANI SAND QUARRY
OVER AN AREA OF 12.00ACRES UNDER ODAPADA
TAHASIL OF DHENKANAL DISTRICT, ODISHA.

TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

[Signature]
S.K. PANDA
RQP/OD/059/2016



APPROVED

[Signature]
18/11/2016
Joint Director Geology
Zonal Survey, Dhenkanal

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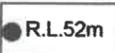
-  Q.L BOUNDARY
-  SAFETY ZONE
-  SPOT RL
-  RESTRICTED AREA
-  EXISTING ROAD
-  RIVER SAND
-  ULTIMATE PIT LIMIT

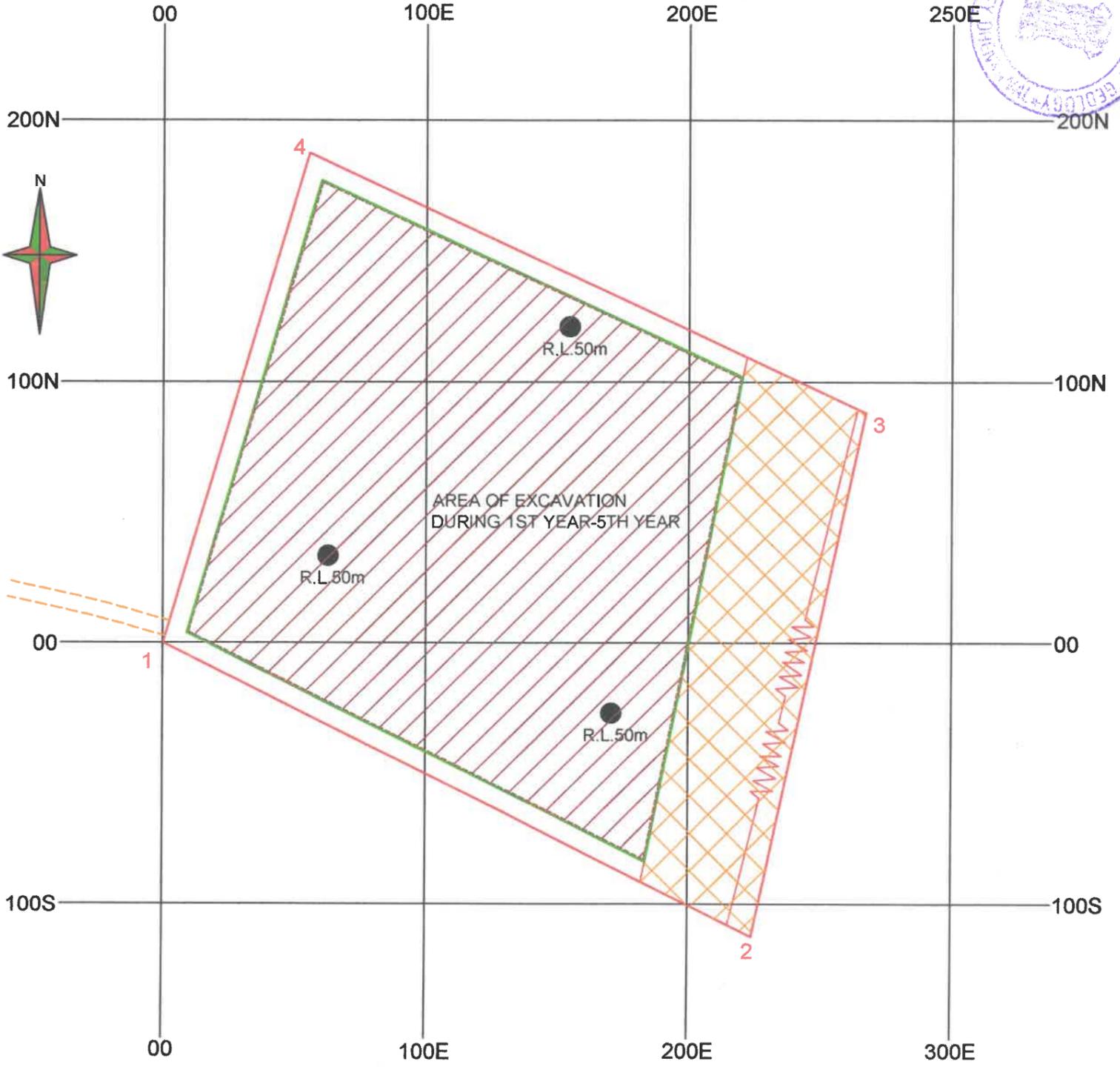
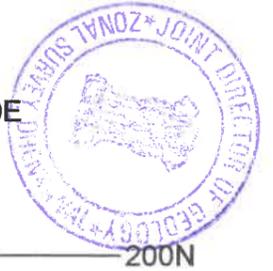
PLATE - IV

GEOLOGICAL PLAN
R.F.-1:2000

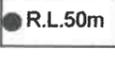
KURUNTI BRAHMANI SAND QUARRY
OVER AN AREA OF 12.00ACRES UNDER ODAPADA
TAHASIL OF DHENKANAL DISTRICT, ODISHA.

TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

[Signature]
S.K. PANDA
RQP/OD/059/2016



INDEX

-  Q.L BOUNDARY
-  SAFETY ZONE
-  SPOT RL
-  RESTRICTED AREA
-  EXISTING ROAD

YEARWISE DEVELOPMENT

YEAR	DEVELOPMENT
1st yr to 5th yr	

APPROVED

A. S. Sharma
18/11/2022

Joint Director Geology
Zonal Survey, Dhenkanal

PLATE - V

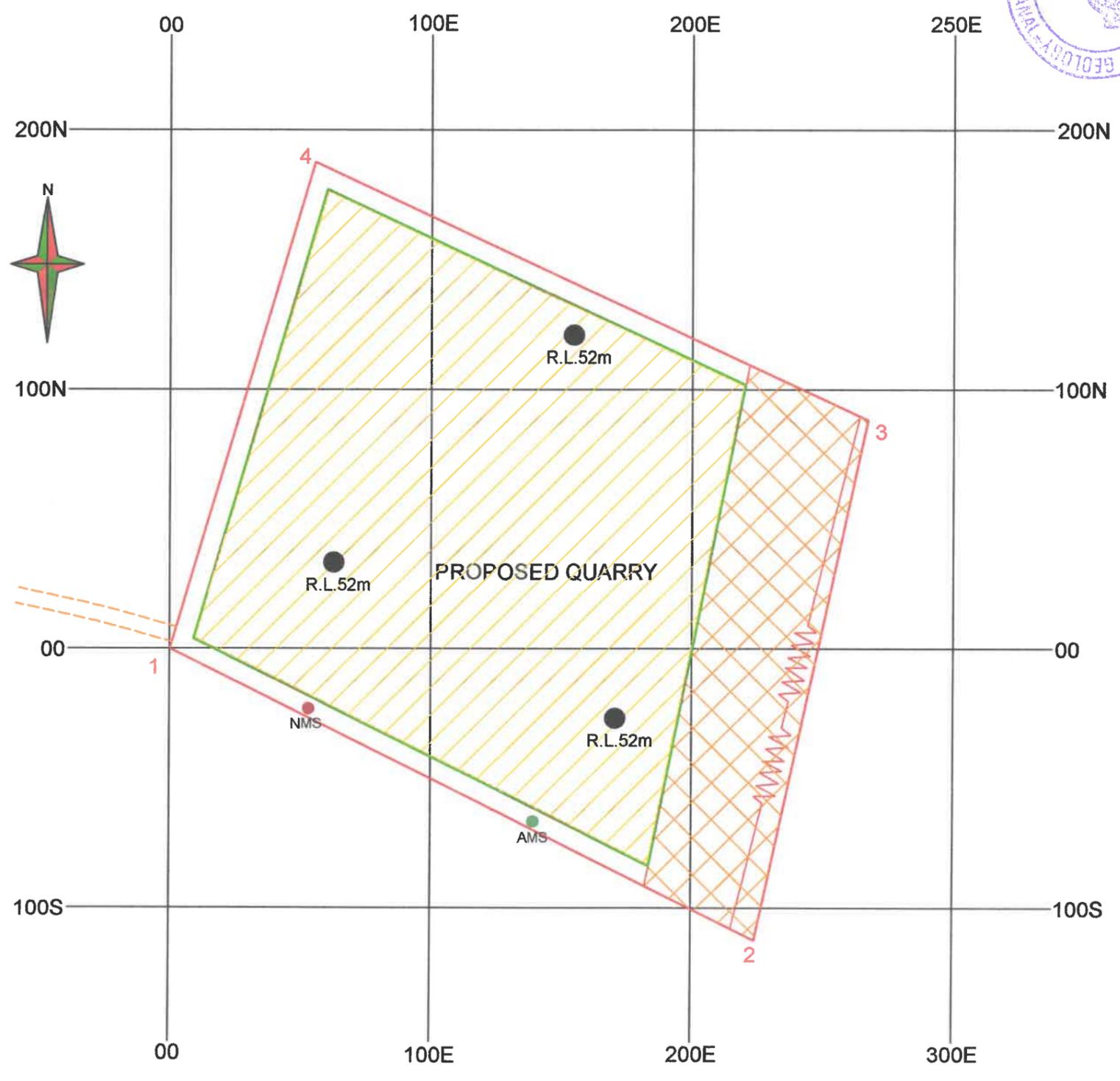
DEVELOPMENT PLAN
R.F.-1:2000

KURUNTI BRAHMANI SAND QUARRY
OVER AN AREA OF 12.00ACRES UNDER ODAPADA
TAHASIL OF DHENKANAL DISTRICT, ODISHA.

TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

S.K. Panda

S.K. PANDA
RQP/OD/059/2016



APPROVED

[Signature]
18/11/2022

Joint Director Geology
Zonal Survey, Dhenkanal

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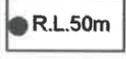
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-  SAFETY ZONE
-  SPOT RL
-  RESTRICTED AREA
-  EXISTING ROAD
-  PROPOSED QUARRY

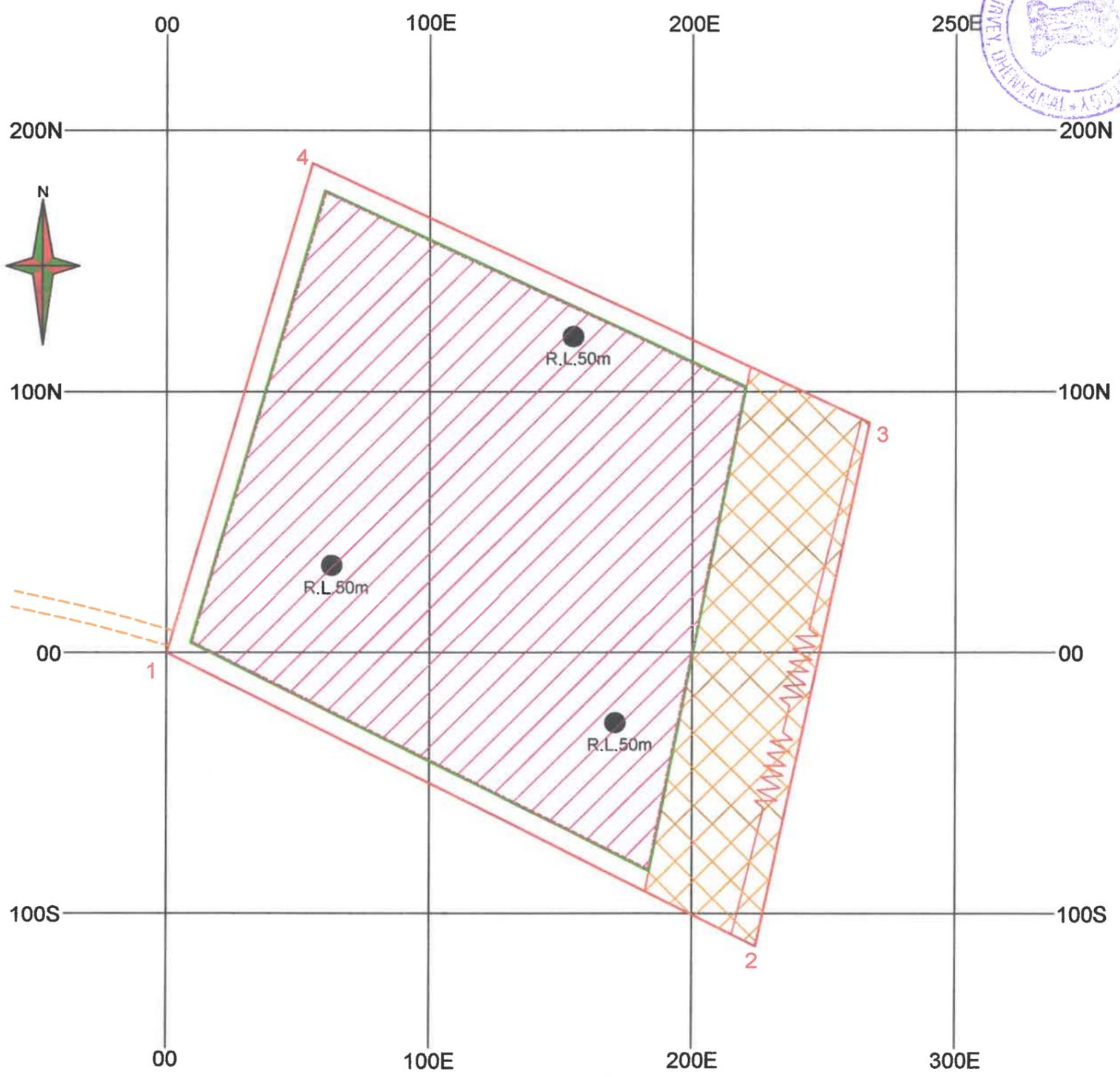
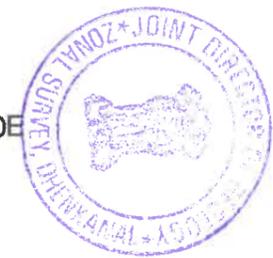
PLATE - VI

ENVIRONMENT MANAGEMENT PLAN
R.F.-1:2000

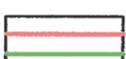
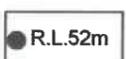
KURUNTI BRAHMANI SAND QUARRY
OVER AN AREA OF 12.00ACRES UNDER ODAPADA
TAHASIL OF DHENKANAL DISTRICT, ODISHA.

TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

[Signature]
S.K. PANDA
RQP/OD/059/2016



INDEX

-  Q.L BOUNDARY
-  SAFETY ZONE
-  SPOT RL
-  RESTRICTED AREA
-  EXISTING ROAD
-  PLAN PERIOD LIMIT
-  CONCEPTUAL LIMIT

APPROVED

[Signature]
18/11/2022
Joint Director Geology
Zonal Survey, Dhenkanal

PLATE - VII

PROGRESSIVE MINE CLOSURE PLAN
R.F.-1:2000

KURUNTI BRAHMANI SAND QUARRY
OVER AN AREA OF 12.00ACRES UNDER ODAPADA
TAHASIL OF DHENKANAL DISTRICT, ODISHA.

TAHASILDAR ODAPADA
(ON BEHALF OF SUCCESSFUL BIDDER)

[Signature]
S.K. PANDA
RQP/OD/059/2016

Annexure 3: Tehsildar checklist

MODIFIED CHECK LIST FOR MINOR MINERAL MINING PROJECT

1.	Online date of application & File No.	:	
2.	Scrutiny fees challan details	:	Not Applicable
3.	Name & address of the Applicant (with postal pin code, mobile / landline no., Email ID.)	:	Tahasildar, Odapada (On Behalf of Successful Bidder) At/Po/Ps- Odapada Dist-Dhenkanal, Odisha, Pin-759019 Phone No- 06732-256555 E-Mail Id - tah.odapada-od@nic.in
4.	Category of Project(B1/B2)	:	B1
5.	Type of proposal (New / Existing / Expansion/ Extension / Amendment)	:	New
6.	Name of the Minor Mineral projects	:	River sand
7.	Whether the present proposal is shown as an identified source of the particular minor mineral in the approved DSR report of the District (Yes / No.) If yes, the page no. / para no / map location in DSR report.	:	Yes SL No- 23 & 31 of Page No- 31 & 32
8.	Lease period, letter of lease and lease execution documents granted by the concerned authority.	:	5 Years & Letter No-3611 Date-11.07.2022
9.	Area of the lease (ha)	:	8.7 Ha (Total Cluster Area)
	a) Forest Land (ha.) i) If Forest land; status of forest clearance	:	No Forest land involved.
	b) Non-forest / Govt. land (ha.)	:	8.7 Ha (Total Cluster Area)
	c) Non-forest Private land (ha.)	:	Not Applicable
10.	For Minor Mineral other than Sand (i.e. Stone / Murrum / Laterite / Decorative Stone / Brick Earth etc.), the concerned DFO to verify the DLC report of the District, and inform, if the proposed lease area plots are listed therein as forest land. Whether the said Certificate from DFO is attached (Yes / No)	:	Not Applicable
11.	For Brick Earth Minor Mineral cases on Agricultural land Please specify following:	:	Not Applicable
	(i) Upland / medium land / low land	:	Not Applicable
	(ii) Rain fed / irrigated	:	Not Applicable
	(iii) Cropping pattern involved	:	Not Applicable
	(iv) Distance of site from nearest Thermal Power Plant	:	Not Applicable
12.	Whether any vegetation exists in the lease area? If so, specify the type and quantity (number/area)	:	No Vegetation exists in the lease area.

13.	Location of mine (Detailed land schedule, etc.) with landmark.	:	Kusupanga & Kurunti Brahmani Sand Quarry (Cluster)						
	i) District	:	Dhenkanal						
	ii) Tahasil	:	Odapada						
	iii) Name of the River, incase of Sand Bed	:	Bramhani River						
	iv) Village /Mouza	:	Kusupanga & Kurunti						
	v) Khata No.	:	335 & 571						
	vi) Plot No. vii) Kisam (Classification)	:	Sl. No.	Mouza	Khata No.	Plot No.	Area (in ha)	Kisam	
	7858		1	Kusupanga	335	1	3.884	Nadi	
			2	Kurunti	571	1	4.856	Nadi	
			Total Area				8.7		
	viii) Co-ordinates of the site (Latitude and Longitude)	:	Kusupanga Brahmani Sand Quarry Latitude: N20°50'47.31" to N20°50'57.37" Longitude :E85°17 '36.95" to E85°17'46.68" Kurunti Brahmani Sand Quarry Latitude: N20°50'38.05" to N20°50'47.88" Longitude :E85°17 '45.58" to E85°17'54.78"						
14.	Longitude and Latitude of nearest mine with boundary to boundary distance.	:	Nearest Mine- Mangalpur Bramhani Sand Quarry is at a distance of 0.7 Km from the lease area . Latitude: N20°51'03.3"to N20°51'12.7" Longitude : E85°17 '07.7" to E85°17'16.3"						
15.	Whether mine area shown clearly in topo map and village sheet (in colour marking)(Yes / No.)	:	Yes, Mines area is clearly marked in Village sheet & Toposheet.						
16.	Environmental Sensitivity (should be mentioned clearly in Kilometers)								
Sl. No.	Area		Distance in Kilometer from the boundary of the lease area with Geo-coordinate i.e. longitude and latitude						
i.	Distance from the following infrastructural facilities								
	Nearest Railway line (with name)	:	Budhapanka Railway Station-4.5Km Latitude- N20°51' 09.64" Longitude- E86°15' 21.68"						
	Nearest National Highway (with name)	:	NH- 55 is 3.5 km away from lease area (Cuttack -Sambalpur Road) Latitude- N20°49'03.65" Longitude- E85°16'53.49"						
	Nearest State Highway (with name)	:	SH-63 is about 19 Km from lease area (Reamala - Maidharpur road) Latitude- N20°46' 30.46" Longitude- E85°07' 55.76"						
	Nearest Major District Road (with name)	:	District Major road-3.5 Km (Cuttack - Sambalpur road) Latitude- N20°49' 04.51" Longitude- E85°16' 51.00"						

Nearest Any Other Road (with name)	:	Village Road - 0.6 km (Kusupanga Village) Latitude- N20°50' 43.17" Longitude- E85°17' 25.87"
Nearest Railway bridge / road bridge	:	Lingara Bridge-6.0 Km Latitude- N20°47' 38.92" Longitude- E85°18' 55.89" Kamalanga Railway Bridge 4.0Km Latitude- N20°53' 03.88" Longitude- E85°17' 10.21"
Nearest Electric transmission line pole or tower	:	Nearest Electric transmission line pole is 1.0 Km from the lease area at Kusupanga Village Latitude- N20°50' 37.76" Longitude-E85°17' 18.64"
Nearest Canal or check dam or reservoirs or lake or ponds	:	Canal -3.0 Km Latitude- N20°50' 07.77" Longitude-E85°16' 09.49"
Nearest in-take point with name for drinking water / industrial use	:	In-take Point- 2.6 km Latitude- N20°51' 02.73" Longitude-E85°16' 17.35"
Nearest intake for irrigation	:	Canal for Irrigation-3.0 Km Latitude- N20°50' 07.77" Longitude-E85°16' 09.49"
Nearest River Embankment	:	Nearest River Embankment – 4.0 Km Latitude- N20°53' 00.03" Longitude-E85°17' 07.92"
Nearest point of intersection of the road used for transporting the minerals from the lease area with the NH/SH/Major district road/any other road.	:	Nearest point of intersection of the road is NH-55 is about 3.5 Km from lease area. Latitude- N20°49'03.65" Longitude- E85°16'53.49"
Distance of the haulage road(If to be constructed separately) from the embankment. If so, length and width of the haulage road and meeting point of haulage road with any other main road and also distance between the village road and the haulage road.	:	Not Applicable
Villages and name of those villages and their roads that will be used for transportation of minerals.	:	Village Road - 0.6 km (Kusupanga Village) Latitude- N20°50' 43.17" Longitude- E85°17' 25.87"
Number and type of vehicle to be engaged for the purpose of transportation and their frequency of plying.	:	Tippers- 8Nos. Tractors-24 Nos
Time and duration during which the loaded and empty vehicles for minerals will be used. Total distances of such village(s) road.	:	8 hours per day for loading & transport Mine site to village road (Kusupanga Village) - 0.6 Km. Latitude- N20°50' 43.17" Longitude- E85°17' 25.87"
ii. Nearest Sanctuary / National Park/Eco-Sensitive Zone / Elephant Corridor/ Conservation Reserve and its distance from boundary of lease. (along with name of the Sanctuary / National Park) etc.	:	Tikarpada Wildlife Sanctuary Of Odisha- 45Km Latitude- N20°41' 07.37" Longitude- E84°54' 00.57".

iii.	Nearest reserve forest (with name) with distance.	:	Khalpal Reserve Forest- 11.5 Km. Latitude- N20°56' 46.80" Longitude- E85°16' 01.80"		
iv.	Nearest Archaeological site (along with the name of the Archaeological Site) with distance.	:	Lokanath Temple - 1.0 Km Latitude- N20°50' 15.62" Longitude- E85°18' 08.81"		
v.	Nearest State boundaries with distance.	:	Nearest State boundary (Odisha-Chhattisgarh) 205 Km from lease area Latitude- N21°20' 59.48" Longitude- E83°24' 02.24"		
vi.	Nearest Defense installations with distance.	:	OSAP 6th Bn,Cuttack-76.5 Km Latitude- N20°27' 39.13" Longitude- E85°57' 20.22"		
vii.	Nearest Densely populated / built-up area / human habitation with distance from boundary of lease. (Name of the nearest habitation)	:	KusupangaVillage 1.0 Km Latitude- N20°50' 37.54" Longitude- E85°17' 18.87"		
viii.	High tide line of sea and river, Nala, canal, estuaries as per CRZ act on upstream and its distance from boundary of lease.	:	Bay of Bengal -132 Km Latitude- N19°44' 58.84" Longitude- E85°46' 25.00"		
ix.	Nearest areas occupied by sensitive man-made land uses with distance. (hospitals, educational institutions, places of worship, community facilities, viz bus stoppage, park etc)	:	Meramandali Government Hospital -5 Km Latitude- N20°48' 09.49" Longitude- E85°18' 38.55" Govt. High School, Kusupanga - 0.5 Km Latitude- N20°50' 46.81" Longitude- E85°17' 29.40" Lokanath Temple - 1.0 Km Latitude- N20°50' 15.62" Longitude- E85°18' 08.81" Meramandali Bus Stop -7.5 Km Latitude- N20°47' 12.45" Longitude- E85°20' 02.44"		
17.	Details of other mine(s) located within 500 meter from the periphery of the lease area				
Sl. No.	Name and address of the mine	Name of mineral	Lease area	EC status	
(i)	No other mines are located within 500 mtrs radius from the periphery of the proposed cluster mine lease area.	Not Applicable	Not Applicable	Not Applicable	
18.	Certificate of the Tahasildar that there is no other minor mineral lease or proposed lease area located within 500 m from the periphery of the proposed mine lease area as per approved DSR report in the area. Whether Certificate from Tahasildar attached (Yes/No).	:	Yes Attached		

19. Other Proposals of the Same Lessee/proponent submitted for EC				
Sl. No.	Name and address of the mine	Name of mineral	Lease area	EC status
(i)	No Other Proposals of the Same Lessee/proponent submitted for EC.	Not Applicable	Not Applicable	Not Applicable
20.	Whether the mining plan is approved? (Yes/No) If so, period of plan and name of the competent approving authority	:	Yes, Approved by O/o Joint Director of Geology, Zonal Survey , Dhenkanal	
21.	Mining method (Manual/Semi mechanized/Mechanized)	:	Manual	
22.	Whether drilling and blasting is required(Yes / No.) If yes, explosive storage license status:	:	Not Applicable	
23.	If any other minor mineral rich or proposed lease area is located within 500 mtrs from the periphery of the proposed mine lease area exist, the corresponding names with exact distances along with Geo-coordinates i.e. longitude and latitude is be indicated	:	No other mines are located within 500 mtrs radius from the periphery of the proposed cluster mine lease area.	
24.	Plan for year wise plantation with species at the river embankment and along side of haulage road/village road for sand mining be indicated.	:	100 nos plantation will be done each year along river Embankment.	
25.	Top and Bottom R.L. of the Sand quarry	:	Top RL-52 mRL Bottom RL-51 mRL (After end of Plan period)	
26.	Whether any no complaint or court case exists against the lease (Yes / No)	:	No court case against the lease.	
27.	Whether any EC granted earlier by SEIAA / DEIAA (Yes / No)	:	Yes, Previous EC Letter is Attached.	

Counter signed and recommended for
Environmental Clearance

Certified that the information
furnished above are true to the best of
my Knowledge

Bhuvan
04.03.23

Signature with seal of Tahasildar

TAHASILDAR
ODAPADA

Bhuvan
04.03.23

Signature of Applicant

TAHASILDAR
ODAPADA

Mining Officer (For Specified Minor Mineral)

Encl: The following documents are mandatory to submit along with filled-in checklist to receipt the proposal for consideration of Environmental Clearance:

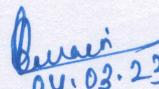
		Put mark	tick
1.	Form-I duly filled.	✓	
2.	Pre-feasibility Report (PFR) properly binding.		
3.	Environment Management Plan (EMP) properly binding.		
4.	Approved District Survey Report for minor mineral as per the amended Notification S.O. No. 3977(E) dated 14.08.2018 issued by MoEF&CC, Govt. of India.		
5.	Certificate from the concerned DFO/ Tahasildar about involvement of DLC land in the lease area, whether it is forest or non-forest land (incase minor mineral other than sand).		
6.	Certificate from Tahasildar that there is no other mines located within 500m from the periphery of the proposed mine lease area as per DSR report in the area.		
7.	Certificate from Tahasildar indicating distance of boundary of mining lease from River Bridge, Railway Bridge, river embankment and Electric High Transmission Line (in case of sand mining).		
8.	Location map / Trace map from Tahasildar of all leases (existing & operating) around 1 km area of the project site.		
9.	Full scape toposheet (1:50,000 scale) showing all features and depicting lease site (colour marking).		
10.	Full scape village sheet showing location of the project and other mines within 500 meter (colour marking).		
11.	Full scape Toposheet showing areas within 10 Km radius from the lease area including Sanctuary/National Park, if Any (colour marking).		
12.	Lease permission /sanction order of Competent Authority (Tahasildar /any other).		
13.	Scrutiny fee payment details		
14.	Approved mining plan along with approval letter.		
15.	Category of land and conversion document, if required		
16.	Copy of Environmental Clearance, if granted by DEIAA/SEIAA earlier and compliance to the Environmental Clearance conditions if granted.		
17.	Distance from the nearest Eco-sensitive Zone in map		
18.	Google map showing the present lease hold area with all sairat source within 500 meter boundary of the lease hold area.		

CERTIFICATE

This is to certify that Two (2) numbers of small quarries of mouza Kusupanga & Kurunti comes in a cluster approach. These sairat sources are not included in DLC land. The detailed Land Schedule about respective quarries are given in the table below:-

LAND SCHEDULE

Sl. No.	Name of Source	Khata No.	Plot No.	Area in Ac.	Kisam
1	Kusupanga Brahmani Sand Quarry	335	1	9.50	Nadi
2	Kurunti Brahmani Sand Quarry	571	1	12.00	Nadi


04.03.23
Tahasildar, Odapada

TAHASILDAR
ODAPADA

Annexure 4: O)
Certificate

Annexure 5: NABET Certificate



Quality Council of India

National Accreditation Board for
Education & Training



Certificate of Accreditation

Green Circle Inc, Vadodara

Green Empire (Anupushpam), Above Axis Bank, Near Yash Complex, Gotri Main Road, Vadodara

The organization is accredited as **Category-A** 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 and underground both	1	1 (a) (i)	A
2	Thermal power plants	4	1 (d)	B
3	Coal washeries	6	2 (a)	A
4	Cement plants	9	3 (b)	A
5	Chemical fertilizers	16	5 (a)	A
6	Synthetic organic chemicals industry	21	5 (f)	A
7	Distilleries	22	5 (g)	B
8	Sugar Industry	25	5 (j)	B
9	Oil & gas transportation pipeline (crude and refinery/ petrochemical products), passing through national parks/ sanctuaries/coral reefs /ecologically sensitive areas including LNG terminal	27	6 (a)	A
10	Industrial estates/ parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes	31	7 (c)	A
11	Building and construction projects	38	8 (a)	B
12	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 April 16 and supplementary minutes Nov 12, 2021 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/21/2146 dated Dec 01, 2021. The accreditation needs to be renewed before the expiry date by Green Circle Inc, Vadodara following due process of assessment.

Sr. Director, NABET
Dated: Dec 01, 2021

Certificate No.
NABET/EIA/2124/RA 0219

Valid up to
Jan 26, 2024



Annexure 6: Baseline Data Report



GREEN CIRCLE, INC.

Integrated HSEQR Consulting Engineers, Scientists & Trainers
(Recognised By Ministry of Environment, Forest and Climate Change, New Delhi Under EPA 1986)
(F. No. - 15018 / 06 / 2016 - CPW)
(ISO 9001, 14001, 45001 & NABL / 17025 Certified Organisation)

Ambient Air Quality Monitoring Locations of Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

Sr. No.	Location	Justification	Distance (KM)	Directions	Coordinates	
AAQ-1	Project Site	-	-	-	20°50'49.80"N	85°17'51.75"E
AAQ-2	Kuspunga	Lateral	0.84	W	20°50'46.11"N	85°17'15.74"E
AAQ-3	Palasahi	Upwind	1.00	N	20°51'18.19"N	85°18'00.40"E
AAQ-4	Parjanga	Cross wind	3.50	E	20°49'58.22"N	85°19'39.44"E
AAQ-5	Matanga	Cross wind	5.50	S	20°48'10.42"N	85° 18'32.74"E
AAQ-6	Janhapada	Upwind	7.25	N	20°54'30.89"N	85°18'12.14"E
AAQ-7	Kusumi	Cross wind	9.37	E	20°50'26.67"N	85°23'13.49"E
AAQ-8	Nalachandrapur	Downwind	8.91	SW	20°48'16.87"N	85°13'04.49"E

Authorized Signatory

CORP. OFFICE & R & D : Green Empire (Anupushpam), Above AXIS Bank, Nr. Yash Complex, Gotri Main Road, Vadodara - 390 021 (Gujarat), INDIA.
Tel.: +91 - 265 - 2371269 Cell: +91 93285 83835 Email: info@greencircleinc.com Website: www.greencircleinc.com

: ALSO AT :
NEW DELHI GOA PUNE BENGALURU U.K. HYDERABAD KOLKATA DHARWAD MUMBAI PORT BLAIR
: OVERSEAS :
AUSTRALIA OMAN KUWAIT AFRICA VIETNAM BANGLADESH MYANMAR SRI LANKA UAE



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(ISO 9001, 14001, 45001 & NABL / 17025 Certified Organisation)

Ambient Air Quality in the Study Area Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

AAQ - 1- Project Site													
Date of Monitoring	Week	PM10($\mu\text{g}/\text{m}^3$)	PM2.5($\mu\text{g}/\text{m}^3$)	SO _x ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	CO(mg/m^3)	NH ₃ ($\mu\text{g}/\text{m}^3$)	Pb($\mu\text{g}/\text{m}^3$)	O ₃ ($\mu\text{g}/\text{m}^3$)	As(ng/m^3)	Ni(ng/m^3)	Benzo-pyrene(ng/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)
01.10.2022	1	76.3	24.9	7.8	13.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
02.10.2022	1	70.8	24.3	7.6	12.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
08.10.2022	2	79.1	23.2	7.3	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
09.10.2022	2	82.6	25.3	7.9	13.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
15.10.2022	3	65.3	23.1	7.3	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
16.10.2022	3	69.7	24.9	7.8	13.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
22.10.2022	4	73.8	24.9	7.8	13.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
23.10.2022	4	66.6	22.4	7.1	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.11.2022	1	68.5	25.3	8.0	13.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.11.2022	1	68.0	22.9	7.3	12.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.11.2022	2	65.5	22.1	7.0	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.11.2022	2	65.1	21.9	6.9	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.11.2022	3	65.2	21.9	7.0	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.11.2022	3	74.8	25.3	7.9	13.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.11.2022	4	68.9	23.2	7.3	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.11.2022	4	69.1	23.2	7.3	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.12.2022	1	67.8	22.9	7.3	12.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.12.2022	1	73.9	24.9	7.8	13.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.12.2022	2	70.6	23.8	7.5	12.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.12.2022	2	71.6	24.2	7.6	12.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.12.2022	3	65.1	21.9	6.9	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.12.2022	3	66.8	22.5	7.1	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.12.2022	4	65.2	21.9	7.0	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.12.2022	4	65.1	21.9	7.4	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Maximum		82.6	25.3	8.0	13.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Minimum		65.1	21.9	6.9	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Average		69.8	23.5	7.4	12.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
98th Percentile		80.9	24.7	7.8	12.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1

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AAQ - 2- Kuspunga Village													
Date of Monitoring	Week	PM10($\mu\text{g}/\text{m}^3$)	PM2.5($\mu\text{g}/\text{m}^3$)	SOx($\mu\text{g}/\text{m}^3$)	NOx($\mu\text{g}/\text{m}^3$)	CO(mg/m^3)	NH3($\mu\text{g}/\text{m}^3$)	Pb($\mu\text{g}/\text{m}^3$)	O3($\mu\text{g}/\text{m}^3$)	As(ng/m^3)	Ni(ng/m^3)	Benzo-pyrene(ng/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)
01.10.2022	1	67.4	22.1	8.2	13.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
02.10.2022	1	64.1	21.0	7.8	12.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
08.10.2022	2	67.3	22.1	8.2	13.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
09.10.2022	2	69.1	22.6	8.4	13.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
15.10.2022	3	66.0	21.6	8.0	13.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
16.10.2022	3	66.2	21.6	8.0	13.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
22.10.2022	4	64.2	21.0	7.8	12.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
23.10.2022	4	65.2	21.3	7.9	12.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.11.2022	1	69.2	22.7	8.4	13.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.11.2022	1	64.1	21.0	7.8	12.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.11.2022	2	65.5	21.4	8.0	13.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.11.2022	2	70.3	23.0	8.5	13.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.11.2022	3	64.4	21.1	7.8	12.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.11.2022	3	68.2	22.3	8.3	13.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.11.2022	4	65.1	21.3	7.9	12.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.11.2022	4	65.3	21.4	7.9	12.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.12.2022	1	67.3	22.1	8.2	13.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.12.2022	1	62.4	20.5	7.6	12.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.12.2022	2	64.6	21.1	7.8	12.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.12.2022	2	62.9	20.6	7.6	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.12.2022	3	63.8	20.9	7.7	12.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.12.2022	3	65.6	21.4	8.0	13.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.12.2022	4	69.4	22.7	8.4	13.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.12.2022	4	64.5	21.1	7.8	12.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Maximum		70.3	23.0	8.5	13.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Minimum		62.4	20.5	7.6	12.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Average		65.9	21.6	8.0	13.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
98th Percentile		68.9	22.5	8.3	13.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1

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AAQ - 3- Palasahi Village													
Date of Monitoring	Week	PM10($\mu\text{g}/\text{m}^3$)	PM2.5($\mu\text{g}/\text{m}^3$)	SO _x ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	CO(mg/m^3)	NH ₃ ($\mu\text{g}/\text{m}^3$)	Pb($\mu\text{g}/\text{m}^3$)	O ₃ ($\mu\text{g}/\text{m}^3$)	As(ng/m^3)	Ni(ng/m^3)	Benzo-pyrene(ng/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)
01.10.2022	1	58.5	19.7	8.0	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
02.10.2022	1	61.5	22.1	9.0	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
08.10.2022	2	61.3	23.4	9.6	12.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
09.10.2022	2	55.4	24.5	10.0	13.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
15.10.2022	3	54.0	23.9	9.7	13.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
16.10.2022	3	58.4	20.5	8.4	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
22.10.2022	4	58.6	19.8	8.0	11.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
23.10.2022	4	59.8	20.3	8.3	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.11.2022	1	60.0	20.3	8.3	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.11.2022	1	60.7	20.5	8.4	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.11.2022	2	60.8	20.6	8.4	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.11.2022	2	55.1	18.6	7.6	10.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.11.2022	3	53.4	18.1	7.4	9.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.11.2022	3	60.4	20.5	8.4	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.11.2022	4	61.0	20.7	8.5	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.11.2022	4	59.8	20.3	8.3	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.12.2022	1	60.9	20.6	8.4	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.12.2022	1	60.5	20.5	8.4	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.12.2022	2	54.0	18.3	8.4	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.12.2022	2	53.4	18.1	7.4	9.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.12.2022	3	53.0	18.0	7.4	9.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.12.2022	3	54.1	18.4	7.5	10.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.12.2022	4	60.7	20.5	8.4	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.12.2022	4	60.2	20.4	8.4	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Maximum		61.5	24.5	10.0	13.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Minimum		53.0	18.0	7.4	9.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Average		58.1	20.4	8.3	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
98th Percentile		60.3	24.0	9.8	13.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1

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AAQ - 4- Parjanga Village

Date of Monitoring	Week	PM10($\mu\text{g}/\text{m}^3$)	PM2.5($\mu\text{g}/\text{m}^3$)	SO _x ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	CO(mg/m^3)	NH ₃ ($\mu\text{g}/\text{m}^3$)	Pb($\mu\text{g}/\text{m}^3$)	O ₃ ($\mu\text{g}/\text{m}^3$)	As(ng/m^3)	Ni(ng/m^3)	Benzo-pyrene(ng/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)
01.10.2022	1	82.1	24.1	7.7	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
02.10.2022	1	74.4	21.9	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
08.10.2022	2	74.6	21.9	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
09.10.2022	2	74.5	21.9	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
15.10.2022	3	72.2	21.2	6.7	10.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
16.10.2022	3	74.5	21.9	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
22.10.2022	4	75.0	22.0	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
23.10.2022	4	76.2	22.3	7.1	10.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.11.2022	1	75.0	22.0	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.11.2022	1	72.2	21.2	6.7	10.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.11.2022	2	74.9	22.0	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.11.2022	2	74.8	21.9	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.11.2022	3	74.9	22.0	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.11.2022	3	72.7	21.3	6.8	10.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.11.2022	4	75.4	22.1	7.0	10.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.11.2022	4	72.4	21.2	6.7	10.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.12.2022	1	73.0	21.5	6.8	10.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.12.2022	1	75.8	22.2	7.1	10.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.12.2022	2	74.9	22.0	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.12.2022	2	76.3	22.4	7.1	10.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.12.2022	3	72.1	21.1	6.6	9.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.12.2022	3	72.4	21.2	6.7	10.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.12.2022	4	75.4	22.1	7.0	10.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.12.2022	4	74.9	22.0	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Maximum		82.1	24.1	7.7	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Minimum		72.1	21.1	6.6	9.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Average		74.6	21.9	7.0	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
98th Percentile		80.4	23.6	7.5	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1

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AAQ - 5- Matanga Village

Date of Monitoring	Week	PM10($\mu\text{g}/\text{m}^3$)	PM2.5($\mu\text{g}/\text{m}^3$)	SOx($\mu\text{g}/\text{m}^3$)	NOx($\mu\text{g}/\text{m}^3$)	CO(mg/m^3)	NH3($\mu\text{g}/\text{m}^3$)	Pb($\mu\text{g}/\text{m}^3$)	O3($\mu\text{g}/\text{m}^3$)	As(ng/m^3)	Ni(ng/m^3)	Benzo-pyrene(ng/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)
01.10.2022	1	76.9	23.6	7.6	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
02.10.2022	1	77.0	23.6	7.6	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
08.10.2022	2	78.5	24.1	7.7	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
09.10.2022	2	78.3	24.0	7.7	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
15.10.2022	3	76.8	23.5	7.5	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
16.10.2022	3	82.3	25.3	8.0	12.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
22.10.2022	4	75.5	23.2	7.4	11.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
23.10.2022	4	77.6	23.9	7.6	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.11.2022	1	78.5	24.1	7.7	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.11.2022	1	78.3	24.0	7.7	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.11.2022	2	79.9	24.5	7.8	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.11.2022	2	80.3	24.6	7.9	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.11.2022	3	79.0	24.2	7.7	11.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.11.2022	3	76.5	23.5	7.5	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.11.2022	4	76.5	23.5	7.5	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.11.2022	4	79.1	24.4	7.8	11.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.12.2022	1	80.6	24.7	7.9	11.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.12.2022	1	80.3	24.6	7.9	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.12.2022	2	78.1	24.0	7.7	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.12.2022	2	85.8	26.4	8.4	12.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.12.2022	3	87.3	26.8	8.6	12.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.12.2022	3	76.9	23.6	7.6	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.12.2022	4	80.3	24.6	7.9	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.12.2022	4	81.6	24.1	7.7	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Maximum		87.3	26.8	8.6	12.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Minimum		75.5	23.2	7.4	11.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Average		79.2	24.3	7.8	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
98th Percentile		85.5	26.2	8.4	12.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1

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 : OVERSEAS :
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AAQ - 6- Janhapada Village

Date of Monitoring	Week	PM10($\mu\text{g}/\text{m}^3$)	PM2.5($\mu\text{g}/\text{m}^3$)	SOx($\mu\text{g}/\text{m}^3$)	NOx($\mu\text{g}/\text{m}^3$)	CO(mg/m^3)	NH3($\mu\text{g}/\text{m}^3$)	Pb($\mu\text{g}/\text{m}^3$)	O3($\mu\text{g}/\text{m}^3$)	As(ng/m^3)	Ni(ng/m^3)	Benzo-pyrene(ng/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)
01.10.2022	1	79.7	24.4	8.0	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
02.10.2022	1	80.4	24.7	8.1	12.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
08.10.2022	2	80.3	24.6	8.0	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
09.10.2022	2	78.1	23.9	7.8	11.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
15.10.2022	3	79.7	24.4	8.0	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
16.10.2022	3	77.4	23.7	7.7	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
22.10.2022	4	75.0	23.0	7.5	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
23.10.2022	4	76.2	23.3	7.6	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.11.2022	1	76.1	23.3	7.6	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.11.2022	1	79.8	24.5	8.0	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.11.2022	2	74.9	23.0	7.5	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.11.2022	2	74.8	22.9	7.5	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.11.2022	3	74.9	23.0	7.5	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.11.2022	3	79.7	24.4	8.0	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.11.2022	4	75.4	23.1	7.5	11.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.11.2022	4	79.7	24.4	8.0	12.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.12.2022	1	78.6	24.2	7.9	12.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.12.2022	1	80.6	24.7	8.1	12.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.12.2022	2	78.5	24.0	7.8	12.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.12.2022	2	77.4	23.7	7.7	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.12.2022	3	74.8	22.9	7.5	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.12.2022	3	81.5	25.0	8.1	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.12.2022	4	75.4	23.1	7.5	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.12.2022	4	76.6	23.5	7.7	11.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Maximum		81.5	25.0	8.1	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Minimum		74.8	22.9	7.5	10.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Average		77.7	23.8	7.7	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
98th Percentile		79.9	24.5	8.0	12.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1

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AAQ -7- Kusumi Village

Date of Monitoring	Week	PM10($\mu\text{g}/\text{m}^3$)	PM2.5($\mu\text{g}/\text{m}^3$)	SO _x ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	CO(mg/m^3)	NH ₃ ($\mu\text{g}/\text{m}^3$)	Pb($\mu\text{g}/\text{m}^3$)	O ₃ ($\mu\text{g}/\text{m}^3$)	As(ng/m^3)	Ni(ng/m^3)	Benzo-pyrene(ng/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)
01.10.2022	1	83.0	25.4	9.0	13.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
02.10.2022	1	77.5	23.9	8.4	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
08.10.2022	2	82.4	25.3	8.9	13.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
09.10.2022	2	77.6	23.9	8.4	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
15.10.2022	3	77.8	23.9	8.5	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
16.10.2022	3	80.6	24.7	8.7	12.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
22.10.2022	4	78.1	24.0	8.5	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
23.10.2022	4	79.4	24.4	8.6	12.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.11.2022	1	78.1	24.0	8.5	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.11.2022	1	81.9	25.2	8.9	13.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.11.2022	2	78.0	24.0	8.5	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.11.2022	2	77.9	23.9	8.5	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.11.2022	3	78.0	24.0	8.5	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.11.2022	3	83.0	25.4	9.0	13.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.11.2022	4	78.5	24.1	8.5	12.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.11.2022	4	81.8	25.1	8.8	13.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.12.2022	1	81.9	25.2	8.9	13.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.12.2022	1	79.0	24.2	8.6	12.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.12.2022	2	82.3	25.3	8.9	13.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.12.2022	2	79.5	24.5	8.6	12.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.12.2022	3	78.1	24.0	8.5	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.12.2022	3	81.0	24.8	8.8	13.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.12.2022	4	78.5	24.1	8.5	12.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.12.2022	4	79.8	24.5	8.7	12.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Maximum		83.0	25.4	9.0	13.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Minimum		77.5	23.9	8.4	12.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Average		79.7	24.5	8.6	12.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
98th Percentile		81.3	24.9	8.8	13.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1

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AAQ -8- Nalachandrapur Village													
Date of Monitoring	Week	PM10($\mu\text{g}/\text{m}^3$)	PM2.5($\mu\text{g}/\text{m}^3$)	SO _x ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	CO(mg/m^3)	NH ₃ ($\mu\text{g}/\text{m}^3$)	Pb($\mu\text{g}/\text{m}^3$)	O ₃ ($\mu\text{g}/\text{m}^3$)	As(ng/m^3)	Ni(ng/m^3)	Benzo-pyrene(ng/m^3)	Benzene ($\mu\text{g}/\text{m}^3$)
01.10.2022	1	82.0	24.3	7.5	12.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
02.10.2022	1	76.9	22.8	7.0	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
08.10.2022	2	81.6	24.2	7.4	11.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
09.10.2022	2	77.0	22.8	7.0	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
15.10.2022	3	82.0	24.3	7.5	12.0	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
16.10.2022	3	79.9	23.7	7.3	11.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
22.10.2022	4	82.4	24.4	7.5	12.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
23.10.2022	4	78.7	23.3	7.1	11.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.11.2022	1	76.3	22.6	6.9	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.11.2022	1	77.3	22.9	7.0	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.11.2022	2	76.1	22.6	6.9	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.11.2022	2	76.0	22.5	6.9	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.11.2022	3	77.3	22.9	7.0	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.11.2022	3	75.0	22.3	6.8	11.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.11.2022	4	80.3	23.8	7.3	11.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.11.2022	4	78.4	23.3	7.1	11.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
03.12.2022	1	80.3	23.8	7.3	11.7	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
04.12.2022	1	77.1	22.8	7.0	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
10.12.2022	2	76.1	22.6	6.9	11.2	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
11.12.2022	2	77.6	23.1	7.0	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
17.12.2022	3	80.6	24.0	7.3	11.8	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
18.12.2022	3	79.1	23.4	7.2	11.6	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
24.12.2022	4	76.6	22.7	6.9	11.3	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
25.12.2022	4	77.8	23.1	7.1	11.4	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Maximum		82.4	24.4	7.5	12.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Minimum		75.0	22.3	6.8	11.1	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
Average		78.4	23.3	7.1	11.5	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1
98th Percentile		80.7	23.9	7.3	11.9	<0.5	<20	<0.01	<20	<5	<1.0	<0.01	<1

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(F. No. - 15018 / 06 / 2016 - CPW)
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Ambient Noise Quality Monitoring location Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

Sr. No.	Location	Distance(KM)	Directions	Coordinates	
N 1	Project Site	-	-	20°50'49.80"N	85°17'51.75"E
N 2	Kuspunga	0.84	W	20°50'46.11"N	85°17'15.74"E
N 3	Palasahi	1.00	N	20°51'18.19"N	85°18'00.40"E
N 4	Parjanga	3.50	E	20°49'58.22"N	85°19'39.44"E
N 5	Matanga	5.50	S	20°48'10.42"N	85° 18'32.74"E
N 6	Janhapada	7.25	N	20°54'30.89"N	85°18'12.14"E
N 7	Kusumi	9.37	E	20°50'26.67"N	85°23'13.49"E
N 8	Nalachandrapur	8.91	SW	20°48'16.87"N	85°13'04.49"E

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Ambient Noise Quality in the Study Area Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

Sr. No.	Location name	Zone	Units	Day Time		Night Time	
				Result	CPCB Permissible Limit	Result	CPCB Permissible Limit
N 1	Project Site	Industrial	dB(A) Leq	48.5	75	44.0	70
N 2	Kuspunga	Residential	dB(A) Leq	42.0	55	37.1	45
N 3	Palasahi	Residential	dB(A) Leq	40.9	55	39.2	45
N 4	Parjanga	Residential	dB(A) Leq	35.8	55	33.3	45
N 5	Matanga	Residential	dB(A) Leq	39.2	55	30.9	45
N 6	Janhapada	Residential	dB(A) Leq	35.7	55	37.1	45
N 7	Kusumi	Residential	dB(A) Leq	41.9	55	32.5	45
N 8	Nalachandrapur	Residential	dB(A) Leq	36.1	55	33.7	45
N 9	Project Site	Industrial	dB(A) Leq	48.5	75	44.0	70

(Source: Monitoring during Study period by GCI)

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Ground Water Sampling Locations Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

Sr. No.	Village Name	Source	Distance	Direction	Coordinate	
GW 1	Kuspunga	Tap Water	0.84	W	20°50'50.17"N	85°17'12.24"E
GW 2	Palasahi	Tap Water	1.00	N	20°51'17.78"N	85°18'04.74"E
GW 3	Parjanga	Tap Water	3.50	N	20°50'01.24"N	85°19'36.86"E
GW 4	Matanga	Tap Water	5.50	SW	20°48'09.56"N	85°18'36.07"E
GW 5	Janhapada	Tap Water	7.25	S	20°54'43.07"N	85°18'01.44"E
GW 6	Kusumi	Tap Water	9.37	S	20°50'40.16"N	85°23'06.49"E
GW 7	Nalachandrapur	Tap Water	8.91	E	20°48'31.55"N	85°13'11.94"E

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Ground Water Quality in the 10km Study Area Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

No.	Parameter	Units	Results							Permissible Limit as Per IS 10500:2012	Reference Method
			GW1	GW2	GW3	GW4	GW5	GW6	GW7		
Sample Identification			GW1	GW2	GW3	GW4	GW5	GW6	GW7		
1.	pH	---	7.2	7.1	7.0	6.8	7.0	7.2	6.9	6.5-8.5	APHA 4500 H+
2.	Conductivity	µs/cm	560	680	550	770	790	680	650	-	APHA 2510 B
3.	Turbidity	NTU	<2	<2	<2	<2	<2	<2	<2	5	APHA 2130
4.	Color	Hazen	< 5	<5	< 5	< 5	< 5	< 5	<5	15	APHA 2120
5.	Odour	-	Agreeable								
6.	Total Dissolved Solid	mg/L	325	420	335	500	510	380	405	2000	APHA 2540 C
7.	Total Suspended Solid	mg/L	<2	<2	<2	<2	<2	<2	<2	-	APHA 2540 B
8.	Sulphate	mg/L	4.5	5.7	5.2	4.5	6.4	6.3	5.9	400	APHA 4500-SO42-E
9.	Chloride	mg/L	25.8	21.6	30.6	28.4	32.0	38.2	35.5	1000	APHA 4500 - Cl-
10.	Total Hardness	mg/L	270	390	310	400	450	295	325	600	APHA 2340 C
11.	Calcium as Ca	mg/L	58.2	95.5	82.4	110	124	59.2	88.3	200	APHA -3500 Ca-B
12.	Magnesium Mg	mg/L	25.1	29.8	23.5	29.7	31.9	27.2	25.3	100	APHA 3500-Mg-B

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No.	Parameter	Units	Results							Permissible Limit as Per IS 10500:2012	Reference Method
			GW1	GW2	GW3	GW4	GW5	GW6	GW7		
Sample Identification			GW1	GW2	GW3	GW4	GW5	GW6	GW7		
13.	Alkalinity	mg/L	45	49	55	67	77	53	51	600	APHA 2320
14.	Copper	mg/L	0.02	0.02	0.04	0.05	0.03	0.02	0.02	1.5	APHA 3111-B
15.	Zinc	mg/L	0.04	0.03	0.02	0.01	0.06	0.02	0.02	15	APHA 3111-B
16.	Iron	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	APHA 3111-B
17.	Lead	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	APHA 3111-B
18.	Nickel	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	APHA 3111-B
19.	Cadmium	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	APHA 3111-B
20.	Calcium Hardness as CaCO ₃	mg/L	149	257	181	277	317	152	234	-	APHA 3500-Ca
21.	Magnesium Hardness as CaCO ₃	mg/L	109	131	92	125	140	117	102	-	APHA 3500-Mg
22.	Phenolic compound	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	APHA 5530
23.	Fluoride	mg/L	0.11	0.09	0.12	0.10	0.13	0.12	0.11	1.5	APHA 4500-F-D

(Source: Water Analysis during study period, GCI)

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Surface Water Sampling Locations of Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

Sr. No.	Village Name	Distance (KM)	Direction	Coordinate	
SW 1	Maniabeda	3.23	NW	20°52'13.60"N	85° 16'35.07"E
SW 2	Lodhani	3.96	NE	20°52'22.20"N	85° 19'18.37"E
SW 3	Parjanga	4.25	SE	20°49'48.66"N	85° 19'53.61"E
SW 4	Brahmani River (Downstream)	5.35	SE	20°49'09.40"N	85° 20'08.25"E
SW 5	Brahmani River (Upstream)	8.93	N	20°54'32.33"N	85° 14'10.00"E
SW 6	Kumusi	7.8	E	20°50'57.28"N	85° 22'25.31"E
SW 7	Galapada	7.41	S	20°46'33.73"N	85° 17'33.08"E
SW 8	Maniabeda	3.23	NW	20°52'13.60"N	85° 16'35.07"E

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Surface Water Quality in the 10km Area of Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

Sr. No	Parameter	Units	Result							Reference Method
			SW1	SW2	SW3	SW4	SW 5	SW 6	SW7	
Sample Identification			SW1	SW2	SW3	SW4	SW 5	SW 6	SW7	
1.	pH	---	7.0	7.1	7.3	6.9	6.8	6.8	7.1	APHA 4500 H+
2.	Conductivity	µS/cm	465	620	535	690	755	630	590	APHA 2510
3.	Turbidity	NTU	<2	<2	<2	<2	<2	<2	<2	APHA 2130
4.	Colour	Hazen	<5	<5	<5	<5	<5	<5	<5	APHA 2120
5.	Odour	-	Agreeable							APHA 2150
6.	Total Dissolved Solid	mg/L	294	441	360	420	482	415	380	APHA 2540 C
7.	Total Suspended Solid	mg/L	26	30	23	25	31	20	21	APHA 2540 B
8.	Sulphate	mg/L	9.1	9.0	8.2	9.5	10.0	76	8.6	APHA 4500-SO42-
9.	Chloride	mg/L	27	29	30	32	31	35	27	APHA 4500 - Cl-
10.	Total Hardness	mg/L	217	235	198	277	286	257	208	APHA 2340
11.	Calcium as Ca	mg/L	59.2	64.7	53.7	64.1	75.6	60	57.3	APHA -3500 Ca
12.	Magnesium Mg	mg/L	17.2	17.4	14.7	25.4	22.9	21.7	13.5	APHA 3500-Mg
13.	Alkalinity	mg/L	77	70	87	51	57	60	75	APHA 2320
14.	Copper	mg/L	0.12	0.07	0.08	0.10	0.14	0.12	0.06	APHA 3111-B
15.	Zinc	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	APHA 3111-B
16.	Iron	mg/L	0.12	0.14	0.16	0.20	0.10	0.08	0.06	APHA 3111-B
17.	Lead	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	APHA 3111-B
18.	Nickel	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	APHA 3111-B
19.	Cadmium	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	APHA 3111-B
20.	Total Coliform	MPN/100 ml	345	277	216	277	201	228	234	APHA 9221 B
21.	Faecal Coliform	MPN/100 ml	80	67	52	69	90	57	45	APHA 9221 E
22.	E. Coli	MPN/100 ml	18	21	23	26	24	21	25	APHA 9221 F

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Sr. No	Parameter	Units	Result							Reference Method
			SW1	SW2	SW3	SW4	SW 5	SW 6	SW7	
Sample Identification			SW1	SW2	SW3	SW4	SW 5	SW 6	SW7	
23.	Calcium Hardness as CaCO ₃	mg/L	147	166	134	163	189	161	149	APHA 3500-Ca
24.	Magnesium Hardness as CaCO ₃	mg/L	74	75	60	118	99	95	62	APHA 3500-Mg
25.	Phenol	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	APHA 5530
26.	Fluoride	mg/L	0.35	0.37	0.41	0.43	0.45	0.33	0.39	APHA 4500-F-
27.	Salinity	mg/L	413	39.8	48.7	43.5	51.3	59.1	41.5	APHA 2520 B
28.	Pesticides	P/A	Absent							Gas Chromatography
29.	Chemical Oxygen Demand	mg/L	17	19	18	21	18	16	22	APHA 5220
30.	Biochemical Oxygen Demand	mg/L	7	6	8	7	6	5	7	APHA 5210
31.	Dissolved Oxygen	mg/L	6.7	6.5	6.3	6.1	6.5	6.3	6.1	APHA 4500-O-C

(Source: Water Analysis during study period, GCI)

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Soil Sampling Locations of Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

Sr. No.	Location	Justification	Distance (km)	Directions	Coordinates	
S 1	Project Site	Barren	-	-	20°50'45.33"N	85°17'40.46"E
S 2	Palasahi	Agricultural	1.10	NE	20°51'14.92"N	85°18'09.15"E
S 3	Parjanga	Barren	3.55	S	20°49'50.64"N	85°19'37.89"E
S 4	Khargaprasad	Agricultural	4.35	SE	20°49'05.52"N	85°19'28.19"E
S 5	Damol	Agricultural	5.75	N	20°53'44.97"N	85°16'35.80"E
S 6	Panigengutia	Agricultural	8.40	S	20°48'25.58"N	85°22'03.49"E
S 7	Chitipada	Agricultural	6.20	SW	20°47'31.28"N	85°18'03.33"E
S 8	Kamalanga	Agricultural	3.49	N	20°52'35.71"N	85°16'053.08"E

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Soil Quality in the 10km Area Kusupanga & Kurunti Brahmani Sand Quarry (October to December 2022)

Sr. No.	Parameters	Unit	Results								Reference Method
			S1	S2	S3	S4	S5	S6	S7	S8	
1	pH	-	6.9	7.1	7.0	6.9	7.1	6.7	7.1	7.3	IS 2720 : Part 26 : 1987
2	Electrical Conductivity	µs/cm	460	500	411	520	424	457	410	493	IS 14767: 2000
3	Soil Moisture Content	%	12.0	12.5	10.1	11.5	14.3	15.1	13.5	13.1	IS 2720 - Part - 2
4	Organic Carbon	%	0.93	1.00	1.11	1.13	1.01	1.15	1.20	0.92	IS 2720 : Part 22 : 1972
5	Organic Matter	%	1.60	1.70	1.90	1.93	1.70	2.01	2.07	1.65	IS 2720 : Part 22 : 1972
6	Phosphorus	mg/kg	0.0017	0.0020	0.0016	0.0021	0.0023	0.0018	0.0023	0.0021	APHA 4500 - P
7	Total Nitrogen	mg/kg	0.030	0.041	0.035	0.047	0.033	0.031	0.043	0.037	APHA 4500-NORG
8	Potassium as K	mg/kg	124.0	130.7	125.4	136.7	133.1	141.3	121.0	127.9	APHA 3500 - K - B
9	Calcium	mg/kg	229.0	247.9	183.1	222.7	241.1	237.0	221.8	201.9	APHA 3500 -Ca- B
10	Magnesium	mg/kg	157	160	141	167	177	142	150	153	APHA 3500 -Mg
11	Chloride	mg/kg	177	143	151	126	140	167	129	155	IS 6925: 1973
12	Copper as Cu	mg/kg	99	120	147	129	153	103	111	125	APHA 3111 B
13	Zinc as Zn	mg/kg	62.0	77.9	77.5	78.2	75.9	70.0	87.4	67.5	APHA 3111 B
14	Iron as Fe	mg/kg	100.2	117.5	126.7	129.3	127.9	127.7	122.5	135.5	APHA 3111 B
15	Lead as Pb	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 3111 B
16	Nickel as Ni	mg/kg	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	APHA 3111 B

Source: Soil Analysis during study period, GCI

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STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY (SEIAA), ODISHA.

(Constituted vide Order No. S.O. 3387 (E) Date 15.12.2015 of Ministry of Environment Forest & CC, Govt. of India,
Under Environment Protection Act, 1986.)
Qr. No. 5RF-2/1, Unit - IX, Bhubaneswar - 751022
E-mail : seiaaorissa@gmail.com

Ref. No. SEIAA 619

Date 30.01.2016

From

Shri S.B. Samant, IFS
Member Secretary,
State Environment Impact Assessment Authority (SEIAA), Odisha,
Bhubaneswar

To

The Tahasildar,
Tahasil- Odapada
Dist- Dhenkanal

Sub: Kurunti Brahmani Sand Quarry, of Sri Pulin Bihari Nayak, at village- Kurunti, Tahasil- Odapada, District- Dhenkanal (12.50 acre or 5.06 ha.)-Environmental Clearance Regarding.

Sir,

This has reference to your letter no.4799 dated 11.09.2015 seeking environmental clearances for the above project under EIA Notification 2006. The proposal has been appraised as per the provisions under the EIA Notification 2006 and on the basis of the documents enclosed with the application such as Checklist, Form-1, Prefeasibility Report, Approved Mining Plan etc. and observations of the State Expert Appraisal Committee, Odisha.

It is a proposed mining of minor mineral- Sand from Kurunti Brahmani Sand Quarry, located at Village- Kurunti, Tahasil- Odapada, District- Dhenkanal, Odisha with total production capacity of 75000 cum (ROM) of sand over lease area of 12.50 acre. The Kurunti Brahmani Sand Quarry, has been negotiated by Tahasildar, Odapada to Sri Pulin Bihari Nayak vide order no. 1099 dated 13.03.2015. The mining plan along with progressive mine closure plan of this mining project has been approved by Joint Director Geology (I/C) Zonal Survey, Dhenkanal on 30.06.2015. Mineable reserves as per the approved mine plan are 56737.5 cum with total production capacity of 75000 cum (ROM)

during the lease period as stated in the approved mining plan. There is no forest land involved in the lease area. There is no protected areas i.e. National Park, Sanctuary, Habitat for Migratory Birds, Tiger Reserve, Protected Monuments, Inter-State boundary and critically polluted area as identified by CPCB etc. located within 5 km radius of the mine lease area and there is no court case / litigation pending against the project.

Considering the information/documents furnished by the project proponent, the State Expert Appraisal Committee (SEAC) after due considerations of the relevant documents submitted by the project proponent have recommended for Environmental Clearance with certain stipulations.

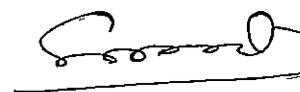
The State Environment Impact Assessment Authority (SEIAA) after considering the proposal and recommendations of SEAC, Odisha hereby accords Environmental Clearance in favour of the project upto the lease period as recommended by the Tahasildar Odapada vide letter no. 4799 dated 11.09.2015 under the provisions of EIA Notification 2006 and 2009 and subsequent amendments thereto subject to strict compliance of the stipulated conditions as follows.

Stipulated Conditions:-

- 1) This environmental clearance shall be valid for the lease period as recommended by the lease granting authority.
- 2) The project proponent shall take statutory clearance /approval /permission from the concerned authorities in respect of his project as and when required.
- 3) Any change in mining technology/scope of working shall not be made without prior approval of the SEIAA.
- 4) The applicant will submit half-yearly compliance report on post environmental monitoring in respect of the stipulated terms and conditions in the Environmental Clearance to the State Environmental Assessment Authority (SEIAA) ,Odisha , SPCB & Regional Office of the Ministry of Environment & Forest, Odisha on 1st June and 1st December of each Calendar Year.
- 5) Any change in the calendar plan including excavation, quantum of mineral and waste shall not be made.
- 6) Mining activity shall be carried out as per approved mining plan prepared for this project.
- 7) It shall be ensured that sand mining does not in any way disturb the flow pattern of the river water.
- 8) Sand quarrying shall not be carried out in streams within 1/5 of the width of the stream bed from the bank.
- 9) Sand mining shall not be carried out within 200 m of any existing structure such as bridges, dams, weirs, intake structure (s) either for irrigation or drinking water purposes, or any other cross drainage structure.

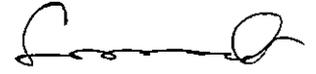


- 10) Sand mining operations shall not affect the existing sources for irrigation or drinking water or industrial purpose.
- 11) Vehicles hired for transportation of sand from the site should be in good condition and should have a pollution check certificate and should conform to applicable air and noise emission standards and should be operated only during non-peak hours.
- 12) The depth of the sand mining shall not exceed 3 m. or water level whichever is less.
- 13) Permission from the Competent Authority shall be obtained for drawl of ground water, if any, required for the project.
- 14) The vehicles shall not be overload and shall be covered with Tarpaulin.
- 15) Conservation measures shall be taken for protection of flora and fauna.
- 16) Personnel working in the project shall be provided with requisite safety devices such as masks, gloves etc.
- 17) The proponent shall take necessary measures to ensure no adverse impacts due to mining operations on the Human Habitation existing nearby.
- 18) The water spray should be operated on the village road to control dust emission while transportation of sand.
- 19) The natural sand dune should not be disturbed.
- 20) All necessary statutory clearances shall be obtained before start of mining operations.
- 21) No mining shall be carried out in the vicinity of natural /manmade archeological sites.
- 22) The area from which the sand has been extracted be leveled and free of any foreign debris or materials.
- 23) The surface of stockpile and sand processing areas outside the river bed to be scarified to a depth of 50 cm. graded evenly and the top soil previously stored, returned to its original depth over the area.
- 24) A river bed rehabilitation plan should be submitted.
- 25) A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, ZilaParisad /Municipal Corporation, Urban Local Body and the Local NGO.
- 26) The conditions stipulated in the environmental clearance must be totally complied with before the lease granting authority.
- 27) The SEIAA, Odisha may revoke or suspend the order, if implementation of any of the above conditions is not satisfactory. The SEIAA, Odisha reserves the right to alter /modify the above conditions or stipulate any further condition in the interest of environment protection.
- 28) Concealing the factual information or failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986.
- 29) That the grant of this Environment Clearance is issued from the environmental angle only, and does not absolve the project proponent from the other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility, to comply with the conditions laid down in all



other laws for the time being in force, rests with the lease granting authority/project proponent.

- 30) Any appeal against this environmental clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under section 16 of the National Green Tribunal Act, 2010.

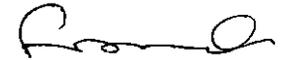


30.1.16

Member Secretary

Memo No 620/SEIAA /Dt. 30.01.2016
Copy to

1. Ministry of Environment, Forests and Climate Change Govt. of India, Indira Paryavaran Bhavan, Jor Bagh Road, Aliganj, New Delhi-110003 for kind information.
2. Additional Chief Secretary, Forests & Environment Dept., Government of Odisha for kind information.
3. Chairman, State Pollution Control Board, Odisha, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-8, Bhubaneswar for kind information.
4. Chief Conservator of Forests, Regional Office (EZ), Ministry of Environment & Forests, A-31, Chandrasekharapur, Bhubaneswar for kind information.
5. Chairman, Central Pollution Control Board, CBD-cum-office Complex, East Arjun Nagar, New Delhi-110032 for kind information.
6. Copy to the Additional District Magistrate, Dhenkanal / Sub-Collector, Dhenkanal for kind information and necessary action.
7. Copy to Sri Pulin Bihari Nayak, At- Dighi, Ps- Talcher, Dist-Angul for kind information.
8. Chairman/Member/Member Secretary, SEIAA for kind information.
9. Chairman, SEAC/Secretary, SEAC, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar for kind information.
10. Guard file for record.



30.1.16

Member Secretary

POINTWISE COMPLIANCE REPORT OF THE CONDITIONS LAID IN THE ENVIRONMENTAL CLEARANCE FOR KURUNTI BRAHMANI SAND QUARRY OVER AN AREA OF 5.06 HA IN VILLAGE KURUNTI UNDER ODAPADA TAHASIL OF DHENKANAL DISTRICT, ODISHA.

SL.NO	STIPULATED CONDITIONS	STATUS IMPLEMENTATION
1	This environmental clearance shall be valid for the lease period as recommended by the lease granting authority.	The environmental clearance is valid from the date of execution.
2	The project proponent shall take statutory clearance/ approval /permission from the concerned authorities in respect of his project as and when required.	Agreed.
3	Any Change in mining technology/scope of working shall not be made without prior approval of the SEIAA.	No, Change in mining technology/scope of working during the lease period.
4	The applicant will submit half-yearly compliance report on post environmental monitoring in respect of the stipulated terms and conditions in the Environmental Clearance to the State Environmental Assessment Authority (SEIAA), Odisha, SPCB & Regional Office of the Ministry of Environment & Forest, Odisha on 1st June and 1st December of each Calendar Year.	Half-yearly compliance report is submitted on post environmental monitoring in respect of the stipulated terms and conditions in the Environmental Clearance to the State Environmental Assessment Authority (SEIAA), Odisha, SPCB & Regional Office of the Ministry of Environment & Forest, Odisha on 1 st June and 1 st December of each Calendar Year.
5	Any Change in the Calendar Plan, including excavation, quantum of mineral and waste shall not made.	No Change in Calendar Plan including excavation, quantum of mineral and waste has been made.
6	Mining activity shall be carried out as per approved mining plan prepared for this project.	Mining activity has been carried out as per approved mining Plan prepared for this project.
7	It shall be ensured that sand mining does not in any way disturb the flow pattern of the river water.	No mining will disturb the flow pattern of the river water.
8	Sand quarrying shall not be carried out in streams within 1/5 of the width of the stream bed from the bank.	There will be strip of 1/5 of the width of the stream bed kept for Non-Mining Zone.
9	Sand Mining shall not be carried out within 200m of any existing structure such as bridges, dams,	There are no existing structures such as bridges, dams, weirs, intake structure either for irrigation or drinking water

	weirs, intake structure (s) either for irrigation or for drinking water purposes or any other cross drainage structure.	purposes, or any other cross drainage structure within 200m of sand quarry.
10	Sand mining operations shall not affect the existing sources for irrigation or drinking water or industrial purpose.	Sand mining operations will not affect the existing sources for irrigation or drinking water or industrial purpose.
11	Vehicles hired for transportation of sand from the site should be in good condition and should have pollution check certificate and should conform to applicable air and noise emission standards and should be operated only during non-peak hours.	All vehicles are engaged in the Mines which have valid PUC certificate. Monitoring has been done for Pollution at regular intervals.
12	The depth of mining shall not exceed 3m/ water level, whichever is less.	The present depth of sand mining is less than 1m and water level is much below the quarry floor.
13	Permission from the competent Authority shall be obtained for drawl of ground water if any required for the project.	There will be no requirement of ground water.
14	The vehicles shall not be overload and shall be covered with Tarpaulin.	No Tractor or Tippers will be overloaded.
15	Conservation measures shall be taken for protection of flora and fauna	All necessary measures will be taken for protection of flora and fauna.
16	Personnel working in the project shall be provided with requisite safety devices such as masks, gloves etc.	Personnel working in the project have been provided with requisite safety devices such as masks, gloves etc.
17	The proponent shall take necessary measures to ensure no adverse impacts due to mining operations on the human habitation existing nearby.	There are no human habitations existing nearby. The nearest village Kurunti is situated at distance of 1 Km in south direction of quarry.
18	The water spray should be operated on the village road to control dust emission while transportation of sand.	Water spray arrangement will be done in the village road to control dust emission while transportation of sand.
19	The natural sand dune should not be disturbed.	No Sand Dunes will be disturbed.
20	All necessary statutory clearances be obtained before start of mining operations.	All necessary clearances will be obtained before start of mining operations.
21	No mining shall be carried out in the vicinity of natural / manmade	Agreed.

	archaeological sites.	
22	The area from which the sand has been extracted be levelled and free of any foreign debris or materials.	The excavated sand area has been levelled and free of any foreign debris or materials.
23	The surface of stockpile and sand processing areas outside the river bed to be scarified to a depth of 50cm graded evenly and the top soil previously stored, shall be returned to its original depth over the area.	There are no stockpile and sand processing area outside the river bed.
24	A river bed rehabilitation plan should be submitted.	Rehabilitation Plan will be submitted to the competent Authority.
25	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat , Zila Parisad /Municipal Corporation ,Urban Local Body and the local NGO.	A copy of clearance letter has been given to Sarpanch, G.P and Zila Parisad. The area is not coming under any municipal corporation. There is no urban local body and NGO.
26	The conditions stipulated in the environmental clearance must be totally complied with before the lease granting authority.	The conditions stipulated in the environmental clearance are being followed. Compliance will be submitted periodically.
27	The SEIAA, Odisha may revoke or suspend the order, if implementation of any of the above conditions is not satisfactory .The SEIAA, Odisha reserves the right to alter /modify the above conditions or stipulate any further condition in the interest of environmental protection.	All the conditions are being complied.
28	Concealing the factual information or failure to comply with any of the conditions mentioned above may result in withdrawal of clearance and attract action under the provisions of Environment (Protection) Act,1986.	No factual information has been concealed.
29	The grant of this environmental clearance is issued from the environmental angle only, and does not absolve the project proponent from other statutory obligations prescribed under any other law or any other instrument in force. The sole and complete responsibility , to comply with the conditions laid down in all other	Agreed.

	laws for the time being in force , rests with the lease granting authority / project proponent.	
30	Any appeal against this environmental clearance shall lie with the National Green Tribunal, if preferred , within a period of 30 days as prescribed under section 16 of the National Green Tribunal Act,2010.	No appeal against this environmental clearance have been made with/before the National Green Tribunal, within a period of 30 days of grant.

Bhuvan
04.03.23

Tahasildar, Odapada
Dist- Dhenkanal

**TAHASILDAR
ODAPADA**