Dalmia
Bharat Cement

new think! cement! sugar! refractories! power!

LQ/MOEFCC/002/2023-053
May 29, 2023.

To,
The Addl. Principal Chief Conservator of Forests (C),
Ministry of Environment, Forest & Climate Change,
Integrated Regional Office (EZ),
A/3, Chandrasekharpur,
Bhubaneswar – 751 023

Sub: **Submission of Six-Monthly Compliance Report of the Environmental Clearance of Lanjiberna Limestone & Dolomite Mines of M/s Dalmia Cement (Bharat) Limited for the period October-2022 to March-2023.**

Ref: Environmental clearance ref. F. No. J-11015/202/2016-IA.II (M) dated 04.03.2020.

Dear Sir,

With reference to above captioned subject matter, we are submitting herewith the six-monthly compliance report of the conditions laid down in above Environmental clearance for the period October-2022 to March-2023.

Thanking you,

Yours sincerely,

For **Dalmia Cement Bharat Limited,**

29.05.2023

(Omprakash R Khelkar)
Agent / Asst. Executive Director (Mines)
Lanjiberna Limestone & Dolomite Mines

Encl: As above.

CC:
1. The Director, Impact Assessment Division, MoEF&CC, New Delhi.
2. The Member Secretary, CPCB, New Delhi.
3. The Member Secretary, OSPCB, Bhubaneswar, Odisha.

Half-yearly Compliance Report Conditions Imposed in the Environmental Clearance

Date: 29.05.2023

Name of the project: **Expansion of Lanjiberna Limestone and Dolomite Mine of M/s. Dalmia Cement (Bharat) Limited formerly known as OCL India Limited with expansion in production of limestone from 4.2 million TPA to 9.5 million TPA, 0.08 million TPA of Dolomite and Rejects/Waste 7.42 Million TPA (Total Excavation: 17 MTPA) along with four existing crushers installed within mine lease area i.e. 400 TPH, 1200 TPH and 2x 200 TPH (aggregate) and installation of one new crusher of 1600 TPH in the mine lease area of 873.057 ha located at Villages-Alanda, Bihabandh, Jhagarpur, Kesramal, Raiberna, Katang, Dhauraada, Lanjiberna and Kukuda,Tehsil-Rajgangpur and Kutra, District Sundargarh, Odisha -Environmental Clearance- Regarding.**

Clearance Letter No and date: **F. No. J-11015/202/2016-IA.II (M) dated 04.03.2020**

Period of compliance Report: **Oct-2022 to March-2023**

A. Specific Conditions:

Sl. No.	SPECIFIC CONDITIONS	COMPLIANCE STATUS
I.	Water requirement will be restricted to 509 KLD and PP to improvise on the water uses and adopt better technology for water use along with enhances water conservation practices.	Water requirement is well within 509 KLD and steps are being taken for water conservation by installation of ETP & STP thereby re-using the treated water.
II.	PP to ensure that the necessary EMP should be implemented and monitored properly to ensure better compliance in order to contain the vehicular emission to minimum.	Environment Management Plan is being strictly implemented and all monitoring related to air, water, noise and soil are carried out by 3rd party NABL accredited lab.

B. Standard Conditions

I. Statutory compliance

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	This Environmental Clearance (EC) is subject to orders/ judgment of Hon'ble Supreme Court of India, Hon'ble High Court, Hon'ble NGT and any other Court of Law, Common Cause Conditions as may be applicable.	Noted

2.	The Project proponent complies with all the statutory requirements and judgment of Hon'ble Supreme Court dated 2nd August,2017 in Writ Petition (Civil) No. 114 of 2014 in matter of Common Cause versus Union of India & Ors before commencing the mining operations.	All statutory requirements have been complied from time to time.
3.	The State Government concerned shall ensure that mining operation shall not be commenced till the entire compensation levied, if any, for illegal mining paid by the Project Proponent through their respective Department of Mining & Geology in strict compliance of Judgment of Hon'ble Supreme Court dated 2nd August, 2017 in Writ Petition (Civil) No. 114 of 2014 in matter of Common Cause versus Union of India & Ors.	Noted
4.	This Environmental Clearance shall become operational only after receiving formal NBWL Clearance from MoEF & CC subsequent to the recommendations of the Standing Committee of National Board for Wildlife, if applicable to the Project.	Not Applicable.
5.	This Environmental Clearance shall become operational only after receiving formal Forest Clearance (FC under the provision of Forest Conservation Act, 1980, if applicable to the Project.	Forest Clearance for diversion of 62.56 Ha forest land for mining has been obtained vide File No. 8-56/1994-FC(pt) dated 30.09.2013.
6.	Project Proponent (PP) shall obtain Consent to Operate after grant of EC and effectively implement all the conditions stipulated therein. The mining activity shall not commence prior to obtaining Consent to Establish / Consent to Operate from the concerned State Pollution Control Board/Committee.	CTO has been granted by Odisha State Pollution Control Board and valid till 31.03.2024.
7.	The PP shall adhere to the provision of the Mines Act,1952, Mines and Mineral (Development & Regulation), Act,2015 and rules & regulations Made there under. PP shall adhere to various circulars issued by Directorate General Mines Safety (DGMS) and Indian Bureau of Mines from time to time.	All statutory compliances are being adhered w.r.t various circulars are being issued time to time by DGMS and IBM.
8.	The Project Proponent shall obtain consents from all the concerned land owners, before start of mining operations, as per the provisions of MMDR Act, 1957 and rules made there under in respect of lands which are not owned by it.	All consents are in place for mining activity.
9.	The Project Proponent shall follow the mitigation measures provided in MoEF & CC's Office Memorandum No.Z-11013/57/2014-IA.II (M), dated 29th October, 2014, titled "Impact of mining activities on Habitations-Issues related to the mining Projects wherein Habitations and villages are	Noted and followed.

	the part of mine lease areas or Habitations and villages are surrounded by the mine lease area".	
10.	The Project Proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of surface water and from CGWA for withdrawal of ground water for the project.	Permission for ground water withdrawal has been obtained vide NOC No: - CGWA/ NOC/MIN/ORIG/2018/4309 and the renewal is in process.
11.	A copy of EC letter will be marked to concerned Panchayat / local NGO etc. if any, from whom suggestion / representation has been received while processing the proposal.	A copy of EC letter has been submitted to the concerned Panchayat.
12.	State Pollution Control Board/Committee shall be responsible for display of this EC letter at its Regional office, District Industries Centre and Collector's office/ Tehsildar's Office for 30 days.	Noted
13.	The Project Authorities should widely advertise about the grant of this EC letter by printing the same in at least two local newspapers, one of which shall be in vernacular language of the concerned area. The advertisement shall be done within 7 days of the issue of the clearance letter mentioning that the instant project has been accorded EC and copy of the EC letter is available with the State Pollution Control Board/Committee and web site Of the Ministry of Environment, Forest and Climate Change (www.parivesh.nic.in). A copy of the advertisement may be forwarded to the concerned MoEF & CC Regional Office for compliance and record	Complied. Newspaper advertisement was made in 'Manthan', Odia Newspaper and in 'Odisha Today', English newspaper on 09.03.2020 .
14.	The Project Proponent shall inform the MoEF &CC for any change in Ownership of the mining lease. In case there is any change in ownership or mining lease is transferred than mining operation shall only be carried out after transfer of EC as per provisions of the para11 of EIA Notification,2006 as amended from time to time.	Noted.

II. Air quality monitoring and preservation

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	The Project Proponent shall install a minimum of 3(three) online Ambient Air Quality Monitoring Stations with 1 (one) in upwind and 2 (two) in downwind direction based on long term climatological data about wind direction such that an angle of 120° is made between the monitoring locations to monitor critical parameters, relevant for mining operations, of	Since the mines is longitudinal in nature, hence 2 nos. of online CAAQMS stations have been installed in discussion with OSPCB and as per CTO condition. The ambient air quality is being continuously monitored and the data is being digitally displayed in front of main gate.

	air pollution viz. PM10, PM2.5, NO2, CO and 502 etc. as per the methodology mentioned in NAAQS Notification No. B-29016/20/90/PCl/I, dated 18.11.2009 covering the aspects of transportation and use of heavy machinery in the impact zone. The ambient air quality shall also be monitored at prominent places like office building, canteen etc. as per the site condition to ascertain the exposure characteristics at specific places. The above data shall be digitally displayed within 03 months in front of the main Gate of the mine site.	
2.	Effective safeguard measures for prevention of dust generation and subsequent suppression (like regular water sprinkling, metaled road construction etc.) shall be carried out in areas prone to air pollution wherein high levels of PM10 and PM2.5 are evident such as haul road, loading and unloading point and transfer points. The Fugitive dust emissions from all sources shall be regularly controlled by installation of required equipment's /machineries and preventive maintenance. Use of suitable water-soluble chemical dust suppressing agents may be explored for better effectiveness of dust control system. It shall be ensured that air pollution level conform to the standards prescribed by the MoEF CC/ Central Pollution Control Board.	Water sprinkling on haulage roads is done on a regular basis for dust suppression. Dust suppression systems have been installed at all source emission points and the air quality conforms to the standards as prescribed by the statutory bodies.

III. Water quality monitoring and preservation

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	In case, immediate mining scheme envisages intersection of ground water table, then Environmental Clearance shall become operational only after receiving formal clearance from CGWA. In case, mining operation involves intersection of ground water table at a later stage, then PP shall ensure that prior approval from CGWA and MoEF & CC is in place before such mining operations. The permission for intersection of ground water table shall essentially be based on detailed hydro-geological study of the area.	Permission for ground water withdrawal has been obtained vide NOC No: - CGWA/NOC/MIN/ORIG/2018/4309 and the renewal is in progress.

2.	Regular monitoring of the flow rate of the springs and perennial nallahs flowing in and around the mine lease shall be carried out and records maintain. The natural water bodies and or streams which are flowing in an around the village, should not be disturbed. The Water Table should be nurtured so as not to go down below the pre-mining period. In case of any water scarcity in the area, the Project Proponent has to provide water to the villagers for their use. A provision for regular monitoring of water table in open dug well located in village should be incorporated to ascertain the impact of mining over ground water table. The Report on changes in Ground water level and quality shall be submitted on six-monthly basis to the Regional Office of the Ministry, CGWA and State Groundwater Department / State Pollution Control Board.	Regular monitoring of the nearby surface water bodies as well as the water table is done in and around the mines lease area. The report of ground water quality and level is submitted to MoEF & CC, CGWA and SPCB on regular basis.
3.	Project Proponent shall regularly monitor and maintain records w.r.t. ground water level and quality in and around the mine lease by establishing a network of existing wells as well as new piezo-meter installations during the mining operation in consultation with Central Ground Water Authority/ State Ground Water Department. The Report on changes in Ground water level and quality shall be submitted on six-monthly basis to the Regional Office of the Ministry, CGWA and State Groundwater Department / State Pollution Control Board.	The ground water level as well as the quality in and around the mines lease area are being monitored and quality being analyzed by 3rd party NABL accredited lab. The reports are being submitted periodically to the statutory bodies.
4.	The Project Proponent shall undertake regular monitoring of natural water course/ water resources/ springs and perennial nallahs existing/ flowing in and around the mine lease and maintain its records. The project proponent shall undertake regular monitoring of water quality upstream and downstream of water bodies passing within and nearby/ adjacent to the mine lease and maintain its records. Sufficient number of gullies shall be provided at appropriate places within the lease for management of water. PP shall carryout regular monitoring w.r.t pH and included the same in monitoring plan. The parameters to be monitored shall include their water quality vis-a-vis suitability for usage as per CPCB criteria and flow rate. It shall be ensured that no obstruction and/ or alteration be made to water bodies during mining operations without justification and prior approval of MoEF & CC. The monitoring of water courses/ bodies existing in lease area shall be carried out four times in a year viz. pre-monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and the record of monitored data may be sent regularly to Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority and Regional Director, Central Ground Water	Regular monitoring of surface water bodies such as nallahs, springs etc. in and around the mines lease area is being done and records maintained. The water quality monitoring and analysis is being done by 3rd party NABL accredited lab and reports are sent to statutory bodies regularly.

	Board, State Pollution Control Board and Central Pollution Control Board. Clearly showing the trend analysis on six-monthly basis.	
5.	Quality of polluted water generated from mining operations which include Chemical Oxygen Demand (COD) in mines run-off; acid mine drainage and metal contamination in runoff shall be monitored along with Total Suspended Solids (TDS), Dissolved Oxygen (DO), pH and Total Suspended Solids (TSS).The monitored data shall be uploaded on the website of the company as well as displayed at the project site in public domain, on a display board, at a suitable location near the main gate of the Company. The circular No. J-20012/1/2006-IA.II (M) dated 27.05.2009 issued by Ministry of Environment, Forest and Climate Change may also be referred in this regard	All monitoring and analysis data generated by 3rd party NABL accredited lab is being submitted to State Pollution Control Board on regular basis and displayed at the project site in public domain. The monitoring results for the period Oct 2022 to March 2023 is attached as **Annexure I**
6.	Project Proponent shall plan, develop and implement rainwater harvesting Measures on long term basis to augment ground water resources in the area in consultation with Central Ground Water Board/ State Groundwater Department. A report on amount of water recharged needs to be submitted to Regional Office MoEF & CC annually.	The village ponds are being restored by cleaning during pre-monsoon to harvest and recharge groundwater to the maximum extent possible. Additionally, roof top rain water harvesting system is being installed on the office premises.
7.	Industrial waste water (workshop and waste water from the mine) should be properly collected and treated so as to conform to the notified standards prescribed from time to time. The standards shall be prescribed through Consent to Operate (CTO) issued by concerned State Pollution Control Board (SPCB). The workshop effluent shall be treated after its initial passage through Oil and grease trap.	Effluent Treatment Plant is in place and water quality at the inlet and outlet is being monitored through 3rd party NABL accredited lab, which conforms to the standard prescribed in CTO issued by OSPCB. The workshop effluent is initially passed through oil & grease trap before treatment.
8.	The water balance/water auditing shall be carried out and measure for reducing the consumption of water shall be taken up and reported to the Regional Office of the MoEF &CC and State Pollution Control Board/Committee.	Efforts are being taken to reduce the water consumption by recycling of wastewater post treatment.

IV. Noise and vibration monitoring and prevention

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	The peak particle velocity at 500m distance or within the nearest habitation, whichever is closer shall be monitored periodically as per applicable DGMS guidelines.	Peak particle velocity is being monitored periodically as per applicable DGMS guidelines.
2.	The illumination and sound at night at project sites disturb the villages in respect of both human and animal population. Consequent sleeping disorders and stress may affect the health in the villages located close to mining operations. Habitations have a right for darkness and minimal noise levels at night. PPs must ensure that the biological clock of the villages is not disturbed; by orienting the floodlights/ masks away from the villagers and keeping the noise levels well within the prescribed limits for day /night hours.	The orientation of floodlights is maintained away from the villagers and noise levels are maintained within the prescribed standard limits for day and night.
3.	The Project Proponent shall take measures for control of noise levels below 85 dBA in the work environment. The workers engaged in operations of HEMM, etc. should be provided with ear plugs/muffs. All personnel including laborers working in dusty areas shall be provide with protective respiratory devices along with adequate training, awareness and information on safety and health aspects. The PP shall be held responsible in case it has been found that workers/ personals/ laborers are working without personal protective equipment.	All necessary precautionary measures have been taken such as controlled blasting to control the noise levels as per stipulated standard. Workers engaged in high noise operation areas have been provided with ear plugs/muffs. All HEMM have been provided air conditioned cabin for providing comforts to operators and protection form noise.

V. Mining plan

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	The Project Proponent shall adhere to the working parameters of mining plan which was submitted at the time of EC appraisal wherein year-wise plan was mentioned for total excavation i.e. Quantum of mineral, waste, over burden, inter burden and top soil etc. No change in basic mining proposal like mining technology, total excavation, mineral & waste production, lease area and scope of working (viz. method of mining, overburden & dump management, O.B & dump mining, mineral transportation mode, ultimate depth of mining etc.) shall not be carried	All the working parameters as per the approved mining plan is being adhered to.

	out without prior approval of the Ministry of Environment, Forest and Climate Change, which entail adverse environmental impacts, even if it is a part of approved mining plan modified after grant of EC or granted by State Govt. in the form to Short Term Permit (STP), Query license or any other name.	
2.	The Project Proponent shall get the Final Mine Closure Plan along with Financial Assurance approved from Indian Bureau of Mines/Department of Mining & Geology as required under the Provision of the MMDR Act, 1957 and Rules/ Guidelines made there under. A copy of approved final mine closure plan shall be submitted within 2 months of the approval of the same from the competent authority to the concerned Regional Office of the Ministry of Environment, Forest and Climate Change for record and verification.	Noted.
3.	The land-use of the mine lease area at various stages of mining scheme As well as at the end-of-life shall be governed as per the approved Mining Plan. The excavation vis-à-vis backfilling in the mine lease area and corresponding afforestation to be raised in the reclaimed area shall be governed as per approved mining plan. PP shall ensure the monitoring and management of rehabilitated areas until the vegetation becomes self-sustaining. The compliance status shall be submitted half-yearly to the MoEFCC and its concerned Regional Office.	The land use at various stages of mining is as per the approved mining plan. The compliance status of the same is submitted half yearly to the statutory body.

VI. Land reclamation

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	The Overburden (O.B.) generated during the mining operations shall be stacked at earmarked OB dump site(s) only and it should not be kept active for a long period of time. The physical parameters of the OB dumps like height, width and angle of slope shall be governed as per the approved Mining Plan as per the guidelines/circulars issued by D.G.M.S w.r.t. safety in mining operations shall be strictly adhered to maintain the stability of top soil/OB dumps. The topsoil shall be used for land reclamation and plantation.	The Overburden (O.B.) generated during the mining operations is being stacked at earmarked OB dump site as per approved mining plan. Safety in mining operations is being adhered to maintain slope stability and top soil is used for land reclamation and plantation.

2.	The reject/waste generated during the mining operations shall be stacked at earmarked waste dump site(s) only. The physical parameters of the waste dumps like height, width and angle of slope shall be governed as per the approved Mining Plan as per the guidelines/circulars issued by DGMS w.r.t. safety in mining operations shall be strictly adhered to maintain the stability of waste dumps.	The rejects/wastes generated during mining operations are stacked at waste dump site as per approved mining plan where in the physical parameters such as height, width and angle of slope are maintained as stipulated in mining plan.
3.	The reclamation of waste dump sites shall be done in scientific manner as per the Approved Mining Plan cum Progressive Mine Closure Plan,	The reclamation of waste dump sites will be done as per the approved Mining Plan cum Progressive Mine Closure Plan.
4.	The slope of dumps shall be vegetated in scientific manner with suitable native species to maintain the slope stability, prevent erosion and surface run off. The selection of local species regulates local climatic parameters and help in adaptation of plant species to the microclimate. The gullies formed on slopes should be adequately taken care of as it impacts the overall stability of dumps. The dump mass should be consolidated with the help of dozer/ compactors thereby ensuring proper filling/ leveling of dump mass. In critical areas, use of geo textiles/ geo-membranes / clay liners / Bentonite etc. shall be undertaken for stabilization of the dump.	Vegetation on slope of dumps will be done with local species to maintain the slope stability thereby preventing erosion and surface run off.
5.	The Project Proponent shall carry out slope stability study in case the dump height is more than 30 meters. The slope stability report shall be submitted to concerned regional office of MoEF&CC.	The slope stability study will be conducted by IIT Bhubaneswar and the report will be submitted to the regional office of MoEF&CC by end of July 2023.
6.	Catch drains, settling tanks and siltation ponds of appropriate size shall be constructed around the mine working, mineral yards and Top Soil/OB/Waste dumps to prevent run off of water and flow of sediments directly into the water bodies (Nallah/ River/ Pond etc.). The collected water should be utilized for watering the mine area, roads, green belt development, plantation etc. The drains/ sedimentation sumps etc. shall be de-silted regularly, particularly after monsoon season, and maintained properly.	Catch drains, settling tanks and siltation ponds have been constructed as per approved mining plan. The drains/ sedimentation sumps etc. are de-silted regularly and maintained properly.
7.	Check dams of appropriate size, gradient and length shall be constructed around mine pit and OB dumps to prevent storm run-off and sediment flow into adjoining water bodies. A safety margin of 50% shall be kept for designing of sump structures over and above peak rainfall (based on 50 years data) and maximum discharge in the mine and its adjoining area which shall also help in providing adequate retention time period thereby allowing proper settling of sediments/ silt material. The sedimentation pits/ sumps shall be constructed at the corners of the garland drains.	Check dams, garland drain and retaining wall have been constructed around mine pit and OB dumps.

8.	The top soil, if any, shall temporarily be stored at earmarked site(s) with in the mine lease only and should not be kept unutilized for long. The physical parameters of the top soil dumps like height, width and angle of slope shall be governed as per the approved Mining Plan and as per the guidelines framed by DGMS w.r.t safety in mining operations shall be strictly adhered to maintain the stability of dumps. The topsoil shall be used for land reclamation and plantation purpose.	Top soil removed is being utilized for plantation and green belt development.

VII. Transportation

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	No Transportation of the minerals shall be allowed in case of roads passing through villages/ habitations. In such cases, PP shall construct a 'bypass' road for the purpose of transportation of the minerals leaving an adequate gap (say at least 200 meters) so that the adverse impact of sound and dust along with chances of accidents could be mitigated. All costs resulting from widening and strengthening of existing public road network shall be borne by the PP in consultation with nodal State Govt. Department. Transportation of minerals through road movement in case of existing village/ rural roads shall be allowed in consultation with nodal State Govt. Department only after required strengthening such that the carrying capacity of roads is increased to handle the traffic load. The pollution due to transportation load on the environment will be effectively controlled and water sprinkling will also be done regularly. Vehicular emissions shall be kept under control and regularly monitored. Project should obtain Pollution Under Control (PUC) certificate for all the vehicles from authorized pollution testing centers.	Transportation of limestone from mines to plant is done through fully covered belt conveyor system (CCBC). Only PUC certified vehicles are allowed to operate within the mining lease hold area.
2.	The Main haulage road within the mine lease should be provided with a permanent water sprinkling arrangement for dust suppression. Other roads within the mine lease should be wetted regularly with tanker-mounted water sprinkling system. The other areas of dust generation like crushing zone, material transfer points, material yards etc. should invariably be provided with dust suppression arrangements. The air pollution control equipment's like bag filters, vacuum suction hoods, dry fogging system etc. shall be installed at Crushers, belt-conveyors and other	Water sprinkling is being done regularly on haulage roads. Dust suppression systems such as dry fog system is in place at receiving hopper, transfer towers etc. Bag filters have been installed at crusher houses and other places prone to air pollution to control fugitive dust emissions.

	areas prone to air pollution. The belt conveyor should be fully covered to avoid generation of dust while transportation. PP shall take necessary measures to avoid generation of fugitive dust emissions.	

VIII. Green Belt

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	The Project Proponent shall develop greenbelt in 7.5m wide safety zone all along the mine lease boundary as per the guidelines of CPCB in order to arrest pollution emanating from mining operations within the lease. The whole Green belt shall be developed within first 5 years starting from windward side of the active mining area. The development of greenbelt shall be governed as per the EC granted by the Ministry irrespective of the stipulation made in approved mine plan.	Green belt of adequate width with native species has been developed along the common boundary of mine lease and surface rights area.
2.	The Project Proponent shall carryout plantation/ afforestation in backfilled and reclaimed area of mining lease, around water body, along the roadsides, in community areas etc. by planting the native species in consultation with the State Forest Department/ Agriculture Department/ Rural development department/ Tribal Welfare Department/ Gram Panchayat such that only those species be selected which are of use to the local people. The CPCB guidelines in this respect shall also be adhered. The density of the trees should be around 2500 saplings per Hectare. Adequate budgetary provision shall be made for protection and care of trees.	As on 31.03.2023, total cumulative of 3,35,236 plantations have been done over an area of 84.89 hectares within the mining lease area and 3484 plantations have been done over an area of 17.50 hectares outside the mining lease area with a survival rate of 75 percent. Efforts are being taken to increase the survival rate to more than 90%.
3.	The Project Proponent shall make necessary alternative arrangements for livestock feed by developing grazing land with a view to compensate those areas which are coming within the mine lease. The development of such grazing land shall be done in consultation with the State Government. In this regard, Project Proponent should essentially implement the directions of the Hon'ble Supreme Court with regard to acquisition of grazing land. The sparse trees on such grazing ground, which provide mid-day shelter from the scorching sun, should be scrupulously guarded/ protected against felling and plantation of such trees should be promoted.	Noted and will be taken care in due course of time.

4.	The Project Proponent shall undertake all precautionary measures for conservation and protection of endangered flora and fauna and Schedule-I species during mining operation. A Wildlife Conservation Plan shall be prepared for the same clearly delineating action to be taken for conservation of flora and fauna. The Plan shall be approved by Chief Wild Life Warden of the State Govt.	Site specific wild life conservation plan has been approved by chief conservator of forest (WL), Odisha having letter No -4313/CWLW-FDWC-FD-0040-2022, Dated 03rd March 2023.
5.	And implemented in consultation with the State Forest and Wildlife Department. A copy of Wildlife Conservation Plan and its implementation status (annual) shall be submitted to the Regional Office of the Ministry.	The approved wildlife conservation plan is being implemented in consultation with State Forest & wildlife department.

IX. Public hearing and human health issues

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	The Project Proponent shall appoint an Occupational Health Specialist for Regular as well as Periodical medical examination of the workers engaged in the mining activities, as per the DGMS guidelines. The records shall be maintained properly. PP shall also carryout Occupational health check-ups in respect of workers which are having ailments like BP, diabetes, habitual smoking, etc. The check-ups shall be undertaken once in six months and necessary remedial/ preventive measures be taken. A status report on the same may be sent to MoEF & CC Regional Office and DGMS on half-yearly basis.	Periodical medical examination of workers engaged in mining activities is being done as per DGMS guidelines, records maintained properly and submitted to the statutory bodies. An OHS specialist has been deputed in mines dispensary.
2.	The Project Proponent must demonstrate commitment to work towards 'Zero Harm' from their mining activities and carry out Health Risk Assessment (HRA) for identification workplace hazards and assess their potential risks to health and determine appropriate control measures to protect the health and wellbeing of workers and nearby community. The proponent shall maintain accurate and systematic records of the HRA. The HRA for neighborhood has to focus on Public Health Problems like Malaria, Tuberculosis, HIV, Anaemia, Diarrhoea in children under five, respiratory infections due to biomass cooking. The proponent shall also create awareness and educate the nearby community and workers for Sanitation, Personal Hygiene, Hand washing, not to defecate in open, Women Health and Hygiene (Providing Sanitary Napkins), hazard of tobacco and alcohol use. The Proponent shall carryout base line HRA for all the category of workers and thereafter every five years.	Health Risk assessment has been done and necessary control measures are being taken to protect the health and well being of workers and nearby community from time to time.

3.	The Proponent shall carry out Occupational health surveillance which be a part of HRA and include Biological Monitoring where practical and feasible, and the tests and investigations relevant to the exposure (e.g. for Dust a X-Ray chest; For Noise Audiometric; for Lead Exposure Blood Lead, For Welders Full Ophthalmologic Assessment; for Manganese Miners a complete Neurological Assessment by a Certified Neurologist, and Manganese (Mn) Estimation in Blood; For Inorganic Chromium- Fortnightly skin inspection of hands and forearms by a responsible person. Except routine tests all tests would be carried out in a Lab accredited by NABH. Records of Health Surveillance must be kept for 30 years, including the results of and the records of Physical examination and tests. The record of exposure due to materials like Asbestos, Hard Rock Mining, Silica, Gold, Kaolin, Aluminium, Iron, Manganese, Chromium, Lead, Uranium need to be handed over to the Mining Department of the State in case the life of the mine is less than 30 years. It would be obligatory for the State Mines Departments to make arrangements for the safe and secure storage of the records including X-Ray. Only conventional X-Ray will be accepted for record purposes and not the digital one). X-Ray must meet ILO criteria (17 x14 inches and of good quality).	Occupational health surveillance is carried out periodically.
4.	The Proponent shall maintained a record of performance indicators for workers which includes (a) there should not be a significant decline in their Body Mass Index and it should stay between 18.5 -24.9, (b) the Final Chest X-Ray compared with the base line X-Ray should not show any capacities ,(c) At the end of their leaving job there should be no Diminution in their Lung Functions Forced Expiratory Volume in one second (FEV1),Forced Vital Capacity (FVC), and the ratio) unless they are smokers which has to be adjusted, and the effect of age, (d) their hearing should not be affected. As a proof an Audiogram (first and last need to be presented), (e) they should not have developed any Persistent Back Pain, Neck Pain, and the movement of their Hip, Knee and other joints should have normal range of movement, (f) they should not have suffered loss of any body part. The record of the same should be submitted to the Regional Office, MoEFCC annually along with details of the relief and compensation paid to workers having above indications.	Records of Performance Indicators w.r.t workers engaged in the mining activities are maintained.
5.	The Project Proponent shall ensure that Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects.	PPEs are provided to the workers and have been made mandatory with necessary training on safety and health aspects.

6.	Project Proponent shall make provision for the housing for workers/labours or shall construct labor camps within/outside (company owned land) with necessary basic infrastructure/ facilities like fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche for kids etc. The housing may be provided in the form of temporary structures which can be removed after the completion of the project related infrastructure. The domestic waste water should be treated with STP in order to avoid contamination of underground water.	Necessary basic infrastructure facilities are in place for mine workers at site.
7.	The activities proposed in Action plan prepared for addressing the issues raised during the Public Hearing shall be completed as per the budgetary provisions mentioned in the Action Plan and within the stipulated time frame. The Status Report on implementation of Action Plan shall be submitted to the concerned Regional Office of the Ministry along with District Administration.	Action Plan addressing the issues raised during the public hearing is under implementation as per budgetary provision and within stipulated time frame and status report being submitted to the concerned statutory bodies as well as District administration.

X. Corporate Environment Responsibility (CER)

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	The activities and budget earmarked for Corporate Environmental Responsibility (CER) as per Ministry's 0.M No 22-65/2017-IA. II (M) dated 01.05.2018 or as proposed by EAC should be kept in a separate bank account. The activities proposed for CER shall be implemented in a time bound manner and annual report of implementation of the same along with documentary proof viz. photographs, purchase documents, latitude &longitude of infrastructure developed & road constructed needs to be submitted to Regional Office, MoEF&CC annually along with audited statement	Noted
2.	Project Proponent shall keep the funds earmarked for environmental protection measures in a separate account and refrain from diverting the same for other purposes. The Year wise expenditure of such fund should be reported to the MoEF&CC and its concerned Regional Office.	Funds earmarked for environmental protection measures are used only for environmental aspects and is not being diverted for any other purpose.

XI. Miscellaneous

Sl. No.	STANDARD CONDITIONS	COMPLIANCE STATUS
1.	The Project Proponent shall prepare digital map (land use & land cover) of the entire lease area once in five years purpose of monitoring land use pattern and submit a report to concerned Regional Office of the MoEF&CC.	Digital Map of the entire lease area (LULC Map) is being prepared and shall be submitted to the Regional office of the Ministry by September 2023.
2.	The Project Authorities should inform to the Regional Office regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.	Noted and will be complied in due course of time.
3.	The Project Proponent shall submit six monthly compliance reports on the status of the implementation of the stipulated environmental safeguards to the MOEFCC & its concerned Regional Office, Central Pollution Control Board and State Pollution Control Board.	Six monthly compliance reports are being submitted periodically to the statutory bodies.
4.	A separate Environmental Management Cell with suitable qualified manpower should be set-up under the control of a Senior Executive. The Senior Executive shall directly report to Head of the Organization. Adequate number of qualified Environmental Scientists and Mining Engineers shall be appointed and submit a report to RO, MoEF&CC.	An Environment Management Cell is in place with qualified environmental officer who functionally reports to the Head of Environment and administratively to the Head of Mines.
5.	The concerned Regional Office of the MoEF&CC shall randomly monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the MoEF&CC officer(s) by furnishing the requisite data / information / monitoring reports.	Noted and full cooperation will be extended.

ENVIRONMENTAL MONITORING REPORT

BASED ON DATA GENERATED

FROM

OCTOBER 2022 – MARCH 2023

FOR

DALMIA CEMENT (BHARAT) LIMITED

At/Po: RAJGANGPUR, District: SUNDARGARH, ODISHA

AT

LANJIBERNA LIMESTONE & DOLOMITE MINES PROJECT

Prepared By:

Cleenviron Private Limited
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1. INDRODUCTION

Lanjiberna Limestone & Dolomite Mines of M/s DALMIA CEMENT (BHARAT) LIMITED is a captive mine for its Cement manufacturing works situated at Rajgangpur in the district of Sundargarh of Odisha State. The mining lease covering an area of 893.55 ha has been reduced to 873.057 ha and is located near the village Lanjiberna (**Figure No: 1.1**), under Sundargarh Sadar sub-division of Sundargarh district approximately 18 kms from the Cement Works by road and the aerial distance will be around 12 kms. A vicinity map up to 10 kms radius from the center of the lease is given in **Figure No: 1.2**. Presently the mine is producing 9.50 million tones of Lime Stone per annum and 80, 000 TPA of Dolomite as per Environmental Clearance from Ministry of Environment and Forest, Govt. India vide letter no: J-11015/202/2016-IA.II(M) dated: 4th March 2020. Consent to operate from State Pollution Control Board, Odisha is also valid up to 31st March 2023 vide Order No 162,vide letter No 4884/IND-I-CON-258, Dt 28.03.2022 for the production of 9.50 million tones of Limestone and 80, 000 TPA of Dolomite.

2. PRESENT STATUS OF THE PROJECT

At present from October 2022 to March 2023 the mine has produced Limestone of 27, 86, 752.00 MT and there was production of Dolomite to the tune of 3, 852.00 MT during the period mentioned, during the period 27, 92, 328.00 MT of sized Limestone has been dispatched to the cement plant and dispatch of Dolomite was 3, 999.8 MT during the period.

The operation of the mines is being carried out in all total three no. of quarries, those are Quarry no. 2 & 6, Quarry no.1 & 3 and Quarry no. 4 & 5.

Status of Compliances as on 31st March 2023.

1. Forest Clearance has been obtained from the MoEF vide letter No.8-56/1994-FC(pt) Dated 30.09.2013.
2. As on date, 102.39 Ha. area has been covered with plantation. Total 3, 38, 720 nos. of trees have been planted including species like Teak, Shisham, Chakunda, Debdaru & Mango etc. till March 2023. Survival rate is approximately is 70.0%. Also total 23, 275 nos. of sapling of Mango, Cashew (Kaju) , Lemon , Teak & Drumstick (Sajana) planted over an area of 133 acres land under WADI Project scheme for economic upliftment of the farmers, through sustainable agriculture, social empowerment.
3. Four ambient air quality monitoring stations in core zone and two in the buffer zone are fixed in consultation with SPCB and considering the meteorological data. Monitoring is being carried out on twice weekly basis at each location as per NAAQS, 18th November 2009.
4. Fugitive dust emission monitoring is carried out on quarterly basis and data thus collected are mentioned in this report. Hydraulic drills attached with efficient dust collection system have been deployed. Latest blasting technology is being adopted. Water sprinkling is being done on haul roads, quarry faces, limestone receiving hopper, conveyor belt etc. Limestone crushing plant has been provided with bag filter. Filter bags are periodically cleaned/ changed. Permanent water sprinkling systems along the haul roads have been installed along the main haul road.
5. To control noise levels below 85 dB(A), latest blasting technology is being adopted. Drill bits are being timely sharpened. Preventive maintenance of diesel driven quarry equipment is being done as per OEM's recommendations. Workers engaged in blasting & drilling operations and in operating HEMM have been provided with ear plugs/ muffs.

Figure No: 1.1 Location Map of the Project

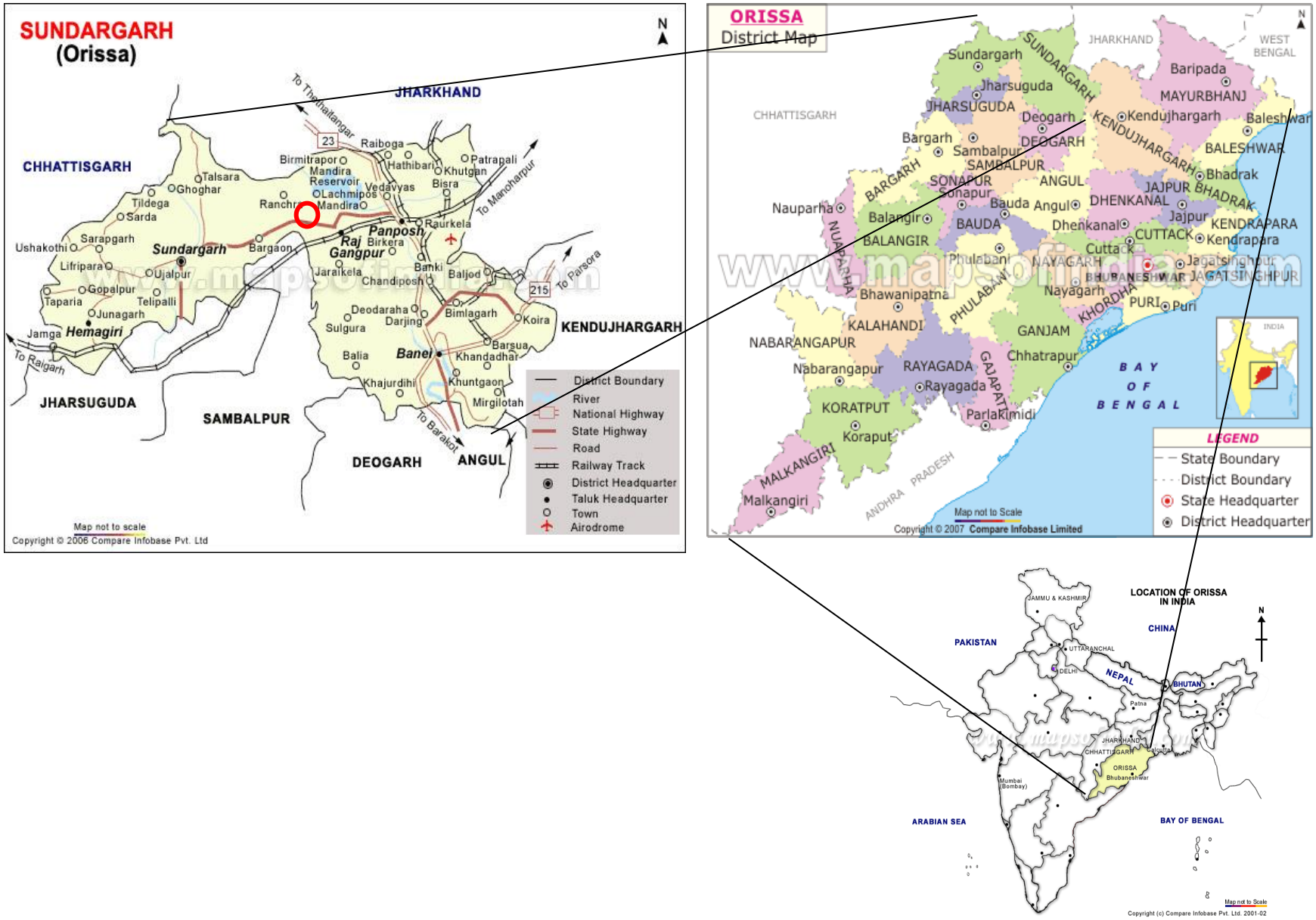
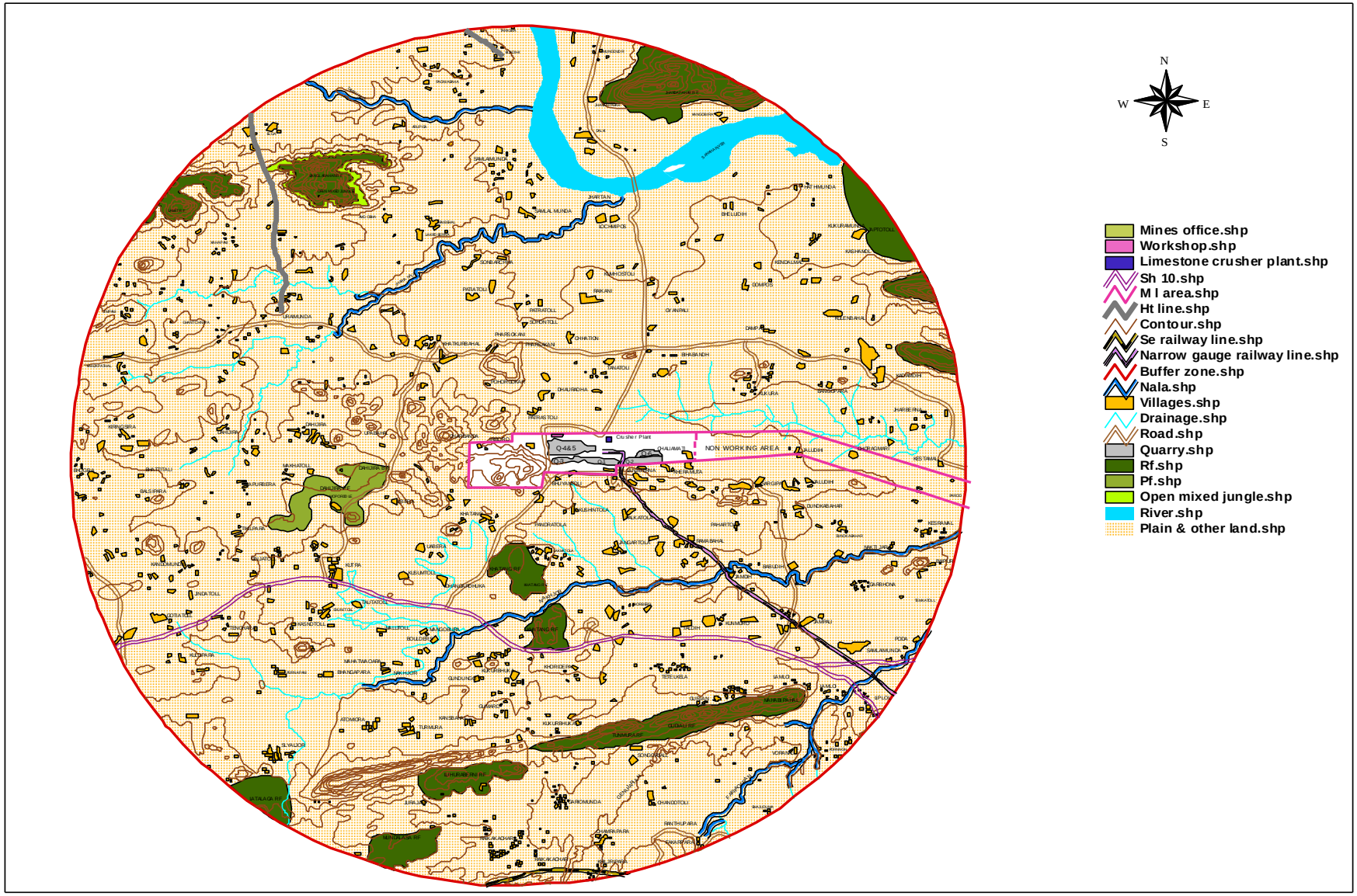


Figure No:1.2 Vicinity Map of Lanjiberna Limestone & Dolomite Mines



Prepared by: Cleenviron Pvt. Ltd.

6. Waste water from garage and workshop are carried to oil separation system (oil & grease trap) and the water is recycled. There is no discharge from the workshop. Water discharged from the quarry pits passes through long drainage and discharge to settling tanks. Thereafter, the water is allowed to discharge to the nearby agricultural land for ultimate usage by the tenants for cultivation purpose as per advice of District Administration. The quality of water is regularly monitored by accredited laboratory and is found well within the prescribed norms. The discharge water from quarry pits is monitored on quarterly basis and the data collected is mentioned in this report.
7. Environmental management Cell has been set up and functioning.

3. ASPECTS CONSIDERED FOR ENVIRONMENTAL MONITORING

This report is based on the monitoring results generated from October 2022 to March 2023 covering post-monsoon and winter seasons of the year. Micro-meteorological monitoring was carried out on continuous basis and Ambient Air monitoring was carried out on twice weekly basis at each location and Stack Emission from Limestone Crusher Plant was carried out on monthly once basis. However other aspects like, Water quality, Fugitive Dust Emission monitoring and Noise level studies are carried out on quarterly basis, i.e. during November and February months of the year. Environmental Monitoring data were generated at Lanjiberna Limestone & Dolomite Mines and its buffer zone covering the following aspects in detail.

i. Micro-meteorological Study
ii. Ambient Air Quality Study
iii. Fugitive Dust Emission Study
iv. Stack Emission Monitoring from Crusher Plant
v. Quarry Discharge Water Quality Study
vi. Ground Water Level Study
vii. Noise Level Study
viii. Effluent Water Quality Study

Monitoring of environmental parameters for collection of data involves field work, which is described below:

3.1 Micro-meteorological Study

For collection of micro-meteorological data like Temperature, Relative Humidity, Wind Speed, Wind Direction, & Rainfall, a weather monitoring station is fixed on the Magazine Hill Top of Lanjiberna Limestone and Dolomite Mines of M/s DALMIA CEMENT (BHARAT) LIMITED Hourly data is being recorded continuously by putting up windows compatible data logging facility instrument, Make: Virtual Electronics Company, Roorkee.

3.2 Ambient Air Monitoring

To assess ambient air quality, total 6 (six) monitoring stations are fixed including 4 (four) in the Core zone and 2 (two) in the buffer zone. The monitoring locations are fixed according to the micro-meteorological data and in consultation with State Pollution Control Board. The monitoring was carried out for parameters like PM2.5, PM10, SO_2, NO_2 and monitoring was carried out on twice weekly basis at each location. For collection of samples Respirable Dust sampler and Fine Particulate samplers were placed at each location, sampling and analytical techniques are followed as per the standard method of ambient air sampling and analysis. The other parameters like NH_3, O_3, CO, As, Ni, Pb, Benzene & Benzo(a)pyrene are monitored once in a year from four core zone AAQ monitoring stations only.

3.3 Fugitive Dust Emission Monitoring

To find out the quantity of fugitive dust emission from the mining operation, two main dust generating locations are identified and those are within the quarry during operation of Excavators and Drill machines. The second location was set up on the haulage road of the mines leading to Crusher Plant. For collection of samples two high volume samplers are used and 8 hourly samples are collected for Particulate Matter only. Fugitive monitoring was carried out on quarterly basis, during month of November for post-monsoon and February for winter season.

3.4 Stack Emission Monitoring from Crusher Plant

The crusher plant of Lanjiberna Limestone and Dolomite mines is equipped with a Dust Extraction and Bag House Filter system to control the emission of dust particles during crushing operation of Limestone lumps in to required size. To assess the emission level of Particulate Matter from the stack of bag filter system, monitoring of Stack emission was scheduled on monthly once basis. Particulate Matter emission was monitored following the IS methods for Stack monitoring.

3.5 Quarry Discharge Water Quality Study

Total three locations were fixed for sampling of the quarry discharge water from three different quarries operating. The sampling and analysis of quarry discharge water were carried out on monthly basis. The parameters analyzed are as per the Schedule – IV of EPA, G.S.R.422(E), 1993. For analysis of parameters the samples were fixed and preserved as per the standard methods of sampling by APHA 23rd Edition.

3.6 Ground Water Level Study

To assess the ground water availability and fluctuation, a net work of 5(Five) existing dug wells are fixed, from where the ground water quality study were carried out during the month of May or June and one extra location was considered in the village Katang for ground water level measurement. The variation of ground water level is being studied on quarterly basis during the months of November for post-monsoon season and February for winter season.

3.7 Noise Level Study

Noise monitoring were carried out at 4(four) different locations within the Core zone once in three months period during November and February months. The measurements were collected by Sound Level Meter, make: Envirotech Instruments Pvt. Ltd., New Delhi, in dB(A) at a height of 1.5 meter, above ground level and away from the sound reflecting sources like walls and buildings etc.

3.8 Effluent Water Quality

The waste water from Workshop/Garage of the Lanjiberna Limestone & Dolomite mines is directed to an Oil Separation Tank and after removal of Oil & TSS it is reused in HEMM washing. The outlet water from the Oil & Grease Separation tank was sampled and analysed for 5 (Five) parameters on quarterly basis during the months of November and February.

4. SAMPLING LOCATIONS

4.1 Micro-Meteorological Study

One meteorological station was set up on the Magazine Hill Top of the Lanjiberna Limestone & Dolomite Mines to monitor wind speed, wind direction, temperature, relative humidity and rainfall on hourly basis by data logging technique.

4.2 Ambient Air Quality Monitoring

Four ambient air quality monitoring stations are fixed within the core zone and two stations are fixed in the buffer zone. General precautions were taken to position the Respirable Dust Samplers at all the locations. The descriptions of the Ambient Air Monitoring Stations are as follows:

A-1 Near Brick Plant

The sampling station is located within the core zone and the station was selected to assess the present level of pollution due to excavation, drilling works being carried out in the quarry no 2&6 and also the movement of crushed limestone from the crusher plant to the Cement Works at Rajgangpur, by belt conveyors systems.

A-2 Limestone Crusher Plant Area

This location is around the Crusher plant area of the Mines within the core zone. This was selected to assess the air quality in and around the crusher plant and the level of pollution due to crushing, screening and transfer of Limestone to conveyor belts.

A-3 Lanjiberna Mines Office Area

The location was selected within the core zone and to assess the pollution load generated from the mini crusher plants situated near the northern boundary of the lease and near Quarry no 4&5.

A-4 Magazine Hill Top

The location was selected within the core zone and to assess the effect of mining as well as crushing operations of the mine on the background air quality and sensitive receptors on the hill top which is at a higher elevation from the ground.

A-5 Village Katang

This location is situated in the buffer zone of the mine and selection of this location was done as to assess the effect of the mining operation on the local receptors, as this village is falling in the predominant wind direction towards south-west of the lease area.

A-6 Village Bihabandh

This location is situated in the buffer zone of the mine and selection of this location was done as to assess the effect of the mining operation on the local receptors, as this village is falling in the predominant wind direction towards north-east of the lease area.

The distances and directions of the Ambient Air Quality monitoring locations are summarized in **Table No 4.1**

Table No 4.1: Ambient Air Quality Monitoring Stations

Sl No	Name of Location	Zone	Distance	Direction
1	Near Brick Plant	Core	-	-
2	Crusher Plant Area	Core	-	-
3	Lanjiberna Mines Office Area	Core	-	-
4	Magazine Hill Top	Core	-	-

Sl No	Name of Location	Zone	Distance	Direction
5	Village Katang	Buffer	1 km from ML Area	SW
6	Village Bihabandh	Buffer	2 km from ML Area	NE

4.3 Fugitive Dust Emission Study Locations:

Two fugitive dust emission monitoring locations are established inside the core zone, to find out the amount of dust being generated from the source during the excavation, drilling & hauling of Limestone to crusher plant. The descriptions of fugitive emission monitoring locations are as follows:

F-1 Downwind of Excavator/ Drill Machine within the Quarry

This location was fixed within an operating quarry and while operation of mining equipments are on. Towards the down wind direction of any excavator or drill machine within a distance of 500 m, one high volume sampler was set for 8 hour operation and the parameter monitored is SPM general precautions are obeyed while collection of samples.

F-2 Haulage Road Leading to Crusher Plant

This location was fixed to evaluate the amount of pollution load on the ambient air due to moving of heavy earth moving equipments like 35T & 50T Dumpers on the haulage road which leads to the Limestone Crusher Plant. The samplers are being operated for continuous of 8 hours by the side of the haulage road and parameter like SPM was measured.

4.4 Stack Emission Monitoring:

The stack of the bag filter unit installed at the limestone crusher plant was monitored for Particulate Matter emission from the same during the crushing of Limestone lumps in to different sizes. There is a platform made at a height around 25m from the ground at the stack and sample has been collected on monthly basis to evaluate the performance of the bag filters and emission level from the stack.

4.5 Quarry Discharge Water:

In order to assess the present quality of water, which is being discharged on to the land after pumping out from the quarry. Three sampling locations were set at the discharge points of the pumped out water. The samples were being collected from each discharge point every month. The descriptions of the locations are given below:

SW-1 Quarry 2&6 Discharge Water

The water collected inside the quarry no-2&6 is pumped out continuously and is stored in a RCC tank before allowing it to flow out of the ML area by a guided channel towards the northern side of the lease and the water is used by the near by villagers for irrigation purpose. The sample were collected from the out let of the RCC tank and analyzed for 27 parameters as per the Schedule – VI of EPA, G.S.R.422(E) 1993 for any contaminants in it.

SW-2 Quarry 1&3 Discharge Water

The water collected inside the quarry no-1&3 is pumped out continuously and is stored in a RCC tank before allowing it to flow out of the ML area by a guided channel towards the southern side of the lease and the water is used by the near by villagers for irrigation purpose. The sample were collected from the out let of the RCC tank and analyzed for 27 parameters as per the Schedule – VI of EPA, G.S.R.422(E) 1993 for any contaminants in it.

SW-3 Quarry 4&5 Discharge Water

The water collected inside the quarry no-4&5 is pumped out continuously and is stored in a RCC tank before allowing it to flow out of the ML area by a guided channel towards the north-eastern side of the lease and the water is used by the near by villagers for irrigation purpose. The sample were collected from

the out let of the RCC tank and analyzed for 27 parameters as per the Schedule – VI of EPA, G.S.R.422(E) 1993 for any contaminants in it.

4.6 Ground Water Level:

Ground water levels were measured during month of November and February to know the amount of seasonal fluctuation and availability of ground water during post-monsoon and winter seasons of the area. The details of the water level measurement locations are described below:

GW-1 Village Kheramuta Dug Well

The water level was measured from the dug well of Kheramuta village for water availability as the villagers are using the dug well water for their domestic purpose.

GW-2 Lanjiberna Colony Dug Well

The water level was measured from the dug well of Lanjiberna Colony for water availability as the workers are using the dug well water for their domestic purpose.

GW-3 Village Dhauradah Dug Well

The water level was measured from the dug well of Dhauradah village for water availability as the villagers are using the dug well water for their domestic purpose.

GW-4 Lanjiberna Mines Workshop Dug Well

The water level was measured from the dug well of Lanjiberna Mines Workshop for water availability as the dug well is being used for domestic purpose.

GW-5 Village Lanjiberna Dug Well

The water level was measured from the dug well of Lanjiberna village for water availability as the villagers are using the dug well water for their domestic purpose.

GW-6 Village Katang Dug Well

The water level was measured from the dug well of Katang village for water availability as the villagers are using the dug well water for their domestic purpose.

4.7 Noise Level Monitoring

Noise levels were measured at 4(four) different locations within the core zone only to assess the impact of the mining operation on the ambient noise level. A brief description of the monitoring location is given below:

N-1 Quarry Area during Operation of HEMM

This station was selected to assess the ambient noise level due to the operation of HEMM within the quarry area during ongoing mining works. The monitoring was carried out inside the quarry and at distance of 100 m from the operating machines.

N-2 Limestone Crusher Plant area

This station was selected to assess the ambient noise level due to the operation of Crusher Plant and crushing and screening operation of Limestone lumps. The monitoring was carried out at a distance of 100m from the Crusher building.

N-3 Lanjiberna Colony Area

This station was selected to assess the ambient noise level due to the mining activities and transportation of limestone to the Cement Plant by Railway wagons. The monitoring was carried out near the Lanjiberna Colony.

N-4 Magazine Hill Top

This station was selected to assess the ambient noise level due to the mining activities and crushing of limestone and its impact on the background and sensitive receptors. The monitoring was carried out on the Magazine Hill top near the security search light post.

4.8 Effluent Water Quality Sampling Station

The wash water of HEMM in workshop is directed to an Oil & Grease separation tank inside the garage premises and the treated water is reused in the washing process. The sample from the outlet of the Tank is collected on quarterly basis for analysis of 5 parameters and to find out the efficiency of the Oil & Grease separation process.

5. METHODOLOGY OF SAMPLING & ANALYTICAL PROCEDURES

5.1 Meteorological Study

For recording various meteorological parameters like, Temperature, RH, Wind Speed, Wind Direction & Rainfall, a weather monitoring station, Make: Virtual Electronics Company, Roorkee was installed at the site. The instrument is equipped with windows based data logging software to store each data on hourly basis, which can be further down loaded to a PC and data can be interpreted as per the requirement of the report.

5.2 Ambient Air Monitoring

Air quality samples were monitored for all parameters as per NAAQS**.** For sampling and analysis, methods prescribed by CPCB were followed and Respirable Dust Samplers (RDS) were used and for PM2.5 sampling Fine Particulate Samplers were used at the site.

5.3 Fugitive Dust Emission Monitoring

Fugitive dust samples were monitored for parameter like, SPM only**.** For sampling and analysis ambient air monitoring methods prescribed by CPCB were followed and High Volume Samplers/ Respirable Dust Samplers were used at the site. 8 hours continuous samplings were carried out once in three months at each location.

5.4 Stack Monitoring

Stack monitoring were carried out once in every month from the bag filter outlet stack of the Limestone Crusher plant and the CPCB standard for monitoring of Stack emission was followed for collecting the sample and the concentration of Particulate Matter were calculated by following the standard methods of CPCB. For collection of sample Ecotech Instruments make Stack sampler Model: ESS -100 was used at the site.

5.5 Water Quality Sampling

As per the standard practice, one sample from each station was collected once, during the month of August and November. Grab water samples were collected in plastic container by standard sampling technique. Necessary precautions were taken for sample preservation. The parameters like pH, Temp., Conductivity and DO were measured at the site by using portable water analysis kit from WTW, Germany. All other parameters were analysed as per the standard methods for Water and Waste Water analysis by APHA.

5.6 Noise Level Monitoring

Ambient Noise level monitoring was carried out with an integrating Sound Level Meter, Model: SLM 100, Make: Envirotech Instruments Pvt. Ltd. in dB(A). The measurements were collected at a height of 1.5m from the ground level and away from any sound reflecting sources like walls and buildings etc.

The Ambient Noise monitoring was carried out on continuous basis by the data logging system of the instrument and data are logged on at every minute for 24 hours. The Sound Pressure Level were measured and Lmin, Lmax & Leq Day Time and Leq Night Time were calculated and interpreted for data analysis.

6. DATA ANALYSIS

6.1 Micro-meteorological Study:

6.1.1 Wind Speed & Wind Direction

During the entire period from 1st October to 31st March all total 4378 no. of data are recorded by the instrument and after interpretation of the collected data it was found that Calm condition prevailed over 1.07%, while considering the 24 hourly data. 0.24% calm condition prevailed from morning 6 hrs to 14hrs for the entire study period, 2.12% calm condition prevailed from 14hrs to 22hrs and 0.54% calm condition prevailed from 22hrs to 06hrs. The predominant wind directions were from NE with average wind speed 2.70 m/sec. The wind rose diagrams for the entire study period are depicted on the **Figure No: 6.1, 6.2, 6.3 & 6.4.**

6.1.2 Temperature

The maximum & minimum temperature during the entire study period were divided in to three parts as the study period was covering post-monsoon, winter seasons and early summer season also. The Minimum temperature during the post-monsoon season was found to be 12.11^{o}C and the Maximum temperature was found to be 32.61^{o}C up to the end of 30th November.

The minimum and maximum temperature during the winter season i.e. from December to February was found to be 9.47^{o}C and 34.71^{o}C. During the month of March the minimum and maximum temperature was found to be 15.85^{o}C and 37.46^{o}C**. Table No 6.1** shows a summary of micro-meteorological data collected for the entire period.

6.1.3 Rainfall

The total rain fall from 1st October to 31st March was observed to be 33.4 mm. during the study period. A month wise rainfall data recorded at the site is depicted in **Table No 6.1.**

Table No: 6.1
A Summary of the Micro-meteorological Data
Project Site : Lanjiberna Limestone & Dolomite Mines
Location : Magazine Hill Top

Sl No	Parameters	From October' 22 – March' 23
1	Predominant Wind Direction	From NE
2	Calm Condition %	1.07
3	Average Wind Speed m/sec	2.70
4	Temperature ^{o}C	
	Post-monsoon Season	
	Minimum	12.11
	Maximum	32.61
	Winter Season	
	Minimum	9.47
	Maximum	34.71
	Early Summer Season	
	Minimum	15.85

Sl No	Parameters	From October' 22 – March' 23
	Maximum	37.46
5	**Rain Fall in mm**	
	October	21.2
	November	0.40
	December	0.20
	January	0.20
	February	0.00
	March	11.40
	Total	**33.4**

Figure No: 6.1 Wind Rose Diagram for 24 Hours

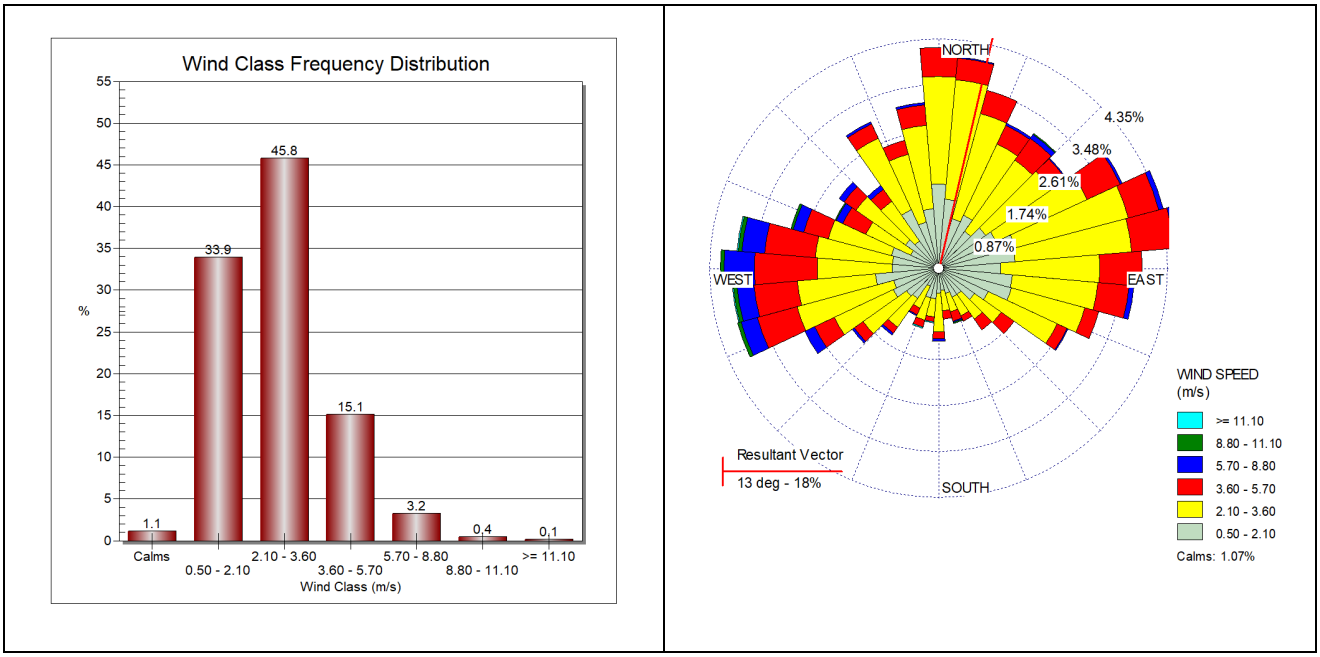


Figure No: 6.2 Wind Rose Diagram from 06 – 14 Hours

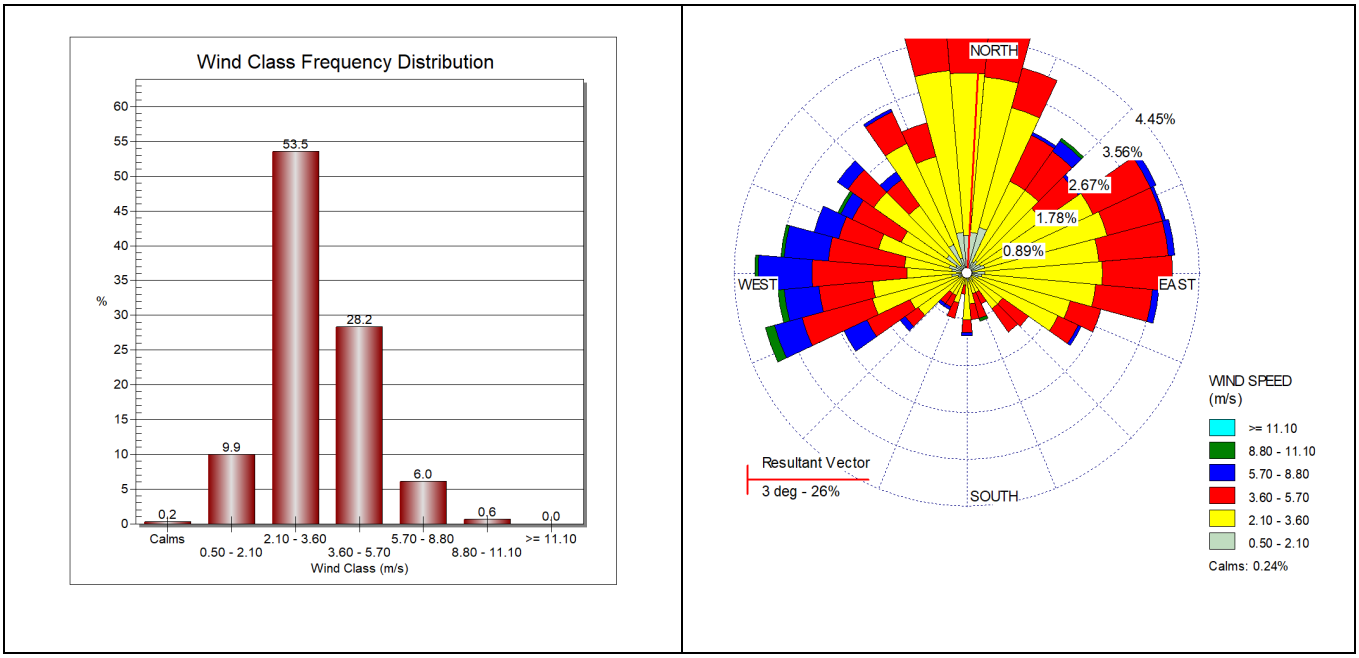


Figure No: 6.3 Wind Rose Diagram from 14 – 22 Hours

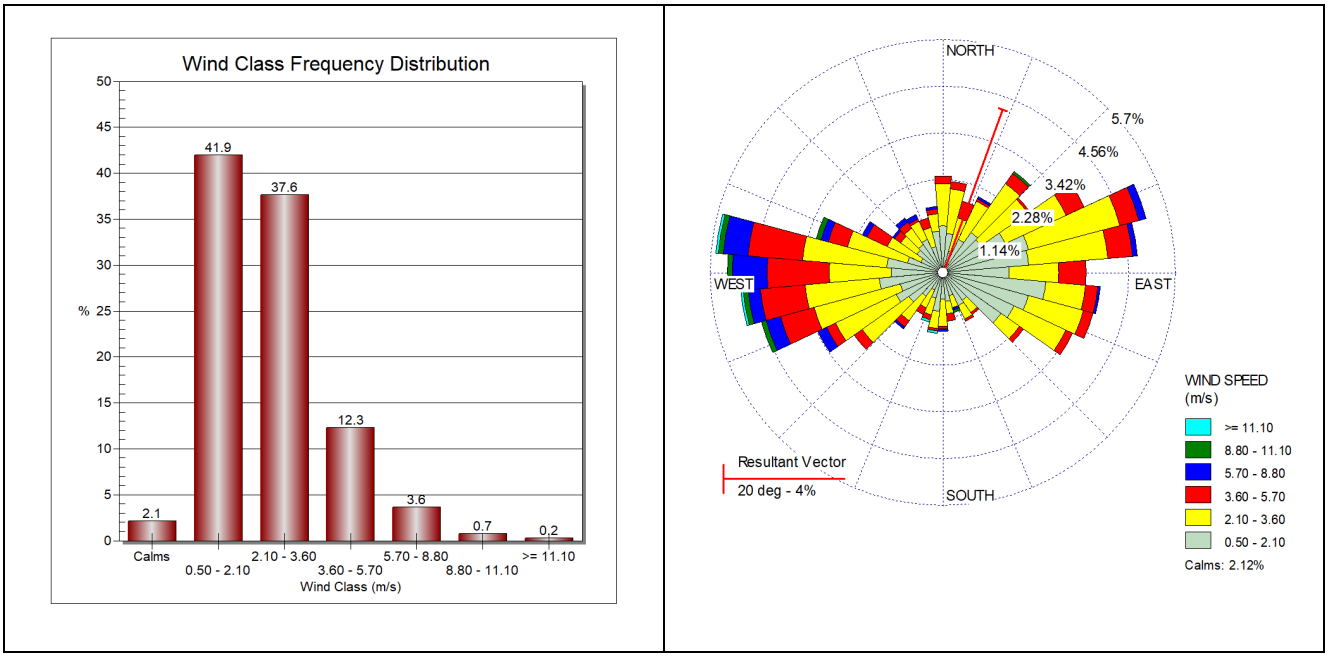
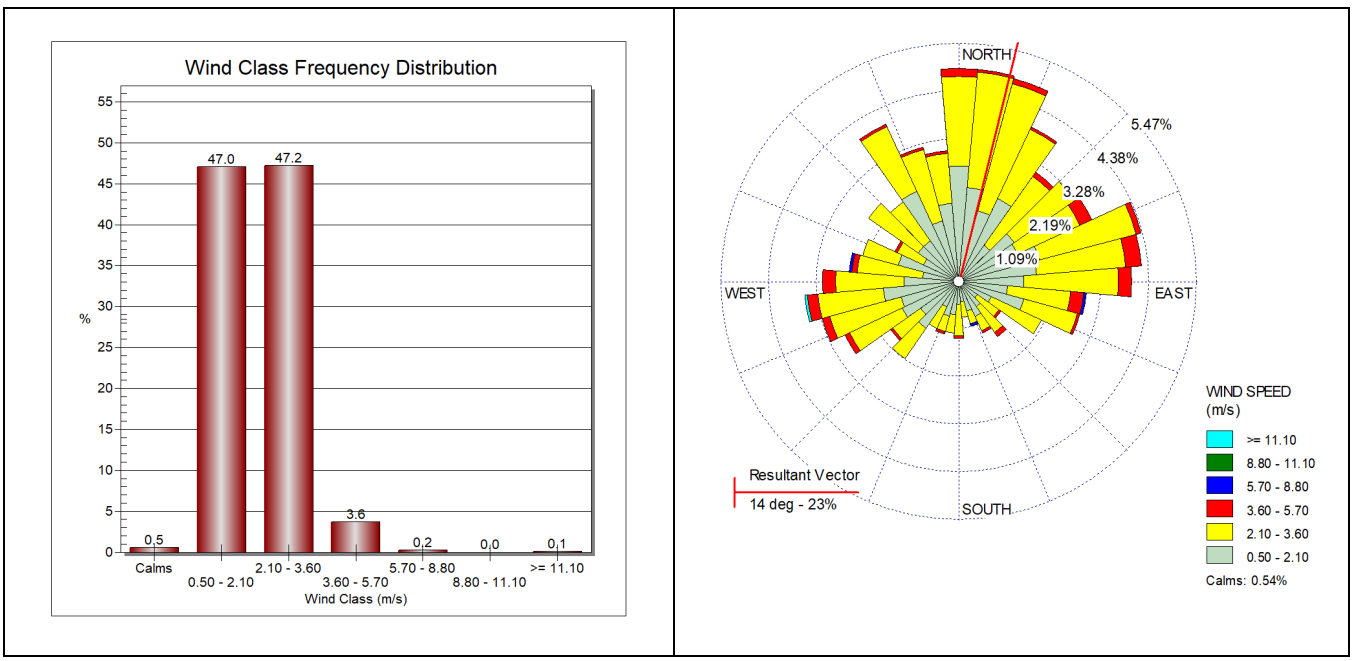


Figure No: 6.4 Wind Rose Diagram from 22 – 06 Hours



6.2 Ambient Air Quality Data

6.2.1 Near Brick Plant (A-1)

PM2.5

Data as given in the **Table No: 6.2** shows that the maximum value was 26µg/m^3, 98 percentile values were 25.94µg/m^3, the lowest value was 14µg/m^3 and the average value was 21.61µg/m^3.

PM10

Data as given in the **Table No: 6.2** shows that the maximum value was 75µg/m^3, 98 percentile values were 74.88µg/m^3, the lowest value was 45µg/m^3 and the average value was 62.78µg/m^3.

All the readings are below the permissible limit of 60 & 100µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

SO_2

The data given in the **Table No: 6.2** shows the maximum value was 13µg/m^3, 98 percentile values were 10.94µg/m^3, the lowest value was 3.0µg/m^3 and the average value was 6.31µg/m^3.

NO_2

The data given in the **Table No: 6.2** shows the maximum value was 32µg/m^3, 98 percentile values were 30.88µg/m^3, the lowest value was 10.0µg/m^3 and the average value was 19.91µg/m^3.

All the readings are below the permissible limit of 80µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

Table No: 6.2
AMBIENT AIR QUALITY DATA
From 01.10.2022 to 31.03.2023
Station: A-1 (Near Brick Plant)

Date	PM2.5	PM10	SO_2	NO_2
03.10.2022	19	64	5	20
06.10.2022	20	58	11	26
10.10.2022	14	45	7	19
15.10.2022	20	58	5	14
17.10.2022	19	61	3	18
20.10.2022	21	62	9	29
22.10.2022	23	67	5	11
25.10.2022	21	66	9	27
27.10.2022	22	73	4	16
02.11.2022	22	61	5	27
05.11.2022	24	62	9	25
08.11.2022	19	54	5	13
11.11.2022	20	60	4	14
14.11.2022	20	57	7	17
17.11.2022	20	68	4	10
21.11.2022	17	50	8	22
24.11.2022	20	58	4	16
26.11.2022	22	61	5	16
03.12.2022	24	68	8	22
05.12.2022	24	69	4	13
07.12.2022	26	75	6	16
12.12.2022	24	71	4	11

Date	PM2.5	PM10	SO_2	NO_2
15.12.2022	26	75	7	21
19.12.2022	22	54	4	19
22.12.2022	21	60	10	27
26.12.2022	23	69	5	17
28.12.2022	20	55	10	28
02.01.2023	22	67	8	26
04.01.2023	23	66	9	21
10.01.2023	23	67	9	25
13.01.2023	23	65	4	17
16.01.2023	25	70	7	20
19.01.2023	17	61	7	22
23.01.2023	19	57	3	12
25.01.2023	23	70	9	29
27.01.2023	18	60	4	22
01.02.2023	21	58	7	17
03.02.2023	16	49	4	11
06.02.2023	21	63	5	20
08.02.2023	22	65	10	28
13.02.2023	21	58	7	22
16.02.2023	23	66	6	17
21.02.2023	24	67	4	16
23.02.2023	21	58	9	23
27.02.2023	22	68	4	11
02.03.2023	21	60	5	32
06.03.2023	25	68	5	19
10.03.2023	22	58	13	31
13.03.2023	25	68	4	19
17.03.2023	20	60	6	18
20.03.2023	24	63	7	27
22.03.2023	25	60	5	19
27.03.2023	23	67	5	13
29.03.2023	25	70	8	24
Minimum	**14**	**45**	**3**	**10**
Maximum	**26**	**75**	**13**	**32**
Average	**21.61**	**62.78**	**6.31**	**19.91**
98%tile Value	**25.94**	**74.88**	**10.94**	**30.88**

6.2.2 Limestone Crusher Plant (A-2)

PM2.5
Data as given in the **Table No: 6.3** shows that the maximum value was 30µg/m^3, 98 percentile values were 26.94µg/m^3, the lowest value was 16µg/m^3 and the average value was 21.70µg/m^3.

PM10
Data as given in the **Table No: 6.3** shows that the maximum value was 82µg/m^3, 98 percentile values were 78.82µg/m^3, the lowest value was 50µg/m^3 and the average value was 64.20µg/m^3.

All the readings are below the permissible limit of 60 & 100µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

SO_2
The data given in the **Table No: 6.3** shows the maximum value was 10µg/m^3, 98 percentile values were 9.00µg/m^3, the lowest value was 3.0µg/m^3 and the average value was 5.79µg/m^3.

NO_2
The data given in the **Table No: 6.3** shows the maximum value was 34µg/m^3, 98 percentile values were 31.94µg/m^3, the lowest value was 11.0µg/m^3 and the average value was 19.65µg/m^3.

All the readings are below the permissible limit of 80µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

Table No: 6.3
AMBIENT AIR QUALITY DATA
From 01.10.2022 to 31.03.2023
Station: A-2 (Limestone Crusher Plant)

Date	PM2.5	PM10	SO_2	NO_2
03.10.2022	20	66	< 3	12
06.10.2022	19	59	10	31
10.10.2022	19	59	4	16
15.10.2022	19	62	4	11
17.10.2022	21	69	3	17
20.10.2022	22	63	4	16
22.10.2022	16	55	6	16
25.10.2022	25	71	5	15
27.10.2022	26	76	< 3	32
02.11.2022	23	67	4	26
05.11.2022	19	51	6	15
08.11.2022	21	59	8	23
11.11.2022	18	56	5	13
14.11.2022	21	58	6	16
17.11.2022	21	60	6	17
21.11.2022	23	66	5	19
24.11.2022	22	63	5	15

Date	PM2.5	PM10	SO_2	NO_2
26.11.2022	23	65	4	15
03.12.2022	20	62	9	26
05.12.2022	30	82	6	24
07.12.2022	25	73	5	17
12.12.2022	23	68	7	22
15.12.2022	27	79	6	18
19.12.2022	24	70	5	17
22.12.2022	23	65	9	34
26.12.2022	19	56	9	26
28.12.2022	23	69	4	13
02.01.2023	19	62	4	13
04.01.2023	18	50	6	19
10.01.2023	20	57	8	24
13.01.2023	24	69	6	21
16.01.2023	21	60	4	13
19.01.2023	18	55	5	14
23.01.2023	24	68	7	19
25.01.2023	24	68	4	17
27.01.2023	21	63	8	23
01.02.2023	24	69	7	21
03.02.2023	23	67	5	13
06.02.2023	24	68	3	20
08.02.2023	24	69	5	19
13.02.2023	20	55	5	15
16.02.2023	24	69	7	19
21.02.2023	25	67	4	19
23.02.2023	16	60	6	16
27.02.2023	19	64	6	19
02.03.2023	23	68	5	28
06.03.2023	25	70	7	26
10.03.2023	20	63	4	15
13.03.2023	25	71	5	27
17.03.2023	17	57	6	16
20.03.2023	21	67	8	27
22.03.2023	21	56	7	23
27.03.2023	18	58	8	25
29.03.2023	22	68	6	28
Minimum	**16**	**50**	**3**	**11**
Maximum	**30**	**82**	**10**	**34**
Average	**21.70**	**64.20**	**5.79**	**19.65**
98%tile Value	**26.94**	**78.82**	**9**	**31.94**

6.2.3 Lanjiberna Mines Office Area (A-3)

PM2.5
Data as given in the **Table No: 6.4** shows that the maximum value was 28µg/m^3, 98 percentile values were 26.88µg/m^3, the lowest value was 13µg/m^3 and the average value was 21.65µg/m^3.

PM10
Data as given in the **Table No: 6.4** shows that the maximum value was 80µg/m^3, 98 percentile values were 76µg/m^3, the lowest value was 35µg/m^3 and the average value was 63.44µg/m^3.

All the readings are below the permissible limit of 60 & 100µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

SO_2
The data given in the **Table No: 6.4** shows the maximum value was 12µg/m^3, 98 percentile values were 10µg/m^3, the lowest value was 3.0µg/m^3 and the average value was 6.37µg/m^3.

NO_2
The data given in the **Table No: 6.4** shows the maximum value was 36µg/m^3, 98 percentile values were 30.94µg/m^3, the lowest value was 10.0µg/m^3 and the average value was 20.98µg/m^3.

All the readings are below the permissible limit of 80µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

Table No: 6.4
AMBIENT AIR QUALITY DATA
From 01.10.2022 to 31.03.2023
Station: A-3 (Lanjiberna Mines Office Area)

Date	PM2.5	PM10	SO_2	NO_2
03.10.2022	22	62	9	28
06.10.2022	24	65	6	28
10.10.2022	23	65	4	12
15.10.2022	16	50	6	10
17.10.2022	22	73	5	24
20.10.2022	19	65	6	18
22.10.2022	13	35	3	12
25.10.2022	21	69	4	18
27.10.2022	23	70	5	20
02.11.2022	24	66	6	20
05.11.2022	17	49	10	31
08.11.2022	19	54	12	36
11.11.2022	22	68	4	16
14.11.2022	23	67	5	17
17.11.2022	23	71	4	12
21.11.2022	22	63	5	14

Date	PM2.5	PM10	SO_2	NO_2
24.11.2022	22	62	7	20
26.11.2022	24	69	9	25
03.12.2022	16	48	5	30
05.12.2022	27	76	6	18
07.12.2022	23	66	8	24
12.12.2022	25	72	4	14
15.12.2022	28	80	7	26
19.12.2022	20	58	5	18
22.12.2022	24	68	4	13
26.12.2022	17	56	5	18
28.12.2022	22	60	3	16
02.01.2023	23	66	5	21
04.01.2023	22	61	8	27
10.01.2023	24	63	8	24
13.01.2023	20	64	9	24
16.01.2023	23	68	8	21
19.01.2023	25	71	10	26
23.01.2023	17	47	9	25
25.01.2023	19	58	5	17
27.01.2023	24	70	4	17
01.02.2023	19	64	7	20
03.02.2023	23	66	4	12
06.02.2023	21	68	9	27
08.02.2023	22	65	8	24
13.02.2023	23	70	8	22
16.02.2023	22	62	6	19
21.02.2023	19	58	7	25
23.02.2023	17	53	8	24
27.02.2023	25	70	7	22
02.03.2023	21	62	7	24
06.03.2023	21	76	7	27
10.03.2023	24	70	6	29
13.03.2023	23	67	7	23
17.03.2023	22	61	6	18
20.03.2023	23	60	5	16
22.03.2023	23	52	6	19
27.03.2023	20	62	4	21
29.03.2023	24	64	4	20
Minimum	**13**	**35**	**3**	**10**
Maximum	**28**	**80**	**12**	**36**

Date	PM2.5	PM10	SO_2	NO_2
Average	**21.65**	**63.44**	**6.37**	**20.98**
98%tile Value	**26.88**	**76**	**10**	**30.94**

6.2.4 Magazine Hill Top (A-4)

PM2.5

Data as given in the **Table No: 6.5** shows that the maximum value was 24µg/m^3, 98 percentile values were 23.94µg/m^3, the lowest value was 8µg/m^3 and the average value was 16.67µg/m^3.

PM10

Data as given in the **Table No: 6.5** shows that the maximum value was 70µg/m^3, 98 percentile values were 69µg/m^3, the lowest value was 27µg/m^3 and the average value was 49.54µg/m^3.

All the readings are below the permissible limit of 60 & 100µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

SO_2

The data given in the **Table No: 6.5** shows the maximum value was 17µg/m^3, 98 percentile values were 10.94µg/m^3, the lowest value was 3.0µg/m^3 and the average value was 6.09µg/m^3.

NO_2

The data given in the **Table No: 6.5** shows the maximum value was 42µg/m^3, 98 percentile values were 39.64µg/m^3, the lowest value was 9.0µg/m^3 and the average value was 20.17µg/m^3.

All the readings are below the permissible limit of 80µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

Table No: 6.5
AMBIENT AIR QUALITY DATA
From 01.10.2022 to 31.03.2023
Station: A-4 (Magazine Hill Top)

Date	PM2.5	PM10	SO_2	NO_2
03.10.2022	16	47	4	12
06.10.2022	14	39	5	15
10.10.2022	8	27	5	16
15.10.2022	14	41	4	13
17.10.2022	17	51	3	12
20.10.2022	12	41	4	10
22.10.2022	15	34	10	42
25.10.2022	17	59	6	26
27.10.2022	13	43	4	15
02.11.2022	18	52	5	23
05.11.2022	16	46	5	18
08.11.2022	12	39	5	17

Date	PM2.5	PM10	SO_2	NO_2
11.11.2022	16	46	7	25
14.11.2022	14	48	5	24
17.11.2022	12	40	3	10
21.11.2022	22	63	8	24
24.11.2022	18	50	9	20
26.11.2022	21	60	5	16
03.12.2022	20	59	7	30
05.12.2022	24	70	9	16
07.12.2022	20	59	5	18
12.12.2022	24	69	4	18
15.12.2022	23	67	4	19
19.12.2022	18	51	3	9
22.12.2022	22	69	8	20
26.12.2022	17	48	10	34
28.12.2022	18	57	7	20
02.01.2023	17	48	4	16
04.01.2023	15	43	9	27
10.01.2023	18	51	8	26
13.01.2023	20	56	8	18
16.01.2023	17	48	7	21
19.01.2023	12	37	5	10
23.01.2023	14	40	4	12
25.01.2023	16	44	11	29
27.01.2023	16	45	6	17
01.02.2023	14	43	5	14
03.02.2023	21	59	4	14
06.02.2023	17	50	17	40
08.02.2023	15	47	8	27
13.02.2023	18	50	6	19
16.02.2023	21	58	6	18
21.02.2023	17	62	5	19
23.02.2023	14	40	10	24
27.02.2023	16	49	5	18
02.03.2023	18	54	4	20
06.03.2023	16	44	8	34
10.03.2023	17	57	7	24
13.03.2023	15	48	4	18
17.03.2023	13	40	4	15
20.03.2023	14	44	4	24
22.03.2023	17	50	7	23

Date	PM2.5	PM10	SO_2	NO_2
27.03.2023	16	50	4	18
29.03.2023	15	43	5	22
Minimum	**8**	**27**	**3**	**9**
Maximum	**24**	**70**	**17**	**42**
Average	**16.67**	**49.54**	**6.09**	**20.17**
98%tile Value	**23.94**	**69**	**10.94**	**39.64**

Figure No: 6.5 Graphical Representations of PM2.5 Values in Core Zone

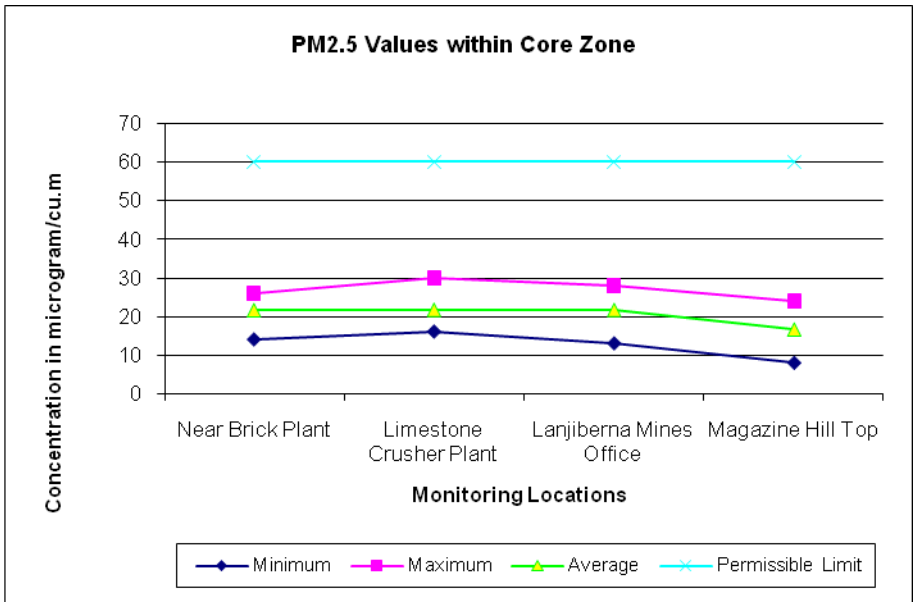


Figure No: 6.6 Graphical Representations of PM10 Values in Core Zone

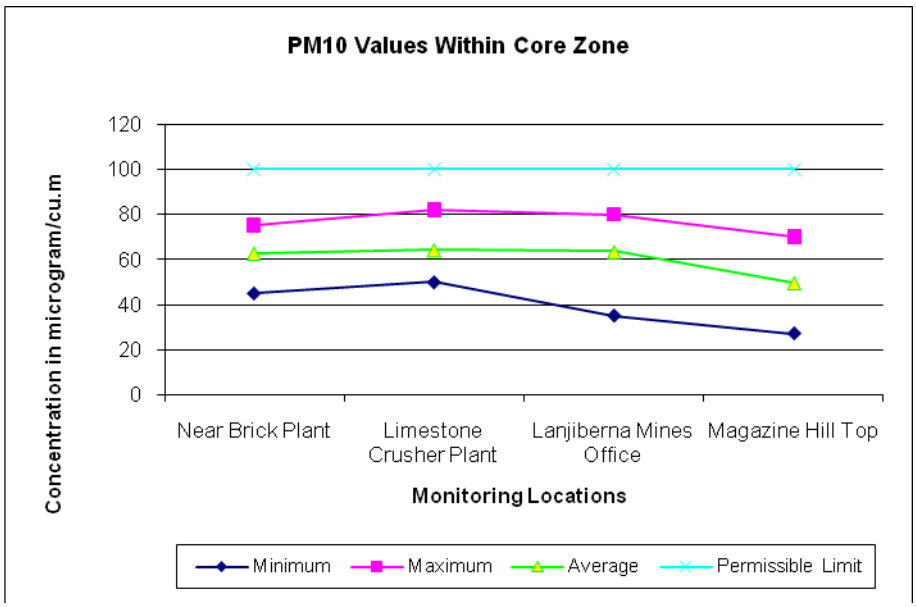


Figure No: 6.7 Graphical Representations of SO_2 Values in Core Zone

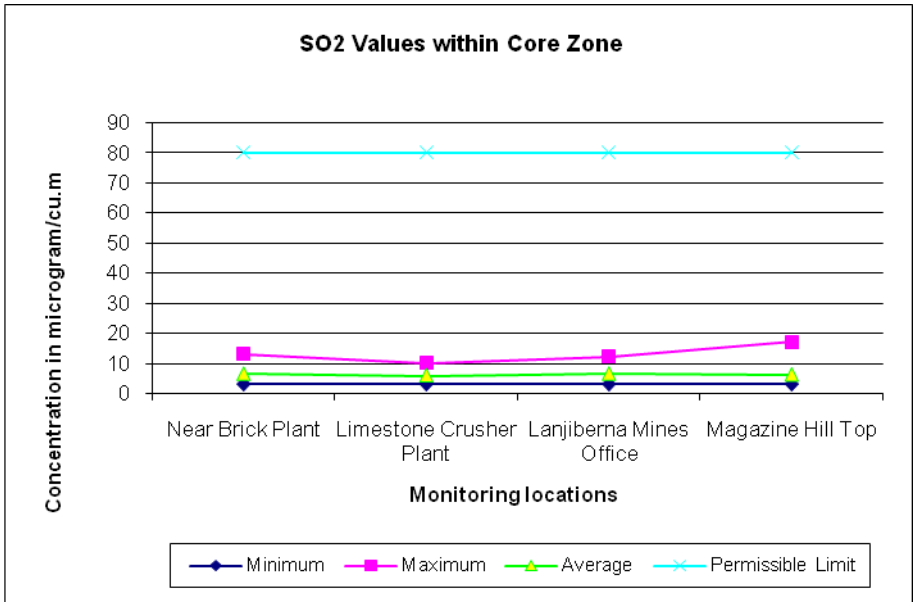
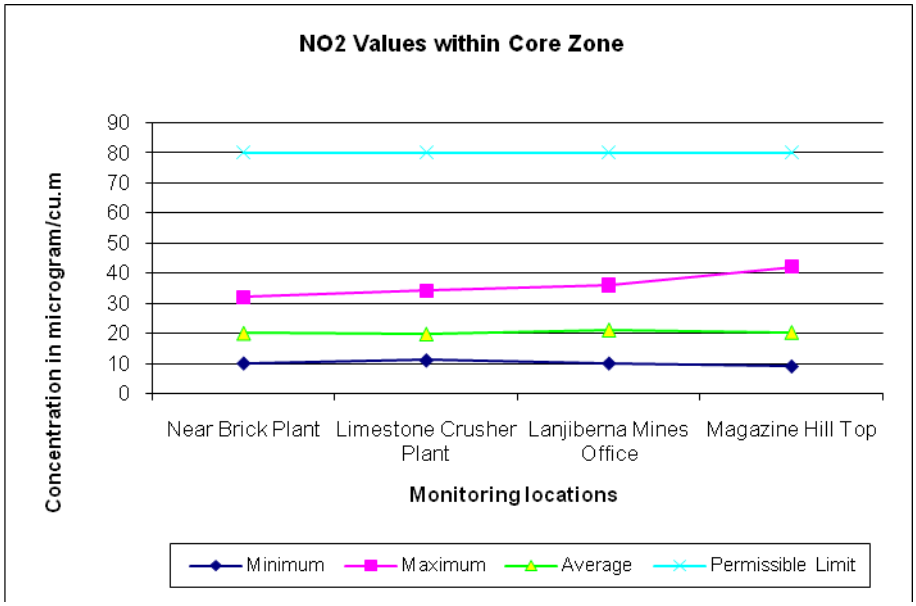


Figure No: 6.8 Graphical Representations of NO_2 Values in Core Zone



6.2.5 Village Katang (A-5)

PM2.5

Data as given in the **Table No: 6.6** shows that the maximum value was 23µg/m^3, 98 percentile values were 23.0µg/m^3, the lowest value was 7.0µg/m^3 and the average value was 16.65µg/m^3.

PM10

Data as given in the **Table No: 6.6** shows that the maximum value was 67µg/m^3, 98 percentile values were 65.12µg/m^3, the lowest value was 21µg/m^3 and the average value was 50.08µg/m^3.

All the readings are below the permissible limit of 60 & 100µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

SO_2

The data given in the **Table No: 6.6** shows the maximum value was 13.0µg/m^3, 98 percentile values were 11.16µg/m^3, the lowest value was 3.0µg/m^3 and the average value was 6.19µg/m^3.

NO_2

The data given in the **Table No: 6.6** shows the maximum value was 34µg/m^3, 98 percentile values were 32.12µg/m^3, the lowest value was 7.0µg/m^3 and the average value was 19.15µg/m^3.

All the readings are below the permissible limit of 80µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

Table No: 6.6
AMBIENT AIR QUALITY DATA
From 01.10.2022 to 31.03.2023
Station: A-5 (Village Katang)

Date	PM2.5	PM10	SO_2	NO_2
03.10.2022	14	42	< 3	7
06.10.2022	14	43	5	16
10.10.2022	7	21	3	11
15.10.2022	17	53	8	23
17.10.2022	14	40	3	9
20.10.2022	16	48	4	11
25.10.2022	11	39	8	26
27.10.2022	17	56	3	10
02.11.2022	16	50	5	22
08.11.2022	14	45	4	14
11.11.2022	16	52	7	24
14.11.2022	13	41	4	19
17.11.2022	15	48	4	12
21.11.2022	12	41	7	23
24.11.2022	15	47	6	16
26.11.2022	12	39	9	21
05.12.2022	18	54	7	22
07.12.2022	17	48	5	14
12.12.2022	17	53	6	18
15.12.2022	23	65	6	17
19.12.2022	19	56	4	24
22.12.2022	17	50	5	17

Date	PM2.5	PM10	SO_2	NO_2
26.12.2022	16	47	10	28
28.12.2022	20	64	4	13
04.01.2023	21	57	11	32
10.01.2023	20	62	10	34
13.01.2023	17	49	7	20
16.01.2023	15	43	4	17
19.01.2023	17	48	7	19
23.01.2023	18	50	9	24
25.01.2023	21	58	11	28
27.01.2023	18	58	4	11
03.02.2023	16	45	6	17
06.02.2023	21	58	8	24
08.02.2023	20	58	8	21
13.02.2023	21	62	7	22
16.02.2023	18	53	6	16
21.02.2023	19	52	10	29
23.02.2023	18	60	13	25
27.02.2023	15	49	3	11
02.03.2023	16	50	5	17
10.03.2023	23	67	5	14
13.03.2023	17	48	9	24
17.03.2023	16	52	4	24
20.03.2023	14	40	4	26
22.03.2023	16	44	5	16
27.03.2023	19	54	3	12
29.03.2023	13	45	5	19
Minimum	**7**	**21**	**3**	**7**
Maximum	**23**	**67**	**13**	**34**
Average	**16.65**	**50.08**	**6.19**	**19.15**
98%tile Value	**23**	**65.12**	**11.16**	**32.12**

6.2.6 Village Bihabandh (A-6)

PM2.5

Data as given in the **Table No: 6.7** shows that the maximum value was 23µg/m^3, 98 percentile values were 23.0µg/m^3, the lowest value was 11.0µg/m^3 and the average value was 16.54µg/m^3.

PM10

Data as given in the **Table No: 6.7** shows that the maximum value was 65µg/m^3, 98 percentile values were 63.12µg/m^3, the lowest value was 34µg/m^3 and the average value was 48.44µg/m^3.

All the readings are below the permissible limit of 60 & 100µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

SO_2

The data given in the **Table No: 6.7** shows the maximum value was 12µg/m^3, 98 percentile values were 10.12µg/m^3, the lowest value was 3.0µg/m^3 and the average value was 6.27µg/m^3.

NO_2

The data given in the **Table No: 6.7** shows the maximum value was 39µg/m^3, 98 percentile values were 38.06µg/m^3, the lowest value was 11.0µg/m^3 and the average value was 21.48µg/m^3.

All the readings are below the permissible limit of 80µg/m^3 as specified in the National Ambient Air Quality Standards, CPCB Notification 18th November 2009.

Table No: 6.7
AMBIENT AIR QUALITY DATA
From 01.10.2022 to 31.03.2023
Station: A-6 (Village Bihabandh)

Dated	PM2.5	PM10	SO_2	NO_2
03.10.2022	13	39	4	18
06.10.2022	13	39	7	20
10.10.2022	11	34	5	18
15.10.2022	16	46	6	26
17.10.2022	12	34	9	28
20.10.2022	18	59	7	19
25.10.2022	17	57	7	16
27.10.2022	18	55	6	21
02.11.2022	20	56	5	18
08.11.2022	22	62	6	19
11.11.2022	16	48	4	11
14.11.2022	18	55	9	25
17.11.2022	17	54	4	17
21.11.2022	17	50	10	26
24.11.2022	19	54	8	22
26.11.2022	15	44	4	13
05.12.2022	18	52	7	20
07.12.2022	23	63	7	25
12.12.2022	16	47	7	22
15.12.2022	14	41	6	18
19.12.2022	17	46	9	30
22.12.2022	19	52	7	19
26.12.2022	14	40	5	22
28.12.2022	15	40	12	25
04.01.2023	16	48	8	39

Dated	PM2.5	PM10	SO_2	NO_2
10.01.2023	15	43	5	16
13.01.2023	15	43	8	18
16.01.2023	13	40	4	38
19.01.2023	23	65	5	20
23.01.2023	13	39	7	23
25.01.2023	16	46	4	17
27.01.2023	17	52	4	20
03.02.2023	16	49	5	14
06.02.2023	19	54	5	27
08.02.2023	17	48	9	28
13.02.2023	17	46	6	19
16.02.2023	17	49	6	15
21.02.2023	15	42	8	30
23.02.2023	16	46	6	11
27.02.2023	19	54	5	17
02.03.2023	18	57	4	19
10.03.2023	18	60	5	23
13.03.2023	17	49	8	24
17.03.2023	14	39	3	13
20.03.2023	14	41	8	35
22.03.2023	19	54	5	19
27.03.2023	16	47	5	23
29.03.2023	16	47	7	25
Minimum	**11**	**34**	**3**	**11**
Maximum	**23**	**65**	**12**	**39**
Average	**16.54**	**48.44**	**6.27**	**21.48**
98%tile Value	**23**	**63.12**	**10.12**	**38.06**

Figure No: 6.9 Graphical Representations of PM2.5 Values in Buffer Zone

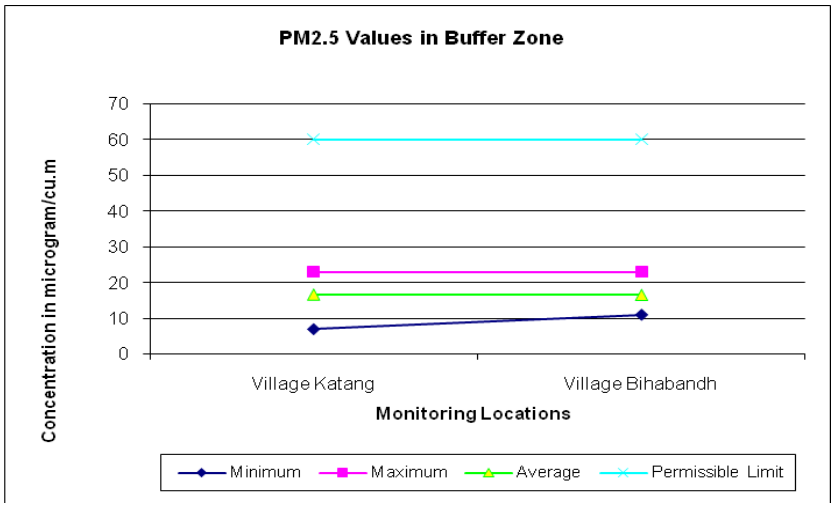


Figure No: 6.10 Graphical Representations of PM10 Values in Buffer Zone

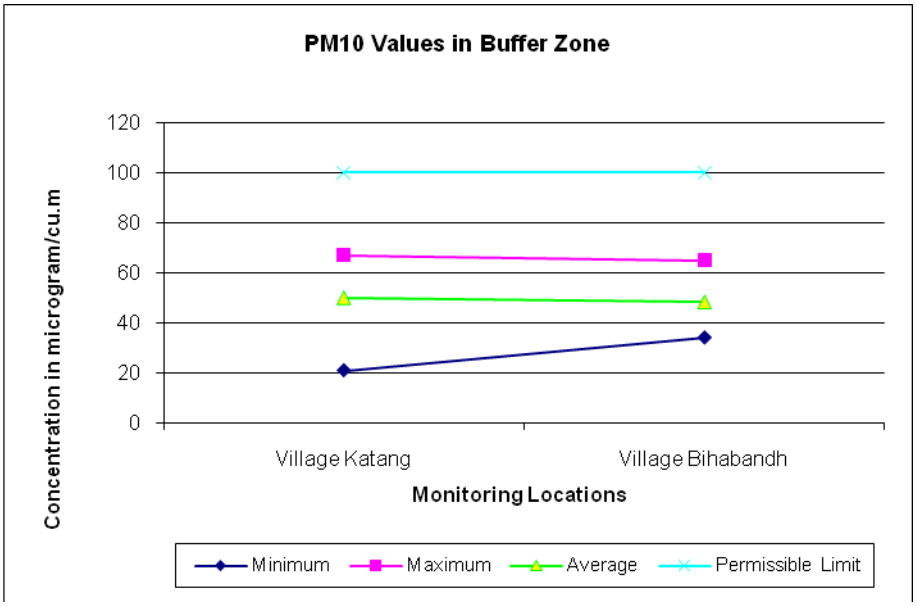


Figure No: 6.11 Graphical Representations of SO_2 Values in Buffer Zone

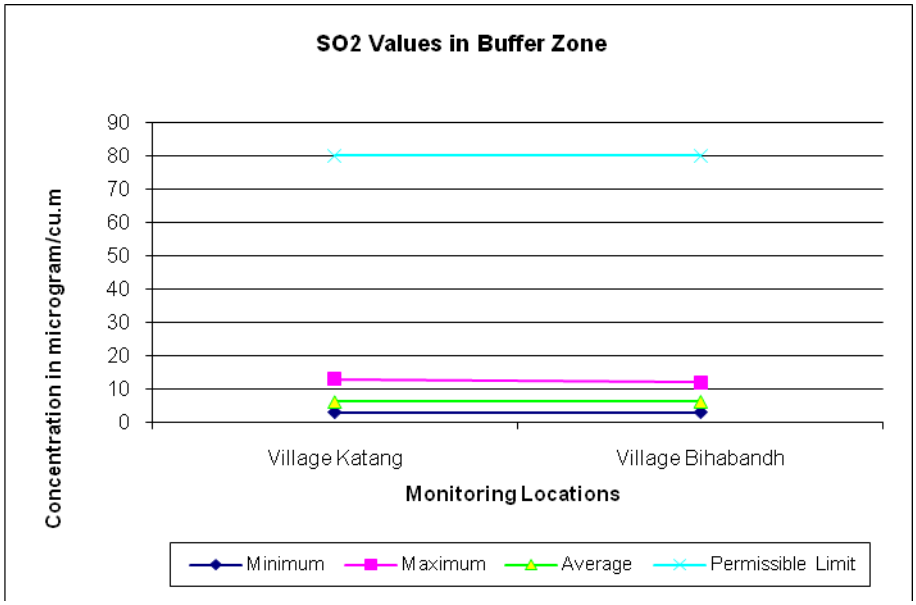
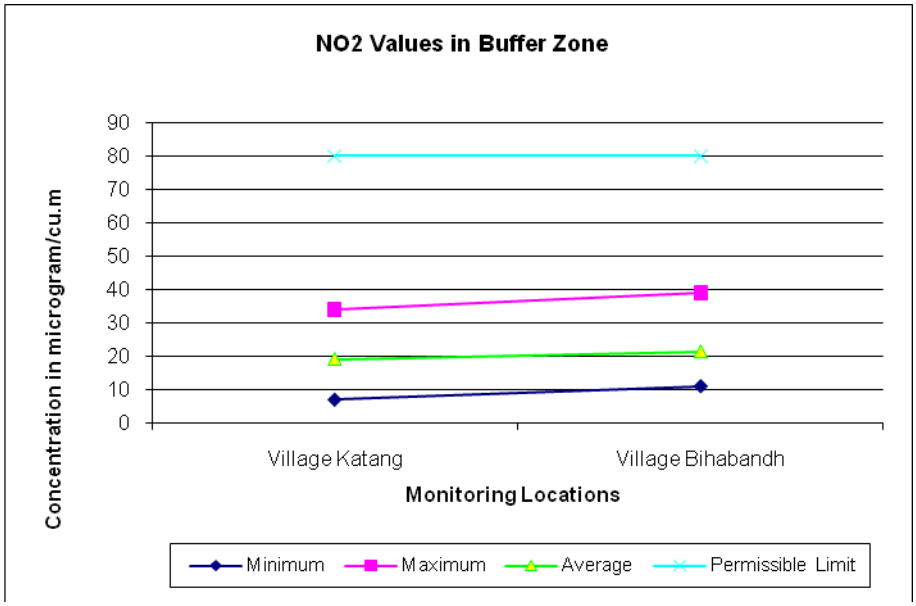


Figure No: 6.12 Graphical Representations of NO_2 Values in Buffer Zone



6.3 Fugitive Dust Emission

The fugitive dust samples collected from two locations during December and February is detailed below.

Table No 6.8: Fugitive Dust Emission Results

Month	Haulage Road from Quarry to Crusher Plant	Downwind of Drill Machine within the Quarry
	Particulate Matter	Particulate Matter
December	575 µg/m^3	598 µg/m^3
February	869 µg/m^3	767 µg/m^3

In the month of February the results are higher than the results for the month of December.

6.4 Stack Emission Monitoring

The monthly monitoring results of stack emission from the Limestone Crusher Plant Bag filter outlet given below shows that all the results from October to March are within the prescribed limits (100 mg/Nm^3) of State Pollution Control Board. The detail results are as follows:

Table No 6.9: Stack Emission Monitoring Results

Sl No	Month	Particulate Matter Concentration in mg/Nm^3
1	October	82
2	November	56
3	December	59
4	January	64
5	February	72
6	March	22

6.5 Water Quality

SW-1 Quarry 2&6 Discharge Water:

The sample after analysis and in comparison with the Standards prescribed in the Schedule – VI of the EPA, G.S.R. 422(E), 1993 for discharge of water on land for irrigation is found to be well within the prescribed limits in both the seasons monitored. The results are detailed in **Table No. 6.10.**

SW-2 Quarry 1&3 Discharge Water

The sample after analysis and in comparison with the Standards prescribed in the Schedule – VI of the EPA, G.S.R. 422(E), 1993 for discharge of water on land for irrigation is found to be well within the prescribed limits in both the seasons monitored. The results are detailed in **Table No. 6.11.**

SW-3 Quarry 4&5 Discharge Water

The sample after analysis and in comparison with the Standards prescribed in the Schedule – VI of the EPA, G.S.R. 422(E), 1993 for discharge of water on land for irrigation is found to be well within the prescribed limits in both the seasons monitored. The results are detailed in **Table No. 6.12.**

Table No: 6.10
Discharge Water Quality from Quarry No 2&6

Sl No	Parameters	Unit	December	February	General Standards As per Schedule - VI of EPA, G.S.R.422(E), 1993
1.	Colour	Hazen	< 5	< 5	-
2.	Odour	-	Odourless	Odourless	-
3.	Temperature	^{o}C	23.1	23.8	-
4.	Total Residual Chlorine	mg/l	0.031	0.06	-
5.	Free Ammonia (as NH_3)	mg/l	< 0.012	< 0.012	-
6.	Cyanide (as CN)	mg/l	< 0.002	< 0.002	0.2
7.	Total Suspended Solids	mg/l	4.0	< 2.5	200
8.	pH Value	-	7.54	7.42	5.5 – 9.0
9.	Oil & Grease	mg/l	< 2.0	< 2.0	10
10.	Ammoniacal Nitrogen (as N)	mg/l	< 5.0	< 5.0	-
11.	Total Kjeldahl Nitrogen (as NH_3)	mg/l	< 10	< 10	-
12.	BOD (5 days at $20^{o}C$)	mg/l	04	03	100
13.	COD	mg/l	16.726	10.042	-
14.	Lead (as Pb)	mg/l	< 2.0	< 2.0	-
15.	Cadmium (as Cd)	mg/l	< 0.05	< 0.05	-
16.	Hex. Chromium (as Cr^{+6})	mg/l	< 0.03	< 0.03	-
17.	Total Chromium (as Cr)	mg/l	< 0.10	< 0.10	-
18.	Copper (as Cu)	mg/l	< 0.10	< 0.10	-
19.	Zinc (as Zn)	mg/l	< 0.10	< 0.10	-
20.	Nickel (as Ni)	mg/l	< 0.25	< 0.25	-
21.	Fluoride (as F)	mg/l	< 0.10	< 0.10	-
22.	Dissolved Phosphate (as P)	mg/l	< 0.01	< 0.01	-
23.	Sulphide (as S)	mg/l	< 0.50	< 0.50	-
24.	Phenolic Compounds (as C_6H_5OH)	mg/l	< 0.10	< 0.10	-
25.	Manganese (as Mn)	mg/l	< 0.05	< 0.05	-
26.	Iron (as Fe)	mg/l	< 0.10	< 0.10	-
27.	Nitrate Nitrogen (as NO_3 – N)	mg/l	< 1.0	2.793	-

Table No: 6.11
Discharge Water Quality from Quarry No 1&3

Sl No	Parameters	Unit	November	January	General Standards As per Schedule - VI of EPA, G.S.R.422(E), 1993
1.	Colour	Hazen	< 5	< 5	-
2.	Odour	-	Odourless	Odourless	-
3.	Temperature	^oC	24.2	24.3	-
4.	Total Residual Chlorine	mg/l	0.040	0.028	-
5.	Free Ammonia (as NH_3)	mg/l	< 0.012	< 0.012	-
6.	Cyanide (as CN)	mg/l	< 0.002	< 0.002	0.2
7.	Total Suspended Solids	mg/l	4.6	< 2.5	200
8.	pH Value	-	7.65	7.52	5.5 – 9.0
9.	Oil & Grease	mg/l	< 2.0	< 2.0	10
10.	Ammoniacal Nitrogen (as N)	mg/l	< 5.0	< 5.0	-
11.	Total Kjeldahl Nitrogen (as NH_3)	mg/l	< 10	< 10	-
12.	BOD (5 days at 20^oC)	mg/l	03	02	100
13.	COD	mg/l	11.149	8.762	-
14.	Lead (as Pb)	mg/l	< 2.0	< 2.0	-
15.	Cadmium (as Cd)	mg/l	< 0.05	< 0.05	-
16.	Hex. Chromium (as Cr^{+6})	mg/l	< 0.03	< 0.03	-
17.	Total Chromium (as Cr)	mg/l	< 0.10	< 0.10	-
18.	Copper (as Cu)	mg/l	< 0.10	< 0.10	-
19.	Zinc (as Zn)	mg/l	< 0.10	< 0.10	-
20.	Nickel (as Ni)	mg/l	< 0.25	< 0.25	-
21.	Fluoride (as F)	mg/l	< 0.10	< 0.10	-
22.	Dissolved Phosphate (as P)	mg/l	< 0.01	< 0.01	-
23.	Sulphide (as S)	mg/l	< 0.50	< 0.50	-
24.	Phenolic Compounds (as C_6H_5OH)	mg/l	< 0.10	< 0.10	-
25.	Manganese (as Mn)	mg/l	< 0.05	< 0.05	-
26.	Iron (as Fe)	mg/l	< 0.01	< 0.10	-
27.	Nitrate Nitrogen (as NO_3 – N)	mg/l	< 1.0	< 1.0	-

Table No: 6.12
Discharge Water Quality from Quarry No 4&5

Sl No	Parameters	Unit	October	March	General Standards As per Schedule - VI of EPA, G.S.R.422(E), 1993
1.	Colour	Hazen	< 5	< 5	-
2.	Odour	-	Odourless	Odourless	-
3.	Temperature	^oC	23.4	27.3	-
4.	Total Residual Chlorine	mg/l	0.041	0.012	-
5.	Free Ammonia (as NH_3)	mg/l	< 0.012	< 0.012	-
6.	Cyanide (as CN)	mg/l	< 0.002	< 0.002	0.2
7.	Total Suspended Solids	mg/l	< 2.5	< 2.5	200
8.	pH Value	-	7.02	7.46	5.5 – 9.0
9.	Oil & Grease	mg/l	< 2.0	< 2.0	10
10.	Ammoniacal Nitrogen (as N)	mg/l	< 5.0	< 5.0	-
11.	Total Kjeldahl Nitrogen (as NH_3)	mg/l	< 10	< 10	-
12.	BOD (5 days at 20^oC)	mg/l	01	10	100
13.	COD	mg/l	4.162	34.678	-
14.	Lead (as Pb)	mg/l	< 2.0	< 2.0	-
15.	Cadmium (as Cd)	mg/l	< 0.05	< 0.05	-
16.	Hex. Chromium (as Cr^{+6})	mg/l	< 0.03	< 0.03	-
17.	Total Chromium (as Cr)	mg/l	< 0.10	< 0.10	-
18.	Copper (as Cu)	mg/l	< 0.10	< 0.10	-

Sl No	Parameters	Unit	October	March	General Standards As per Schedule - VI of EPA, G.S.R.422(E), 1993
19.	Zinc (as Zn)	mg/l	< 0.10	< 0.10	-
20.	Nickel (as Ni)	mg/l	< 0.25	< 0.25	-
21.	Fluoride (as F)	mg/l	< 0.10	< 0.10	-
22.	Dissolved Phosphate (as P)	mg/l	< 0.01	< 0.01	-
23.	Sulphide (as S)	mg/l	< 0.50	< 0.50	-
24.	Phenolic Compounds (as C_6H_5OH)	mg/l	< 0.10	< 0.10	-
25.	Manganese (as Mn)	mg/l	< 0.05	< 0.05	-
26.	Iron (as Fe)	mg/l	0.1032	< 0.10	-
27.	Nitrate Nitrogen (as NO_3 – N)	mg/l	1.63	< 1.0	-

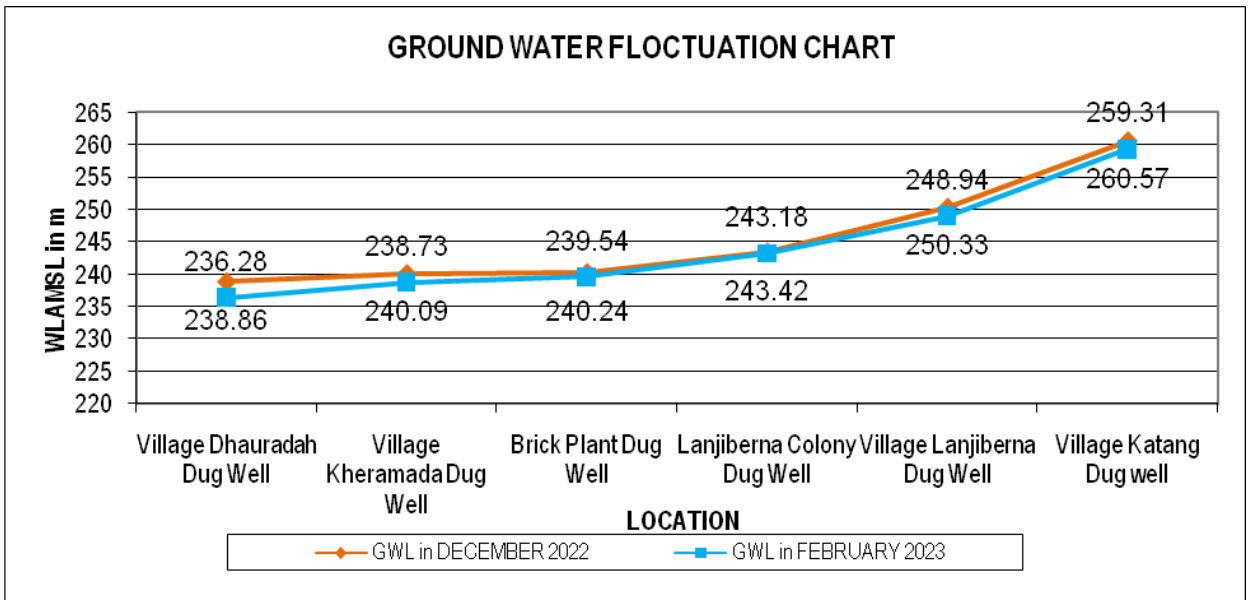
6.6 Ground Water Level Data

The ground water level measured from the existing dug wells mentioned above are found to be varying significantly at all the locations, during the month of November the water level was found to be higher, which has decreased slightly during the month of February due to start of Dry summer months. The detail data is given below in the **Table No 6.13**, with a graphical representation of the fluctuation in **Figure No: 6.13.**

Table No 6.13: Ground Water Level Data

Sl No	Location	Ground Level in m AMSL	Ground Water Level in m AMSL		Height of Water Column in m	
			December	February	December	February
1	Village Kheramada Dug Well	243.23	240.09	238.73	4.87	3.51
2	Lanjiberna Colony Dug Well	247.83	243.42	243.18	6.99	6.75
3	Village Dhauradah Dug Well	242.34	238.86	236.28	5.01	2.43
4	Brick Plant Dug Well	245.03	240.24	239.54	1.35	0.65
5	Village Lanjiberna Dug Well	255.14	250.33	248.94	2.92	1.53
6	Village Katang Dug well	264.89	260.57	259.31	3.63	2.37

Figure No 6.13: Seasonal Fluctuation of Ground Water Level



6.7 Noise Level Monitoring Data

Noise monitoring was carried out at four different locations of the mine during month of December and February for post-monsoon and winter seasons respectively. The Sound Pressure Level recorded was calculated for Lmin, Lmax, Leq Day Time & Leq Night Time. All the data are given in detail in the **Table No 6.14 & 6.15.**

N-1 Quarry Area during Operation of HEMM

The noise level range between 71.9 and 44.2 dB(A) and the Leq values for Day time was 63.8 dB(A) and Leq values for Night time was 47.3 dB(A) during the month of November.

The noise level range between 64.9 and 43.8 dB(A) and the Leq values for Day time was 58.4 dB(A) and Leq values for Night time was 45.8 dB(A) during the month of February.

On comparison of the results with ambient air quality standards in respect of noise by CPCB, it was found that the ambient noise levels from this location was well within the standards for Industrial area for both day and night time.

N-2 Limestone Crusher Plant Area

The noise level range between 69.7 and 44.1 dB(A) and the Leq values for Day time was 63.0 dB(A) and Leq values for Night time was 48.4 dB(A) during the month of December.

The noise level range between 67.3 and 43.2 dB(A) and the Leq values for Day time was 60.3 dB(A) and Leq values for Night time was 45.7 dB(A) during the month of February.

On comparison of the results with ambient air quality standards in respect of noise by CPCB, it was found that the ambient noise levels from this location was well within the standards for both day and night time.

N-3 Lanjiberna Colony area

The noise level range between 62.4 and 43.7 dB(A) and the Leq values for Day time was 57.0 dB(A) and Leq values for Night time was 46.1 dB(A) during the month of December.

The noise level range between 60.2 and 44.3 dB(A) and the Leq values for Day time was 52.9 dB(A) and Leq values for Night time was 45.6 dB(A) during the month of February.

On comparison of the results with ambient air quality standards in respect of noise by CPCB, it was found that the ambient noise levels from this location was well within the standards for Residential area for both day and night time.

N-4 Magazine Hill Top

The noise level range between 60.4 and 44.1 dB(A) and the Leq values for Day time was 55.1 dB(A) and Leq values for Night time was 45.9 dB(A) during the month of December.

The noise level range between 58.4 and 43.7 dB(A) and the Leq values for Day time was 52.2 dB(A) and Leq values for Night time was 44.6 dB(A) during the month of February.

On comparison of the results with ambient air quality standards in respect of noise by CPCB, it was found that the ambient noise levels from this location was well within the standards for Silence Zone for both day and night time.

Table No: 6.14
Noise Level Data in Month of December

SL NO	STATION NO	L_{eq} dB(A) Day Time (0600 Hrs – 2200 Hrs)	L_{eq} dB(A) Night Time (2200 Hrs – 0600 Hrs)	L_{max} dB(A)	L_{min} dB(A)
1.	N1	63.8	47.3	71.9	44.2
2.	N2	63.0	48.4	69.7	44.1
3.	N3	57.0	46.1	62.4	43.7
4.	N4	55.1	45.9	60.4	44.1

Table No: 6.15
Noise Level Data in Month of February

SL NO	STATION NO	L_{eq} dB(A) Day Time (0600 Hrs – 2200 Hrs)	L_{eq} dB(A) Night Time (2200 Hrs – 0600 Hrs)	L_{max} dB(A)	L_{min} dB(A)
1.	N1	58.4	45.8	64.9	43.8
2.	N2	60.3	45.7	67.3	43.2
3.	N3	52.9	45.6	60.2	44.3
4.	N4	52.2	44.6	58.4	43.7

6.8 Effluent Water Quality Data

The water quality from the outlet of Oil & Grease Separation tank was monitored during month of December and February for five parameters. pH was in the range of 7.63 to 7.61 which is slightly alkaline, TSS was 88.2 & 16.1 mg/l in December & February months, Oil & Grease content was 2.4 & 2.0 mg/l in December and February months, Iron was < 0.10 & 1.948 mg/l in the month of December & February and Nickel was < 0.25 mg/l in both the months. All the results are found to be well within the prescribed standards of State Pollution Control Board.

7. CONCLUSION

7.1 Ambient Air Quality

It is concluded from the above study that the overall ambient air quality of the Lanjiberna Limestone & Dolomite mines of DALMIA CEMENT (BHARAT) LIMITED is good and the action taken by the mines authority were quite satisfactory.

7.2 Fugitive Dust Emission

The results of fugitive dust emission monitoring shows that the mining authority has taken up highly effective sprinkling systems inside the mines to control the emission of dust from the drilling, excavation and hauling operations.

7.3 Stack Emission Monitoring

The stack emission monitoring results of all the six months shows that the bag filter installed in the limestone crusher plant is very much effective and results are all within the prescribed standards by the State Pollution Control Board, Odisha.

7.4 Water Quality

The discharge water quality of all the quarries are found to be well within the prescribed standards as per EPA, G.S.R.422(E), 1993.

7.5 Ground Water Level

There is no problem in the availability of ground water in the area and all the locations have adequate water. The ground water level is found to be slightly decreasing in the month of February due to start of dry summer months.

7.6 Noise level

Noise monitoring results show that noise levels are well within the limits at all the stations, and there is no problem in the area due noise from the mining activity.

7.7 Effluent Water Quality

The treatment facility available for Oil & Grease separation in the workshop waste water of the mines is found to be good and the system is operating quite well.

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