

Date: 31.05.2022

To,
The Addl. Principal Chief Conservator of Forests (C),
Ministry of Env., Forest and Climate Change
Regional Office (WZ), E-5
Kendriya Paryavaran Bhawan,
E-5 Arera Colony, Link Road-3, Ravishankar Nagar,
Bhopal-462016

Sub: Proposed Pagara-Jhiriya Limestone Mine (ML Area: 395.965 ha including mining area 185.57 ha, non-mining area 208.395 ha and area for installation of 500 TPH Capacity of Crusher 2 ha) located near Villages – Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan, Tehsil – Amarpatan, District – Satna, Madhya Pradesh-Submission of Half-Yearly Compliance-reg.

Ref: 1. Environmental Clearance (EC) granted by MOEFCC, Govt. of India vide Letter No. J-11015/58/2017-IA.II (M) dated 26.07.2021

Dear Sir,

With reference to above subject matter and referred letter, we are herewith submitting point wise Half-Yearly Compliance report of conditions laid down in Environment Clearance for the period **Oct., 2021 to March, 2022** for your kind perusal and record.

Thanking You

Yours faithfully,

For Dalmia Cement (Bharat) Ltd.



(Dinesh Dixit)

DGM, Mines

Encl: As Above

CC:

- 1) Regional Director, CPCB Zonal Office, Vithal Market, Paryavaran Parisar, E-5, Arera Colony, Bhopal-462016, Madhya Pradesh
- 2) Regional Officer, M.P. Pollution Control Board, Satna, Madhya Pradesh.

COMPLIANCE OF CONDITIONS OF ENVIRONMENT CLEARANCE GRANTED VIDE LETTER NO. J-11015/58/2017-IA. II (M); DATED 26/07/2021.

Specific EC conditions: -

| Sr. | Conditions | Compliance |
|-----|--|---|
| 1. | The Project Proponent shall carry out the mining only in 187.57 Ha [185.57 Ha permissible mineral extraction area and 2 Ha for setting up of crusher of 500 TPH] only. The area of 208.395 Ha shall be treated as no mining area. In the no mining area only green belt development, afforestation and other protective activities shall be carried out. | Noted. Mining activities will be carried out only in 187.57 Ha. Remaining 208.395 Ha will be treated as no mining area and only green belt development, afforestation and other protective activities will be carried out in accordance to the IBM approved Mining Plan. |
| 2. | The Project Proponent shall install the AQ station at the mine site, villages, from 500m edge of mining lease boundary towards Mini Zoo & White Tiger Safari for monitoring of any impact due to mining for the parameters mentioned. | Noted. This is a Greenfield project and currently the mining activities is limited to initial land development within the permissible area and land purchase. Installation of AQ stations as prescribed will be undertaken with advancement of mining activities. |
| 3. | The Project Proponent shall monitor the ground vibration at the site, near the boundary and sensitive receptor during blasting. Villages located in non-mining zone shall be protected from noise and vibration, air pollution by adopting measures as given in the EMP and as per the DGMS. | Noted. Currently, initial mine development activities have been undertaken only. Blasting has not been undertaken yet. Vibration shall be monitored regularly and all necessary protection measures shall be undertaken as per EMP and rules/guidelines of DGMS. However, no blasting is proposed in 300 m safety barrier from habitation. |
| 4. | The budget of Rs. 2.0 Crores to address the concerns raised by the public including in the public hearing to be completed within 3 years from the date of start of mining operations. | Being Complied. Annexure- I. The mine is in initial stage of mine development and land purchase. It will be undertaken as per the Action Plan submitted during appraisal of EC. Following activities as committed has already been undertaken: 1. Water Tanker of 5000-liter capacity has been provided to Gram Panchayat Jhiriya Koparihan 2. Drilling of water borewell at village Jhiriya Kothar & Jhiriya Bajpaien 3. Support extended during Covid-19 pandemic by distributing masks, sanitizers in all villages. Ration |

| Sr. | Conditions | Compliance |
|-----|---|--|
| | | <p>support for 300 under privileged families.</p> <p>4. Deepening of Pond and Devt of Ghat at Jhiriya Bajpain. Total Cost Rs 2.81 Lakh.</p> <p>5. Construction of Community Center at Jhiriya Bajpain. Total Cost Rs 9.80 Lakh.</p> <p>6. Deepening of Pond at Jhiriya Koparihan. Total Cost Rs 9.79 Lakh.</p> <p>7. Electric Batery operated Vehical (Golf Cart) Donated to Maharaja martand white tiger Safari Mukundpur–Total Cost-6.35 Lac</p> |
| 5. | The Project Proponent shall return each block within 2 years after completion of each activity at each block with the proper reclamation for the purpose of agriculture. | <p>Noted. After reaching at ultimate depth, part of the excavated pits will be backfilled and returned for agricultural purposes within 2 years. Part of excavated pits will be developed as water reservoir for community use.</p> |
| 6. | The Project Proponent shall undertake the plantation in peripheral zone and ensure that the plantation in peripheral zone and plantation along haul roads should be completed within 3 years from the date of commencement of mining operations with at least 90% survival rate. Causalities of the previous year should be replaced other than the saplings proposed to be planted every year. PP shall provide tree guard to maintain the early stages of plant growth. PP shall undertake commercial plantation within 2 years at each block after it is backfilled. | <p>Noted. The mining activities is currently limited to initial mine development within the permissible area and land purchase as mining operation could not commence due to onset of monsoon. However, plantation has been started in the purchased land. Soon after, land development activities and land purchase, plantation will be taken up in the desired manner. 520 plants have been planted within the ML area. Photographs showing plantation is attached as Annexure-II.</p> |
| 7. | The Project Proponent shall convert the proposed 1.7 km road into cement road which connects the NH-75 for mineral transportation. | <p>Noted. Currently, DCBL is in the process of acquiring land to develop a dedicated road for mineral transportation. No transportation has been done during this compliance period.</p> |
| 8. | The Project Proponent shall implement the Rehabilitation of project affected families (PAFs) and payment of compensation to PAFs as per the policy and guidelines of the Central/State Government, as provided under the law. | <p>Noted. Lands are being purchased in mutual agreement with the land owners and compensation is paid as per the Policy and guidelines of the State</p> |

| Sr. | Conditions | Compliance |
|-----|---|--|
| | | Government/Central Government as provided under the law. |
| 9. | The Project Proponent shall also organize employment-based apprenticeship/ internship training program every year with appropriate stipend for the youth and other programs to enhance the skill of the local people. | Noted. |
| 10. | The Project Proponent shall ensure that the water bodies used for community development. | Noted. After reaching ultimate depth, part of excavated pits will be developed as water reservoir for community use. |
| 11. | The Project Proponent shall submit detailed Hydro Geological study for blocks where the water table is intersecting and obtain permission from CGWA before undertaking mining operations. | Complied. Detailed Hydrogeological study have been undertaken by JM EnviroNet Pvt. Ltd. for Hydro-geological evaluation during grant of EC. Ground water intersection is not anticipated in first 15 years of mining as per the study carried out. Prior NOC will be taken from CGWA for intersection of ground water. CGWA NOC has been obtained for ground water abstraction vide NOC no CGWA/NOC/MIN/ORIG/2021/13090 dated 25/09/2021 and it is valid upto 24/09/2023. (Attached as Annexure-III). Hydrogeological Study report is attached as an Annexure-IV. Copy of Hydrogeological Study report has been submitted to RO, MOEFCC dated 01.12.2021 and submission receipt is attached as Annexure-V. |
| 12. | The Project Proponent should obtain permission for withdrawal of ground water before commencing mining operations. | Complied. CGWA NOC has been obtained for ground water abstraction vide NOC no CGWA/NOC/MIN/ORIG/2021/13090 dated 25/09/2021 which is valid up to 24/09/2023. (Attached as Annexure-III) |
| 13. | The Project Proponent should strictly follow the protective measures as suggested by PCCF, MP in the NOC granted vide Lr. व.प्रा./मा°चि°/माइन-81/3928 dated 10.06.2021 regarding the Maharaja Martand Singh Judeo Dev White Tiger Safari and Zoo. | Noted. |

| Sr. | Conditions | Compliance |
|------------|---|-------------------|
| 14. | Regular surveillance on Silicosis shall be carried through regular occupational health checkup of 1/3 of the persons every year. | Noted. |
| 15. | Project proponent shall examine the possibility of undertaking commercial plantation in consultation with local community within two years. | Noted. |

Standard Conditions: -

| Sr. | Conditions | Compliance |
|------------|--|---|
| 1. | Statutory Compliance | |
| 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 judgement 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. | Noted |
| 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 Judgement 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. | -- |
| 4. | The Project Proponent shall follow the mitigation measures provided in MoEFCC's Office Memorandum No. Z-11013/57/2014-IAJI (M), dated 29th October, 2014, titled "Impact of mining activities on Habitations-Issues related to the mining Projects wherein Habitations and villages are the part of mine lease areas or Habitations and villages are surrounded by the mine lease area". | Noted. |
| 5. | 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. | Complied. Attached as Annexure-VI. |
| 6. | State Pollution Control Board/Committee shall be responsible for display of this EC letter at its Regional | -- |

| Sr. | Conditions | Compliance |
|------------|---|--|
| | office, District Industries Centre and Collector's office/ Tehsildar's Office for 30 days. | |
| 7. | 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.environmentalclearance.nic.in). A copy of the advertisement may be forwarded to the concerned MoEFCC Regional Office for compliance and record. | <p>Complied.</p> <p>A public notice informing about grant of EC has been published in two newspapers named "Dainik Jagaran and Navbharat" on 4th August 2021 in English as well as in vernacular language i.e. Hindi. Copy of Advertisements are attached as Annexure-VII.</p> <p>Newspapers with advertisement have been submitted to the Regional Office of MoEFCC. Copy of submission receipt is attached as Annexure-VIII.</p> |
| 8. | 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 para 11 of EIA Notification, 2006 as amended from time to time. | <p>Noted.</p> |
| II. | Air quality monitoring and preservation | |
| 9. | 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 air pollution viz. PM10, PM2.5, NO ₂ ; CO and SO ₂ etc. as per the methodology mentioned in NAAQS Notification No. B-29016/20/90/PCUI, 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. | <p>Noted.</p> <p>Currently, the mining operation is limited to initial mine development and land purchase.</p> <p>With the start of mining operation at planned capacity, online Ambient Air Quality Monitoring Stations will be established as prescribed to monitor critical parameters relevant for mining operations of air pollution as per the methodology mentioned in NAAQS Notification dated 18.11.2009. The ambient air quality shall also be monitored at prominent places like office building, canteen etc. Monitored data will be displayed in front of the main Gate of the mine site. A copy of Air quality monitoring result at mine site is enclosed as Annexure - IX</p> |
| 10. | Effective safeguard measures for prevention of dust generation and subsequent suppression (like regular water sprinkling, metalled 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, | <p>Noted.</p> <p>During operation of the mine, various measures such as regular water sprinkling will be done on haul road, at loading and unloading points and at</p> |

| Sr. | Conditions | Compliance |
|-------------|---|--|
| | loading and unloading point and transfer points. The Fugitive dust emissions from all sources shall be regularly controlled by installation of required equipments/ 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 MoEFCC/ Central Pollution Control Board. | transfer points will be undertaken to control fugitive dust emissions. Bag filters and automatic water spray system shall be installed at crusher. Air pollution level will be kept within the standard specified by MOEFCC/CPCB. As the mining activities limited to initial land development and not carried out on regular basis. Water tankers for water sprinkling are hired as and when required during development. |
| III. | Water quality monitoring and preservation | |
| 11. | 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 MoEFCC 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. | Noted. Detailed Hydrogeological study have been undertaken by JM EnviroNet Pvt. Ltd. for Hydro-geological evaluation during grant of EC. Ground water intersection is not anticipated in first 15 years of mining as per the study carried out. Prior NOC will be taken from CGWA for intersection of ground water. However, CGWA NOC has been obtained for ground water abstraction vide NOC dated 25/09/2021. |
| 12. | 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. | Noted. During this compliance period, no major mining activities have been undertaken, it is limited to mine development only. However, to monitor the water level and quality, a network of existing wells and installation of new piezo-meters will be established in consultation with concerned department prior to ground water abstraction. |
| 13. | 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 | Noted. |

| Sr. | Conditions | Compliance |
|-----|--|--|
| | <p>plan. The parameters to be monitored shall include their water quality vis-à-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 MoEFCC. 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 Board, State Pollution Control Board and Central Pollution Control Board. Clearly showing the trend analysis on six-monthly basis.</p> | |
| 14. | <p>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.</p> | <p>Noted. During this compliance period, no effluent has been generated because of limited activities. However, the effluent generated from workshop, will be monitored regularly and monitored data will be uploaded/displayed as prescribed.</p> |
| 15. | <p>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 MoEFCC annually.</p> | <p>Noted. Hydrogeological Study including Rain Water Harvesting Plan has been prepared and submitted to CGWA along with the Application for NOC. CGWA NOC has been obtained vide NOC dated 25/09/2021. Rain water harvesting plan which was submitted to CGWA, will be implemented. Copy of the same is attached as Annexure IV.</p> |
| 16. | <p>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.</p> | <p>Noted. Currently, no waste water is generated as mining activities is limited to initial development and land purchase. However, in future it will be ensured that the effluent generated from the workshop when established, will be</p> |

| Sr. | Conditions | Compliance |
|------------|---|---|
| | | treated properly to conform to the prescribed standards. |
| 17. | 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. | Noted. |
| IV. | Noise and vibration monitoring and prevention | |
| 18. | The peak particle velocity at 500m distance or within the nearest habitation, whichever is closer shall be monitored periodically as per applicable DGMS guidelines. | Noted. |
| 19. | 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. | Noted. |
| 20. | 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 provided 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. | Noted and Being complied. |
| V. | Mining Plan | |
| 21. | The Project Proponent shall adhere to approved mining plan, inter alia, including total excavation (quantum of mineral, waste, over burden, inter burden and top soil etc.); mining technology; lease area; scope of working (viz. method of mining, overburden & dump management, O.B & dump mining, mineral transportation mode, ultimate depth of mining, concurrent reclamation and reclamation at mine closure; land-use of the mine lease area at various stages of mining scheme as well as end-of-life; etc. | Noted. Mining operation including total excavation, mining technology; scope of working etc. will be carried out in accordance with the approved mining plan. |
| 22. | 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 | Noted. Mining operation and reclamation-rehabilitation of mined out area will be |

| Sr. | Conditions | Compliance |
|------------|--|--|
| | <p>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.</p> | <p>carried out in accordance with the approved mining plan.</p> |
| VI. | Land reclamation | |
| 23. | <p>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.</p> | <p>Noted. There is no dump formation during compliance period. As per the Approved Mining Plan, over burden will be stacked in temporary dump and will be used for backfilling/construction of mine road/crusher ramp. It will be stabilized by proper sloping, benching, grassing etc. The physical parameters of the dumps will be maintained as per the approved Mining Plan and guidelines/circulars issued by D.G.M.S. Top soil will be used in plantation and as topping on the backfilled area for plantation.</p> |
| 24. | <p>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.</p> | <p>Noted.</p> |
| 25. | <p>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.</p> | <p>Noted. No dump has been formed during this compliance period.</p> |
| 26. | <p>Check dams of appropriate size, gradient and length shall be constructed around mine pit and OB dumps to prevent</p> | <p>Noted.</p> |





| Sr. | Conditions | Compliance |
|-------------|--|---|
| | <p>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.</p> | |
| VII. | Transportation | |
| 27. | <p>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. [If applicable in case of road transport].</p> | <p>Noted. No transportation of minerals outside lease area has been undertaken during this compliance period.</p> |
| 28. | <p>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 equipments like bag filters, vacuum suction hoods, dry fogging system etc. shall be installed at Crushers, belt-conveyors and other 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.</p> | <p>Noted. Currently, the mining activities are intermittent and not carried out on regular basis. Therefore, water tankers are hired as and when required during development. With the advancement of mining operation, all the measures shall be implemented as per the provisions of EMP given in EIA/EMP report to control fugitive dust emissions such as permanent water sprinkling arrangement at the main haulage road, water sprinkling at loading & unloading points, Bag filters/dry Fog System and automatic water spray system at crusher etc.</p> |

| Sr. | Conditions | Compliance |
|--------------|--|--|
| VIII. | Green Belt | |
| 29. | 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. | Noted. The mining activities is currently limited to initial mine development within the permissible area as Mining operation could not be commenced due to onset of monsoon. A Safety barrier (No mining zone) of 7.5m is demarcated all along the ML boundary. Soon after, land development activities and land purchase, greenbelt will be developed as per guidelines of CPCB. About 520 plants have been planted within purchased land in ML. Annexure-II |
| 30. | 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. | Noted. No major mining activities except land development work have been undertaken due to onset of monsoon. Plantation has been started within ML boundary. However, Consultation with DFO, Satna is also in progress for development of greenbelt/plantation. Letter submitted to the concerned DFO is attached as Annexure- X . |
| 31. | 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. | No grazing land falls within ML area. |
| IX. | Public hearing and human health issues | |
| 32. | Project Proponent shall make provision for the housing for workers/labors 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 | Noted Currently, the mining operation is limited to initial land development and land purchase. Being mining project, no major construction will be done except |

| Sr. | Conditions | Compliance |
|------------|---|---|
| | <p>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.</p> | <p>mines office, crusher, rest shelter etc. As local people will be engaged during construction phase, provision for housing for workers will not be required. However, all necessary facilities will be provided.</p> <p>During operation phase, local people will be employed. Proper infrastructure with shelter, drinking water, toilet and first-aid facilities will be provided to the laborers. Currently, mining activities is being carried out intermittently with limited manpower and restricted to initial land development and land purchase. At present, it is regulated by a remote office outside the ML area having all infrastructure facilities.</p> <p>Therefore, it is proposed to install portable Bio-toilets at the site to cater to the requirement. However, during later years when the mine will be operating at full capacity, domestic waste water will be treated in STP and treated water will be used for plantation purpose.</p> |
| X. | Corporate Environment Responsibility (CER) | |
| 33. | <p>The Project Proponent shall submit the time-bound action plan to the concerned regional office of the Ministry within 6 months from the date of issuance of environmental clearance for undertaking the activities committed during public consultation by the project proponent and as discussed by the EAC, in terms of the provisions of the MoEF&CC Office Memorandum No.22-65/2017-IA.III dated 30 September, 2020. The action plan shall be implemented within three years of commencement of the project.</p> | <p>Time bound action plan prepared and submitted during grant of EC and mentioned in para no. 17 of EC as per MoEF&CC Office Memorandum No.22-65/2017-IA III dated 30 September, 2020. The same is attached as an Annexure -XI.</p> <p>The mine is in initial stage of land development and land purchase. It will be undertaken as per the Action Plan submitted. However few activities have been undertaken which are detailed in Specific EC conditions No. 4.</p> |
| XI. | Miscellaneous | |
| 34. | <p>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.</p> | Noted. |
| 35. | <p>The Project Authorities should inform to the Regional Office regarding date of financial closures and final</p> | Noted. |

| Sr. | Conditions | Compliance |
|-----|--|---------------|
| | approval of the project by the concerned authorities and the date of start of land development work. | |
| 36. | 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. | Noted. |
| 37. | 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. | Noted. |
| 38. | 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. |
| 39. | In pursuant to Ministry's O.M No 22-34/2018-IA.111 dated 16.01.2020 to comply with the direction made by Hon'ble Supreme Court on 8.01.2020 in W.P. (Civil) No 114/2014 in the matter Common Cause vs Union of India, the mining lease holder shall after ceasing mining operations, undertake regrassing the mining area and any other area which may have been disturbed due to other mining activities and restore the land to a condition which is fit for growth of fodder, flora, fauna etc. | Noted. |
| 40. | The Ministry or any other competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environment protection. | Noted. |
| 41. | Concealing factual data failure to comply with any or submission of false/ fabricated data and of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of Environment (Protection) Act, 1986. | Noted. |

Following activities as committed has already been undertaken: Annexure- I

| Sr. No. | Work Description | Photographs |
|---------|--|--|
| 1 | Water Tanker of 5000-liter capacity has been provided to Gram Panchayat Jhiriya Koparihan Total Cost-0.99Lac |  |
| 2 | Drilling of water borewell at village Jhiriya Kothar & Jhiriya Bajpaien |  |
| 3 | Support extended during Covid-19 pandemic by distributing masks, sanitizers in all villages. Ration support for 300 under privileged families. |  |
| 4 | Deepening of Pond and Development of Ghat at Jhiriya Bajpainen. Total Cost Rs 2.81 Lakh. |  |

Following activities as committed has already been undertaken: Annexure- I

| | | |
|---|--|---|
| 5 | Construction of Community Center at Jhiriya Bajpain. Total Cost Rs 9.80 Lakh. |  |
| 6 | Deepening of Pond at Jhiriya Koparihan. Total Cost Rs 9.79 Lakh. |  |
| 7 | Electric Battery operated Vehical (Golf Cart) Donated to Maharaja martand white tiger Safari Mukundpur – Total Cost-6.35 Lac |  |

Photographs showing plantation in Purchased land: Annexure-II



Photographs showing plantation in Purchased land: Annexure-II



| | Decimal | DMS |
|-----------|-----------|-------------|
| Latitude | 24.453611 | 24°27'13" N |
| Longitude | 81.202095 | 81°12'7" E |

2022-01-12(Wed) 01:13(PM)

| | Decimal | DMS |
|-----------|-----------|-------------|
| Latitude | 24.453584 | 24°27'12" N |
| Longitude | 81.202176 | 81°12'7" E |

2022-01-12(Wed) 01:12(PM)

Photographs showing plantation in Purchased land: Annexure-II

| Dalmia Cement Bharat Limited | | |
|--------------------------------------|---------------------|------------------------|
| Pagara-Jhiriya Limestone Mine | | |
| Sr.No. | Name of Tree | No.of Sapplings |
| 1 | Aamla | 70 |
| 2 | Neem | 50 |
| 3 | Reetha | 50 |
| 4 | Kachnar | 50 |
| 5 | Kaaduva | 50 |
| 6 | Bahera | 50 |
| 7 | Jamun | 50 |
| 8 | Khanji | 50 |
| 9 | Seethafal | 50 |
| 10 | Kadam | 50 |
| Total | | 520 |



भारत सरकार
जल शक्ति मंत्रालय
जल संसाधन, नदी विकास
और गंगा संरक्षण विभाग
केन्द्रीय भूमि जल प्राधिकरण
Government of India
Ministry of Jal Shakti
Department of Water Resources,
River Development & Ganga Rejuvenation
Central Ground Water Authority

(भूजल निकासी हेतु अनापत्ति प्रमाण पत्र)

NO OBJECTION CERTIFICATE (NOC) FOR GROUND WATER ABSTRACTION

| | | | |
|-----------------------------------|---|--------|----------------|
| Project Name: | Pagara-jhiriya Limestone Mine_ml Area-395.965 Ha | | |
| Project Address: | Located Near Villages– Pagra, Jhiriya Kothar, Jhiriya Bajpaien And Jhiriya Koparihan, Tehsil Amarpatan | | |
| Village: | Pagra | Block: | Amarpatan |
| District: | Satna | State: | Madhya Pradesh |
| Pin Code: | | | |
| Communication Address: | Mr. V. Karthikeyan (deputy Executive Director), Dalmia Cement (bharat) Ltd, 11th And 12th Floor, Hansalaya Building, 15, Barakhamba Road, Karol Bagh, Central, Delhi - 110001 | | |
| Address of CGWB Regional Office : | Central Ground Water Board North Central Region, Block-1, 4th Floor, Paryawas Bhawan, Area Hills, Jail Road, Bhopal, Madhya Pradesh - 462011 | | |

| | | | | | | | | | | | | |
|---|------------------------------|-----------------------------|---------------------|----|----|-----|-----------------------------|--------|---------------------|----|----|-----|
| 1. NOC No.: | CGWA/NOC/MIN/ORIG/2021/13090 | | | | | | | | | | | |
| 2. Application No.: | 21-4/1071/MP/MIN/2020 | 3. Category: (GWRE 2020) | Safe | | | | | | | | | |
| 4. Project Status: | New Project | 5. NOC Type: | New | | | | | | | | | |
| 6. Valid from: | 25/09/2021 | 7. Valid up to: | 24/09/2023 | | | | | | | | | |
| 8. Ground Water Abstraction Permitted: | | | | | | | | | | | | |
| | Fresh Water | | Saline Water | | | | | | | | | |
| | Dewatering | | Total | | | | | | | | | |
| | m ³ /day | m ³ /year | m ³ /day | | | | | | | | | |
| | m ³ /day | m ³ /year | m ³ /day | | | | | | | | | |
| | m ³ /day | m ³ /year | m ³ /day | | | | | | | | | |
| | 75.00 | 22500.00 | | | | | | | | | | |
| 9. Details of ground water abstraction /Dewatering structures | | | | | | | | | | | | |
| | Total Existing No.:0 | | | | | | Total Proposed No.:1 | | | | | |
| | DW | DCB | BW | TW | MP | MPu | DW | DCB | BW | TW | MP | MPu |
| Abstraction Structure* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| *DW- Dug Well; DCB-Dug-cum-Bore Well; BW-Bore Well; TW-Tube Well; MP-Mine Pit;MPu-Mine Pumps | | | | | | | | | | | | |
| 10. Ground Water Abstraction/Restoration Charges paid (Rs.): | 45000.00 | | | | | | | | | | | |
| 11. Number of Piezometers(Observation wells) to be constructed/ monitored & Monitoring mechanism. | No. of Piezometers | | | | | | Monitoring Mechanism | | | | | |
| | | | | | | | Manual | DWLR** | DWLR With Telemetry | | | |
| **DWLR - Digital Water Level Recorder | 1 | | | | | | 0 | 1 | 0 | | | |

(Compliance Conditions given overleaf)

This is an auto generated document & need not to be signed.

18/11, जामनगर हाउस, मानसिंह रोड, नई दिल्ली - 110011 / 18/11, Jamnagar House, Mansingh Road, New Delhi-110011
Phone: (011) 23383561 Fax: 23382051, 23386743
Website: cgwa-noc.gov.in

पानी बचाये - जीवन बचाये
SAVE WATER - SAVE LIFE

Validity of this NOC shall be subject to compliance of the following conditions:

Mandatory conditions:

- 1) Installation of tamper proof digital water flow meter with telemetry on all the abstraction structure(s) shall be mandatory for all users seeking No Objection Certificate and intimation regarding their installation shall be communicated to the CGWA within 30 days of grant of No Objection Certificate.
- 2) Proponents shall mandatorily get water flow meter calibrated from an authorized agency once in a year.
- 3) Construction of purpose-built observation wells (piezometers) for ground water level monitoring shall be mandatory as per Section 14 of Guidelines. Water level data shall be made available to CGWA through web portal. Detailed guidelines for construction of piezometers are given in Annexure-II of the guidelines.
- 4) Proponents shall monitor quality of ground water from the abstraction structure(s) once in a year. Water samples from bore wells/ tube wells / dug wells shall be collected during April/May every year and analysed in NABL accredited laboratories for basic parameters (cations and anions), heavy metals, pesticides/ organic compounds etc. Water quality data shall be made available to CGWA through the web portal.
- 5) In case of mining projects, additional key wells shall be established in consultation with the Regional Director, CGWB for ground water level monitoring four (4) times a year (January, May, August and November) in core as well as buffer zones of the mine.
- 6) In case of mining project the firm shall submit water quality report of mine discharge/ seepage from Govt. approved/ NABL accredited lab.
- 7) The firm shall report compliance of the NOC conditions online in the website (www.cgwa-noc.gov.in) within one year from the date of issue of this NOC.
- 8) Industries abstracting ground water in excess of 100 m³/d shall undertake annual water audit through certified auditors and submit audit reports within three months of completion of the same to CGWA. All such industries shall be required to reduce their ground water use by at least 20% over the next three years through appropriate means.
- 9) Application for renewal can be submitted online from 90 days before the expiry of NOC. Ground water withdrawal, if any, after expiry of NOC shall be illegal & liable for legal action as per provisions of Environment (Protection) Act, 1986.
- 10) This NOC is subject to prevailing Central/State Government rules/laws/norms or Court orders related to construction of tube well/ground water abstraction structure / recharge or conservation structure/discharge of effluents or any such matter as applicable.

General conditions:

- 11) No additional ground water abstraction and/or de-watering structures shall be constructed for this purpose without prior approval of the Central Ground Water Authority (CGWA).
- 12) The proponent shall seek prior permission from CGWA for any increase in quantum of groundwater abstraction (more than that permitted in NOC for specific period).
- 13) Proponents shall install roof top rain water harvesting in the premise as per the existing building bye laws in the premise.
- 14) The project proponent shall take all necessary measures to prevent contamination of ground water in the premises falling which the firm shall be responsible for any consequences arising thereupon.
- 15) In case of industries that are likely to contaminate the ground water, no recharge measures shall be taken up by the firm inside the plant premises. The runoff generated from the rooftop shall be stored and put to beneficial use by the firm.
- 16) Wherever feasible, requirement of water for greenbelt (horticulture) shall be met from recycled / treated waste water.
- 17) Wherever the NOC is for abstraction of saline water and the existing wells (s) is /are yielding fresh water, the same shall be sealed and new tubewell(s) tapping saline water zone shall be constructed within 3 months of the issuance of NOC. The firm shall also ensure safe disposal of saline residue, if any.
- 18) Unexpected variations in inflow of ground water into the mine pit, if any, shall be reported to the concerned Regional Director, Central Ground Water Board.
- 19) In case of violation of any NOC conditions, the applicant shall be liable to pay the penalties as per Section 16 of Guidelines.
- 20) This NOC does not absolve the proponents of their obligation / requirement to obtain other statutory and administrative clearances from appropriate authorities.
- 21) The issue of this NOC does not imply that other statutory / administrative clearances shall be granted to the project by the concerned authorities. Such authorities would consider the project on merits and take decisions independently of the NOC.
- 22) In case of change of ownership, new owner of the industry will have to apply for incorporation of necessary changes in the No Objection Certificate with documentary proof within 60 days of taking over possession of the premises.
- 23) This NOC is being issued without any prejudice to the directions of the Hon'ble NGT/court orders in cases related to ground water or any other related matters.
- 24) Proponents, who have installed/constructed artificial recharge structures in compliance of the NOC granted to them previously and have availed rebate of upto 50% (fifty percent) in the ground water abstraction charges/ground water restoration charges, shall continue to regularly maintain artificial recharge structures.
- 25) Industries which are likely to cause ground water pollution e.g. Tanning, Slaughter Houses, Dye, Chemical/ Petrochemical, Coal washeries, pharmaceutical, other hazardous units etc. (as per CPCB list) need to undertake necessary well head protection measures to ensure prevention of ground water pollution as per Annexure III of the guidelines.
- 26) In case of new infrastructure projects having ground water abstraction of more than 20 m³/day, the firm/entity shall ensure implementation of dual water supply system in the projects.
- 27) In case of infrastructure projects, paved/parking area must be covered with interlocking/perforated tiles or other suitable measures to ensure groundwater infiltration/harvesting.
- 28) In case of coal and other base metal mining projects, the project proponent shall use the advance dewatering technology (by construction of series of dewatering abstraction structures) to avoid contamination of surface water.
- 29) The NOC issued is conditional subject to the conditions mentioned in the Public notice dated 27.01.2021 falling which penalty/EC/cancellation of NOC shall be imposed as the case may be.
- 30) This NOC is issued subject to the clearance of Expert Appraisal Committee (EAC) (if applicable).

(Non-compliance of the conditions mentioned above is likely to result in the cancellation of NOC and legal action against the proponent.)

COMPREHENSIVE REPORT FOR CGWB APPLICATION SUBMISSION

PAGARA-JHIRIYA LIMESTONE MINE (ML AREA: 395.965HA)
TOTAL EXCAVATION OF 2.41 MILLION TPA [LIMESTONE: 1.5 MTPA, SOIL: 0.56 MTPA AND OB: 0.35 MTPA]
LOCATED
NEAR VILLAGES - PAGRA, JHIRIYA KOTHAR, JHIRIYA BAJPAIEN & JHIRIYA KOPARIHAN,
TEHSIL - AMARPATAN, DISTRICT - SATNA, MADHYA PRADESH



PROJECT PROPONENT



M/S. DALMIA CEMENT (BHARAT) LIMITED (DCBL)
11TH AND 12TH FLOOR, HANSALAYA BUILDING
15, BARAKHAMBA ROAD
NEW DELHI-110001

ENVIRONMENT CONSULTANT



M/S. J.M. ENVIRONET PVT. LTD.
(NABET CERTIFICATE NO. NABET/EIA/2023/RA 0186)
EMMAR DIGITAL GREENS, TOWER - B, UNIT NO. 1517, GOLF COURSE EXT. ROAD, SECTOR - 61,
GURUGRAM (HARYANA) - 122 011
Email: jmenviron@hotmail.com
DECEMBER 2020

INDEX

| S. NO. | CONTENTS | PAGE NO. |
|---|--|--------------|
| CHAPTER 1- INTRODUCTION | | 1-3 |
| 1.1 | GENERAL INTRODUCTION | 1 |
| 1.2 | PROJECT DESCRIPTION | 1 |
| 1.3 | OBJECTIVE AND SCOPE | 3 |
| CHAPTER 2- LOCATION AND LANDUSE PATTERN OF THE STUDY AREA | | 4-6 |
| 2.1 | LOCATION OF THE PROJECT | 4 |
| 2.2 | LAND USE PATTERN | 5 |
| CHAPTER 3- METEOROLOGY--DRAINAGE-TOPOGRAPHY AND GEOLOGICAL DESCRIPTION | | 7-18 |
| 3.1 | CLIMATE AND RAINFALL | 7 |
| 3.2 | GEOMORPHOLOGY AND TOPOGRAPHY | 8 |
| 3.3 | DRAINAGE PATTERN | 9 |
| 3.4 | REGIONAL GEOLOGY | 13 |
| 3.5 | LOCAL GEOLOGY | 17 |
| CHAPTER 4- HYDROGEOLOGICAL-AQUIFER DESCRIPTION & TREND ANALYSIS OF WATER LEVEL | | 19-29 |
| 4.1 | HYDROGEOLOGY OF THE AREA | 19 |
| 4.2 | AQUIFER TYPES, WATER LEVEL AND YIELD POTENTIAL | 20 |
| 4.3 | GROUNDWATER RESOURCES OF THE AREA | 22 |
| 4.4 | GROUNDWATER LEVEL MONITORING | 24 |
| CHAPTER 5- GROUND WATER QUALITY AND WATER REQUIREMENT AND ITS RECYCLE PROCESS | | 30-35 |
| 5.1 | GROUNDWATER QUALITY | 30 |
| 5.2 | WATER REQUIREMENT OF PROPOSED MINE | 34 |
| CHAPTER 6- GROUNDWATER RESOURCES EVALUATION | | 36-41 |
| 6.1 | GROUNDWATER RESOURCES EVALUATION | 36 |
| 6.2 | DYNAMIC GROUNDWATER RESOURCES | 36 |
| 6.3 | GROUND WATER RESOURCES IN THE CORE ZONE | 36 |
| 6.3.1 | RECHARGE DUE TO RAINFALL | 36 |
| 6.3.2 | TOTAL DYNAMIC RESERVES OF CORE ZONE | 37 |
| 6.3.3 | GROUNDWATER DRAFT OF CORE ZONE | 37 |
| 6.4 | GROUNDWATER RESOURCES FOR BUFFER ZONE | 38 |
| 6.4.1 | RECHARGE DUE TO RAINFALL | 38 |
| 6.4.2 | RETURN FLOW FROM APPLIED IRRIGATION | 39 |
| 6.4.3 | RECHARGE DUE TO SURFACE WATER BODIES | 39 |
| 6.4.4 | TOTAL RECHARGE OF BUFFER ZONE | 39 |
| 6.5 | GROUNDWATER DRAFT OF BUFFER ZONE | 39 |
| 6.5.1 | DRAFT DUE TO APPLIED IRRIGATION | 39 |
| 6.5.2 | DRAFT DUE TO DOMESTIC USE | 40 |
| 6.5.3 | DRAFT DUE TO LIVESTOCK USE | 40 |
| 6.5.4 | DRAFT DUE TO INDUSTRIAL USE | 40 |

| | | |
|--|--|--------------|
| 6.5.5 | TOTAL DRAFT OF BUFFER ZONE | 40 |
| 6.6 | ALLOCATION OF GROUND WATER FOR DOMESTIC USE FOR FUTURE DEVELOPMENT | 41 |
| 6.7 | SUMMARY OF BUFFER ZONE WATER BALANCE | 41 |
| CHAPTER 7-IMPACT OF MINING ON WATER RESOURCES OF THE AREA | | 42-45 |
| 7.1 | MINING SCHEME/YEARWISE DEVELOPMENT OF MINES | 42 |
| 7.2 | IMPACT OF MINING ON WATER RESOURCES | 43 |
| 7.2.1 | IMPACT OF MINING ON SURFACE WATER | 43 |
| 7.2.2 | IMPACT OF MINING ON GROUND WATER | 43 |
| 7.2.3 | IMPACTS DUE TO GROUND WATER DRAFT | 44 |
| 7.3 | MITIGATION MEASURES | 44 |
| 7.4 | RECOMMENDATIONS & SUGGESTIONS | 45 |
| SUMMARY AND CONCLUSIONS | | 46-47 |

LIST OF FIGURES

| S. NO. | DESCRIPTION | PAGE NO. |
|------------|---|----------|
| FIGURE 2.1 | LOCATION MAP OF THE STUDY AREA | 4 |
| FIGURE 2.2 | LAND USE/LAND COVER PATTERN WITHIN 10 KM BUFFER ZONE, DALMIA CEMENT (BHARAT) LIMITED, AMARPATAN, SATNA, MADHYA PRADESH. | 6 |
| FIGURE 3.1 | RAINFALL PATTERN OF SATNA DISTRICT | 8 |
| FIGURE 3.2 | CONTOUR ELEVATION MAP IN AND AROUND PROPOSED LIMESTONE MINE DCBL, SATNA-MP | 10 |
| FIGURE 3.3 | GEOMORPHOLOGICAL FEATURES IN AND AROUND PROPOSED LIMESTONE MINE, DALMIA CEMENT (BHARAT) LIMITED, AMARPATAN, SATNA, MADHYA PRADESH (SOURCE: BHUKOSH) | 11 |
| FIGURE 3.4 | DRAINAGE PATTERN IN AND AROUND PROPOSED LIMESTONE MINE, DALMIA CEMENT (BHARAT) LIMITED, AMARPATAN, SATNA, MADHYA PRADESH (SOURCE: USGS) | 12 |
| FIGURE 3.5 | STRATIGRAPHIC SEQUENCE OF VINDHYAN BASIN SUPER GROUP (SOURCE: CGWB) | 16 |
| FIGURE 3.6 | GEOLOGICAL FORMATIONS IN AND AROUND 10 KM BUFFER ZONE, DALMIA CEMENT (BHARAT) LTD., AMARPATAN, SATNA, MADHYA PRADESH (SOURCE: CGWB) | 18 |
| FIGURE 4.1 | HYDROGEOLOGICAL FORMATIONS WITHIN BUFFER ZONE, DALMIA CEMENT (BHARAT) LTD., AMARPATAN, SATNA, MADHYA PRADESH (SOURCE: CGWB) | 21 |
| FIGURE 4.2 | PHOTOGRAPHS SHOWING MONITORING OF GROUND WATER REGIME IN AND AROUND PROPOSED LIMESTONE BLOCK, AMARPATAN, SATNA, MADHYA PRADESH | 25 |
| FIGURE 4.3 | DEPTH TO WATER LEVEL PATTERN (M BGL) IN BUFFER ZONE, DALMIA CEMENT (BHARAT) LTD., AMARPATAN, SATNA, MADHYA PRADESH | 27 |

| | | |
|------------|---|----|
| FIGURE 4.4 | DEPTH TO WATER LEVEL PATTERN (M BGL) IN AND AROUND CORE ZONE, DALMIA CEMENT (BHARAT) LTD., AMARPATAN, SATNA, MADHYA PRADESH | 28 |
| FIGURE 4.5 | DEPTH TO WATER LEVEL PATTERN (AMSL) IN BUFFER ZONE, DALMIA CEMENT (BHARAT) LTD., AMARPATAN, SATNA, MADHYA PRADESH | 29 |
| FIGURE 5.1 | LOCATIONS OF GROUNDWATER QUALITY MONITORING WITHIN BUFFER ZONE, DALMIA CEMENT LTD., AMARPATAN, SATNA, MADHYA PRADESH | 31 |
| FIGURE 5.2 | WATER BALANCE DIAGRAM | 35 |

LIST OF TABLES

| S.NO. | DESCRIPTION | PAGE NO. |
|-----------|---|----------|
| TABLE 1.1 | SALIENT FEATURES OF THE PROJECT | 1 |
| TABLE 2.1 | LAND USE / LAND COVER DETAILS OF STUDY AREA | 5 |
| TABLE 3.1 | RAINFALL STATISTICS OF SATNA DISTRICT | 7 |
| TABLE 3.2 | REGIONAL GEOLOGY | 13 |
| TABLE 3.3 | GENERAL STRATIGRAPHIC SEQUENCE OF THE LEASE AREA | 17 |
| TABLE 4.1 | GROUNDWATER AVAILABILITY, UTILIZATION AND DEVELOPMENT STAGE IN BUFFER ZONE OF PROPOSED LIMESTONE MINE, AMARPATAN, SATNA, MADHYA PRADESH | 23 |
| TABLE 4.2 | DETAILS OF GROUNDWATER LEVEL MONITORING, DALMIA CEMENT (BHARAT) LTD., AMARPATAN, SATNA, MADHYA PRADESH | 26 |
| TABLE 5.1 | LOCATION OF GROUNDWATER SAMPLING STATIONS | 30 |
| TABLE 5.2 | DETAILS OF GROUNDWATER QUALITY ANALYSIS, STUDY PERIOD – POST MONSOON SEASON (OCTOBER-DECEMBER, 2018) | 32 |
| TABLE 5.3 | WATER REQUIREMENT | 34 |
| TABLE 7.1 | YEAR WISE WORKING DETAILS | 43 |



CHAPTER - 1
INTRODUCTION

1.1 GENERAL INTRODUCTION

About Dalmia Cement (Bharat) Limited (DCBL)

DCBL is one of the leading cement producers of India. The group was founded in 1935 by Shri Jaidayal Dalmia. First Cement Plant of DCBL was established in 1939 at Dalmiapuram, Tamil Nadu, thus enjoying a heritage of over 81 Years of expertise and experience. The Group currently has cement plants in Tamil Nadu (Dalmiapuram & Ariyalur), Andhra Pradesh (Kadapa), Meghalaya (Thangskai) Karnataka (Belgaum), Jharkhand (Bokaro), Assam (Umrangso & Lanka), Odisha (Rajgangpur & Kapilas) and West Bengal (Midnapur). The Group now controls a cement capacity of about 27 Million Tonnes & has a strong presence in Southern, Eastern & North East Regions of the Country.

1.2 PROJECT DESCRIPTION

Project Details

Dalmia Cement (Bharat) Limited (DCBL) was initially sanctioned prospecting license over an area of 735.296 ha, dated 22.05.2010. After conduction of prospecting operations, Mining Lease (ML) was granted by the Government of Madhya Pradesh for Pagara-Jhiriya Limestone Mine (ML Area: 395.965 ha) in favor of M/s. DCBL in 5 blocks/parts after curtailing prohibited area such as Nallah, Road, Public Utilities vide order no. F-3-8/2013/12-1, dated 20.03.2015 and executed & registered on 27.07.2015 and on 06.11.2015 respectively. The Proposed Limestone Mine of M/s. Dalmia Cement (Bharat) Ltd. is near villages– Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan, Tehsil – Amarpatan, District – Satna, Madhya Pradesh with total excavation of 2.41 Million TPA [Limestone: 1.5 MTPA, Soil: 0.56 MTPA and OB: 0.35 MTPA having (ML Area – 395.965 ha including mining area 185.57 ha, non-mining area 208.395 ha and area for installation of Crusher 2 ha) along with installation of crusher of 500 TPH capacity.

The company has approached Ministry of Environment, Forest and Climate Change (MoEFCC), Govt. of India, New Delhi for grant of Terms of References (ToR) for environmental clearance of proposed limestone mine. The ToR was granted by MoEFCC vide its letter number J-11015/58/2017-IA.II (M) dated 16th May, 2018.

Description of the Project

Pagara-Jhiriya Limestone Mine is located near Villages – Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan, Tehsil – Amarpatan, District – Satna, Madhya Pradesh. The Salient features of the project is given in the table 1.1

Table 1.1
Salient Features of the Project

| S.No | Particulars | Descriptions |
|------|--------------------|---|
| 1 | District and State | Satna and Madhya Pradesh |
| 2 | Taluka | Amarpatan |
| 3 | Village | Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan |

| | | |
|----|--|--|
| 4 | Mine Lease Area | 395.965 ha |
| 5 | Whether the area is in Forest | No |
| 6 | Ownership/Occupancy | 3.884 Ha Government Land and 392.081 Ha Private Land |
| 7 | Toposheet Number, Latitude & Longitude | Core zone – G44V3 Buffer zone – G44V2, G44V3, G44V6 & G44V7 Latitude 24°26'41.5" N to 24°28'18.3" N Longitude 81°09'42.6" E to 81°12'27.6" E |
| 8 | Nearest Railway station | Turki Railway Station (~9.0 km in NNW direction) |
| 9 | Nearest State Highway | <ul style="list-style-type: none"> NH-30 (Earlier NH-7) (~ 2.0 km in NNW direction) NH-39 (Earlier NH-75) (~2.5 km in NNW direction) |
| 10 | Nearest Airport | <ul style="list-style-type: none"> Allahabad Airport (~120 km in NNE direction) Khajuraho Airport (~130 km in NW direction) |
| 11 | Water Bodies within 10 km Radius of Lease Area | <ul style="list-style-type: none"> Lilji Nadi (Adjacent in NE direction) Dharam Sagar (~5.0 km in North direction) Murja Nadi (~5.0 km in SSE direction) Chanduwa Nala (~6.0 km in NNE direction) Kariari Nadi (~6.0 km in NNW direction) Jamuniha Nala (~6.5 km in South direction) Garvandha Nala (~7.0 km in ESE direction) Saiphani Nala (~7.5 km in SE direction) Bhamara Nala (~8.0 km in SE direction) Dhirma Nala (~ 8.5 km in NNE direction) Canal (~8.5 km in SE direction) |
| 12 | National Park, Wild Life Sanctuary, Biosphere Reserves, Reserved/ Protected Forest, Ramsar site etc. within 10 km radius | <ul style="list-style-type: none"> There is no National Park, Wild Life Sanctuary, Biosphere Reserves, Wildlife corridors, Tiger/Elephant Reserves etc. within 10 km radius study area Mand Reserve Forest (~5.0 in SE direction) Papra Reserve Forest (~9.5 in SSE direction) |

Status of NOC

Total water requirement for the proposed mining project will be 75 KLD; which will be sourced from Ground water and water augmented by rainwater harvesting inside the mine lease. This is a proposed project so M/s. DCBL is applying for fresh NOC as per Gazette Notification dated 24.09.2020. After grant of NOC all the conditions will be complied and followed by the project proponent.

1.3 OBJECTIVE AND SCOPE

Purpose of the Report

M/s. Dalmia Cement (Bharat) Ltd. has retained M/s. **JM Environet Pvt. Ltd.**, to evaluate **Comprehensive Report** in the mine lease area and around the vicinity of 10 km radius buffer zone in order to obtain NOC for Groundwater abstraction from Central Ground Water Board (CGWB)/Central Ground Water Authority (CGWA).

Scope and Methodology of the Report

1. To analyze physiographic conditions of the study area with the help of field observations, GPS readings, Survey of India (SOI) Toposheet and Satellite images
2. Physiographic studies of the project and its surroundings with the help of latest Google images, site visit, GPS survey etc. which helps in determining physiographic gradient.
3. Secondary data collection i.e. climate and rainfall, soil and topography, geology, drainage etc. for interpretation.
4. Detailed hydro-geological survey in core and buffer zone including geology, types of aquifer and their hydraulic parameters governing the groundwater regime of the area, depth to water level, groundwater quality, water abstraction structures and their discharge, surface water bodies, drainage pattern, major irrigation sources and their potential etc.
5. To work out quantitative as well as qualitative variations in groundwater with respect to aerial extent and to find out water balance
6. To ascertain the impact of the project on groundwater conditions of the surrounding area.
7. Groundwater resources evaluation based on the norms recommended by Groundwater Estimation Committee (GEC), 2009.
8. Evaluation of present groundwater scenario as well as future course of action for protecting the natural environment

CHAPTER-2

LOCATION AND LANDUSE PATTERN OF THE STUDY AREA

2.1 LOCATION OF THE PROJECT

The mine site is located at Villages-Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan, Tehsil- Amarpatan, District – Satna, Madhya Pradesh.

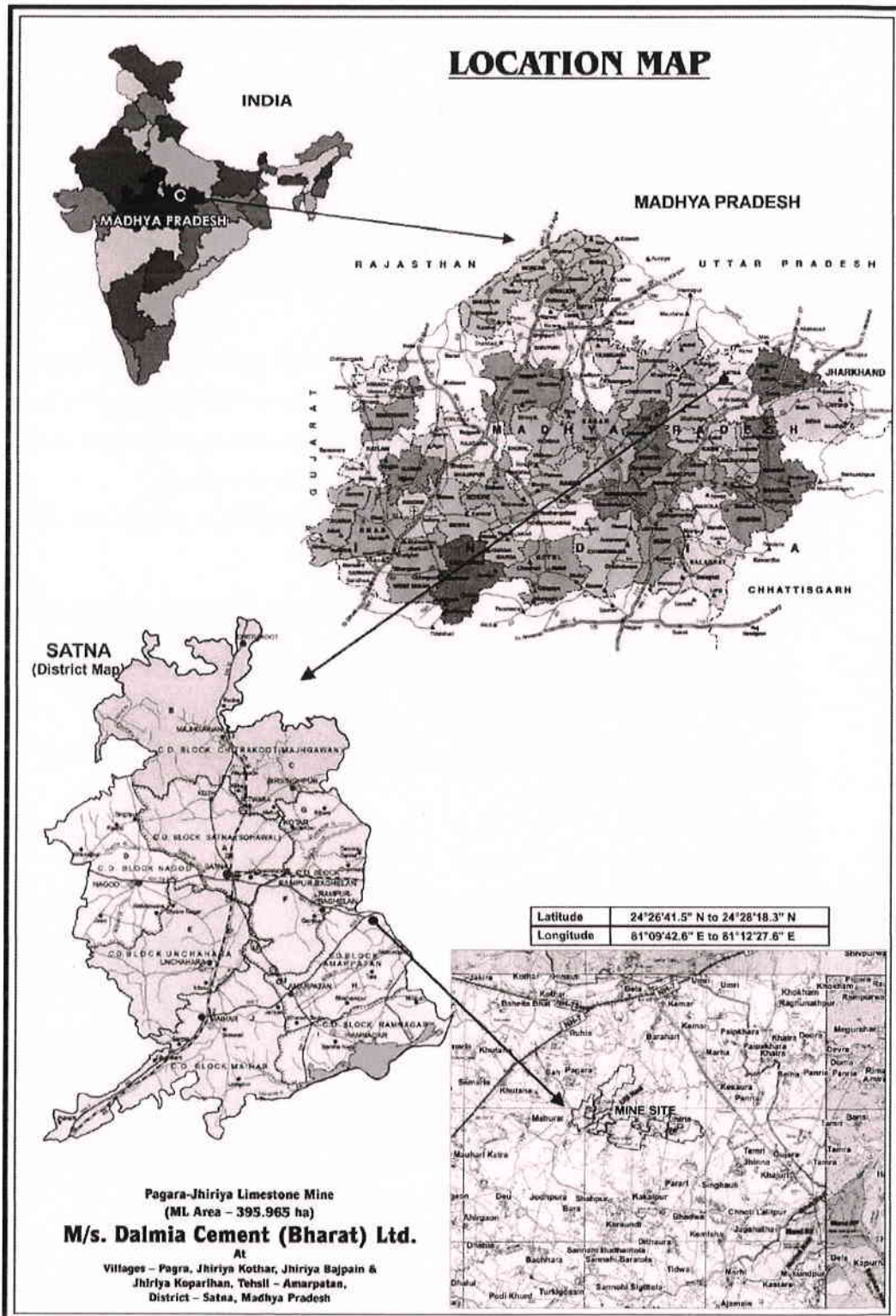


Figure 2.1: Location Map of the study area

2.2 LAND-USE PATTERN

Total study area/ buffer zone (43953.68 ha) of Pagara-Jhiriya Limestone Mine, Dalmia Cement (Bharat) Ltd. mainly comprises of Agriculture land (29339.90 ha), Plantation (4177.68 ha), open land (6893.87 ha) and open scrub land (925.88 ha) with 66.75%, 9.50%, 15.69%, 2.11% of area falling under respectively. Ponds/Reservoirs and human settlements cover 602.09 ha and 864.13 ha area which makes 1.37% and 1.97% of the total study area. Forest Land & Industrial Area covers 1.54% and 0.13% respectively. Mine quarry & Air Strip cover 0.92% & 0.02% respectively.

Table 2.1
Land Use / Land Cover Details of Study Area

| S. No. | Class Name | Area (In ha) | Area (in %) |
|--------|------------------------|-----------------|---------------|
| 1. | River/Nallah/Waterbody | 494.64 | 1.13 |
| 2. | Canal | 107.45 | 0.24 |
| 3. | Open Land | 6893.87 | 15.69 |
| 4. | Open Scrub Land | 925.88 | 2.11 |
| 5. | Forest Land | 678.82 | 1.54 |
| 6. | Plantation/Vegetation | 4177.68 | 9.50 |
| 7. | Agriculture Land | 29339.90 | 66.75 |
| 8. | Human settlement | 864.13 | 1.97 |
| 9. | Industrial Area | 60.39 | 0.13 |
| 10. | Mine Quarry | 403.90 | 0.92 |
| 11. | Air Strip | 7.02 | 0.02 |
| | | 43953.68 | 100.00 |

Source: LU/LC Map of the study area

Pagara-Jhiriya Limestone Mine (ML Area: 395.965 ha)
Near Villages - Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Kopanhan, Tehsil - Amarpatan, District - Satna, MP

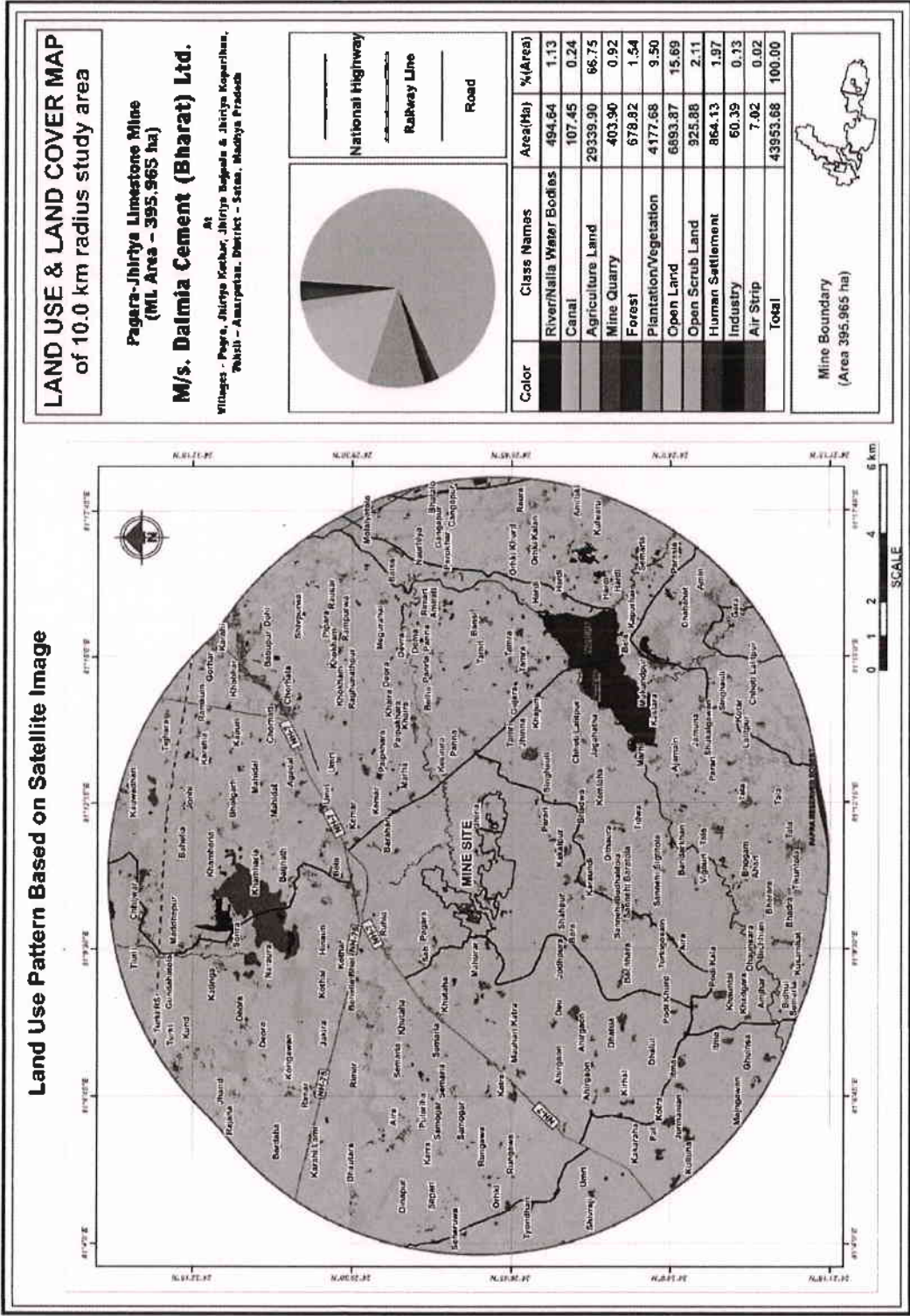


Figure 2.2: Land use/Land cover pattern within 10 km Buffer Zone, Dalmia Cement (Bharat) Limited, Amarpatan, Satna, Madhya Pradesh.

CHAPTER-3

METEOROLOGY--DRAINAGE-TOPOGRAPHY AND GEOLOGICAL DESCRIPTION

3.1 CLIMATE AND RAINFALL

The climate of Satna district is characterized by a hot summer with general dryness, except during the south-west monsoon season. The year may be divided into four seasons. The cold season from December to February is followed by the hot season from March to about middle of June. The period from the middle of June to September is the south-west monsoon season. October and November form the post-monsoon or transition period. The area receives maximum rainfall during south-west monsoon period (i.e. Jun to September) and about 87.7% of annual rainfall is received during this period only. 12.3% of the annual rainfall takes place between periods October to May. The normal annual rainfall of Satna district is 989 mm. The maximum precipitation is received during the rainy season with little to moderate during winter. The normal maximum temperature observed during the month of May is 42° C and minimum during the month of January is 8.1°C. The normal annual mean maximum and minimum temperature of Satna district are 32.2°C and 19°C respectively. During the south-west monsoon season the relative humidity generally exceeds 86% (August month). The rest of year is drier. The driest part of the year is the summer season, when relative humidity is less than 29%. May is the driest month of the year. The wind velocity is higher during the pre-monsoon period as compared to post monsoon period. The maximum wind velocity is 9.2 km/ hr during the month of June and minimum 2.8km/hr during the month of November. The average normal annual wind velocity is 5.4 km/hr.

The region has a tropical monsoon climate with long humid summer and short winters. The rain fall is heavy during S-W monsoon and light during pre-monsoon season.

EVAPORATION:

The evaporation variations are almost in similar line with the variations of temperature. The evaporation is maximum in the month of May and minimum during the months of December and January.

HUMIDITY:

The atmospheric humidity is usually low during summer months around 25%. However humidity slowly starts building up from third week of May and it reaches maximum around 80% during monsoon period. The humidity again decreases in winter season and it varies between 30 to 40% during winter season.

The annual average rainfall in the region is around 989 mm (average of last sixteen years rainfall data from 2004-2019) varying from minimum 663 mm in 2010 to maximum 1704 mm in 2016. (Table 3.1).

Table 3.1
Rainfall Statistics of Satna District

| S.No. | Year | Annual Rainfall (mm) |
|-------|------|----------------------|
| 1 | 2004 | 1078 |
| 2 | 2005 | 1472 |
| 3 | 2006 | 780 |
| 4 | 2007 | 741 |

| | | |
|----------------|------|---------------|
| 5 | 2008 | 754 |
| 6 | 2009 | 893 |
| 7 | 2010 | 663 |
| 8 | 2011 | 1027 |
| 9 | 2012 | 960 |
| 10 | 2013 | 1351 |
| 11 | 2014 | 809 |
| 12 | 2015 | 1081 |
| 13 | 2016 | 1704 |
| 14 | 2017 | 743 |
| 15 | 2018 | 784 |
| 16 | 2019 | 979 |
| Average | | 988.68 |

Source: India Meteorological Department (IMD)

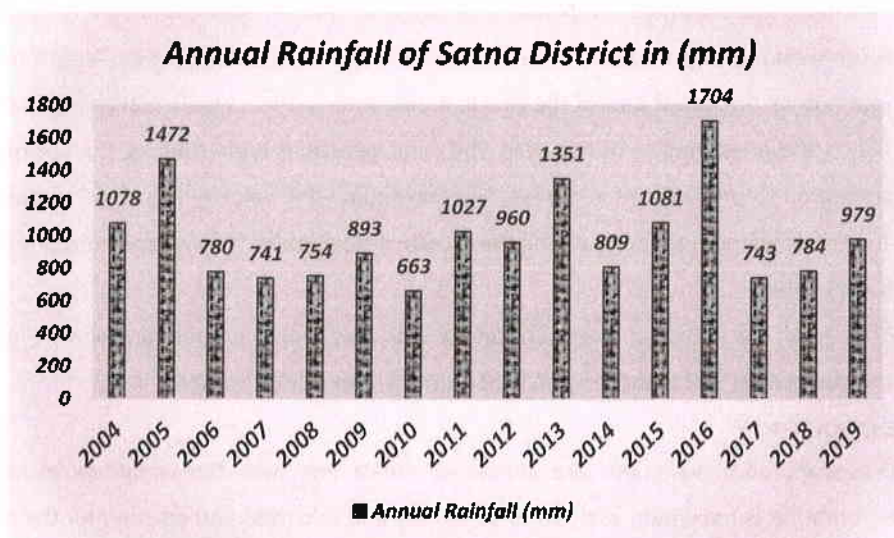


Figure 3.1: Rainfall Pattern of Satna District

3.2 GEOMORPHOLOGY AND TOPOGRAPHY

Geomorphology Almost entire Satna district lies on the Vindhyan plateau, which extends from the Kaimur hill range in the south to the edge of the Ganga valley in the north. It is traversed by three prominent hill ranges from south-south west to north-north east and is occupied by a higher plateau in the south-western part of the district known as “Parasmania Pahar” which is part of Bhandar series. Maximum elevation of the district is 704 m above mean sea level, which is recorded near “Papa Reserve Forest” on Kaimur hill range on southern part of the district. The southern and northern fringes of the district lie low in the respective valleys of the Son and the Yamuna rivers. Geomorphologically the district can be broadly divided into five following topographic divisions

- The Central Plateau
- The South-western plateau and Kaimur range
- The Northern Range

- The Son Valley area, and
- The Yamuna Valley

The central plateau occupies major part of the district area, centrally located between the Kaimur range in south and Panna range in the north. The central plateau is studded by small isolated hillocks namely, Kaitha hill (601.7m), Rampur (573m) and Bida (627.6m). The Kaimur hill range is passing through southern part of the district from Maihar and Amarpatan Tehsils in ENE-WSW direction forming water divide between Tons and Son Sub-basins.

The northern range which is also called as “Panna range” is low range with broken ridges extends through the northern part of the district, extending from south-west to north-east direction .The Paisuni and Banganga streams rises from northern face of Panna range. The highest peak of Panna hill range is Digri (484m). The son valley area is occurring as narrow strip, located south of Kaimur range. The Yamuna valley area is located on northern fringe of the district, below the Vindhyan plateau. It is part of the Ganga alluvial plain and characterized by the level plain with alluvial soil. Paisuni and Baghain rivers drain this area. (Figure 3.3)

The topography of the area is almost plain having gentle slope towards North-East direction. The highest reduced level is 328 mRL towards south-west while the lowest elevation is 319mRL in the north-east. (Figure 3.2)

3.3 DRAINAGE PATTERN

Satna district is falling under the Ganga basin area. The Yamuna, the Tons and the Son are Sub-basins of the Ganga basin, which are draining the area. Excepting small southern part, the district is mainly drained by river Tons and its tributaries. Tons is a Perennial River, which flows in north and north-east direction. Its main tributaries are westerly flowing Seranji Nala, north-easterly flowing Lilji Nala, Barua Nala and Beehar Nadi, northerly flowing Magardaha Nala, and easterly flowing Satna, Simrawal and Asrawal rivers. The “ Paisuni or Mandakni” sacred river, which is tributary of the river Yamuna drains northern part of the district (Chitrakoot area). Southeast part of the district is drained by Son River and its tributaries. ENE-WSW trending Kaimur hill range is acting main water divide of the area, which separates Tons Sub-basin from the Son Sub basin.

There are many factors controlling the occurrence and path flows of groundwater, like physiographic, slope, drainage pattern and landforms. Understanding the role of geomorphology and drainage is essential to accurately assess hydro-geological systems and groundwater resources.

DRAINAGE PATTERN IN LEASE AREA

The drainage of lease area is towards North- east. The area is devoid of any major rivers, however, minor seasonal rivulets exist and these drain into Bihar River which is located at about 4.5 kms in south-east flowing towards north-east. Lilji Nadi is flowing between block P-1 & block JK-1. Streams originated from mining lease area are at last submerged in Lilji River. In SW part of the mining lease a pond is there which will not be disturbed during the mining activities. Mining lease has been granted in blocks due to the Village, roads, nalas and habitation. Appropriate safety barrier will be left. The

local drainage pattern in and around the area is sub-parallel and dendritic in nature with low drainage density indicating the formation in the area is comparatively porous and permeable in nature. (Figure 3.4)

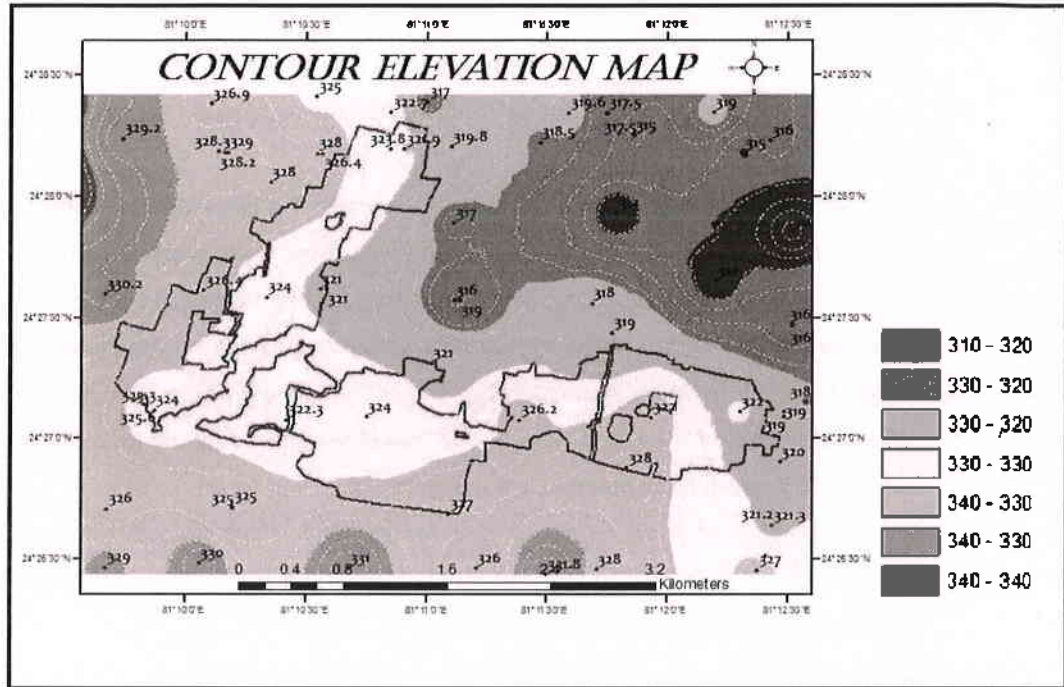


Figure 3.2: Contour Elevation Map in and around Proposed Limestone Mine DCBL, Satna-MP
 (Source: USGS)

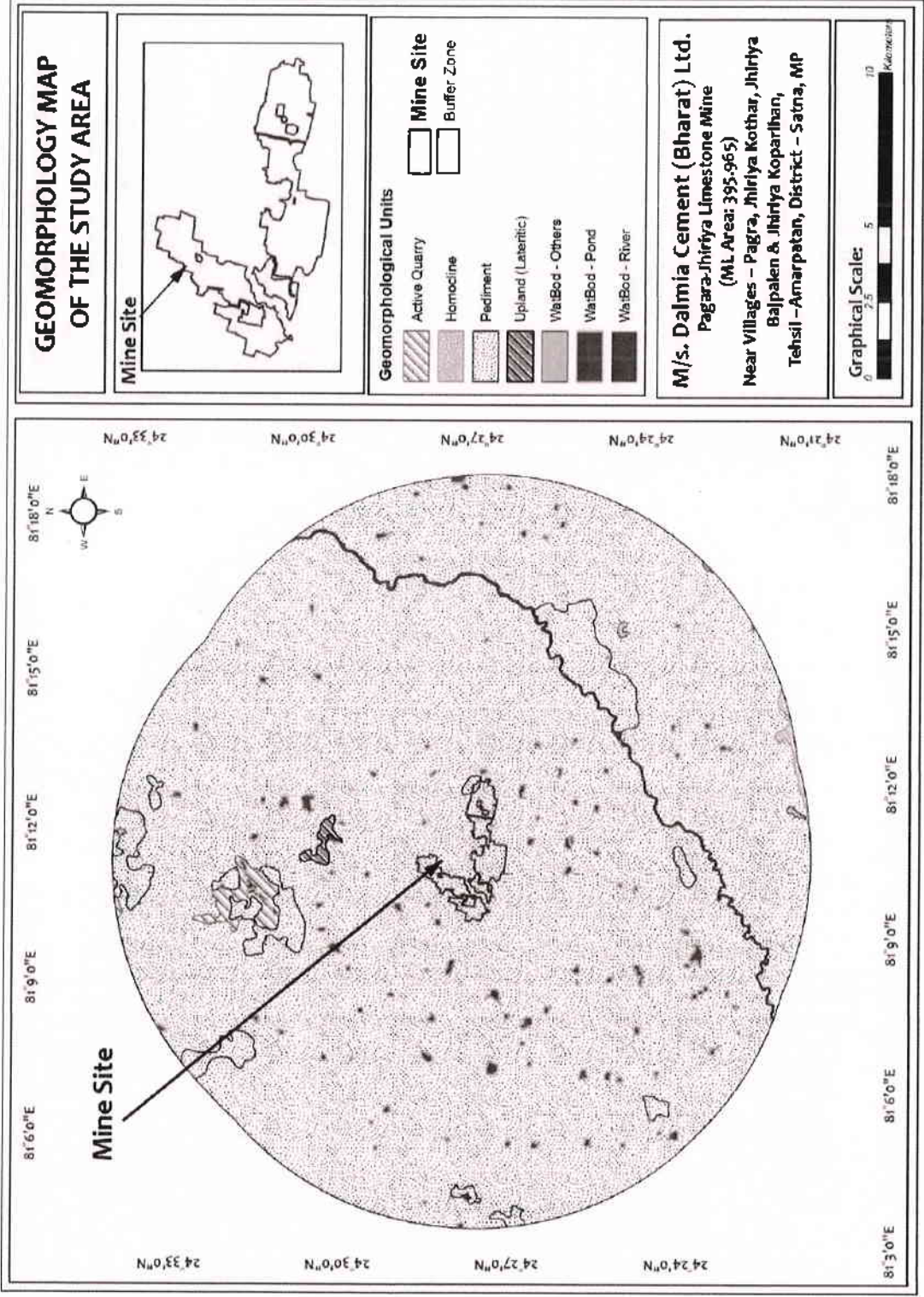


Figure 3-3: Geomorphological features in and around Proposed Limestone Mine, Dalmia Cement (Bharat) Limited, Amarpatan, Satna, Madhya Pradesh (Source: Bhukosh)

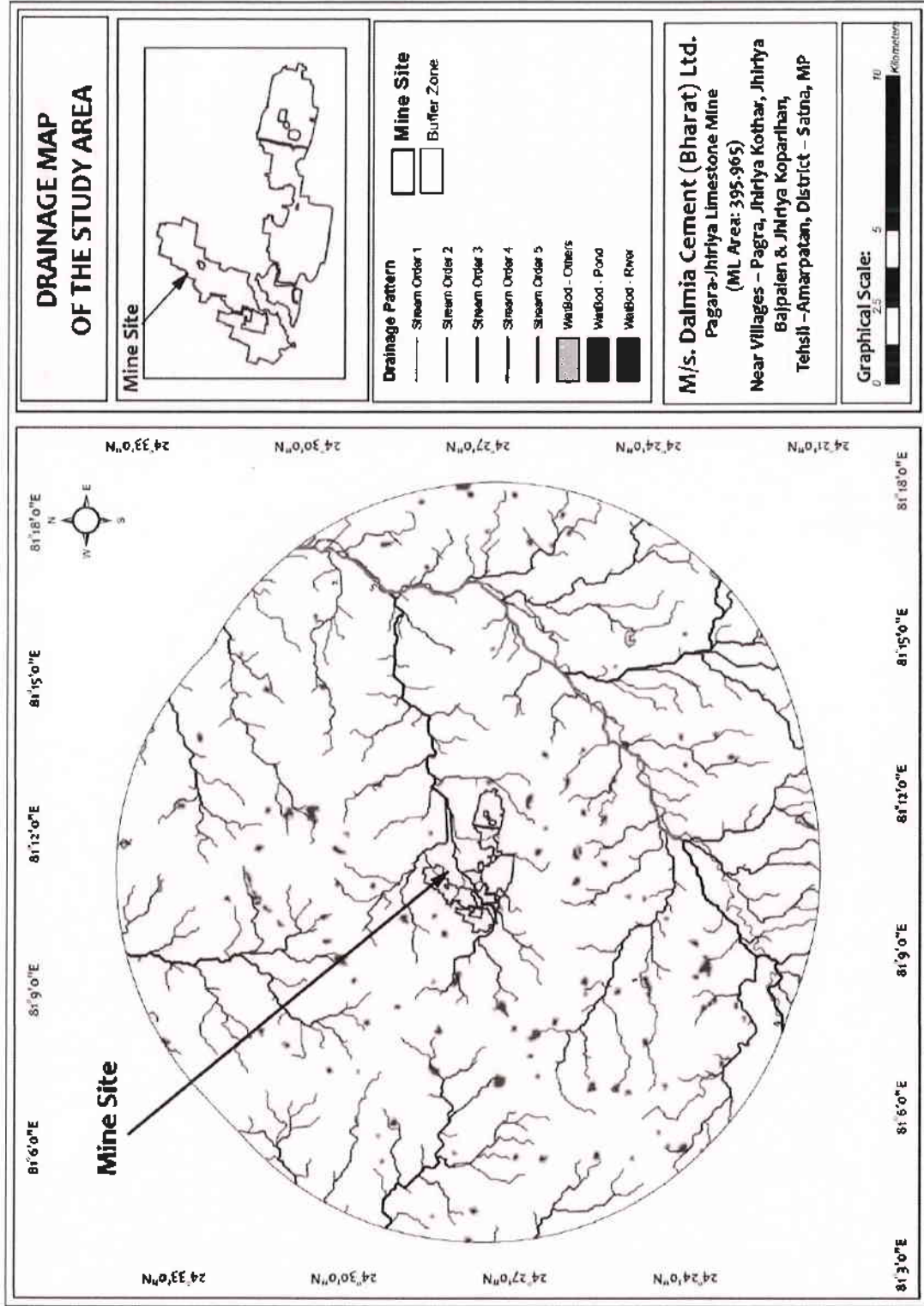


Figure 3.4: Drainage Pattern in and around Proposed Limestone Mine, Dalmia Cement (Bharat) Limited, Amarpatan, Satna, Madhya Pradesh (Source: USGS)

3.4 REGIONAL GEOLOGY

The limestone horizon of Satna belt belongs to Bhandar series of Upper Vindhyan system. It stretches from Bihar in the East to Rajasthan in the West forming NNE-SSW syncline. Limestone of the area belongs to Bhandar group. The Vindhyan super group consists of 4 main groups named as follows: -

Table - 3.2
Regional Geology

| GROUP | FORMATION |
|---------|-------------------------|
| BHANDER | Upper Bhandar Sandstone |
| | Sirbu Shale |
| | Nagod Limestone |
| | Ganurgarh Shale |
| REWA | Govindgarh Sandstone |
| | Jhiri Shale |
| | Asan Sandstone |
| | Panna Shale |
| KAIMUR | Dhandraul Sandstone |
| | Mangesar Formation |
| | Bijaygarh Shale |
| | Chaghar Sandstone |
| | Susnai Breccia |
| | Sasaram Sandstone |
| SEMRI | Baghwar Shale |
| | Rohtasgarh Limestone |
| | Rampur Formation |
| | Salkhan Limestone |
| | Koldiha Shale |
| | Deonar Formation |
| | Kajrahat Limestone |
| | Arangi Limestone |
| | Deoland Formation |

Source: Approved Modified Mining plan & Progressive Mine Closure Plan

The Semri Group of rocks is represented by an alternating sequence of Sandstone and Shale along with Porcellinite and Limestone. The Kaimur group is represented by sandstone which is purplish in colour, fine grained, massive & thickly bedded. Both groups exposed along the southern border and northern part of the district.

Bhandar Group

Shikhaoda Formation: The lower part of the formation is of mixed lithology containing sandstone beds encased within shale. The upper part is dominated by medium-grained sandstones. The lower part

represents deposits of storm-influenced tidal flat system, whereas the upper sandstone-dominated part contains braid plain and eolian strata

Sirbu Shale: This formation begins with oolitic and stromatolitic limestones followed by shales with stringers of sandstone and siltstone. A lagoonal environment has been inferred.

Bundihill Formation (Maihar Formation): The formation consists of sandstones with interlayer of reddish mudstone. The depositional system is considered as a tide-storm influenced coastal flat

Lakheri Formation (Dolni Limestone): This formation is characterized by limestones, at places stromatolitic, with an intervening unit of siliciclastics (sandstone-shale heterolithic unit). The depositional environment has been inferred as a storm-influenced, homoclinal carbonate ramp

Ganurgarh Formation: The formation is represented by shales with intervening layers of siltstone and sandstone. A tide-affected, coastal flat system has been inferred for its deposition

Rewa Group

Govindgarh Sandstone: Pebbly to coarse-grained sandstone representing deposits of a braid plain with patches of eolianites

Drammondgunj Sandstone: Medium-grained sandstone deposited in shore face environment.

Rewa Shale (Parma Shale, Asan Sandstone, Jhiri Shale): Purple to green shale with sandstone interbeds up to several meters thick and meter thick and volcanoclastic beds. The inferred depositional environment is inner shelf with the sand interbeds emplaced by storm flows

Kaimur Group

Dhandraul Sandstone: This formation is represented by medium to coarse-grained sandstones. The depositional environments include braid plain, eolian sand sheet (upper part), braid plain delta (lower part)

Mangeswar Formation: This formation is represented by fine to medium-grained, decimeter to meter-thick, tabular sandstone bodies with shale partings. The inferred depositional environment is storm-influenced inner shelf.

Bijaygarh Shale: The lower part of this formation is characterized by a sandstone-shale intercalated unit with the sandstone/shale ratio decreasing upwards; whereas, the upper part is represented by claystones with significant pyrite concentration at Amjhore, Rohtas District, Bihar. The succession records gradual transition from inner shelf to outer shelf

Ghaghar Sandstone: This is a medium-grained sandstone unit deposited in shoreface environment under the influence of wave and tide.

Sasaram Formation: This formation begins with medium-grained sandstone and is followed by a sandstone-shale intercalated unit. The lower part represents deposits of tide-affected shoreface environment and the upper part a storm influenced inner shelf setting

Semri Group

Rohtas Formation: This formation begins with massive, plane-laminated and/or stromatolitic limestones followed by an intercalated unit of limestone and shale. In the western part at Jukehi, Satna District, M.P., the limestones of the formation are overlain by thick (30 m) volcanoclastic deposits. This volcanoclastic horizon thins towards east. The overall depositional environment is inferred to be a carbonate platform with a distally steepened ramp.

Rampur Formation: This formation consists of greenish shales with interbeds of sandstone representing deposits of storm-influenced inner and outer shelf.

Salkhan Formation: This formation is well developed in the eastern part of the Son Valley in Mirzapur district and is represented by stromatolitic as well as non-stromatolitic limestones. This formation is a lateral equivalent of Chorhat Formation. A peritidal environment is inferred for its deposition.

Chorhat Formation: This formation is represented by sandstones with and without mud partings and layers. The formation is well developed in the western part of Son valley in the Chorhat area of Sidhi District, M.P. The inferred depositional environment varies from shore face to tide-storm influenced coastal flat. The formation yielded some markings claimed to be of trails of triploblastic metazoans.

Koldaha Formation: The Koldaha Formation begins with a sandstone-shale intercalated unit and gradually becomes clayey. There are three distinct coarser units within the formation, the bottom-most of which is conglomeratic containing clasts of the underlying horizons; the other two units are coarse to medium-grained sandstones. There is also a thin limestone band occurring below the top-most sandstone unit. The shales of this formation yielded some markings claimed to be of trails of metazoans. The shaly parts are products inner and outer shelf, whereas the encased coarser clastics have been interpreted as deposits of fan deltas.

Deonar Formation: The Deonar Formation is entirely represented by volcanoclastic deposits. There are fine-grained tuffs along with infrequent thicker and coarser volcanoclastic deposited in outer shelf environment.

Kajrahat Formation: This formation is overwhelmingly represented by limestones, which are at places stromatolitic. However, a few interbeds of volcanoclastic and siliciclastics have also been recognized. They dominantly represent peritidal to sub tidal carbonate deposits of a carbonate platform

Arangj Formation: This formation is characterized by sandstone-shale intercalation followed by pure claystones. The formation also contains a few intercalated horizons of fine-grained volcanoclastic (tuffs). The overall environment of deposition is inner to outer shelf.

Deoland Formation: This is the bottom-most formation of the Vindhyan Supergroup. It starts with conglomerates followed by pebbly sandstone and sandstone representing deposits of alluvial fans and fans deltas.

3.5 LOCAL GEOLOGY

The limestone of the lease area belongs to Bhandar group of Vindhyan super group. The area around Pagra, Jhiriya Kothar, Jhiriya Bajpaien and Jhiriya Koparihan villages are occupied by Nagod limestone of Bhandar Group. The limestone in these parts is mainly of stromatolitic type with a nodular look. The Nagod limestone formation of Bhandar Group is sandwiched between the underlain Simrawal/Ganurgarh Shale and overlain by Sirbu Shale. The limestone bands of good quality cement grade broadly occur in two horizons, namely upper grey limestone and lower grey limestone and separated by shale band. General Stratigraphic Sequence of the Lease Area as given in table- 3.3

Table - 3.3
General Stratigraphic Sequence of the Lease Area

| | |
|---------------|--|
| Recent | Alluvium/Top Soil |
| Bhandar Group | Faint grey to light green shale, weathered at some places Grey to dark grey limestone with interaction of shale Grey Shale Dark Grey Limestone Ganurgarh Shale |

Source: Review of Mining plan & Progressive Mine Closure Plan, pg no. 17

Description of Litho units

Soil –

Soil is sandy in nature. Major part of the mining lease area is covered by soil which varies in thickness from 0.00 m to 4.00 m with an average thickness of about 1 m out of this about 0.5 m is fertile soil.

Sirbu Shale –

Sirbu shale formation (200m) widely exposed in low lying areas, isolated hillocks, Nallah cutting and well cutting sections. It is composed of shales, siltstone, stromatolites bearing limestone/dolomites and sandstones.

Nagod Limestone –

The Nagod limestone is mainly of stromatolitic type with a nodular look, found between Ganurgarh shale and overlain Sirbu shale. The limestone bands usually occur in two main horizons namely upper grey limestone and lower grey limestone with a thick shale band in between.

Ganurgarh Shale –

The Ganurgarh shale is the basal formation of the Bhandar Group, the uppermost stratigraphic sequence of the Vindhyan Super group (Precambrian). The significant sedimentary features in the formation are micro-cross-lamination, very small ripple marks of symmetrical, flat-topped and interference types, ripple marks, mud cracks, raindrop imprints and shale pebbles.

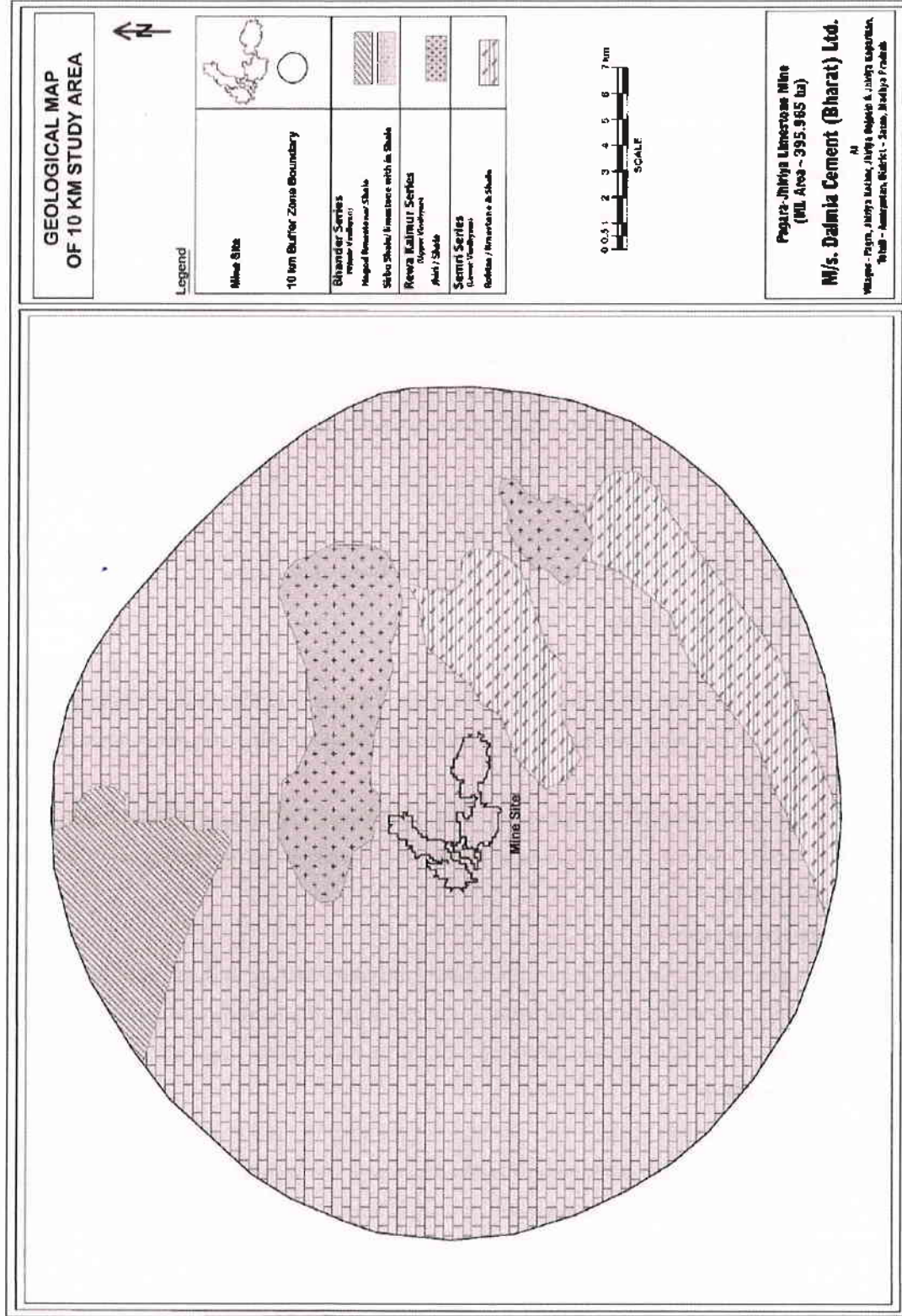


Figure 3.6: Geological Formations in and around 10 km Buffer Zone, Dalmia Cement (Bharat) Ltd., Amarpatan, Satna, Madhya Pradesh (Source: CGWB)

4.1 HYDROGEOLOGY OF THE AREA

Rainfall is the main source of ground water recharge in the Satna district. Various geological formations ranging in age from Achaean to Recent occurs in different part of area and contributes to a complex geological set up in the district. However, Vindhyan are the main rock units of the area, covering more than 95% of geographical area of the district. Among Vindhyan, both Lower and Upper Vindhyan represent the area, but Lower Vindhyan mostly occupies the southern part of the area in Son Sub-basin. A comprehensive hydro geological map is shown in the fig. 4.1

Occurrence and movement of ground water in hard rock is essentially by development and nature of secondary joints and fractures. Solution cavities in limestones also play an important role in groundwater movement at certain places. Ground water in general occurs under unconfined to semi-confined conditions. The occurrence and movement of ground water in different lithological units is majorly controlled by following formations:

Bhander Lime Stone

This unit is hard and compact but jointed and fractured. Along the joints and planes of stratification "Grikes" and "Solution Cavities" get developed through the process of dissolution of country rock by circulating ground water. Often cavities are filled with yellow colored plastic clay known as "Terra-Rosa". Cavernous Limestone hold good quantity of ground water, but quality may be slightly hard. General yield potential of Bhander (Nagod) Lime stone is 3 to 12 LPS. Exploratory wells drilled at Kirpalpur (Satna-Anicut), Maihar- Stadium and Jhinna-Nala tapping Limestone aquifers have given good yields.

Sirbu Shale

Sirbu shale is younger unit of Upper Vindhyan having very thick horizon along Syncline axis. In low-lying topographic areas and in the weathered mantle, occurrence of ground water is of limited quantity yet enough to sustain dug wells for domestic/drinking purposes. The brownish red variety is more productive than the grayish shales. Due to its impervious nature, lots of small ponds are constructed in Sirbu shales which hold water even during summer season in Maihar and Amarpatan Blocks. These ponds are also used for production of water-nuts in abundance. General yield potential of Sirbu shale is 1 to 3 LPS.

Rohtas Lime stone and Shales (Semri-series, Lower Vindhyan)

Rohtas limestone is light to dark grey in colour, fine grained and compact with shaly and sandy inter beds. These are thinly laminated, but massive form is also reported from some areas. Ground water generally occurs under unconfined conditions at shallow depths. Physiographic locations and degree of Karstification (Development of solution channels / Cavities) is important factor, which decides yield of ground water structure at specific location. Massive limestone does not have porosity / permeability. CGWB exploratory wells drilled at Ajwain, Rivara and Ramnagar gone dry due to massive nature of Rohtas limestone. Exploratory wells drilled at Bhadanpur and Mirgauti had yielded

fairly good yield recorded as 1020 and 880 LPM respectively. Depth of open Wells ranges from 10m to 20m, bgl in this formation.

Kaimur and Rewa Series formations (Upper Vindhyan)

Kaimur and Rewa Series formations of Upper Vindhyan is together forming hilly and forested area, consisting of two limbs of synclinal basin. Main rock units are hard and compact siliceous (Quartzitic) sandstone and shales. Northern limb is quite broad while southern limb is rather narrow, representing “Kaimur Hill Range”. In Kaimur hill range excepting establishment of Maihar Cement Plant entire area is barren. Ground water generally occurs in jointed, fractured and weathered horizons. Weathering of shales occurring in between sand stones has created valley like structures in northern limb area of Kaimur and Rewa series formations. Inhabitation is mostly confined in valley areas of northern limb where some ground water is available for domestic and agriculture needs. Otherwise this is scarcity area from the ground water availability point of view. Pre- monsoon depth to water level in Majhgawan and Nakaila Ground Water Monitoring Wells of CGWB was recorded 8.11 and 8.41 m, bgl respectively during the year-2006. Yield Potential of these formations is less than 3 Liters / second.

4.2 AQUIFER TYPES, WATER LEVEL AND YIELD POTENTIAL

The chief aquifer units are weathered top soil, limestone and weathered fractured, splintery Sibru shale formation. The study area is covered with thin soil layer. The weathered Nagod Limestone and weathered, fractured, splintery Sibru shale formation is acting as shallow water bearing aquifer. The porosity value of these limestone formations is very low as compared to standard porosity values (10-20%) and acting as aquitard that yield water slowly. This limestone with poor water holding capacity allows the movement of water along the gradient/hydraulic gradient of the area.

The limestone formation is massive and well jointed. The permeability of this formation is mainly of secondary origin i.e. it had developed largely through the network of joints and fracture patterns, produced by diastrophic forces. The solubility of the rock permits further modification of the permeability by circulating water. In such cases, permeability would be progressively modified and the joint network may get so enlarged that some of the main channels may be only partially filled with water and consequently draw water forms smaller channels except at the time of heavy infiltration. In such area, water supply from wells would be quite uncertain—wells which tap these large cavities would yield profuse quantities of water, whereas others constructed in relatively dry rocks may not be successful. It is, therefore, imperative to locate the large cavities or channels filled with water prior to sinking wells in such areas.

Depth to water levels in post-monsoon period ranges between 20 to 22 m bgl while in pre-monsoon season, it ranges between 22 to 25 m bgl. Major part of the study area/buffer zone (more than 70%) covered by Limestone and Shale formation having yield between 1 to 4 Litres per second (LPS). (Figure 4.1)

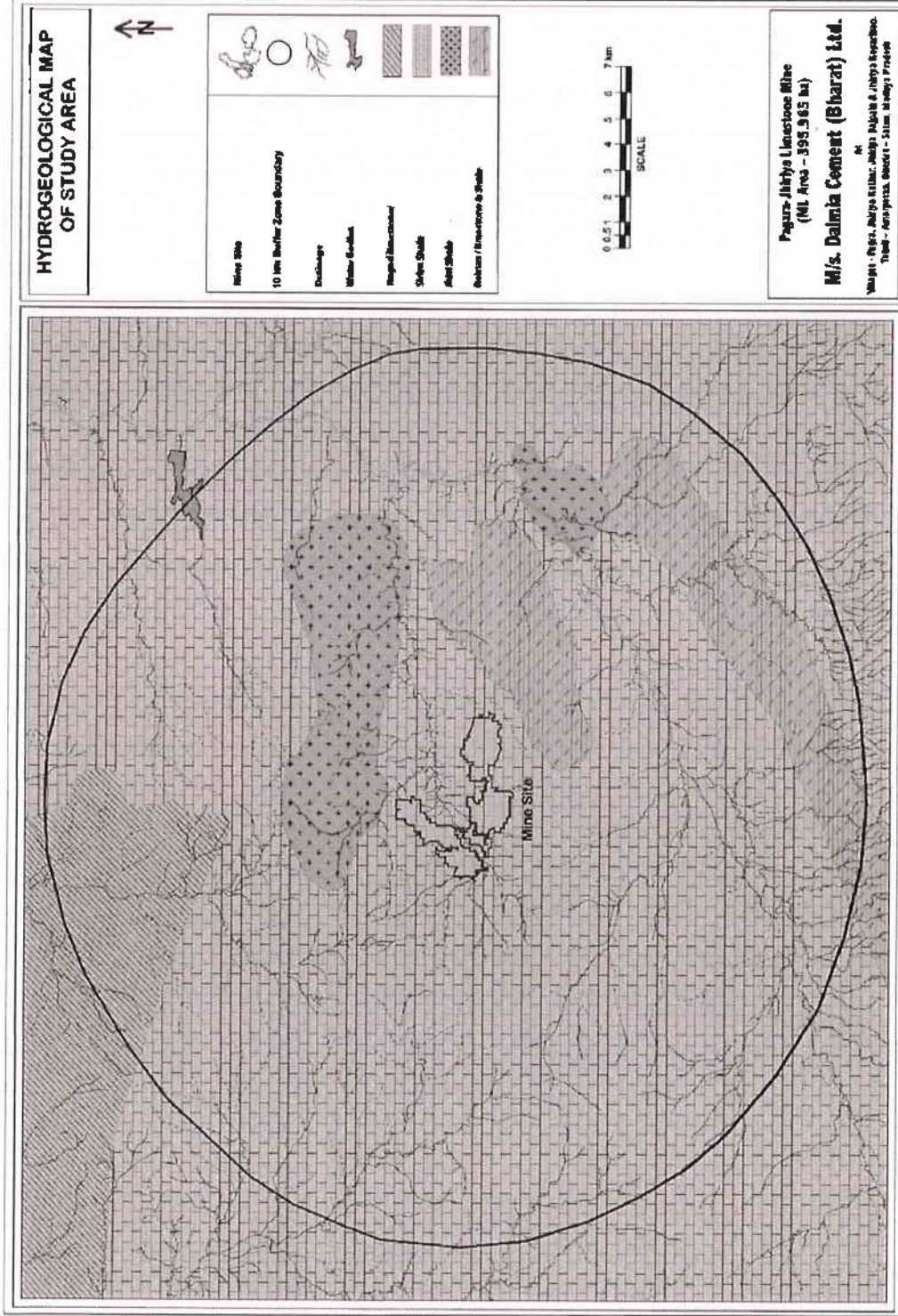


Figure 4.1: Hydrogeological Formations within Buffer Zone, Dalmia Cement (Bharat) Ltd., Amarpatan, Satna, Madhya Pradesh (Source: CGWB)

4.3 GROUNDWATER RESOURCES OF THE AREA

Groundwater is one of the Earth's widely distributed and most important natural resource. The largest source of fresh water in the world lies underground. At the same time, development of groundwater is very old. Increased demand of groundwater for various purposes has stipulated development of groundwater resources.

The core zone of the proposed limestone block of Pagra -Jhiriya falls in Amarpatan block of Satna district whereas buffer zone in Rewa Block along with Amarpatan and Rampur Baghelan blocks of Satna district and Rewa District. The groundwater development in the district is being done by dug wells and bore wells. Groundwater is the main source of drinking in study area. There are eight assessment units (block) in the district out of which five blocks fall under non-command category whereas Rampur Baghelan, Sohawal and Unchehra falls under both command as well as non-command category. Rampur Baghelan, Sohawal and Maihar blocks of the district are categorized as semi-critical, and rest as safe. The highest stage of ground water development is computed as 60.29 % in the area of Amarpatan block which falls under safe category. The net ground water availability in the district is 614.19 mcm and ground water draft for all uses is 418.60 mcm, making stage of ground water development to 68.15% as a whole for district which lies under safe category.

The groundwater potentials of Amarpatan, Rampur Baghelan, and Rewa blocks are summarized in **Table 4.1**

Table 4-1:
Groundwater Availability, Utilization and Development Stage in Buffer zone of proposed Limestone Mine, Amarpatan, Satna, Madhya Pradesh

| Assessment Unit | Command/Non Command | Net Annual Groundwater Availability (Ham) | Existing Gross Groundwater Draft for Irrigation (Ham) | Existing Gross Groundwater Draft for Domestic and Industrial Water Supply (Ham) | Existing Gross Groundwater Draft for All Uses (Ham) | Allocation for Domestic and Industrial Supply for Next 25 Years (Ham) | Net Groundwater Availability for Future Irrigation Development (Ham) | Groundwater Development Stage/Category |
|-----------------------|---------------------|---|---|---|---|---|--|--|
| District Satna | | | | | | | | |
| Amarpatan | Command | 1396 | 8 | 46 | 54 | 75 | 1313 | 3.87 |
| | Non-command | 5998 | 3974 | 430 | 4404 | 695 | 1329 | 73.42 |
| | Block Total | 7394 | 3982 | 476 | 4458 | 770 | 2642 | 60.29/Safe |
| Rampur Baghelan | Command | 5365 | 310 | 116 | 426 | 240.48 | 4814.52 | 7.94 |
| | Non-command | 9470 | 10168 | 474 | 10642 | 474 | -1172 | 112.38 |
| | Block Total | 14835 | 10478 | 590 | 11068 | 714.48 | 3642.52 | 74.61/Semi Critical |
| District Rewa | | | | | | | | |
| Rewa Block | Command | 3427 | 699 | 137 | 836 | 288 | 2441 | 24.4 |
| | Non-command | 5587 | 3045 | 619 | 3664 | 1223 | 1319 | 65.6 |
| | Block Total | 9014 | 3743 | 756 | 4499 | 1511 | 3760 | 49.9/Safe |

* Dynamic Groundwater Resources Assessment carried out is based on year 2017. (Source: CGWA).

4.4 GROUNDWATER LEVEL MONITORING

Occurrence of groundwater is varying in different formations and rock types which are based on the process of genesis and fractures/joints/cavities present in the rocks. The weathered and fractured zones present in the rocks provide scope of groundwater occurrence, storage and its movement. In the study area, groundwater occurs under phreatic or unconfined condition in weathered zone of rocks and semi-confined to confined conditions in fractures/cavernous parts of rocks i.e. limestone and shale at depths. The existence of joints and fractures are often associated with well-marked karstification and seem to be zones of rich groundwater potential. The Karstification is well developed and exposed along the banks of streams, and lineaments are prominent which indicate suitable sites for groundwater exploitation. The topography of the area is almost plain having gentle slope towards North-East direction. The slope of the Proposed Limestone Mine ranges from 2-5m/km. The highest reduced level is 328 mRL towards south-west while the lowest elevation is 319mRL in the north-east. The groundwater flow also follows the topography of the area and surface drainage pattern and moves in north and north-eastern direction. However, the hydraulic gradient as observed from monitoring of groundwater level of the area is about 1.5-2.5 m/km.

A detailed groundwater level monitoring has been carried during pre-monsoon season at about 15 different locations within buffer zone from existing open wells and bore wells. Photographs of monitoring groundwater regime are shown in **Figure 4.2** Based on field investigation, contour map for depth to water level (m bgl) and depth to water level (m amsl) for core and buffer zone has been prepared and represented in **Figure 4.3, 4.4, 4.5**.

Depth to water level in study area was found to vary between 7.5 m to 37.2 m bgl indicating water level to be relatively deep at few places such as Pana (37.2 m bgl), Barahari (36.3 m bgl), Kasaura (36.2m bgl), Kemar (35.2 m bgl) and Jodhpur (33.1 m bgl). The minimum and maximum surface elevation of monitoring points in the study area is found to vary between 316 mRL to 352 mRL respectively.

However, in and around mine lease boundary, depth to water level is comparatively deeper and found to vary between 22 m bgl to 25 m bgl.

The groundwater movement in and around the project area is mainly controlled by fracture porosity present in Bhandar limestone, and Sibru and Simrawal shale. Its flow generally follows the general slope of ground surface in the area. Accordingly, the direction of groundwater flow in the Proposed limestone mines is mainly towards north/north-east direction.

Bhandar Limestone and Sibru and Simrawal Shale are principal aquifers in the area in which movement of water is controlled mainly by occurrence of fractures and cracks and occasionally at places by clay partings in the limestone; however, generally this formation lacks cavities. The formations are horizontal to sub-horizontal and area not found to be disturbed by any major tectonic disturbances. The joint planes are irregular in nature. Limestone has been found with solution cavities which is a common feature in limestone terrain. The bedding planes are prominent and can be recognized easily and bedding plane foliation can be found at places in the area. The joints are irregular and do not

follow any particular pattern. Folding and faulting are insignificant and the beds are more or less horizontal. The occurrence and deposition of various rock types is dependent mostly on the topography and inliers and outliers are common features in the area. Like other calcareous formations, lenticular and irregular bedding, cross laminations and mud-cracks have been observed in limestone bearing areas which have given passage to flowing water forming solution cavities.



Figure 4.2: Photographs showing Monitoring of Ground Water Regime in and around Proposed Limestone Block, Amarpatan, Satna, Madhya Pradesh

Table 4.2
Details of Groundwater Level Monitoring, Dalmia Cement (Bharat) Ltd., Amarpatan, Satna, Madhya Pradesh

| S.No. | Location | Latitude | Longitude | Water level (m bgl) | Elevation (m) | Water level (m amsl) |
|-------|------------|----------------|----------------|---------------------|---------------|----------------------|
| 1 | Pagra | 24° 27' 29.52" | 81° 10' 13.08" | 25.7 | 327 | 301 |
| 2 | Mine Site | 24° 26' 49.92" | 81° 10' 48.36" | 24.6 | 328 | 303 |
| 3 | Sah | 24° 28' 29.64" | 81° 9' 1.08" | 22.7 | 337 | 314 |
| 4 | Manyrar | 24° 27' 0" | 81° 7' 21.36" | 22.6 | 346 | 323 |
| 5 | Jodhpura | 24° 25' 45.48" | 81° 9' 36" | 33.1 | 337 | 304 |
| 6 | Bara | 24° 25' 24.24" | 81° 9' 36.72" | 22.1 | 335 | 313 |
| 7 | Shahpur | 24° 25' 36.84" | 81° 10' 47.64" | 24.6 | 336 | 311 |
| 8 | Karaundi | 24° 25' 24.6" | 81° 10' 35.4" | 18.2 | 330 | 312 |
| 9 | Bhadwa | 24° 25' 27.48" | 81° 12' 51.12" | 16.7 | 321 | 304 |
| 10 | Singhaulti | 24° 23' 21.84" | 81° 14' 30.12" | 7.5 | 317 | 310 |
| 11 | Kemar | 24° 28' 55.92" | 81° 12' 9" | 35.2 | 324 | 289 |
| 12 | Barahari | 24° 28' 55.2" | 81° 11' 57.48" | 36.3 | 324 | 288 |
| 13 | Kasaura | 24° 27' 59.04" | 81° 12' 50.04" | 36.2 | 316 | 280 |
| 14 | Marha | 24° 25' 28.92" | 81° 8' 30.12" | 22.6 | 334 | 311 |
| 15 | Pana | 24° 24' 38.88" | 81° 1' 46.92" | 37.2 | 352 | 315 |

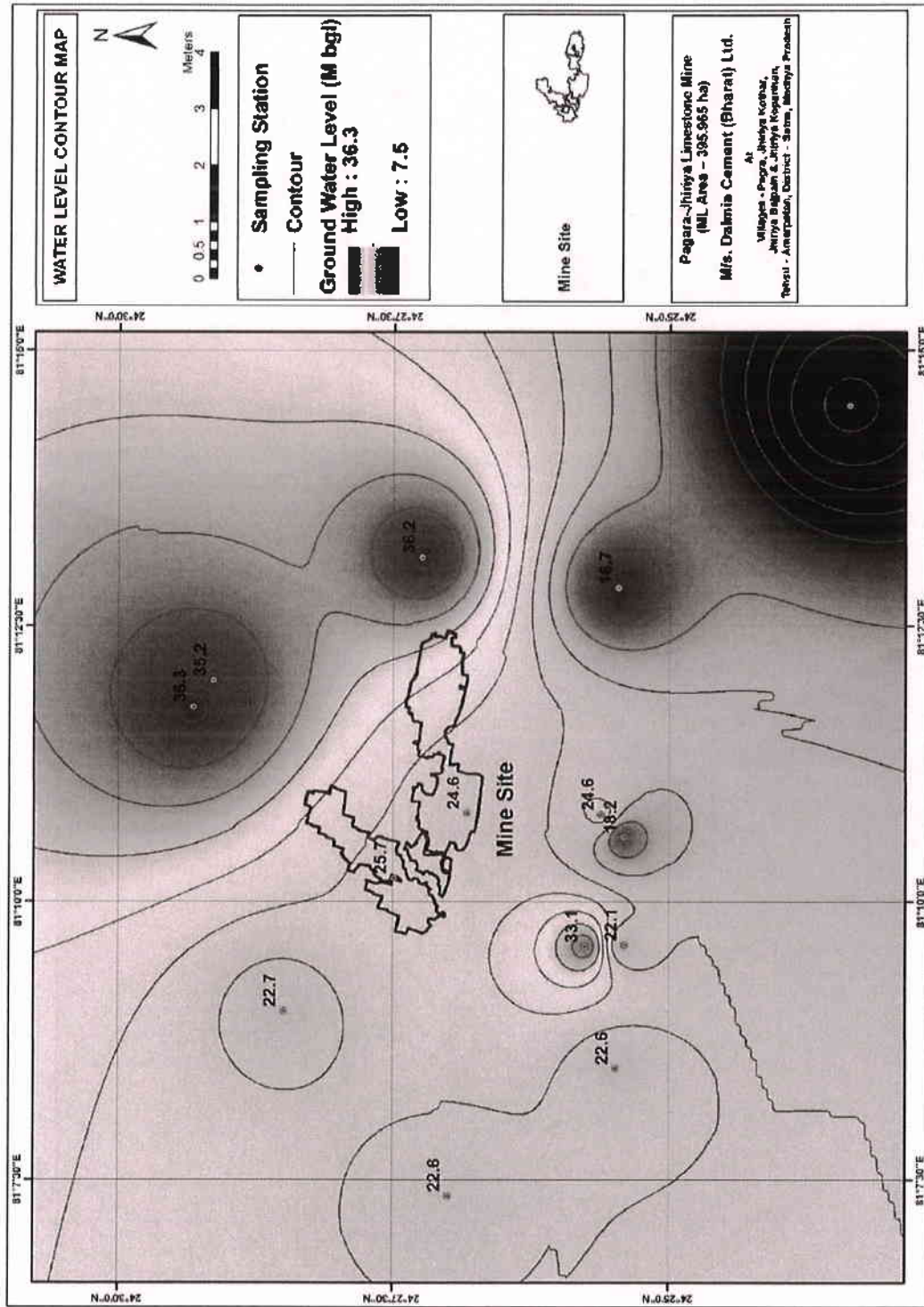


Figure 4.3: Depth to Water Level Pattern (m bgl) in Buffer Zone, Dalmia Cement (Bharat) Ltd., Amarpatan, Satna, Madhya Pradesh

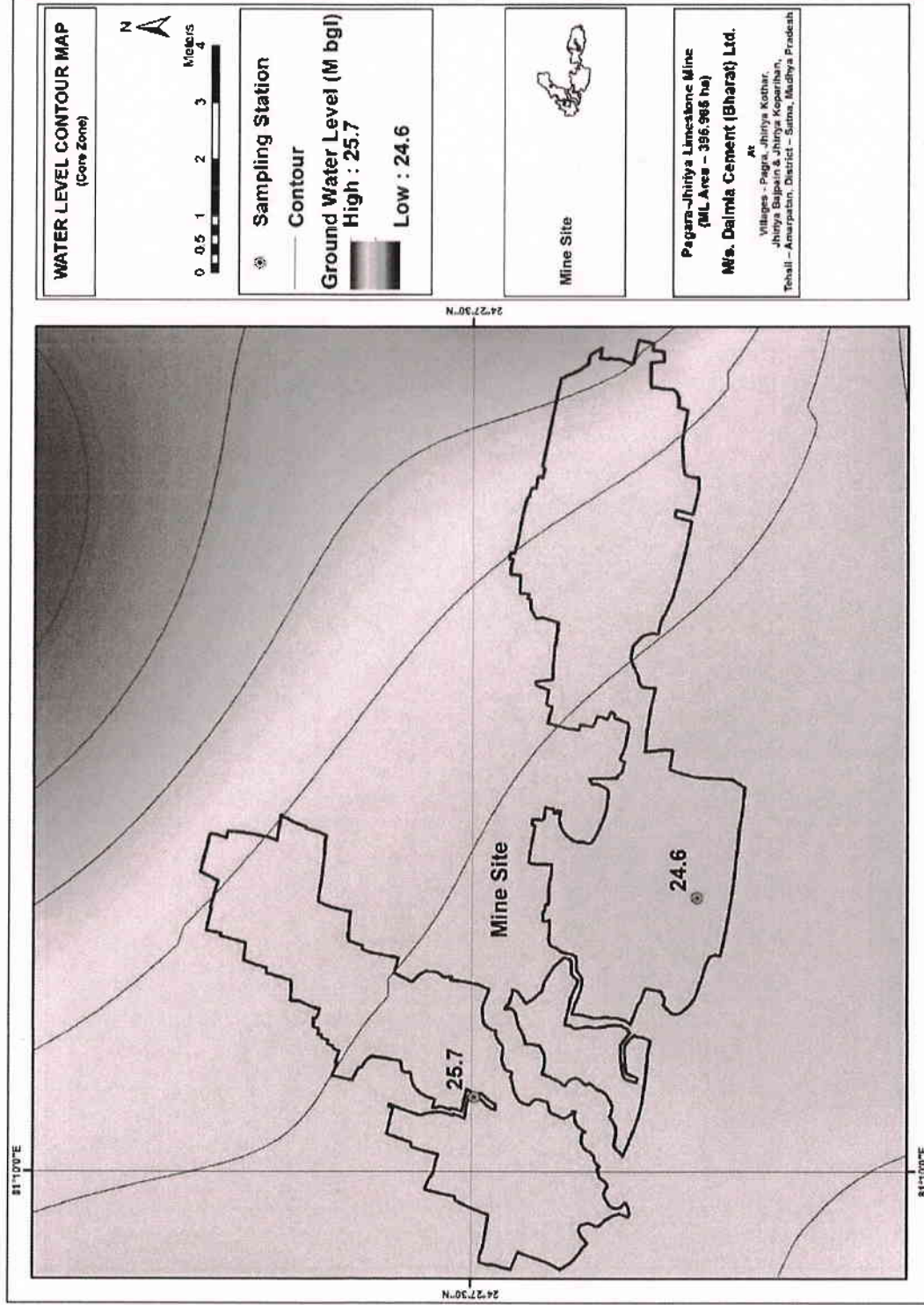


Figure 4-4: Depth to Water Level Pattern (m bgl) in and around Core Zone, Dalmia Cement (Bharat) Ltd., Amarpatan, Satna, Madhya Pradesh

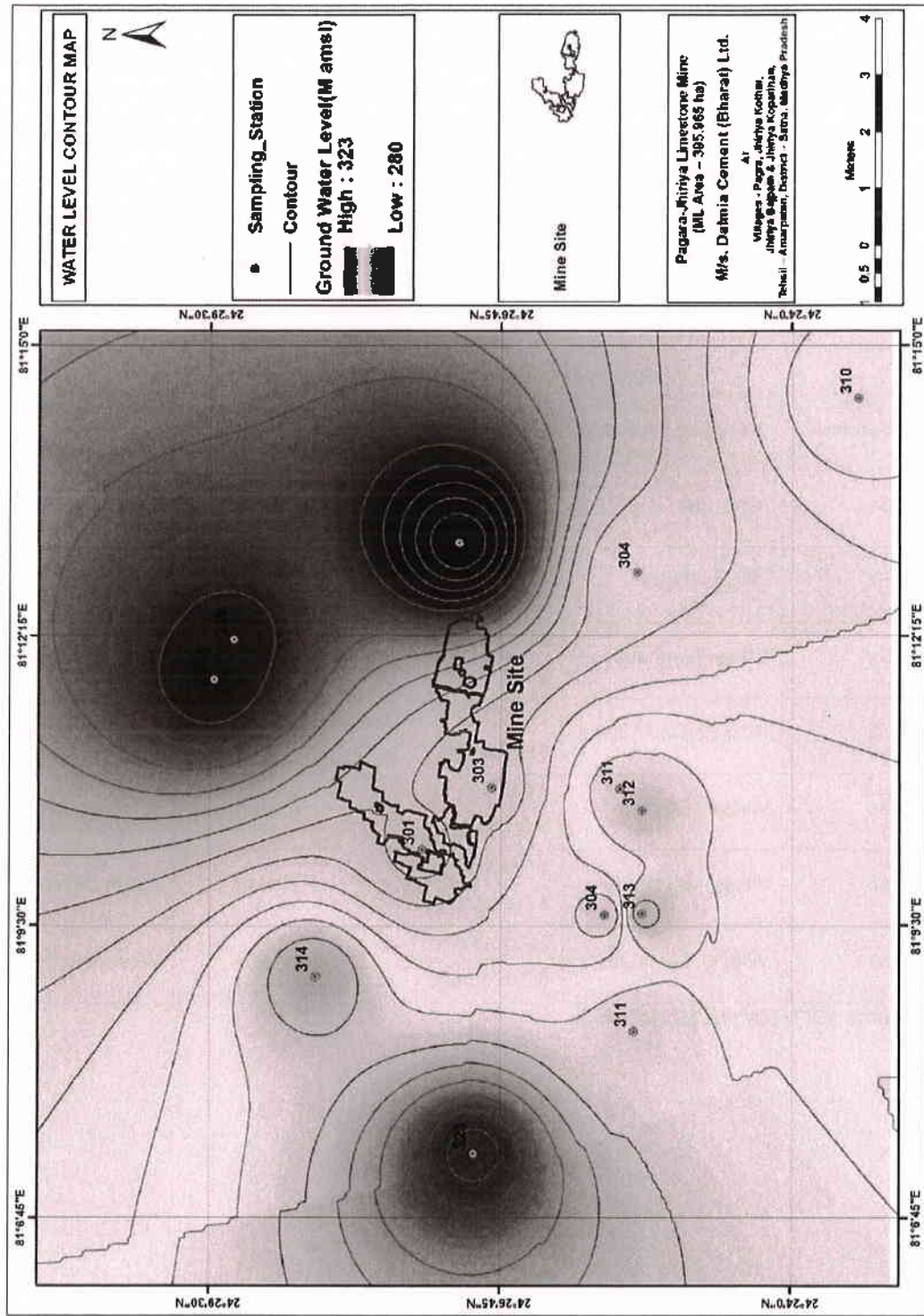


Figure 4-5: Depth to Water Level Pattern (amsl) in Buffer Zone, Dalmia Cement (Bharat) Ltd., Amarpatan, Satna, Madhya Pradesh

CHAPTER - 5

GROUND WATER QUALITY AND WATER REQUIREMENT AND ITS RECYCLE PROCESS

5.1 GROUNDWATER QUALITY

There is no perennial surface water body in the study area except some small water bodies i.e. Lilji Nadi, Dharam Sagar, Bihar Nadi, Murja Nadi, Chanduwa Nala, Kariari Nadi, Dhirma Nala, Jamuniha Nala, Garvandha Nala, Saiphan Nala, Bhamara Nala & Canal under construction.

Ground water samples were collected from the available water resources around the mine site. The samples were collected and tested from different sites.

The quality of ground water was studied by collecting 7 water samples. Details of ground water sampling locations and their distance and directions are given in **Table – 5.1**. Ground water analysis results are given in **Table – 5.2**.

Table 5.1
Location of Groundwater Sampling Stations

| Station code | Sampling Locations | Coordinates | Distance & direction from mine site | |
|--------------|----------------------|--------------------------------|-------------------------------------|-----------------|
| | | | Distance | Direction |
| SGWS1 | Mine site | 24°26'49.8"N 81°10'34.2"E | - | Core zone |
| SGWS2 | Village- Pagra | 24°27'22.0"N 81°09'57.7"E | ~0.5 km | NW direction |
| SGWS3 | Village-Singhauli | 24°23'22.5"N 81°14'23.0"E | ~ 3.0 km | SE direction |
| SGWS4 | Near BaijnathVillage | 24°30'26.74"N 81°10'51.63"E | ~ 5.0 km | North direction |
| SGWS5 | Village –Devra | 24°28'50.1"N 81°14'24.7"E | ~ 6.0 km | NE direction |
| SGWS6 | Village –Sigitodla | 24°24'13.1"N 81°10'59.4"E | ~ 6.0 km | South direction |
| SGWS7 | Village –Samogar | 24°27'58.8"N 81°06'00.8"E | ~ 7.5 km | West direction |

Source: SOI Toposheet & field Survey

Table 5.2
Details of Groundwater Quality Analysis, Study Period – Post Monsoon Season (October-December, 2018)

| S.No | Parameter | Unit | Mine site | Village Pagra | Village Singhauli | Near Village Bajnath | Village Devra | Village Sigtiodla | Village Samogar | Specification as per IS 10500-2012 | |
|------|-------------------------------------|------------|------------------|------------------|-------------------|----------------------|------------------|-------------------|------------------|------------------------------------|--------------------------|
| | | | | | | | | | | Desirable limits | Permissible limit (Max.) |
| 1. | pH (at 25°C) | - | 7.05 | 7.12 | 7.11 | 7.21 | 7.16 | 7.09 | 7.15 | 6.5-8.5 | No Relaxation |
| 2. | Colour | Hazen Unit | BDL (DL 5 Hazen) | BDL (DL 5 Hazen) | BDL (DL 5 Hazen) | BDL (DL 5 Hazen) | BDL (DL 5 Hazen) | BDL (DL 5 Hazen) | BDL (DL 5 Hazen) | 5 | 15 |
| 3. | Turbidity | NTU | BDL (DL 1.0 NTU) | BDL (DL 1.0 NTU) | BDL (DL 1.0 NTU) | BDL (DL 1.0 NTU) | BDL (DL 1.0 NTU) | BDL (DL 1.0 NTU) | BDL (DL 1.0 NTU) | 1 | 5 |
| 4. | Odour | - | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 5. | Taste | - | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 6. | Total Hardness as CaCO ₃ | mg/l | 361 | 403 | 401 | 388 | 426 | 465 | 434 | 200 | 600 |
| 7. | Calcium as Ca | mg/l | 95.23 | 136.94 | 101.18 | 116.32 | 102.4 | 117.05 | 143.21 | 75 | 200 |
| 8. | Alkalinity as CaCO ₃ | mg/l | 351.98 | 396.60 | 413.73 | 362.40 | 333.45 | 376.08 | 265.53 | 200 | 600 |
| 9. | Chloride as Cl | mg/l | 12.50 | 54.21 | 39.99 | 23.93 | 24.31 | 27.49 | 39.99 | 250 | 1000 |
| 10. | Cyanide as CN | mg/l | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | 0.05 | No Relaxation |
| 11. | Magnesium as Mg | mg/l | 30.17 | 14.73 | 36.09 | 23.59 | 41.36 | 42.10 | 18.56 | 30 | 100 |
| 12. | Total Dissolved Solids | mg/l | 570 | 692 | 525 | 634 | 581 | 638 | 608 | 500 | 2000 |
| 13. | Sulphate as SO ₄ | mg/l | 212.24 | 191.16 | 88.98 | 116.67 | 151.39 | 194.56 | 173.47 | 200 | 400 |
| 14. | Fluoride as F | mg/l | 0.90 | 0.89 | 1.08 | 0.92 | 0.83 | 0.75 | 0.82 | 1 | 1.5 |
| 15. | Nitrate as NO ₃ -N | mg/l | 0.23 | 1.76 | 3.48 | 2.12 | 2.58 | 2.44 | 2.58 | 45 | No Relaxation |
| 16. | Iron as Fe | mg/l | 0.07 | 0.15 | 0.07 | 0.11 | 0.15 | 0.05 | 0.12 | 1 | No Relaxation |
| 17. | Aluminium as Al | mg/l | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | 0.03 | 0.2 |
| 18. | Boron | mg/l | BDL (DL 0.20) | BDL (DL 0.20) | BDL (DL 0.20) | BDL (DL 0.20) | BDL (DL 0.20) | BDL (DL 0.20) | BDL (DL 0.20) | 0.5 | 1 |
| 19. | Phenolic Compounds | mg/l | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | 0.001 | 0.002 |

| S. No | Parameter | Unit | Mine site | Village Pagra | Village Singhauli | Near Village Bajinath | Village Devra | Village Sigitodla | Village Samogar | Specification as per IS 10500-2012 | |
|-------|------------------------------|-------|-----------------|-----------------|-------------------|-----------------------|-----------------|-------------------|-----------------|------------------------------------|--------------------------|
| | | | | | | | | | | Desirable limits | Permissible limit (Max.) |
| 20. | Anionic Detergents as MBAS | mg/l | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | 0.2 | 1 |
| 21. | Chromium as Cr | mg/l | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | 0.05 | No Relaxation |
| 22. | Zinc as Zn | mg/l | BDL (DL 0.0005) | BDL (DL 0.0005) | BDL (DL 0.0005) | BDL (DL 0.0005) | BDL (DL 0.0005) | BDL (DL 0.0005) | BDL (DL 0.0005) | 5 | 15 |
| 23. | Copper as Cu | mg/l | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | 0.05 | 1.5 |
| 24. | Manganese as Mn | mg/l | BDL (DL 0.10) | BDL (DL 0.10) | BDL (DL 0.10) | BDL (DL 0.10) | BDL (DL 0.10) | BDL (DL 0.10) | BDL (DL 0.10) | 0.1 | 0.3 |
| 25. | Cadmium as Cd | mg/l | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | 0.003 | No Relaxation |
| 26. | Lead as Pb | mg/l | BDL (DL 0.008) | BDL (DL 0.008) | BDL (DL 0.008) | BDL (DL 0.008) | BDL (DL 0.008) | BDL (DL 0.008) | BDL (DL 0.008) | 0.01 | No Relaxation |
| 27. | Arsenic as As | mg/l | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | BDL (DL 0.002) | 0.01 | 0.05 |
| 28. | Mercury as Hg | mg/l | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | BDL (DL 0.001) | 0.001 | No Relaxation |
| 29. | Sodium as Na | mg/l | 5.40 | 20.30 | 29.20 | 20.60 | 15.80 | 21.40 | 21.40 | - | - |
| 30. | Potassium as K | mg/l | 1.70 | 4.87 | 4.25 | 4.10 | 3.10 | 2.80 | 2.80 | - | - |
| 31. | Nickel | mg/l | BDL (DL 0.005) | BDL (DL 0.005) | BDL (DL 0.005) | BDL (DL 0.005) | BDL (DL 0.005) | BDL (DL 0.005) | BDL (DL 0.005) | 0.02 | No Relaxation |
| 32. | Conductivity | µs/cm | 978.0 | 1135 | 1026 | 941 | 1166 | 985 | 985 | - | - |
| 33. | Hexa Chromium as Cr+6 | mg/l | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | BDL (DL 0.03) | - | - |
| 34. | Phosphate as PO ₄ | mg/l | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | - | - |
| 35. | Total Suspended Solid | mg/l | BDL (DL1.0) | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | - | - |

Source: Ground Water Quality Analysis Report

The Physico-chemical quality of groundwater was compared with drinking water standard (IS: 10500-2012). All the groundwater samples showed good Ground water quality. Chemical analysis of groundwater samples reveals that there is not much variation in chemical composition of water samples collected from different bore wells of nearby villages. Groundwater quality is found to be good in general for various utilization purposes as all the major parameters were found within permissible range for drinking water standards as described by Indian Standard: 10500-2012. Analysis results of groundwater during post-monsoon season-2018 indicate the following:

The physico-chemical quality of groundwater was compared with drinking water standard (IS:10500-2012). The ground water/drinking water samples were collected from 7 locations. All the ground water samples showed good ground Water quality. The pH of the water samples ranged from 7.05 to 7.21 indicating slightly alkaline in nature; and maximum pH was recorded at village Pagra. The colour and turbidity were found to be BDL, and odour and taste were agreeable at all sampling locations. The observed values of parameter varies from: total hardness (361 to 465 mg/l), alkalinity (265.53 to 413.73 mg/l) and total dissolved solids (525 to 692 mg/l).

The concentration of chloride was found to be (12.50 to 54.21 mg/l) and sulphate was (88.98 to 212.24 mg/l). The concentrations of other micro and macro nutrients were also at low level i.e. nitrate (0.23 to 3.48 mg/l), calcium (95.23 to 143.21 mg/l), magnesium (14.73 to 42.10 mg/l), and iron (0.05 to 0.15 mg/l).

5.2 WATER REQUIREMENT OF PROPOSED MINE

Total water requirement for the proposed mining project will be 75 KLD, which includes 25 KLD water for dust suppression, 10 KLD for Washing of machineries, 35 KLD for green belt development & plantation and balance 5 KLD for domestic purpose. Water will be sourced from ground water and/or mine sump (as & when developed) after obtaining necessary permission from the competent authority.

The break-up of water requirement is given in the **Table 5.2** and water balance diagram is given in **fig. no. 5.2**

Table 5.3
Water Requirement

| S. No. | Particulars | Quantity (KLD) |
|--------------|--|----------------|
| 1. | Dust Suppression during drilling, on haul roads & crusher and loading unloading points | 25 |
| 2. | Plantation and Greenbelt Development | 35 |
| 3. | Washing of machineries | 10 |
| 4. | Drinking water | 5 |
| Total | | 75 |

Source: Approved Modified Mining Plan & Progressive Mine Closure Plan, pg no. 64

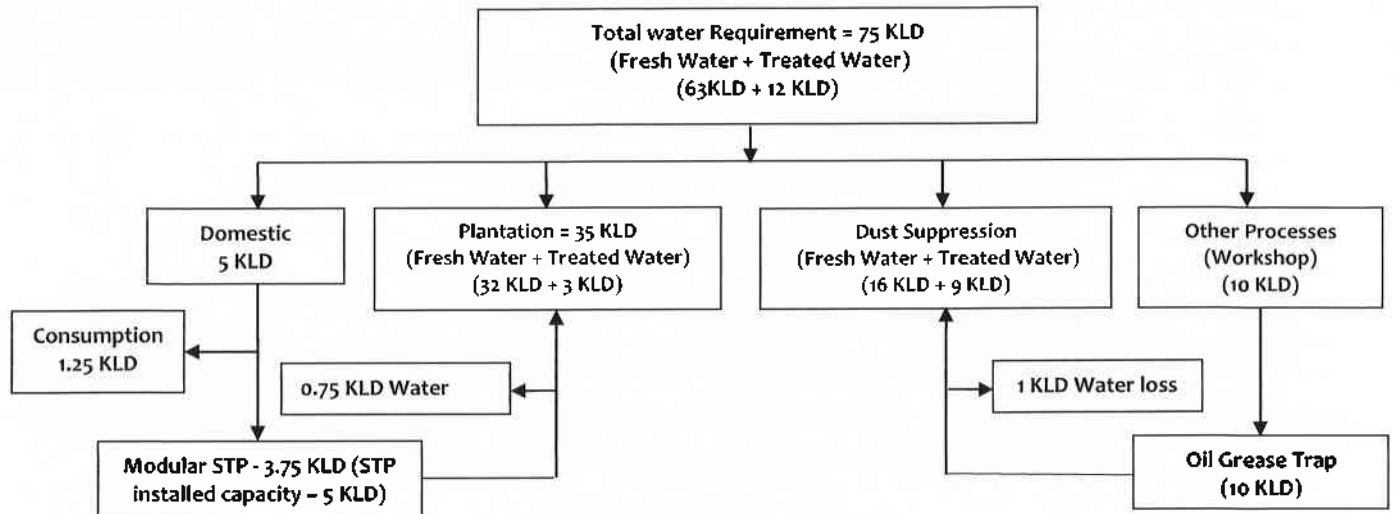


Figure 5.2: Water Balance Diagram

Proposed Groundwater Abstraction structures within the mine premises.

Number of Proposed Structures: - 1

| S. No | Type of Structure | Depth (m) / Dia (mm) | Depth to Water Level (m bgl) | Discharge (m ³ /Hr) | Operational Hrs. (Day) / Days (Year) | Mode of Lift | Pump Capacity (HP) | Max. Quantity withdrawn (KLD) |
|-------|-------------------|----------------------|------------------------------|--------------------------------|--------------------------------------|------------------|--------------------|-------------------------------|
| 1 | Bore well | 80 / 150 | 20.00 | 15 | 5 / 300 | Submersible Pump | 5 | 75 |

6.1 GROUNDWATER RESOURCES EVALUATION

Groundwater Resources of an area can be distinguished under two categories-

1. Dynamic Groundwater Resources
2. Static Groundwater Resources

6.2 DYNAMIC GROUNDWATER RESOURCES

Dynamic groundwater is that amount of water, which is found in the natural zone of fluctuation in an aquifer due to ground water recharge. Total Groundwater Recharge (R_t) of the area can be estimated by assessing the various component of the following equation.

| | | |
|-------|---|---|
| R_t | = | $R_r + R_s + R_i + S_r + R_c$ |
| R_r | = | Recharge from Rainfall |
| R_s | = | Recharge from irrigation due to surface water |
| R_i | = | Recharge from irrigation due to groundwater |
| S_r | = | Recharge through surface water bodies |
| R_c | = | Recharge to confined aquifer |

6.3 GROUNDWATER RESOURCES IN THE CORE ZONE

The proposed limestone mine covers about 395.965 hectares (3.95 sq.km.) of land. The main source of groundwater recharge is due to rainfall by direct percolation.

6.3.1 RECHARGE DUE TO RAINFALL

(a) By Groundwater Table Fluctuation Method

In the core zone, dominant geological formations are Vindhyan shale/limestone whose average specific yield can be taken as 0.015 as per norms of GWRE 2009, while seasonal fluctuation is taken as 2 m. Recharge due to rainfall computed by specific yield and water table fluctuation method is as follows:-

| | | |
|----------|---|---|
| R_{rt} | = | $A \times Sf \times Sy$ |
| Where, | | |
| R_{rt} | = | Recharge |
| A | = | Area |
| Sf | = | Seasonal Fluctuation |
| Sy | = | Specific Yield |
| Here, | | |
| A | = | 395.965 Hectare |
| Sf | = | 2.0 m |
| Sy | = | 0.015% |
| R_{rt} | = | $395.965\text{Ha} * 0.015 * 2\text{ m}$ |
| | = | $3.95\text{ sq.km.} * 0.015 * 2$ |
| | = | 0.1185 mcm/annum |

(b) By Rainfall Infiltration Factor Method

In the area where groundwater level monitoring is not adequate in space and time, rainfall infiltration method may be adopted. The groundwater estimation committee, Govt. of India (2009)

has suggested norms for recharge from rainfall under various hydro-geological conditions. Rainfall infiltration factor has been suggested as 3 to 10% for Limestone and shale formation as prevailing in Satna district. On an average, it can be taken as 7% for the core zone having well-developed drainage and comparatively more permeable strata.

$$\begin{aligned}
 R_r &= \text{Area} \times \text{Rainfall} \times \text{RI factor} \\
 \text{Rainfall} &= 989\text{mm (average annual rainfall, 2004-2017)} \\
 \text{RI factor} &= 7\% \\
 \text{Area} &= 395.965 \text{ Hectare} \\
 R_r &= 395.965 \text{ Ha} \times 989 \text{ mm} \times 7\% \\
 &= 3.95 \text{ Sq.km.} \times 0.989 \text{ m} \times 0.07 \\
 &= 0.273 \text{ mcm/annum}
 \end{aligned}$$

As per the recommendations of GEC, 2009, if the difference between the two, expressed as a percentage of rainfall infiltration method is greater than or equal to -20% or less than or equal to +20%, then the recharge is taken as the value estimated by the water table fluctuation method. If it is less than -20%, then it is taken as 0.8 times the value estimated by rainfall infiltration factor method. If it is greater than +20%, then recharge is taken as equal to 1.2 times the value estimated by rainfall infiltration factor method.

The difference between the two is 0.155 mcm/annum or 56.76%, thus the rainfall recharge for normal monsoon is to be taken as 1.2 times, the value estimated by rainfall infiltration factor method i.e. 0.328 mcm/annum

It shows that $R_r = 0.328 \text{ mcm/annum}$

6.3.2 TOTAL DYNAMIC RESERVES OF CORE ZONE

Considering all above recharge components, total dynamic reserves in the investigated core area will be

$$R_r = 0.328 \text{ mcm/annum}$$

6.3.3 GROUNDWATER DRAFT OF CORE ZONE

Groundwater draft in the area can be estimated by assessing the various components of the following equation-

$$D_t = D_i + D_d + D_{in} + D_w + D_{et} + D_o$$

Where,

- D_t = Total Groundwater Draft
- D_i = Groundwater Draft for irrigation in the area
- D_d = Groundwater draft for domestic use
- D_{in} = Groundwater Draft for industrial use
- D_w = Groundwater Draft for irrigation and Domestic use
- D_{et} = Groundwater Draft by way of evapo-transpiration
- D_o = Groundwater Draft as out flow from Confined aquifer.

Here,

Total Groundwater Draft- Total water requirement for the mine activities including mine workshop, drinking and domestic purposes, dust suppression and green belt development etc. is about 75 KLD which shall be met out from groundwater in initial stage and mine sump i.e. groundwater seepage and accumulated rainwater in later stages. Therefore, proposed groundwater draft within the core

zone will amount to 22,500 cum or 0.02mcm/annum (based on 300 mine working days). Evapo-transpiration losses are considered nil as already included while calculating recharge by specific yield and rainfall infiltration factor method.

$$D_t = 0.02 \text{ mcm/annum}$$

Net recharge of core zone is 0.328mcm/annum while net draft is coming around 0.02mcm/annum. Groundwater development stage in the core zone shall be 6.86% only of the total groundwater recharge; hence it is coming under safe category.

6.4 GROUND WATER RESOURCES FOR BUFFER ZONE

Area of buffer zone is coming about 439.53sq.km. (As per land use/land cover map). This buffer zone has mainly Nagod Limestone with Sibru and Simrawal shale, and Nagod Limestone and Jhiri Shale as principal aquifers. Rainfall is the principal source of groundwater but seepage from surface water bodies, canals, return flow from applied irrigation as well as infiltration factor also play a significant role in raising the groundwater level. Geographical area, specific yield and infiltration index are the parameters for determining the amount of water which is stored in the aquifer.

6.4.1 RECHARGE DUE TO RAINFALL

(a) BY GROUNDWATER TABLE FLUCTUATION METHOD

The buffer zone has Vindhyan shale/sandstone whose average specific yield can be taken as 0.015 as per norms of GWRE 2009, while seasonal fluctuation is taken as 2.0 m. Recharge due to rainfall computed by specific yield and water table fluctuation method is as follows:-

$$\begin{aligned} R_{r1} &= A \times Sf \times Sy \\ &= 439.53\text{sq.km} \times 2 \text{ m} \times 0.015 \\ &= 439.53 \times 2 \times 0.015 \\ &= 13.19 \text{ mcm/annum} \end{aligned}$$

(b) BY RAINFALL INFILTRATION FACTOR

In the area where groundwater level monitoring is not adequate in space and time, rainfall infiltration method may be adopted. The groundwater estimation committee, Govt. of India (2009) has suggested norms for recharge from rainfall under various hydro-geological conditions. Rainfall infiltration factor is 0.07 as per dynamic groundwater resource of Madhya Pradesh CGWB, Satna.

$$\begin{aligned} R_{r2} &= \text{Area} \times \text{Rainfall} \times \text{RI Factor} \\ &= 439.53 \times 0.989 \text{ mm} \times 7\% \\ &= 439.53 \times 0.989 \times 0.07 \\ &= 30.43 \text{ mcm/annum} \end{aligned}$$

As per the recommendations of Groundwater Estimation Committee (GEC), 2009, if the difference between the two, expressed as a percentage of rainfall infiltration method is greater than or equal to -20% or less than or equal to +20%, then the recharge is taken as the value estimated by the water table fluctuation method. If it is less than -20%, then it is taken as 0.8 times the value estimated by

rainfall infiltration factor method. If it is greater than +20%, then recharge is taken as equal to 1.2 times the value estimated by rainfall infiltration factor method.

The difference between the two is 17.24 mcm/annum or 56.65%, thus the rainfall recharge for normal monsoon is to be taken as 1.2 times, the value estimated by rainfall infiltration factor method i.e. 36.52mcm/annum.

6.4.2 RETURN FLOW FROM APPLIED IRRIGATION

As suggested by the GEC committee, groundwater recharge from the return flow of irrigation water is normally taken as 30% of the total water applied for irrigation in an area consists of Limestone and Shale. Total groundwater applied for irrigation is 15.36mcm/annum (Section 6.5.1). Groundwater recharge from the above factors is as under:

$$\begin{aligned} R_{iB} &= 15.36 \times 0.3 \\ &= 4.6 \text{ mcm/annum} \end{aligned}$$

6.4.3 RECHARGE DUE TO SURFACE WATER BODIES

As per the land use pattern of the buffer zone, total area under surface water bodies and seasonal water bodies work out to be 6.02 Sq.km. As per the GEC, groundwater recharge through surface water bodies can be taken as 40% of the total water spread area. Hence, groundwater recharge from the above factors is as under

$$\begin{aligned} S_{rB} &= 6.02 \text{ sq.km.} \times 0.4 \\ &= 2.41 \text{ mcm/annum} \end{aligned}$$

6.4.4 TOTAL RECHARGE OF BUFFER ZONE

$$\begin{aligned} R_B &= 36.53 + 4.6 + 2.41 \\ &= 43.54 \text{ mcm/annum} \end{aligned}$$

6.5 GROUNDWATER DRAFT OF BUFFER ZONE

In the investigated area, groundwater draft will occur mainly due to applied irrigation, domestic and industrial uses. Evapo-transpiration losses are considered nil as they are already taken into account while calculating recharge by water table fluctuation and rainfall infiltration factor method. Hence, groundwater draft can be computed by reducing the equation (B) to:

$$D_{tB} = D_{iB} + D_{dB} + D_{tB} + D_{iB}$$

6.5.1 DRAFT DUE TO APPLIED IRRIGATION (D_{iB})

The groundwater draft in the buffer zone takes place mainly by dug wells and shallow/deep bore wells used for irrigation. There are about 1050 dug wells and 650 shallow/deep bore wells tapping the aquifer consist of limestone and shale. These bore wells usually have an average discharge of 80m³/day for shale and 120m³/day for Limestone (on an average, discharge of 0.012 mcm). However, dug wells having a discharge of 50m³/day for shale and 70m³/day for limestone (on an average, discharge of 0.005 mcm) (Source: CGWB). The annual draft has been calculated after

considering that these structures generally operate for 4 months in a year. The annual groundwater withdrawal from these wells is calculated as-

$$\begin{aligned} \text{Groundwater draft by dug wells} &= 1050 \times 120 \text{ days} \times 60 \text{ m}^3/\text{day} \\ &= 7.56 \text{ mcm/ annum} \end{aligned}$$

$$\begin{aligned} \text{Groundwater draft by bore wells} &= 650 \times 120 \text{ days} \times 100 \text{ m}^3/\text{day} \\ &= 7.8 \text{ mcm/ annum} \end{aligned}$$

$$\begin{aligned} \text{Total groundwater draft due to applied irrigation} &= 7.56+7.8 \\ &= 15.36 \text{ mcm/annum} \end{aligned}$$

6.5.2 DRAFT DUE TO DOMESTIC USE (D_{dB})

The total population in buffer zone area was around 166945 according to census figure for 2011 which has increased to 224874.9 in 2018 as per population growth rate of 34.7% per decade. Considering 100 Liters (0.1 m^3) as domestic use in rural and semi urban area (GEC, 1997), the total groundwater withdrawal for domestic use will be.

$$\begin{aligned} D_{dB} &= 224874.9 \times 0.1 \times 365 \\ &= 8207934 \\ &= 8.2 \text{ mcm/ annum} \end{aligned}$$

6.5.3 DRAFT DUE TO LIVESTOCK USE (D_{lB})

The water consumption for livestock has been empirically considered as 5% of human consumption which is calculated as

$$\begin{aligned} D_{lB} &= 8.2 \times 0.05 \\ &= 0.41 \text{ mcm/annum} \end{aligned}$$

6.5.4 DRAFT DUE TO INDUSTRIAL USE

There are basically three major cement plants within 10 km buffer zone namely Jaypee-Rewa Cement Plant, Ultra Tech-Bela Cement Plant and Prism Cement along with three number of existing limestone mines including project/mining activities, dust suppression and green belt development, domestic purposes shall be met from surface reservoir/mined out reservoirs of existing mines apart from minor groundwater withdrawal for drinking purpose only. Therefore, total groundwater withdrawal for industrial use may be considered as nil.

$$D_{iB} = \text{Nil}$$

6.5.5 TOTAL DRAFT OF BUFFER ZONE

$$\begin{aligned} D_{tB} &= D_{lB} + D_{dB} + D_{iB} + D_{ine} \\ &= 15.36 + 8.2 + 0.41 + \text{Nil} \\ &= 23.97 \text{ mcm/annum} \end{aligned}$$

Total recharge of the buffer zone is 43.54mcm/annum while total groundwater draft is 23.97mcm/annum. The groundwater development in the area is about 55% of total groundwater recharge. Therefore, buffer zone is coming under Safe category as per groundwater development

status, indicating that the basin possesses surplus groundwater storage available for long-term development and planning. As per groundwater resources assessment carried out by Central Ground Water Board, stage of groundwater development in Satna district is coming about 68.15%; also indicating the area under Safe category.

6.6 ALLOCATION OF GROUND WATER FOR DOMESTIC USE FOR FUTURE DEVELOPMENT

Domestic use of population within 10 km radius of project site has been projected for year 2039. Considering population growth percentage @34.7% per decade, population in year 2039 is estimated to be 4, 08, 015 persons. Dependency of population is mainly on the groundwater in this area. Considering 100 litres (0.1 m³) as domestic consumption in rural and semi urban area, the total water withdrawal for domestic use will be:

$$\begin{aligned} D_{db} &= 4, 08, 015 \times 0.1 \times 365 \text{ days} \\ &= 14.89 \text{ mcm/annum} \end{aligned}$$

Present draft due to domestic use is 8.2 mcm/annum; hence additional water allocated for future domestic use works out to be 14.89-8.2= 6.69 mcm/annum.

6.7 SUMMARY OF BUFFER ZONE WATER BALANCE

| | In MCM/Year |
|---|--------------|
| A. Groundwater Recharge in 10 km radius area | |
| 1. Recharge due to Rainfall | 36.52 |
| 2. Recharge from other sources: | |
| a) Return Flow from Applied Irrigation | 4.6 |
| b) Recharge due to Surface Water Bodies | 2.41 |
| c) Recharge due to Canal Seepage | - |
| GROSS RECHARGE | 43.53 |
| B. Groundwater Draft | |
| 1. Draft due to Applied irrigation | 15.36 |
| 2. Draft due to Domestic use | 8.2 |
| 3. Draft due to Livestock | 0.41 |
| 4. Draft due to Industries | - |
| Total Draft | 23.97 |
| C. Net Groundwater Available (A-B) | 19.56 |
| D. Percentage of Groundwater Development | 55% |
| E. Category of the area for Groundwater Development | SAFE |
| F. Allocation for Future Domestic Purpose (in addition to present consumption) | 6.69 |

CHAPTER-7

IMPACT OF MINING ACTIVITIES ON WATER RESOURCES OF THE AREA

7.1 MINING SCHEME/YEAR WISE DEVELOPMENT OF MINES

Mining will be carried out by fully mechanized conventional open cast method. All operations of mining will be done by deployment of heavy earth moving machineries for deep hole drilling,, blasting, excavation, loading-unloading, crushing & transport. Various mining activities such as drilling, blasting, loading, transportation and crushing will be so conducted as to ensure maximum mineral conservation and minimum environmental degradation. The geological study in the region including Rewa and Satna districts was first mapped by FR Mallet in 1871.

Proposed Mine lease was granted in 11 patches after excluding habitation, ponds, road, Nala etc. Mining will be carried out only in 6 pit/blocks (Pit/Block no. 1, 3, 4, 5, 6 & 7) having total area of 185.57 ha. In addition to this a Crusher of 500 TPH will be installed in 2 ha area. Thus, the total area used for mining and crushing will be 187.57 ha and remaining area of 208.395 ha will be treated as no mining area and only green belt development, afforestation and other protective activities carried out in this area. At conceptual stage, Block 1, 4 and 5 will be completely backfilled and reclaimed. The block 3 & 6 will be partially backfilled and partially converted into water reservoir. The block 7 will be competently converted into water reservoir.

Salient Features of Mining

Mining operation will be carried out by Conventional Open cast fully mechanized mining method by formation of benches. Bench height and bench width will be maintained at 6 m and 15 m respectively. Mining operation includes drilling, blasting, loading, Crushing and transportation to end use plant, shall be adopted keeping in mind the quality, cost, safety and conservation of mineral.

Top soil and OB with nutrient value will be scrapped and stacked separately in non-mineralize area and same will be used for future plantation and backfilling purpose.

Since the limestone is hard and compact, drilling is required to break the rock. Drilling will be carried out by crawler mounted DTH hammer Drill machine. Drilling will be carried out by drilling 6 m deep hole of 100 mm dia. The height of the mineral bench will be up to 6.0 m and width will be equal to 15m, the width of a bench will not be less than three times the length of the largest machine working on the bench. Controlled blasting with 'V' pattern firing will be in practice which is much safe and fragmentation is good and throw is within control. Sequential blasting will be done by using electric delay detonator or NONEL system of initiation to reduce vibration and fly rock. Oversize boulders generated from primary blasting will be reduced to acceptable crusher feed size by deploying rock breakers. Maximum 30 nos of holes will be blasted in a round/day.

The fragmentation will be kept reasonably well and the oversize will be limited below 10%.

Blasting will be adopted with the use of ANFO and/or Column Charge (Slurry Explosives) and booster charge. Powder factor in limestone is considered 7 kg/tonne of excavation where as in waste it is 7.5 to 8 kg/ tonne of excavation. For blasting ANFO and/or Column Charge (Slurry Explosives) and booster charge explosives will be used. Loading operations will be carried out by

hydraulic excavators. The blasted ROM will be loaded by Hydraulic Excavators of 4.0 m³ shovels/ backhoe bucket size in to dumpers of 35 tonnes capacities and material will be transported to the crushing plant. Crusher will be located in mining lease area. The waste material comprising of shale will be loaded into dumpers and sent to the dumping area earmarked for the purpose.

The ROM ore comprising of Cement grade and blendable grade limestone will be dispatched to the Cement Plant by suitable blending, thus the entire limestone will be consumed and no mineral reject will be generated for separate stacking. Cement Plant to be located at around 25 km near Jamuna village. Transportation will be carried out by dumpers.

Table 7.1
Year Wise Working Details

| Period | Area Disturbed by Mining | Top RL | Bottom RL | Depth of Mining | Pit Dimensions | |
|-----------|--------------------------|--------|-----------|-----------------|-------------------|------------------|
| | | | | | Max Length of Pit | Max Width of Pit |
| | Ha | | | m | m | m |
| 2020-2021 | 11.43 | 320 | 319 | 1 | 405 | 288 |
| 2021-2022 | 21.19 | 319 | 317 | 2 | 660 | 500 |
| 2022-2023 | 24.19 | 317 | 311 | 6 | 760 | 500 |
| 2023-2024 | 30.43 | 311 | 306 | 5 | 760 | 500 |
| 2024-2025 | 19.15 | 326 | 306 | 20 | 1200 | 500 |

Source: Review of Mining Plan with Progressive Mine Closure Plan,

Source: Conceptual Map & AutoCAD Software

7.2 IMPACT OF MINING ON WATER RESOURCES

7.2.1 IMPACT OF MINING ON SURFACE WATER

All the mining activity proposed to be carried out in next five years will not interfere anywhere with the natural drainage pattern. However, to prevent the entry of surface run-off in the active mining pit, it is proposed to make bund around the pit with soil generated during mining so that rainwater will be channelized towards temporary unused pit/water reservoir. The surface runoff from OB/waste dump site along seasonal Nallah (five year plan period) shall be channelized to settling tank through garland drains. Moreover, no stored water shall be released directly to streams. Clean and clear water will be discharged through rainwater harvesting pit; check dam also be provided to prevent siltation to discharge. Hence, there is no possibility of any siltation in natural streams and reduction of vertical percolation. It is therefore apparent that there is hardly any impact of mining on the surface water regime.

7.2.2 IMPACT OF MINING ON GROUNDWATER

There will not be any adverse impact on the groundwater quality due to mining. The mineral formation do not contain any harmful element, which could percolate into the ground and pollute the groundwater. Hence, no control measures are required.

Garland drains will be provided all around the excavation to prevent flow of surface rainwater/runoff from surrounding areas in the working pit. The drains shall be lined with stone masonry and shall be of adequate size to carry the storm water without overflow. The rain water which will get accumulated in working pit will be pumped out by diesel pump of adequate capacity. The rainwater collected in the excavated out area or in mine sump shall be utilized for water spraying on haul roads

and other dust prone areas, greenbelt development and other purposes.

According to groundwater level monitoring data, water level is found shallow in the applied lease area. Depth to water level in and around mine lease area is found to vary between 20 m to 22m bgl during post monsoon season and 22-25 m during pre-monsoon season. The mineral availability and depth of mine working will go up to 20 m bgl (306 m RL) in present plan period and up to 48 m bgl (275 mRL) in conceptual period. Hence, there is no possibility of groundwater intersection by mine workings, or groundwater seepage in the mine pits in the present plan period

7.2.3 IMPACTS DUE TO GROUND WATER DRAFT

The main impact of ground water draft by industries is groundwater depletion, a term often defined as long-term water-level declines caused by sustained groundwater pumping is a key issue associated with groundwater use which may cause the following impacts on socio economic condition:

1. Over pumping lowered the water level which decline the yield and reduce its availability for irrigation as well as drinking purposes which can directly affect to the basic need of the population.
2. Crop production decrease from lack of water availability (40% of global food production relies on groundwater)
3. Decline in water level may lead to deterioration of water quality due to excessive ground water draft may have an adverse effect to the health of the people in the study area.
4. When water is taken out of the soil, the soil collapses, compacts, and drops and causes land subsidence due to removal of subsurface water.
5. As the depth to water increases, the water must be lifted higher to reach the land surface through pumping which require more energy. Hence it become prohibitively expensive.

7.3 MITIGATION MEASURES

Over-exploitation of groundwater was found to have several socio-economic and ecological consequences. Water development decisions in the State and elsewhere in the country are primarily guided by economic objectives and criteria, which promote only those investments that are capable of giving higher direct economic returns in the water sector. As this is a proposed project therefore following mitigation measures will be adopted after commencement of the Project:

- The project proponent in consultation with Regional Office, CGWB may provide artificial recharge through rooftop area for better percolation of rain water.
- The design and construction will be done after detailed engineering in case of requirement of recharge structure development.
- The company proposes the proper de-silting and cleaning of nearby ponds periodically prior to monsoon.
- Mechanical ploughing at the base of the basin.
- Addition of organic matter or chemicals to the uppermost layer
- The industry will install piezometers fitted with automatic water level recorder having telemetry system at suitable location and execute ground water regime monitoring programme in and around the project area on regular basis in consultation with CGWB and as per as NOC conditions.

- The industry will take up area specific plantation program to enhance the recharge measures.

7.4 RECOMMENDATIONS & SUGGESTIONS

Awareness program about the conservation of ground water resources to make the population aware.

SUMMARY AND CONCLUSION

- Dalmia Cement (Bharat) Ltd. is proposing new limestone mine project- Proposed Pagara-Jhiriya Limestone Mine near Villages – Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan, Tehsil – Amarpatan, District – Satna, Madhya Pradesh with total excavation of 2.41 Million TPA [Limestone: 1.5 MTPA, Soil: 0.56 MTPA (348000 cum) and OB: 0.35 MTPA (176000 cum)] having (ML Area – 395.965 ha including mining area 185.57 ha, non-mining area 208.395 ha and area for installation of 500 TPH Capacity of Crusher 2 ha).
- The total water requirement for the proposed limestone mine is 75 cum/day (22,500 cum/annum) which shall be met from groundwater in initial stages and mine sump water in later stages.
- The annual average rainfall in the region is around 989 mm (average of last sixteen years rainfall data from 2004-2019) varying from maximum 1704 mm in 2005 to minimum 663 mm in 2010
- The limestone of the lease area belongs to Bhandar group of Vindhyan Super Group. The area around Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan, villages occupied by Nagod limestone of Bhandar Group.
- The limestone in these parts is mainly of stromatolitic type with a nodular look. The Nagod limestone formation of Bhandar Group is sandwiched between the underlain Simrawal/Ganurgarh Shale and overlain by Sirbu Shale.
- The chief aquifer units are weathered top soil, limestone and weathered fractured, splintery Sibiru shale formation. The study area is covered with thin soil layer. The weathered Nagod Limestone, Rohtas Limestone and weathered, fractured, splintery Sibiru shale & Jhiri Shale are acting as shallow water bearing aquifer, The porosity value of these limestone formations is very low as compared to standard porosity values (10-20%) and acting as aquitard that yield water slowly. This limestone with poor water holding capacity allows the movement of water along the gradient/hydraulic gradient of the area.
- Depth to water level in study area was found to vary between 7.5 m to 37.2 m bgl indicating water level to be relatively deep at few places such as Pana (37.2 m bgl), Barahari (36.3 m bgl), and Kasaura (36.2 m bgl). The minimum and maximum surface elevation of monitoring points in the study area is found to vary between 316 mRL to 352 mRL respectively.
- During present mining plan period, mineral availability and depth of mine working will go up to 20 m bgl (306 m RL) in present plan period and up to 48 m bgl (275 mRL) in conceptual period. Hence, there is every possibility of groundwater level intersection by mine workings.
- Major part of the study area/buffer zone (more than 70%) covered by Limestone and Sandstone formation having yield between 1 to 8 Liters per second (LPS).
- The topography of the area is almost plain having gentle slope towards North-East direction. The highest reduced level is 328 mRL towards south-west while the lowest elevation is 319 mRL in the north-east.

However, the hydraulic gradient as observed from monitoring of groundwater level of the area is about 1.5-2.5 m/km.

- Chemical analysis of groundwater samples reveals that groundwater near project site is having TDS, alkalinity and Calcium more than desirable limit at few places. However, all the parameters were found within permissible limits for Drinking water Standard as prescribed by IS: 10500-2012.
- Total recharge of the buffer zone is 43.53 mcm/annum while total groundwater draft is 23.97 mcm/annum. The groundwater development in the area is about 55% of total groundwater recharge. Therefore, buffer zone is coming under Safe category as per groundwater development status, indicating that the basin possesses surplus groundwater storage available for long-term development and planning. Mining activity proposed to be carried out in next five years and up to conceptual stage will not interfere anywhere with the natural drainage pattern. Hence, no diversion is required and there is hardly any impact of mining on the surface water regime.
- Depth to water level in and around mine lease area is found to vary between 20 m to 22m bgl during post monsoon season and 22-25 m during pre-monsoon season. The mineral availability and depth of mine working will go up to 20 m bgl (306 m RL) in present plan period and up to 48 m bgl (275 mRL) in conceptual period. Hence, there is no possibility of groundwater intersection by mine workings, or groundwater seepage in the mine pits in the present plan period
- No groundwater seepage will occur during the first five years (plan period) due to no intersection of mining activity with ground water level.
- The total water requirement for mining activities is 75 KLD which shall amount to 0.02mcm/annum.



Dalmia cement

cement! sugar! refractories! power!

FUTURE TODAY

Date: 30.11.2021

The Addl. Principal Chief Conservator of Forests (C),
Ministry of Env., Forest and Climate Change
Regional Office (WZ), E-5
Kendriya Paryavaran Bhawan,
E-5 Arera Colony, Link Road-3,
Ravishankar Nagar, Bhopal-462016.

Sub- Proposed Pegara-Mariya Limestone Mine (ML Area: 895.965 ha including Mining Area 385.67 ha, Non-Mining Area 208.395 ha and area for installation of 500 TPH Capacity of Crusher 2 ha) located near Villages: Pegra, Mariya Kothar, Mariya Bajpala & Mariya Kopalhan, Tehsil: Anarpatan, District: Satna, Madhya Pradesh- EC Compliance-reg.

Ref: Environment Clearance from MOEF, New Delhi, F. No. J-11015/SR/2017-1A II (M) dated 26th July, 2021

Dear Sir,

With reference to the above mentioned subject and referred letter, we would like to mention that MoEF&CC, New Delhi has granted Environmental Clearance for above cited project vide letter dated 26th July 2021. In compliance of conditions stipulated in Environmental Clearance following documents are attached herewith for your kind perusal and record:

| Condition No. | Condition details | Compliance Status |
|--|--|---|
| Specific Condition no 11 | The Project Proponent shall submit detailed Hydro Geological study for blocks where the water table is intersecting and obtain permission from CGWA before undertaking mining operations. | Detailed Hydrogeological study have been undertaken by JM EnviroNet Pvt. Ltd. for Hydro-geological evaluation during grant of EC. Ground water intersection is not anticipated in first 15 years of mining as per the study carried out. Prior NOC will be taken from CGWA in case of intersection of ground water as anticipated. CGWA NOC has been obtained for ground water abstraction vide NOC no CGWA/NOC/MIM/ORIG/2021/13090 dated 25/09/2021 and which is valid upto 24/09/2023. Hydro-geology study report is attached herewith as Annexure I. |
| Standard Condition no 7 under "Statutory Compliance" | 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 | A public notice informing about grant of EC has been published in two newspapers named "Dainik Jagaran and Navbharat" on 4 th August 2021 in English as well as in vernacular language i.e. Hindi. Original Newspapers of Advertisement along with copy of EC were submitted at your good on 31.08.2021. Receiving of the same is attached herewith as Annexure-II. |

Dalmia Cement (Bharat) Limited

11th & 12th Floor, Hansalaya Building, 15, Barakhamba Road, New Delhi - 110 001, Delhi, India
T +91 11 2346 5100 Toll Free 1800 2020 W www.dalmiacement.com CIN: U65191TN1996P
Registered Office: Dalmiapuram, District Tiruchirappalli - 621 651, Tamil Nadu, India
A Dalmia Bharat Group company, www.dalmiabharat.com

02/12/21
कार्यालय/OFFICE
वन एवं जलवायु परिवर्तन मंत्रालय
Ministry of Environment, Forests & Climate Change
केन्द्रीय पर्यावरण भवन (के०)/Regional Office (New Delhi Zone)
भोपाल (म.प्र.)/BHOPAL-462016

| Condition No. | Condition details | Compliance Status |
|---|---|--|
| | the Ministry of Environment, Forest and Climate Change (www.environmentalclearance.nic.in). A copy of the advertisement may be forwarded to the concerned MoEFCC Regional Office for compliance and record. | |
| Standard Condition no 32 under X- Corporate Environment Responsibility (CER): | The Project Proponent shall submit the time-bound action plan to the concerned regional office of the Ministry within 6 months from the date of issuance of environmental clearance for undertaking the activities committed during public consultation by the project proponent and as discussed by the EAC, in terms of the provisions of the MoEF&CC Office Memorandum No.22-65/2017-IAIII dated 30 September, 2020. The action plan shall be implemented within three years of commencement of the project. | A time bound action plan was prepared on the basis of issues raised during public hearing and submitted during appraisal. The same is also mentioned in para no. 17 of granted EC. Action plan is also attached herewith as an Annexure III. |

Thanking You
Yours Faithfully
For Dalmia Cement (Bharat) Ltd.


(Dinesh Dixit)
Mine Manager

Encl: As Above

E126109231510 INR1697326109231
3F 34184 876 1/5 04801 00018 449 India Post
Counter No:2,26/11/2021,16:24
To:SAFFWAN, PANNA
PIN:465115, Raipur Baghelan S.G
From:DWJHA CPWF, RAJHILU1
Wt:200g
Ad:41.30(Bank)tar:6.30
www.indiapost

श्री मान सरपंच महोदय,

ग्राम पंचायत पगरा, तहसील: रामपुर बघेलन, जिला: सतना (मध्य प्रदेश)

विषय: मैसर्स डालमिया सीमेंट (भारत) लिमिटेड द्वारा प्रस्तावित चूना पत्थर खदान (एमएल क्षेत्र: 395.965 हेक्टेयर) की चूना पत्थर उत्पादन क्षमता के साथ पर्यावरणीय मंजूरी - 1.5 मिलियन टीपीए (कुल उत्खनन - 2.41 मिलियन टीपीए) के साथ-साथ क्रशर की स्थापना - वोबलर के साथ 500 टीपीए क्षमता: - गांव पगरा, झिरिया कोठार, झिरिया वाजपेयी और झिरिया कोपरिहान, तहसील: रामपुर बघेलन, जिला: सतना (मध्य प्रदेश)। - पर्यावरणीय मंजूरी की प्रति जमा करने के संबंध में।

संदर्भ: एमओईएफसीसी, भारत सरकार के द्वारा पत्र संख्या J-11015/58/2017-IA.॥ (M) दिनांक 26.07.2021 के माध्यम से पर्यावरण मंजूरी दी गई।

श्रीमान,

उपरोक्त विषय के संदर्भ में, हम यह उल्लेख करना चाहेंगे कि उल्लेखित, पगरा, झिरिया कोठार, झिरिया वाजपेयी और झिरिया कोपरिहान, तहसील: रामपुर बघेलन, जिला: सतना (मध्य प्रदेश) में प्रस्तावित चूना पत्थर खदान (एमएल क्षेत्र: 395.965 हेक्टेयर) के लिए एमओईएफसीसी, भारत सरकार के पत्र संख्या J-11015/58/2017-IA.॥ (M) दिनांक 26.07.2021 के माध्यम से पर्यावरण मंजूरी दी गई है।

आपकी जानकारी और रिकॉर्ड के लिए पर्यावरण मंजूरी की एक प्रति इसके साथ प्रस्तुत की जा रही है।

धन्यवाद

आपका विश्वासी,

डालमिया सीमेंट (भारत) लिमिटेड के लिए



संलग्नक: उपरोक्तानुसार

केला धरोहर सारि लपय ३०००
 निविदा आमंत्रित की जाती है। उक्त निविदा
 कुलसचिव कार्यालय में जमा की जावेगी। विस्तृत जानकारी प्रकाश
 कार्यालयीन समय में प्राप्त की जा सकती है।

DANIK JAGRAN कुल सचिव

4/8/21

PUBLIC NOTICE

This is to inform that M/s Dalmia Cement (Bharat) Ltd., 11th-12th Floor, Hansalya building, 15, Barakhamba Road, New Delhi-110001, has been accorded the Environmental Clearance (EC) for its proposed "Pagara-Jhiriya Limestone Mine" (ML Area - 395.965 Ha) with Limestone: 1.5 Million TPA, Soll: 0.56 Million TPA and OB: 0.35 Million TPA (Total capacity within mine lease at Villages: Pagra, Jhiriya Kothar, Jhiriya Bajpalen & Jhiriya Koparihan Tehsil - Amarpatan, District - Satna, Madhya Pradesh by Ministry of Environment, Forest & Climate Change vide F.No. J-11015/58/2017-IA.II(M) dated 26.07.2021. A copy of the EC is available with the State Pollution Control Board, MP and also at website of the Ministry of Environment, Forest & Climate Change at <http://parivesh.nic.in/>.

PUBLIC NOTICE

This is to inform that M/s Dalmia Cement (Bharat) Ltd., 11th-12th Floor, Hansalya building, 15, Barakhamba Road, New Delhi-110001, has been accorded the Environmental Clearance for its proposed "Janardanpur Limestone Mine" with Limestone: - 4 Million TPA, Top Soll/Sub Soll: - 1.25 Million TPA, Waste (OB/IB/Shale): - 1 Million TPA & Screen Rejects:- 0.40 Million TPA (Total Excavation: - 6.65 Million TPA) along with installation of Crusher-1200 TPH capacity with Wobbler within the mine lease of 575.830 ha at Villages - Bairiha, Patrahai & Janardanpur, Tehsil - Rampur Baghelan, District - Satna, Madhya Pradesh by Ministry of Environment, Forest & Climate Change vide F.No. J-11015/13/2019-IA.II(M) dated 26.07.2021. A copy of the EC is available with the State Pollution Control Board, MP and also at website of the Ministry of Environment, Forest & Climate Change at <http://parivesh.nic.in/> (www.environmentalclearance.nic.in).

प्रभारी मंडौली के नेतृत्व में चौकी प्रभारी
जला पट्टा दाखला करन हेतु आदेशित
किया गया दिनांक 27 जुलाई 2021 को

रिपोर्ट पर अपराध सदर फायम फर
पट्टाए/आतद्र।सह तथा धमद्र सिंह का
विवेचना में लिया गया। दौरान विवेचना
योगदान रहा।

नवभारत 04/08/21

नवभारत 04/08/21

आम सूचना

आम सूचना

यह सूचित किया जाता है कि मैसर्स डालमिया सीमेंट (भारत) लिमिटेड, 11वीं-12वीं मंजिल, हंसल्या बिल्डिंग, 15, बाराखंभा रोड, नई दिल्ली-110001, को इसकी प्रस्तावित 'जनार्दनपुर चूनापत्थर खदान' परियोजना (खनन पट्टा क्षेत्र 575.83 हैक्टेर) चूनापत्थर उत्पादन क्षमता - 4.0 मिलियन टन प्रतिवर्ष, ऊपरी मिट्टी/ मृदा (sub soil) 1.25 मिलियन टन प्रतिवर्ष, अपशिष्ट (ओ.बी./आई.बी./शेल) 1.00 मिलियन टन प्रतिवर्ष एवं स्क्रीन रिजेक्ट -0.40 मिलियन टन प्रतिवर्ष (कुल उत्खनन- 6.65 मिलियन टन प्रतिवर्ष) एवं 1200 टन प्रतिघंटा के क्रशर और योबलर निकट ग्राम बैरियहा, पटरहि और जनार्दनपुर, तहसील: रामपुर अघेलान, जिला- सतना, मध्य प्रदेश के लिए पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय द्वारा पर्यावरण स्वीकृति पत्र क्रमांक एफ.सं. J-11015/13/2019-IA.II(M) दिनांक 26.07.2021 को प्रदान की गई है। इसकी एक प्रति राज्य प्रदूषण नियंत्रण बोर्ड, एमपी के पास और पर्यावरण वन और जलवायु परिवर्तन मंत्रालय की वेबसाइट <http://parivesh.nic.in/> (www.environmentalclearance.nic.in) पर भी उपलब्ध है।

यह सूचित किया जाता है कि मैसर्स डालमिया सीमेंट (भारत) लिमिटेड, 11वीं-12वीं मंजिल, हंसल्या बिल्डिंग, 15, बाराखंभा रोड, नई दिल्ली-110001, को इसकी प्रस्तावित "पगारा-झिरिया चूनापत्थर खदान" परियोजना (खनन पट्टा क्षेत्र 395.965 हैक्टेर) चूनापत्थर उत्पादन क्षमता - 1.5 मिलियन टन प्रतिवर्ष, मिट्टी - 0.56 मिलियन टन प्रतिवर्ष एवं ओ.बी. - 0.35 मिलियन टन प्रतिवर्ष (कुल उत्खनन- 2.41 मिलियन टन प्रतिवर्ष) एवं 500 टन प्रतिघंटा के क्रशर निकट ग्राम पगारा, झिरिया कोठार, झिरिया बाजपेइन और झिरिया कौपरिहान तहसील: अमरपाटन, जिला: सतना, मध्य प्रदेश के लिए पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय द्वारा पर्यावरण स्वीकृति पत्र क्रमांक एफ.सं. J-11015/58 /2017 -IA.II(M) दिनांक 26.07.2021 को प्रदान की गई है। इसकी एक प्रति राज्य प्रदूषण नियंत्रण बोर्ड, एमपी के पास और पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय की वेबसाइट <http://parivesh.nic.in/> (www.environmentalclearance.nic.in) पर भी उपलब्ध है।

स्वत्वाधिकारी रामगोपाल इन्वेस्टमेंट प्रा.लि. हेतु लेसी एंजेज मीडिया प्रा. लि. के लिए मुद्रक, प्रकाशक रावेन्द्र मिश्रा द्वारा मीजा कोलगावा, इंडस्ट्रियल एरिया, सतना से प्रकाशित एवं नवभारत प्रेस भोपाल प्रा.लि.

Date: 06.08.2021

To,
The Addl. Principal Chief Conservator of Forests (C),
Ministry of Env., Forest and Climate Change
Regional Office (WZ), E-5
Kendriya Paryavaran Bhawan,
E-5 Arera Colony, Link Road-3, Ravishankar Nagar,
Bhopal-462016

Sub: Environmental Clearance of Proposed Limestone Mine (ML Area: 575.830 ha.) with Limestone Production Capacity - 4.0 Million TPA (Total Excavation - 6.65 Million TPA) along with Installation of Crusher - 1200 TPH Capacity with Wobbler at Villages: Bairiha, Patrahai & Janardanpur, Tehsil: Rampur Baghelan, District: Satna (Madhya Pradesh) of M/s. Dalmia Cement (Bharat) Ltd.- **Submission of copy of EC reg.**

Ref: 1. Environmental Clearance (EC) granted by MOEFCC, Govt. of India vide Letter No. J-11015/13/2019-IA.II (M) dated 26.07.2021

Dear Sir,

With reference to the above mentioned subject, we would like to mention that Environmental Clearance has been granted for the "Proposed Limestone Mine (ML Area: 575.830 ha) at Villages: Bairiha, Patrahai & Janardanpur, Tehsil: Rampur Baghelan, District: Satna (Madhya Pradesh) by MOEFCC, Govt. of India vide Letter No. J-11015/13/2019-IA.II (M) dated 26.07.2021.

In compliance of Standard condition no 20 of granted EC, we have advertised a public notice informing about the grant of EC to proposed mine in two newspapers named "Dainik Jagaran and Navbharat" on 4th August 2021 in English as well as in vernacular language i.e. Hindi.

A Copy of Environmental Clearance and Original copy of both Newspapers are being submitted herewith for your information and record.

Thanking You

Yours faithfully,

For Dalmia Cement (Bharat) Ltd.



(V. Karthikeyan)
Deputy Executive Director

Encl: As above

31/8/21
Integrated Regional Office
Ministry of Environment, Forest & Climate Change
Bhopal



क्षेत्रीय कार्यालय,
म.प्र.प्रदूषण नियंत्रण बोर्ड,
रीवा रोड मैहर-अमरपाटन बाई पास, सतना (म.प्र.)
e-Mail-romppcb_satna@rediffmail.com, website- www.mppcb.nic.in

क्रमांक 29 / क्षे.का. / प्रनिबो / पूर्व / 2022,

सतना, दिनांक: 29/5

प्रति,

✓ प्रबंधक,

मेसर्स डालमिया सीमेंट (भारत) लि.,
जिला-सतना (म.प्र.)


विषय:- भुगतान आधारित वायु मॉनिटरिंग रिपोर्ट बावत्।

—000—

महोदय,

उपरोक्त विषयांतर्गत बोर्ड द्वारा माह अप्रैल 2022 में आपके उद्योग की भुगतान आधारित वायु मॉनिटरिंग का कार्य किया गया है, जिसका भुगतान आपके द्वारा किया गया है। तदुपरांत आपको वायु मॉनिटरिंग रिपोर्ट संलग्न कर प्रेषित किया जा रहा है।

संलग्न:- उपरोक्तानुसार।


(के.पी.सोनी)
क्षेत्रीय अधिकारी,
म.प्र.प्रदूषण नियंत्रण बोर्ड,
सतना (म.प्र.)



Regional Laboratory
Madhya Pradesh Pollution Control Board Satna
मध्य प्रदेश प्रदूषण नियंत्रण बोर्ड सतना



TC-10028

TEST REPORT (AMBIENT AIR)

| | | | |
|---------------------------------------|--|---------------------|--------------|
| Sample No. | :RLMPPCB/Air /825 | Report No | : 825 |
| Name & Address of Party | :M/S, Dalmia Cement (Bharat) Ltd. Distt- Satna (M.P.) | Party Reference No. | : - |
| Sample Description | :Ambient Air Monitoring | Reporting Date | : 29.04.2022 |
| | | Receipt Date | :22.04.2022 |
| Environmental Condition of Laboratory | a. Lab Temperature (⁰ C) | 25±2 | |
| | b. Relative Humidity (%) | 55±10 | |

General Information

| | | | | |
|--|---|---|---------------------------|----|
| Client Representative (Name & Designation) | : Mr. Ajaya Kumar (Manager Environment) | | | |
| Sample collected by (Name & Designation) | : Mr. C.S.Patel (Jr Sci) & Mr Ajeet Kumar , Satendra Tiwari (Lab Att.) | | | |
| Station Code | S1 | S2 | S3 | S4 |
| Sampling Location | Pagra , Jhiriya, Kothar mines | Janardanpur , Bairiha Mines 575.830 hac | Jamuna Mines , 89.234 hac | - |
| Latitude | : 24.4532,81.2029 | - | 24.57271, 81.0863 | - |
| Longitude | : - | - | - | - |
| Instrument Used | RDS 460 BL | RDS 460 BL | RDS 460 BL | - |
| Instrument code | 2944 | 2945 | 2143 | - |
| Instrument calibration status | Calibrated | | | |
| Meteorological condition during monitoring | Clear | Clear | Clear | - |
| Date of Monitoring | :22.04.2022 | :22.04.2022 | :22.04.2022 | :- |
| Time of Monitoring | : 24 Hours | : 24 Hours | : 24 Hours | - |
| Actual duration of Monitoring, (minutes) | :470 minutes | :460 minutes | :477 minutes | - |
| Ambient Temperature (⁰ C) | : 42.6 | : 41.4 | : 42.2 | - |
| Surrounding activity | :No | | | |
| Scope Of Monitoring | : PM ₁₀ ,PM _{2.5} , So ₂ , No ₂ | | | |
| Control measure if Any | : NO | : NO | : NO | - |
| Sampling & Analysis Protocol | : IS-5182 | | | |
| Parameter Required | :PM ₁₀ ,PM _{2.5} | | | |

TEST RESULTS

| S. No. | Parameter | Protocol | Result | | | | Unit | NAAQS |
|--------|---|---------------------------|--------|------|------|----|-------------------|-------|
| | | | S1 | S2 | S3 | S4 | | |
| 1. | Particulate Matter (PM ₁₀) | IS:5182 (Part 23) :RA-017 | 80.3 | 88.4 | 90.4 | - | µg/m ³ | 100 |
| 2. | Particulate Matter (PM _{2.5}) | IS:5182 (Part 24) :RA2019 | 32.7 | 39.6 | 42.2 | - | µg/m ³ | 60 |
| 3. | Nitrogen Dioxide (NO ₂) | IS:5182 (Part 6) :RA-2017 | - | - | - | - | µg/m ³ | 80 |
| 4. | Sulphur Dioxide (SO ₂) | IS:5182 (Part 2) :RA-2017 | - | - | - | - | µg/m ³ | 80 |

NAAQS – National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3 (I)]

Dalmia **cement**

FUTURE TODAY

cement! sugar! refractories! power!

To,
District Forest Officer
Satna, Madhya Pradesh

Date: 30.11.2021

Sub: - Proposed Pagara-Jhiriya Limestone Mine (ML Area: 395.965 ha including Mining Area 185.57 ha, Non-Mining Area 208.395 ha and area for installation of 500 TPH Capacity of Crusher 2 ha) located near Villages: Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan, Tehsil: Amarpatan, District: Satna, Madhya Pradesh- EC Compliance-reg. Greenbelt Development-reg.

Ref: Environment Clearance from MOEF, New Delhi, F. No. J-11015/58/2017- IA II (M) dated 26th July, 2021

Dear Sir,

With reference of above mentioned subject and reference, we would like to mention that the subject mine has been granted Environmental Clearance vide F. No. J-11015/58/2017- IA II (M) dated 26th July, 2021.

In compliance of Standard Condition no. 42 under "VIII Green Belt" stipulated in granted EC, we are herewith submitting Greenbelt Development Plan prepared by our consultant during grant of Environmental Clearance for this project.

We are approaching your good office for your valuable guidance, suggestion and appropriateness of Greenbelt Development Plan.

Thanking You

Yours Faithfully

For Dalmia Cement (Bharat) Ltd.



(Dinesh Dixit)
DGM, Mines



Encl: As Above

Dalmia Cement (Bharat) Limited

11th & 12th Floor, Hansalya Building, 15, Barakhamba Road, New Delhi - 110 001, Delhi, India
T +91 11 2346 5100 Toll Free 1800 2020 W www.dalmiacement.com CIN: U65191TN1996PLC035963
Registered Office: Dalmiapuram, District Tiruchirappalli - 621 651, Tamil Nadu, India
A Dalmia Bharat Group company, www.dalmiabharat.com

TIME-BOUND ACTION PLAN ALONG WITH BUDGETARY ALLOCATION

Time bound action plan prepared on the basis of the issues raised in Public hearing is as follows:

| S. No. | Program | Activities | Budget (Rs. In Lakh) | Physical Targets | | |
|--------|-------------------------------------|--|----------------------|---|----------------------|---------------------------|
| | | | | 1 st Year | 2 nd Year | 3 rd year |
| 1. | Water Conservation & Drinking Water | Rejuvenation / deepening of existing ponds (one in each village) in Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan | 10 | Pagra, Jhiriya Kothar | Jhiriya Bajpaien | Jhiriya Koparihan |
| | | Construction of Hand pump (one in each village) in Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan Repair and maintenance and construction of existing water structures in village Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan | 15 | Jhiriya Bajpaien | Jhiriya Kothar | Jhiriya Koparihan, Pagra, |
| 2. | Livelihood | Setting up of skill training centre under the banner of Dalmia Institute of Knowledge and Skill Harnessing (DIKSHa) for training of unemployed youth. No. of Training centre – 1 Place of Training Centre – Pagra Trades: General Duty Assistant, Retail Sales & Assistant Electrician, Computer Operators, HEMM Driver etc. Duration of courses: 3 months Affiliation: NSDC / MP Skill Mission Capacity of the Centre : 270 | 95 | Village Pagra | | |
| | | Skill development for women by establishing a center for computer education, tailoring, embroidery etc. at village Pagra | 25 | Village Pagra | | |
| 3. | Social Infrastructure | Installation of 20 nos of Solar lights in common places of villages Installation of Solar plates in Schools for Power back-up | 10 | Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan | | |
| | | Refurbishment of Govt. schools like Development of Smart class rooms with wi-fi, Girls toilets in Schools, | 15 | Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan | | |

| S. No. | Program | Activities | Budget (Rs. In Lakh) | Physical Targets | | |
|--------|--------------|--|----------------------|-----------------------|----------------------|----------------------|
| | | | | 1 st Year | 2 nd Year | 3 rd year |
| | | drinking water, improving sanitation facilities, sports equipments and facilities, laboratory equipments, boundary walls, etc. in surrounding villages Pagra, Jhiriya Kothar, Jhiriya Bajpaien & Jhiriya Koparihan | | | | |
| | | Setting up of computer labs for imparting computer literacy programs for school children and Digital Classroom with Modern teaching aids. | 20 | Vill. Pagara | | |
| | | Upgradation of medical equipments in existing health sub centers, PHC like extra beds, x – ray machines, ECG machines etc. in Jhiriya Bajpein. | 15 | Vill. Jhiriya Bajpein | | |
| | | Renovation / construction of Community Centers | 10 | | | |
| | | Improvising facilities in mini zoo by providing 1 nos of battery operated vehicles (White Tiger Safari) at Mukundpur and other infra facilities | 10 | 5 | 5 | 0 |
| 4 | COVID Center | Establishment of a COVID center at Village Panchayat of project villages with necessary medical equipment providing Oxygen concentrators, beds, PPE Kits, support in vaccination, Awareness for COVID etc. | 25 | COVID health Centre | - | |
| | | Grand Total | 250 | | | |