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**To,** **Date: 29.11.2022**

**Deputy Inspector General of Forests**
**Ministry of Environment, Forest and Climate Change,**
**Integrated Regional Office, Jaipur, A-218 & B 216,**
**Aranya Bhawan, Mahatma Gandhi Road,**
**Jhalana Institutional Area, Jaipur, Rajasthan – 302004**

**Sub:** Proposed Sindwari, Ramakhera, Satkhanda Block- B Limestone Mine (Auctioned block) over an area of 474.50 ha with Limestone Production Capacity 1.8 Million TPA (Total Excavation 3 Million TPA) along with 500 TPH capacity of Crusher in Village(s) - Ravliya, Bhavliya, Bhopali, Cherliya, Mangrol and Sindwari, Tehsil Nimbahera, District-Chittaurgarh, Rajasthan of M/s Dalmia Cement (Bharat) Ltd. - ***Submission of Half-Yearly Compliance-reg.***

**Ref:** Environmental Clearance (EC) granted by MOEFCC, Govt. of India vide File No. - IA-J-11015/38/2018-IA-II(M) (EC Identification No. - EC22A001RJ128760) dated 28/06/2022.

Dear Sir,

With reference to above subject matter and referred letter, we would like to mention that Dalmia Cement (Bharat) Limited (DCBL) has been successfully declared as the "Preferred Bidder" for grant of Proposed Sindwari, Ramakhera, Satkhanda Block- B Limestone Mine (Area 357.067 ha) through the e-auction conducted by the Government of Rajasthan. MOEFCC, Govt. of India has granted Environmental Clearance (EC) of proposed mine for Limestone production capacity of 1.8 Million TPA (Total Excavation 3 Million TPA) with crusher capacity of 1000 TPH vide EC Identification No. EC22A001RJ128760; File. No. IA-J-11015/38/2018-IA-II(M) dated 28/06/2022. Proposed mine is not under operation as it is yet to be executed.

We are herewith submitting point wise Half-Yearly Compliance report of conditions laid down in Environment Clearance for the period **April 2022 to Sept 2022** for your kind perusal and record.

Thanking You
Yours faithfully,

**For Dalmia Cement (Bharat) Ltd.**

**(V Karthikeyan)**

**Deputy Executive Director**

**Encl:**

- **Half Yearly Compliance Report**
- **Annexures:**
  1. **NOC from CGWA**
  2. **Newspaper Advertisement**
  3. **Comprehensive Hydrogeology report**
  4. **Approved Wild Life Conservation Plan along with Approval issued by PCCF & CWLW, Rajasthan**

# HALF YEARLY COMPLIANCE REPORT OF ENVIRONMENTAL CLEARANCE

## April 2022 to September 2022

**EC Identification No. - EC22A001RJ128760; File No. - IA-J-11015/38/2018-IA-II(M); DATED 28/06/2022.**

Mine is yet to be executed & registered. Consent to establish and Operate will be obtained after execution and registration of Mine lease.

**Specific EC conditions: -**

| Sr. | Conditions | Remarks |
|---|---|---|
| 1) | Continuous air quality monitoring shall be done in the impact zone in the downwind direction within 200 m from the core zone. Other three monitoring stations proposed, two in the downwind direction and one as a reference within 500 m of the core zone. | **Noted for compliance**<br>Air Quality monitoring will be started at the start of mining operation. Mining operation will be started after obtaining Consent to Establish & Operate after execution & registration of mine lease. |
| 2) | As committed through the report submitted by the project proponent that the controlled blasting to be carried out with a proper blast design so as to limit the<br>noise pollution as well as keep blast induced ground vibrations (PPV) should be less than 2 mm/s on the highway and other structures. | **Noted for compliance** |
| 3) | Adequate buffer zone (minimum 50 m preferably more than that) shall be kept between the mine and highway as well as the water body passing through the mine lease area. | **Noted for compliance**<br>Safety barrier of 50 m will be kept from highway and water body and mining will ne be done in safety barrier. |
| 4) | Transport of material will be restricted between 6 am and 6 pm or day light hours, as the season may be and shall not exceed the time limit. | **Noted for compliance** |
| 5) | The project proponent had committed that it has marked 2.72 Crore as soft loan for project affected people for development of startups as a part of R&R budget. A progress report shall be submitted in every 6 months to the Ministry. | **Noted for compliance**<br>The mine is yet to be executed. Implementation of the same will be undertaken at the start of mining operation. Locals will be encouraged & supported to start their own work. 6 monthly Progress report will be regularly. |
| 6) | The project proponent shall monitor water quality with specific reference to Langelier Saturation Index to assess the impact of calcium carbonate on water quality. | **Noted for compliance**<br>Water quality will be regularly monitored with specific reference to Langelier Saturation |

| Sr. | Conditions | Remarks |
|---|---|---|
| | | Index to assess the impact of calcium carbonate on water quality. |
| 7) | The project proponent had committed that Greenbelt in 7.5 m statuary boundary will be on 15.75 ha area (39,375 Saplings) and Plantation in safety barrier, on backfilled area & on upper most 2 benches of pits will be covering ~88.203 ha area with 2,20,508 saplings. As committed, the project proponent shall start immediately and a progress report on plantation with survival rate shall be submitted every year to the Ministry. | **Noted for compliance**<br>Plantation in safety zone along ML boundary will be undertaken at the start of mining operation.<br>Plantation in safety barrier, Backfilled area and uppermost 2 benches will be undertaken as per the mine development. |
| 8) | The monitoring of noise and vibration shall be conducted at the edge of the mine lease and the progress report must be submitted to the Ministry in every 6 months. | **Noted for compliance**<br>Noise and vibration monitoring at the edge of the mine lease will be undertaken at the start of mining operation. Monitoring reports will be submitted to the Ministry in every 6 months |
| 9) | The fugitive dust emission through personal dust monitoring shall be conducted and the data must be submitted to the Ministry in every 6 months to the Ministry. | **Noted for compliance**<br>Fugitive dust emission through personal dust monitoring will be undertaken at the start of mining operation. Monitoring reports will be submitted to the Ministry in every 6 months |
| 10) | The Project Proponent should periodically monitor and maintain the health records of the mine workers digitally prior to mining operations, at the time of operation of mine and post mining operations. Regular surveillance on Silicosis shall be carried through regular occupational health check-up every year for mine workers. | **Noted for compliance** |

**Standard Conditions: -**

| Sr. | Conditions | Remarks |
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| I. | **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 | **Noted** |

| Sr. | Conditions | Remarks |
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| | Common Cause versus Union of India & Ors before commencing the mining operations. | |
| 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. | **This is a Greenfield project.** |
| 4) | This Environmental Clearance shall become operational only after receiving formal NBWL Clearance from MoEF&CC subsequent to the recommendations of the Standing Committee of National Board for Wildlife, if applicable to the Project. | **Not Applicable** |
| 5) | This Environmental Clearance shall become operational only after receiving formal Forest Clearance (FC) under the provision of Forest Conservation Act, 1980, if applicable to the Project. | **Not Applicable** |
| 6) | Project Proponent (PP) shall obtain Consent to Operate after grant of EC and effectively implement all the conditions stipulated therein. The mining activity shall not commence prior to obtaining Consent to Establish / Consent to Operate from the concerned State Pollution Control Board/Committee. | **Noted for compliance.** |
| 7) | The PP shall adhere to the provision of the Mines Act, 1952, Mines and Mineral (Development & Regulation), Act, 2015 and rules & regulations made there under. PP shall adhere to various circulars issued by Directorate General Mines Safety (DGMS) and Indian Bureau of Mines from time to time. | **Noted** |
| 8) | The Project Proponent shall obtain consents from all the concerned land owners, before start of mining operations, as per the provisions of MMDR Act, 1957 and rules made there under in respect of lands which are not owned by it. | **Noted for compliance.** |
| 9) | The Project Proponent shall follow the mitigation measures provided in MoEFCC's Office Memorandum No. Z-11013/57/2014-IA.II (M), | **Noted for compliance.** |

| Sr. | Conditions | Remarks |
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| | 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". | |
| 10) | The Project Proponent shall obtain necessary prior permission of the competent authorities for drawl of requisite quantity of surface water and from CGWA for withdrawal of ground water for the project. | **Complied**<br>CGWA NOC has been obtained for ground water abstraction vide NOC no. CGWA/NOC/MIN/ORIG/2021/13708 dated 12/11/2021 and valid up to 11/11/2023. Attached as **Annexure-I**. |
| 11) | A copy of EC letter will be marked to concerned Panchayat / local NGO etc. if any, from whom suggestion / representation has been received while processing the proposal. | **--** |
| 12) | State Pollution Control Board/Committee shall be responsible for display of this EC letter at its Regional office, District Industries Centre and Collector's office/ Tehsildar's Office for 30 days. | -- |
| 13) | The Project Authorities should widely advertise about the grant of this EC letter by printing the same in at least two local newspapers, one of which shall be in vernacular language of the concerned area. The advertisement shall be done within 7 days of the issue of the clearance letter mentioning that the instant project has been accorded EC and copy of the EC letter is available with the State Pollution Control Board/Committee and web site of the Ministry of Environment, Forest and Climate Change (www.parivesh.nic.in). A copy of the advertisement may be forwarded to the concerned MoEFCC Regional Office for compliance and record. | **Complied.**<br>A public notice informing about the grant of EC of proposed mine was published in two newspapers named "Time of India & Dainik Bhaskar" in English as well as in Hindi respectively. Copy of Advertisements is attached herewith as **Annexure II**. |
| 14) | The Project Proponent shall inform the MoEF&CC for any change in ownership of the mining lease. In case there is any change in ownership or mining lease is transferred than mining operation shall only be carried out after transfer of EC as per provisions of the para 11 of EIA Notification, 2006 as amended from time to time. | **Noted** |
| **II.** | **Air quality monitoring and preservation** | |
| 15) | The Project Proponent shall install a minimum of 3 (three) online Ambient Air Quality Monitoring | **Noted for Compliance during operation.** |

| Sr. | Conditions | Remarks |
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| | 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, NO2; CO and SO2 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. | |
| 16) | 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, 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. | **Noted for Compliance during operation.**<br>All mitigation measures will be undertaken to control fugitive emission such as water sprinkling, bag filter/dry fog system at crusher etc. Plantation will also be done which will help to control fugitive emission. |
| **III.** | **Water quality monitoring and preservation** | |
| 17) | 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 | **Complied.**<br>Detailed Hydrogeological study have been undertaken by Enkay Enviro Services Pvt. Ltd., Jaipur for Hydro-geological evaluation during grant of EC.<br>As per the study, the water level varies from 75mbgl to 80mbgl in pre-monsoon and 70mbgl to 75mbgl in post monsoon. The depth of mining pit during first plan period (five years) is 414 MSL (16m bgl) and the |

| Sr. | Conditions | Remarks |
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| | table shall essentially be based on detailed hydro-geological study of the area. | ultimate pit limit will be about 344 MSL (84 mbgl). Hence, ground water seepage is anticipated during the course of mining in block 2 & 3 after plan period.<br><br>CGWA NOC has been obtained for ground water abstraction & Seepage vide NOC no. CGWA/NOC/MIN/ORIG/2021/13708 dated 12/11/2021. (Attached as **Annexure-I**).<br>Hydrogeological Study report is attached as an **Annexure-III.** |
| 18) | Regular monitoring of the flow rate of the springs and perennial nallahs flowing in and around the mine lease shall be carried out and records maintain. The natural water bodies and or streams which are flowing in an around the village, should not be disturbed. The Water Table should be nurtured so as not to go down below the pre-mining period. In case of any water scarcity in the area, the Project Proponent has to provide water to the villagers for their use. A provision for regular monitoring of water table in open dug wall located in village should be incorporated to ascertain the impact of mining over ground water table. The Report on changes in Ground water level and quality shall be submitted on six-monthly basis to the Regional Office of the Ministry, CGWA and State Groundwater Department / State Pollution Control Board. | **Noted for compliance during operation of the mine.** |
| 19) | 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 for compliance during operation.** |
| 20) | The Project Proponent shall undertake regular monitoring of natural water course/ water resources/ springs and perennial nallahs existing/ | **Noted for compliance during operation of the mine.** |

| Sr. | Conditions | Remarks |
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| | flowing in and around the mine lease and maintain its records. The project proponent shall undertake regular monitoring of water quality upstream and downstream of water bodies passing within and nearby/ adjacent to the mine lease and maintain its records. Sufficient number of gullies shall be provided at appropriate places within the lease for management of water. PP shall carryout regular monitoring w.r.t. pH and included the same in monitoring plan. The parameters to be monitored shall include their water quality vis-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. | |
| 21) | 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. | **Noted for compliance.** |
| 22) | Project Proponent shall plan, develop and implement rainwater harvesting measures on long term basis to augment ground water resources in | **Noted for Compliance.**<br>Hydrogeological Study including Rain Water Harvesting Plan was prepared and submitted |

| Sr. | Conditions | Remarks |
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| | 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. | to CGWA along with the Application for NOC. NOC has been obtained from CGWA vide NOC NOC no. CGWA/NOC/MIN/ORIG/2021/13708 dated 12/11/2021. Rain water harvesting plan, submitted to CGWA, will be implemented. Copy of the same is attached as **Annexure III**. |
| 23) | 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. | **Noted for compliance.**<br>At present, mine is not executed. However, during operation of mine, it will be ensured that the effluent generated from the workshop, when established, will be treated properly to conform to the prescribed standards. No waste water will be discharged in natural drain or out of ML boundary. |
| 24) | 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 for compliance.**<br>Measures will be taken to reduce the water consumption such as use of treated water, use of sprinklers etc. However, later, the rainwater accumulated in the mine pit as and when developed, will augment the water requirement of the project except domestic requirement. |
| **IV.** | **Noise and vibration monitoring and prevention** | |
| 25) | 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 for compliance.** |
| 26) | 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 for compliance.** |
| 27) | 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 | **Noted for compliance during operation of mine.**<br>Adequate measures, detailed in EIA/EMP and Mining plan, shall be implemented to control |

| Sr. | Conditions | Remarks |
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| | /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. | the noise level below 85 dBA in the work environment. PPE will be provided to all workers engaged in operations of HEMM, working in dusty area etc. Awareness training programs about safety and health aspects will also be arranged. |
| **V.** | **Mining Plan** | |
| 28) | The Project Proponent shall adhere to the working parameters of mining plan which was submitted at the time of EC appraisal wherein year-wise plan was mentioned for total excavation i.e. quantum of mineral, waste, over burden, inter burden and top soil etc. No change in basic mining proposal like mining technology, total excavation, mineral & waste production, lease area and scope of working (viz. method of mining, overburden & dump management, O.B & dump mining, mineral transportation mode, ultimate depth of mining etc.) shall not be carried out without prior approval of the Ministry of Environment, Forest and Climate Change, which entail adverse environmental impacts, even if it is a part of approved mining plan modified after grant of EC or granted by State Govt. in the form to Short Term Permit (STP), Query license or any other name. | **Noted for compliance during operation of mine.**<br>Mining will be done as per the IBM approved mining plan & progressive mine closure plan. |
| 29) | The Project Proponent shall get the Final Mine Closure Plan along with Financial Assurance approved from Indian Bureau of Mines/Department of Mining & Geology as required under the Provision of the MMDR Act, 1957 and Rules/ Guidelines made there under. A copy of approved final mine closure plan shall be submitted within 2 months of the approval of the same from the competent authority to the concerned Regional Office of the Ministry of Environment, Forest and Climate Change for record and verification. | **Noted for compliance during operation of mine.**<br>Mining will be done as per the IBM approved mining plan. |
| 30) | 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 | **Noted for compliance.**<br>Mining operation and reclamation-rehabilitation of mined out area will be |

| Sr. | Conditions | Remarks |
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| | mine lease area and corresponding afforestation to be raised in the reclaimed area shall be governed as per approved mining plan. PP shall ensure the monitoring and management of rehabilitated areas until the vegetation becomes self-sustaining. The compliance status shall be submitted half-yearly to the MoEFCC and its concerned Regional Office. | carried out in accordance with the approved mining plan & progressive mine closure plan**.** |
| **VI.** | **Land reclamation** | |
| 31) | 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. | **Noted for compliance.**<br>Generated OB and Topsoil will be managed as per the approved mining plan during operation of the mine. Both will be stacked separately at the earmarked place and physical parameters of the dumps will be maintained as per approved mining plan and as per the guidelines/circulars issued by D.G.M.S.<br>As per the Approved Mining Plan, overburden generated will be used for backfilling. Top Soil will be used for greenbelt/plantation development. |
| 32) | The reject/waste generated during the mining operations shall be stacked at earmarked waste dump site(s) only. The physical parameters of the waste dumps like height, width and angle of slope shall be governed as per the approved Mining Plan as per the guidelines/circulars issued by DGMS w.r.t. safety in mining operations shall be strictly adhered to maintain the stability of waste dumps. | **Noted for compliance during operation phase.** |
| 33) | The reclamation of waste dump sites shall be done in scientific manner as per the Approved Mining Plan cum Progressive Mine Closure Plan. | **Noted for compliance during operation phase.** |
| 34) | 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/ | **Noted for compliance during operation phase.** |

| Sr. | Conditions | Remarks |
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| | 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. | |
| 35) | The Project Proponent shall carry out slope stability study in case the dump height is more than 30 meters. The slope stability report shall be submitted to concerned regional office of MoEF&CC. | Noted<br>As per the IBM approved Mining Plan, Maximum height of the dump shall be kept at 24 m. |
| 36) | 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. | **Noted for compliance.**<br>Retaining wall and garland drain along with settling tank & siltation ponds will be developed as per the approved mining plan, to collect surface run off. Clean & clear water after proper sedimentation will be discharged in natural drainage. |
| 37) | Check dams of appropriate size, gradient and length shall be constructed around mine pit and OB dumps to prevent storm run-off and sediment flow into adjoining water bodies. A safety margin of 50% shall be kept for designing of sump structures over and above peak rainfall (based on 50 years data) and maximum discharge in the mine and its adjoining area which shall also help in providing adequate retention time period thereby allowing proper settling of sediments/ silt material. The sedimentation pits/ sumps shall be constructed at the corners of the garland drains. | **Noted for compliance during operation of mine.** |
| 38) | The top soil, if any, shall temporarily be stored at earmarked site(s) within the mine lease only and should not be kept unutilized for long. The physical parameters of the top soil dumps like height, width and angle of slope shall be governed as per the approved Mining Plan and as per the guidelines framed by DGMS w.r.t. safety in mining operations shall be strictly adhered to maintain the stability of dumps. The topsoil shall be used for land reclamation and plantation purpose. | **Noted for compliance.**<br>Top soil will be temporarily dumped at earmarked place and will be used for Green Belt/plantation.<br>The physical parameters of the top soil dumps will be maintained with implementation of measures as per the approved Mining Plan and as per the guidelines framed by DGMS. |
| **VII.** | **Transportation** | |

| Sr. | Conditions | Remarks |
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| 39) | 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. | **Noted for compliance during operation of mine.**<br>It is a non-captive mine. The part of the limestone will be transported to the cement plant of the subsidiary company and part may also be sold to other cement plants & end use industries.<br>There is NH 56 passing through the lease. Transportation will be done by NH-56. For transportation of crushed limestone from the proposed mine to the end use plants, it is proposed to use about 200 m of MDR road to connect to NH-56 and thereafter will use NH-56. For the remaining distance of about 1.5 km towards our proposed cement plant, underpass will be used to cross the NH-56 and thereafter will use the side lane of NH-56 to connect to 2 lane of 15 m wide road, mainly used by the industry located nearby which connects our proposed cement plant. Roads are not passing through any village. |
| 40) | 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. | **Noted for compliance during operation of mine.** |
| **VIII.** | **Green Belt** | |
| 41) | 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 | **Noted for Compliance.**<br>Safety barrier (No mining zone) of 7.5m is demarcated along the ML boundary in mining |

| Sr. | Conditions | Remarks |
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| | 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. | area, as per approved mining plan and greenbelt will be developed as per guidelines of CPCB as well as the granted Environmental clearance irrespective of the stipulation made in approved mine plan. |
| 42) | 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 for Compliance.** |
| 43) | The Project Proponent shall make necessary alternative arrangements for livestock feed by developing grazing land with a view to compensate those areas which are coming within the mine lease. The development of such grazing land shall be done in consultation with the State Government. In this regard, Project Proponent should essentially implement the directions of the Hon'ble Supreme Court with regard to acquisition of grazing land. The sparse trees on such grazing ground, which provide mid-day shelter from the scorching sun, should be scrupulously guarded/ protected against felling and plantation of such trees should be promoted. | **Noted for Compliance.** |
| 44) | The Project Proponent shall undertake all precautionary measures for conservation and protection of endangered flora and fauna and Schedule-I species during mining operation. A Wildlife Conservation Plan shall be prepared for the same clearly delineating action to be taken for conservation of flora and fauna. The Plan shall be approved by Chief Wild Life Warden of the State Govt. | **Complied**<br>There are 6 Scheduled-I species within study area. A WildLife Conservation Plan (WLCP) for these 6 Scheduled-I species with a total budget of Rs. 267 lacs, was prepared and the same was approved by Principal Chief Conservator of Forests & Chief Wildlife Warden, Rajasthan vide letter no. एफ |

| Sr. | Conditions | Remarks |
|---|---|---|
| | | 11(422) विकास -II /मुवजीप्र/2020-21 /292 dated 10th March 2022. Approval letter along with approved WildLife Conservation Plan is attached as **Annexure IV**. |
| 45) | And implemented in consultation with the State Forest and Wildlife Department. A copy of Wildlife Conservation Plan and its implementation status (annual) shall be submitted to the Regional Office of the Ministry. | WildLife Conservation Plan (WLCP) of 6 Scheduled-I species approved by PCCF & CWLW, Rajasthan vide letter no. dated 10th March 2022, is attached as **Annexure IV** along with Approval letter**.** |
| **IX.** | **Public hearing and human health issues** | |
| 46) | The Project Proponent shall appoint an Occupational Health Specialist for Regular as well as Periodical medical examination of the workers engaged in the mining activities, as per the DGMS guidelines. The records shall be maintained properly. PP shall also carryout Occupational health check-ups in respect of workers which are having ailments like BP, diabetes, habitual smoking, etc. The check-ups shall be undertaken once in six months and necessary remedial/ preventive measures be taken. A status report on the same may be sent to MoEFCC Regional Office and DGMS on half-yearly basis. | **Noted for compliance during operation of mine.**<br>Pre-employment and Periodic health check-up as stipulated in condition will be undertaken and details will be submitted to RO, MoEF&CC & DGMS. An Occupational Health Specialist for Regular as well as Periodical medical examination of the workers will also be engaged during operation of mine. |
| 47) | The Project Proponent must demonstrate commitment to work towards 'Zero Harm' from their mining activities and carry out Health Risk Assessment (HRA) for identification workplace hazards and assess their potential risks to health and determine appropriate control measures to protect the health and wellbeing of workers and nearby community. The proponent shall maintain accurate and systematic records of the HRA. The HRA for neighborhood has to focus on Public Health Problems like Malaria, Tuberculosis, HIV, Anaemia, Diarrhoea in children under five, respiratory infections due to bio mass cooking. The proponent shall also create awareness and educate the nearby community and workers for Sanitation, Personal Hygiene, Hand washing, not to defecate in open, Women Health and Hygiene (Providing Sanitary Napkins), hazard of tobacco and alcohol use. The Proponent shall carryout base | **Noted for compliance during operation of mine.** |

| Sr. | Conditions | Remarks |
|---|---|---|
| | line HRA for all the category of workers and thereafter every five years. | |
| 48) | The Proponent shall carry out Occupational health surveillance which be a part of HRA and include Biological Monitoring where practical and feasible, and the tests and investigations relevant to the exposure (e.g. for Dust a X-Ray chest; For Noise Audiometric; for Lead Exposure Blood Lead, For Welders Full Ophthalmologic Assessment; for Manganese Miners a complete Neurological Assessment by a Certified Neurologist, and Manganese (Mn) Estimation in Blood; For Inorganic Chromium- Fortnightly skin inspection of hands and forearms by a responsible person. Except routine tests all tests would be carried out in a Lab accredited by NABH. Records of Health Surveillance must be kept for 30 years, including the results of and the records of Physical examination and tests. The record of exposure due to materials like Asbestos, Hard Rock Mining, Silica, Gold, Kaolin, Aluminium, Iron, Manganese, Chromium, Lead, Uranium need to be handed over to the Mining Department of the State in case the life of the mine is less than 30 years. It would be obligatory for the State Mines Departments to make arrangements for the safe and secure storage of the records including X-Ray. Only conventional X-Ray will be accepted for record purposes and not the digital one). X-Ray must meet ILO criteria (17 x14 inches and of good quality). | **Noted for compliance during operation of mine.** |
| 49) | The Proponent shall maintain a record of performance indicators for workers which includes (a) there should not be a significant decline in their Body Mass Index and it should stay between 18.5 - 24.9, (b) the Final Chest X-Ray compared with the base line X-Ray should not show any capacities, (c) At the end of their leaving job there should be no Diminution in their Lung Functions Forced Expiratory Volume in one second (FEV1), Forced Vital Capacity (FVC), and the ratio) unless they are smokers which has to be adjusted, and the effect of age, (d) their hearing should not be affected. As a proof an Audiogram (first and last need to be presented), (e) they should not have developed | **Noted for compliance during operation of mine.** |

| Sr. | Conditions | Remarks |
|---|---|---|
| | any Persistent Back Pain, Neck Pain, and the movement of their Hip, Knee and other joints should have normal range of movement, (f) they should not have suffered loss of any body part. The record of the same should be submitted to the Regional Office, MoEFCC annually along with details of the relief and compensation paid to workers having above indications. | |
| 50) | The Project Proponent shall ensure that Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. | **Noted for compliance.** |
| 51) | 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 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. | **Noted for compliance during site development activities.**<br>It's a mining project and no major construction activities will be involved except a mine office.<br>Necessary arrangements such as rest shelter, drinking water, mobile toilets, Medical health care etc. will be provided for the workers. |
| 52) | The activities proposed in Action plan prepared for addressing the issues raised during the Public Hearing shall be completed as per the budgetary provisions mentioned in the Action Plan and within the stipulated time frame.<br>The Status Report on implementation of Action Plan shall be submitted to the concerned Regional Office of the Ministry along with District Administration. | **Noted for compliance.**<br>A time bound action plan was prepared on the basis of issues raised during public hearing and submitted during appraisal.<br>The same will be undertaken during operation of mine and Status report of implementation will be submitted along with Half Yearly Compliance report. |
| **X.** | **Corporate Environment Responsibility (CER)** | |
| 53) | The activities and budget earmarked for Corporate Environmental Responsibility (CER) as per Ministry's O.M. No. 22-65/2017-IA. II (M) dated 01.05.2018 or as proposed by EAC should be kept in a separate bank account. The activities proposed for CER shall be implemented in a time bound manner and annual report of implementation of the same along with documentary proof viz. | **Noted for compliance.**<br>In line with the MoEF&CC O.M. No. F. No. 22-65/2017-IA.III dated 30.09.2020 & 20.10.2020, a time bound action plan was prepared on the basis of issues raised during public hearing and submitted during appraisal. The same will be undertaken during operation of mine and Status report of |

| Sr. | Conditions | Remarks |
|---|---|---|
| | photographs, purchase documents, latitude & longitude of infrastructure developed & road constructed needs to be submitted to Regional Office MoEF&CC annually along with audited statement. | implementation will be submitted along with Half Yearly Compliance report. |
| 54) | Project Proponent shall keep the funds earmarked for environmental protection measures in a separate account and refrain from diverting the same for other purposes. The Year wise expenditure of such funds should be reported to the MoEFCC and its concerned Regional Office. | **Noted for compliance.** |
| **XI.** | **Miscellaneous** | |
| 55) | 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. | **Noted for compliance.** |
| 56) | The Project Authorities should inform to the Regional Office regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work. | **Noted for compliance.** |
| 57) | 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 for compliance.** |
| 58) | 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 for compliance.** |
| 59) | 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.** |

| Sr. | Conditions | Remarks |
|---|---|---|
| 20. | 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.** |
| 21. | 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.** |
| 22. | The above conditions will be enforced inter·alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 197 4, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made there under and also any other orders passed by the Hon'ble Supreme Court of India/High Court and any other Court of Law relating to the subject matter. | **Noted.** |
| 23. | Any appeal against this environmental clearance shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010. | **Noted.** |

# ANNEXURES

ANNEXURE I

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: | Sindwari Ramakhera Satkhanda Block B Limestone Mine (auction Block) Of Dalmia Cement (bharat)limited | | |
| Project Address: | Located At Village(s) Ravliya, Bhavliya, Bhopali, Cherliya, Mangrol And Sindwari, Nimbahera, Chittaurgarh | | |
| Town: | Nimbahera | Block: | Nimbahera |
| District: | Chittorgarh | State: | Rajasthan |
| Pin Code: | | | |
| Communication Address: | Mr. V. Karthikeyan (deputy Executive Director), Dalmia Cement Bharat Ltd, 11th And 12th Floor, Hansalaya Building, 15, Barakhamba Road, , New Delhi, Delhi - 110001 | | |
| Address of CGWB Regional Office : | Central Ground Water Board Western Region, 6-a, Jhalana Doongri, Jaipur, Rajasthan - 302004 | | |

| | | | | | |
|---|---|---|---|---|---|
| 1. | **NOC No.:** | CGWA/NOC/MIN/ORIG/2021/13708 | | | |
| 2. | Application No.: | 21-4/16107/RJ/MIN/2021 | 3. | Category: (GWRE 2020) | Over Exploited |
| 4. | Project Status: | New Project | 5. | NOC Type: | New |
| 6. | **Valid from:** | 12/11/2021 | 7. | **Valid up to:** | 11/11/2023 |

8. Ground Water Abstraction Permitted:

| Fresh Water | | Saline Water | | Dewatering | | Total | |
|---|---|---|---|---|---|---|---|
| m³/day | m³/year | m³/day | m³/year | m³/day | m³/year | m³/day | m³/year |
| 83.00 | 24900.00 | | | | | | |

9. Details of ground water abstraction /Dewatering structures

| | **Total Existing No.:0** | | | | | | **Total Proposed No.:3** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | DW | DCB | BW | TW | MP | MPu | DW | DCB | BW | TW | MP | MPu |
| Abstraction Structure* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 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.): | 99600.00 |

| 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

CENTRAL GROUND WATER AUTHORITY

## ANNEXURE I

**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 m 3 /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 failing 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 failing 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.)**

CENTRAL GROUND WATER AUTHORITY

**ANNEXURE-II**

# TIMES OF INDIA

## Public Notice

This is to inform that M/s Dalmia Cement (Bharat) Ltd., 11th-12th Floor, Hansalaya building, 15, Barakhamba Road, New Delhi-110001, has been accorded the Environmental Clearance for its proposed "Sindwari, Ramakhera, Satkhanda Block- B (Auction Block) over an area of 474.50 ha. with production capacity 3.0 Million TPA ROM (Limestone: 1.80 MTPA, Soil: 0.076 MTPA, OB: 1.124 MTPA) along with crusher capacity of 500 TPH located in Villages - Ravliya, Bhavliya, Bhopali, Cherliya, Mangrol and Sindwari, Tehsil Nimbahera, District- Chittaurgarh, Rajasthanby Ministry of Environment, Forest & Climate Change (EC Identification number-EC22A001RJ128760) vide F.No. J-11015/38/2018-IA-II(M) dated 28.06.2022. A copy of the EC is available with the Rajasthan State Pollution Control Boardand also at website of the Ministry of Environment, Forest & Climate Change at http://parivesh.nic.in

D KASHMIR

ANNEXURE-II

# DAINIK BHASKAR

## आम सूचना

यह सूचित किया जाता है कि मैसर्स डालमिया सीमेंट (भारत) लिमिटेड, 11 वीं - 12 वीं मंजिल, हंसालया बिल्डिंग, 15, बाराखंभा रोड, नई दिल्ली-110001 को इस की प्रस्तावित 'सिंदवाडी, रामाखेड़ा, सतखंडा ब्लॉक - बी, (खनन पट्टा क्षेत्र 474.50 हैक्टेर) 3.0 मिलियन टन प्रतिवर्ष, ( चूना पत्थर - 1.80 मिलियन टन प्रतिवर्ष, मृदा 0.076 मिलियन टन प्रतिवर्ष और अपशिष्ट 1.124 मिलियन टन प्रतिवर्ष ) एवं 500 टन प्रतिघंटा की क्षमता के क्रशर निकट गांव- रावलिया, भावलिया, भोपाली, चेरलिया, मांगरोल और सिंदवाडी, तहसील - निम्बाहेड़ा, जिला - चित्तौड़गढ़ (राजस्थान) के लिए पर्यावरण, वन एवं जल वायु परिवर्तन मंत्रालय द्वारा पर्यावरण स्वीकृति पत्र क्रमांक एफ.सं. J-11015/38/2018-IA-II(M) (पर्यावरण स्वीकृति पहचान संख्या- EC22A001RJ128760 ) दिनांक 28.06.2022 को प्रदान की गई है । इसकी एक प्रति राजस्थान राज्य प्रदूषण नियंत्रण बोर्ड के पास और पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय की वेबसाइट http://parivesh.nic.in पर भी उपलब्ध है।

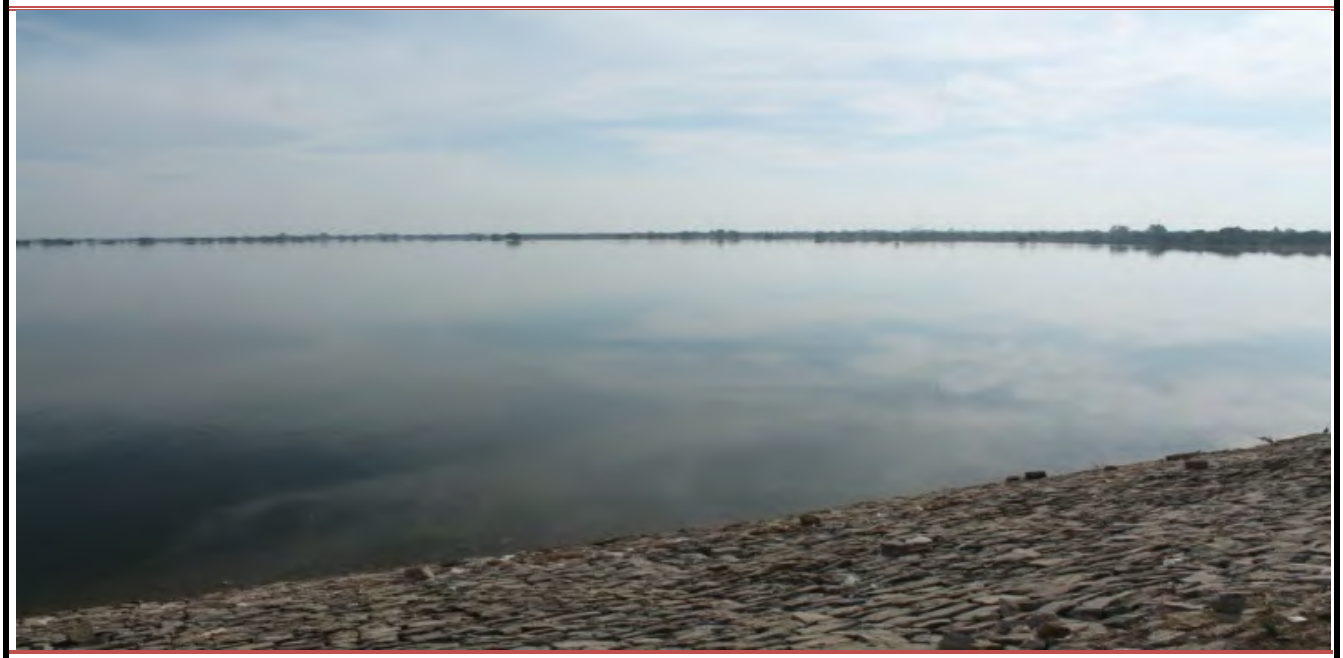
# COMPREHENSIVE HYDROGEOLOGICAL REPORT AS PER GAZETTE NOTIFICATION OF CENTRAL GROUND WATER AUTHORITY DATED 24.09.2020 AND SUBSEQUENT PUBLIC NOTICE

**FOR**

**(SINDWARI, RAMAKHERA, SATKHANDA BLOCK-B LIMESTONE MINE)**

**AT**

**LOCATION: VILLAGE(s) – RAVLIYA, BHAVLIYA, BHOPALI, CHERLIYA, MANGROL AND SINDWARI**
**TEHSIL: NIMBAHERA, DISTRICT: CHITTAURGARH, RAJASTHAN, INDIA**



**Applicant: - Dalmia Cement (Bharat) Limited**
**Authorized Signatory: - V. Karthikeyan (Deputy Executive Director)**
**Address: 11th and 12th Floors, Hansalaya, 15, Barakhamba Road, New Delhi – 110 001**
**Phone No.: - 011 – 23457157; Fax No.:- 011 - 23324136**
**Email: env.head@dalmiabharat.com**

**ENVIRONMENTAL & GROUND WATER CONSULTANT ORGANIZATION**
**ENKAY ENVIRO SERVICES PVT. LTD., JAIPUR**
Certificate No. NABET/GWCO/IA/GW0010, **Valid up to 07 Feb, 2024,**
Certificate No. NABET/EIA/2023/RA 0183, **Valid up to 12 Dec, 2023,**
Corporate Office: # 92 Heera Nagar - A, Near Shalimar Bagh, Ajmer Road, Jaipur (Raj.).
Pin Code: 302 021 Phone: 0141-4920770/4920771,
Email: - info@enkayenviro.com,
Website: - www.enkayenviro.com

September-2021

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# CHAPTER-1.0

## 1. Brief About the Project Giving Location Details, Coordinates, Google/ Toposheet Maps, etc. Demarcating the Project Area.

### Introduction:

### Brief Introduction of Company:

Dalmia Cement (Bharat) Ltd. (DCBL) company is one of the leading cement producers of India. It 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 registered address of DCBL is Dalmiapuram, P.O. Kallakudi, Dist.- Tiruchirappalli (Tamil Nadu) - 621651.

Presently, DCBL cement production capacity stands at 30Million tonnes& has a strong presence in Southern, Eastern & North-East Regions of the Country. The DCBL currently has cement plants in Tamil Nadu (Dalmiapuram & Ariyalur), Andhra Pradesh (Kadapa), Meghalaya (Thangskai), Assam (Umrangso & Lanka), Karnataka (Belgaum), Jharkhand (Bokaro), Odisha (Rajgangpur & Kapilas), Bihar (Kalyanpur), and West Bengal (Medinipur) and Maharashtra (Chandrapur).

### Proposed Project:

The Proposed Project Villages: Ravliya, Bhavliya, Bhopali, Cherliya, Mangrol and Sindwari Tehsil – Nimbahera, District- Chittaurgarh, Rajasthan over an area of 474.50 ha. was e-auctioned by Government of Rajasthan for non-captive use and Dalmia Cement (Bharat) Limited (DCBL) was declared as the “Preferred Bidder "with probable reserves of about 19.82 Million tonnes to produce 1.8 MTPA of Limestone (ROM/ Total Excavation3.0 Million TPA). Dalmia Cement (Bharat) Limited appointed CGWA/NABET Accredited Consultant “Enkay Enviro Services Pvt. Ltd., Jaipur” to prepare site specific Comprehensive Hydro-geological study report and Rainwater Harvesting plan for proposed Limestone mine. Nimbahera block falls under overexploited category and non-notified area according to CGWA format of Eligibility.

## Comprehensive Hydro-geological Report on ground water conditions in both core and buffer zones for Sindwari, Ramakhera, Satkhanda Block-B Limestone Deposits

### Objective of the Report:

- As per the Public Notice released by CGWA dated 18th August, "the Comprehensive hydrogeological report prepared by accredited consultant on ground water conditions in both core and buffer zones of the mine shall not be required in cases where groundwater withdrawal is less than 100 KLD."
- To study Ground water conditions in both core and buffer zone with details like aquifer types, aquifer depth, cone tapped etc.
- To find out spatial and temporal variations in water levels and Ground water quality of shallow and deep aquifers
- To analyze the impact, the impact of groundwater extraction on local ground water by providing Hydrograph of water level / Piezometer in monitoring wells and trend analysis of historical water levels flow net analysis (ground water flow directions)
- A physiographic condition of the study area is analyzed by visual inference, Global Positioning System readings and Satellite image.
- To survey the hydro-geological conditions of the study area.
- To evaluate the groundwater flow direction of the area.
- To find out the water level of the project area
- Aquifers details with estimation of groundwater recharge.
- To explore the volume of Rooftop run-off and Storm water harvesting within the Mine Site and design of rainwater harvesting systems.
- To determine the Ground Water Potential of the area (Core Zone and Buffer zone)
- To aesthetics ground water budgeting of the core area and the stage wise observation.
- To aesthetics impact on ground water regime and suggest impact mitigation measures
- To provide recommendation for improving the ground water regime
- Evaluate the impacts on agriculture productivity, habitat conditions, recreational resources and aesthetics of the vicinity; and predict the likely impacts on ground water due to mining and other related activities.
- To do the appraisal based on the groundwater conditions of the mining area and to aquifer properties.
- To prepare a Comprehensive Hydro-geology Report on ground water conditions in both core and buffer zone of proposed mining project in order to obtain NOC for Groundwater abstraction from Central Ground Water Authority(CGWA),in line with Gazette Notification of Ministry of Jal Shakti (Department of Water Resources, River Development and Ganga Rejuvenation) (Central Ground Water Authority) Notification New Delhi, dated 24th September, 2020 and subsequent public notices.

## Requirement of Water:

The details of requirement of water during mine operation for various uses is as follows:
The total water demand for the proposed limestone mine will be 83 KL Dout of which 5KLD water will be used for domestic purpose, 40 KLD for dust suppression, 30KLD for plantation and 8 KLD for washing of machinery. Water demand will be met from ground water through bore wells in the mine lease area after obtaining necessary permission from CGWA. After development of the mine pit, DCBL will augment the mine pit rain water for meeting the requirements except domestic water requirement. After installation of water treatment plant, treated water will be used for dust suppression /plantation, hence fresh water demand will be reduced.

## Project description:

The proposed project "Sindwari, Ramakhera, Satkhanda Block – B" Limestone Mine was e-auctioned and allotted to DCBL. The proposed mine is spread over an area of 474.50 ha. with probable reserves of about 19.82 Million Tonnes to produce 1.8 MTPA of Limestone (Total Excavation is 3.0 Million TPA). As per the Tender Document provided by State Govt., end use of the proposed project is not defined. However, company planned to use part of the limestone from proposed mine to one of the proposed cement plant of its subsidiary company (RPPL) proposedat about 1 km. Part of the limestone & other unusable ROM from the mine may also be sold to other Cement Plant &end use Industries.

Conventional Opencast mechanized mining method will be adopted which includes drilling, blasting, loading, transportation and crushing.

RPPL has already obtained Environmental Clearance for its proposed integrated cement plant of 5.0 Million TPA capacity and 54 MW CPP vide letter no J-11011/472/2010-IA.II(I) dated 11th September 2015 from MoEF&CC, New Delhi.

## Location of the Project:

The proposed Sindwari, Ramakhera, SatkhandaBlock-B Limestone Mine is locatedin Village(s) – Ravliya, Bhavliya, Bhopali, Cherliya, Mangroland Sindwari, Tehsil – Nimbahera, District – Chittaurgarh, Rajasthan. The project site falls on Survey of India Toposheet No. G43U10 (45L/ 10) The study area (10 km radius from Mine Lease boundary) falls within Toposheet no G43U10 (45L/

10) & G43U9 (45L/9). The geographical position of the mining lease boundary pillars are given in Table: 1.1 and access to the mine site is given in table 1.2 below:

**Table 1.1: Geographical Position of the Boundary Pillars**

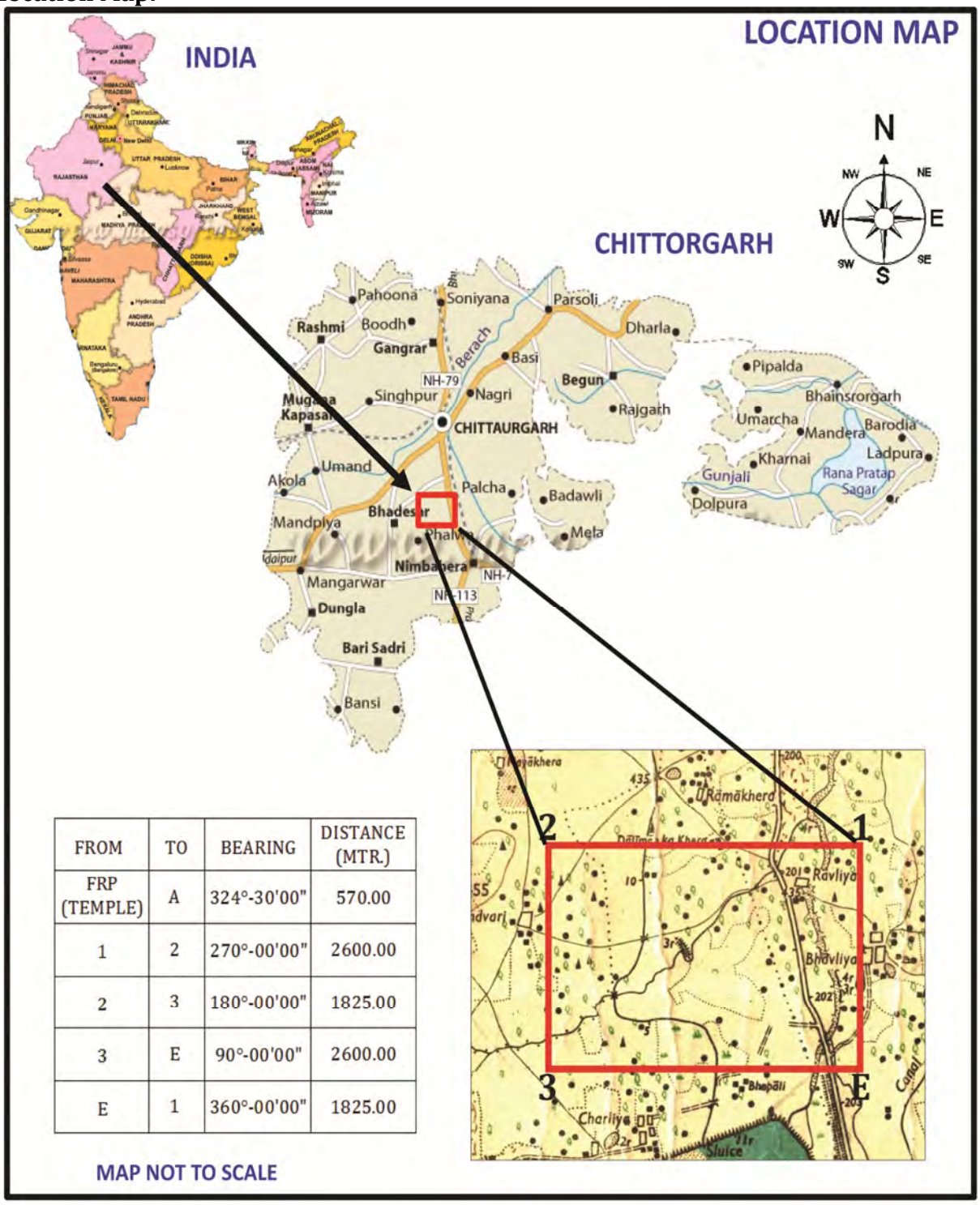
| No. of Lease Boundary Pillars. | Latitude (N) | Longitude (E) |
|---|---|---|
| 1 | 24°43’28.01216"N | 74°38'52.59332"E |
| 2 | 24°43'27.78710"N | 74°37'20.04389"E |
| 3 | 24°42’28.45132"N | 74°37'20.22314"E |
| 4 | 24°42'28.45132"N | 74°38'52.59332"E |

**Table 1.2: Access to the Mine Site**

| Particulars | Distance & Direction (From the Lease Boundary) |
|---|---|
| Nearest Railway Station | Mangrol ~ 2.40 Km, SE;<br>Shambhupura ~ 5.0 Km, NNE |
| Nearest Airport | Maharana Pratap Airport, Udaipur ~ 74.30 Km, WSW |
| Nearest Highway | NH- 56 (Earlier known as NH-79)~Passing through the lease area from North to South in the East. |

**Comprehensive Hydro-geological Report on ground water conditions in both core and buffer zones for Sindwari, Ramakhera, Satkhanda Block-B Limestone Deposits**

**Location Map:**




| FROM | TO | BEARING | DISTANCE (MTR.) |
|---|---|---|---|
| FRP (TEMPLE) | A | 324°-30'00" | 570.00 |
| 1 | 2 | 270°-00'00" | 2600.00 |
| 2 | 3 | 180°-00'00" | 1825.00 |
| 3 | E | 90°-00'00" | 2600.00 |
| E | 1 | 360°-00'00" | 1825.00 |

**Figure 1.1: Location Map**

**Google Map:**

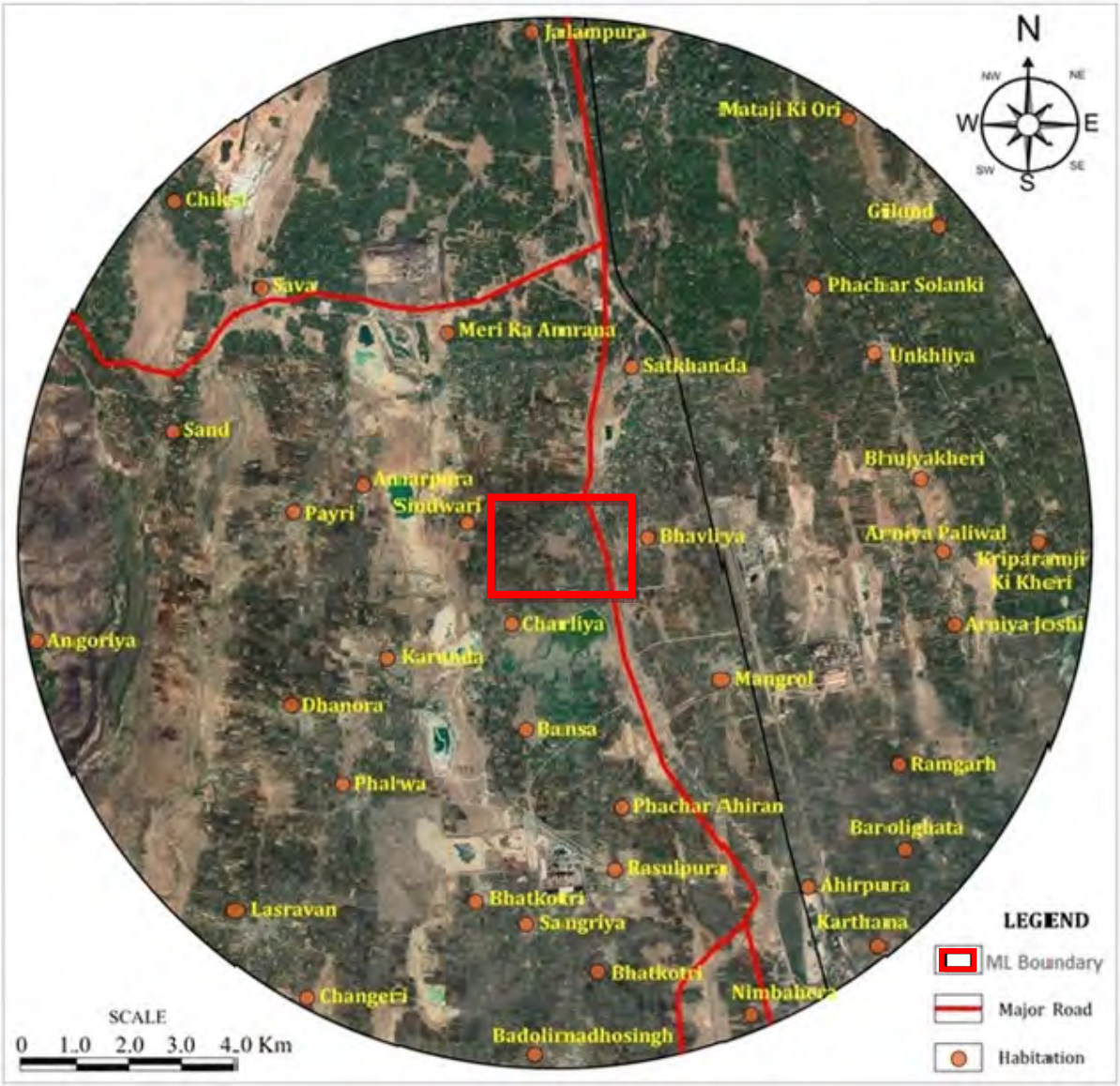



**Figure 1.2: The map showing general location of the proposed M L Boundary on Google map**

**Comprehensive Hydro-geological Report on ground water conditions in both core and buffer zones for Sindwari, Ramakhera, Satkhanda Block-B Limestone Deposits**

**Toposheet Map:**


**Figure 1.3: The map showing general location of the proposed M L Boundary**

**Comprehensive Hydro-geological Report on ground water conditions in both core and buffer zones for Sindwari, Ramakhera, Satkhanda Block-B Limestone Deposits**

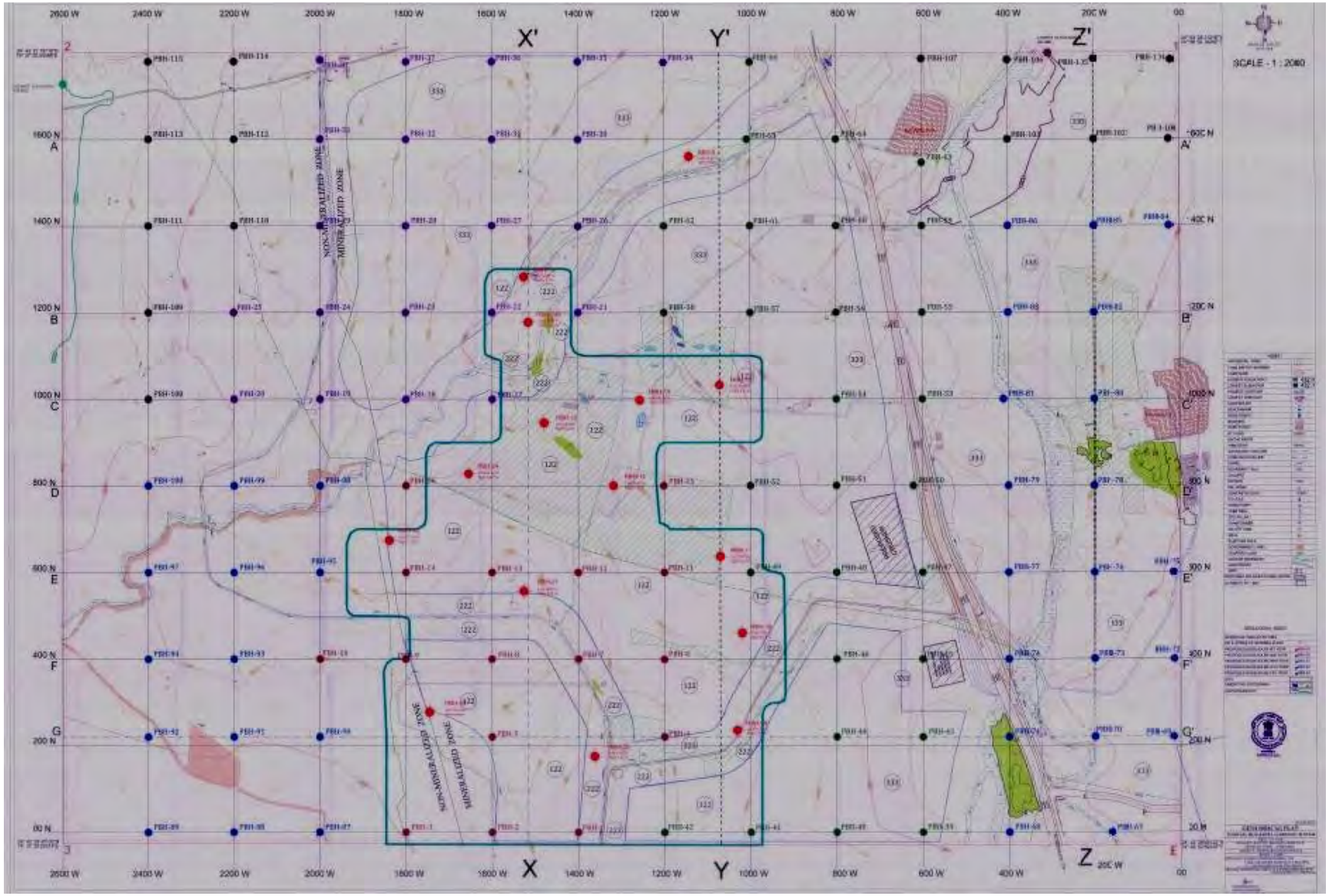



**Figure 1.4: Surface Plan**

**Comprehensive Hydro-geological Report on ground water conditions in both core and buffer zones for Sindwari, Ramakhera, Satkhanda Block-B Limestone Deposits**

**Field Photographs**

**Photo: Limestone Outcrop**

**Photo: Agriculture Activity**

**Photo : Limestone Outcrop**

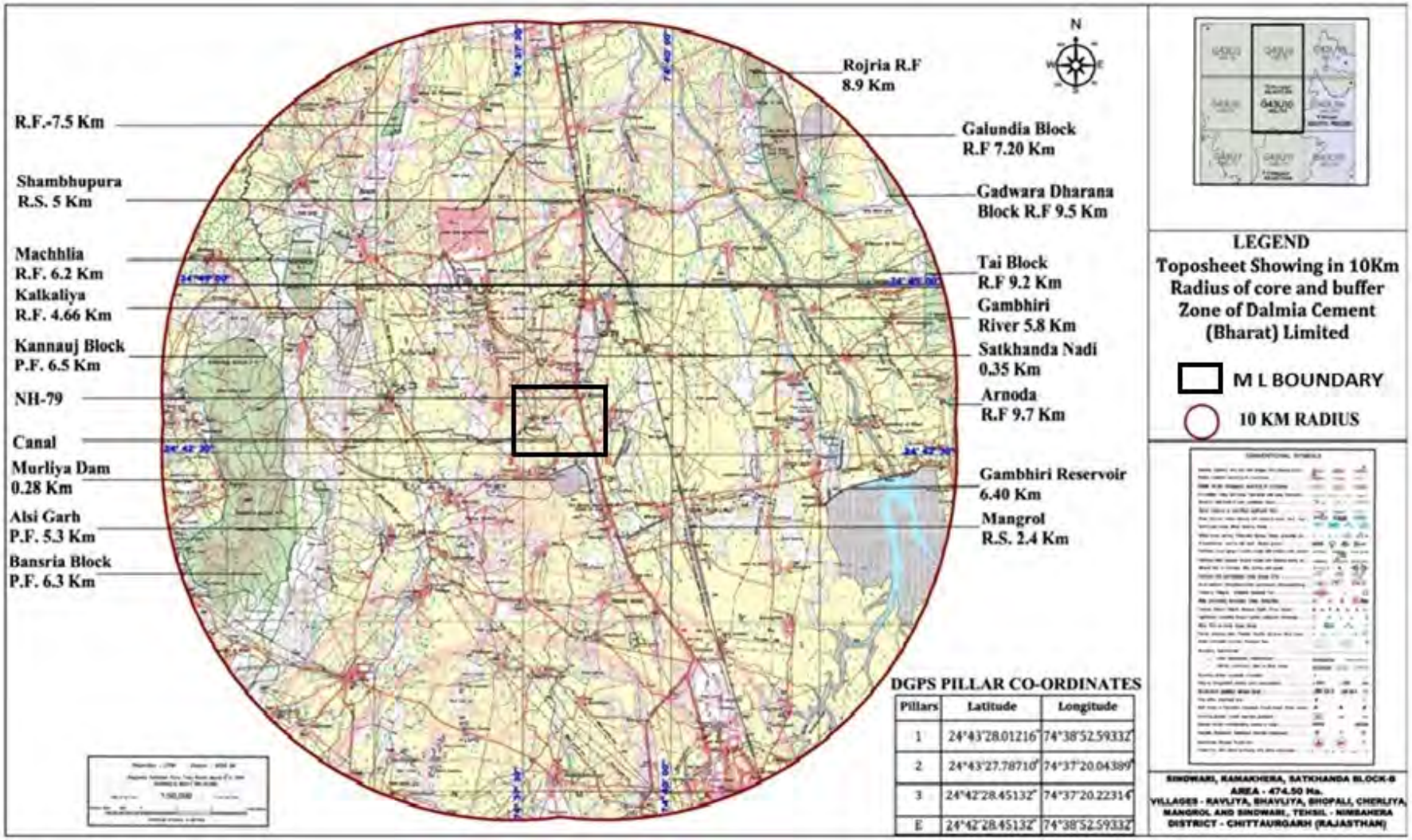
**Photo: Limestone Outcrop**

**Photo : Canal Passing through Lease Area (Originate from Cherliya Village)**

**Figure 1.5: Photographs showing Mining Lease Area**

## Comprehensive Hydro-geological Report on ground water conditions in both core and buffer zones for Sindwari, Ramakhera, Satkhanda Block-B Limestone Deposits

**Key Plan:**




**DGPS PILLAR CO-ORDINATES**

| Pillars | Latitude | Longitude |
|---|---|---|
| 1 | 24°43'28.01216" | 74°38'52.59332" |
| 2 | 24°43'27.78710" | 74°37'20.04389" |
| 3 | 24°42'28.45132" | 74°37'20.22314" |
| E | 24°42'28.45132" | 74°38'52.59332" |

**Figure 1.6: Toposheet Map of Study Area**

## 1.1 Land Use Land Cover of the surrounding area, Percentage of LULC categories: Land Use of Study Area:

### Source of information:

Land use data collected from the following sources: -

1. Topographic data - Survey of India Toposheet.
2. Remote Sensing Data - LISS IVFMX Data of Resource sat 2A - NRSC, Hyderabad.
3. Ground Truthing of the area

Land use pattern of the study area was carried out by the standard method of analysis of Survey of India Toposheet sheet data and following by ground truth collection and interpretation of Google Earth Image data year 2020.

### Data Base:

The detail of the primary data in the form of digital data on LISS-IVFMX for interpretation and analysis is given below in Table 1.3. The mask of the entire project area including the influence zone was generated from the R2A- LISS-IVFX.

**Table 1.3: Database used for LULC Mapping**

| S. No. | Satellite | Sensor | Date type & Bands |
|---|---|---|---|
| 1. | ResourceSat-2A | LISS-IVFMX) | Digital (1,2,3) |

### Methodology:

The R2A LISS-IVFMX of digital format has been used in interpretation of data in conjunction with secondary or collateral data. The methodology followed for extraction of information from satellite data is especially at standard visual interpretation based on tone, texture, shape, size and colour. Arc GIS version 10.1 and ERDAS imagine version 2014 software packages were used for creation of database, data interpretation and analysis.

### Salient features of the adopted methodology are given below:

- ✓ Acquisition of satellite data
- ✓ Preparation of base map using Survey of India toposheet
- ✓ Data analysis using visual interpretation techniques through software
- ✓ Digitization using head up vectorization method

- ✓ Ground truth studies or field checks using GPS
- ✓ Finalization of the map
- ✓ Topology construction in GIS
- ✓ Area calculation for statistics generation

## Ground Truth Collection:

The Survey of India Toposheet were used for field verification and a systematic transverse plan using existing road network was made to study Land Use Pattern of the area, covering as many representative sample areas as possible to observe the broad land use features and to adjust the sample areas according to field conditions. Detail field observations and investigations were carried out and noted the land use features and plotted on the Satellite Image Data.

## Pre-field Interpretation of Satellite Data:

The False Colour Composite (FCC) of R2A LISS-IVFMX satellite imagery having 5 m spatial resolution satellite data 1:50,000 scales were used for pre-field interpretation work. Taking the help of Toposheet, geology, and geo-morphology and by using the image elements, the features were identified and delineated the boundaries. Each feature was identified on image by the image elements like tone, texture, colour, shape, size, pattern and association. A tentative legend in terms of land cover and land use was formulated. The sample area for field check is selected covering all the physiographic, land use/land cover feature cum image characteristics.

## Post Field Work for Land Use/Land Cover Classification:

The base maps of the study area were prepared, with the help of Survey of India Toposheet on1:50,000 scale. Field information and the final details were transferred onto the base maps.The final interpreted and classified map was the categorically differentiate with standard colour coding and described features with standard symbols. All the classes were identified and marked by the standard legend on the map. The following Land Cover classes were derived and classified as under:

- ✓ Project Site
- ✓ Residential Area
- ✓ Road
- ✓ Railway
- ✓ Industrial Area
- ✓ Stone Quarry/ Mining

- ✓ Agriculture Land
- ✓ Plantation
- ✓ Forest Area
- ✓ Barren Hilly/ Scrub Land
- ✓ Barren/ Fallow Land
- ✓ Canal
- ✓ River
- ✓ Pond/ Reservoir
- ✓ Rainwater pits

## Land Use and Land Cover (LULC) for 10 km radius study area (46,216.44 Hectares):

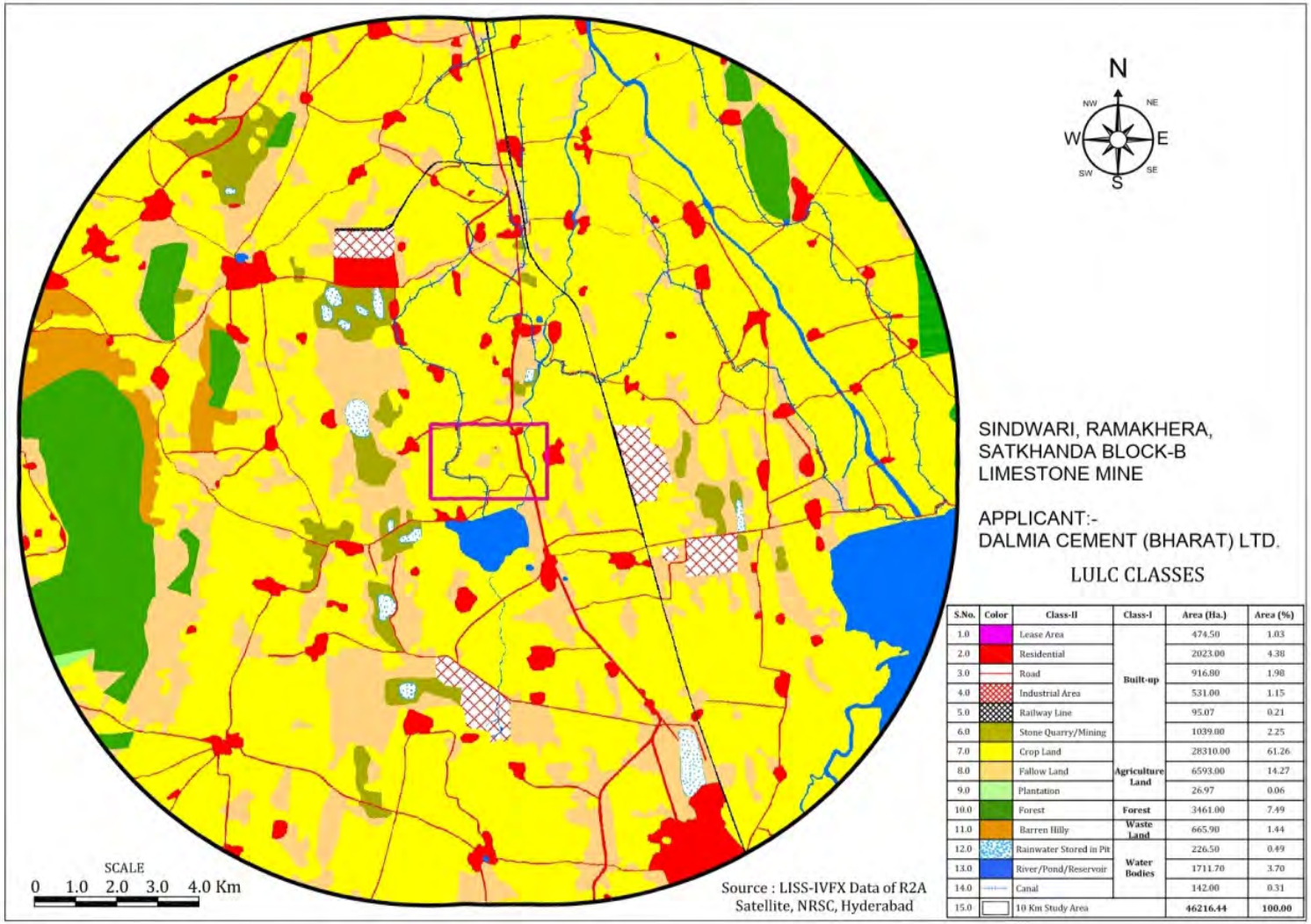
Classification scheme adopted for the preparation of land use/ land cover maps on 1:25,000 scales. Land use/ Land cover classification standardized by NRSC/ ISRO. The land use/ land cover area of the study area. The following land use classes have been observed in the study area:

**Table 1.4: LULC Classification**

| S. No. | Class | | Area (Ha.) | Area (%) |
|---|---|---|---|---|
| | Class - I | Class - II | | |
| 1 | Project Site | Project Site | 474.50 | 1.03 |
| 2 | Builtup | Residential Area | 2,023.00 | 4.38 |
| | | Transportation - Road | 916.80 | 1.98 |
| | | Transportation - Railway | 95.07 | 0.21 |
| | | Industrial Area | 531.00 | 1.15 |
| | | Stone Quarry/ Mining | 1,039.00 | 2.25 |
| 3 | Agriculture | Agriculture Land | 28,310.00 | 61.26 |
| | | Plantation | 26.97 | 0.06 |
| 4 | Forest | Forest Area | 3461.00 | 7.49 |
| 5 | Barren/ Uncultivable/Waste Land | Barren Hilly/ Scrub Land | 665.90 | 1.44 |
| | | Barren/ Fallow Land | 6,593.00 | 14.27 |
| 6 | Wetlands/ Water Bodies | Canal | 142.00 | 0.31 |
| | | River | 173.70 | 0.38 |
| | | Pond/ Reservoir | 1,538.00 | 3.33 |
| | | Rainwater in Pits | 2,26.50 | 0.49 |
| **Total** | | | **46,216.44** | **100.00** |

**Total area of 10km radius is about 46,216.44 hectares.**

(Source: Resource sat-2A LISS-IVFMX)




| S.No. | Color | Class-II | Class-I | Area (Ha.) | Area (%) |
|---|---|---|---|---|---|
| 1.0 | | Lease Area | Built-up | 474.50 | 1.03 |
| 2.0 | | Residential | | 2023.00 | 4.38 |
| 3.0 | | Road | | 916.80 | 1.98 |
| 4.0 | | Industrial Area | | 531.00 | 1.15 |
| 5.0 | | Railway Line | | 95.07 | 0.21 |
| 6.0 | | Stone Quarry/Mining | | 1039.00 | 2.25 |
| 7.0 | | Crop Land | Agriculture Land | 28310.00 | 61.26 |
| 8.0 | | Fallow Land | | 6593.00 | 14.27 |
| 9.0 | | Plantation | | 26.97 | 0.06 |
| 10.0 | | Forest | Forest | 3461.00 | 7.49 |
| 11.0 | | Barren Hilly | Waste Land | 665.90 | 1.44 |
| 12.0 | | Rainwater Stored in Pit | Water Bodies | 226.50 | 0.49 |
| 13.0 | | River/Pond/Reservoir | | 1711.70 | 3.70 |
| 14.0 | | Canal | | 142.00 | 0.31 |
| 15.0 | | 10 Km Study Area | | 46216.44 | 100.00 |

**Figure 1.7: Land Use/Land Cover Map of Study Area**

Total Five major land use/land cover classes were demarcated in the study area following Level four classification. A thematic map of 1:50,000 scales were generated incorporating these classified categories considering the area of the project.

The present land use studies show that agriculture land covered about 61.26 % of the total area and second dominated area habitation covering as much as 9.98 % of the total area which includes the industrial settlements, Stone Quarry/Mining, railways and road network of the study area. The consistently shifting nature of the eastern part to western part bank migration has resulted in large uncultivated & rural settlement along the active plain area towards the site location.

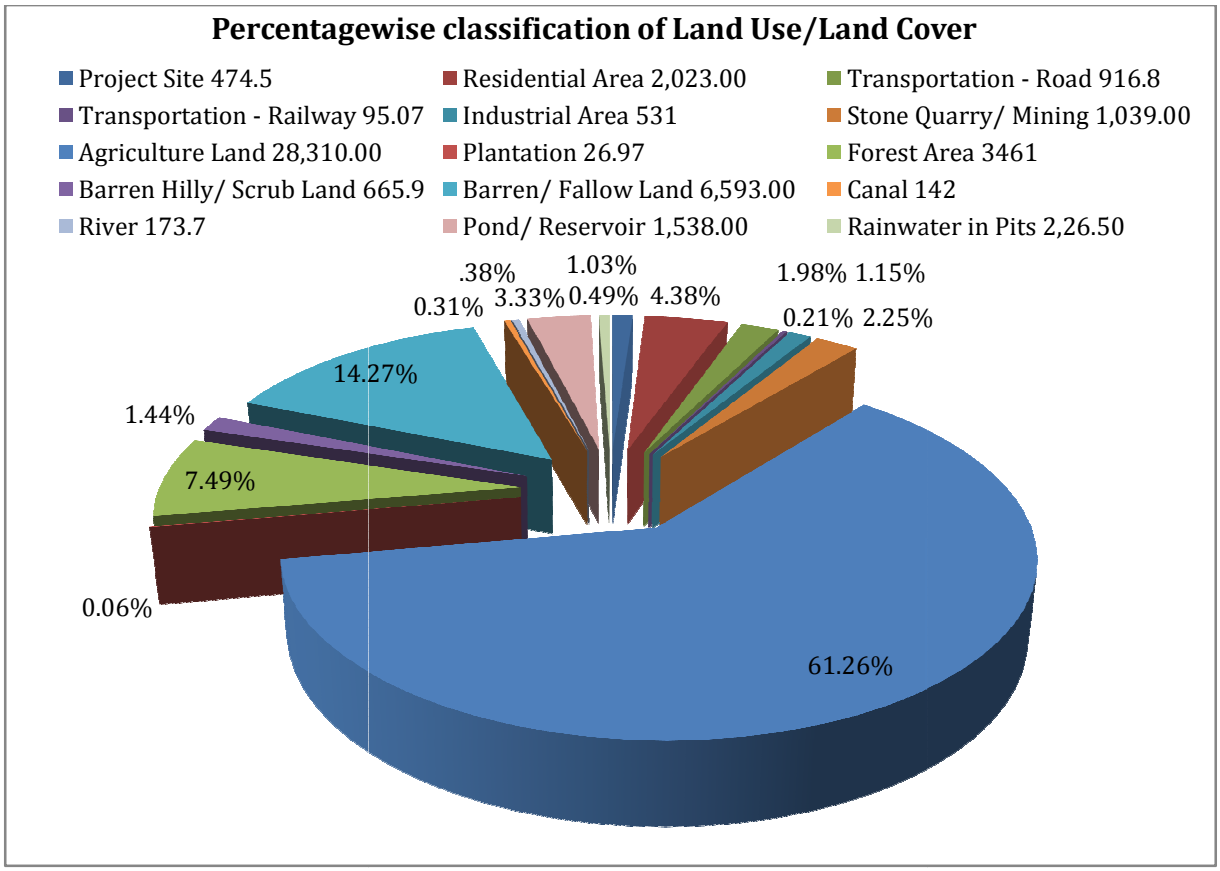



**Figure: 1.8: Percentagewise classification of Land Use & Land Cover Map**

## Climate and Rainfall:

### Climate:

In four months of rainy season (from mid-June to mid-September) the area receives 697 mm. per annum to 1538 mm. per annum while Winter Season prevails from mid-September to February with $4^0$ C minimum temperature and Summer Season prevails from March to mid-June with temperature rising up to $48^0$C.

## Rainfall:

The rainfall record of last 10 years of nearby station Nimbahera indicates that rainfall varied between minimums of 697 mm. per annum, maximum of 1538 mm. per annum with an average of 1064m.m. per annum. The southern part of the district receives slightly more rainfall than other part of district. The rainfall data of last 10 years isgiven as under:

**Table 1.5: Annual Rainfall (mm.)**

| Sr. No. | Year | Rainfall in mm |
|---|---|---|
| 1 | 2010 | 891 |
| 2 | 2011 | 1119 |
| 3 | 2012 | 1138 |
| 4 | 2013 | 1218 |
| 5 | 2014 | 1085 |
| 6 | 2015 | 938 |
| 7 | 2016 | 1538 |
| 8 | 2017 | 697 |
| 9 | 2018 | 846 |
| 10 | 2019 | 1170 |
| **Average Rainfall** | | **1064 mm** |

**Source: WRD, Rajasthan**

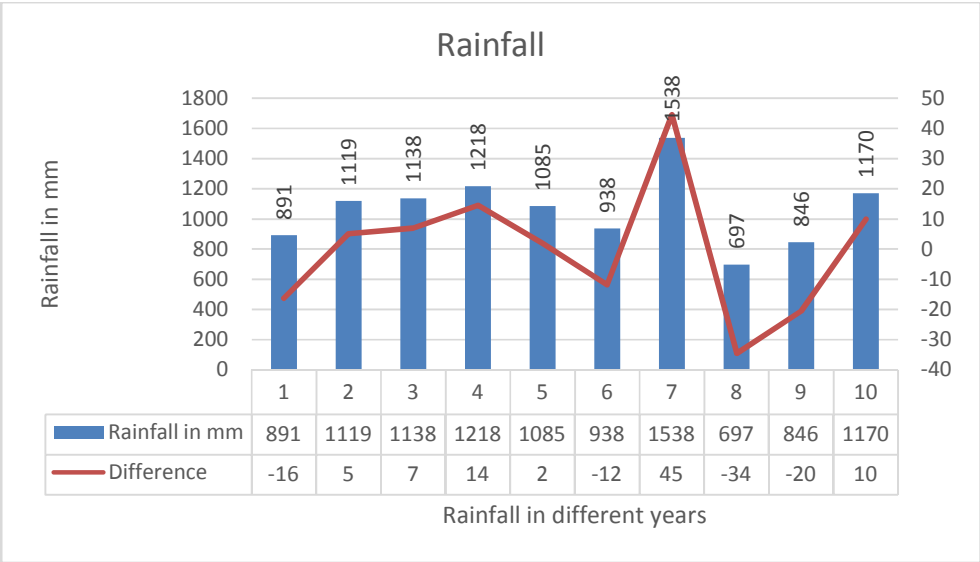



**Figure 1.9: Rainfall Status (Last 10 Years)**

## 1.2 Topography and Drainage:

### Topography:

The mine area are falls on Survey of India Toposheet No.45L/10 (G43U10) and lies between Latitudes 24⁰42'28.45''N to 24⁰43'28.01''N and Longitudes 74⁰37'20.04''E to 74⁰38'52.59''E. Topographically the area comprises of flat terrain with small mounds &knolls and generally slopes towards north-eastern side. The max. ground level is about 432mRLin north western part and min. about 422 mRLin North-eastern part. In the central part of the mine, the ground level generally slopes from 429mRL to 425mRL from SW to NE direction.

### Geomorphology & Drainage:

The district is characterized by undulating topography. The western, southern and northern parts are generally plain area. Hills are scattered in Chhoti Sadri, Bari Sadri and Pratapgarh Tehsil. Hill ranges towards east of Chittaurgarh town runs north-south with intervening valleys parallel to each other. Chittaurgarh and Pratapgarh Tehsil are partly hilly and partly plain. The district has the regional slope from south to north. The height varies from 317m to 617m amsl. Pal khera hill is the highest, having height of 617m.

**Table: 1.6 Geomorphological units, their description and distribution**

| Origin | Landform Unit | Description |
|---|---|---|
| Denudational | Buried Pediment | Pediment covers essentially with relatively thicker alluvial, colluvial or weathered materials. |
| | Intermontane Valley | Depression between mountains, generally broad & linear, filled with colluvial deposits. |
| | Pediment | Broad gently sloping rock flooring, erosional surface of low relief between hill and plain, comprised of varied lithology, crisscrossed by fractures and faults. |
| Fluvial | Alluvial Plain | Mainly undulating landscape formed due to fluvial activity, comprising of gravels, sand, silt and clay. Terrain mainly undulating,<br><br>produced by extensive deposition of alluvium. |
| | Alluvial Plain (Sandy) | Flat to gentle undulating plain formed due to fluvial activity, mainly consists of gravels, sand, silt and clay with unconsolidated material of varying lithology, predominantly sand along river. |
| | Valley Fill | Formed by fluvial activity, usually at lower topographic locations, comprising of boulders, cobbles, pebbles, gravels, sand, silt and clay. The unit has consolidated sediment deposits. |
| | Ravine | Small, narrow, deep, depression, smaller than gorges, larger than |

| | | |
|---|---|---|
| | | gulley, usually carved by running water. |
| Structural | Dissected Plateau | Plateau, criss-crossed by fractures forming deep valleys. |
| | Plateau | Formed over varying lithology with extensive, flat, landscapes, bordered by escarpment on all sides. Essentially formed horizontally layered rocky marked by extensive flat top and steep slopes. It may be criss crossed by lineament. |
| Hills | Denudational, Structural<br><br>Hill, Linear Ridge | Steep sided, relict hills undergone denudation, comprising of varying lithology with joints, fractures and lineaments.<br><br>Linear to arcuate hills showing definite trend-lines with varying lithology associated with folding, faulting etc.<br><br>Long narrow low-lying ridge usually barren, having high run off may form over varying lithology with controlled strike. |

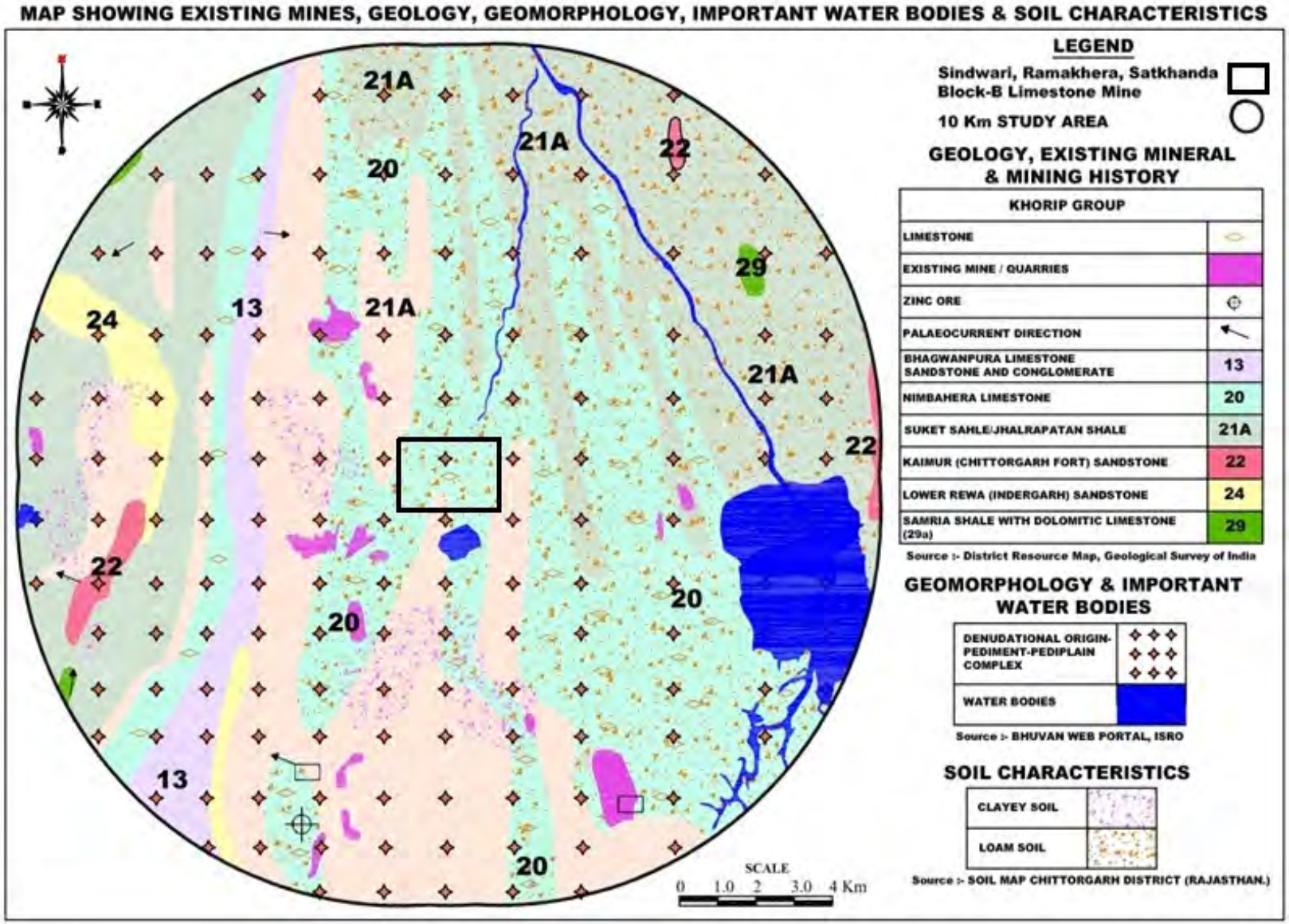



**Figure 1.10: Geomorphology of Study area**

## Drainage:

The western, southern and northern parts of district are generally plain area. Hills are scattered in Chhoti Sadri, Bari Sadri and Pratapgarh Tehsil. Hill ranges towards east of Chittaurgarh town runs north-south with intervening valleys parallel to each other. Chittaurgarh and Pratapgarh Tehsil are partly hilly and partly plain.

The drainage pattern is well developed and drainage density varies from 0.3 to 1 km/sq.km. Chambal is the only perennial river. It enters the district near Gandhi Sagar and flows towards NE for about 50 km and then passes into Kota district. The other main rivers are Banas, Gambhiri, Gujjali, Bamani, Berach, Jakham and Wagon. The Banas River originates in Udaipur district and enters Chittaurgarh through Rashmi tehsil. It passes through Somi, Sankhli, Pahunia, and Unchkia villages. The Ghambhiri Riveroriginating in Madhya Pradesh flowing through Nimbhahera and Chittaurgarh tehsils joins Berach River. It passes through villages of Khor, Myara, Sarthal and Tai.

## Drainage Pattern of the Project Site:

There is no perennial nalla/river passing through the ML area. The area shows dendritic drainage pattern but general flow of rain water is towards north-east side. Threes nallahs exist in south eastern part of lease area. These merge and flow towards north to NNE direction and after passing through the lease area proceed further and meet river Gambhiri. One more nallah enters the lease area from south-western side and after draining through the lease area in north–east direction confluences into the eastern nallah.

Seasonal nallahs shall not be disturbed during the mining. 50 m safety barrier will be left at both side of nalla and plantation will be done in safety barrier. The storm water shall not be discharged directly out of the ML boundary. Protective measuresto arrest silt & loose sediments with surface run-offs, will be undertaken during course of mining which would be maintained regularly till Conceptual stage.

Garland drain of width 1.0m and depth 1.0m will be constructed along with settling tank (about 12 nos)of size 8.0m x 5.0m x 1.5m. Siltation pond of size 16m X 10m X 2.5 m will also be constructed at the base of the quarry/ dump to check and arrest flow of loose sediments with surface run offs. It will be regularly de-silted especially after rains.

Retaining wall (1.5m x 1.5m x 1.5) will also be constructed in boundary to prevent over flow during rains. However, OB/waste will be backfilled simultaneously from 5th year onwards and top soil will be used for greenbelt/plantation. There will be no change in the natural drainage pattern of the buffer zone due to mining.

**Drainage Map:**

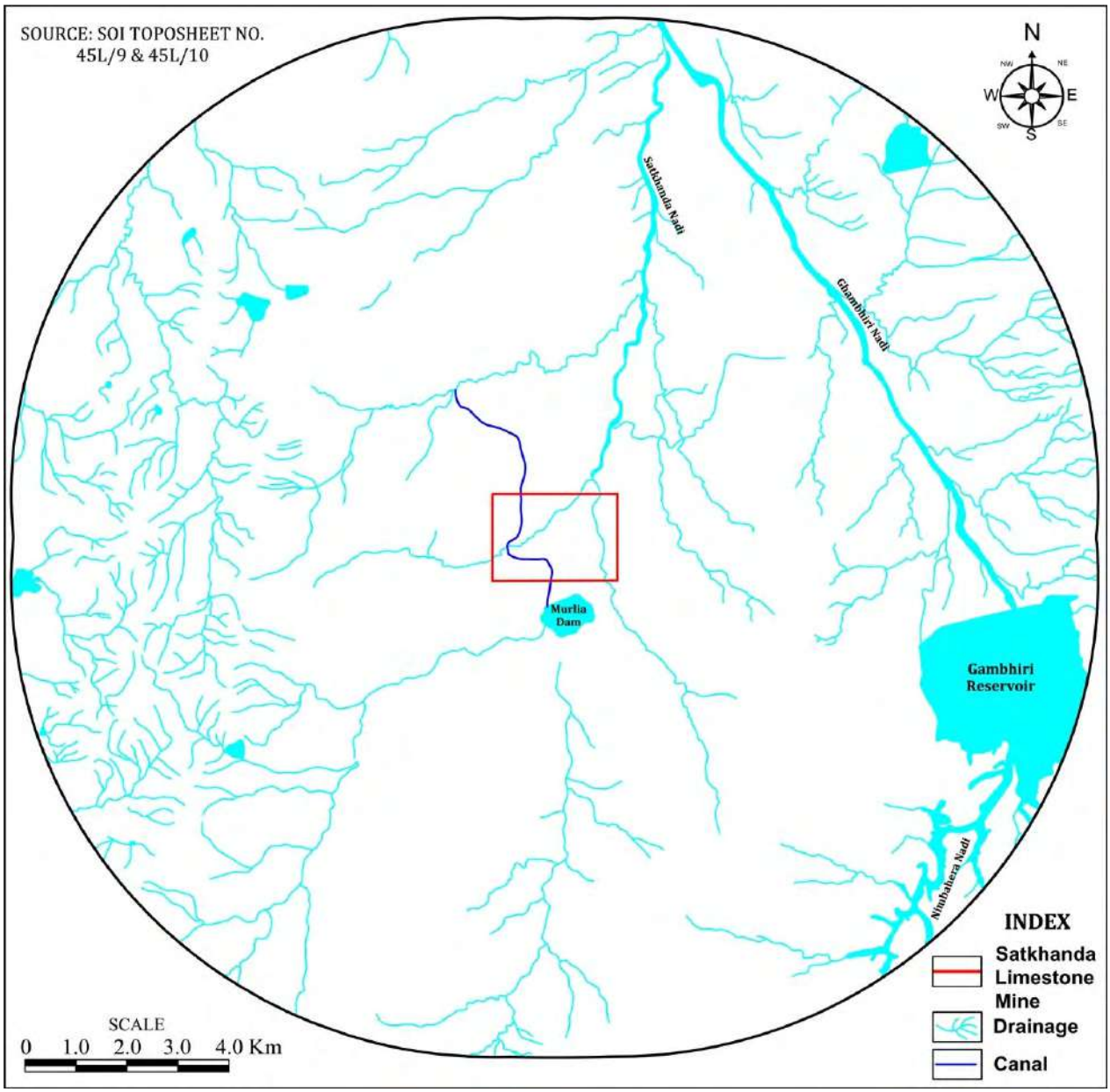



**Figure 1.11: Drainage Map**

**Photographs showing Surface Water Bodies in Study Area:**

**Figure 1.12: Gambhiri DamFigure 1.13: Canal in the Study Area**

## 1.3 Details of Wetland:

A wetland is a distinct ecosystem that is flooded by water, either permanently or seasonally, where oxygen-free processes prevail. The primary factor that distinguishes wetlands from other land forms or water bodies is the characteristic vegetation of aquatic plants, adapted to the unique hydric soil.

Any wetland site which has been listed under the Ramsar Convention that aims to conserve it and promote sustainable use of its natural resources is called a Ramsar Site. As per as Ramsar Site there are only two wetland sites in Rajasthan, which is in Jaipur and Bharatpur District.

## Comprehensive Hydro-geological Report on ground water conditions in both core and buffer zones for Sindwari, Ramakhera, Satkhanda Block-B Limestone Deposits

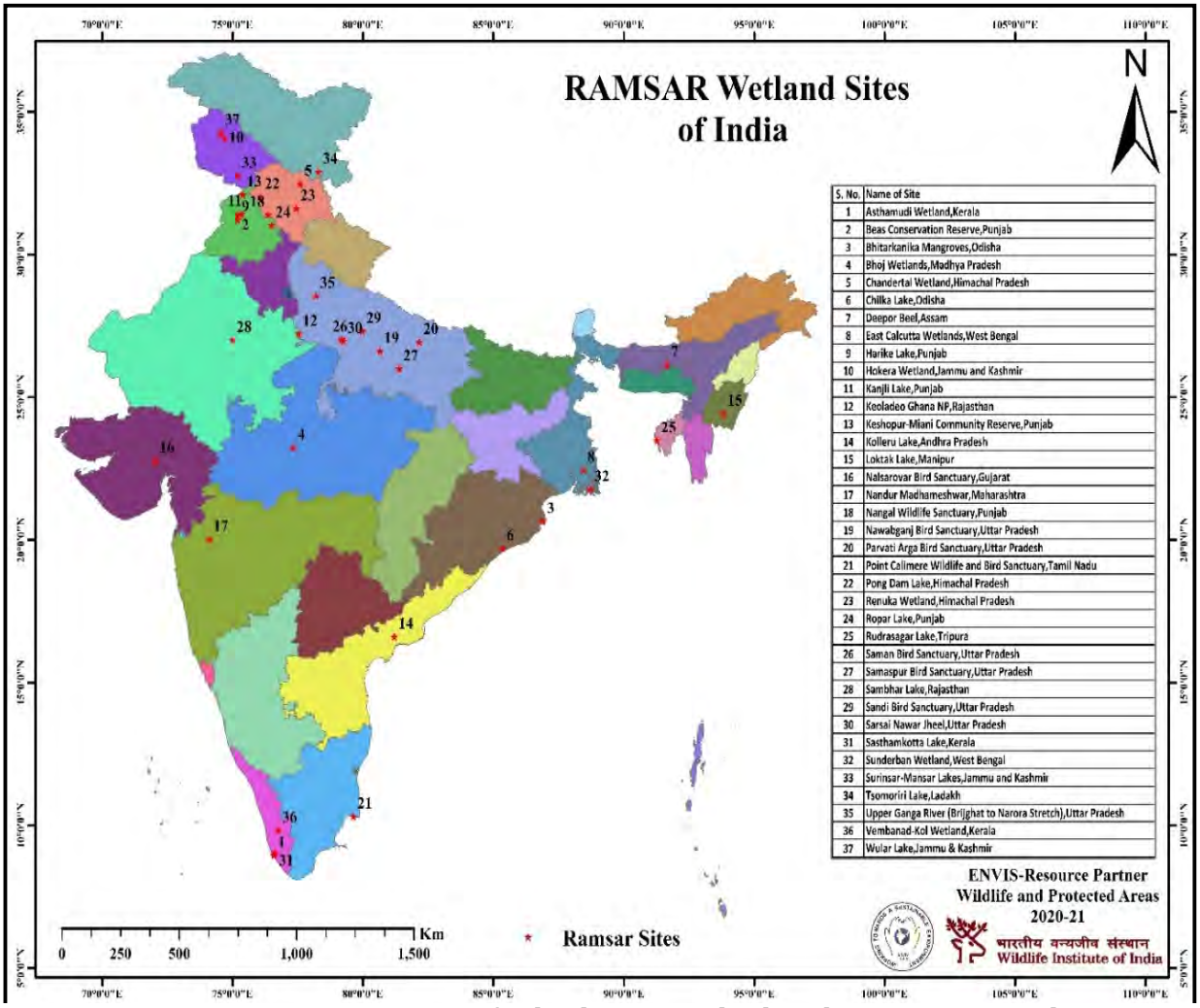



**Figure1.14: Ramsar Site Map of India showing Wetlands and Mine Site in Rajasthan (Source: Report of Wild life Institute of India, 2021)**

# CHAPTER-2.0

## 2. Groundwater situation in and around the Project Area including water level and quality data and map salong with quality issues, if any. In case of mines, Groundwater conditions in both core and buffer zone should be described.

### 2.1 Brief Geology of the area:

Geologically the region is considered to be a part of Lower Vindhyan Super Group, Khorip Group and Nimbahera Limestone formation of Proterozoic Era. The Litho – Stratigraphic succession of Vindhyan Super Group, as per Geological Survey of India (revised Stratigraphic succession given by Balmiki Prasad, 1984) is given below:

**Table 2.1: Regional Geology**

| Era | Super Group | Group | Formation | Litho Units |
|---|---|---|---|---|
| PROTEROZOIC | LOWER VINDHYAN | Khorip | Suket Shale | Not Exposed |
| | | | NimbaheraLimestone | Limestone |
| | | | Bari Shale/ Nimbahera Shale | Shales |
| | | | Jiran Sandstone (Khorimalan Conglomerate) | Sandstone and Khorimalan Conglomerate |
| | | Lasrawan | Binota Shale | Shale |
| | | | Kalmia Sandstone | Not Exposed |
| | | Sand | Palri Shale | Not Exposed |
| | | | Sawa Sandstone | Not Exposed |
| | | Satola | Bhagwanpura Limestone | Not Exposed |
| | | | Khardeola Sandstone | Not Exposed |
| | | | Khairmalia Andesite | Not Exposed |
| | | | Unconformity<br>Berach Granite | |
| | Bhilwara | Hindoli | Badesar | Not Exposed |

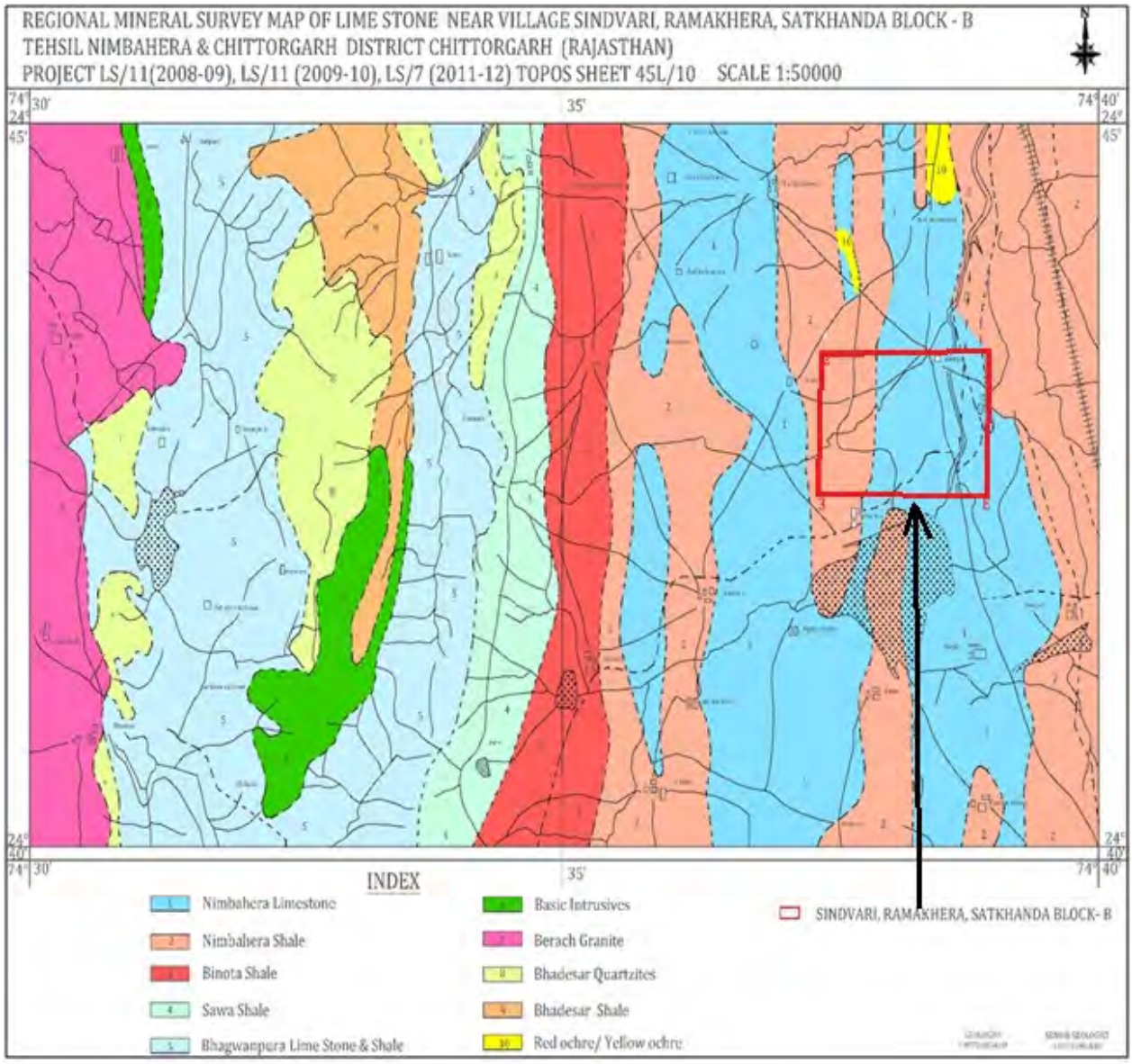



**Figure 2.1: Regional Geology Map**

## Local Geology:

Geologically, the area comprises of Nimbahera Limestone and Nimbahera shale (Bari Shale) belonging to Khorip Group of Vindhyan Super Group. Most of the area is soil covered; a few outcrops are intermittently exposed. The limestone in the area is light grey, greenish grey and grey in color. The limestone is trending almost N-S direction with rolling dips varying from 5° to 15° easterly. The Stratigraphic succession of rocks in the area is summarized as follows:

**Table 2.2: Local Geology**

| Era | Super Group | Group | Formation | Litho Unit |
|---|---|---|---|---|
| PROTEROZOIC | VINDHYAN | Khorip | Suket Shale | Shale |
| | | | Nimbahera Limestone | Limestone |
| | | | Bari/ Nimbahera Shale | Shale |

### Alluvium & Soil:

The major part of the area is covered by top soil varying in thickness from 0.1m to 0.4 m with an average thickness of about 0.3 m.

### Nimbahera Limestone:

It is named after the town of Nimbahera in Chittaurgarh District. It conformably overlies the Bari Shale and also has gradational contact at places. It is massive, hard, compact, regularly jointed, slabby and occurs in thin to thick beds varying in thickness from 10cm to a meter. It is fine- grained and compact and breaks with smooth and conchoidal surface. The limestone is pale, light to dark grey, greenish grey, pinkish and reddish brown in colour with grey, green and red shale partings. The lower brownish limestone generally grades into Bari Shale through calcareous shale.

### Bari Shale:

Bari Shale is also known as Nimbahera Shale and conformably lies over Sandstone and conglomerate. Western and Eastern part of the area is occupied by this Shale. It is generally trending in N-S direction with low easterly dips. This shale is thinly bedded with thin laminations. It is typically purple or greenish purple also sometimes light brown and pale yellow in colour. It is are naceous in the lower part and calcareous towards top. Shale is soft and fragile and cannot be used as decorative stone.

**(Source: Approved Mining Plan with PMCP):**

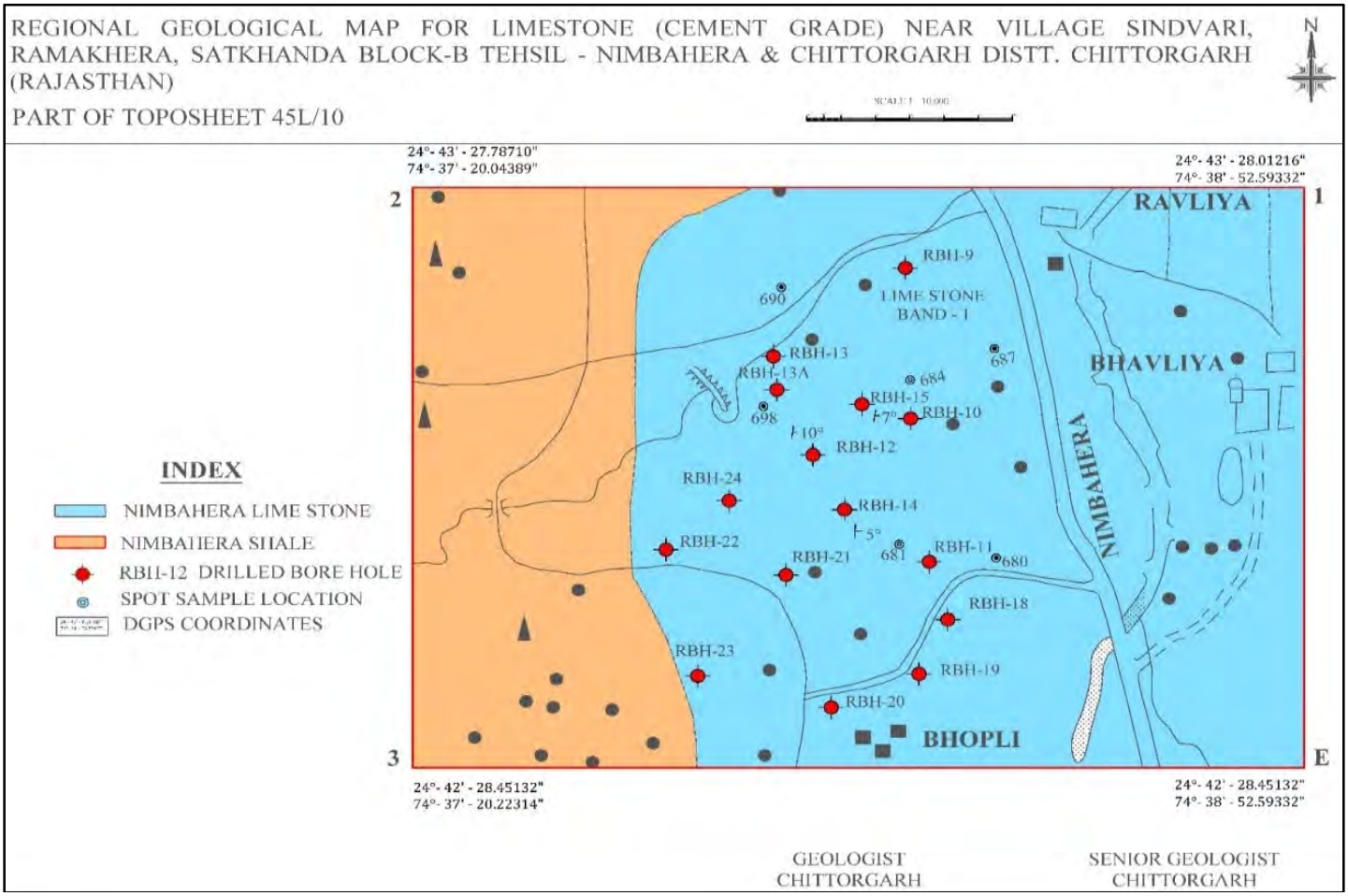



**Figure 2.2: Local Geology Map of the Core Area**

## Soils & Irrigation Practices:

Two third area of the district is covered by hilly terrain. The soils of the district falls under the following broad categories:

- Black Soils
- Yellowish brown soils
- Grayish brown alluvial soils
- Hilly soils

Black soils are found in Pratapgarh, Arnod, Dungla, Kapasan, Begun and parts of Rashmi tehsils. Yellowish brown soils are predominant in Chittaurgarh, Nimbahera, Bhopalsagar, Bhainsorgah and Bhadesar Panchyat Samities. The hilly soils occur in Bhainsorgarh, Begun, Chittaurgarh, Dungla, ChottiSadri, and Nimbahera Panchayat samities. There are broad stretches of light sandy loam soils along banks of river.

**Irrigation:**

The principal means of irrigation in the district are wells/tube wells, though some areas are irrigated by canals, tanks etc. Groundwater is the main source of irrigation and is utilized through dug wells, DCB's, and tube wells. Tanks form the second most important source of irrigation in the district. Canal irrigates only a small area. Important irrigation projects are Gambhiri (Nimbahera), Bankiy & Bassi (Chittaurgarh), Wagon (Dungla), Dorai & Orai (Begun), Bhoplasagar (Kapasan).

## 2.2 Hydrogeology of the Area:

The geological set-up of the study area is represented by various igneous and meta-sedimentary rocks. Bhilwara super group of Archean age comprising of Shale, Phyllite, Slate, Limestone, Marble, Schist, Quartzite etc. prevail in north -eastern part of the district. Meta-sedimentary rocks belonging to Vindhyan super group are exposed in central and northeastern part. Deccan Traps are exposed in southern part while thin mantle of alluvium occurs along river courses and stream channels.

**Hydro-geological Condition:**

Groundwater occurs under unconfined condition in saturated zone of rock formation. Its occurrence is controlled by topography, physiography and structural features of the geological formations. The movement of the groundwater in hard rock areas is governed by size, openness, interconnection and continuity of structural weak planes while in unconsolidated rocks, ground water movement takes places through pore space between grains. Water bearing properties of different aquifers are described below:

**Groundwater in Vindhyans:**

**Sandstone:**

The Vindhyan sandstone, which is jointed and fractured, occurs in small pockets around Madhura Tala village. This aquifer is tapped by open wells ranging in depth from 6m to 12m. The depth to water level varies from 4mbgl to 9mbgl. Yield of wells ranges from 10 to 150m$^3$/day. Thickness of the water column ranges from 1m to5m.

**Shales:**

Shales intercalated with calcareous material generally forms poor aquifer. Depth of open wells ranges from 6m to 18m. Depth to water level range from 5mbgl to 10m,bgl. Deep water level condition occurs towards north of Pratapgarh. Thickness of water column ranges from 0.80m to 5.50m. Yield test show specific capacity of wells is of the order of 0.181m$^3$/min/m and optimum yield is 0.06m$^3$ /min.

**Nimbahera Limestone:**

It is named after the town of Nimbahera in Chittaurgarh District. It conformably overlies the Bari Shale and also has gradational contact at places. It is massive, hard, compact, regularly jointed, slabby and occurs in thin to thick beds varying in thickness from 10cm to a meter. It is fine- grained and compact and breaks with smooth and concoidal surface. The limestone is pale, light to dark grey, greenish grey, pinkish and reddish brown in colour with grey, green and red shale partings. The lower brownish limestone generally grades into Bari Shale through calcareous shale.

**Groundwater in Unconsolidated Sediments:**

**Alluvium**:

Alluvium occurs overlying the weathered hard rock formation. It has limited thickness and aerial extension. It is confined to riverbeds and riverbanks. The depth to water level is less than 10m,bgl near river courses but exceeds 25m in other areas.

**Table No. 2.3: Hydro-geological Parameter details**

| Sr. n. | Particulars | Details |
|---|---|---|
| 1 | Aquifer | Limestone |
| 2 | Water Level | Pre-monsoon: 75mbgl-80mbgl<br>Post-monsoon: 70mbgl-75mbgl |
| 3 | Specific Yield | 50-125m3/day |
| 4 | Hydraulic Conductivity | 0.66 m/day |
| 5 | Transmissibility | 72.96m$^2$/day |
| 6 | Fluctuation | 4m to 5 m |
| 7 | Water Level Trend | Water level trend flow maximum towards North Eastdirection |

### 2.2.1 Aquifer Description [Type, Depth, Storability, Permeability and Porosity]:

**Deep Aquifer System:**

The study area reveals that basalt, sandstone, quartzite, granite/gneiss, phyllite etc. forms the hard rock aquifer. Multiple aquifer system is found in basaltic terrain. Groundwater potentialities are within contact zone of basalt and others lithological units. Shallow aquifer up to 30m depth is encountered in all bore wells except at Kotra, Sohagpura, and Arnod.Its yield is 2 lpm to 15 lpm. First deep aquifer was encountered in depth range of 26m and 90m. Its yield varies from 6 lpm to 105 lpm. Yield less than 3 lpm is found at Pratapgarh and Sohagpura. Second deep aquifer is encountered in depth range of 40m to 92m, which yields 20 lpm to 100 lpm. Third deep aquifer was observed between 95m to 105m, which forms a negative zone.

**(Source: Yearly report 2019-20, CGWB)**

### 2.2.2 Ground water flow and aquifer interaction [flow direction, Ground water – surface water connectivity]:

It is estimated that 3 tube wells will be sufficient enough to meet out the proposed water requirement. There is no perennial existing drainage within the lease area. Three nallahs exist in south eastern part. These merge and flow towards north to NNE direction and after passing through the lease area precede further and meet river Satkhanda and ultimately merges into river Gambhiri. One more nallahs enters the lease area from south-western side and after draining through the lease area in north –east direction confluences into the eastern nallahs described above. Nallahs willnot be disturbed and applicable statutory barrier will be left along both sides. There is a canal crossing the lease area diagonally from South to North (Seasonal), which will be protected by 50m safety zone on the both the sides. Water bodies in buffer zone will not be disturbed. Storm water shall not be discharged directly out of the ML area into any water bodies. At lower level and over flow to seasonal water courses, garland drain of width 1.0m wide and depth 1.0m will be constructed. Garland drain will be channelized to settling tanks of 8m x 5m x 1.5m size& Siltation pond of 16m x 10m X 2.5m. It will be regularly de-silted especially after rains. Retaining wall (1.5m x 1.0m X 1.5m) will also be constructed around the waste dump. After complete sedimentation, storm water will be channelized in RWHs through garland drains within ML area which will be used for different activities and overflow water will follow natural drainage out of ML area. .

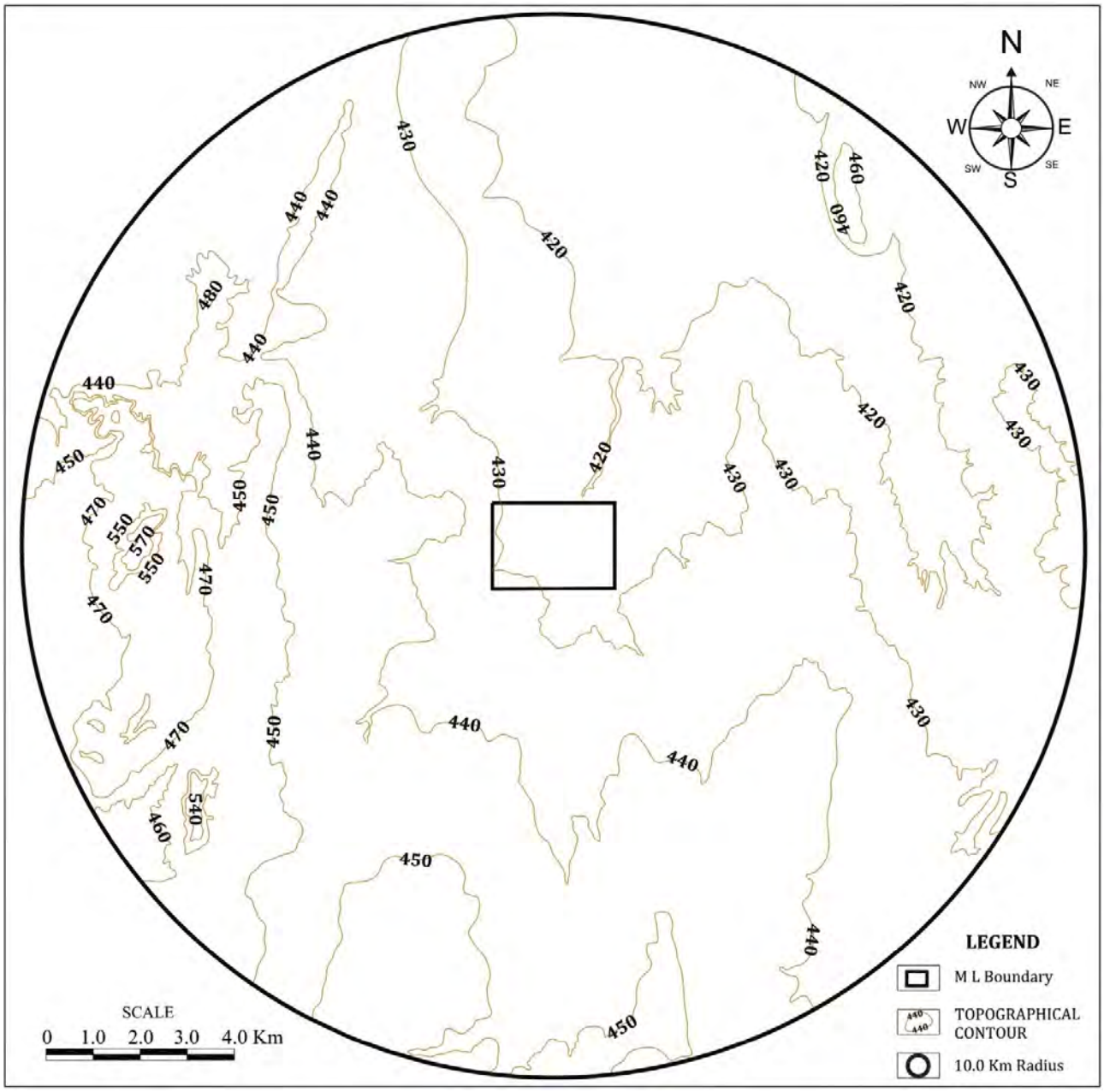



**Figure 2.3: Surface level contour Map of 10 KM buffer zone**

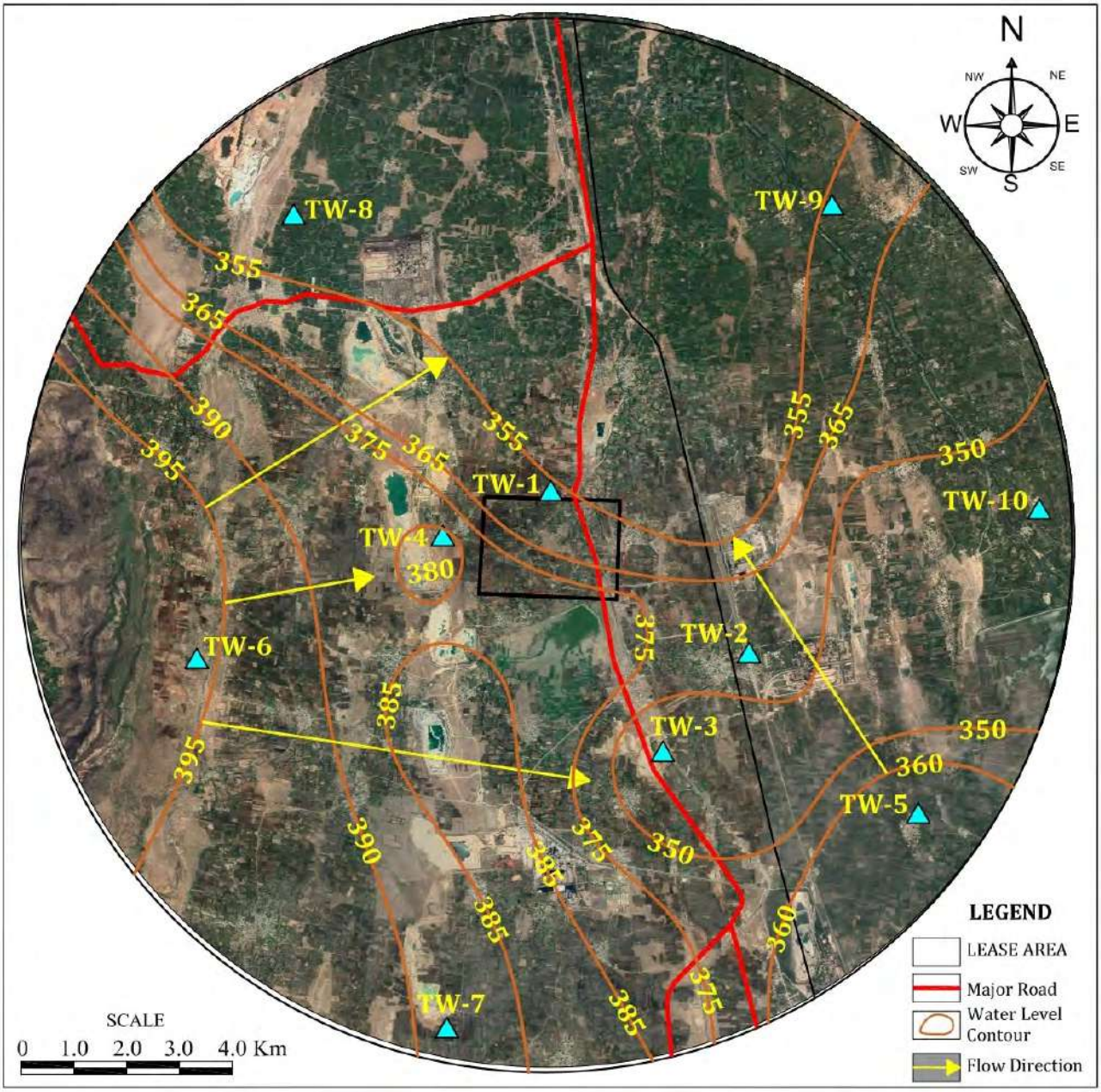



**Figure 2.4: Water level contour Map of 10 KM buffer zone**

### 2.2.3 Ground water level trend analysis [pre – monsoon and post – monsoon] Last 10 years:

The regional water level ranges between 30 mbgl to 60 mbgl below ground level during the pre-monsoon period and post monsoon water levels are 25mbgl to 40m bgl below ground level.

In study area water level ranges between 75 mbgl to 80 mbgl below ground level during the pre-monsoon period and post monsoon water levels are 70mbgl to 75m bgl below ground level.

Water level of the area as per Hydro-geological studies carried out in adjoining block varies **from 70m to 80m.** The ultimate pit limit will be about 344 MSL from max ground level and water level is 359MSL.

### Decadal (2011-2020) water level trend:

Water level trend has been worked out for Pre-monsoon and Post-Monsoon comparing water level data majority of monitoring stations are declining trend ranging from 0.12m/yr to 0.96m/yr during pre-monsoon. Rise in water level is observed in small pockets in Pratapgarh, Bari Sadri and Chttaurgarh tehsils. During post-monsoon decadal trend show rise and decline of 0.03 and 0.25m/yr respectively.

**Table 2.4: Ground Water Level data of Core & Buffer Zone**

| Well No | Latitude | Longitude | Type of well | Pump (HP) | Depth (m) | Diameter (Inch) | Land Surface Elevation (m AMSL) | Depth to Water Below Land Surface, pre-monsoon (m) | Water Table Elevation (m AMSL) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 24°43´24.70´´N | 74°38´03.10´´E | Tube Well | SUBMERSIBLE | 121 | 9 | 432 | 76 | 356 |
| 2 | 24°41´52.90´´N | 74°40´16.60´´E | Tube Well | SUBMERSIBLE | 185 | 9 | 439 | 88 | 351 |
| 3 | 24°40´52.90´´N | 74°39´20.80´´E | Tube Well | SUBMERSIBLE | 155 | 9 | 437 | 91 | 346 |
| 4 | 24°43´05.80´´N | 74°37´02.90´´E | Tube Well | SUBMERSIBLE | 121 | 9 | 438 | 58 | 380 |
| 5 | 24°40´27.75´´N | 74°42´11.47´´E | Tube Well | SUBMERSIBLE | 152 | 9 | 438 | 76 | 362 |
| 6 | 24°41´40.15´´N | 74°34´11.89´´E | Tube Well | SUBMERSIBLE | 152 | 9 | 473 | 78 | 395 |
| 7 | 24°37´59.12´´N | 74°37´06.30´´E | Tube Well | SUBMERSIBLE | 130 | 9 | 451 | 62 | 389 |
| 8 | 24°46´12.28´´N | 74°35´05.07´´E | Tube Well | SUBMERSIBLE | 160 | 9 | 436 | 80 | 356 |
| 9 | 24°46´30.77´´N | 74°41´12.23´´E | Tube Well | SUBMERSIBLE | 121 | 9 | 418 | 63 | 355 |
| 10 | 24°43´23.83´´N | 74°43´32.84´´E | Tube Well | SUBMERSIBLE | 155 | 9 | 425 | 76 | 349 |

### 2.2.4 Hydrograph of the water level: (Resource: GROUND WATER DEPARTMENT, JODHPUR, Jodhpur Govt. of Raj)

**Table 2.5: Hydrograph of the water level**

| Water level Trend 2011-2020 of near village: Baroli Ghata (Govt. Piezometers/Dug well) | | |
|---|---|---|
| **Year** | **Pre-monsoon** | **Post -monsoon** |
| 2011 | 21.20 | 3.60 |
| 2012 | 17.10 | 4.50 |
| 2013 | 15.70 | 4.30 |
| 2014 | 15.30 | 3.50 |
| 2015 | 15.10 | 9.80 |
| 2016 | 15.20 | 1.50 |
| 2017 | 14.10 | 6.60 |
| 2018 | 14.70 | 4.02 |
| 2019 | 11.48 | 1.60 |
| 2020 | 13.03 | 12.0 |

**Hydrograph of Village Baroli Ghata**

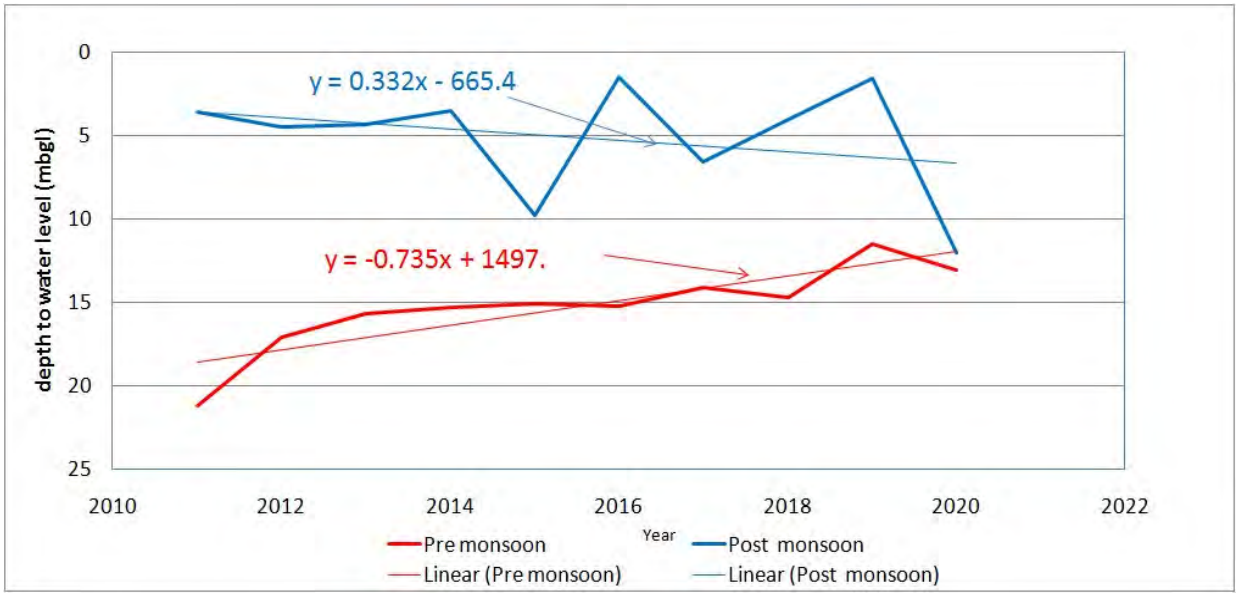



**Figure 2.5: Hydrograph of the water level (Village: Baroli Ghata)**

**Table 2.6: Hydrograph of the water level Resource: GROUND WATER DEPARTMENT, JODHPUR, Jodhpur Govt. of Raj)**

| Water level Trend 2011-2020 near village: Karoonda (Govt. Piezometers/Dug well) | | |
|---|---|---|
| Year | Pre-monsoon | Post -monsoon |
| 2011 | 19.50 | 1.90 |
| 2012 | 18.70 | 3.90 |
| 2013 | 17.80 | 3.40 |
| 2014 | 20.80 | 4.25 |
| 2015 | 18.30 | 7.90 |
| 2016 | 29.10 | 1.90 |
| 2017 | 32.10 | 9.70 |
| 2018 | 31.69 | 1.76 |
| 2019 | 31.69 | 1.76 |
| 2020 | 23.95 | 29.50 |

**Hydrograph of Village Karoonda**

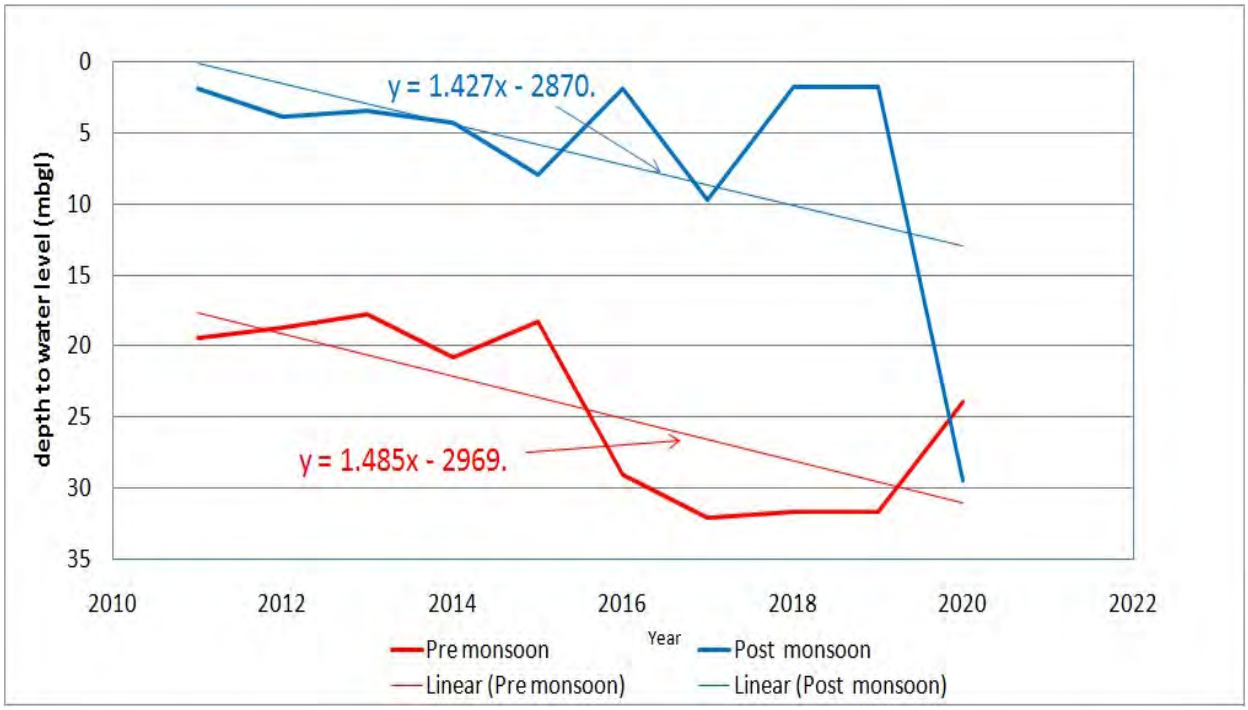



**Figure 2.6: Hydrograph of the water level (Village: Karoonda)**

**Table 2.7: Hydrograph of the water level Resource: GROUND WATER DEPARTMENT, JODHPUR, Jodhpur Govt. of Raj)**

| Water level Trend 2011-2020 of near village: Mangrol (Govt. Piezometers/Dug well) | | |
|---|---|---|
| Year | Pre-monsoon | Post -monsoon |
| 2011 | 9.40 | 2.40 |
| 2012 | 8.20 | 2.90 |
| 2013 | 7.80 | 2.30 |
| 2014 | 8.40 | 3.10 |
| 2015 | 8.10 | 4.30 |
| 2016 | 8.00 | 8.60 |
| 2017 | 8.20 | 4.20 |
| 2018 | 8.30 | 3.27 |
| 2019 | 8.46 | 2.06 |
| 2020 | 8.30 | 8.00 |

**Hydrograph of Village Mangrol**

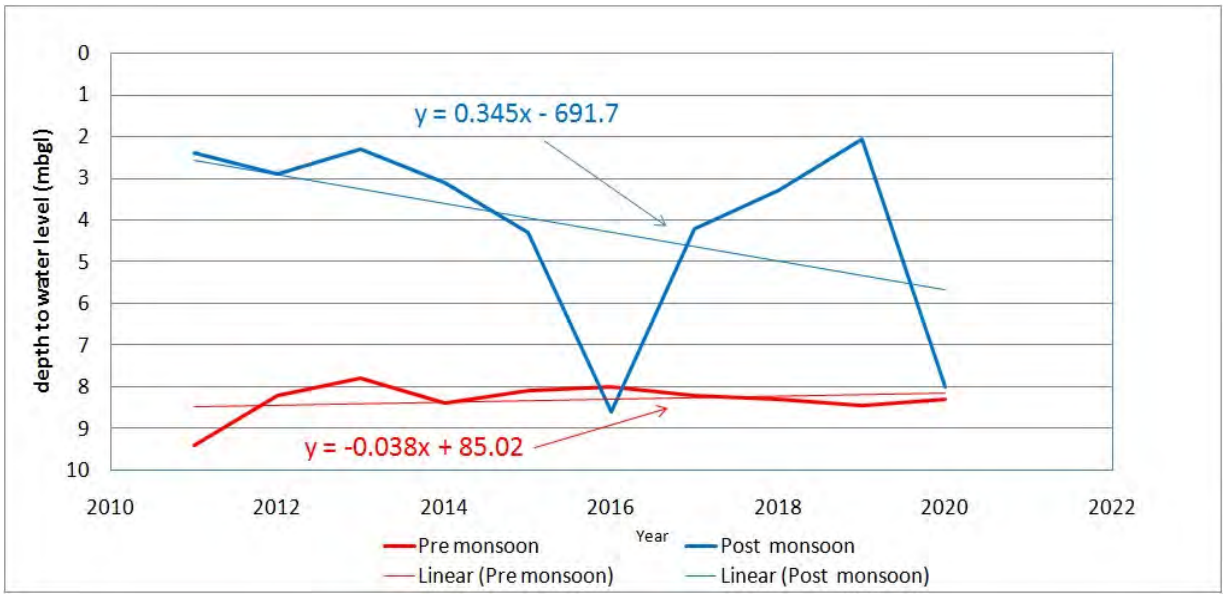



**Figure 2.7: Hydrograph of the water level (Village: Mangrol)**

**Table 2.8: Hydrograph of the water level Resource: GROUND WATER DEPARTMENT, JODHPUR, Jodhpur Govt. of Raj)**

| Water level Trend 2011-2020 of near village Teela Khera : (Govt. Piezometers/Dug well) | | |
|---|---|---|
| Year | Pre-monsoon | Post -monsoon |
| 2011 | 15.40 | 3.40 |
| 2012 | 13.40 | 3.50 |
| 2013 | 13.10 | 3.05 |
| 2014 | 12.90 | 4.50 |
| 2015 | 12.40 | 9.60 |
| 2016 | 14.00 | 4.30 |
| 2017 | 15.40 | 4.70 |
| 2018 | 16.05 | 4.23 |
| 2019 | 11.34 | 3.65 |
| 2020 | 12.40 | 10.90 |

**Hydrograph of Village Teela Khera**

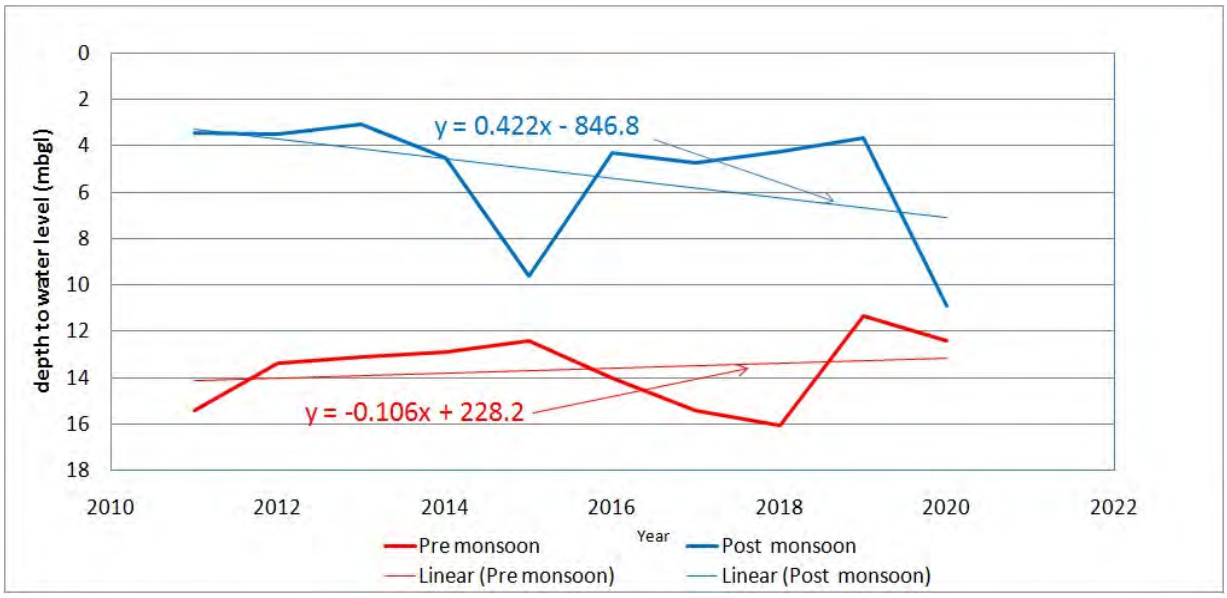



**Figure 2.8: Hydrograph of the water level (Village: Teela Khera)**

### 2.2.5 Predictedwaterleveldeclineforaffectedaquifers[Groundwatermodeling]:

As per the new guidelines notified on 24.09.2020, Groundwater modeling study shall be required to be submitted for projects falling in Safe category where withdrawal by industries is >500 m3/d in hard rock and >2000 m3/d in soft rock/alluvium. Total fresh water requirement for the project is 83KLD, hence **Groundwater modeling** is not applicable.

### 2.2.6 Ground water quality [pre - monsoon and post –monsoon]:

Primary sources of potable water in the area are mainly shallow and deep tube wells along with few dug wells. The ground water samples were collected and tested from eight different representative sites through bore wells. Water samples were collected as grab samples and were analyzed for various parameters as per the procedures specified in "Standard Methods for the Examination of Water and Wastewater" published by American Public Health Association (APHA). Different physico-chemical parameters of ground water during study period (October, November & December 2018) were compared with standard specifications IS 10500:2012 at each monitoring stations. The details of monitoring locations are given inTable-2.16 and its water quality is given in table 2.17.

**Table 2.9: Ground water sample location details**

| Location Code | Location Name | Sample Collection Details | Co-ordinates |
|---|---|---|---|
| GW-1 | Mine Site | Open well Water from Mine Site | N24⁰42'39.09" E74⁰37'43.29" |
| GW-2 | Cherliya | Govt. Hand pump- Near Aganwadi School | N24⁰42'10.21" E74⁰37'33.04" |
| GW-3 | Tilakhera | Govt. Hand pump-Near house of Mr.Magi Ram Jat S/o Brij Mohan Lal Jat, | N24⁰42'53.36" E74⁰41'48.22" |
| GW-4 | Amarpura | Borewell-Near house of Mr. Parasmal, S/o Mr. Manju Seeya | N24⁰43'30.16" E74⁰35'58.58" |
| GW-5 | Bar Ka Amrana | Govt. Hand pump-Near house of Mr. Chanada Dangi, S/o Mr.Heera | N24⁰43'58.55" E74⁰40'32.45" |
| GW-6 | Satkhanda | Govt. Hand pump-Near house of Mr. Girdhari Lal, S/o. Dev Narayan | N24⁰44'46.03" E74⁰38'37.50" |
| GW-7 | Sitaram Ji Ka Khera | Borewell-Near house of Mr. Beru Lal, S/o Mr. Negi Ram Jat | N24⁰43'58.97" E74⁰40'13.87" |
| GW-8 | Mangrol | Borewell-Near house of Mr. Anil Jat, S/o Mr. Gopal Jat | N24⁰41'42.54" E74⁰39'51.19" |

(*GW=Groundwater)

**Table 2.10: Ground Water Analysis as per IS: 10500 – 2012**

| S. No. | Parameter | Requirement (Desirable Limits) | Permissible Limits in the Absence of Alternate Source | Units | Mine Site | Cherliya | Tilakhera | Amarpura | Bar Ka Amrana | Satkhanda | Sitaramji K Khera | Mangrol |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date of Sampling | | 1. | | 24.10.2018 | | | | | | | |
| 1 | Color | 5 | 15 | Hazen | <5 | <5 | < 5 | < 5 | < 5 | < 5 | < 5 | < 5 |
| 2 | pH | 6.5 – 8.5 | NR | - | 6.93 | 6.93 | 6.74 | 7.15 | 6.95 | 6.69 | 7.19 | 6.85 |
| 3 | Turbidity | 1 | 5 | NTU | 1.1 | 1.1 | 1.2 | 1.0 | 1.1 | 1.2 | 1.0 | 1.1 |
| 4 | Dissolved Solids | <500 | <2000 | Mg/L | 523 | 436 | 1,114 | 922 | 892 | 760 | 686 | 898 |
| 5 | Aluminum as Al | <0.03 | <0.2 | Mg/L | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 6 | Ammonia (as Total Ammonia-N) | 0.5 | NR | Mg/L | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| 7 | Anionic Detergents as MBAS | <0.2 | <1.0 | Mg/L | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| 8 | Barium as Ba | 0.7 | NR | Mg/L | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| 9 | Boron as B | <1.0 | <5.0 | Mg/L | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| 10 | Calcium as Ca | <75 | <200 | Mg/L | 116.80 | 92.80 | 131.20 | 153.60 | 142.40 | 140.80 | 102.40 | 99.20 |
| 11 | Chloramines as $Cl_2$ | 4.0 | NR | Mg/L | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 | < 1.0 |
| 12 | Chloride as Cl | <250 | <1000 | Mg/L | 47.99 | 25.19 | 147.95 | 89.97 | 101.97 | 81.98 | 41.99 | 111.97 |
| 13 | Copper as Cu | <0.05 | <1.5 | Mg/L | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 14 | Fluoride as F | <1.0 | <1.5 | Mg/L | 0.63 | 0.59 | 0.34 | 0.84 | 0.63 | 0.57 | 0.82 | 0.69 |
| 15 | Free Residual Chlorine | <0.02 | -- | Mg/L | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| 16 | Iron as Fe | <0.03 | <1.0 | Mg/L | 0.03 | 0.03 | 0.08 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| 17 | Magnesium as Mg | <30.0 | <100 | Mg/L | 10.69 | 10.69 | 28.19 | 38.88 | 31.10 | 14.58 | 23.23 | 27.22 |
| 18 | Manganese as Mn | <0.1 | <0.3 | Mg/L | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 19 | Nitrate as $NO_3$ | <45.0 | <100 | Mg/L | 33.63 | 32.82 | 108.06 | 103.28 | 28.17 | 56.51 | 27.37 | 22.85 |
| 20 | Phenolic | <0.001 | <0.002 | Mg/L | < 0.001 | < 0.001 | < 0.001 | <0.00 | <0.00 | < 0.001 | < 0.001 | < 0.001 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Compounds as $C_6H_5OH$ | | | | | | | 1 | 1 | | | |
| 21 | Selenium as Se | <0.01 | NR | Mg/L | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 22 | Sulphate as $SO_4$ | <200 | <400 | Mg/L | 56.38 | 48.75 | 116.84 | 107.57 | 136.50 | 69.30 | 139.16 | 234.26 |
| 23 | Total Alkalinity as $CaCO_3$ | <200 | <600 | Mg/L | 264.00 | 240.00 | 396.00 | 544.00 | 408.00 | 304.00 | 328.00 | 388.00 |
| 24 | Total Hardness as $CaCO_3$ | <200 | <600 | Mg/L | 336.00 | 276.00 | 444.00 | 484.00 | 484.00 | 412.00 | 352.00 | 360.00 |
| 25 | Zinc as Zn | <0.03 | <0.2 | Mg/L | < 0.01 | < 0.01 | < 0.01 | < .01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 26 | Cadmium as Cd | <0.01 | NR | Mg/L | < 0.003 | < 0.003 | < 0.003 | < 0.001 | < 0.003 | < 0.003 | < 0.003 | < 0.003 |
| 27 | Lead as Pb | <0.05 | NR | Mg/L | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 28 | Mercury as Hg | <0.001 | NR | Mg/L | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 | < 0.001 |
| 29 | Total Arsenic as As | <0.01 | NR | Mg/L | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 | < 0.005 |
| 30 | Total Chromium as Cr | <0.05 | NR | Mg/L | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| 31 | Sulphide as S | 0.05 | NR | Mg/L | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| 32 | Nickel as Ni | 0.02 | NR | Mg/L | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| ***Test Method: - APHA (22nd Edition).*** | | | | | | | | | | | | |

**Result:**

The analysis results indicate that pH of the groundwater were found to be in range of 6.69-7.19. The TDS were found to be in the range of 436–1114Mg/l (Village – Tilakhera). Other parameters like Total Hardness as $CaCO_3$ (276Mg/l - 484 Mg/ l), Total Alkalinity (240 – 544Mg/ l), Calcium as Ca (92.80 – 153.60 Mg/ l), Magnesium as Mg (10.69 – 38.88 Mg/ l), Chloride as Cl (25.19-147.95 Mg/l), Sulphate as $SO_4$(48.75 -234.26Mg/l) and Fluoride as F- (0.34-0.84Mg/l) were found within the prescribed limits in absence of alternate source. The water quality is potable in nature.

### 2.2.7 Water quality of nearby waterbodies:

Two Surface water samples were collected during the study period. The details of monitoring locations are given in table 2.17 and its quality is given in Table 2.18 respectively.

**Table 2.11: Location detail of surface water**

| ocation Code | Location Name | Sample Collection Details | Co-ordinates |
|---|---|---|---|
| SW-1 | Cherliya | Pond from Cherliya | N24⁰42'01.27" E74⁰37'36.07" |
| SW-2 | Gambhiri Dam | Gambhiri Dam Water | N24⁰42'11.41" E74⁰43'57.68" |

**Table 2.12: Surface Water Analysis**

| S. No. | Parameters | Unit | Limits as per IS: 2296 Class C | Cherliya pond | Gambhiri Dam |
|---|---|---|---|---|---|
| | Date of Sampling | | | 24.10.2018 | |
| 1 | pH | - | 6.50 – 8.50 | 7.43 | 7.88 |
| 2 | Turbidity | NTU | -- | < 1 | < 1 |
| 3 | Total Hardness (as $CaCO_3$) | mg/L | -- | 160 | 136 |
| 4 | Total Alkalinity (as $CaCO_3$) | mg/L | -- | 116 | 120 |
| 5 | Chlorides (as Cl) | mg/L | <600 | 41.99 | 29.99 |
| 6 | Sulphate (as $SO_4$) | mg/L | <400 | 74.47 | 70.25 |
| 7 | Nitrate (as $NO_3$) | mg/L | <50 | 9.14 | 10.71 |
| 8 | Fluoride (as F) | mg/L | <1.5 | 0.32 | 0.21 |
| 9 | BOD | mg/L | <3 | 3.5 | 2.0 |
| 10 | COD | mg/L | -- | 13 | 9 |
| 11 | Phenolic Compounds (as $C_6H_5OH$) | mg/L | <0.005 | < 0.001 | < 0.001 |
| 12 | Lead (as Pb) | mg/L | <0.1 | < 0.01 | < 0.01 |
| 13 | Iron (as Fe) | mg/L | <50 | < 0.01 | < 0.01 |
| 14 | Arsenic (as As) | mg/L | <0.2 | < 0.005 | < 0.005 |
| 15 | Cadmium (as Cd) | mg/L | <0.01 | < 0.003 | < 0.003 |
| 16 | Total Chromium (as Cr) | mg/L | <0.05 | < 0.01 | < 0.01 |
| 17 | Mercury (as Hg) | mg/L | -- | < 0.001 | < 0.001 |
| 18 | Copper (as Cu) | mg/L | <1.5 | < 0.01 | < 0.01 |
| 19 | Zinc (as Zn) | mg/L | <15 | < 0.01 | < 0.01 |
| 20 | Selenium (as Se) | mg/L | <0.05 | < 0.01 | < 0.01 |
| 21 | Oil &Grease | mg/L | -- | <5 | <5 |
| 22 | Colour | Hazen | <300 | <1 | <1 |
| 23 | Dissolved Solids | mg/L | <1500 | 342 | 298 |
| 24 | Residual Free Chlorine | mg/L | -- | < 0.2 | < 0.2 |
| 25 | Boron (as B) | mg/L | -- | < 0.1 | < 0.1 |
| 26 | Calcium (as Ca) | mg/L | -- | 46.40 | 33.60 |
| 27 | Magnesium (as Mg) | mg/L | -- | 10.69 | 12.64 |
| 28 | Dissolved Oxygen | mg/L | >4 | 4.7 | 5.2 |
| ***Test Method:- APHA (22nd Edition)*** | | | | | |

**Observation:**

The results obtained for the collected samples indicate that the surface water quality was found to be well within the prescribed standards limit (Class C). The analysis results indicate that pH of the surface water are in range of 7.43- 7.88. The TDS were found to be in the range of 298– 342 Mg/ l. Other parameters like Total Hardness as $CaCO_3$, Total Alkalinity, Calcium as Ca, Magnesium as Mg, Chloride as Cl, Sulphate as $SO_4$ and Fluoride as F except BOD found slightly higher at Cherliya Pondmay be due to some anthropogenic activities such as bathing, cattle bathing etc. as per Class C.

# CHAPTER-3.0

**3. Details of the Tube wells/ Bore wells proposed to be constructed. This includes the aquifer parameters, drilling depth, diameter; tentative lithological log details of pump to be lowered, H.P. of pump tentative discharge of tube wells / bore wells, etc. locations to be marked on the site plan/map, location of proposed Piezometer.**

## 3.1 Details of Existing Tube wells:

After survey of the mining lease area of Satkhanda Block – B (474.5 ha), it was observed that farmers have been abstracting groundwater from 62 existing tube wells for irrigation. The irrigation tube wells are located invariably in private lands. The basic information of Tube wells falling in the ML area is given as below:

**Table No. 3. 1: Tube well details**

| S.No. | Village | Irrigation Private Tube wells (Nos.) |
|---|---|---|
| 1 | Ravliya | 32 |
| 2 | Bhopali | 11 |
| 3 | Cherliya | 8 |
| 4 | Bhavliya | 6 |
| 5 | Sindwari | 3 |
| 6 | Mangrol | 2 |
| **Total** | | **62** |

**(Source: Approved Mining Plan)**

It was observed that the aforesaid irrigation tube wells have an average depth of 150m with generate pumping yield of 4000 lph (minimum) to around 20000 lph (maximum) in fracture/ cavity zones. The electric motors installed are mostly of 7.5 HP to 12.5 HP.

**Table 3.2:Proposed Tube wells details**

| S No. | Type of Structure Name | Year of Construction | Depth (Meter) | Diameter (mm) | Depth to Water Level (Meters below Ground Level) | Discharge(m3/Hour) | Operational hours/Day | Operational Days/Year | Mode of Lift Name | Horse Power of Pump | Whether fitted with Water Meter | Whether Permission /Registered with CGWA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Tube well | After lease execution and CGWA Permission | 121 | 200 | 76 | 10.00 | 3 | 300 | Submersible Pump | 8.00 | Yes | No |
| 2 | Tube well | | 121 | 200 | 75 | 10.00 | 3 | 300 | Submersible Pump | 8.00 | Yes | No |
| 3 | Tube well | | 160 | 200 | 81 | 10.00 | 3 | 300 | Submersible Pump | 8.00 | Yes | No |

## Details of Proposed Piezometers:

Two (2) Piezometers are required to be constructed down to a depth of 125 m for regular monitoring of the ground water levels and quality of ground water in the project area. The tentative design of the proposed Piezometers has been given in **Figure-3.4**.

It is recommended to avail the services of experienced hydro geologist to study the cutting samples to take appropriate decision during drilling. Drill cutting samples are to be collected at every three meters' interval and at every change of formation. The samples thus collected are to be marked and preserved for possible future reference and for inserting appropriate screens. Design (well assembly) and construction of observation well (Piezometers) should be on the basis of actual strata met during drilling with the consultation of hydro geologist.

### Table 3.3: Proposed Piezometers Location

| S. No | Name | Latitude | Longitude |
|---|---|---|---|
| **1** | Pz-1 | 24°42´45.22´´N | 74°38´23.81´´E |
| **2** | Pz-2 | 24°43´21.81´´N | 74°38´15.84´´E |

### Table 3.4: Proposed Rainwater Harvesting Structure Location

| S. No. | Rain Water Harvesting Structures | Latitude | Longitude |
|---|---|---|---|
| 1 | RWH-1 | 24°43´22.77´´N | 74°37´46.84´´E |
| 2 | RWH-2 | 24°42'56.65"N | 74°38'27.63"E |
| 3 | RWH-3 | 24°43´10.58´´N | 74°37´30.01´´E |
| 4 | RWH-4 | 24°42´33.93´´N | 74°37´41.97´´E |

**Map Showing of Proposed Piezometers &RWH Structures:**

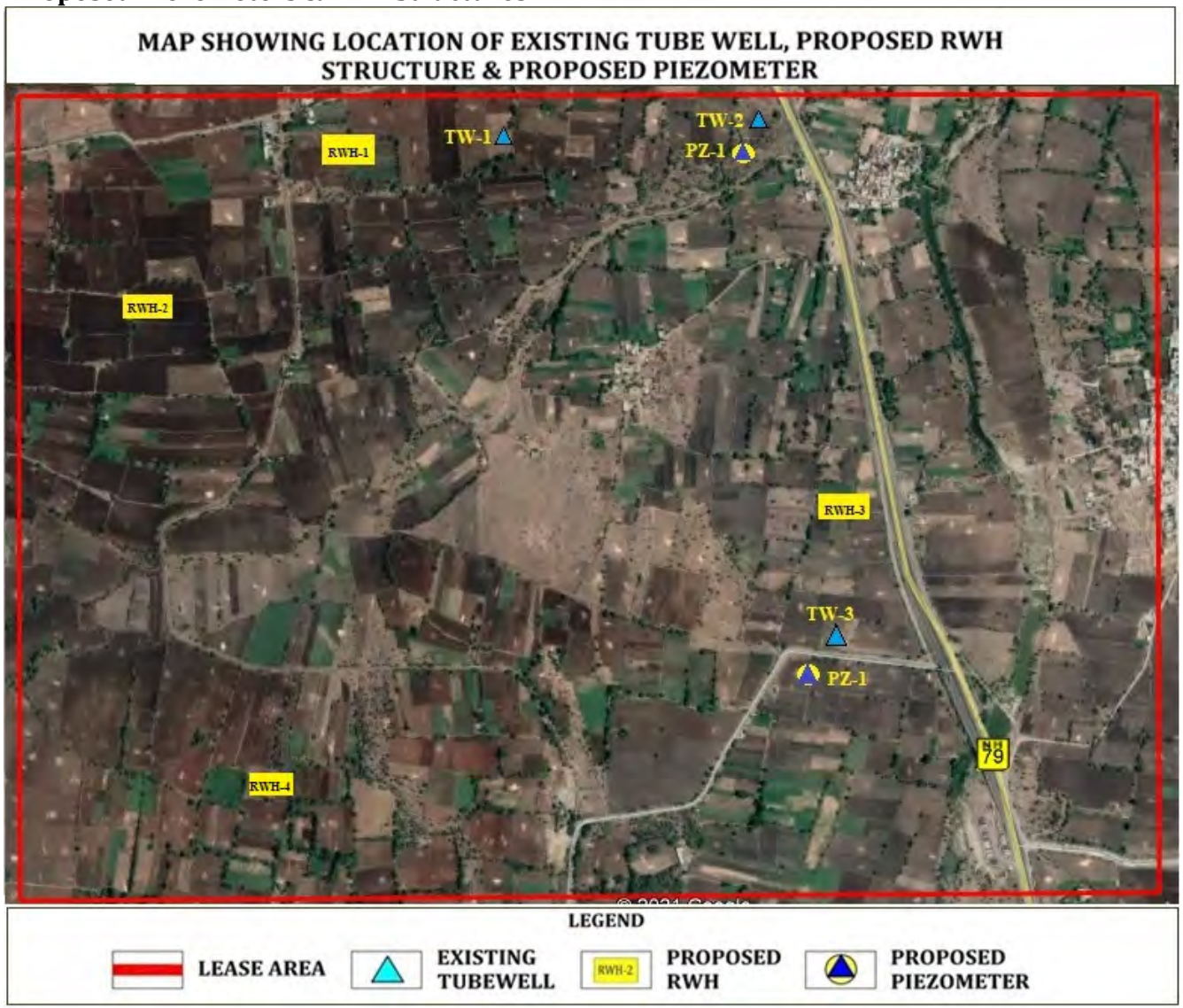



**Figure 3.1: Location of Proposed Tube wells, Piezometers& RWH**

# CHAPTER-4.0

## 4. Details of Geophysical studies carried out in and around the project area. Groundwater resources computation of the block in which the project falls.

### 4.1 Geophysical Investigation Methods:

A variety of methods are available to assist in the assessment of geological sub-surface conditions. The main emphasis of the framework undertaken was to determine the thickness and composition of the sub-surface formation and to identify water-bearing zones. The geophysical method is used to investigate the Earth's subsurface. Geology, mining, environment, geotechnical, civil engineering, hydrology and archeology etc. are studied at scientific level by geophysical method.

### Electrical resistivity:

Electrical resistivity, also known as resistivity, is a bulk electric property of all material that shows how strongly it opposes the flow of electric current. A low resistivity indicates a material that readily allows the flow of electric current – i.e. it is conductive. All materials have a certain resistivity and fall within a broad range. The SI unit for resistivity is the ohmmeter (Ωm). Resistivity surveys can allow for imaging the subsurface of the Earth on both land and in water, with scans in either 2D sections or 3D volumes of rock. It is used by applying a small and highly controlled electric current across an array of electrodes, and so resistivity surveys are often coupled with induced polarization surveys as the latter also make use of such electrodes.

Because of the conductive properties of various metal-bearing minerals, resistivity can be used in mineral exploration for metallic ore bodies. However, resistivity is an important method for many other studies including geotechnical and groundwater exploration. For example, geologists can use resistivity imaging to create a time-lapse of biological or hydrological events over time, to capture % change of dynamic conditions e.g. examining how water discharges underground, or see how dangerous chemical spillages are moving underground.

### Basic Principles:

The electrical properties of rocks in the upper part of the earth's crust are dependent upon the lithology, porosity and the degree of pore space saturation and the salinity of the pore water. Saturated rocks have lower resistivity than unsaturated and dry rocks. The higher the porosity of the saturated rocks, or the salinity of the saturating fluids, the lower is the resistivity. The presence of clays and conductive minerals also reduces the resistivity of the rock.

The resistivity of earth materials can be studied by measuring the electrical potential distribution produced at the earth's surface by an electric current that is passed through the earth. Current is moved through the

subsurface from one current electrode to the other and the potential difference is recorded as the current passes. From this information, resistivity values of various layers are acquired and layer thickness can be identified.

The apparent resistivity values determined are plotted as a log function versus the log of the spacing between the electrodes. These plotted curves identify thickness of layers. If there are multiple layers (more than 2), the acquired data is compared to a master curve to determine layer thickness.

This method is least influenced by lateral in-homogeneities and capable of providing higher depth of investigation. The resistance R of a certain material is directly proportional to its length L and cross-sectional area A, expressed as:

R = Rs * L/A (in Ohm)

Where Rs is known as the specific resistivity (characteristic of the material and independent of its shape or size)

With Ohm's Law,

R = dV/I (Ohm)

Where dV is the potential difference across the resistor and I is the electric current through the resistor. The specific resistivity may be determined by:

Rs = (A/L) * (dV/I) (in Ohm m)

**Vertical Electrical Sounding (VES):**

When carrying out a resistivity sounding, current is led into the ground by means of two electrodes. With two other electrodes, situated near the centre of the array, the potential field generated by the current is measured. From the observations of the current strength and the potential difference, and taking into account the electrode separations, the ground resistivity can be determined. During a resistivity sounding, the separation between the electrodes is step-wise increased (**known as a Wenner and Schlumberger Array**), thus causing the flow of current to penetrate greater depths. When plotting the observed resistivity values against depth on double logarithmic paper, a resistivity graph is formed, which depicts the variation of resistivity with depth. This graph can be interpreted with the aid of a computer, and the actual resistivity layering of the subsoil is obtained. The depths and resistivity values provide the hydro geologist with information on the geological layering and thus the occurrence of groundwater.

**Table 4.1 Coordinates of the Geophysical Location**

| No. of Station Point | Latitude | Longitude | Depth (m) |
|---|---|---|---|
| Station 1 | 24º42’42.80’’N | 74º38’44.90’’E | 100 |
| Station 2 | 24º42’35.80’’N | 74º37’39.60’’E | 100 |
| Station 3 | 24º43’24.60’’N | 74º38’03.00’’E | 100 |

**Figure 4.1: Geophysical Field Survey in Project Site**

## Wenner Array Method:

The Wenner array consists of four collinear, equally spaced electrodes. The outer two electrodes are typically the current (source) electrodes, the inner two electrodes are the potential (receiver) electrodes and one is the centre point electrode. The array spacing expands about the array midpoint while maintaining an equivalent spacing between each electrode. The advantages of the Wenner array are that the apparent resistivity is easily calculated in the field and the instrument sensitivity is not as crucial as with other array geometries. Relatively small current magnitudes are needed to produce measurable potential differences. The disadvantages are that for each sounding, all of the electrodes have to be moved to a new position. In order to image deep into the earth, it is necessary to use longer current cables; handling the cables and electrodes between each measurement can be cumbersome, especially in difficult terrain. The Wenner array is also very sensitive to near surface in homogeneities which may skew deeper electrical responses. The Wenner array is a labor-intensive survey because of the cable lengths required and the movement of the electrodes during the survey. Substantial lengths of cable energized with current at high voltage present a safety hazard.

## Calculation formula:

$$\text{Resistivity} = 2\pi(A*R)$$

Where,
$\pi$= 3.14
A= Area
R= Reading in ohms

## Material and Methodology:

The equipment used for the survey is:
1. Aqua-meter CRM500 automatic
2. Coiled wire
3. Measuring Tape
4. Hammer
5. GPS Device
6. Current, potential and centre electrodes

## Procedures:

1. A levelled terrain in the VES station was located and the Wenner array was used for the present study.
2. The five electrodes were positioned symmetrically along a straight line i.e.,Middle of side centerelectrode ($C_0$), the current electrodes ($C_1$ and $C_2$) on the outside and the potential electrodes ($P_1$ and $P_2$) which are also the inner electrodes place in between $C_1$ and $C_2$.

3. CRM500 automaticAqua-meter was made such as: setting the number of circles to 4, automatic reading of values in ohms and sending anauto current into the ground.

4. To change the depth range of penetration, the current electrodes were displaced outwards while the potential electrodes remained fixed.

5. When the ratio of the distance between the current electrodes to that of the potential electrodes became too large, the potential electrodes were displaced outwards otherwise the potential difference becomes too small to measure with sufficient accuracy.

6. The maximum current electrode spacing (AB/2) was 100m and the Aquameter was used to measure and record the resistance of the subsurface.

7. The values of the resistance obtained in the field were multiplied with their respective Geometric factor (k) which gave the required apparent resistivity results.
8. The required data was plotted on a log-log graph sheet and the resultant curve was quantitatively interpreted.

**Results:**
Interpretation results of the soundings are shown in the table presented below:

**Table 4.2 Geophysical data (Station-1)**

| $C_1$ | $P_1$ | $P_2$ | $C_2$ | a | Geometric Factor (G) | Reading in ohms | Calculated Apparent Resistivity in Ohms. m | Datum |
|---|---|---|---|---|---|---|---|---|
| 0 | 5 | 10 | 15 | 5 | 31.4 | 143.05 | 4491.71 | 7.5 |
| 5 | 10 | 15 | 20 | 5 | 31.4 | 97.92 | 3074.58 | 12.5 |
| 10 | 15 | 20 | 25 | 5 | 31.4 | 69.05 | 2168.24 | 17.5 |
| 15 | 20 | 25 | 30 | 5 | 31.4 | 36.46 | 1144.79 | 22.5 |
| 20 | 25 | 30 | 35 | 5 | 31.4 | 79.01 | 2480.84 | 27.5 |
| 25 | 30 | 35 | 40 | 5 | 31.4 | 64.60 | 2028.29 | 32.5 |
| 30 | 35 | 40 | 45 | 5 | 31.4 | 48.72 | 1529.88 | 37.5 |
| 35 | 40 | 45 | 50 | 5 | 31.4 | 53.82 | 1690.02 | 42.5 |
| 40 | 45 | 50 | 55 | 5 | 31.4 | 41.78 | 1312.00 | 47.5 |
| 45 | 50 | 55 | 60 | 5 | 31.4 | 32.45 | 1018.88 | 52.5 |
| 0 | 10 | 20 | 30 | 10 | 62.8 | 213.90 | 13433.00 | 15 |
| 5 | 15 | 25 | 35 | 10 | 62.8 | 90.03 | 5654.02 | 20 |
| 10 | 20 | 30 | 40 | 10 | 62.8 | 94.99 | 5965.13 | 25 |
| 15 | 25 | 35 | 45 | 10 | 62.8 | 73.51 | 4616.73 | 30 |
| 20 | 30 | 40 | 50 | 10 | 62.8 | 78.66 | 4939.92 | 35 |
| 25 | 35 | 45 | 55 | 10 | 62.8 | 28.40 | 1783.34 | 40 |
| 30 | 40 | 50 | 60 | 10 | 62.8 | 202.00 | 12685.60 | 45 |
| 0 | 15 | 30 | 45 | 15 | 94.2 | 137.88 | 12988.67 | 22.5 |
| 5 | 20 | 35 | 50 | 15 | 94.2 | 99.15 | 9339.49 | 27.5 |
| 10 | 25 | 40 | 55 | 15 | 94.2 | 100.00 | 9420.00 | 32.5 |
| 15 | 35 | 45 | 60 | 15 | 94.2 | 25.79 | 2429.65 | 38.75 |
| 15 | 35 | 45 | 60 | 15 | 94.2 | 25.79 | 2429.65 | 38.75 |

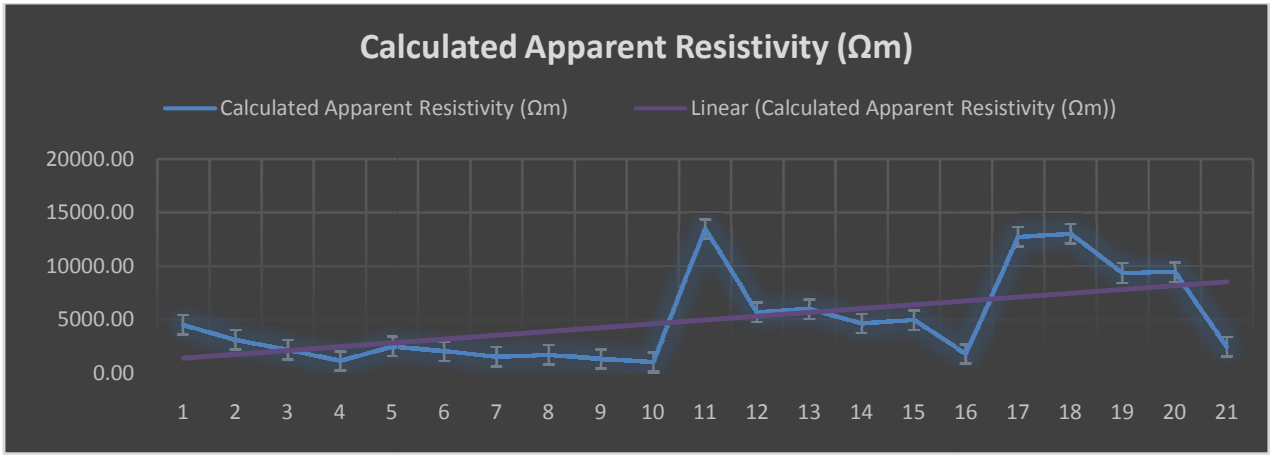



**Figure 4.2: Geophysical Graph Status (Station-1)**

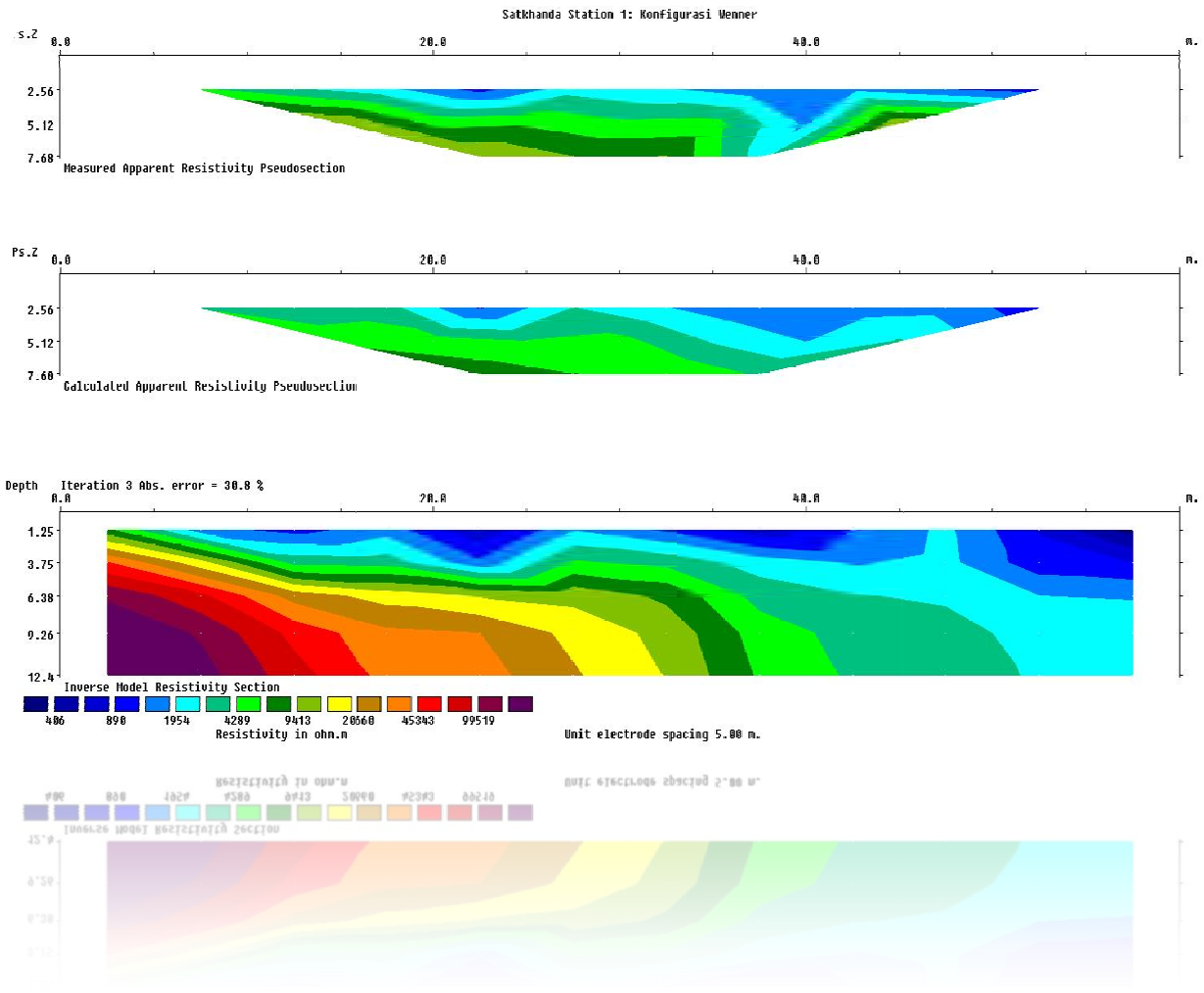



**Figure 4.3: Geophysical Status (Station-1)**

**Table 4.3 Geophysical data (Station-2)**

| $C_1$ | $P_1$ | $P_2$ | $C_2$ | a | Geometric Factor (G) | Reading in ohms | Calculated Apparent Resistivity in Ohms.m | Datum |
|---|---|---|---|---|---|---|---|---|
| 0 | 5 | 10 | 15 | 5 | 31.4 | 255.91 | 8035.55 | 7.5 |
| 5 | 10 | 15 | 20 | 5 | 31.4 | 162.83 | 5112.83 | 12.5 |
| 10 | 15 | 20 | 25 | 5 | 31.4 | 74.79 | 2348.33 | 17.5 |
| 15 | 20 | 25 | 30 | 5 | 31.4 | 114.18 | 3585.22 | 22.5 |
| 20 | 25 | 30 | 35 | 5 | 31.4 | 104.74 | 3288.82 | 27.5 |
| 25 | 30 | 35 | 40 | 5 | 31.4 | 103.53 | 3250.73 | 32.5 |
| 30 | 35 | 40 | 45 | 5 | 31.4 | 87.58 | 2750.16 | 37.5 |
| 35 | 40 | 45 | 50 | 5 | 31.4 | 86.72 | 2723.13 | 42.5 |
| 40 | 45 | 50 | 55 | 5 | 31.4 | 75.75 | 2378.43 | 47.5 |
| 45 | 50 | 55 | 60 | 5 | 31.4 | 80.43 | 2525.39 | 52.5 |
| 0 | 10 | 20 | 30 | 10 | 62.8 | 403.47 | 25338.06 | 15 |
| 5 | 15 | 25 | 35 | 10 | 62.8 | 206.70 | 12980.67 | 20 |
| 10 | 20 | 30 | 40 | 10 | 62.8 | 186.09 | 11686.26 | 25 |
| 15 | 25 | 35 | 45 | 10 | 62.8 | 96.62 | 6067.52 | 30 |
| 20 | 30 | 40 | 50 | 10 | 62.8 | 150.00 | 9420.00 | 35 |
| 25 | 35 | 45 | 55 | 10 | 62.8 | 188.38 | 11830.28 | 40 |
| 30 | 40 | 50 | 60 | 10 | 62.8 | 374.14 | 23495.86 | 45 |
| 0 | 15 | 30 | 45 | 15 | 94.2 | 272.96 | 25712.45 | 22.5 |
| 5 | 20 | 35 | 50 | 15 | 94.2 | 135.64 | 12777.13 | 27.5 |
| 10 | 25 | 40 | 55 | 15 | 94.2 | 127.50 | 12010.50 | 32.5 |
| 15 | 35 | 45 | 60 | 15 | 94.2 | 79.45 | 7484.38 | 38.75 |

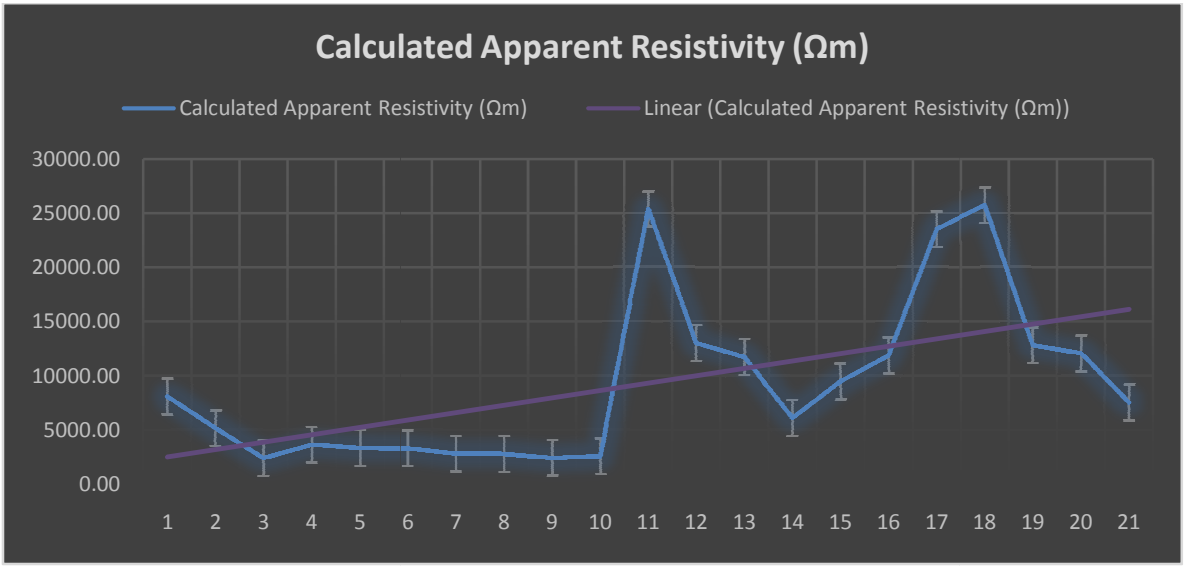



**Figure 4.4: Geophysical Graph Status (Station-2)**

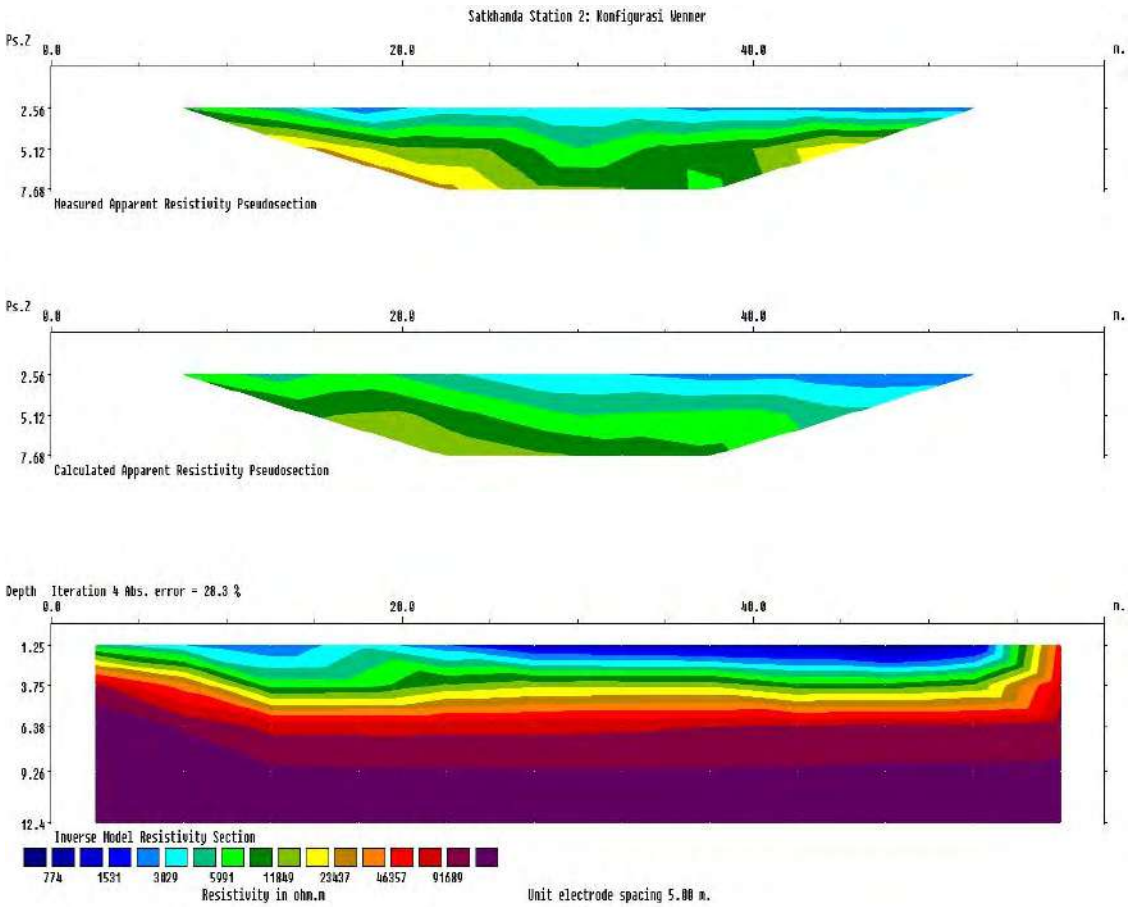



**Figure 4.3: Geophysical Status (Station-2)**

**Table 4.4 Geophysical data (Station-3)**

| $C_1$ | $P_1$ | $P_2$ | $C_2$ | a | Geometric Factor (G) | Reading in ohms | Calculated Apparent Resistivity in Ohms.m | Datum |
|---|---|---|---|---|---|---|---|---|
| 0 | 5 | 10 | 15 | 5 | 31.4 | 43.31 | 1359.84 | 7.5 |
| 5 | 10 | 15 | 20 | 5 | 31.4 | 33.21 | 1042.79 | 12.5 |
| 10 | 15 | 20 | 25 | 5 | 31.4 | 39.59 | 1243.20 | 17.5 |
| 15 | 20 | 25 | 30 | 5 | 31.4 | 28.25 | 887.01 | 22.5 |
| 20 | 25 | 30 | 35 | 5 | 31.4 | 57.66 | 1810.45 | 27.5 |
| 25 | 30 | 35 | 40 | 5 | 31.4 | 24.86 | 780.59 | 32.5 |
| 30 | 35 | 40 | 45 | 5 | 31.4 | 45.39 | 1425.31 | 37.5 |
| 35 | 40 | 45 | 50 | 5 | 31.4 | 31.37 | 985.10 | 42.5 |
| 40 | 45 | 50 | 55 | 5 | 31.4 | 47.11 | 1479.26 | 47.5 |
| 45 | 50 | 55 | 60 | 5 | 31.4 | 41.96 | 1317.54 | 52.5 |
| 0 | 10 | 20 | 30 | 10 | 62.8 | 61.42 | 3857.16 | 15 |
| 5 | 15 | 25 | 35 | 10 | 62.8 | 82.86 | 5203.43 | 20 |
| 10 | 20 | 30 | 40 | 10 | 62.8 | 62.88 | 3948.68 | 25 |
| 15 | 25 | 35 | 45 | 10 | 62.8 | 61.67 | 3872.67 | 30 |
| 20 | 30 | 40 | 50 | 10 | 62.8 | 43.35 | 2722.23 | 35 |
| 25 | 35 | 45 | 55 | 10 | 62.8 | 38.55 | 2420.70 | 40 |
| 30 | 40 | 50 | 60 | 10 | 62.8 | 55.51 | 3486.04 | 45 |
| 0 | 15 | 30 | 45 | 15 | 94.2 | 41.85 | 3941.91 | 22.5 |
| 5 | 20 | 35 | 50 | 15 | 94.2 | 65.15 | 6137.27 | 27.5 |
| 10 | 25 | 40 | 55 | 15 | 94.2 | 38.05 | 3584.60 | 32.5 |
| 15 | 35 | 45 | 60 | 15 | 94.2 | 75.64 | 7125.73 | 38.75 |

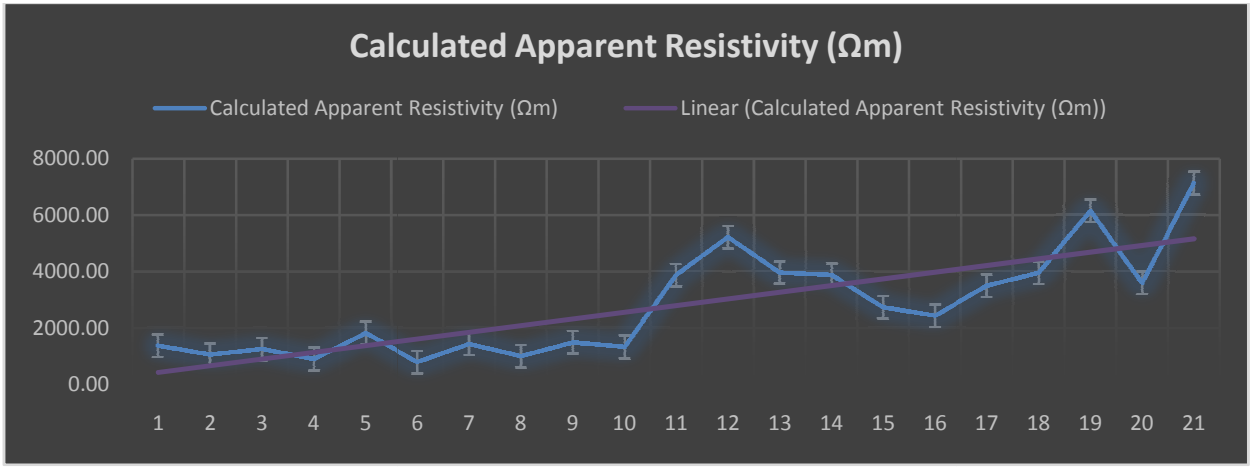



**Figure 4.6: Geophysical Graph Status (Station-3)**

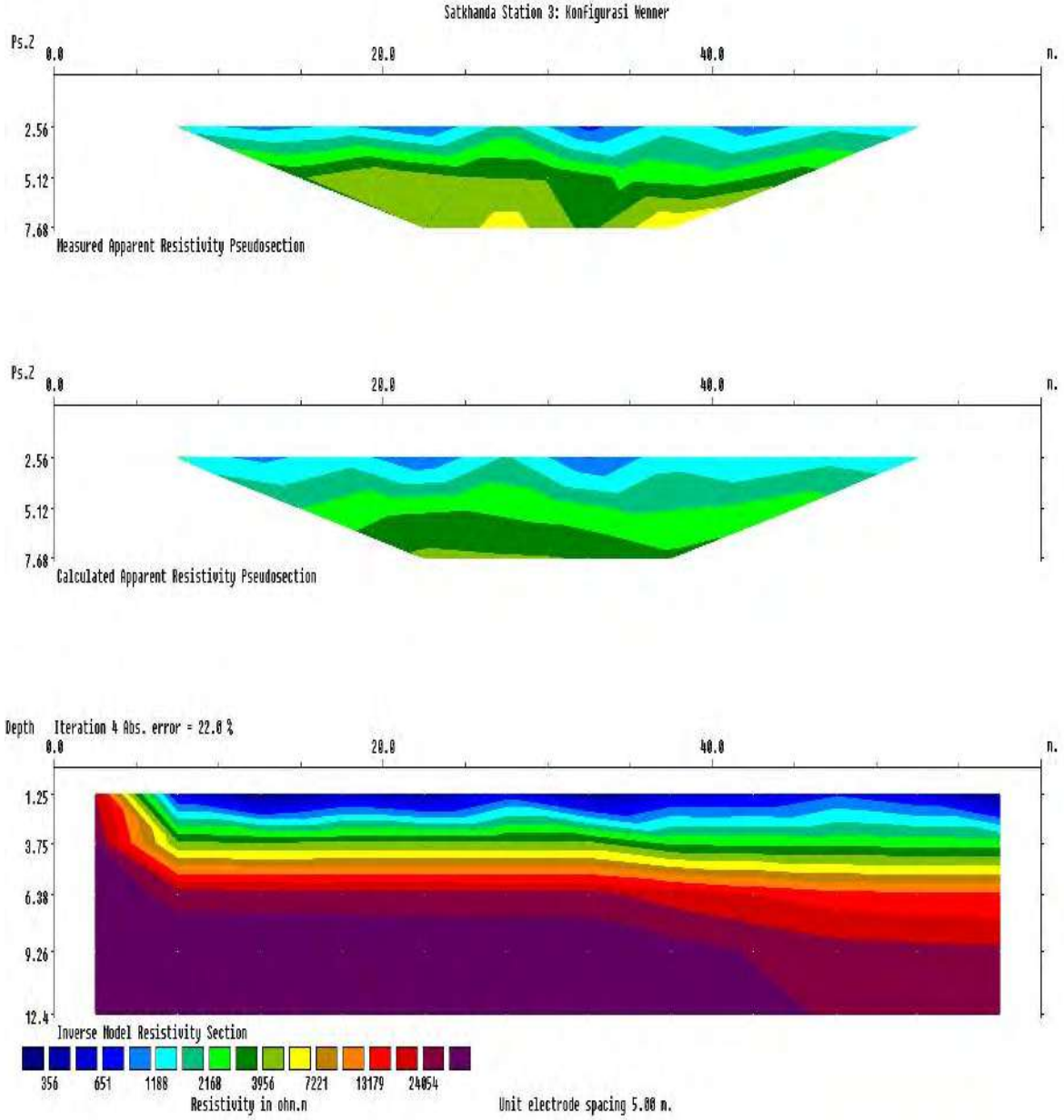



**Figure 4.7: Geophysical Status (Station-3)**

## AQUIFER PERFORMANCE TEST:

Ground water is a replenish-able resource, the quantification of which is of great importance for drawing up plans for utilization of ground water and forms an important aspect in judging the potentiality of an area in the line of total water requirement. A judicious exploitation of ground water resources cannot be planned without the basic knowledge of ground water hydraulics which is used in evaluating aquifer parameters for predicating total water resources.

Hydraulic parameters of aquifer system are determined by conducting aquifer performance test at optimum extraction rate on representative set of exploratory & observation tube wells.

Observation during aquifer performance test includes measurement of water levels and discharge rate. Water levels were measured with the help of water level indicator and the yield was measured with the help of water meter installed at the outlet delivery pipe. The effect of pumping was measured in both pumping well at standard interval for 1050min. Data collected during the test were subject to analysis by Jacob's method to calculate hydraulic parameters of aquifer. In the present area, aquifer performance test were conducted on one set of exploratory & observation tube wells.

The details of aquifer performance test data are given in the following pages:

### STEP DRAW DOWN TEST:

A step draw down test is one test in which the discharge rate is changed in controlled stages. The discharge rate is maintained at a constant value within the stage. The test is generally carried out in three steps. Drawdown measurements are taken throughout the test with each step and maximum drawdown of the well is recorded. The data obtained from the test are utilized in working out long duration pumping rate based on the characteristics determined as a result of test.

The pumping well was subjected to step drawdown test in 3 stages of 100 min. each with the help of multistage 5hp submersible pump and control valve.

In order to determine intake capacity of water by the aquifer of the area, the recharge test was carried out on deep tube well of 120 m depth. In this test, the known volume of water was injected varying from 4,000 liters to 5,000 liters in 55 minutes. The water spill over from the well till volume was 4,500 liters. However, water injection @ of 4,200 liters in 55 minutes did not spill over and the water column of 1.24 m was developed which was assimilated in to the ground water in 55 minutes.

The rate of dissemination of water column to the original static water level was periodically measured as per logarithmic scale.

Static water level = 17.51 mbgl

Vol. of water injected = 5000 liters in 5 min

Initial water column observed = 1.20 m

Diameter of Well = 8 inches

Depth of well = 17.51 mbgl

Total water dissemination period = 55 min

**TABLE -4.5: Recharge Test Data**

| Time in min. | Measured water level in m (WL) | Head (h) = (SWL – WL) (m) |
|---|---|---|
| 10 | 18.75 | 1.24 |
| 12 | 18.4 | 0.89 |
| 14 | 18.3 | 0.79 |
| 16 | 18.25 | 0.74 |
| 18 | 18.2 | 0.69 |
| 20 | 18.15 | 0.64 |
| 25 | 18.1 | 0.59 |
| 30 | 17.95 | 0.44 |
| 35 | 17.9 | 0.39 |
| 40 | 17.75 | 0.24 |
| 45 | 17.6 | 0.09 |
| 50 | 17.55 | 0.04 |
| 55 | 17.51 | 0 |

Theoretically, total head (H) developed by 5,000 liter of water injected in the well would be:

$H = V/\pi r^2$

Where:

H = Total Head

V = Volume of water = 5.0 $m^3$

r = radius of well = 0.10 m

$= 5.0/3.14 \times (0.1)^2$

H = 159.23 m

Head loss (ho) = Instantaneous head loss on injection of water prior to measurement would be:

Total Head – Observed Head

ho = H – h

ho = 159.23 – 1.24

ho = **157.99 m**

First reading at 10th min. shows that observed head (h) was only **1.24 m**. The volume of water remained in the well at the time of measurement amounts to be:

$Qm = 3.14 \times (0.1)^2 \times 1.24$

Qm = **0.039 $m^3$**

Instantaneous dissemination of water Qo would be =

$Qo = Q - Qm$

$Qo = 5.0m^3 - 0.04\ m^3$

**$Qo = 4.96\ m^3$**

Analysis of test results reveals that instantaneous dissemination of water is **4.96 m³** in 5 min and negligible water remains to be absorbed by the aquifer thereafter. However, complete water dissemination is achieved in 55 minutes.

Therefore, rate of water intake works out to be **0.05 m³/min.** i.e.**5.0 m³/hour**.

Hence,

**Recharge capacity = 120 m³/day**

***Note: - This can apparently vary with the geological regime of the area. Since, the site is confined and small, the recharge capacity is determined.***

**AQUIFER PERFORMACE TEST DATA:**

EXPLORATORY WELL

Depth of tube well l= 120 M. Diameter of tube well= 200 M.M.
Static water level = 17.51 M. Yield =15000 LIT/HR.

**Table 4.6: Pumping Test Data**

**Pumping TW No. : - 1 S.W. L. : - 17.51 m.**

| Time since pumping started (min.) | Water level (m) | Draw Down (m) | Time since pumping started (min.) | Water Level (m) | Draw Down (m) |
|---|---|---|---|---|---|
| 1 | 21.75 | 4.24 | 90 | 27.83 | 10.32 |
| 2 | 23.77 | 6.26 | 100 | 27.9 | 10.39 |
| 3 | 24.58 | 7.07 | 150 | 28.01 | 10.5 |
| 4 | 25.03 | 7.52 | 200 | 28.13 | 10.62 |
| 5 | 25.98 | 8.47 | 250 | 28.19 | 10.68 |
| 6 | 26.12 | 8.61 | 300 | 28.25 | 10.74 |
| 7 | 26.2 | 8.69 | 350 | 28.28 | 10.77 |
| 8 | 26.4 | 8.89 | 400 | 28.29 | 10.78 |
| 9 | 26.45 | 8.94 | 450 | 28.3 | 10.79 |
| 10 | 26.61 | 9.1 | 500 | 28.32 | 10.81 |
| 15 | 26.86 | 9.35 | 550 | 28.32 | 10.81 |
| 20 | 27.01 | 9.5 | 600 | 28.34 | 10.83 |

| | | | | | |
|---|---|---|---|---|---|
| 25 | 27.28 | 9.77 | 700 | 28.37 | 10.86 |
| 30 | 27.33 | 9.82 | 750 | 28.38 | 10.87 |
| 35 | 27.33 | 9.82 | 800 | 28.39 | 10.88 |
| 40 | 27.4 | 9.89 | 900 | 28.4 | 10.89 |
| 45 | 27.53 | 10.02 | 1000 | 28.41 | 10.9 |
| 50 | 27.6 | 10.09 | 1050 | 28.41 | 10.9 |
| 55 | 27.66 | 10.15 | | | |
| 60 | 27.76 | 10.25 | | | |
| 70 | 27.79 | 10.28 | | | |
| 80 | 27.83 | 10.32 | | | |

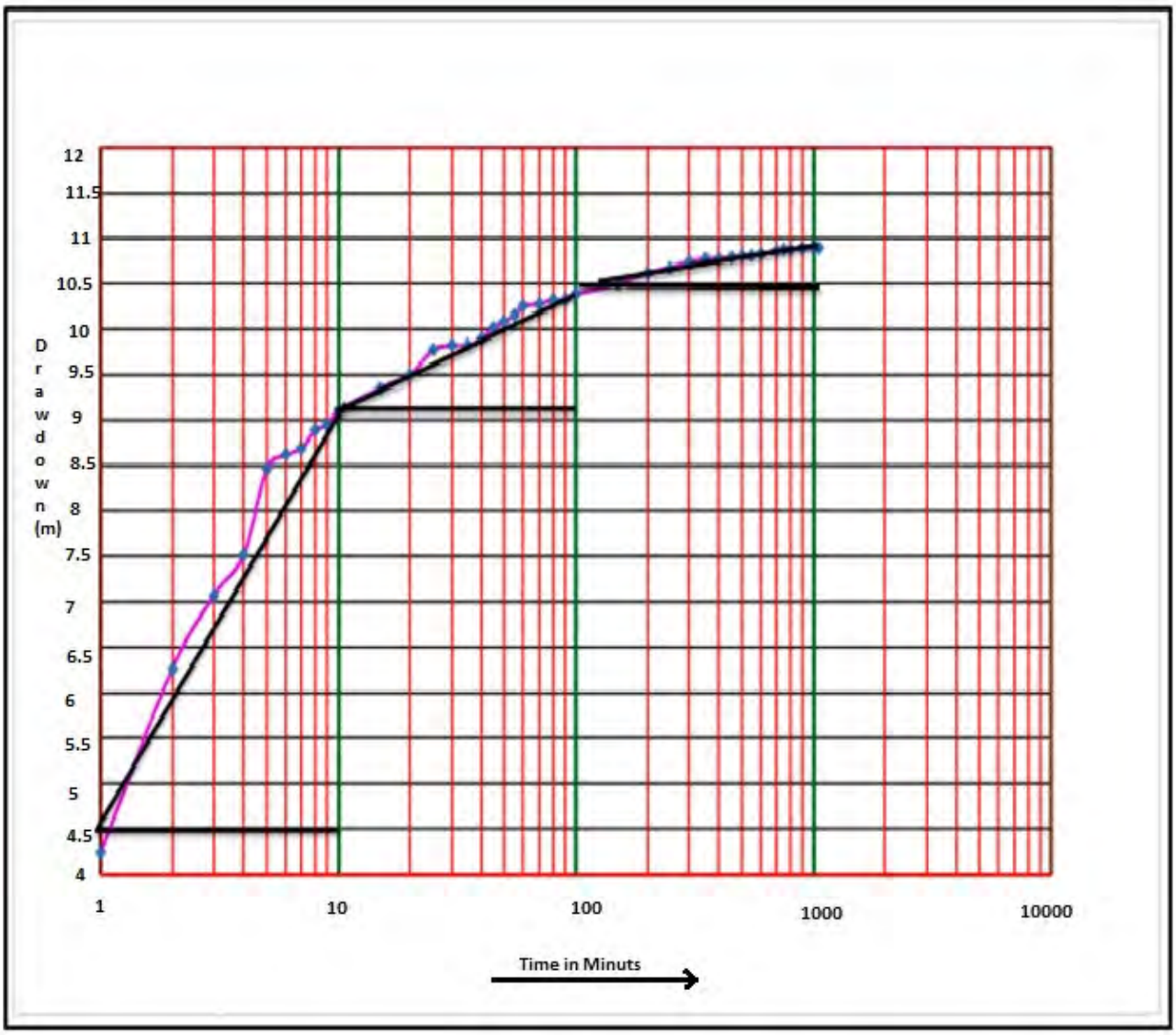



**Figure 4.8: Pumping test data**

**HYDRAULIC PARAMETERS;**

**TRANSMISSIVITY:**

Transmissivity of the aquifer is determined based on Jacob's straight-line method, which present good empirical technique to arrive at most useful hydraulic parameter for the aquifer using all the three segment of time drawdown curve spread over three-log cycle.

First Segment

$$T = 2.3\ Q/\ 4\pi\ \Delta s$$

Where,

T = Transmissivity of aquifer in m2/day

Q= optimum yield at which test was carried out = 360 m3/day

S= drawdown intercept for one log cycle = 9.4 m (Fig.1)

$$T = (2.3 \times 360)/\ (4 \times 3.14 \times 9.4)$$

= 7.0131 m2/day

Second Segment

$$T = 2.3\ Q/\ 4\pi\ \Delta s$$

Where,

T = Transmissivity of aquifer in m2/day

Q= optimum yield at which test was carried out = 360 $m^3$/day

S= Drawdown intercept for one log cycle = 1.4 m (Fig.1)

T = (2.3 x 360)/ (4 x3.14 x 1.4)

= 47.09 $m^2$/day

Third Segment

$$T = 2.3\ Q/\ 4\pi\ \Delta s$$

Where,

T = Transmissivity of aquifer in m2/day

Q= optimum yield at which test was carried out = 360 $m^3$/day

S= residual drawdown intercept for one log cycle = 0.4 m (Fig.10)

T = (2.3 x 360)/ (4 x 3.14 x 0.4)

= 164.80$m^2$/day

**Average Transmissivity,**

**= (7.01 + 47.09 + 164.80)/3**

**= 218.90/3**

**= 72.96 $m^2$/day**

**HYDRAULIC CONDUCTIVITY:**

This parameter is defined as rate of flow of water through one-meter thickness of aquifer from unit cross sectional area. It is determined by the formula:

$$K = T/b$$

Where,

T= Transmissivity of the aquifer = 72.96$m^2$/day

b= saturated thickness of the tested well = 110.49m (Depth of well – water level)

K = 72.96/110.49

= 0.66 m/day

K = 0.66 m/day

**HYDRAULIC GRADIENT:**

As per the water level contour map of the buffer zone hydraulic gradient works out to be 2.2 & 4.7 m/km.

**Computing of Ground water (Draft) resources of an area can be distinguished under two categories:**

1. Dynamic ground water resources
2. Static ground water resources

**DYNAMIC GROUND WATER RESOURCES:**

Dynamic ground water is that amount of water, which is found in the natural zone of fluctuation in an aquifer due to ground water recharge. Total ground water recharge ($R_T$) of the area can be estimated by assessing the various components of the following equation: -

$R_T = Rr + Rs + R_I + Sr + Rc$ - - - - - - - - - - - - - - - (I)

Where,

Rr = Recharge from Rainfall.

Rs = Recharge from Irrigation due to surface water.

$R_I$ = Recharge from Irrigation due to ground water.

$S_I$ = Recharge through surface water bodies.

Rc = Recharge to confined aquifers.

**GROUND WATER RECHARGE IN THE CORE ZONE:**

**MINING LEASE AREA:**

**RECHARGE DUE TO RAINFALL (Rrm):**

**(A) BY GROUNDWATER LEVELFLUCTUATION METHOD:**

Recharge due to rainfall is computed by specific yield water levelfluctuation method as below:

$Rr = A \times S.F \times Sy$ ---------- (III)

Where,

Rr = Recharge due to rainfall in the investigated area.

A = Rechargeable area = 4.745000 $Km^2$

S.F. = Seasonal fluctuation in water level.

= 4 m to 5m as observed

Sy = Specific yield = 3% for Limestone aquifer (As per available reports of Govt. agencies).

Therefore,

$Rr = 4.745000 \times 4 \times 0.03$

= 0.56 mcm/annum

$R_{r1m} \approx 0.56$ mcm/annum

**(B) BY RAINFALL INFILTRATION FACTOR METHOD:**

In areas where groundwater level monitoring is not adequate, rainfall infiltration may be adopted. The ground water estimation committee, Govt. of India has suggested norms of recharge from rainfall under various hydro geological conditions. For areas as that of Nimbahera having consolidated sedimentary and favorable hydro geological conditions of shallow water level and well-developed drainage, rainfall infiltration factor has been suggested as 10% to 20% of the normal rainfall. At a minimum level, infiltration factor for the area can be taken as 10%.

$R_{r2m}$ = area x rainfall of study period x R.I. factor
= 4.745000x 1.064 x 0.10
= 0.50mcm/annum
≈0.50mcm/annum

**COMPARISON OF RECHARGE:**

A. Recharge from water level fluctuation method= 0.56 mcm
B. Recharge from rainfall infiltration method = 0.50mcm

PD = {(A - B)/B} x 100
= {(0.56 – 0.50)/ 0.50} x 100
= {(0.06)/ 0.50} x 100
= 12.00%

Since the percentage of deviation (12.00%) is less than +20%, the recharge coefficient is taken as the value estimated by the water level fluctuation method.

**RECHARGE FROM RAINFALL = 0.56 MCM**

**DYNAMIC RESERVES FOR MINE AREA:**

Considering all above recharge components, dynamic reserves in the investigated area will be:
$R_{Tm} = R_{rm}$

$R_{Tm}$ = 0.56 mcm/annum

**$R_{Tm}$ = 0.56 mcm/annum**

**GROUND WATER DRAFT OF CORE ZONE:**

Ground water draft in the area can be estimated by assessing the various components of the following equation:

$D_T$ = Di + Dd + Din + Dw + Det + Do----------(B)

$D_T$ = Total ground water draft

Di = Ground water draft for irrigation in the area

Dd = Ground water draft for domestic use in the area

Din = Ground water draft for industrial use in the area

Dw = Ground water draft for irrigation & domestic use around the area in the radius of influence.

Det = Ground water draft by way of evapotranspiration.

Do = Ground water draft as out flow from unconfined aquifer.

**RECHARGE DUE TO APPLIED IRRIGATION ($R_{IB}$)**

Ground water recharge from the return flow of irrigation water is normally taken as 30% of the total water applied for irrigation as suggested by the committee. Ground water recharge from the above factors is as under

**1.194 x 0.3 = 0.36 mcm/annum**

**$R_{IB}$ = 0.36 mcm/annum**

**MINE LEASE AREA:**

From equation no. (B)

$D_T = Di + Dd + Din + Do + Det$

In the Corearea, ground water draft will occur through proposed ground water abstraction structures. Evapo-transpiration losses will be negligible as water level is deep.

Hence ground water draft can be computed by reducing the equation (B) to:

$D_{Tm} = Din$

Total water requirement is 83 KLD. Hence

Din = 83x 300 = 0.0249mcm/annum

Din = 0.0249mcm/annum

Hence total ground water draft in the mining area will be:

**$D_{Tm}$ = 0.0249mcm/Annum**

**DRAFT DUE TO APPLIED IRRIGATION ($D_{iB}$) IN MINE LEASE AREA:**

The ground water draft in the Core zone takes place mainly by dug well and tube wells used for irrigation. There are about 62 tube wells tapping limestone aquifer. In addition to that, there are about 7 dug wells tapping shale in the remaining part of the buffer zone. It has been stated earlier that in limestone area it is about 150 cum/day and in shale area it is 100 cum/day. The annual draft has been calculated after considering that these structures will operate only for four months a year. The annual ground water withdrawal from these wells is as under:

Limestone area

62 x 150 x 120 = 1.110 mcm/annum

Shale area

7 x 100 x 120 = 0.084 mcm/annum

**$D_{iB}$ = 1.194 mcm/annum**

**Table 4.7: Recharge & draft of core zone**

| RECHARGE OF CORE ZONE ( MINE AREA) | |
|---|---|
| **Recharge due to rainfall** | |
| (A) By water table fluctuation method | 0.56 MCM |
| (B) By rainfall infiltration method | 0.50 MCM |
| Recharge due to rainfall after Comparison of recharge | 0.56 MCM |
| Recharge due to applied irrigation in Core Zone | 0.36 MCM |
| **Total dynamic reserve for Mine area** | **0.92 MCM/ANNUM** |
| **DRAFT OF CORE ZONE** | |
| Draft due to applied irrigation in Core Zone | 1.1940 MCM |
| Draft due to Mine Lease | 0.0249 MCM |
| **Total draft of Core Zone** | **1.2189 MCM/ANNUM** |
| **Stage of Development & Category** | **132.48 % , Over exploited Area** |

# CHAPTER-5.0

## 5. Approved Mining Plan in case

### 5.1 Year wise mine plan including excavation depth, area and mine seepage.

### Salient features of mining:

The salient features of mode of working as per approved Mining Plan are: -

- The mining activities will be under taken as to ensure maximum mineral conservation and minimum environmental degradation.
- Open cast mechanized system of mining shall be practice to mine in the limestone deposit.
- It is proposed to commence the mining operation in SW part of the block during first five year and accordingly developmental work has been planned.
- The maximum height of the bench will be kept at 10m and width of the working will be around 12 – 16m.
- Controlled blasting with 'V' pattern firing is proposed 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. Rock breaker will be used to eliminate secondary blasting. Blasting shelters will be provided within the blasting zone.
- Use of rock breaker for secondary breaking of boulders in quarries shall be adopted
- The blasted ROM will be loaded by Hydraulic Excavators of 4.0 to 4.5m$^3$ shovels/ backhoe bucket size in to dumpers of 25 Tonnes capacity and will be sent to crusher.
- Haul road at 1:16 gradient will be maintained for easy movement of machinery and transport vehicles. A road grader will be utilized for Maintenance - of haul roads
- A crusher of 500 TPH capacity is proposed to be installed within the intended mine area. The crusher output size will be about 75mm in the plan period. The part of the crushed limestone will be transported to the cement plant of the subsidiary company (RPPL) and part of the limestone along with other waste materials produced may also be sold to other cement plants & end use industries by road transport. In future, possibility of transportation of crushed limestone to the RPPL plant will be explored by cross country belt conveyor (CCBC) in two shift basis.
- Working will be carried out in single shift till the fourth year and from fifth year onwards two shifts are proposed.

**Mine Development Plan:**

The year wise development of mines for the plan period is as given below: -

**Table 5.1: Proposed Year Wise Development during Plan Period**

| Year | Pit No. | Total Tentative Excavation(Cum) | Top Soil (Cum) | OB/SB/IB (Cum) | ROM(Cu.m.) | | Mineral Reject | ROM/ Waste Ratio |
|---|---|---|---|---|---|---|---|---|
| | | | | | Ore (Cum) | Sub-grade (Cum) | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| Ist | 1 | Land agreement/Purchase + Exploration + obtaining various clearances | | | | | | |
| IInd | | | | | | | | |
| IIIrd | | 1,11,773 | 19,247 | 0 | 80,008 | 12,518 | 0 | 1 : 0.00 |
| IVth | | 2,58,836 | 20,810 | 1,786 | 1,60,169 | 76,071 | 0 | 1 : 0.01 |
| Vth | | 5,26,736 | 23,785 | 1,82,951 | 3,20,000 | 0 | 0 | 1 : 0.57 |
| **Total** | | **8,97,346** | **63,842** | **1,84,737** | **5,60,177** | **88,589** | **0** | **1: 0.33** |

Note: Tentative tonnage of the ore to be produced shall be arrived by computing the approximate bulk density and recovery factor as these data are variable and can be established on time series. In the present case, the bulk density considered is 2.5, as per GR of DMG, Rajasthan.

(**Source: - Approved Mining Plan with PMCP dated 26.09.2018).**

With a view to systematically mine the deposit, it has been planned to commence mining operation in south western part of the block during first plan period and accordingly the developmental work has been planned. This part of the area is free from habitation and mining is proposed to be started within the grid lines 1400W-1800 W and 00N-500N. There is a canal crossing the lease area diagonally from South to North (Seasonal), which will be protected by 50m safety zone on the both the sides. During Ist and IInd year of plan, detailed exploration will be done by drilling at 200m interval within and around the proposed mining area. The top soil with nutrient value is around 0.3 m thick which shall be scrapped and stacked separately for future plantation purpose.

During the plan period, it has been programmed to undertake developmental works including land acquisition, obtaining various permissions from the authorities, exploration etc. during Ist and IInd Year. The excavation program from the block shall be started during the 3rd Year of the plan period by mechanized means. The mine working shall be confined in the area as shown in the development plans. The quarry will be developed at different levels. The maximum height of the benches will be kept at 10 m and the width of

the working benches shall be around 12-16 m. Haulage roads at 1:16 gradient shall be maintained for easy movement of machinery and transport vehicles. Depth of the pit during first five years is 414 MSL.

**Table 5.2: Proposed Mine Pit Section Wise Rain Water Calculation (Five Years)**

| Year | Area m2 | Rainfall (m) | Total Volume of Rainwater Collected in pits (m3) | Seepage after ground water intersection | Year wise Total Water collected 80% in Pits (m3) (Because 15% Ground Water Recharge & 5% Evaporation Loss) |
|---|---|---|---|---|---|
| I-Year | Land agreement/Purchase + Exploration + obtaining various clearances | | | | |
| II-Year | Land agreement/Purchase + Exploration + obtaining various clearances | | | | |
| III-Year | 37531 | 1.064 | 39933 | **No seepage as ground water will not be intersected** | 31946 |
| IV-Year | 32415 | 1.064 | 34490 | | 27592 |
| V-Year | 50354 | 1.064 | 53577 | | 42862 |
| **Total** | **120300** | | **128000** | | **102400** |

**Development Map:**

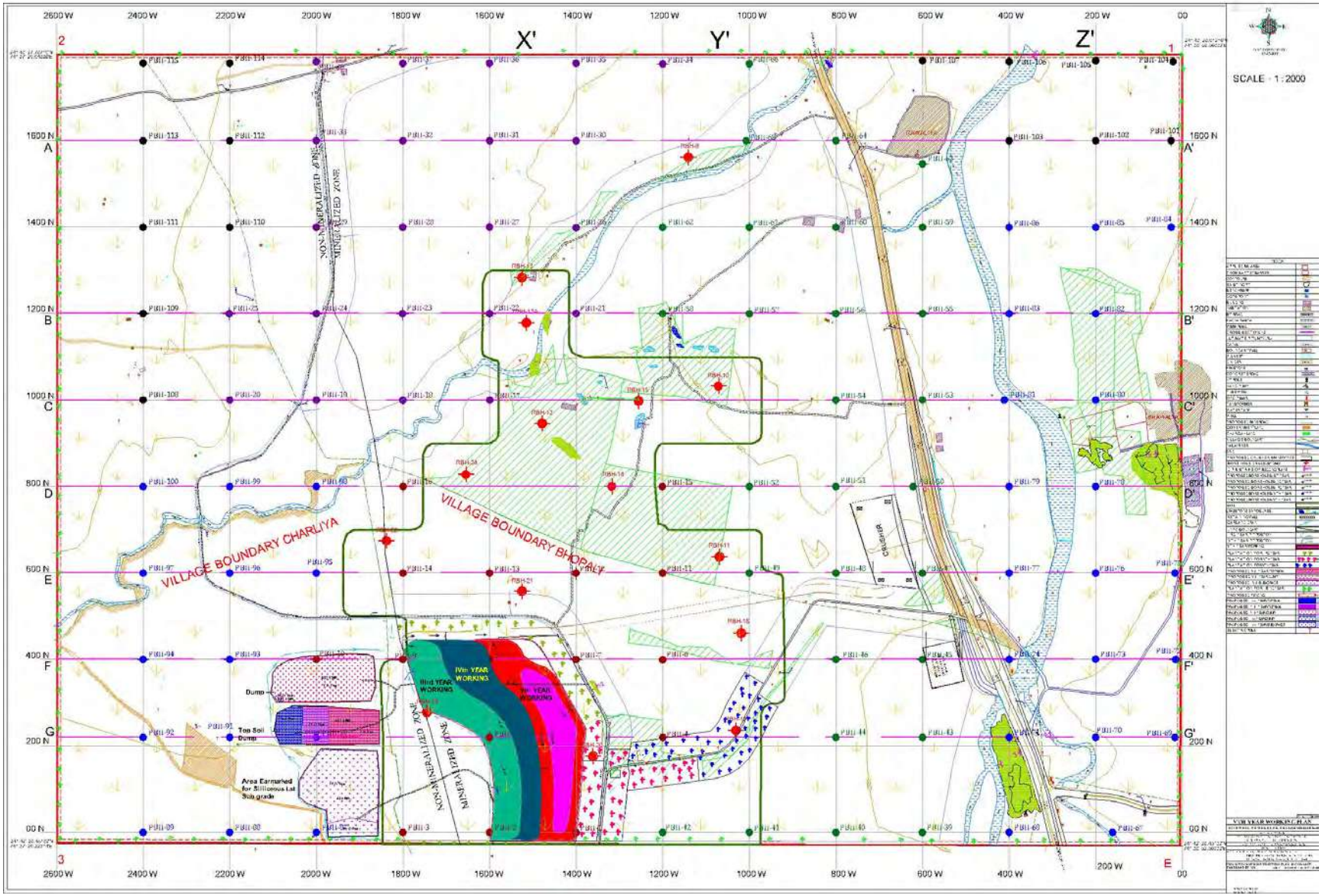



**Figure-5.1 First Plan Period Development Plan**

## Conceptual Mining Plan:

The development and the ultimate pit limit have been designed keeping in view 7.5m barrier as per Rule 111 of MMR 1961, established mineral reserves and public works. The area proposed for excavation at plan period will be 12.03 ha and at conceptual stage it will be 172.51 Ha. The mining depth during first five years is 414MSL(16mbgl) and ultimate depth of mining will be 344 MSL (85m) deep. Each bench of 10 m height is proposed to be worked at an angle of $75^0$ from horizontal and bench width shall be kept at 12m in final stage at every bench level. These parameters will result in an ultimate pit slope of $40^o$ from horizontal.

During the conceptual phase/ life of mine, 172.51 ha area will be excavated out of which 2.68 ha. will be reclaimed with the waste materials up to 429.6 MSL. An area over 169.83 ha. (excavated area) shall be developedas water reservoir with proper fencing. 56.61 ha area (including safety zone) shall be developed under plantation. At the conceptual stage, backfilled area shall also be rehabilitated by plantation. Area under infrastructure shall also be utilized for plantation.

**Table: 5.3 Land Use /Land Cover of Core Zone**

| S. No. | Particulars | Pre-Operational (Ha.) | Operational/ Plan Period (Ha.) | Post-Operational (Ha.) |
|---|---|---|---|---|
| 1. | Pit area | 2.19 (Old Pits existing) | 12.03 | 172.51 (2.68 Ha. Backfilled and Reclaimed & Rehabilitated by plantation and 169.83 Ha – Water Reservoir). |
| 2. | Storage of Top Soil | 0.00 | 1.5961 | 00 |
| 3. | Waste dump site including Retaining Wall, Garland drain etc. | 0.00 | 2.3092 | 00 |
| 4. | Sub-Grade | 0.00 | 2.9530 | 00 |
| 5. | Infrastructure (Workshop, Admin. Building, Magazine etc.) | 0.00 | 1.213 | 18.053 (Utilized for green belt Development) |
| 6. | Roads | 9.85 | 12.69 | 11.69 (Avenue Plantation will be carried out) |
| 7. | Mineral Separation Plant – Crushing Plant | 0.0 | 2.09 | 00 |
| 8. | Others (Canal, Habitation, Nallah etc.) | 13.07 | 13.07 | 13.07 (Public Use) |
| 9. | Greenbelt/ Plantation | 0.00 | 15.75 | 56.61 |
| 10. | Un-disturbed | 449.39 | 410.7987 | 202.567 |
| **Total** | | **474.50** | **474.50** | **474.50** |
| **Source: - Approved Mining Plan with PMCP by IBM dated 26.09.2018.** | | | | |

Ground water level is not envisaged to be encountered during the plan period. Entire Tehsil Nimbahera has been Notified by CGWA for ground water abstraction. In case if water level is encountered in future, prior NOC/permission from CGWA will be obtained.

### Rainwater Storage Capacity of Excavated Pit at Conceptual Stage:

**Become very essential to collect, utilized and dispose the accumulated rain water for various mining activities.**

At conceptual stage, there will be four pits in the lease as depicted in the conceptual plan. During the conceptual phase/ life of mine, 172.51 ha area will be excavated out of which 2.68 ha. will be reclaimed with the waste materials up to 429.6 MSL. An area over 169.83 ha. (excavated area) shall be worked as water reservoir with proper fencing. 56.61 ha area (including safety zone) shall be developed under plantation. At the conceptual stage, backfilled area shall also be rehabilitated by plantation as well as plantation will also be done on first two upper benches of excavated pits. Area under infrastructure shall also be utilized for plantation.

**Table 5.4: Rain Water Accumulation Capacity of Pits at Conceptual Stage:**

| S. No. | Pits | Ultimate size of Pits (m) Length x Width Maximum | Ultimate Co-ordinates | Top RLs(m) | Bottom RLs(m) | Maximum Water Holding Capacity (Million Cu. m) | Proposed Use |
|---|---|---|---|---|---|---|---|
| 1 | Pit-1 | 460m x 357m | S020-N440/ W1400-W1800 | 430 m | 410 m | 3.28 | Community use like Irrigation, Domestic, Pisciculture etc. |
| 2 | Pit-2 | 502 m x 950 m | S022-N480/ W350-W1300 | 428 m | 344 m | 40.06 | |
| 3 | Pit-3 | 1450m x 1218m | N200-N1650/ W614-W1832 | 428 m | 347m | 143.05 | |
| 4 | Pit-4 | 780m x 872m | N1000-N1780/W900-W1950 | 428m | 372m | 38.08 | |
| **Total** | | | | | | **224..47** | |

After development of the pit, rain water collected in mine pit will be used for plantation and dust suppression. The use of mine pit water and treated water will reduce the daily fresh water demand of mine. It is envisaged that over a period of time, it may have a positive impact as the excavated pit will work as rainwater harvesting structures as well as may also be used by community for irrigation, domestic, pisciculture etc.

**Intersection of Ground Water:**

Water level of the area as per Hydro-geological studies carried out in adjoining block varies from 75mbgl to 80mbgl in pre-monsoon and 70mbgl to 75mbgl in post monsoon. The depth of mining pit during first plan period (five years) is 414 MSL (16m bgl) and at conceptual stage, the quarry shall be worked up to the UPL i.e. 344 MSL (84 m bgl) to win the mineable reserves within the lease area considered. Hence, the water level will not be intersected during plan period. However, in future, prior permission from CGWA will be taken before intersection of ground water.

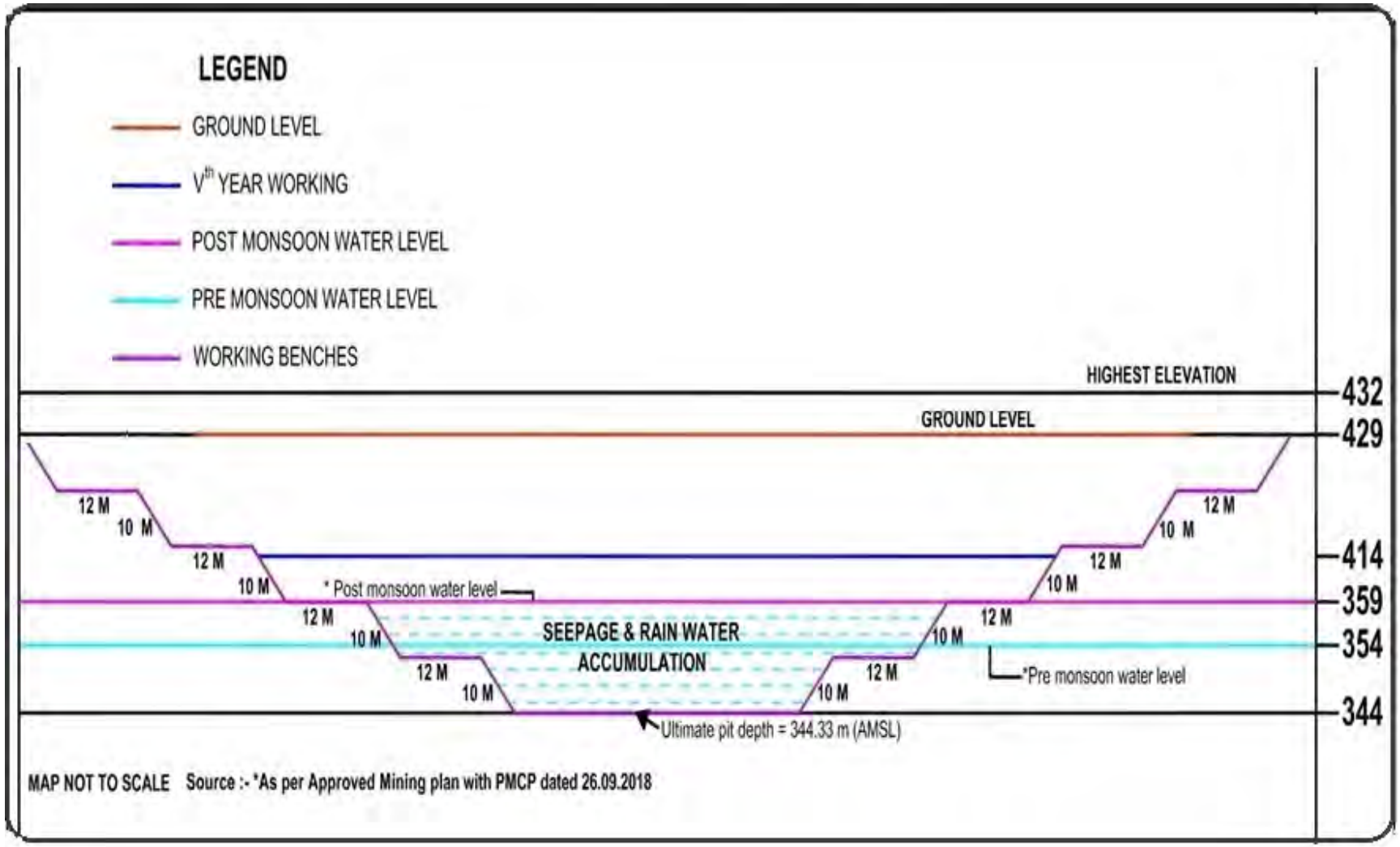



**Figure 5.2 Bench wise Seepage &Rain water accumulated**

## Rainwater Harvesting and Artificial Recharge to Groundwater as per CGWA, Guidelines:

Roof top rainwater harvesting, which involves the collection of rainwater from the roof of the buildings and its storage in surface tanks or recharge to sub-surface aquifer, can play an important role in conservation of water. Thus, the need for artificial recharge of groundwater is beyond doubt and is the most powerful management strategy available to face the challenge of fast depletion in ground water resource.

## Approach and Observations:

On the basis of topography the locations of the recharge structures are so planned that the available rooftop rainwater from nearby building reaches directly to local natural drainage and then into there charge pond. Simultaneously, excess runoff from the existing rainwater drainage system should be harvested through Rain Water Harvesting Structure and clean & clear water should be diverted directly to the natural drainage. Apart from recharge pit, it will also be better to recharge the existing dug wells and bore wells which are the main water source of the area.

## Availability of Rainwater:

The rainfall runoff will be harvested and rainfall harvesting structure of sufficient capacity will be installed for the same. The rainwater runoff depends on the rainfall in the area and the runoff coefficient of the surface. The main surfaces in the project area are roof top area, road/paved area, green belt and open area. The average annual rainfall at Nimbahera rain gauge station which is nearest to the project area, is **1064**mm (1.064m) and the same is considered for calculating the quantity of rain water for harvesting. As per the CGWA norms, consideredrunoff coefficient forroof top is 85%, for road and paved areas 65%, foropen area 20% and for Green belt area is taken as 15%. On this basis, the runoff in the area is quantified. The details of various types of surfaces and quantity of rainfall runoff are given below:

**Table 5.5: Rainwater harvesting in the proposed five-year period in the Mine Lease Area:**

| **S. No.** | **Estimation of Quantum of runoff available through Rain water harvesting (within premises) sheet** | | | | |
|---|---|---|---|---|---|
| | Particulars | Area (Sqm) | Rain fall (m) | Runoff Coefficient* | Quantum of Runoff available (Cum/Year) |
| | 1 | 2 | 3 | 4 | 5 (2*3*4) |
| 1 | Roof Top of building/Shed/ | 12130 | 1.064 | 0.85 | 10970 |
| 2 | Road/Paved area(as per mining plan first five yrs) | 126900 | 1.064 | 0.65 | 87764 |
| 3 | Open Land with pit area | 4448470 | 1.064 | 0.20 | 946634 |
| 4 | Green Belt | 157500 | 1.064 | 0.15 | 25137 |
| **5** | **Total (sq.m)** | **4745000** | **Total Quantum of available runoff (cum/y)** | | **1070506** |
| *** Ref: Manual of Artificial Recharge of Ground Water, (CGWB,2007)** | | | | | |

Ground water abstraction by the mine workings will be **24900** $m^3$/annum and recharge potential to be created would be around **1070506** $m^3$/annum. Direct rainfall collected in pit area (12.03 ha) will also add in ground water recharge and later on, collected water will be used for various purposes which will reduce the ground water abstraction.

These recharge measures would not only negate the adverse impact on ground water regime, but would also help in improving groundwater regime due to additional recharge.

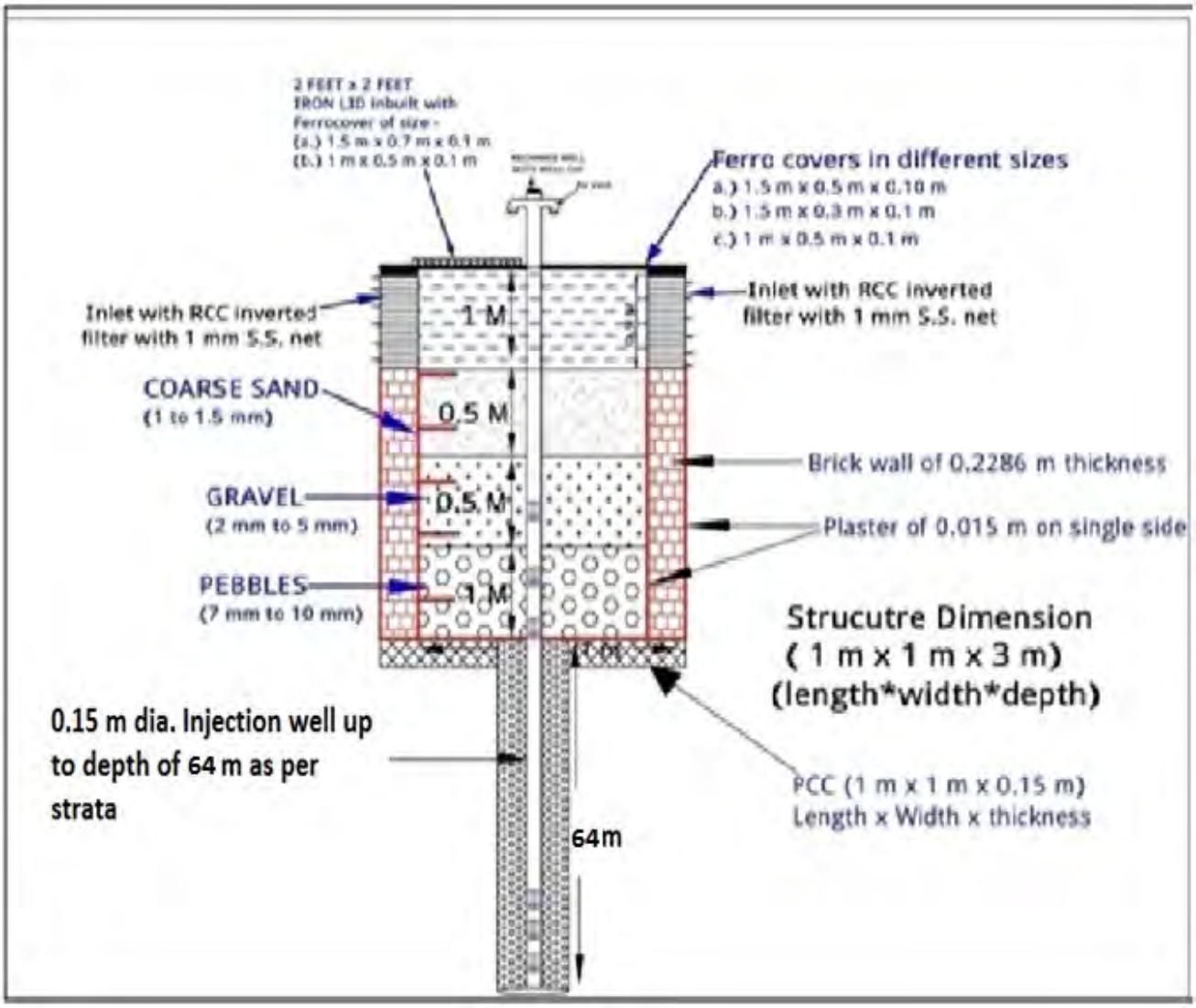



**Figure 5.3: Typical Schematic Design of Injection Well**

**CHAPTER-6.0**

## 6. PROPOSED USAGE OF PUMPED WATER IN CASE OF MINING DEWATERINGPROJECTS.

Not Applicable

# CHAPTER-7.0

## 7. Comprehensive assessment of the Impact on the ground water regime in and around the project area highlighting the risks and proposed management strategies proposed to overcome any significant environmental issues.

### 7.1 Impact on surface water sources:

There are no perennial surface water bodies within the buffer zone, only some seasonal nallahs are crossing the Mine. Three seasonal nallahs exist in south eastern part. These merge and flow towards north to NNE direction and after passing through the lease area, proceed further and meet river Satkhanda and ultimately merges into river Gambhiri. One more seasonal nallah enters the lease area from south-western side and after draining through the lease area in north –east direction confluences into the eastern nallahs described above. Nallahs shall not be disturbed and applicable statutory barrier shall be left along both side.

There is a canal crossing the lease area diagonally from South to North (Seasonal), which will be protected by 50m safety zone on the both the sides.

It is therefore apparent that there will be hardly any impact of mining on the surface water regime. The surface water is not going to be pumped or utilized anywhere in the lease area for any purpose. Surface runoff from the mine during rainfall will be channelized to settling tank & siltation pond through garland drains and will be connected to RWHs. Over flow surface water will be channelized to settling tank & siltation pond through garland drains. Settling tank & siltation pond will allow sedimentation from rain water.

No waste water from the mining will be disposed off in any surface water bodies. Wastewater will be treated and will be used for mining activities/plantation. Hence, there will be no negative impact on any surface water bodies in nearby areas.

Domestic wastewater will be treated in modular STP and treated water will be used for plantation. Wastewater from workshop will also be treated in oil & grease trap and will be used for dust suppression.

Garland drains shall be constructed all around the excavation area followed by the retaining wall to prevent flow of rainwater runoff or leaching from surrounding areas in the working pit during heavy rains. The garland drain shall be channelized to settling tanks, siltation pond. 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 area or in mine pit shall be collected and used for plantation and dust suppression. It is envisaged that over a period of time, it may have a positive impact as the excavated pit will work as rainwater harvesting structures.

### 7.1.1 Diversion of existing channels [constructed dam/barrages/weir/canals/hydro-electric projects]:

Seasonal Nallahs shall not be disturbed and applicable statutory barrier shall be left along both side.

There is a canal crossing the lease area diagonally from South to North (Seasonal), which will be protected by 50m safety zone on the both the sides. There is no proposal for diversion of nallah or canal. Appropriate mitigation measures will be adopted to control the surface run-off:

- Storm water shall not be discharged directly out of the ML area into any water bodies. Garland drain of width 1.0m wide and depth 1.0m will be constructed all around the excavated area and dumps. Garland drain will be channelized to settling tanks of 8m x 5m x 1.5m size& Siltation pond of 16m x 10m X 2.5M.
- It will be regularly de-silted especially after rains.
- Retaining wall (1.5m x 1.0m X 1.5m) will also be constructed around the waste dumpto prevent over flow during rains.
- After complete sedimentation, clean & clear storm water will be connected to rainwater harvesting structures and over flow rainwater will follow the natural drainage out of ML area. It will not affect the quality of the surface water out of the ML area.
- Preventive measures such as Garland drain, settling tank & retaining wall shall be made at the base of the quarry/ dump to check and arrest flow of loose sediments with surface run offs.

### 7.1.2 Change in land use [change in flood plain, lotic & lentic systems etc.]:

The mining activity will be gradual confined in blocks and removal of vegetation & soil cover will also be undertaken progressively along with other mitigative measures like phase wise development of greenbelt etc.

During the plan period, about 7,875 numbers of trees every year are proposed to be planted over an area of about 13 ha. LULC of the Mine lease area will gradually change impacting part of the lease area only to an extent of about 55%, about 45% of lease area will remain undisturbed being non-mineralized/sub-grade/habitation/existence of nallah, canal, road etc. There will not be any permanent dump, but temporary dumps will also exhibit the transitional impact on LULC.

However, it is proposed that at the conceptual stage, out of the total excavated area (172.51Ha.), 2.68 Ha. area will be backfilled and will be reclaimed & rehabilitated by plantation and 169.83 ha. area will be converted into water reservoir which will be developed for community use.

With effective EMP, the post mining scenario will have green cover over an area of about 56.61 ha fresh area, about 18.053 ha of built up area (after dismantling), about 2.68 ha. excavated area shall also be reclaimed by plantation after backfilling&Plantation will also be developed on upper two Benches of excavated pits.Avenue plantation over 11.69 ha area of road is proposed to be developed to enrich the eco-system.

### 7.1.3 Current & Potential threats:

No ground water will be intersected during present plan period as mining will be carried out at a depth higher than the ground water level. There will not be inflow of water hence there will not be any stress on the static ground water reserves.

The surface runoff in rainy season will require arrangement for disposal, particularly the water from higher levels will follow the natural gradient to reach the working pit.

Garland drain of the suitable width and depth will be constructed around the pit with settling tanks in between at regular distances. Rain water will be flow through the garland drain connected to Rainwater Harvesting Structure after de-siltation in the settling tanks built in between the garland drain and over flow clean water will follow the natural gradient.

When the pit will reach to a greater depth, two stages of pumping along with construction of deeper and wider garland drain will be restored for taking care of runoff water.

Since, the depth of mineralization and conceptual depth will be more than ground water level hence the necessary hydrogeological study will be conducted as per CGWA norms and due necessary precautions and directives will be adopted as per CGWA norms.

### Contaminations due to runoff from mine lease area:

The garland drains all around the pits/dumps will be constructed to channelize the surface run-off to settling tanks and siltation ponds for proper sedimentation. Clean & clear water, after sedimentation, will be channelized in RWHs through garland drains and overflow water will follow natural drainage out of ML area.

Rain water collected in the excavated pit will be pumped out and will be used for dust suppression and plantation.

Retaining walls in the dump areas to control dump erosion and contaminationto prevent any wash off or leaching of dump materials during heavy rains.

### Sources of potential contamination:

These are the major source of the contamination identified in mining area:

A. Contamination from discharge of Domestic waste water

B. Leakage of STP

Domestic waste water will not be discharged and will be diverted to modular STP for proper treatment. Treated water will be used for Plantation. STP will be maintained properly. Base of STP will be constructed in a way to avoid any leachate.

### 7.2 Impact on Groundwater sources:

There will not be any adverse impact on the ground water quality due to mining. Ground water will not be intersected during first plan period. The Limestone do not contain any harmful element, which could percolate into the ground and pollute the ground water. Hence, no control measures are required.

### 7.2.1 A description of the impacts on environmental values that have occurred, or are likely to occur, because of any past ground water abstraction.

**The present ground water status of the Nimbahera Block:**

Major water bearing formations in the area are Limestone, Gneiss, Basalt, Schist/phyllite & Shale and project area falls in limestone formation. Groundwater occurs under unconfined condition in saturated zone of rock formation. Its occurrence is controlled by topography, physiography and structural features of the geological formations. The movement of the groundwater in hard rock areas is governed by size, openness, interconnection and continuity of structural weak planes while in unconsolidated rocks, ground water movement takes places through pore space between grains.

**Block wise categorized as per CGWA, norms in below table:**

**Table 7.1: Groundwater draft details**

| District/ Assessment Unit | Net Annual Groundwater Availability(ham) | Gross Groundwater Draft for All uses (ham) | Stage of ground water development | Category |
|---|---|---|---|---|
| Nimbahera | 4920 | 9839 | 199.98 | O.E. (Non-Notify) |

(Source: cgwa-noc.gov.in/Sub/Check Eligibility/CheckEligibility.aspx CGWA)

Ground water will be abstracted through tube wells and ground water will not be intersected during firstfiveyear plan period. No impact has been envisaged due topast ground water abstraction since it is a proposed project.

### 7.2.2 An assessment of the likely impacts on environment that will occur, or are likely to occur, because of the ground water abstraction for a five year period starting on the consultation day for the report; and over the projected life of the resource project area, affected area and radius of influence.

**Impact on Ground Water Regime:**

**Mining may generate effluent which could contaminate ground water.**

The surface runoff in rainy season will require arrangement for disposal, particularly the water from higher levels as it will follow the natural gradient to reach the working pit. Garland drain of the suitable width and depth will be constructed around the pit.

Settling tanks in between at regular distances. Rain water will flow through the garland drain and de-silted in the settling tanks built in between the garland drain and clear water will be connected to rainwater harvesting structures and over flow surface water further will follow the natural drains. Retaining wall

shall be constructed all around the waste dump, to arrest wash off with dump materials. Perforation shall be left at around 10 m intervals to allow for passage of water.

When the pit will reach to a greater depth, two stages of pumping with construction of deeper and wider garland drain will be restored for taking care of runoff water.

Since, the depth of mineralization/conceptual depth will be more than ground water level hence the necessary hydro geological study will be conducted as per EC norms and due necessary precautions and directives will be adopted as per EC and hydro geological study.

The suitable Check Dam will be constructed in the different location for control of soil erosion and to recharge ground water.

Intersection of ground water may cause decline in the ground water level. However, there will not be any ground water intersection during plan period and only 83 KLD water will be abstracted. Hence, impact of the same will be locally and within the working zone only.

### Drainage ditch at the bottom of benches & dumps:

All the benches of working and abandoned nature will be equipped with drainage ditches having suitable gradient and dimension along the length, located at the bottom of the vertical wall of each bench.

This will help in controlling the erosion of the bench floor and dumps especially in monsoon months. The surface run off from the benches will be channelized through the garland drain, desilted in settling tank and connected to Rain water harvesting structure and clean & clear over flow runoff will follow the natural gradient.

## 7.3 Socio-Economic Aspects:

### Economic Benefits:

The mining and associated activities in the mineral bearing areas will contribute to the gains in the G.D.P. The mine shall be contributing around Rs 55 Cr every year to the State and Central Govt. exchequer by way of mining revenue (Royalty, Premium, DMF& NMET) after the lease is executed and the mine is operated at its peak rated capacity of 1.80 million tonnes per annum. Implementation of various development programs under Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY), using the funds generated by District Mineral Foundations (DMFs), will improve the Socio-Economic status of the area.

**SOCIAL BENEFITS:**

The proposed project will enhance the socio-economic activities in the adjoining areas. This will result in following benefits:

- Improvements in physical infrastructure.
- Improvements in social Infrastructure.
- Post-mining enhancement of green cover.

As responsible corporate, Dalmia Cement (Bharat) Limited (DCBL) has always given top most priority for socioeconomic development of the local community as company's prosperity in vision and philosophy. The community has been a key stakeholder in business and environmental issues are a matter utmost priority for the company. The Management believes to being catalyst in the transformation of the communities around its business operations through partnership with local communities, Government, NGO's and other stake holders.

The prime objective of DCBL's Corporate Social Responsibility Policy is to hasten social, economic and environmental progress. DCBL remains focused on generating systematic and sustainable improvement for local communities surrounding our plants and project sites.

In the recent years' company has realigned its Corporate Social Responsibility to focus on issues material to the company and its stakeholders. The approach is to make significant and sustainable difference through our programmes in the lives of beneficiaries by working in partnership with our stakeholders. Stakeholder engagements and baseline studies highlighted the issues of water scarcity, unemployment amongst rural youths and basic rural infrastructure needs in our neighboring community. The company realized that these issues were more material to their Group's businesses as well as to the communities around their facilities. Dalmia Bharat Group thus planned their Corporate Social Responsibility programmes in sectors of Soil & water conservation; Energy conservation and climate change mitigation; Skill development &livelihood Training and Social Development. The project is likely to generate direct and indirect employment opportunities in the area also.

The Company will undertake various Socio-Economic Developmental activities for the betterment of surrounding area leading to overall growth of the region. Proposed Limestone Mine will contribute Revenue to the State and Centre Govt. in terms of taxes etc. The local economy will receive a boost. The overall effect will improve the purchasing capacity, increased in income and thus a higher standard of living viz. better education, improved health and sanitation facilities, housing etc. This is envisaged as a major positive benefit, which will ultimately lead to the sustainable development of the region.

### 7.3.1 Settlements and population dynamics around project area:

As per the Census of India 2011, the population of the study area is 77,451comprising of scattered rural habitation. The gender distribution 50.60% are males and 49.40% are females. The gender ratio is 976 in the study area is slightly higher as compared to the districts' 970 (Chittaurgarh) as per Census of India, 2011.

**Table: 7.2: Human Settlement**

| S. No. | Villages | Household | Population | | | Literacy | | | Main Worker | | | Marginal Worker | | | Non Worker | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female |
| **0-2 Km** | | | | | | | | | | | | | | | | | |
| 1 | Amarpura | 116 | 549 | 280 | 269 | 325 | 213 | 112 | 356 | 175 | 181 | 0 | 0 | 0 | 193 | 105 | 88 |
| 2 | Bar Ka Amrana | Data Not Available | | | | | | | | | | | | | | | |
| 3 | Bhavliya | 324 | 1619 | 836 | 783 | 933 | 595 | 338 | 788 | 463 | 325 | 16 | 4 | 12 | 815 | 369 | 446 |
| 4 | Bhopali | 4 | 11 | 6 | 5 | 9 | 5 | 4 | 4 | 4 | 0 | 0 | 0 | 0 | 7 | 2 | 5 |
| 5 | Cherliya | 143 | 703 | 343 | 360 | 329 | 207 | 122 | 384 | 188 | 196 | 5 | 2 | 3 | 314 | 153 | 161 |
| 6 | DalimanKaKhera | Data Not Available | | | | | | | | | | | | | | | |
| 7 | NayaKhera | 49 | 272 | 143 | 129 | 142 | 96 | 46 | 145 | 74 | 71 | 10 | 4 | 6 | 117 | 65 | 52 |
| 8 | PeepliyaGadiya | 88 | 454 | 241 | 213 | 248 | 170 | 78 | 282 | 140 | 142 | 3 | 3 | 0 | 169 | 98 | 71 |
| 9 | Rama Khera | 126 | 649 | 321 | 328 | 245 | 160 | 85 | 285 | 160 | 125 | 150 | 41 | 109 | 214 | 120 | 94 |
| 10 | Ravliya | 89 | 368 | 172 | 196 | 158 | 101 | 57 | 205 | 100 | 105 | 3 | 1 | 2 | 160 | 71 | 89 |
| 11 | Satkhanda | 765 | 3827 | 1906 | 1921 | 1966 | 1302 | 664 | 1886 | 1088 | 798 | 81 | 21 | 60 | 1860 | 797 | 1063 |
| 12 | Seendwari | 153 | 732 | 379 | 353 | 422 | 288 | 134 | 406 | 236 | 170 | 14 | 7 | 7 | 312 | 136 | 176 |
| 13 | Bilola | Data Not Available | | | | | | | | | | | | | | | |
| **2-4 Km** | | | | | | | | | | | | | | | | | |
| 14 | Bansa | 162 | 755 | 388 | 367 | 455 | 294 | 161 | 179 | 159 | 20 | 324 | 98 | 226 | 252 | 131 | 121 |
| 15 | Dhanora | 322 | 1470 | 740 | 730 | 660 | 456 | 204 | 602 | 300 | 302 | 211 | 118 | 93 | 657 | 322 | 335 |
| 16 | JorawarsinghKaKhera | 36 | 205 | 107 | 98 | 134 | 75 | 59 | 44 | 43 | 1 | 14 | 9 | 5 | 147 | 55 | 92 |
| 17 | Kesharpura | 63 | 270 | 139 | 131 | 83 | 60 | 23 | 161 | 83 | 78 | 4 | 1 | 3 | 105 | 55 | 50 |
| 18 | MaliyaKheri | 96 | 450 | 238 | 212 | 276 | 166 | 110 | 181 | 119 | 62 | 71 | 17 | 54 | 198 | 102 | 96 |
| 19 | Mangrol | 903 | 4512 | 2284 | 2228 | 2622 | 1630 | 992 | 2011 | 1246 | 765 | 315 | 82 | 233 | 2186 | 956 | 1230 |
| 20 | MediKaAmrana | 172 | 859 | 442 | 417 | 421 | 286 | 135 | 461 | 235 | 226 | 70 | 37 | 33 | 328 | 170 | 158 |

| S. No. | Villages | Household | Population | | | Literacy | | | Main Worker | | | Marginal Worker | | | Non Worker | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female |
| 21 | Murliya | 240 | 1175 | 620 | 555 | 593 | 398 | 195 | 466 | 307 | 159 | 174 | 53 | 121 | 535 | 260 | 275 |
| 22 | Payari | 212 | 1041 | 530 | 511 | 597 | 367 | 230 | 499 | 294 | 205 | 26 | 6 | 20 | 516 | 230 | 286 |
| 23 | PhacharAheeran | 293 | 1562 | 798 | 764 | 902 | 579 | 323 | 824 | 454 | 370 | 178 | 60 | 118 | 560 | 284 | 276 |
| 24 | Peer Khera | 66 | 325 | 157 | 168 | 160 | 106 | 54 | 185 | 84 | 101 | 2 | 1 | 1 | 138 | 72 | 66 |
| 25 | RelKaAmrana | 83 | 420 | 206 | 214 | 212 | 134 | 78 | 106 | 84 | 22 | 91 | 15 | 76 | 223 | 107 | 116 |
| 26 | Samri | 178 | 864 | 422 | 442 | 572 | 314 | 258 | 426 | 237 | 189 | 81 | 18 | 63 | 357 | 167 | 190 |
| 27 | Shambhoopura | 680 | 3035 | 1528 | 1507 | 2097 | 1193 | 904 | 1151 | 821 | 330 | 46 | 19 | 27 | 1838 | 688 | 1150 |
| 28 | Sitaram Ji ka Khera | Data Not Available | | | | | | | | | | | | | | | |
| | **4-6 Km** | | | | | | | | | | | | | | | | |
| 29 | Arniya Joshi | 317 | 1631 | 847 | 784 | 1027 | 646 | 381 | 898 | 465 | 433 | 72 | 25 | 47 | 661 | 357 | 304 |
| 30 | Bamniya | 212 | 1207 | 608 | 599 | 607 | 412 | 195 | 662 | 380 | 282 | 48 | 2 | 46 | 497 | 226 | 271 |
| 31 | Bhatakotri | Data Not Available | | | | | | | | | | | | | | | |
| 32 | BhoojiyaKheri | 170 | 830 | 430 | 400 | 411 | 260 | 151 | 448 | 238 | 210 | 26 | 5 | 21 | 356 | 187 | 169 |
| 33 | Lachhmipura | 41 | 157 | 83 | 74 | 57 | 41 | 16 | 79 | 45 | 34 | 4 | 2 | 2 | 74 | 36 | 38 |
| 34 | Patniya | 223 | 959 | 471 | 488 | 473 | 310 | 163 | 585 | 299 | 286 | 5 | 0 | 5 | 369 | 172 | 197 |
| 35 | PhacharSolanki | 108 | 567 | 292 | 275 | 332 | 209 | 123 | 213 | 173 | 40 | 34 | 5 | 29 | 320 | 114 | 206 |
| 36 | Phalasiya | 81 | 398 | 189 | 209 | 220 | 136 | 84 | 233 | 114 | 119 | 2 | 0 | 2 | 163 | 75 | 88 |
| 37 | Phalwa | 394 | 1881 | 943 | 938 | 1169 | 709 | 460 | 691 | 434 | 257 | 161 | 62 | 99 | 1029 | 447 | 582 |
| 38 | Rasoolpur | 153 | 662 | 316 | 346 | 362 | 216 | 146 | 319 | 180 | 139 | 68 | 15 | 53 | 275 | 121 | 154 |
| 39 | SankhlonKaKhera | 27 | 120 | 66 | 54 | 84 | 54 | 30 | 80 | 41 | 39 | 2 | 2 | 0 | 38 | 23 | 15 |
| 40 | Sand | 167 | 777 | 394 | 383 | 376 | 270 | 106 | 535 | 258 | 277 | 8 | 6 | 2 | 234 | 130 | 104 |
| 41 | Sangariya | 119 | 592 | 287 | 305 | 309 | 189 | 120 | 388 | 177 | 211 | 8 | 3 | 5 | 196 | 107 | 89 |
| 42 | Sawa | Data Not Available | | | | | | | | | | | | | | | |
| 43 | Shahbad | 90 | 379 | 190 | 189 | 180 | 118 | 62 | 247 | 127 | 120 | 7 | 2 | 5 | 125 | 61 | 64 |
| 44 | Shergarh | 27 | 107 | 52 | 55 | 21 | 14 | 7 | 57 | 29 | 28 | 0 | 0 | 0 | 50 | 23 | 27 |
| 45 | TeelaKhera | 88 | 439 | 213 | 226 | 214 | 132 | 82 | 269 | 130 | 139 | 0 | 0 | 0 | 170 | 83 | 87 |
| 46 | Unkhaliya | 412 | 2080 | 1062 | 1018 | 1176 | 766 | 410 | 1043 | 571 | 472 | 185 | 29 | 156 | 852 | 462 | 390 |
| | **6-8 Km** | | | | | | | | | | | | | | | | |
| 47 | Aheerpura | 136 | 645 | 338 | 307 | 408 | 252 | 156 | 292 | 181 | 111 | 22 | 5 | 17 | 331 | 152 | 179 |
| 48 | ArniyaPanth | 570 | 287 | 1494 | 1379 | 1581 | 998 | 583 | 1439 | 871 | 568 | 40 | 11 | 29 | 1394 | 612 | 782 |

| S. No. | Villages | Household | Population | | | Literacy | | | Main Worker | | | Marginal Worker | | | Non Worker | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female |
| | | | 3 | | | | | | | | | | | | | | |
| 49 | Bansati | 135 | 596 | 300 | 296 | 241 | 154 | 87 | 192 | 139 | 53 | 149 | 39 | 110 | 255 | 122 | 133 |
| 50 | BaroliGhata | 340 | 1499 | 758 | 741 | 832 | 548 | 284 | 950 | 461 | 489 | 1 | 0 | 1 | 548 | 297 | 251 |
| 51 | Biloda | 127 | 521 | 261 | 260 | 243 | 157 | 86 | 325 | 163 | 162 | 2 | 1 | 1 | 194 | 97 | 97 |
| 52 | BorKheri | 125 | 626 | 306 | 320 | 328 | 208 | 120 | 190 | 159 | 31 | 186 | 39 | 147 | 250 | 108 | 142 |
| 53 | Chiksi | 372 | 1626 | 831 | 795 | 833 | 554 | 279 | 1041 | 539 | 502 | 28 | 7 | 21 | 557 | 285 | 272 |
| 54 | Gilund | 868 | 4275 | 2172 | 2103 | 1889 | 1218 | 671 | 2361 | 1233 | 1128 | 238 | 85 | 153 | 1676 | 854 | 822 |
| 55 | Jalampura | 286 | 1101 | 559 | 542 | 593 | 389 | 204 | 665 | 342 | 323 | 18 | 9 | 9 | 418 | 208 | 210 |
| 56 | Jogni | 25 | 107 | 51 | 56 | 82 | 45 | 37 | 25 | 22 | 3 | 2 | 2 | 0 | 80 | 27 | 53 |
| 57 | Kanpura | 41 | 187 | 96 | 91 | 92 | 58 | 34 | 35 | 20 | 15 | 57 | 33 | 24 | 95 | 43 | 52 |
| 58 | Kanthariya | 82 | 402 | 192 | 210 | 193 | 119 | 74 | 192 | 120 | 72 | 37 | 6 | 31 | 173 | 66 | 107 |
| 59 | KheraBansati | 63 | 321 | 179 | 142 | 207 | 127 | 80 | 107 | 83 | 24 | 0 | 0 | 0 | 214 | 96 | 118 |
| 60 | KriparamKheri | 136 | 666 | 333 | 333 | 378 | 246 | 132 | 389 | 188 | 201 | 17 | 8 | 9 | 260 | 137 | 123 |
| 61 | Lasrawan | 687 | 3267 | 1661 | 1606 | 1654 | 1074 | 580 | 1682 | 945 | 737 | 72 | 37 | 35 | 1513 | 679 | 834 |
| 62 | MachhlaKhera | Data Not Available | | | | | | | | | | | | | | | |
| 63 | Mayra | 86 | 375 | 196 | 179 | 156 | 103 | 53 | 207 | 121 | 86 | 5 | 3 | 2 | 163 | 72 | 91 |
| 64 | Motha | 207 | 998 | 511 | 487 | 541 | 334 | 207 | 440 | 245 | 195 | 35 | 7 | 28 | 523 | 259 | 264 |
| 65 | Palri | 71 | 346 | 181 | 165 | 181 | 114 | 67 | 71 | 42 | 29 | 137 | 61 | 76 | 138 | 78 | 60 |
| 66 | Sarthal | 87 | 436 | 210 | 226 | 228 | 147 | 81 | 284 | 127 | 157 | 4 | 2 | 2 | 148 | 81 | 67 |
| 67 | Tai | 257 | 1148 | 580 | 568 | 691 | 427 | 264 | 734 | 360 | 374 | 7 | 3 | 4 | 407 | 217 | 190 |
| 68 | Theekariya | 262 | 1332 | 671 | 661 | 663 | 463 | 200 | 727 | 407 | 320 | 4 | 2 | 2 | 601 | 262 | 339 |
| 69 | **8-10 Km** | | | | | | | | | | | | | | | | |
| 70 | Angoriya | Data Not Available | | | | | | | | | | | | | | | |
| 71 | Bahalyon Ki Dhani | Data Not Available | | | | | | | | | | | | | | | |
| 72 | Barolimadhosingh | Data Not Available | | | | | | | | | | | | | | | |
| 73 | Bhalundi | Data Not Available | | | | | | | | | | | | | | | |
| 74 | Changeri | 111 | 557 | 284 | 273 | 358 | 229 | 129 | 259 | 157 | 102 | 24 | 11 | 13 | 274 | 116 | 158 |
| 75 | Ghatiyawali | 1116 | 5241 | 2639 | 2602 | 2563 | 1639 | 924 | 2567 | 1449 | 1118 | 316 | 125 | 191 | 2358 | 1065 | 1293 |
| 76 | HathiKaGurha | 10 | 43 | 24 | 19 | 19 | 14 | 5 | 24 | 12 | 12 | 6 | 4 | 2 | 13 | 8 | 5 |
| 77 | Ishakabad | Data Not Available | | | | | | | | | | | | | | | |

| S. No. | Villages | Household | Population | | | Literacy | | | Main Worker | | | Marginal Worker | | | Non Worker | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female | Total | Male | Female |
| 78 | Jawada | 434 | 2171 | 1093 | 1078 | 1376 | 849 | 527 | 1242 | 639 | 603 | 25 | 13 | 12 | 904 | 441 | 463 |
| 79 | Jharsadri | 140 | 638 | 330 | 308 | 342 | 219 | 123 | 430 | 212 | 218 | 0 | 0 | 0 | 208 | 118 | 90 |
| 80 | Kharon Ki Dhani | Data Not Available | | | | | | | | | | | | | | | |
| 81 | Kannauj | Data Not Available | | | | | | | | | | | | | | | |
| 82 | Karthana | 323 | 1481 | 748 | 733 | 617 | 416 | 201 | 514 | 380 | 134 | 214 | 36 | 178 | 753 | 332 | 421 |
| 83 | Khor | 211 | 1001 | 487 | 514 | 611 | 374 | 237 | 500 | 295 | 205 | 2 | 0 | 2 | 499 | 192 | 307 |
| 84 | Mandawali | 249 | 1147 | 552 | 595 | 721 | 417 | 304 | 667 | 320 | 347 | 16 | 9 | 7 | 464 | 223 | 241 |
| 85 | Mataji Ki Ordi | 157 | 769 | 386 | 383 | 350 | 235 | 115 | 438 | 230 | 208 | 0 | 0 | 0 | 331 | 156 | 175 |
| 86 | Mohammadpura | 96 | 501 | 255 | 246 | 293 | 185 | 108 | 288 | 144 | 144 | 42 | 12 | 30 | 171 | 99 | 72 |
| 87 | Nawabpura | 140 | 625 | 319 | 306 | 258 | 173 | 85 | 366 | 185 | 181 | 2 | 0 | 2 | 257 | 134 | 123 |
| 88 | PemandiyaKhera | 75 | 317 | 175 | 142 | 171 | 125 | 46 | 179 | 109 | 70 | 6 | 3 | 3 | 132 | 63 | 69 |
| 89 | Phootwal | 25 | 106 | 52 | 54 | 48 | 30 | 18 | 56 | 29 | 27 | 8 | 0 | 8 | 42 | 23 | 19 |
| 90 | Rughnathpura | 25 | 125 | 62 | 63 | 35 | 20 | 15 | 57 | 28 | 29 | 6 | 2 | 4 | 62 | 32 | 30 |
| 91 | Rebariyon Ki Dhani | Data Not Available | | | | | | | | | | | | | | | |
| 92 | SankhlonKaKhera | 27 | 120 | 66 | 54 | 84 | 54 | 30 | 80 | 41 | 39 | 2 | 2 | 0 | 38 | 23 | 15 |
| 93 | Semaliya | 77 | 349 | 169 | 180 | 131 | 91 | 40 | 213 | 102 | 111 | 83 | 43 | 40 | 53 | 24 | 29 |
| **Total** | | **16,171** | **77,451** | **39,190** | **38,261** | **41,570** | **26,482** | **15,088** | **39,012** | **21,855** | **17,157** | **4,332** | **1,395** | **2,937** | **34,107** | **15,940** | **18,167** |

***Source:- Census of India' 2011**

**Dependency on Source of water:**

The major source of water in the study area is sub-surface/Ground water for different purposes viz. domestic, agriculture, industrial etc. whereas in some villages surface water is also used. Most of the villages have Tube wells/Borehole for irrigation and few villagers use canal/river, pond etc. for irrigation in their fields. In the study area, surface water from Gambhiri reservoir, canal and other small reservoirs exist which also help as a source of irrigation. For domestic uses the water is supplied through the water tap, handpump, covered well etc. In summer season with the increase in demand in water quantity, the amount of supplied water remains almost the same not in the proportion of the demand.

In the surveyed area there are different kind of water sources available. In the study area boreholes and tube wells are the main sources of irrigation, more than 85% of the total irrigation is done through them. Whereas the remaining land is irrigated from the water from river, canal (15 %) etc.

Mostly villages are benefitted by the groundwater by Head pumps and Bore wells for the domestic use.

It is clearly seen that the villagers have to face hard conditions during the summer season due to the shortage in the domestic water supply.

**Ground Water Uses:**

Analysis of survey data of the study area, we found that the surface water and sub-surface water /ground water both are used by the users/villagers but ground water is used more than surface water. Ground water contributes more in irrigation, drinking and other uses.

**Management or Mitigation Measures:**

- Domestic waste water will be channelized into modular STP.
- Waste water from workshop will be routed into Oil & Grease trap and the water than or eventually taken for reuse after sedimentation.
- The catch drains of the individual terrace are planned to connect to the garland drain (1 m X 1m) outside the periphery of the dump.
- The construction of retaining walls (2m X 1.5m) and garland drains (1 m X 1m) with settling tank/siltation ponds/check dam & check filters shall be constructed well in advance at the proposed sites and shall be maintained regularly.

### 7.3.2 Dependency on sources of water [surface or sub-surface]:

The subject mine is a proposed mine and the habitation within study areas are not dependent on mine pit rain water hence not applicable.

### 7.3.3 Ground water uses [e.g. irrigation (irrigation method, number ofwatering) water supply etc.]

**Industries present within the 10 km study area:**

The Wonder Cement, Nuvoco Vistas Corporation Ltd, & Aditya Cement Works in the buffer zone, has also been using the ground water for its industrial purpose. It has been reported that each industry has about 2000Cum/day of water requirement, except Aditya Cement Works which has water requirement of 2500KLD.

In the study area, groundwater draft will occur mainly due to applied irrigation, domestic and industrial uses.

**Ground Water Resources (Buffer Zone):**

The area of Buffer zone (462.1644sq. km. - 4.745000 Sq.km = 457.4194 Sq.km.) lies in Nimbahera & Chittaurgarh block. This buffer zone has limestone and shale as main aquifer. Limestone aquifer zone is partly irrigated by the canal system therefore gets more ground water recharge from the return flow of the irrigation water as compared to the area which is not irrigated by the canal and is irrigated only by wells and tube wells.

**Recharge Due to Rainfall ($R_{rb}$):**

**(A) BY GROUNDWATER TABLE FLUCTUATION METHOD ($R_{rtf}$):**

The buffer zone has Limestone and Shale as main aquifer with exposure of Quartzite and groundwater recharge occurs due to this formation. It has been observed that average seasonal fluctuation of water level is varying between 4 to 5 m. At an average level, it can be taken as 4.5 m. Specific yield is varying between 1 to 1.5% for Shale and Limestone formations and can be taken as 1% on minimum. Recharge due to rainfall in the buffer zone computed by specific yield and water level fluctuation is given as:

$R_{rtf}$ =A x Sf x Sy
=457.4194 sq.m. x 4.5 m x 1 %
= 457.4194 x 4.5 x 0.01
**= 20.58 mcm/annum**

**(B) BY RAINFALL INFILTRATION FACTOR METHOD:**

The ground water recharge can also roughly have estimated by rainfall infiltration method. The ground water estimation committee, Govt. of India has suggested norms of recharge from rainfall under various hydro geological conditions. For areas as that of Nimbahera having consolidated sedimentaries and favorable hydro geological conditions of shallow water level and well-developed drainage, rainfall infiltration factor has been suggested as 6% to 10% of the normal rainfall. At a minimum level infiltration factor for the area can be taken as 6%.

$R_{r2}$ = area x Study year rainfall x R.I. factor
= 457.4194 x 1.064 x 0.06
**= 29.20mcm/annum**

**COMPARISON OF RECHARGE:**

A. Recharge from water table fluctuation method = 20.58mcm
B. Recharge from rainfall infiltration method = 29.20 mcm

PD = {(A - B)/B} x 100
= {(20.58– 29.20)/ 29.20} x 100
= {(-8.62)/ 29.20} x 100
= 29.52%

Since the percentage of deviation (29.52%) is greater than 20%, the recharge coefficient taken as the value estimated by the water level fluctuation method.

**RECHARGE FROM RAINFALL = 20.58 MCM**

**RECHARGE DUE TO APPLIED IRRIGATION ($R_{IB}$)**

Ground water recharge from the return flow of irrigation water is normally taken as 30% of the total water applied for irrigation as suggested by the committee. Ground water recharge from the above factors is as under

**30.84 x 0.3 = 9.25 mcm/annum**
**$R_{IB}$ = 9.25 mcm/annum**

**RECHARGE DUE TO SURFACE WATER BODIES ($S_{IB}$):**

As per the land use pattern of the buffer zone total area under surface water bodies work out to be 2.4Sq.km. As per the GWEC ground water, recharge through surface water bodies can be taken as 40% of the total spread area. Hence, ground water recharge from the above factors is as under

2.4 x 0.4 = 0.96 mcm/annum
$S_{IB}$ = 0.96 mcm/annum

**TOTAL RECHARGE OF BUFFER ZONE ($R_{TB}$):**

**$R_{TB}$ = $R_R$ + $R_{IB}$ +** $S_{IB}$
= 20.58+ 9.25 + 0.96
**$R_{TB}$ = 30.79 mcm/annum**

**GROUND WATER DRAFT OF BUFFER ZONE:**

From equation no. (B)

$D_{TB} = D_{iB} + D_{dB} + D_{inB} + D_{oB} + D_{etB}$

In the investigated area, ground water draft will occur due to applied irrigation, due to domestic use, due to industrial use. Evapotranspiration losses are negligible as water level is deep. Hence ground water draft can be computed by reducing the equation (B) to:

$D_{TB} = D_{iB} + D_{dB} + D_{inB} + D_{oB}$

**DRAFT DUE TO APPLIED IRRIGATION ($D_{iB}$):**

The ground water draft in the buffer zone takes place mainly by dug well and tube wells used for irrigation. There are about 995 dug wells/tube wells tapping limestone aquifer. In addition to that, there are about 1078 dug wells tapping shale in the remaining part of the buffer zone. It has been stated earlier that in limestone area it is about 150 cum/day and in shale area it is 100 cum/day. The annual draft has been calculated after considering that these structures will operate only for four months a year. The annual ground water withdrawal from these wells is as under:

Limestone area

995 x 150 x 120 = 17.91 mcm/annum

Shale area

1078 x 100 x 120 = 12.93 mcm/annum

**$D_{iB}$ = 30.84 mcm/annum**

**DRAFT DUE TO INDUSTRIAL USE ($D_{inB}$):**

The Wonder Cement, NuvocoVistas Corporation Ltd, & Aditya Cement Works lies in the buffer zone, has also been using the ground water for its industrial purpose. It has been reported that each industry has about 2000Cum/day of water requirement, except Aditya Cement Works which has water requirement of 2500KLD.

Hence, total draft due to industrial uses is

= (3 x 2000) + 2500

= 8500 cum/day

**$D_{inB}$ = 2.80 mcm/annum**

**DRAFT DUE TO DOMESTIC USE ($D_{dB}$):**

In the buffer area, the population is about 77451 according to Census figures for 2011. As population growth percentage has been @ 16.09 % per annum since 2011, the present Population is estimated at 2,02,071persons Considering 100 litters (0.1 $m^3$) as domestic consumption in rural and semi urban area (as per GERC Report 2004), the total water withdrawal for domestic use will be:

$D_{dB}$= 202071 x 0.1 x 365

**= 7.37 mcm/annum**

**DRAFT DUE TO LIVESTOCK USE (DlB):**

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

DlB = 7.37 x 0.05 = 0.37 mcm/annum

Hence total water requirement for Domestic and livestock use will be

$D_{dB}$ **= 7.37 + 0.37 = 7.74mcm/annum**

**TOTAL DRAFT IN THE BUFFER ZONE:**

$D_{TB}$ = $D_{iB}$+ $D_{inB}$+ $D_{dB}$ + $D_{lB}$

= 30.79 + 2.80 + 7.37 + 0.37

**$D_{TB}$ = 41.33mcm/annum**

Total ground water recharge is 30.79mcm/annum and total ground water pumpage is 41.33mcm, indicating that the area is overexploited and present stage of ground water development is 134.58% of the ground water recharge.

**Table7.3: Recharge & draft of buffer zone**

| RECHARGE OF BUFFER ZONE | |
|---|---|
| **Recharge due to rainfall** | |
| (A )By water table fluctuation method | 20.58 MCM |
| (B) By rainfall infiltration method | 29.20 MCM |
| Recharge due to rainfall after Comparison of recharge | 20.58 MCM |
| Recharge due to applied irrigation | 9.25 MCM |
| Recharge due to surface water bodies | 0.96 MCM |
| **Total recharge of Buffer Zone** | **30.79 MCM/ANNUM** |
| **DRAFT OF BUFFER ZONE** | |
| Draft due to applied irrigation | 30.79 MCM |
| Draft due to industrial use | 2.80 MCM |
| Draft due to domestic use | 7.37 MCM |
| Draft due to livestock use | 0.37MCM |
| **Total draft of Buffer Zone** | **41.33MCM/ANNUM** |
| **Stage of Development & Category** | **134.23% , Over exploited Area** |
| | |

**7.3.4 Improvement/declineinagriculturalyieldinlast5yearsandlikelyimpactafterNOC**

Not Applicable

**7.3.5 Impact of proposed / existing project on local communities [based on local interactions (interactions must be with stakeholders like fishermen community, farmers etc.]:**

There is no local community/tribes in or nearby the lease area.
There is Murliya dam and mining activities may affect it.

## Suggestion and Mitigation:

Murliya dam is outside the mining lease area and mining activity will be carried out at 290 m away from the Murliya Dam. Lithological strata of the ML area is massive, fine-grained, hard and compact. No impact is envisaged from mining activities. Blasting will be for short time and instantaneous. However, controlled blasting will be adopted and to avoid secondary blasting, rock breaker will be used for breaking of boulder.Stream/Nallah flowing from Murliya Dam after passing through the lease area flows towards North

to NNE direction which further meets River Gambhiri. DCBL shall be undertaking various work for rainwater harvesting and artificial groundwater recharge. It may also be noted that upon reaching ultimate pit limit, the mined out pits shall be reclaimed by converting into water reservoir, which shall further replenish the groundwater. At the conceptual stage, about 169.83 ha excavated area will be developed as water reservoir for community use.

### Ground water monitoring:

- The groundwater quality analysis on monthly basis as per CGWA norms and submission to the regularity authority.

- Monitoring of ground water level on monthly basis as per CGWA norms and submission to regularity authority.

# CHAPTER-8.0

## 8. Proposed Measures for Disposal of Wastewater by Industry Drawing Saline Water:

This project is opencast mining for Limestone at Villages: Ravliya, Bhavliya, Bhopali, Cherliya, Mangrol and Sindwari, Tehsil: Nimbahera, District: Chittaurgarh (Rajasthan) and this project site does not fall under saline zone as per CGWA categorization.

Therefore, this chapter on disposal of waste water for saline water is not applicable.

# CHAPTER-9

## 9. Measures to be adopted for water conservation, which includes recycling, reuse, treatment, etc. this includes the water balance chart being adopted by the firm along with details of water conservation methods to be adopted.

The surface runoff in rainy season will require arrangement for disposal, particularly the water from higher levels which will follow the natural gradient to reach the working pit. Garland drain of the suitable width and depth will be constructed around the pit with settling tanks in between at regular distances. Garland drains with settling tanks will also be constructed around dumps. Retaining walls will also be constructed around dumps to collect the wash off. Rain water will flow through the garland drain and desilted in the settling tanks builtin between the garland drain and will be further routed to the RWHS and overflow clear water will follow the natural gradient out of ML boundary. Direct rainfall within mine pit will be used for plantation & dust depressions. When the pit has reached to a greater depth, two stages of pumping along with construction of deeper and wider garland drain will be restored for collection of runoff water.

**Management or Mitigation Measures:**

- Waste water from workshop will be routed into Oil & Grease trap and the water than or eventually will be used for dust suppression after sedimentation.
- The catch drains of the individual terrace are planned to connect to the garland drain (1 m X 1m) outside the periphery of the dump.
- The construction of retaining walls (2m X 1.5m) and garland drains (1 m X 1m) with settling tank/siltation ponds/check dam & check filters shall be constructed well in advance at the proposed sites and shall be maintained regularly.

## 9.1 Brief write up along with capacity and flow chart of Sewage Treatment Plants / Effluent Treatment Plants / Combined Effluent Treatment Plants existing/ proposed within the project:

Not Applicable

## 9.2 Details of water conservation measures to be adopted to reduce/save the ground water:

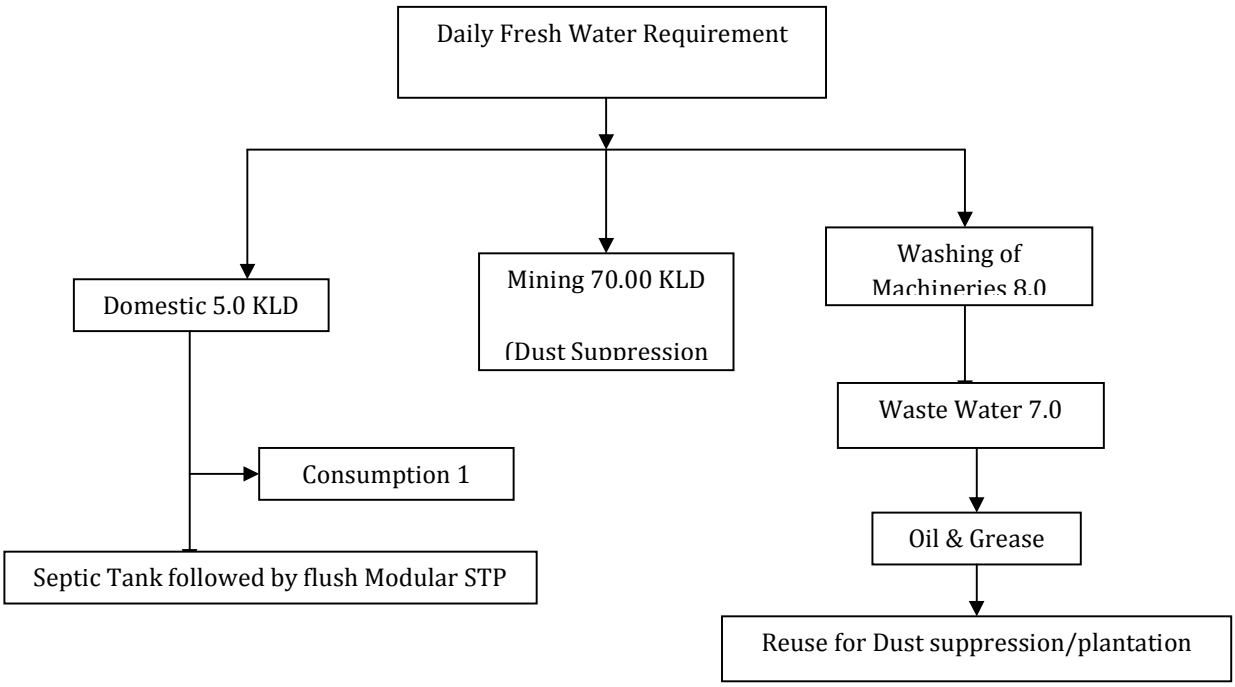
**Water Requirement:**

- The estimated demand of water for the proposed mining project is 83 KLD. Water demand is proposed to be met from ground water.
- Once the lands will be purchased by DCBL, most of the existing tube wells would be defunct. It is evident that with the start of Mining activity in the Satkhanda Block – B, the natural groundwater status is likely to improve because of our lesser requirement as against present agricultural use of groundwater from the existing tube wells.

The daily water demand will be 83.00 KLD, out of which 5.00KLD water will be used for domestic purpose, 40.0 KLD for dust suppression, 30.00 KLD for plantation and 8.0 KLD for other process. Water demand will be met from ground water and after development of the mine pit, DCBL will augment the mine pit rain water for meeting the requirements except domestic water requirement. Waste water will be treated and will be used for dust suppression and plantation. Use of rain water and treated water will reduce the fresh water demand. Other measures such as use of water sprinklers etc. will also help to reduce the water demand.

## 9.3 Details Total water balance chart:

**Water Balance Chart**



# CHAPTER-10

## 10. Any Other Details Pertaining to the Project:

### 10.1 Conclusion:

The water extraction for proposed mining utilization will be done from three proposed tube wells of 125 m to 150 m depth with water extraction not more than 83m$^3$ per day.

- The total requirement of water for all uses is 83 KLD.
- The estimated quantity of water required for domestic use is 5KLD.
- The annual rainfall of the area is 1064.40 mm at Nimbahera rain gauge station.
- The inventory of ground water abstraction structures and local enquiries reveal that the yield of the bore wells in the area ranges from 120 to 300 liters per minute.
- Implementation of ground water augmentation measures like recharge by RWH would increase the ground water resource of the area there by increasing the yield of proposed bore well.

### 10.2 Recommendation:

- It is recommended to construct four (4) rainwater harvesting structures. The construction of recharge structures shall be completed in a series manner in the span of two years when the mining will be at its full capacity.
- Artificial recharge measures viz. RWH (Rainwater harvesting Structures) will be implemented to augment the ground water resources.
- Two Piezometers are proposed to be constructed down to a depth of 125 m to 150 m for regular monitoring of ground water levels and quality of ground water in the project area.
- The tentative design of the proposed Piezometers has been given in figure10.1
- Around the bore well, 18" diameter chamber may be made with well cap having lock and key arrangement to prevent any tampering. There should be provision of 1.5" diameter PVC airline in the Bore well for inserting probe of water level recorder for complete precision in the water level data. Water samples should be collected from all the observation wells including Piezometers proposed in and around the proposed mine area for chemical analysis to determine physical as well as inorganic chemical constituents.
- The periodicity of monitoring should be kept at four times in a year, i.e. during first week of January, last week of May, last week of August and the first week of November every year. This also conforms to

the guidelines of Central Ground Water Authority, Ministry of Water Resources, and Government of India.

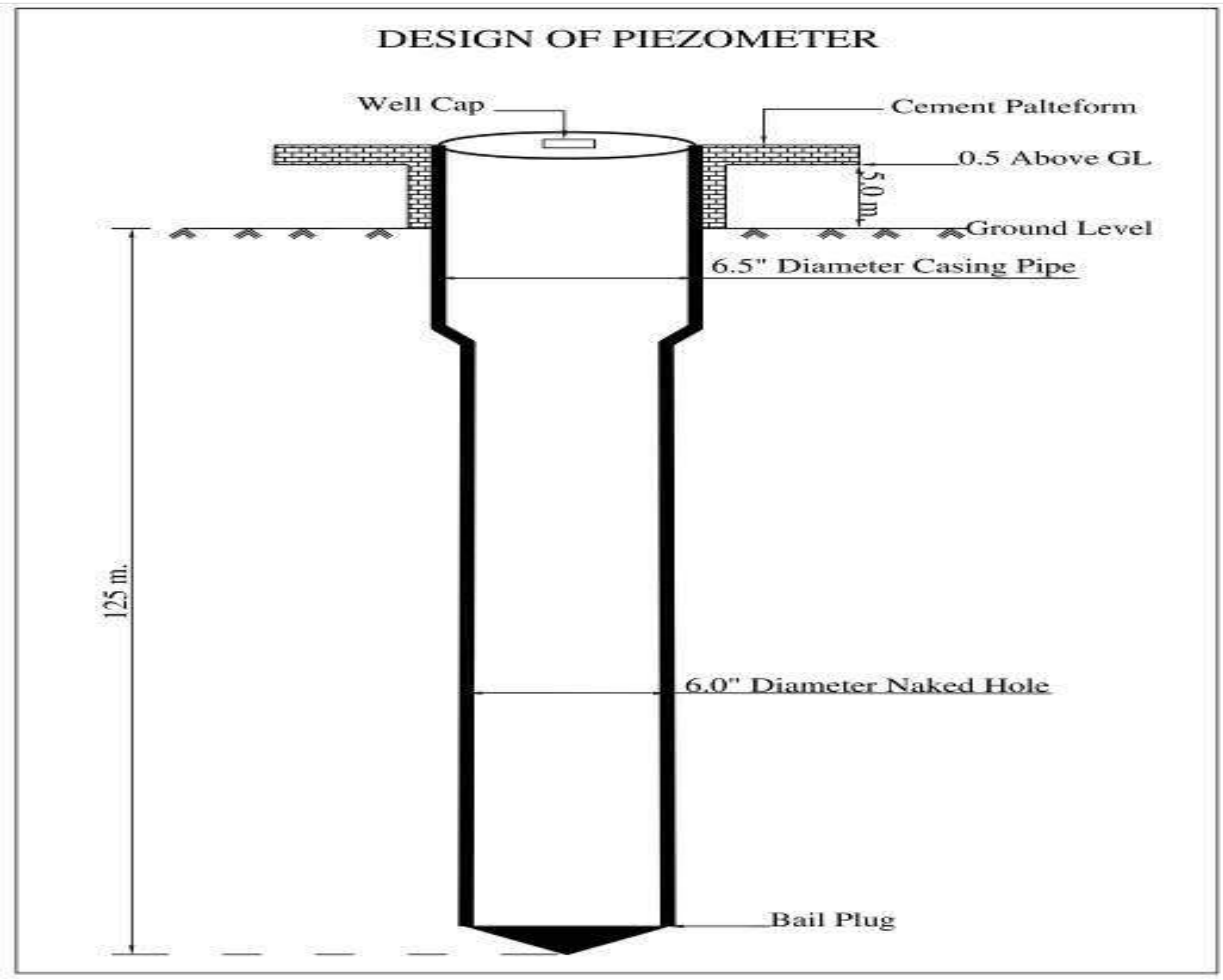



**Figure 10.1: Proposed design of Piezometer**

कार्यालय प्रधान मुख्य वन संरक्षक एवं मुख्य वन्य जीव प्रतिपालक,
अरण्य भवन, झालाना संस्थानिक क्षैत्र, राजस्थान जयपुर
फोन नम्बर: 0141–2700151 ई–मेल: cwlw.raj@gmail.com

क्रमांकः एफ 11(422)विकास–II / मुवजीप्र / 2020–21 / 292 दिनांक : 10-3-2022

निमित्त,

M/s Dalmia Cement (Bhart) LTD.
11th and 12th floor Hansalaya Building,
15 Barakhamba Road, New Delhi- 110001

विषय :– Request for Approval of wildlife Conservation Plan and Authentication of 10 km Radious Map of the study area of Proposed Sindwari, Ramakhera, Sathenda Block – B (Autctioned Block) Limestone Mine (ML Area 474.50 Ha.) located in village(s) – Ravliya, Bhavliya Bhopali, Cherliya Mangrol and Sindeari, Tehsil Mimbahera, District – Chittorgarh, Rajasthan of M/S Dalmia Cement (Bharat) Ltd.

सन्दर्भ :– Ministry of Environment, Forest and Climate Change ds ToR Letter No. J-11015/38/2018-IA.II(M) Dated 06.06.2018 एवं मुख्य वन संरक्षक,वन्यजीव उदयपुर पत्रांक 4702 दिनांक 10.08.2021 व पत्र क्रमांक 1475 दिनांक 03.03.2022

महोदय,

उपरोक्त विषयान्तर्गत सन्दर्भित पत्र के क्रम में लेख है कि इस कार्यालय के पत्र कमांक 115 दिनांक 23.09.2021 द्वारा वाईल्डलाईफ कजर्वेशन प्लान के सम्बन्ध में जारी सैद्वान्तिक स्वीकृती कि अनुपालना में M/s Dalmia Cement (Bharat) Ltd. द्वारा योजना कि कुल राशि 267.00 लाख कि 20 प्रतिशत राशि 53,40,000 /– दिनांक 11.01.2022 को आरपैक्स खातें में जमा की जा चुकी हैं।

चूँकि इस कार्यालय द्वारा जारी पत्रांक 6451–6463 दिनांक 24.05.2019 द्वारा जारी दिशा–निर्देशों में उल्लेखित व शर्तों की पालना में प्रस्तावित कजर्वेशन प्लान, नक्शा तथा परियोजना क्षेत्र में पाये जाने वाले वनस्पति एवं वन्यजीवों की सूची उप वन संरक्षक, द्वारा प्रमाणित कर मुख्य वन संरक्षक की अभिशांषा के साथ प्रस्तुत की गई है।

अतः पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार नई दिल्ली के पत्र क्रमांक न. J-11015/38/2018– IA-II (M) दिनांक 06.06.2018 के बिन्दु संख्या 17,18 की पालना के लिये इस कार्यालय द्वारा वन्यजीव संरक्षण योजना (WCP) की निम्न शर्तों के साथ स्वीकृति जारी की जाती है :–

(i) यदि परियोजना लागत में कोई वृद्धि होती है तो तदनुसार वन्यजीव संरक्षण योजना में भी वृद्धि की जाकर, अपेक्षित राशि वन्यजीव प्रभाग में जमा कराई जावे।

(ii) केन्द्रीय सरकार द्वारा जारी संदर्भित आदेशों के अनुरूप इस योजना के क्रियान्वयन का प्रबोधन किया जावे साथ ही संलग्न मैप को भी उप वन संरक्षक के अभिशंषा अनुसार प्रमाणित किया जाता है।

संलग्न : 1. नक्शा, 2. एनेक्सर–1, 3- Wildlife Conservation Plan की प्रति,

भवदीय,

(अरिन्दम तोमर)
अति0 प्रधान मुख्य वन संरक्षक
एवं मुख्य वन्यजीव प्रतिपालक
राजस्थान, जयपुर
दिनांक :

क्रमांकः एफ 11(412)विकास–II / मुवजीप्र / 2020–21 /
प्रतिलिपि निम्न को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित है :–

1. संभागीय मुख्य वन संरक्षक, उदयपुर
2. उप वन संरक्षक, वन्यजीव, चित्तौड़गढ।

अति0 प्रधान मुख्य वन संरक्षक एवं
मुख्य वन्यजीव प्रतिपालक,
राजस्थान, जयपुर

# WILDLIFE CONSERVATION PLAN

***Pavo cristatus* (Indian Peafowl), *Panthera padrus fusca* (Indian Leopard), *Prionailurus rubiginosus* (Rusty-Spotted Cat), *Canis lupus pallipes* (Indian Wolf), *Varanus bengalensis* (Indian Monitor Lizard) & *Gyps indicus/Gyps bengalensis* (Indian Vulture)**

**FOR**

## SINDWARI, RAMAKHERA, SATKHANDA BLOCK – B LIMESTONE MINE

**Location: - Village(S) – Ravliya, Bhavliya, Bhopali, Cherliya, Mangrol and Sindwari, Tehsil – Nimbahera, District – Chittaurgarh, Rajasthan.**

FCA Proposal
C.S.
(SUGNA RAM JAT)
DCF, Chittorgarh

**Applicant**

Dalmia
Bharat Cement

**DALMIA CEMENT (BHARAT) LTD.**
**11th and 12th Floors, Hansalaya, 15, Barakhamba Road, New Delhi – 110 001**
**Email: - env.head@dalmiacement.com**

**ENVIRONMENTAL CONSULTANT**

**ENKAY ENVIRO SERVICES PVT. LTD., JAIPUR**
Accredited EIA Consultant Organization by NABET,QCI, New Delhi
at S. No. 49 (MoEF&CC)
List of Accredited EIA Consultant Organizations.
Certificate No NABET/EIA/2023/RA0183
Validity: - Up to 12.12.2023.
Corporate Office: - # 92 Heera Nagar - A, Near Shalimar Bagh, Ajmer Road,
Jaipur (Raj.). - 302 021
Phone: - 0141-4920770/ 4920771
Email: - info@enkayenviro.com,
Website: - www.enkayenviro.com

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# WILDLIFE CONSERVATION PLAN

# DALMIA CEMENT (BHARAT) LTD.

**SINDWARI, RAMAKHERA, SATKHANDA BLOCK – B LIMESTONE MINE**
**Location: - Village(S) – Ravliya, Bhavliya, Bhopali, Cherliya, Mangrol and Sindwari, Tehsil – Nimbahera, District – Chittorgarh, Rajasthan.)**


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| 3. | Villages and habitations within the WCP area; demographic and occupational profile; cropping pattern; impact on the WCP area and especially on the forest growth; information about cattle populations and dependency on the forest for grazing; other forest dependents; etc. | 13 |
| 4. | Description of topography, geology, climate, natural disasters, natural drainage lines, water bodies and whether the particular landscape is the source or origin of any stream/river. | 16 |
| 5. | Details of linear infrastructure such as roads, rail lines, water ways and canals; other developmental structure in the WCP area adversely affecting the movement of mega fauna in the area and possible ameliorative measures. Details of the water reservoirs, vertical mining pits and unguarded dug wells in the WCP area should also be mentioned with possible safeguards available and proposed. | 24 |
| 6. | Description of flora and fauna of the WCP area showing the details or endemic; threatened and scheduled species. | 27 |
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| | | |
|---|---|---|
| | the WCP area(Data on animal kill/injury, cattle kill and crop damage in WCP area and also the date on animal kill due to various reasons will also be analyzed and mentioned). Also the extent of human-wild implementation should be assessed and recorded. | |
| 10. | Other Industries within the study area | 70 |
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| 12. | Brief note about literature survey of Research | 71 |
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| 1. | It should cover the following aspect in general about the entire plan and to address the issue over project area as well as the buffer area.<br><br>Strategies to mitigate and minimize adverse impacts as indicated in Chapter-2 | 82-105 |
| | **Chapter- IV & V** | **106-127** |
| 1. | • Interventions to be implemented by the project authorities inside the project area (core & Buffer area) with suitable justifications.<br>&<br>• Plan period preferably for initial 10 years with suitable provisions for interim reviews and suitable modifications.<br><br>• Relevant provisions of Environment Management Plan for the project and the interventions overlapping in nature are to be specified. | 106-127 |

| | | |
|---|---|---|
| | **Chapter- VI** | **128-132** |
| 1. | The Financial forecast statement should detail the financial outlay for the interventions to be implemented by the project authorities within the WCP area (core and buffer separately). The annual work program and annual outlay for each component should be clearly given in a table. It should also include monitoring and evaluation arrangement for the activities undertaken. The outlay and indicative activities are indicated in point no. 4 of the instructions | 128-132 |
| | **Chapter- VII** | **133** |
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| **V** | Letter of Intent | **175-177** |
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| **VIII** | Green Belt Development Plan | **180** |


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Dalmia
BHARAT CEMENT

## Annexure- I

| | | | |
|---|---|---|---|
| 1. | **Name of Project Proponent** | : | Dalmia Cement (Bharat) Limited |
| 2. | **Name of project** | : | Sindwari, Ramakhera, Satkhanda Block-B (Auctioned Block) Limestone Mine of M/s Dalmia Cement (Bharat) Ltd. with Limestone 1.8 MTPA, Top Soil- 0.076 MTPA, OB–1.124 MTPA (ROM/Total Excavation 3.0 Million TPA) with installation of crusher capacity of 500 TPH located in Village(s) - Ravliya, Bhavliya, Bhopali, Cherliya, Mangrol and Sindwari, Tehsil Nimbahera, District- Chittaurgarh, Rajasthan in MLA 474.50 ha. |
| 3. | **Activities to be undertaken in project (in brief)** | : | **PROJECT DESCRIPTION**<br>The proposed mine "Sindwari, Ramakhera, Satkhanda Block- B" spread over an area of 474.50 Ha, in Tehsil – Nimbahera, District- Chittorgarh, Rajasthan was e-auctioned auctioned as an independent mine by Government of Rajasthan and Dalmia Cement (Bharat) Limited (DCBL) has been declared as the "Preferred Bidder" under the Mineral (Auction) Rule, 2015 Government of Rajasthan has issued the Letter of Intent in favour of Dalmia Cement (Bharat) Ltd. vide letter no. P.5 (2) Khan/ Group– 2/ 2017 dated 29.08.2017.The proposed project obtained TOR from EAC (Non-Coal Mining)/MoEF&CC under 1(a)-A category vide letter no. J-11015/ 38/ 2018-IA.II (M) dated 06.06.2018 as per the EIA Notification S. No. 1533 dated 14th September' 2006 and its subsequent amendments.<br>The said proposal is for obtaining Environmental |



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| | | | |
|---|---|---|---|
| | | | Clearance for a capacity of 3.0 Million TPA of ROM/Total Excavation (Limestone: - 1.8 MTPA) with installation of a crusher with capacity of 500 TPH within lease area of 474.50 ha.<br><br>**METHOD OF WORKING**<br>The salient features of mode of working as per approved Mining Plan are:-<br><br>➢ The mining activities will be conducted as to ensure maximum mineral conservation and minimum environmental degradation.<br>➢ Conventional Opencast fully mechanized mining method will be adopted which includes drilling, blasting, loading, transportation and crushing.<br>➢ The maximum height of the bench will be kept at 10m and width of the working will be around 12 – 16m.<br>➢ Controlled blasting with 'V' pattern firing is proposed 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. Rock breaker will be used to eliminate secondary blasting. Blasting shelters will be provided within the blasting zone.<br>➢ Use of rock breaker for secondary breaking of boulders in quarries shall be adopted.<br>➢ The blasted ROM will be loaded by Hydraulic Excavators |



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| | | | |
|---|---|---|---|
| | | | of 4.0 to 4.5m3 shovels/ backhoe bucket size in to dumpers of 25 to 35 Tonnes capacity and will be sent to crusher.<br>➢ Haul road at 1:16 gradient will be maintained for easy movement of machinery and transport vehicles. A road grader will be utilized for Maintenance - of haul roads<br>➢ A crusher of 500 TPH capacity is proposed to be installed within the intended lease area. The crusher output size will be about 75mm in the plan period.<br>➢ As the State Govt. did not define the end use of the proposed project, company planned to use part of the crushed limestone to one of the proposed cement plant of its subsidiary company (RPPL) located at about 1 km and part of the limestone & other unusable ROM from the mine may also be sold to other end use by road transport.<br>➢ Working will be carried out in single shift till the fourth year and from fifth year onwards two shifts are proposed.<br>➢ Mining excavation will be carried out after leaving statutory barrier of 7.5 meters from the ML boundary. Plantation will be taken-up within this statutory barrier. |
| 4. | **Cost of project** | : | Project Cost: -Rs. 233.33 Crore |
| 5. | **Location of project (district, tehsil, revenue village etc. with geo-coordinates)** | : | The mine is situated at Village(s) –Ravliya, Bhavliya, Bhopali, Cherliya, Mangrol and Sindwari, Tehsil–Nimbahera, District – Chittaurgarh, Rajasthan. The lease |



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area falls within the Survey of India Toposheet No. G43U10 (45L/ 9) and the study area (10 km radius from Ml boundary) falls within GoI. Toposheet no. G43U10 (45L/ 9) & G43U9 (45L/ 10).

**Geological Coordinates**

| Pillar Nos. | Latitude (N) | Longitude (E) |
|---|---|---|
| 1 | 24°43'28.01216" | 74°38'52.59332" |
| 2 | 24°43'27.78710" | 74°37'20.04389" |
| 3 | 24°42'28.45132" | 74°37'20.22314" |
| E | 24°42'28.45132" | 74°38'52.59332" |

***Source:- Approved Mining Plan with PMCP dated 26.09.2018 and tender documents.***

| | | | |
|---|---|---|---|
| 6. | **Area of project (in ha) & 10 Km buffer area (in ha)** | : | Core Area: 474.50 Ha (ML area)<br>10 Km Buffer Area: 46,216.44Ha. |

| | | | |
|---|---|---|---|
| 7. | **Name of ecologically sensitive areas near the project locations (see point 2a of instructions)** | : | *Not present in core and buffer zone (10 km radius of project site).* |
| 8. | **Name of Schedule I species for which Wildlife Conservation Plan (WCP) is made** | : | **Wild Life Conservation Plan is prepared based on the authenticated list of Flora-Fauna (within 10 km study area of the proposed project) issued by DCF, Chittaurgarh, Rajasthan vide letterएफ( )सर्वे / उवसं/2019 -20 /43 dated 03.01.2020.There are no Schedule-I species within the ML area (Core Zone), however name of Schedule I species found in buffer zone (10 km from project boundary) are listed as follows:** |
| 9. | **Financial Outlay of WCP as per (see point no. 4 of instructions)** | : | As per the instructions for preparation of Wild Life Conservation Plan issued by Addl. PCCF & CWW, Jaipur vide F. No. () WCP/CWLW/2019/6451-6463 dated 24.05.2019, financial outlay calculation is hereunder: |

| S. N0 | Vernacular Name | Scientific Name | Family | Status (WPA-1972) |
|---|---|---|---|---|
| 1. | Indian peafowl | *Pavo cristatus* | Phasianidae | Sch- I |
| 2. | Rusty Spotted Cat | *Prionailurus rubiginosus* | Felidae | Sch- I |
| 3 | Indian Vulture | *Gyps bengalensis* | Accipitridae | Sch- I |
| 4. | Indian leopard | *Panthera pardus fusca* | Felidae | Sch- I |
| 5. | Indian wolf | *Canis lupus pallipes* | Canidae | Sch- I |
| 6. | Indian Monitor Lizard | *Varanus bengalensis* | Varanidae | Sch- I |



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<table>
<tr><td></td><td>a) Formula 1</td><td></td><td>1% of Project Cost<br>Project Cost: 233.33 Crore<br>1 % of Project cost is Rs. 2.33 Crore</td></tr>
<tr><td></td><td>b) Formula 2</td><td></td><td>Rs. 0.50 Lacs Per ha of core area + Rs. 5 Lacs (lumpsum) for each Schedule -I species
<table>
<tr><th>S. No.</th><th>Particular</th><th>Details</th><th>Amount (in Crore)</th></tr>
<tr><td>1.</td><td>Rs. 0.50 Lacs Per ha of project area</td><td>474.50 Ha.</td><td>2.37</td></tr>
<tr><td rowspan="6">2.</td><td rowspan="6">Rs. 5 Lacs (lumpsum) for the buffer area for each Schedule- I species</td><td>Indian Peafowl</td><td>0.05</td></tr>
<tr><td>Rusty Spotted Cat</td><td>0.05</td></tr>
<tr><td>Indian Vulture</td><td>0.05</td></tr>
<tr><td>Indian leopard</td><td>0.05</td></tr>
<tr><td>Indian Wolf</td><td>0.05</td></tr>
<tr><td>Indian Monitor Lizard</td><td>0.05</td></tr>
<tr><td colspan="3">Total</td><td>2.67Crore</td></tr>
</table></td></tr>
<tr><td></td><td>c) Financial outlay (Maximum of formula 1 and 2)</td><td></td><td>Financial Outlay- Formula 2:<br>Total Amount: Rs. 2.67 Crore</td></tr>
<tr><td>10.</td><td>Name of neighboring concerned forest divisions (from where recommendation/ authentication may be required for this project)</td><td>:</td><td>Divisional Forest Officer, Chittaurgarh (Rajasthan)</td></tr>
<tr><td>11.</td><td>Request, if any, for seeking reduction in outlay of WCP with grounds</td><td>:</td><td></td></tr>
<tr><td>12.</td><td>Name of Implementing Agency for the WCP</td><td>:</td><td>Divisional Forest Officer, Chittaurgarh (Rajasthan)</td></tr>
<tr><td>13.</td><td>Date of inspection of site & name of forest officer who has inspected it</td><td>:</td><td></td></tr>
</table>



Sr GM (PH)

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(SUGNA RAM JAT)

| 14. | Checklist of attachments | : | Reply | Reference |
|---|---|---|---|---|
| | **Map authenticated by DCF** | | Attached for authentication | Attached as **Appendix- VI** |
| | **List of flora & fauna authenticated by DCF** | | Yes, | 1. Vide letter एफ ( )सर्वे/उवसं/ 2019 -20 /43 dated 03.01.2020 : Schedule I Species Viz. *Pavo cristatus, Prionailurus rubiginosus, Gyps bengalensis* and *Panthera pardus fusca* Attached as **Appendix-IV**<br>2. एफ ( )सर्वे/उवसं/ 2020-21/369 dated 20.01.2021 Schedule I Species Viz. *Canis lupus pallipes* and *Varanus bengalensis* Attached as **Appendix-IV (a)** |
| | **Wildlife Conservation Plan as per format authenticated by DCF** | | Attached for authentication | |

(Arindam Tomar)
APCCF & CWLW
Rajasthan, Jaipur

उप वन संरक्षक
चित्तौड़गढ़



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## CHAPTER -VI

**FINANCIAL FORECAST STATEMENT SHOULD DETAIL THE FINANCIAL OUTLAY FOR THE INTERVENTIONS TO BE IMPLEMENTED BY THE PROJECT AUTHORITIES WITHIN THE WCP AREA (CORE AND BUFFER SEPARATELY). THE ANNUAL WORK PROGRAM AND ANNUAL OUTLAY FOR EACH COMPONENT SHOULD BE CLEARLY GIVEN IN A TABLE. IT SHOULD ALSO INCLUDE MONITORING AND EVALUATION ARRANGEMENT FOR THE ACTIVITIES UNDERTAKEN. THE OUTLAY AND INDICATIVE ACTIVITIES ARE INDICATED IN POINT NO. 4 OF THE INSTRUCTIONS.**

The wildlife Conservation Plan for 6 numbers of Schedule I Species with the financia outlay of Rs. 267 lacs has been calculated on the baisis of formula I.

| S.No | Activities | Year Wise Fund Allocation (in Lakhs) | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | 9th | 10th | |
| 1 | **Habitat improvement & mitigative measures (Food, Water, shelter, Movement etc) and measures to reduce/minimize the human-animal conflict.** | | | | | | | | | | | |
| 1a | Construction of five small tree groves (2 Ha Each) as per *MJSA module in a different habitation area of peafowl and other birds with planting of suitable shady trees in each grove and creation of meadows (Grass land) (for ten years). Improvement of vegetation habitat and food by RDF method with gap plantation. | 10.0 | ... | 12.0 | ... | 14.0 | ... | 16.0 | ... | 18.0 | ... | **70.00*** |
| 1b | Maintenance of newly planted saplings including causality replacement (15% of total plants species) @Rs.150 per plant per year. | ... | 2.50 | ... | 3.0 | ... | 3.5 | ... | 3.75 | ... | 4.25 | **17.00** |



Enviohrs
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| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1c | Protection of existing water holes and provision for Construction of small water holes, small water ponds and providing watering facilities. | 5.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | **10.00** |
| 1d | Development and Maintenance of Nursery in the study area. | 2.0 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 | **4.25** |
| 1e | Provision for artificial Salt lick near meadows and water availability of the study area. | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | **2.00** |
| 1f | Formation of peacock protection force {PPF} and Provision for formation of human- animal conflict team | 5.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | **10.00** |
| | Total | **23.20** | **3.95** | **13.45** | **4.45** | **15.45** | **4.95** | **17.45** | **5.20** | **19.45** | **5.70** | **113.25** |

**2. Awareness and extension (Forest staff will also be invited for various activities to ensure Participation)**

| | | | | | | | | | | | | |
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| 2a | LED video mobile Van will be installed for this with wildlife awareness movies/ animations/videos it will be move around the habitations area to spread awareness. To highlight importance status of wildlife, a public awareness and education campaign will be launched in the area. Slide slow, pamphlets, meetings, exhibition etc. will be helpful. (Provision of such Multiutility Vehicle of Rs. 10 | 10.50 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | **13.65** |



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| | lacs ) | | | | | | | | | | | |
| 2c | Provision of Awareness and education programme for wildlife, biodiversity significance and sustainable use of resources at school level, village level and Gram Panchayat level with presence of live stock kippers and forest department representatives. | 2.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | **7.0** |
| | Total | **13** | **0.85** | **0.85** | **0.85** | **0.85** | **0.85** | **0.85** | **0.85** | **0.85** | **0.85** | **20.65** |
| **3** | **Support for Forest Department for monitoring, rescue & rehabilitation of wildlife Veterinary care, animal health, rescue, tools and equipment etc.** | | | | | | | | | | | |
| 3a | Provision for establishment of Well Ventilated Rescue Centre, required equipment and necessary medicine for the same. | 10.0 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | **14.5** |
| 3b | Providing of one rescue vehicle for needful wildlife also providing the one Tranquillizer gun/Dart gun to forest department. (Including yearly medicine and maintenance of equipment for 9 years ) | 20.0 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | **23.1** |
| 3c | Provision of veterinary care and cages for injured or sick deformed animal. One refrigerator and 5 Ice boxes will provide for preservation of Veterinary medicines | 2.50 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | **4.30** |
| 3d | One Canon 7D camera with accessories, one Binoculars Nikon and one GPS | 2.50 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | **4.3** |



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| | instrument will be give to forest department | | | | | | | | | | | |
| 3e | Fund for regular monitoring of the wildlife habitats, den sites and resting sites through periodical visits of watchers & volunteers and Regular patrol the entire habitat to monitor hunter movement. Provision for providing necessary materials petrol/ Diesels | 1.5 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | **4.65** |
| 3f | Create sign boards – regularly crossing areas like National Highways and State Highways. | 2.5 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | **5.65** |
| | Total | **39.0** | **1.95** | **1.95** | **1.95** | **1.95** | **1.95** | **1.95** | **1.95** | **1.95** | **1.95** | **56.55** |
| **4** | **Contribution towards conservation of wildlife in Pas (to be deposited in RPACS) Wetland Development, Research & Monitoring – Wildlife, census of wildlife etc** | | | | | | | | | | | |
| 4a | Tree planting along the fringes of wetland Silvicultural operation thereafter | 4.50 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | **7.65** |
| 4b | Population Status Assessment once in two year (FD) and Overall | 5.0 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | **9.50** |
| 4c | Provision for other expenses regarding conservation plan | 4.85 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | **8.00** |
| | Total | **14.35** | **1.20** | **1.20** | **1.20** | **1.20** | **1.20** | **1.20** | **1.20** | **1.20** | **1.20** | **25.15** |
| **5** | **Administration Cost for processing inspection etc ((to be deposited in RPACS)** | | | | | | | | | | | |
| 5a | Administration Cost for processing and inspection of | 12.2 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | **25.70** |



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| | WCP etc. | | | | | | | | | | | |
| **6** | **Miscellaneous including Eco-Development and capacity building** | | | | | | | | | | | |
| 6a | Eco-development support-livehood development-fuel& fodder plots | 8.0 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | **9.35** |
| 6b | Skill development training for local villagers and forest guard | 4.0 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | **5.8** |
| 6c | For Eco- Restoration of villages 1500 plants (@ Rs. 70/saplings) every year is to be distributed among the villages | 1.10 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | 1.05 | **10.5** |
| | Total | **13.10** | **1.40** | **1.40** | **1.40** | **1.40** | **1.40** | **1.40** | **1.40** | **1.40** | **1.40** | **25.70** |
| | **TOTAL (point. 1 -6)** | **114.85** | **10.85** | **20.35** | **11.35** | **22.35** | **11.85** | **24.35** | **12.1** | **26.35** | **12.60** | **267.0** |

**Note:-**

- Plantation for grooves development will be as per the Mukhya Mantri Jal Swavablan Youjna (MJSA Scheme)
- Selection of villages for Improvement of habitation/ roosting will be decided in close consultation with the local forest department.
- Maintenance for sapling will be providing by project authorities.
- Provision for regular monitoring and evaluation of implementation of conservation plan.
- Provision for modification of conservation plan if need arises.
- Location for the veterinary hospital and equipment will be decide by the Forest Department

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