



By E-mail

PACD/MoEF/HYC/C/302/3575

Date:31-10-2023

To,
Deputy Director General of Forests (C)
Integrated Regional Office, Gandhi Nagar
Ministry of Environment, Forest & Climate Change,
A- Wing -407 & 409, Aranya Bhawan,
Near CH -3 Circle Sector-10 A,
Gandhinagar -382010 (Gujarat)

Subject: Submission of 6 monthly compliance report of the conditions as laid down Environmental Clearance vide letter **No J-11015/240/2016-IA. II (M)**, dated 16/10/2020 in respect of **Pachhtardi Limestone Mines**, pertaining to Shree Digvijay Cement Co Ltd. for the period of **Apr - 2023 to Sep - 2023**.

Respected Sir,

As required, we are submitting herewith Pointwise compliance status to various stipulations, as laid-down in Environmental Clearance letter **No J-11015/240/2016-IA. II (M)**, dated 16/10/2020 with supporting documents, is enclosed with the following Annexure: -

Sr. No.	Annexure	Sr. No.	Annexure
1	Annexure-1 (Ambient Air (Apr – 23 to June - 23))	5	Annexure-5 (Noise Report – (Apr – 23 to June - 23))
2	Annexure-2 (CGWA Renewal Application)	6	Annexure-6 (Mining Plan Approval Letter)
3	Annexure-3 (Monitoring well with WL)	7	Annexure-7 (Photographs of Plantation)
4	Annexure -4 (Compressive Hydrogeological Report)	8	Annexure-8 (Environment Yearly Expenses Statement)

We hope that you will find the above submission in order.

Thanking you,

Yours faithfully,

For **SHREE DIGVIJAY CEMENT CO. LTD.**

Manager Mine

Enclosures - As Above

Copy To:

1.The Environmental Engineer, Gujarat Pollution Control Board, Paryavaran Bhavan, Sector 10A, Gandhinagar -382010

**SHREE DIGVIJAY
CEMENT CO. LTD.**

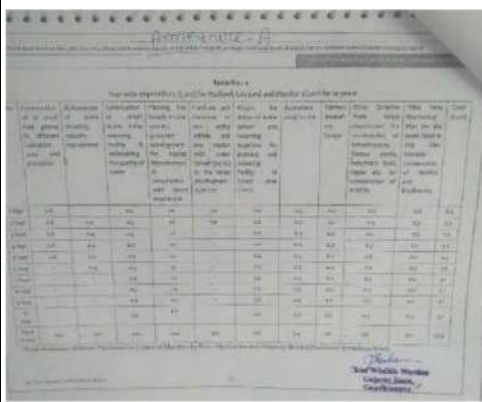
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SHREE DIGVIJAY CEMENT CO. LTD.
PACHHTARDI LIMESTONE MINE
SIX MONTHLY COMPLIANCE STATUS
April-2023 to September-2023

Point wise compliance status to various stipulations as laid down in the Environmental Clearance letter No. J-11015/240/2016-IA. II (M) dated 16.10.2020.

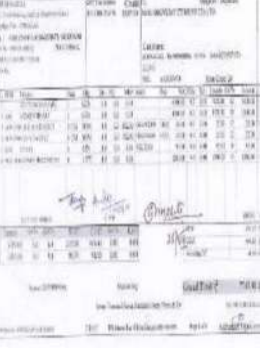
Sr. No.	CONDITIONS	COMPLIANCE STATUS												
A.	Specific conditions:													
i.	The Project proponent shall undertake the plantation in 7.5 m width all along the boundary of the mining lease including stone parapet walls of 1.5' X 5' dimension shall all along the ML boundary and avenue plantation on either side of the village road within the first year of the commencement of mining operations with a native, broad leaved tree sapling of not less than 12 feet height and maintenance of the same shall be carried.	Being Complied. Plantation details are as under: <table> <tr> <th>Year</th><th>Nos of Saplings planted</th><th>Name</th></tr> <tr> <td>2021-22</td><td>250</td><td>Neem & Gulmohar</td></tr> <tr> <td>2022-23</td><td>250</td><td>Neem, Gulmohar and Chiku</td></tr> <tr> <td>2023-24 (April-23 to September -23)</td><td>250</td><td>Neem, Gulmohar and Chiku</td></tr> </table>	Year	Nos of Saplings planted	Name	2021-22	250	Neem & Gulmohar	2022-23	250	Neem, Gulmohar and Chiku	2023-24 (April-23 to September -23)	250	Neem, Gulmohar and Chiku
Year	Nos of Saplings planted	Name												
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2023-24 (April-23 to September -23)	250	Neem, Gulmohar and Chiku												
ii.	The project proponent shall take all precautions to see that there is no impact on school function till it is shifted to new agreed premises in a time bound manner within 2 years from the date of opening of mine. A safe distance of 300 meters should be maintained from the school, in which there should not be mining. In the mining area adjacent to 300 meters boundary, mining should be carried out without use of explosives and with controlled mining activities, so that the school activities are not affected due to noise, vibration and dust. Construction of new school building should be started as early as possible, and all efforts should be made to see that school in new premises as agreed by Panchayat begins immediately after that.	The Precautionary measures for no impact in school functions are being implemented as under: 1. Mining started from other side i.e., 1000 mtrs away from the School. 2. Transportation route of Limestone is being carried on from farthest possible distance > 1000 mtrs from the School. 3. Excavation is being carried out by an Eco-Friendly mining method i.e. with the use of Ripper-Dozer and Excavator combination (Without Drilling & Blasting) to minimise Noise, dust and Vibrations. 4. Regular monitoring of Ambient Air Quality & Noise monitoring is being carried out & results are well within the stipulated norms. The land identified for shifting of school is under finalisation by the Education Department, as advised by the Collector vide his												

Sr. No.	CONDITIONS	COMPLIANCE STATUS
		order no. JAMAN/1/VASHI/1612//2019 dated 20.12.2019. The capital budget for construction of the school building have been sanctioned by the Management. As soon as it is finalised. Construction of new school building shall be started for its completion in time bound manner.
iii.	No drilling and blasting shall be carried. Mining shall be carried, as proposed by the PP, by using Surface Miner with loader combination or by Ripper dozer and Excavator combination.	Being complied. There is no Drilling and blasting. Mining operations are being carried out by the using of ripper dozer & excavator combination an Eco-Friendling mining. 
iv.	The project proponent shall implement the conservation plan for Schedule-I species reported namely, Indian Peafowl, Leopard, monitor lizard in consultation with State Forest Department including the recommendations of the Chief wildlife warden.	Noted and being complied. Fund details as given in approved. WLCP are as under: 
Status of Implementation of Conservation Plan for Schedule-I species reported namely, Indian Peafowl, Leopard, monitor lizard in the Buffer Zone of Pachhtardi Limestone Mines. Conservation Plan is enclosed as Annexure-		

Sr. No.	CONDITIONS	COMPLIANCE STATUS	
	Proposals	Amount (In Lac Rs.)	Status of Compliances
	Construction of small tree grooves in different habitation with plantation	0.8	
	Planting the woody shrubs species, grassland development for habitat improvement in consultation with forest department.	1.0	
	Purchase and Donation of one utility vehicle and one tractor with water tanker (3KL-4 KL) to the forest department agencies.	5.0	Complied with purchasing and donating utility vehicle to forest department. 
	Wages for driver of water tanker and recurring expenses for planting and watering facility in forest area.	0.3	
	Awareness Programme	0.5	 
	Farmer's Awareness Camp	0.2	 
	Close collation from forest department for construction of infrastructure, rescue wards, Veterinary fund, cages etc for conservation of wild life.	0.5	Appreciation Letter from DCF is as under: Porbandar for providing Bolero Camper.

Sr. No.	CONDITIONS	COMPLIANCE STATUS
	Third party monitoring for the work allotted in this plan towards conservation of wildlife and Biodiversity	0.1
		

v.	The project proponent shall implement the measures suggested in the EIA/EMP report inter alia, including Dust control measures, Garland drains, plantation along the boundary and avenue plantation, Reclamation / Rehabilitation of mined out area, etc.	Being complied.
vi	The project proponent undertakes the activities proposed under Corporate Environmental Responsibility (CER) as per the guidelines of Ministry's OM dated 1st May 2018.	
		Noted & being complied.

			
Semi Fowler Bed	Water Cooler	Tailoring Classes	Invoice

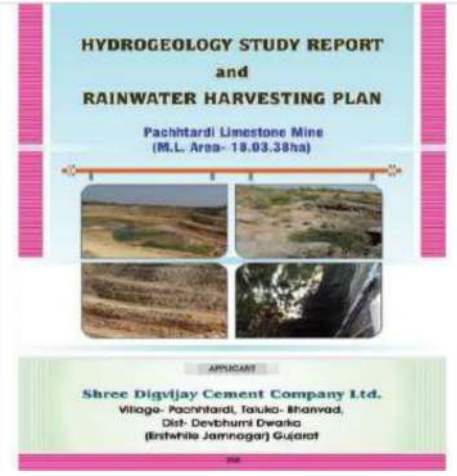
Sr. No.	CONDITIONS	COMPLIANCE STATUS
B.	Standards conditions:	
I	Statutory compliance	
1)	This Environmental Clearance (EC) is subject to orders/ judgment of Hon'ble Supreme Court of India, Hon'ble High Court, Hon'ble NGT and any other Court of Law, Common Cause Conditions as may be applicable.	Noted.
2)	The Project proponent complies with all the statutory requirements and judgment of Hon'ble Supreme Court dated 2nd August,2017 in Writ Petition (Civil) No. 114 of 2014 in matter of Common Cause versus Union of India & Ors before commencing the mining operations.	Noted.
3)	The State Government concerned shall ensure that mining operation shall not be commenced till the entire compensation levied, if any, for illegal mining paid by the Project Proponent through their respective Department of Mining & Geology in strict compliance of Judgment of Hon'ble Supreme Court dated 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in matter of Common Cause versus Union of India & Ors.	Noted.
4)	The Project Proponent shall follow the mitigation measures provided in MoEF & CC Office Memorandum No. Z-11013/57/2014-IA. II (M), dated 29th October 2014, titled "Impact of mining activities on Habitations-Issues related to the mining Projects wherein Habitations and villages are the part of mine lease areas or Habitations and villages are surrounded by the mine lease area".	Noted.
5)	A copy of EC letter will be marked to concerned Panchayat / local NGO etc. if any, from whom suggestion / representation has been received while processing the proposal.	Copy of clearance letter have been submitted to all concerned Panchayat.



Sr. No.	CONDITIONS	COMPLIANCE STATUS
6)	State Pollution Control Board/Committee shall be responsible for display of this EC letter at its regional office, District Industries Centre, and Collector's office/ Tehsildar's Office for 30 days.	Noted.
7)	The project authorities should widely advertise about the grant of this EC letter by printing the same in at least two local newspapers, one of which shall be in vernacular language of the concerned area. The advertisement shall be done within 7 days of the issue of the clearance letter mentioning that the instant project has been accorded EC and copy of the EC letter is available with the State Pollution Control Board/Committee and web site of the Ministry of Environment, Forest and Climate Change (www.parivesh.nic.in). A copy of the advertisement may be forwarded to the concerned MoEF& CC Regional Office for compliance and record.	Complied. The advertisement has been published in two local newspapers dated 22.10.2020. The publication has appeared in the - (1) Times of India - Ahmedabad Edition (2) Divya Bhaskar - Rajkot edition.
		
8)	The Project Proponent shall inform the MoEF & CC for any change in ownership of the mining lease. In case there is any change in ownership or mining lease is transferred than mining operation shall only be carried out after transfer of EC as per provisions of the pars 11 of EIA Notification, 2006 as amended from time to time.	Noted.
II.	Air quality monitoring and preservation	
9)	The Project Proponent shall install a minimum of 3 (three) online Ambient Air Quality Monitoring Stations with 1 (one) in upwind and 2 (two) in downwind direction based on long term climatological data about wind direction such that an angle of 120° is made between the monitoring locations to monitor critical parameters, relevant for mining operations, of	Noted. Being complied. Ambient air quality is being monitored regularly on monthly basis. The monitoring results for the period from April-23 to June- 23 is attached herewith as

Sr. No.	CONDITIONS	COMPLIANCE STATUS
	air pollution viz. PM10, PM2.5, NO2, CO and SO2 etc. as per the methodology mentioned in NAAQS Notification No. B- 29016/20/90/PCI/I dated 18.11.2009 covering the aspects of transportation and use of heavy machinery in the impact zone. The ambient air quality shall also be monitored at prominent places like office building, canteen etc. as per the site condition to ascertain the exposure characteristics at specific places. The above data shall be digitally displayed within 03 months in front of the main Gate of the mine site	Annexure-1
10)	Effective safeguard measures for prevention of dust generation and subsequent suppression (like regular water sprinkling, metalled road construction etc.) shall be carried out in areas prone to air pollution wherein high levels of PM10 and PM2.5 are evident such as haul road, loading and unloading point and transfer points. The Fugitive dust emissions from all sources shall be regularly controlled by installation of required equipment/ machineries and preventive maintenance. Use of suitable water-soluble chemical dust suppressing agents may be explored for better effectiveness of dust control system. It shall be ensured that air pollution level conform to the standards prescribed by the MoEF & CC/ Central Pollution Control Board.	Water is being sprinkled continuously. on the mine haul roads as well as near the faces in order to suppress the fugitive emissions generated due to the movements of vehicles within the stipulated norms. Ambient air quality is being monitored regularly and results are well within the stipulated norms. Analysis Report from NABL Lab is given above. 
III.	Water quality monitoring and preservation	
11)	In case, immediate mining scheme envisages intersection of ground water table, then Environmental Clearance shall become operational only after receiving formal clearance from CGWA. In case, mining operation involves intersection of ground water table at a later stage, then PP shall ensure that prior approval from CGWA and MoEF & CC is in place before such mining operations. The permission for intersection of ground water table shall essentially be based on detailed hydro- geological study of the area.	Being complied. There is no intersection of water table at any stage. The water table in the region is 25 Mtrs & mining is proposed at 20 Mtrs NOC from CGWA has been obtained. Copy of Renewal Application enclosed as Annexure-2
12)	Project Proponent shall regularly monitor and maintain records w.r.t. ground water level and quality in and around the mine lease by establishing a network of existing wells as well	Being complied. Photographs of Monitoring well with Water Level data enclosed

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	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.	as Annexure-3
13)	The Project Proponent shall undertake regular monitoring of natural water course/ water resources/ springs and perennial nallahs existing/ flowing in and around the mine lease including upstream and downstream. Sufficient number of gullies shall be provided at appropriate places within the lease for management of water. 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 MoEF & CC. The monitoring of water courses/ bodies existing in lease area shall be carried out four times in a year viz. pre- monsoon (April-May), monsoon (August), post-monsoon (November) and winter (January) and the record of monitored data may be sent regularly to Ministry of Environment, Forest and Climate Change and its Regional Office, Central Ground Water Authority and Regional Director, Central Ground Water Board, State Pollution Control Board and Central Pollution Control Board. Clearly showing the trend analysis on six-monthly basis	Noted. There is no surface water body i.e. Nalla (s), streams, or perennial river within the lease area. No wastewater generated from mining operations.
14)	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.	Not applicable, as there is no wastewater being generated from mining operations. The domestic wastewater generated from office toilets is being disposed off through soak pit & Septic tank.
15)	Project Proponent shall plan, develop, and implement rainwater harvesting measures on long term basis to augment ground water resources in the area in consultation with Central Ground Water Board/ State Ground	Noted. Hydrogeological Study Report and Rainwater plan is prepared by JME Consultants for systematic Rainwater Harvesting in Pachhtardi Mines. The

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	water Department. A report on amount of water recharged needs to be submitted to Regional Office MoEF & CC annually.	report with proposals is submitted to Regional Office, CGWB, Ahmedabad along with application for Ground Water abstraction. Work for one large village is taken by SDCCL. Copy of CHR enclosed as Annexure-4  Deeping of pond to be done. Mine pits will also be created as water reservoir which serves as recharge ponds.
16)	Industrial wastewater (workshop and wastewater 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.	Repair and maintenance of vehicles is being done at Tata Cargo workshop, Jamnagar. All maintenance & treatment facilities like ETP are available as per the norms. A photograph is attached for your kind reference. 
17)	The water balance/water auditing shall be carried out and measure for reducing the consumption of water shall be taken up and reported to the Regional Office of the MoEF & CC and State Pollution Control Board/Committee.	Noted.
IV.	Noise and Vibration Monitoring and Prevention.	
18)	The peak particle velocity at 500m distance or within the nearest habitation, whichever is closer shall be monitored periodically as per applicable DGMS guidelines.	The condition is not applicable, as there is no blasting.

Sr. No.	CONDITIONS	COMPLIANCE STATUS
19)	The illumination and sound at night at project sites disturb the villages in respect of both human and animal population. Consequent sleeping disorders and stress may affect the health in the villages located close to mining operations. Habitations have a right for darkness and minimal noise levels at night. PPs must ensure that the biological clock of the villages is not disturbed; by orienting the floodlights/ masks away from the villagers and keeping the noise levels well within the prescribed limits for day /night hours.	Being complied. Mining operations is restricted to daytime only. Noise monitoring is being carried out regularly and results are well within the stipulated norms. The Noise report for the period April- 23 to June-23 is attached as Annexure-5
20)	The Project Proponent shall take measures for control of noise levels below 85 dBA in the work environment. The workers engaged in operations of HEMM, etc. should be provided with ear plugs /muffs. All personnel including laborers working in dusty areas shall be provided with protective respiratory devices along with adequate training, awareness and information on safety and health aspects. The PP shall be held responsible in case it has been found that workers/ personals/ laborers are working without personal protective equipment.	All precautionary measures are being taken for control of noise levels in the work environment. 1. Noise monitoring is being done regularly. 2. Machineries like Dozer-Ripper is provided with AC cabin for operator which protects the operator from heat, noise & dust. 3. Timely maintenance of mining machineries is being carried out. 4. PPEs ear plugs / earmuffs is being provided to operators. 5. Training is being imparted on awareness on safety and health. 6. Monitoring results on AAQ and noise level for the period April-2023 to June-2023 is enclosed as Annexure-5.
V.	Mining plan	
21)	The Project Proponent shall adhere to approved mining plan, inter alia, including, total excavation (quantum of mineral, waste, over burden, inter burden and top soil etc.); mining technology; lease area; scope of working (method of mining, overburden & dump management, OB & dump mining, mineral transportation mode, ultimate depth of mining, concurrent reclamation and reclamation at mine closure; land-use of the mine lease area at various stages of mining scheme as well as at the end-of-life; etc.).	Noted & being complied. Review of Mining Plan has been approved on 28.01.2021. Mining is being carried out as per approved mining plan. Copy of Approval Letter enclosed as Annexure-6
22)	The shall be governed as per the approved Mining Plan. The excavation vis-à-vis backfilling in the mine lease area and corresponding afforestation to be raised in the reclaimed area shall be governed as per approved mining plan. PP shall ensure the monitoring and management of rehabilitated areas until the vegetation becomes self-sustaining. The compliance status shall be submitted half-	Being complied. Mining is being carried out as per approved mining plan. Compliance reports are being submitted regularly to all concerned offices/department in stipulated period.

Sr. No.	CONDITIONS	COMPLIANCE STATUS
	yearly to the MoEF & CC and its concerned Regional Office.	
VI	Land Reclamation	
23)	The Overburden (O.B.), waste and topsoil 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 / waste dumps / topsoil dump like height, width and angle of slope shall be governed as per the approved Mining Plan and the guidelines/circulars issued by D.G.M.S. The topsoil shall be used for land reclamation and plantation.	Not applicable. There are no Overburden, hence no waste dumps. There are some thin patches of soil cover which are scraped during excavation and being used simultaneously for plantation purpose. Hence, there is no provision for separate stacking of topsoil.
24)	The slope of dumps shall be vegetated in scientific manner with suitable native species to maintain the slope stability, prevent erosion and surface run off. The selection of local species regulates local climatic parameters and help in adaptation of plant species to the microclimate. The gullies formed on slopes should be adequately taken care of as it impacts the overall stability of dumps. The dump mass should be consolidated with the help of dozer/ compactors thereby ensuring proper filling/ leveling of dump mass. In critical areas, use of geo textiles/ geo-membranes / clay liners / Bentonite etc. shall be undertaken for stabilization of the dump.	Not applicable. There are no waste dumps.
25)	Catch drains, settling tanks and siltation ponds of appropriate size shall be constructed around the mine working, mineral yards and Topsoil/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	Shall be complied as the mining progresses and Mining Pits are developed. The mining pit shall be converted in the water reservoirs. Dewatering of Mine Water shall not be done. The accumulated rainwater in the Pit shall be utilised for watering the mine area, roads, green belt development, plantation etc. in subsequent year.
26)	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	Noted and shall be done.

Sr. No.	CONDITIONS	COMPLIANCE STATUS
	be constructed at the corners of the garland drains.	
VII.	Transportation	
27)	No Transportation of the minerals shall be allowed in case of roads passing through villages/ habitations. In such cases, PP shall construct a 'bypass' road for the purpose of transportation of the minerals leaving an adequate gap (say at least 200 meters) so that the adverse impact of sound and dust along with chances of accidents could be mitigated. All costs resulting from widening and strengthening of existing public road network shall be borne by the PP in consultation with nodal State Govt. Department. Transportation of minerals through road movement in case of existing village/ rural roads shall be allowed in consultation with nodal State Govt. Department only after required strengthening such that the carrying capacity of roads is increased to handle the traffic load. The pollution due to transportation load on the environment will be effectively controlled and water sprinkling will also be done regularly. Vehicular emissions shall be kept under control and regularly monitored. Project should obtain Pollution Under Control (PUC) certificate for all the vehicles from authorized pollution testing centers. [If applicable in case of road transport]	Being complied. Mineral is being despatched through "bypass" road by providing tarpaulin covered  trucks. water sprinkling is done regularly. Pollution Under Control (PUC) certificate for all the vehicles from authorized pollution testing centers has been obtained.
28)	The Main haulage road within the mine lease should be provided with a permanent water sprinkling arrangement for dust suppression. Other roads within the mine lease should be wetted regularly with tanker-mounted water sprinkling system. The other areas of dust generation like crushing zone, material transfer points, material yards etc. should invariably be provided with dust suppression arrangements. The air pollution control equipment 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.	Water is being sprinkled, continuously on the mine haul roads as well as near the faces in order to suppress the fugitive, emissions generated due to the movements of vehicles. Mineral is being despatched in Tarpaulin covered trucks. There are no Crushers, belt-conveyors at mine site. 
VIII	Green Belt	
29)	The Project Proponent shall develop greenbelt in 7.5m wide safety zone all along the mine lease boundary as per the guidelines of CPCB in order to arrest pollution emanating from mining operations within the lease. The whole green	Plantation is being done as per details provided in approved mining plan. 250 nos. sapling have been

Sr. No.	CONDITIONS	COMPLIANCE STATUS
	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.	planted in the year 2023-24 (April To September). Plantation photographs are enclosed as Annexure-7
30)	The Project Proponent shall carryout plantation / afforestation in backfilled and reclaimed area of mining lease, around water body, along the roadsides, in community areas etc. by planting the native species in consultation with the State Forest Department/ Agriculture Department/ Rural development department/ Tribal Welfare Department/ Gram Panchayat such that only those species be selected which are of use to the local people. The CPCB guidelines in this respect shall also be adhered the density of the trees should be around 2500 saplings per Hectare. Adequate budgetary provision shall be made for protection and care of trees.	Noted. Plantation is being done as per details provided in approved mining plan. 250 nos. sapling have been planted in the year 2023-24. (April to September). Plantation photographs are enclosed as Annexure-7
31)	The Project Proponent shall make necessary alternative arrangements for livestock feed by developing grazing land with a view to compensate those areas which are coming within the mine lease. The development of such grazing land shall be done in consultation with the State Government. In this regard, Project Proponent should essentially implement the directions of the Hon'ble Supreme Court with regard to acquisition of grazing land. The sparse trees on such grazing ground, which provide mid-day shelter from the scorching sun, should be scrupulously guarded/ protected against felling and plantation of such trees should be promoted.	Noted and shall be done.
IX.	Public Hearing and Human Health	
32)	Project Proponent shall make provision for the housing for workers/labors or shall construct labor camps within/outside (company owned land) with necessary basic infrastructure/ facilities like fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche 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 wastewater should be treated with STP in order to avoid contamination of underground water.	Not applicable. This is mining project.
X	Corporate Environment Responsibility	

Sr. No.	CONDITIONS	COMPLIANCE STATUS																																																																								
33)	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. photographs, purchase documents, latitude & longitude of infrastructure developed & road constructed needs to be submitted to Regional Office MoEF & CC annually along with audited statement	Noted & being complied. <table><tr><th>#</th><th>Area</th><th>Activity (at Villages Pachhadi, Pachor, Debbhar, Sharneshwar & Mokhada)</th><th colspan="3">CER Budget (Rs. In Lac)</th></tr><tr><th></th><th></th><th></th><th>First year</th><th>Second year</th><th>Total</th></tr><tr><td>1</td><td>Education</td><td>Providing Teaching Aids for Schools like Actual objects, Models, pictures, Charts, Maps, flash cards, flannel board, bulletin board, overhead projector etc.</td><td>1.0</td><td>-</td><td>1.0</td></tr><tr><td></td><td></td><td>Improvements in Infrastructures like provision of Washrooms of two Schools, supports in construction and maintenance of playground.</td><td>-</td><td>3.0</td><td>3.0</td></tr><tr><td>2</td><td>Health & Sanitation</td><td>Providing Basic Necessary equipment to PHC like BP Instrument, Electric Auto Clave, SS Dressing Trolley, Instrument Trolley.</td><td>-</td><td>1.0</td><td>1.0</td></tr><tr><td></td><td></td><td>Providing Basic Necessary equipment to PHC like Oxy Kit with Filling Adaptor, Semi Fowler Hospital Beds, Electronic Weighing Scales.</td><td>1.0</td><td>-</td><td>1.0</td></tr><tr><td>3</td><td>Skill Improvement</td><td>Skill development programme like Tailoring classes, Computer training (Sewing machines and computers will be provided by Company)</td><td>3.0</td><td>-</td><td>3.0</td></tr><tr><td>4</td><td>Infra Improvement</td><td>Renovation and Development of Sharneshwar Ghat (Cemetery) at Pachhadi.</td><td>1.0</td><td>-</td><td>1.0</td></tr><tr><td></td><td></td><td>Providing Solar Powered Street Lights in Pachhadi village</td><td>-</td><td>2.0</td><td>2.0</td></tr><tr><td>5</td><td>Drinking Water</td><td>Arrangement of RO facility for safe drinking water supply in schools and Gram Panchayat</td><td>1.0</td><td>-</td><td>1.0</td></tr><tr><td></td><td></td><td>Deepening and maintenance of water pond.</td><td>-</td><td>1.0</td><td>1.0</td></tr><tr><td colspan="3">Total</td><td>9.0</td><td>6.0</td><td>15.0</td></tr></table> Six monthly Environment expenses is enclosed as Annexure-8	#	Area	Activity (at Villages Pachhadi, Pachor, Debbhar, Sharneshwar & Mokhada)	CER Budget (Rs. In Lac)						First year	Second year	Total	1	Education	Providing Teaching Aids for Schools like Actual objects, Models, pictures, Charts, Maps, flash cards, flannel board, bulletin board, overhead projector etc.	1.0	-	1.0			Improvements in Infrastructures like provision of Washrooms of two Schools, supports in construction and maintenance of playground.	-	3.0	3.0	2	Health & Sanitation	Providing Basic Necessary equipment to PHC like BP Instrument, Electric Auto Clave, SS Dressing Trolley, Instrument Trolley.	-	1.0	1.0			Providing Basic Necessary equipment to PHC like Oxy Kit with Filling Adaptor, Semi Fowler Hospital Beds, Electronic Weighing Scales.	1.0	-	1.0	3	Skill Improvement	Skill development programme like Tailoring classes, Computer training (Sewing machines and computers will be provided by Company)	3.0	-	3.0	4	Infra Improvement	Renovation and Development of Sharneshwar Ghat (Cemetery) at Pachhadi.	1.0	-	1.0			Providing Solar Powered Street Lights in Pachhadi village	-	2.0	2.0	5	Drinking Water	Arrangement of RO facility for safe drinking water supply in schools and Gram Panchayat	1.0	-	1.0			Deepening and maintenance of water pond.	-	1.0	1.0	Total			9.0	6.0	15.0
#	Area	Activity (at Villages Pachhadi, Pachor, Debbhar, Sharneshwar & Mokhada)	CER Budget (Rs. In Lac)																																																																							
			First year	Second year	Total																																																																					
1	Education	Providing Teaching Aids for Schools like Actual objects, Models, pictures, Charts, Maps, flash cards, flannel board, bulletin board, overhead projector etc.	1.0	-	1.0																																																																					
		Improvements in Infrastructures like provision of Washrooms of two Schools, supports in construction and maintenance of playground.	-	3.0	3.0																																																																					
2	Health & Sanitation	Providing Basic Necessary equipment to PHC like BP Instrument, Electric Auto Clave, SS Dressing Trolley, Instrument Trolley.	-	1.0	1.0																																																																					
		Providing Basic Necessary equipment to PHC like Oxy Kit with Filling Adaptor, Semi Fowler Hospital Beds, Electronic Weighing Scales.	1.0	-	1.0																																																																					
3	Skill Improvement	Skill development programme like Tailoring classes, Computer training (Sewing machines and computers will be provided by Company)	3.0	-	3.0																																																																					
4	Infra Improvement	Renovation and Development of Sharneshwar Ghat (Cemetery) at Pachhadi.	1.0	-	1.0																																																																					
		Providing Solar Powered Street Lights in Pachhadi village	-	2.0	2.0																																																																					
5	Drinking Water	Arrangement of RO facility for safe drinking water supply in schools and Gram Panchayat	1.0	-	1.0																																																																					
		Deepening and maintenance of water pond.	-	1.0	1.0																																																																					
Total			9.0	6.0	15.0																																																																					



Semi Fowler Bed



Water Cooler

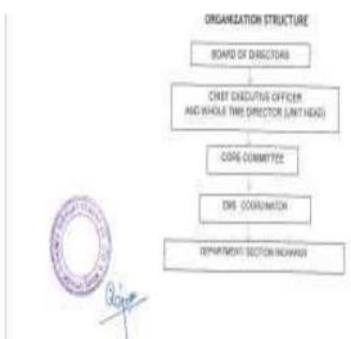


Tailoring Classes



Invoice

XI.	Miscellaneous	
34)	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 & shall be complied.

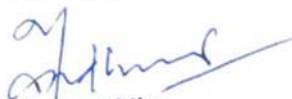
Sr. No.	CONDITIONS	COMPLIANCE STATUS
35)	The Project Authorities should inform to the Regional Office regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work	Complied. Copy of Notice for opening of mine has been sent vide our letter No. Pacd/ IBM Notice/ A/207/2659 dated 16.02.22 
36)	The Project Proponent shall submit six monthly compliance reports on the status of the implementation of the stipulated environmental safeguards to the MoEF & CC & its concerned Regional Office, Central Pollution Control Board and State Pollution Control Board.	Compliance reports are being submitted regularly via email to all concerned offices/departments.
37)	A separate 'Environmental Management Cell' with suitable qualified manpower should be set-up under the control of a Senior Executive. The Senior Executive shall directly report to Head of the Organization. Adequate number of qualified Environmental Scientists and Mining Engineers shall be appointed and submit a report to RO, MoEF & CC.	A Separate Environmental Management Cell has been set-up. The details given under. 
38)	The concerned Regional Office of the MoEF & CC shall randomly monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the MoEF & CC officer(s) by furnishing the requisite data / information / monitoring reports.	Noted.
39)	In pursuant to Ministry's O.M No 22-34/2018-IA.III dated 16.01.2020 to comply with the direction made by Hon'ble Supreme Court on 8.01.2020 in W.P. (Civil) No 114/2014 in the matter Common Cause vs Union of India, the mining lease holder shall after ceasing mining operations, undertake re-grassing the mining area and any other area which may have been disturbed due to other mining activities and restore the land to a condition which is fit for	Noted.

Sr. No.	CONDITIONS	COMPLIANCE STATUS
	growth of fodder, flora, fauna etc.	
25.	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.
26.	Concealing factual data or submission of false/fabricated data and failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attracts action under the provisions of Environment (Protection) Act, 1986.	Noted.
27.	The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, 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.
28.	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

Thanking you,

Yours faithfully,

For SHREE DIGVIJAY CEMENT CO. LTD.


Manager Mine



Royal

Environment Auditing & Consultancy Service

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Ref. No. :494/04/2023-24

Date:01/05/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Buffer Zone Pachhtar and Pachhtardi Mines : APRIL 2023 (1st time)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Buffer Zone = 1. Pachhtar Village			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	04/04/2023	04/04/2023	05/04/2023	05/04/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	---	S	S	S	S
04.	Average Wind Speed	Km./Hrs.	2 to 14	2 to 14	2 to 14	2 to 14
05.	Average flow rate during sampling	m3/minutes	1.20	1.10	1.18	1.16
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	2.0
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	32.9	30.6	29.3	30.9
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	50.7	52.8	54.6	52.7
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	21.6	19.8	17.9	19.8
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	25.9	23.4	27.5	25.6

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ph.: +91 9099919954 ■ E-mail : royaleenvironment@live.com ■ admin@royalconsultancy.com

Ref. No. : 495/04/2023-24

Date:01/05/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : APRIL 2023 (1st time)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 1. Near Weigh Bridge			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	----	03/04/2023	03/04/2023	04/04/2023	04/04/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	----	S	S	S	S
04.	Average Wind Speed	Km./Hrs.	2 to 14	2 to 14	2 to 14	2 to 14
05.	Average flow rate during sampling	m3/minutes	1.20	1.10	1.16	1.15
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	30.6	29.5	32.8	31.0
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	54.4	50.7	55.6	53.6
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	20.2	21.3	18.5	20.0
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	25.2	26.8	24.9	25.6

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. : 496/04/2023-24

Date:01/05/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : APRIL 2023 (1st time)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 2. Near Loading area			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	03/04/2023	03/04/2023	04/04/2023	04/04/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	----	S	S	S	S
04.	Average Wind Speed	Km./Hrs.	2 to 14	2 to 14	2 to 14	2 to 14
05.	Average flow rate during sampling	m3/minutes	1.21	1.18	1.20	1.20
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	27.4	33.5	30.2	30.4
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	49.5	51.2	48.2	49.6
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	25.7	21.2	20.9	22.6
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	27.5	27.9	26.2	27.2

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. : 5054/04/2023-24

Date: 01/05/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Buffer Zone Pachhtar and Pachhtardi Mines : APRIL 2023 (2nd Visit)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Buffer Zone = 1. Pachhtar Village			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	18/04/2023	18/04/2023	18/04/2023	18/04/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	---	SW	SW	SW	SW
04.	Average Wind Speed	Km./Hrs.	3 to 15	3 to 15	3 to 15	3 to 15
05.	Average flow rate during sampling	m3/minutes	1.20	1.10	1.18	1.16
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	36.4	33.4	31.2	33.7
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	56.3	58.2	54.9	56.5
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	18.4	20.8	19.6	19.6
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	29.8	26.4	27.4	27.9

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. :5055/04/2023-24

Date: 01/05/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : APRIL 2023 (2nd Visit)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 1. Near Weigh Bridge			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	17/04/2023	17/04/2023	18/04/2023	18/04/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	---	SW	SW	SW	SW
04.	Average Wind Speed	Km./Hrs.	3 to 15	3 to 15	3 to 15	3 to 15
05.	Average flow rate during sampling	m3/minutes	1.22	1.14	1.18	1.18
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	34.5	30.4	35.6	33.5
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	56.9	54.8	58.5	56.7
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	26.8	24.5	22.4	24.6
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	28.5	26.3	29.4	28.1

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. :5056/04/2023-24

Date: 01/05/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : APRIL 2023 (2nd Visit)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 2. Near Loading area			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	—	17/04/2023	17/04/2023	18/04/2023	18/04/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	----	SW	SW	SW	SW
04.	Average Wind Speed	Km./Hrs.	3 to 15	3 to 15	3 to 15	3 to 15
05.	Average flow rate during sampling	m3/minutes	1.22	1.18	1.20	1.20
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	28.8	30.3	32.5	30.5
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	52.6	54.8	50.2	52.5
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	20.4	22.6	19.3	20.8
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	30.6	27.2	26.5	28.1

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Plot No. 19 & 20, B/s. The North Star Nest School, Masoom School Road, Mota Mava, RAJKOT - 360 005.
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Ref. No. :594/05/2023-24

Date:01/06/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Buffer Zone Pachhtar and Pachhtardi Mines : May 2023 (1st time)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Buffer Zone = 1. Pachhtar Village			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	06/05/2023	06/05/2023	06/05/2023	06/05/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	----	S	S	S	S
04.	Average Wind Speed	Km./Hrs.	2 to 16	2 to 16	2 to 16	2 to 16
05.	Average flow rate during sampling	m3/minutes	1.20	1.10	1.18	1.16
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	2.0
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	31.9	28.6	27.4	29.3
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	51.6	50.2	53.4	51.7
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	20.4	18.7	16.4	18.5
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	24.1	22.5	26.4	24.3

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

Royal Environment Auditing & Consultancy Service



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Plot No. 19 & 20, B/s. The North Star Nest School, Masoom School Road, Mota Mava, RAJKOT - 360 005.
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Ref. No. : 595/05/2023-24

Date:01/06/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : MAY 2023 (1st time)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 1. Near Weigh Bridge			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	05/05/2023	05/05/2023	06/05/2023	06/05/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	---	S	S	S	S
04.	Average Wind Speed	Km./Hrs.	2 to 16	2 to 16	2 to 16	2 to 16
05.	Average flow rate during sampling	m3/minutes	1.20	1.10	1.16	1.15
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	29.4	30.1	33.4	31.0
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	56.4	51.4	58.7	55.5
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	20.1	22.3	17.5	20.0
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	24.1	25.6	23.4	24.4

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. : 596/05/2023-24

Date:01/06/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : MAY 2023 (1st time)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 2. Near Loading area			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	05/05/2023	05/05/2023	06/05/2023	06/05/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	---	S	S	S	S
04.	Average Wind Speed	Km./Hrs.	2 to 16	2 to 16	2 to 16	2 to 16
05.	Average flow rate during sampling	m3/minutes	1.21	1.18	1.20	1.20
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	29.5	32.4	31.4	31.1
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	48.7	50.6	49.8	49.7
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	18.7	20.1	22.3	20.4
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	26.4	28.7	25.6	26.9

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. : 6054/05/2023-24

Date: 01/06/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Buffer Zone Pachhtar and Pachhtardi Mines : May 2023 (2nd Visit)

Name of company : Shree Digvijay Cement Company Limited
Digvijaygram - 361 140.
District : Jamnagar.

Sr. No.	Particulars	Unit	Buffer Zone = 1. Pachhtar Village			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	25/05/2023	25/05/2023	25/05/2023	25/05/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	---	SW	SW	SW	SW
04.	Average Wind Speed	Km./Hrs.	2 to 18	2 to 18	2 to 18	2 to 18
05.	Average flow rate during sampling	m3/minutes	1.20	1.10	1.18	1.16
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	35.2	32.1	30.4	32.6
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	58.4	54.6	53.4	55.5
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	19.4	21.2	22.8	21.1
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	30.1	28.4	26.1	28.2

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. :6055/05/2023-24

Date: 01/06/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : May 2023 (2nd Visit)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 1. Near Weigh Bridge			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	25/05/2023	25/05/2023	25/05/2023	25/05/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	---	SW	SW	SW	SW
04.	Average Wind Speed	Km./Hrs.	2 to 18	2 to 18	2 to 18	2 to 18
05.	Average flow rate during sampling	m3/minutes	1.22	1.14	1.18	1.18
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	33.1	28.1	34.5	31.9
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	57.1	55.1	57.2	56.5
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	27.1	22.1	21.2	23.5
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	29.2	25.4	28.2	27.6

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. :6056/05/2023-24

Date: 01/06/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : May 2023 (2nd Visit)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 2. Near Loading area			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	—	25/05/2023	25/05/2023	25/05/2023	25/05/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	—	SW	SW	SW	SW
04.	Average Wind Speed	Km./Hrs.	2 to 18	2 to 18	2 to 18	2 to 18
05.	Average flow rate during sampling	m3/minutes	1.22	1.18	1.20	1.20
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	29.3	33.2	35.6	32.7
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	53.1	55.6	52.1	53.6
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	22.3	21.1	20.7	21.4
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	31.2	29.4	28.4	29.7

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. :694/06/2023-24

Date:01/07/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Buffer Zone Pachhtar and Pachhtardi Mines : June 2023 (1st time)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Buffer Zone = 1. Pachhtar Village			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	----	07/06/2023	07/06/2023	07/06/2023	07/06/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	----	SE	SE	SE	SE
04.	Average Wind Speed	Km./Hrs.	2 to 12	2 to 12	2 to 12	2 to 12
05.	Average flow rate during sampling	m3/minutes	1.19	1.10	1.18	1.16
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	2.0
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	31.7	29.4	30.6	30.6
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	51.4	49.5	48.1	49.7
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	14.3	12.7	16.7	14.6
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	17.8	18.2	16.1	17.4

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. : 795/06/2023-24

Date:01/07/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : June 2023 (1st time)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 1. Near Weigh Bridge			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	08/06/2023	08/06/2023	08/06/2023	08/06/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	---	SW	SW	SW	SW
04.	Average Wind Speed	Km./Hrs.	3 to 9	3 to 9	3 to 9	3 to 9
05.	Average flow rate during sampling	m3/minutes	1.19	1.10	1.14	1.14
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	31.4	32.8	25.6	29.9
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	51.7	52.8	49.5	51.3
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	13.4	12.7	14.2	13.4
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	18.2	17.3	17.6	17.7

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. : 696/06/2023-24

Date:01/07/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : June 2023 (1st time)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 2. Near Loading area			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	08/06/2023	08/06/2023	08/06/2023	08/06/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	----	SW	SW	SW	SW
04.	Average Wind Speed	Km./Hrs.	3 to 9	3 to 9	3 to 9	3 to 9
05.	Average flow rate during sampling	m3/minutes	1.20	1.18	1.14	1.17
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	29.8	28.1	30.4	29.4
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	51.0	52.7	49.9	51.2
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	13.2	14.6	12.7	13.5
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	17.5	18.1	19.0	18.2

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. : 7054/06/2023-24

Date: 01/07/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Buffer Zone Pachhtar and Pachhtardi Mines : June 2023 (2nd Visit)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Buffer Zone = 1. Pachhtar Village			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	---	25/06/2023	25/06/2023	25/06/2023	25/06/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	----	SE	SE	SE	SE
04.	Average Wind Speed	Km./Hrs.	2 to 10	2 to 10	2 to 10	2 to 10
05.	Average flow rate during sampling	m3/minutes	1.19	1.14	1.18	1.17
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	32.1	33.2	29.4	31.6
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	51.6	52.4	49.4	51.1
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	13.2	12.7	11.9	12.6
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	16.4	18.1	17.5	17.3

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. :8055/06/2023-24

Date: 01/07/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines : June 2023 (2nd Visit)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 1. Near Weigh Bridge			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	----	25/06/2023	25/06/2023	25/06/2023	25/06/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	----	SE	SE	SE	SE
04.	Average Wind Speed	Km./Hrs.	2 to 10	2 to 10	2 to 10	2 to 10
05.	Average flow rate during sampling	m3/minutes	1.20	1.10	1.18	1.16
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	32.7	29.8	28.9	30.5
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	51.6	49.7	52.4	51.2
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	13.5	12.6	12.9	13.0
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	16.7	18.1	17.6	17.5

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

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Ref. No. :7056/06/2023-24

Date: 01/07/2023

REPORT OF AMBIENT AIR QUALITY MONITORING : Core Zone Pachhtar and Pachhtardi Mines :June 2023 (2nd Visit)

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sr. No.	Particulars	Unit	Core Zone = 2. Near Loading area			Average Result of 24 Hrs.
			1 st 8:00 Hrs.	2 nd 8:00 Hrs.	3 rd 8:00 Hrs.	
01.	Date of sampling	----	25/06/2023	25/06/2023	25/06/2023	25/06/2023
02.	Duration of Sampling	Hrs.	8.00	8.00	8.00	24.00
03.	Dominant Wind Direction (From)	----	SE	SE	SE	SE
04.	Average Wind Speed	Km./Hrs.	2 to 10	2 to 10	2 to 10	2 to 10
05.	Average flow rate during sampling	m3/minutes	1.22	1.10	1.14	1.15
06.	Average flow rate for Gas sampling	LPM	0.5	0.5	0.5	0.5
07.	Permissible Limits of PM 2.5	µg/m ³	60	60	60	60
08.	Measured Concentration of PM 2.5	µg/m ³	29.6	30.4	31.3	30.4
09.	Permissible Limits of PM 10	µg/m ³	100	100	100	100
10.	Measured Concentration of PM 10	µg/m ³	51.4	49.4	47.6	49.5
11.	Permissible Limits of SO ₂	µg/m ³	80	80	80	80
12.	Measured Concentration of SO ₂	µg/m ³	11.6	10.8	12.8	11.7
13.	Permissible Limits of NO ₂	µg/m ³	80	80	80	80
14.	Measured Concentration of NO ₂	µg/m ³	17.9	18.2	17.3	17.8

Instrument used : 1) Ecotech RDS, Model No. AAS - 217BL, Gaseouse Sampling Kit- AAS 109 & PM 2.5 Sampler AAS 127

Calibrate Done on : 26/12/2022

Royal Environment Auditing & Consultancy Service

Rajkot

Analyst

Government of India
Ministry of Jal Shakti
Department of Water Resources, River Development and Ganga Rejuvenation
Central Ground Water Authority (CGWA)
Application for Issue of NOC to Abstract Ground Water (NOCAP)

**Application for Renewal of NOC to Dewater Ground Water for Mining Industry
(Application for Renewal of NOC)**

Application Number : 21-4/4141/GJ/MIN/2018

Applied For Renewal : 1st

1.	General Information:	
	Water Quality:	Fresh Water
	Purpose of Renewal Application:	Existing Ground Water
	Application Type Category/ Type of Application	Limestone
2.	Name of Mine/Project:	PACHHTARDI LIMESTONE MINE (M.L. AREA 18.03.88 HA)
3.	Location Details of the Mining Unit- (Attach Site, Approved Mining Plan, Toposketch of Surrounding 10km Radius Outside) (\$) :	
	Address Line 1 :	PACHHTARDI LIMESTONE MINE
	Address Line 2 :	SHREE DIGVIJAY CEMENT COMPANY LIMITED
	Address Line 3 :	
	State:	GUJARAT
	District:	DEVBHUMI DWARKA
	Sub-District:	Bhanvad
	Village/Town:	Pachhatardi
	Latitude:	21.000000
	Logitude:	69.000000
	Area Type :	Non-Notified
	Area Type Category :	Safe
	Whether industry is MSME:	No
4.	Communication Address	
	Address Line 1:	MANISH KUMAR UPADHYAY
	Address Line 2:	SHREE DIGVIJAY CEMENT COMPANY LTD
	Address Line 3:	DIGVIJAYGRAM, SIKKA
	State:	GUJARAT
	District:	JAMNAGAR
	Sub-District:	
	Pincode:	361140
	Phone Number with Area Code:	
	Mobile Number:	91 7861880790
	Fax Number:	
5.	Details of Existing NOC issued by CGWA (enclose copy)	
	E-Mail:	sdccmines@gmail.com
	NOC Letter No:	CGWA/NOC/MIN/ORIG/2021/11839
	Date of Issuance:	06/05/2021
	Vailidity (Start):	06/05/2021
	Validity (End):	05/05/2023

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	Reason for not applying for renewal before expiry of NOC Validity (Attach Affidavit):			
6.	Change in Land Use Pattern after execution of Project and Surroundings (10 km Radius - Outside)			
	Buffer Zone 33,922 Ha. of Pachhtardi Limestone mine mainly composite of crop land of (12,289 ha. covering 36.23%) 1500.00 ha. followed by stony land (11,022 ha covering 32.49% area) and followed land (6358 ha. covering 18.74% area) respectively other classes buffer zone area include plantation (1985 ha) open scrub land (1101 ha.) Mines quarry (339 ha) ponds-reservoirs (338 ha) Revers - Canals (259 ha) and human settlements (227 ha) covering 5.85%, 3.25%, 1.0 %, 1.0 %, 0.76 % and 0.67% of totarea			
7.	Land Use Detail of Project Area			
	Land Use Details	Existing (sq meter)	Proposed (sq meter)	Grand Total (sq meter)
	Green Belt Area	3200.00	0.00	3200.00
	Open Land	177188.00	0.00	177188.00
	Road/ Paved Area	0.00	0.00	0.00
	Rooftop area of building/ sheds	0.00	0.00	0.00
	Total	180388.00	0.00	180388.00
8.	Whether there is a change in Topography of the Area after the execution of the Project:			Yes
	a)	Regional	Physiographically, the district can be divided into the following units: Hilly areas and Coastal and alluvial Plains. Khambaliya and Kalyanpur talukas are characterized by plain topography, whereas Bhanvad taluka is characterized by hilly terrains. Cliffs are found in the Dwarka taluka with height up to 30 m. Barda, Alech, Gop etc. are famous hill ranges in the district. Okha Rann is a low-lying marshy area. Low coastal dunes and sand banks run along the north and west coasts while Kaly	
	b)	Project Area	The applied mining lease area is having a gentle sloping topography. The elevation range of outcrops of the limestone deposits are in the range of 80 mRL to 102 mRL.	
9.	Whether there is change in Drainage pattern of the area after the execution of the Project:			Yes
	a)	Regional	A Seasonal River namely Vartu River is flowing at a distance of 5 km in north/north-west direction from mine site which is ultimately draining itself into Arabian sea	
	b)	Project Area	No major river/stream occurs in and around proposed mine site area. However, a wide seasonal nallah is flowing adjacent of lease area along northern boundary from south-east to north-west direction. It carries flow only during rainy season, remains dry for most part of the year.	
10.	Present Townships / Villages within 10 km radius of the Project:-			Total 46 number of villages within 10 km buffer zone. 0-3 km: 6 villages 3-7 km: 14 villages 7-10 km: 26 villages

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11.	Whether the Groundwater Table will be Intersected by Activity :-										No	
	(a) At What Depth (m bgl)						Pre-monsoon		Post-monsoon			
	Minimum (m bgl)											
	Maximum (m bgl)											
	(b) Maximum Depth Proposed to Dewater (m bgl)											
	(c) Groundwater Flow Direction (Attach Map)(\$)											
	(d) Any Other Information											
12.	Total Water Requirement for various Purpose to be Mentioned						Existing (m3/day)	Additional (m3/day)	Existing (m3/year)	Additional (m3/year)		
	Ground Water Required through Abstract Structure						22.00		6600.00			
	Ground Water Abstracted on account of Dewatering / Mining Seepage											
	Total Ground Water Withdrawal						22.00	0	6600.00	0		
13.	Details of De-Watering Structure											
	(a) De-Watering Existing Structure											
	Number of Existing Structures:						0					
		SNo.	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) / Days (Year)	Mode of Lift Name	Horse Power of Pump	Whether fitted with Water Meter	Whether Permission Registered with CGWA /If so Details Thereof	
	(b) De-Watering Requirement and Additional Structure Detail											
	Number of Proposed Structures:						0					
		SNo.	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) / Days(Year)	Mode of Lift Name	Horse Power of Pump	Whether fitted with Water Meter	Whether Permission Registered with CGWA/If so Details Thereof	
14.	Details of Utilization of Pumped Water (Please Attach Details)(m3/year) (\$)											
	(a)	Water Supply			Yes	600.00		For Domestic Water				
	(b)	Agriculture			No							
	(c)	Green Belt Development			Yes	900.00		For Development of Plantation				
	(d)	Suppression of Dust			Yes	5100.00		For Dust Suppression				
	(e)	Recharge			Yes	348660.00		For Ground Water recharge in rainy season				
	(f)	Any Other Item										
15.	Monitoring of Ground Water Regime (Attach Map(\$))											

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	(a)	Location Details of the Wells / Piezometers (Latitude, Longitude, Reduced Level)	Groundwater level monitoring has been carried during premonsoon season (February, 2018) within buffer zone from existing dug wells, and bore wells.								
	(b)	Number of Wells / Piezometers	A total of 21 locations were monitored.								
	(c)	Attach Details of GW Level of Observation Wells / Piezometers(At Least for One Year)(\$)	Details of Groundwater Level monitoring is attached as Annexure-IV.								
	(d)	General Quality of GW in the Area & Surroundings (\$)	Water Quality report enclosed as Annexure-V								
	(e)	Any Other Item	Water Balance Chart enclosed as Annexure-VI								
16. Give the details of change in groundwater regime and quality after execution of the project (Attach detailed report with Map showing GW flow direction(\$))											
Drainage map enclosed as Annexure-XVIII											
17. Proposed Pump / Pumping Groundwater Outside the Mine Pit for Domestic or Other Use (If so, give Details):											
Number of Existing Structures:						1					
		SNo.	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) / Days (Year)	Mode of Lift Name	Horse Power of Pump	Whether fitted with Water Meter	Whether Permission Registered with CGWA/If so Details Thereof
		1	Borewell / 2021	80.00 / 150	22.00	10.00	2 / 300	Submersible Pump	3.00	Yes	Yes / -
Number of Additional Structures:						2					
		SNo.	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) / Days (Year)	Mode of Lift Name	Horse Power of Pump	Whether fitted with Water Meter	Whether Permission Registered with CGWA/If so Details Thereof
		1	Borewell / 2023	90.00 / 200	25.00	10.00	2 / 300	Submersible Pump	7.00	No	No / -
		2	Borewell / 2023	90.00 / 200	25.00	10.00	3 / 300	Submersible Pump	7.00	No	No / -
18. (a). Compliance to the Condition prescribed in the NOC											
	SNo.	Conditions given in NOC				Compliance Conditions Applicable		Status of Compliance			
	1	Area Specific Plantation				Yes		Area Specific Plantation is enclosed as Annexure-XIV			
	2	Domestic Water School Sanitation				Yes		Domestic Water School Sanitation Photographs is enclosed as Annexure-XVI			

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3	Groundwater quality monitoring - Pre monsoon and Post monsoon	Yes	Groundwater quality monitoring - Pre monsoon and Post monsoon is enclosed as Annexure-V
4	Maintenance of recharge structures	Yes	Recharge Pit photographs is enclosed as Annexure-VII
5	Number of Pizometers as per NOC and Water Level Record	Yes	Piezometer as per NOC and Water Level Record photographs is enclosed as Annexure-IV
6	Number of Tubewells Borewales as per NOC	Yes	Number of Borewell as per NOC photographs is enclosed as Annexure-II
7	Pizometer fitted with AWLRs with telemetry as per NOC	Yes	Not Applicable, Piezometer as per NOC and Water Level Record photographs is enclosed as Annexure-IV
8	Quantum of Groundwater as per NOC	Yes	Water Balance Chart is enclosed as Annexure-VI
9	Recharge through ponds	Yes	Recharge through ponds is enclosed as Annexure-VII
10	Recycle and reuse of water	Yes	will be done
11	RWH and AR structures implemented	Yes	Recharge Pond photographs is enclosed as Annexure-VII
12	Submission of Compliance report to the Region	Yes	The CGWA NOC Condition Compliance already submitted copy is enclosed as Annexure-XX
13	Water conservation measures	Yes	Recharge Pond photographs is enclosed as Annexure-VII
14	Water Security Plan of villages	Yes	Will be done
15	Well monitored around the plant premises	Yes	Well monitored around the mining area photograph is enclosed as Annexure-IV

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	16	Wells fitted with water meter and its Record	Yes	Wells fitted with water meter and its Record is enclosed as Annexure Annexure XII
--	----	--	-----	---

(b). Compliance to the Condition prescribed in the NOC - Other

SNo.	Conditions given in NOC	Status of Compliance
------	-------------------------	----------------------

No Record Found!

19. Gainful utilization of pump water:-

20. Details of Rainwater Harvesting and Artificial Recharge Measures for Groundwater Recharge in the Area:-

MINING USE- Self Declaration

☒ I hereby certify that the data and information furnished above are true to the best of my knowledge and belief and I am aware that if any part of the data / information submitted is found to be false or misleading at any stage, the application will be rejected outright.

I hereby declare that all the mandatory documents prescribed in the application form have been uploaded and no blank /irrelevant documents have been uploaded. I am also aware that any false/ wrong submission /uploading of document will lead to rejection of my application without any notice.

It is to certify that no case related to ground water withdrawal/ contamination is pending against the industry/ project/ unit as on date. Any such case filed against the company/ project/ unit in respect of ground water withdrawal/ contamination during the pendency of this application shall be immediately brought to the notice of CGWA.

I hereby undertake that in case any environmental compensation/ penalty is imposed on the firm by any statutory authority, I shall comply with the decision of such authority.

1. Application Proforma is subject to modification from time to time.

2. Application is submitted online on website <http://cgwa-noc.gov.in> to following office.

Regional Director, Central Ground Water Board West Central Region, Swami Narayan College, Building, Shah Alam Tolnaka, AHMADABAD, GUJARAT, 380022

3. Incomplete application will be summarily rejected.

Scanned copy of last page of application with signature and seal should be attached at prescribed place before submission of application.

4. Receipt of Processing Fee of Rs. 5000.00/- (Rupees Five Thousand Only) submitted through NON TAX RECEIPT PORTAL (<https://bharatkosh.gov.in>) should be attached along with hard copy of application.

Processing Fee:-

Bharat Kosh Transaction Ref. No:-	2604230003400
Bharat Kosh Transaction Date:-	26/04/2023

Note:- The Processing Fee is Non-Refundable. Applicant should ensure and Check Eligibility of Submission of Application and Required Documents before Submitting Online Application.

5. Hard copy of application required:	No
---------------------------------------	----

Government of India
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6.	Ground Water Quality Approved	Not Define	Ground Water Charge Required:	Not Define
	Ground Water Charge Recieve:	No	Ground Water Charge Amount:	
			Ground Water Arear Amount:	

Attached Files:

1). GroundWater flow Direction Map: (Refer:11-C)

S.No	Attachment Name	File Name
1	Groundwater Flow Direction Map	Annexure-XVIII (Drainage Map).pdf

2). GW Level of Observation Wells / Piezometer : (Refer:15-C)

S.No	Attachment Name	File Name
1	GW Level of Observation Wells/Piezometer	Annexure-IV (Piezometer with WL).pdf

3). General Quality of Ground Water in the Area : (Refer:17-D)

S.No	Attachment Name	File Name
1	General Quality of GW in Area	Annexure-V (WQR).pdf

4). Changes in Topography : (Refer: 8)

S.No	Attachment Name	File Name
1	Topography	Annexure-XIX (Toppographical Map).pdf

5). Changes in Drainage Pattern : (Refer: 9)

S.No	Attachment Name	File Name
1	Changes in Drainage	Annexure-XVIII (Drainage Map).pdf

6). Reason for Not Applying for Renewal before Expiring NOC : (Refer: 5)

No Attachment Found!

7). Existing NOC : (Refer: 5)

S.No	Attachment Name	File Name
1	Existing NOC	Annexure-I (NOC).pdf

8). Compliance to the Condition prescribed in the NOC : (Refer: 17-a)

SNo.	Conditions given in NOC	Attachments		
		S.No.	Attachment Name	File Name
1	Area Specific Plantation	No Attachment Found!		

Government of India
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Applied For Renewal : 1st

2	Domestic Water School Sanitation	No Attachment Found!
3	Groundwater quality monitoring - Pre monsoon and Post monsoon	No Attachment Found!
4	Maintenance of recharge structures	No Attachment Found!
5	Number of Pizometers as per NOC and Water Level Record	No Attachment Found!
6	Number of Tubewells Borewales as per NOC	No Attachment Found!
7	Pizometer fitted with AWLRs with telemetry as per NOC	No Attachment Found!
8	Quantum of Groundwater as per NOC	No Attachment Found!
9	Recharge through ponds	No Attachment Found!
10	Recycle and reuse of water	No Attachment Found!
11	RWH and AR structures implemented	No Attachment Found!
12	Submission of Compliance report to the Region	No Attachment Found!
13	Water conservation measures	No Attachment Found!
14	Water Security Plan of villages	No Attachment Found!
15	Well monitored around the plant premises	No Attachment Found!
16	Wells fitted with water meter and its Record	No Attachment Found!

9). Compliance to the Condition prescribed in the NOC - Other : (Refer: 17-b)

SNo.	Conditions given in NOC	Attachments		
		S.No.	Attachment Name	File Name

10). Extra Attachment :

S.No	Attachment Name	File Name
1	Affidavit of Non-availability of Water	Affidavit - (Non-Availability Water Pachhtardi).pdf
2	Affidavit of Wetland	Affidavit - (Wetland Pachhtardi).pdf
3	CHR	Annexure -XI (CHR).pdf
4	Approval Letter MP	Annexure-XXI (MP Approval_Letter).pdf
5	CGWA NOC Condition Compliance	CGWA Compliance-Pachhtardi Final.pdf

11). Bharat Kosh Reciept (Porcessing Fee):

No Attachment Found!

12). Application with Signature and Seal:

Government of India
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S.No	Attachment Name	File Name
1	Aplication with Signature and Seal Attachment	Declaration Letter-Pachhtardi.pdf

13). MSME certificate in case of MSME:

No Attachment Found!

Date :

Name & Signature of the applicant

Place :

(With official seal)

Associated User : anilnigam

Submitted By User : anilnigam

Submission Date : 28/04/2023

* In case signed by any authorized signatory, the details of the signatory with the authorization shall be enclosed.

Piezometer Well (Ground Water Monitoring)



WATER LEVEL REPORT PACHHTARDI MINES

1. WATER SAMPLE FROM PACHHTARDI MINES

DATE – 21.05.2022

NAME – NEAR PACHHTARDI MINES PIT, WELL

TOTAL DEPTH OF WELL – 23.66 M

WATER FILLED LEVEL – 1.00 M

WITHOUT WATER – 22.66 M

HYDROGEOLOGY STUDY REPORT

and

RAINWATER HARVESTING PLAN

Pachhtardi Limestone Mine
(M.L. Area- 18.03.38ha)



APPLICANT

Shree Digvijay Cement Company Ltd.

Village- Pachhtardi, Taluka- Bhanvad,

Dist- Devbhumi Dwarka

(Erstwhile Jamnagar) Gujarat

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CHAPTER-1 INTRODUCTION

1.1 GENERAL

M/s. Shree Digvijay Cement Company Limited is a public limited company under Indian Company Act having its registered office and cement plant at Digvijaygram (Sikka), District Jamnagar, Gujarat manufactures ordinary Portland Cement, Pozzalana Cement, Sulphate Resisting Portland Cement and Oil Well Cement Galss 'G' by dry process technology.

Mining of Limestone and manufacturing of Clinker / Cement, has been the main life of activity of the company, which it has been carrying out with distinction for last over seven decades period.

Shree Digvijay Cement Company Limited, incorporated in the year 1944, started its production in the year 1949 by the then prevailing "Wet process" Technology, using calcareous sea sand as the main raw material. The various types of cement produced by this company under the brand name "KAMAL".

In order to meet requirement of Limestone for manufacturing of Cement in their cement plant situated at Digvijaygram (Sikka), District Jamnagar, M/s Shree Digvijay Cement Company Limited has proposed Pachhtardi Limestone Mine (M.L. area- 18.03.88 Ha) with Production Capacity 0.35 million TPA At survey No 78/p, Village: Pachhtardi, Taluka: Bhanvad, District: Devbhumi Dwarka (Erstwhile Jamnagar) (Gujarat).

1.2 LOCATION

The site is located close to the Arabian Sea as well as the Gulf of Kutch on the western coast of Gujarat. The site is well connected with nearest town and City Bhanvad at about 12.0 km in NE direction from the mine site. Nearest railway station is Bhanvad Railway Station at about 12.0 km in NE direction. The nearest airport is Porbandar Airport, Gujarat at about 26.0 km in SSW direction from mine site.

The site is well connected with communication facilities like telephone, fax, and wireless and as such, no constraints are envisaged in this aspect as tehsil and district headquarters are near to the site. The details about location of area are given in the table below while location map showing the project site is given in **Figure 1.1**.

S. No	Particulars	Details
1.	District and State	Devbhumi Dwarka and Gujarat
2.	Block/Tehsil	Bhanvad
3.	Village	Pachhtardi
4.	Occupancy/ownership	Government Waste Land
5.	National Park, Wild Life Sanctuaries, Biosphere Reserves, Wildlife corridors, Tiger/Elephant Reserves	- Barda Wild life Sanctuary (~1.5 km from mine site) - ESZ of Barda Wild life Sanctuary (~1.18 km from mine site)

	etc. within 10 km radius study area	
6.	Reserve/Protected Forest within 10 km radius study area	SOI Toposheet not available due to closeness of National Boundary. Location of any Reserved/Protected Forests will be obtained from Forest Department
7.	Water Bodies within 10 km radius of the mine site	• One seasonal nallah adjacent to the lease area • Vartu River (~5.0 km in NNW direction) • Vartu Dam (~7.0 km in NNE direction)
8.	Nearest Town & City	Bhanvad (~ 12.0 km in NE direction)
9.	Nearest Railway Station	Bhanvad (~ 12.0 km in NE direction)
10.	Nearest Airport	Porbandar Airport, Gujarat (~26.0 km in SSW direction)
11.	Toposheet no., Latitude & Longitude	Topo Sheet no. 41 G/9 Latitude - 21° 51' 16.39"N to 21° 51' 38.11"N Longitude- 69° 40' 58.74"E to 69° 41' 33.83"E
12.	Nearest Highway	➤ SH-95 (Adjacent to the mine area) ➤ SH-27 (~9.0 km in ENE direction)

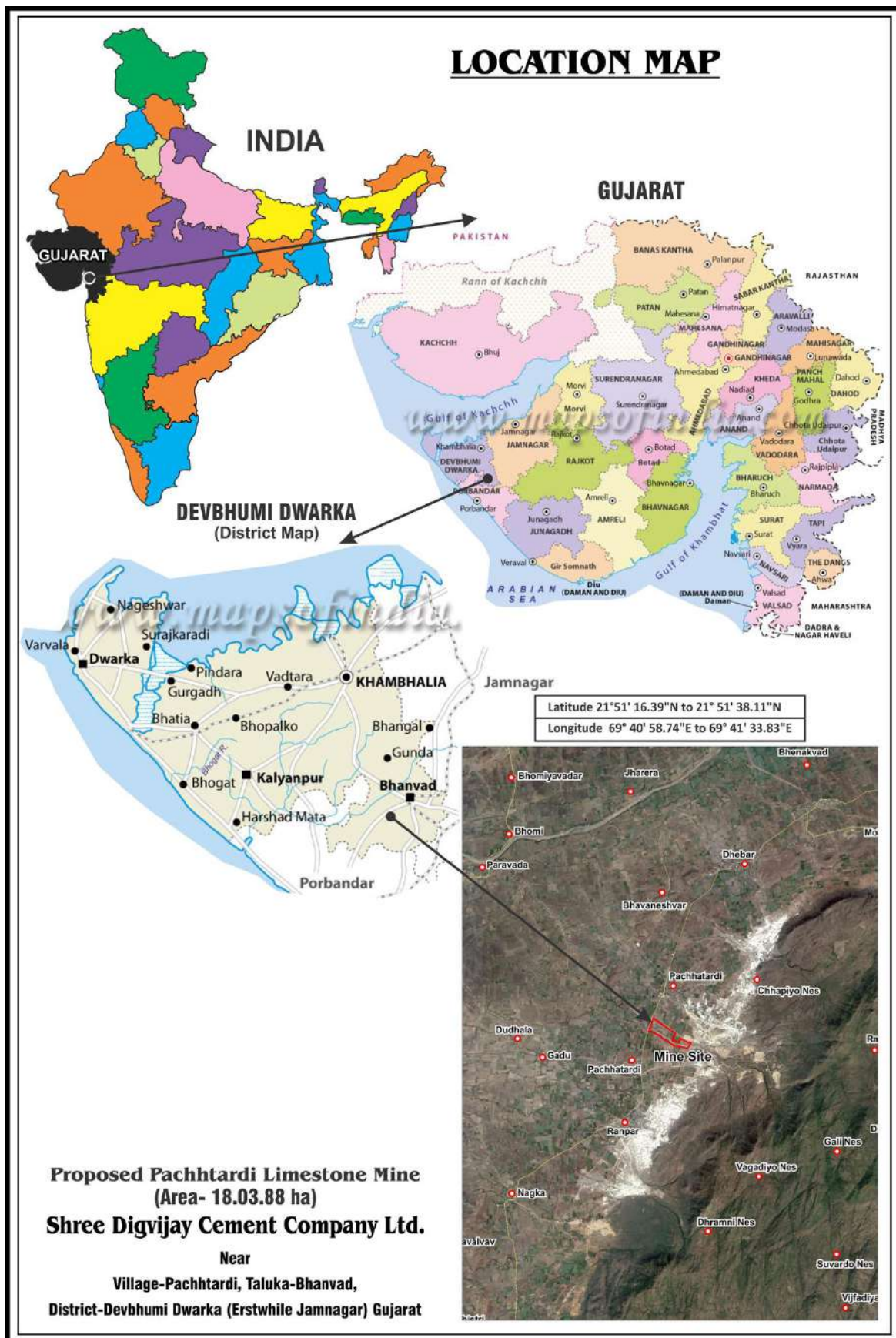


Figure 1.1: Location Map showing Proposed Limestone Mine, Devbhoomi Dwarka, Gujarat

1.3 CLIMATE AND RAINFALL

District has a hot semi-arid climate. There are three defined seasons. The "hot" season lasts from March to May and is extremely hot and humid, before giving way to the "wet" season with extremely erratic monsoonal rainfall that averages around 630 millimeters (25 in) but has varied from less than 100 millimeters (3.9 inches) in 1911 and 1939 to over 1,500 millimeters (59.1 inches) for the district in 2010. Tropical cyclones sometimes affect the region during this period. The "cool" season from October to February remains hot during the day but has negligible rainfall, low humidity and cool nights, so it is by far the most comfortable time of year. Temperature profile of the area is given in **Figure 1.2**.

This region is under the influence of South-west monsoon. The average annual rainfall of Devbhoomi Dwarka district is around 742 mm (average of last fourteen years rainfall data from 2004-2017) varying from minimum 367 mm in 2012 to maximum 1506 mm in 2010. (**Table 1.1** and **Figure 1.3**).

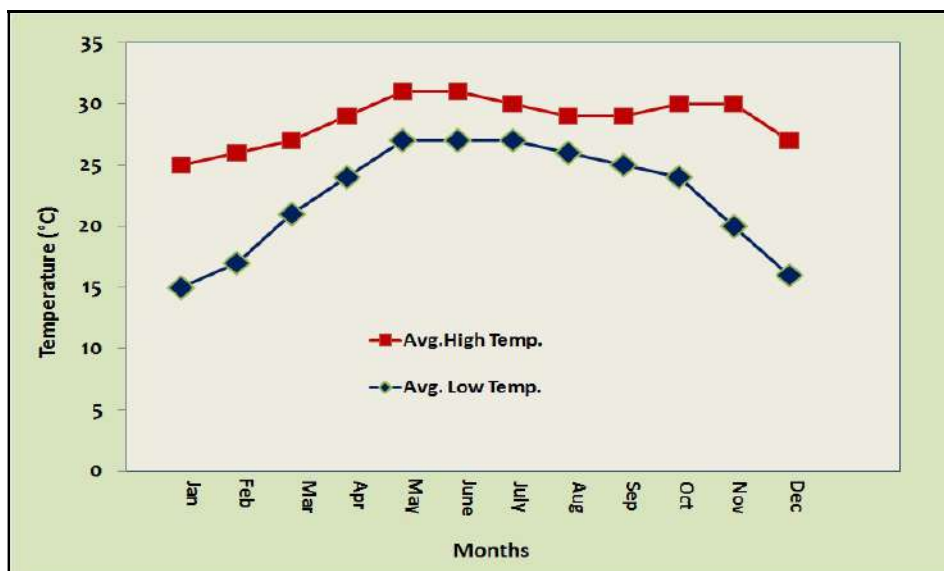


Figure 1.2: Temperature Profile of District Devbhoomi Dwarka

Table 1.1: Rainfall Statistics of District Devbhoomi Dwarka

S.No.	Year	Annual Rainfall (mm)
1	2004	563
2	2005	576
3	2006	774
4	2007	1199
5	2008	578
6	2009	918
7	2010	1506
8	2011	795

9	2012	367
10	2013	934
11	2014	542
12	2015	450
13	2016	573
14	2017	620
Average		742
Source: India Meteorological Department (IMD)		

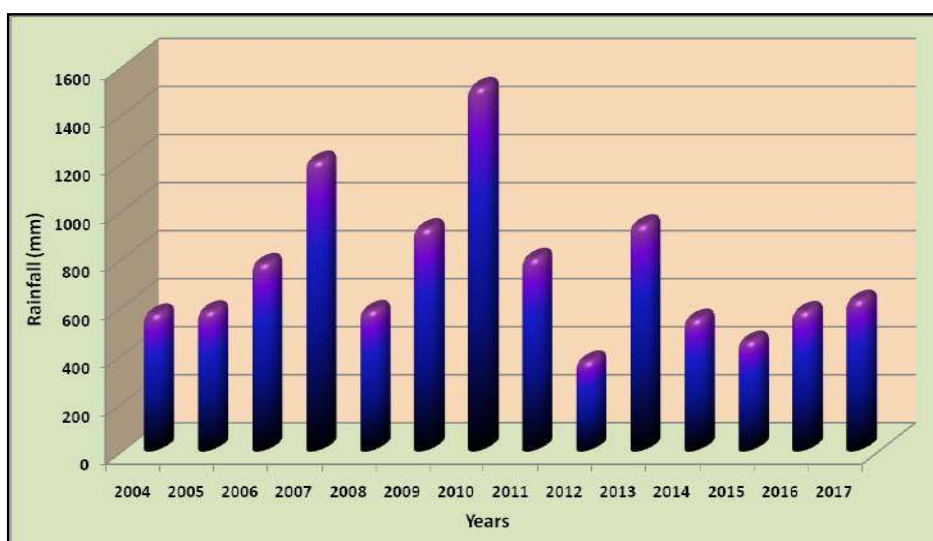


Figure 1.3: Rainfall Pattern of District Devbhoomi Dwarka

1.4 TOPOGRAPHY, SOIL AND DRAINAGE PATTERN

Physiographically, the district can be divided into the following units: Hilly areas and Coastal & alluvial Plains.

Khambaliya and Kalyanpur talukas are characterized by plain topography, whereas Bhanvad taluka is characterized by hilly terrains. Cliffs are found in the Dwarka taluka with height up to 30 m. Barda, Alech, Gop etc. are famous hill ranges in the district. Okha Rann is a low-lying marshy area. Low coastal dunes and sand banks run along the north and west coasts while Kalyanpur is coming under plain areas.

Soils of the area may be broadly classified as Coastal alluvial, medium black, shallow black and hilly. The medium black and shallow black soils are the main soil types, while the coastal and hilly soils are the sub-soils. The black soil is rich in mineral and organic matter and is more fertile. The medium black soils are found in Khambaliya and kalyanpur talukas. These soils are generally 25 to 50 cm deep. Shallow black soils are found in Bhanvad and Dwarka talukas. It is about 25 cm deep. The coastal alluvial soils are found in Kalyanpur and Khambaliya talukas. These soils are mostly

saline and alkaline in nature. Hilly soils are found in southern parts of the district, particularly in Bhanvad taluka.

The applied mining lease area is having a gentle sloping topography. The elevation range of outcrops of the limestone deposits are in the range of 80 mRL to 102 mRL. No major river/stream is occurs in and around proposed mine site area as well as buffer zone. However, a fairly wide seasonal nallah (12-15 m width) is flowing adjacent of lease area along northern boundary in south-east to north-west direction (**Figure 1.4**). It carries flow only during rainy season, remains dry for most part of the year. Another seasonal nallah near southern boundary of mining lease also carries run-off water. Apart from that, few small ponds also exist within 10 km buffer zone area. Drainage Map of the area is shown in **Figure 1.5**.

Natural surface water in the area is limited as monsoonal precipitation is the only source of the surface water. Therefore, earth dams and a number of check dams on the effluent streams/channels have been constructed to store the surface water.





Figure 1.4: Seasonal Nallah flowing along Northern Boundary of Mine Site

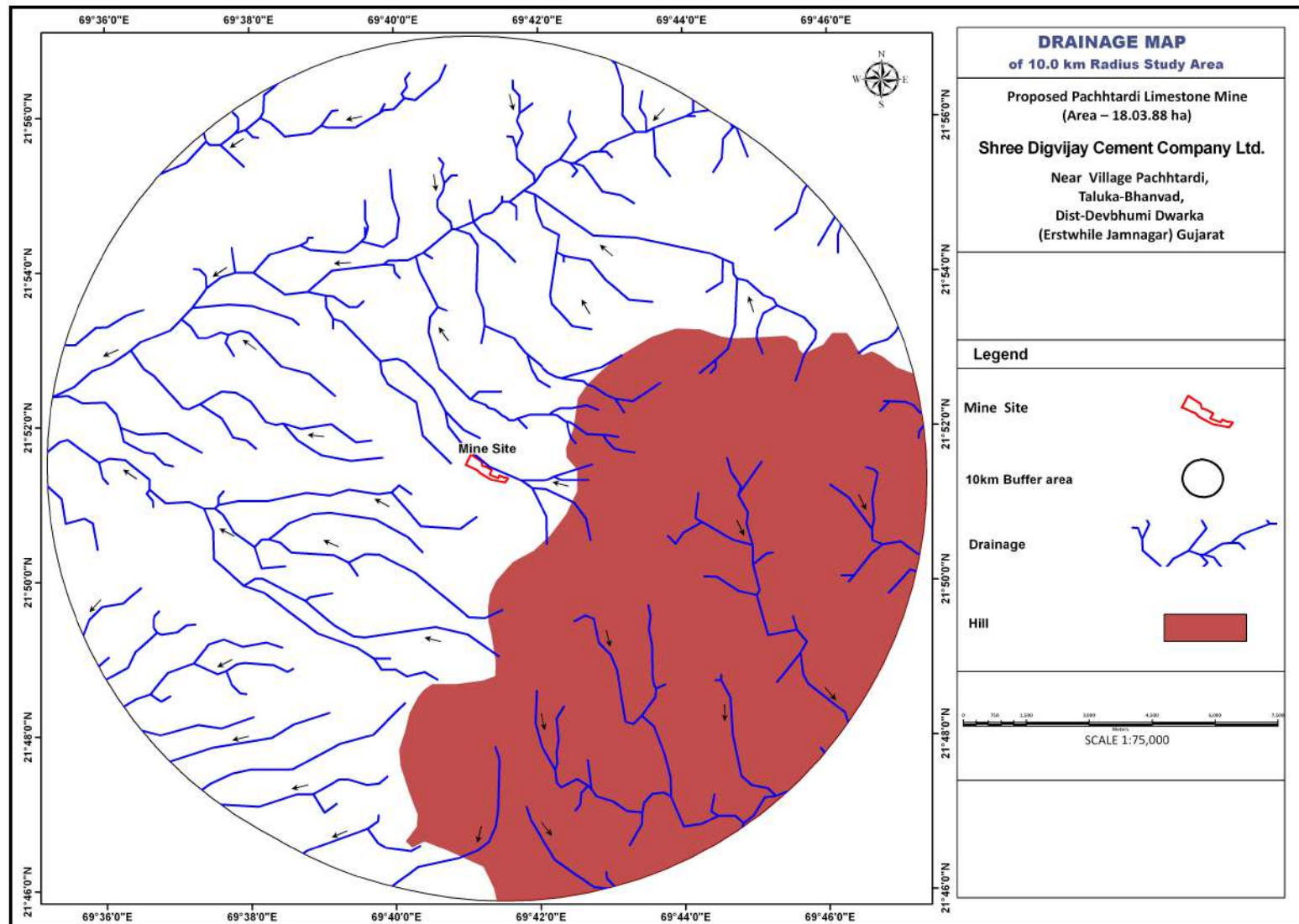


Figure 1.5: Drainage Map of surrounding 10 km Buffer Zone

1.5 GEOMORPHOLOGY

Regionally, the area having seven geomorphic units namely pediplain, dissected upland and denuded hills, recent tidal flats, beaches, flood plains and other tidal flats as shown in Geomorphological map of the area (**Figure 1.4**).

Pediplain area is developed on the horizontal to sub-horizontal basaltic flows (Deccan traps) and on the tertiary sedimentary rocks having gentle slopes (1-2%) mainly towards north-west. Within this area, low-lying ridges and denuded hills are located. Denuded hills aligned in east-west trend are formed along acidic rocks intrusion and along basalt ridges in the central and southern part between elevations 140 and 527 m. These ridges are acting as water divides for rivers flowing in northerly and southerly direction. Dissected uplands having 2-3% slope is formed in the central part between elevations 80 to 140 m due to erosion by minor streams. Flood plains in the area are poorly developed due to short ephemeral nature of rivers/streams having low surface discharge. Drainage in the central part of the area is dendritic and in the western part radial. Drainage in the tidal flat area is of dendritic, trellis and parallel type. The older tidal flat area is dominated by distributaries channels. Trellis and parallel type of drainage is confined to deltaic areas of rivers reflecting tectonic control. Geology and drainage are controlling geomorphology of the area.

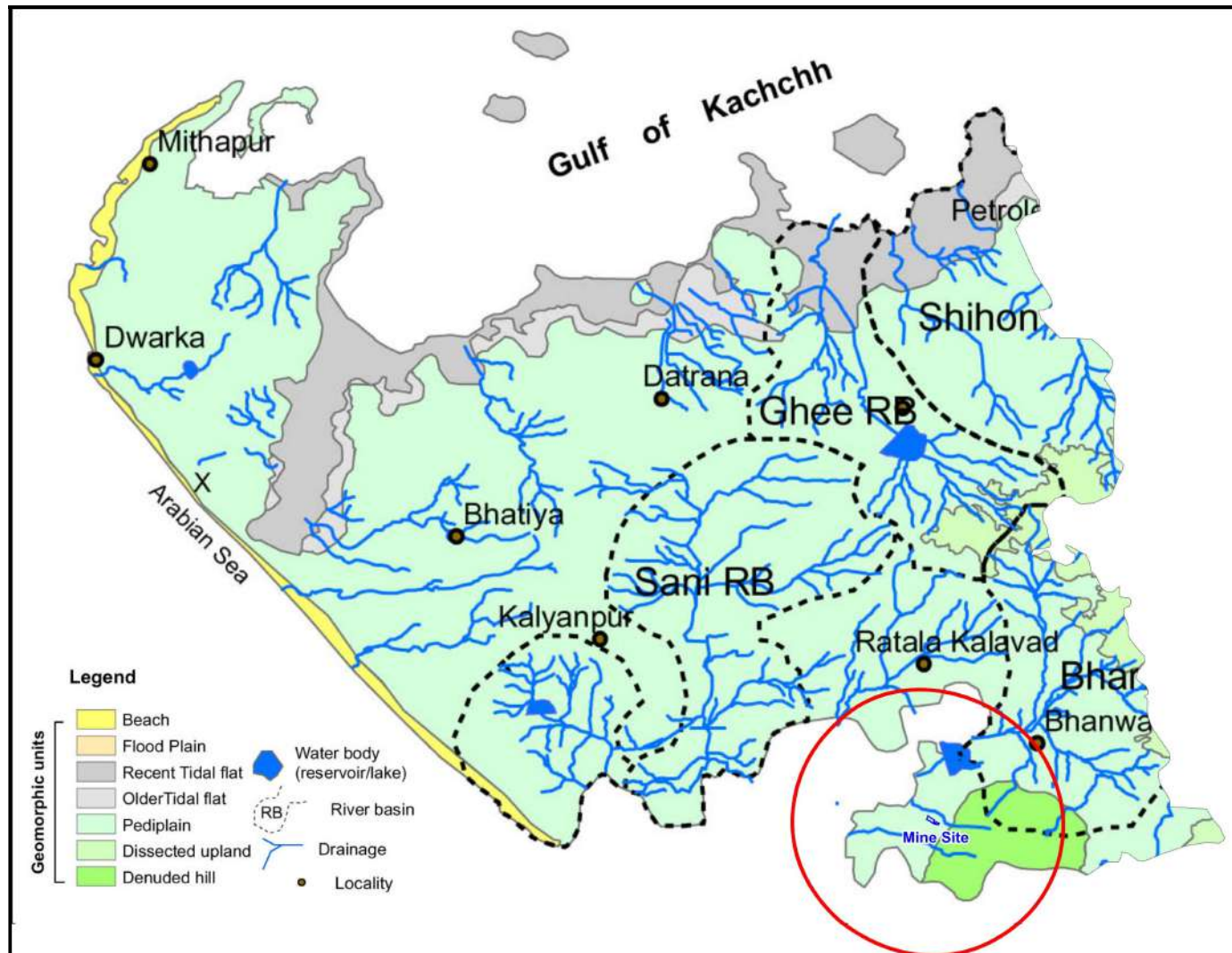


Figure 1.6: Map showing Geo-morphological Set-up in and around Study Area (Source: GSI)

CHAPTER-2

SCOPE OF WORK AND METHODOLOGY

2.1 SCOPE OF WORK

The Scope of work includes the following.

1. To analyze physiographic conditions of the study area with the help of field observations, GPS readings, Survey of India (SOI) toposheets and Satellite images.
2. To observe hydrogeological conditions and study of aquifer system of the area i.e. in Core and 10 km Buffer Zone.
3. To work out quantitative as well as qualitative variations in groundwater with respect to aerial extent and to find out water balance.
4. To observe surface water features and their impact on groundwater balance.
5. To ascertain the impact of proposed mining project on groundwater conditions of the surrounding area.
6. To work out scope of Rainwater harvesting within the proposed mining project and proposal for suitable recharge/storage system.
7. To suggest ways and means of creating rainwater harvesting to negate adverse impact on groundwater regime of the area.
8. To prepare detailed Hydro-geological report.

2.2 METHODOLOGY

Following methodology has been adopted for hydro-geological investigation in the area:

1. Physiographic studies of the proposed mining project and its surroundings with the help of latest Google images, site visit, GPS survey etc. which helps in determining physiographic gradient.
2. Secondary data collection i.e. climate and rainfall, soil and topography, geology, drainage etc. for interpretation.
3. Detailed hydro-geological survey in core and buffer zone including geology, types of aquifers and their hydraulic parameters governing the groundwater regime of the area, depth to water level, groundwater quality, water abstraction structures and their discharge, surface water bodies, drainage pattern, major irrigation sources and their potential etc.
4. Groundwater resources evaluation based on the norms recommended by Groundwater Estimation Committee (GEC), 2009.
5. Evaluation of present groundwater scenario as well as future course of action for protecting the natural environment
6. Scope of Rainwater Harvesting from runoff generated from various areas of proposed mining project depending upon average annual rainfall and its intensity, recharge capacity of the aquifers and the design considerations.

CHAPTER-3

LAND USE LAND COVER PATTERN

3.1 LAND-USE PATTERN

Total study area/ buffer zone (33,922 ha) of proposed mining project of Shri Digvijay Cement Company Limited mainly comprises of Crop Land (12,289 Hectare covering 36.23% area) followed by stony land (11,022 Hectare covering 32.49% area) and fallow land (6,358 Hectare covering 18.74% area) respectively. Other classes of buffer area include plantation (1985 ha), open scrub land (1101 ha), mine quarries (339 ha), ponds/reservoirs (338 ha), river/canal (259 ha) and human settlements (227 ha) covering 5.85%, 3.25%, 1.0%, 1.0%, 0.76% and 0.67%, of the total study area (Figure 3.1).

Land use pattern in buffer zone (10 km Radius) –

S. No.	LU/LC Class	Area (hectare)	Area (%)
1	River/Canal	259.38	0.76
2	Ponds/Reservoir	338.16	1.0
3	Stony Area	11022.30	32.49
4	Open Scrub Land	1100.98	3.25
5	Plantation	1985.32	5.85
6	Fallow Land	6358.47	18.74
7	Crop Land	12289.10	36.23
8	Human Settlement	227.31	0.67
9	Industrial Area	2.14	0.01
10	Mine Quarry	338.55	1.0
	Total	33922	100

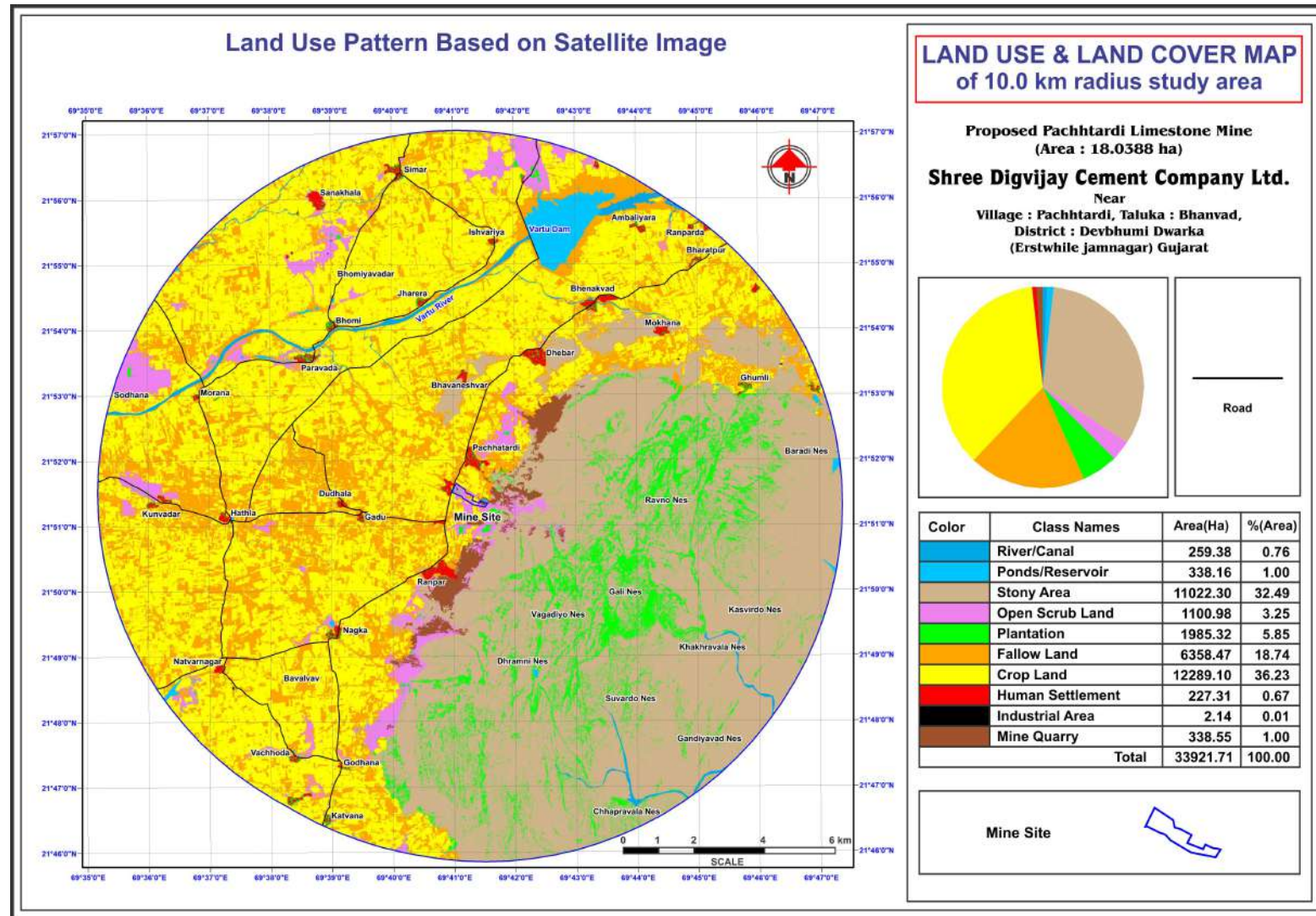


Figure 3.1: Land use/Land cover pattern in 10 km buffer zone, Shri Digvijay Cement Company Limited, Devbhoomi Dwarka (Gujarat)

CHAPTER-4

GEOLOGY

4.1 REGIONAL GEOLOGY

Regionally, the area comprises a variety of geological formations broadly grouped under hard rocks comprising 'Deccan Traps' and soft rocks comprising 'Tertiaries and Alluvium'.

The area represents an uneven dissected terrain with altitudes varying from the mean sea level to 627 m in Barda hills. High altitudes are confined to Barda hills and Alech hills. The area is well connected through roads and Porbandar is linked with Ahmedabad, state capital by railway.

Basaltic and acidic flows and related intrusives are overlain by laterite, the Gaj and Dwarka formations of tertiary age and quaternary sediments. Basaltic flows occupying the low-lying areas around Barda hills are more or less horizontally disposed, weathered greenish to grey/grayish black in colour and vary in texture from fine grained aphanitic to medium grained porphyritic and glomeroporphyritic varieties with groundmass showing inter-granular to inter-sertal textures. The top most portions of the flows are marked by amygdular zones filled with secondary minerals. Basalt exhibits devitrification of glass, spheroidal weathering and columnar jointing at places.

The flows are intruded by younger acid igneous rocks, basic dykes and olivine gabbro. The acid igneous rocks form Barda hills. In Barda hills, the main intrusive phases are represented by granophyres and felsites. The Barda massif is mainly composed of grayish white to pale grey, very fine to coarse grained and granular miarolitic granophyres carrying miarolitic cavities-0.5 to 2 cm in diameter, filled with quartz, feldspar, calcite and iron oxides indicating shallow depth of intrusion. The miarolitic granophyres grades imperceptibly into fine to medium grained granophyres, grey aphanitic felsites and spherulitic felsites (spherulites resulting from devitrification of glass). The finer varieties of granophyres are occasionally porphyritic. Presence of aegirine-augite and acmite in the groundmass suggests peralkaline nature of the groundmass.

The basic dykes traversing the basaltic flows are either basaltic or olivine bearing dolerite. Majority of them trend either in NW-SE or NNE-SSE directions. In Barda hills, minor intrusions of granophyres and felsites in the form of plugs and dykes within the miarolitic granophyres and basalts (outside the main massif) suggest at least two phases of acid igneous activity.

In north-western part of the area, laterite occurs as cappings or thin impersistent bands through lithomargic clay over the weathered basalt. The laterite contains pockets of bauxite. The thickness of laterite-bauxite horizon ranges from 0.4 to 12.0 m.

Rocks of Gaj formation unconformably overlying the Deccan volcanic or laterite, are exposed in the north-western part along the coast of the Arabian sea. The lithounits include variegated clays, claystone, yellow and red marl, fossiliferous yellowish limestone, red crystalline limestone and yellowish marly limestone showing imperceptible sub-horizontal dips. Based on species of larger foraminifera *Miogypsina irregularis*, *Lapidocyclina* (*Nephrolepina*) *borneensis*, *Austrotrilliana*

howchini etc. and the nano-plankton viz. *Dicoaster challengeri*, *Coccolithus* sp. etc. lower Miocene age has been attributed to the Gaj sediments.

Dwarka formation gradationally overlies the Gaj formation and includes marl, marly limestone, shelly limestone, arenaceous limestone, sandstone and clay. These rocks trend in NW-SE with low south-westerly dips varying up to 10° and are exposed along the sea coast for a distance of approximately 22 km as a narrow band. The fossil assemblage is devoid of echinoids and include pelecypods (pectin sp., *Corbula trigonalis* etc.), corals (*Orbicella conoides*, *Porites incrustans* etc.), Bryozoans, foraminifers, abundance of sessile barnacle *Balanus*, etc. suggesting Pliocene to middle Eocene age. Ripple marks, cross beddings and cylindrical burrows are present.

Unconformably overlying the Deccan volcanics, Gaj and Dwarka formations, the Porbandar group consists of lower Miliolite formation and the Upper Chhaya formation. The Miliolite formation overlies the older rocks with a profound unconformity marked by a polymitic conglomerate horizon and is characterized by a lower inter-bedded sequence of calcarenites and micrites and the upper pelletoid calcarenites. Its thickness is highly variable ranging from a couple of meters to 60 m. whenever, it occurs as a sheet, the thickness is not much, but at places, where it consists of piled up heaps, it shows thickness as much as 60 m. the microfauna observed include benthoforaminifera and ostracoda, suggesting lower Pleistocene age. The limestones are thinly bedded, sub-horizontally disposed, cross-bedded and area deposited under shallow marine as well as aeolian environment.

Chhaya formation unconformably overlies the Miliolite formation as a narrow band along the coast and comprises calcarenites, calcirudites and mega fossil bearing rocks such as coral reefs, oyster beds etc. the calcirudites are largely made up of poorly cemented, mechanically sorted fossil debris imparting porous appearance to the rock. Dating of the corals and oysters by C14 method assign a late Pleistocene to Holocene age to the Chaya formation (earlier known as Miliolite Limestone) which are exposed as a narrow band all along the coast of the Arabian Sea as a thin and impersistent blanket and isolated patches away from the sea.

The recent deposits include sand dunes, coastal dunes, consolidated shore sand, Rann clay, soil and alluvium. Regional geological map of the area is shown in **Figure 4.1**.

The generalized stratigraphic succession in and around study area is given below.

Stratigraphic Succession of Study Area

Age Group	Formations		Lithology
Recent			Soil, Sandstone, Mud and Rann Clay
Sub-recent			Dead Coral Reef
Holocene	Miliolite Limestone		Limestone and Calcareous Sandstone and Shell Limestone
Pliocene to middle Miocene	Dwarka Formation	Upper Member	Porous, sandy, gritty or pure limestone with fossilized shell fragments
		Middle Member	Clay with sandy laminations, Sandstones and mottled Sand stones, marl Limestones
		Lower Member	Limestones and Clay with a thick friable, thinly bedded very fine grained mottled Sandstones
Lower to Middle Miocene	Gaj Formation		Grey or yellowish gypsum bearing clay, Calcareous silty clay stone and yellow fossiliferous Limestones

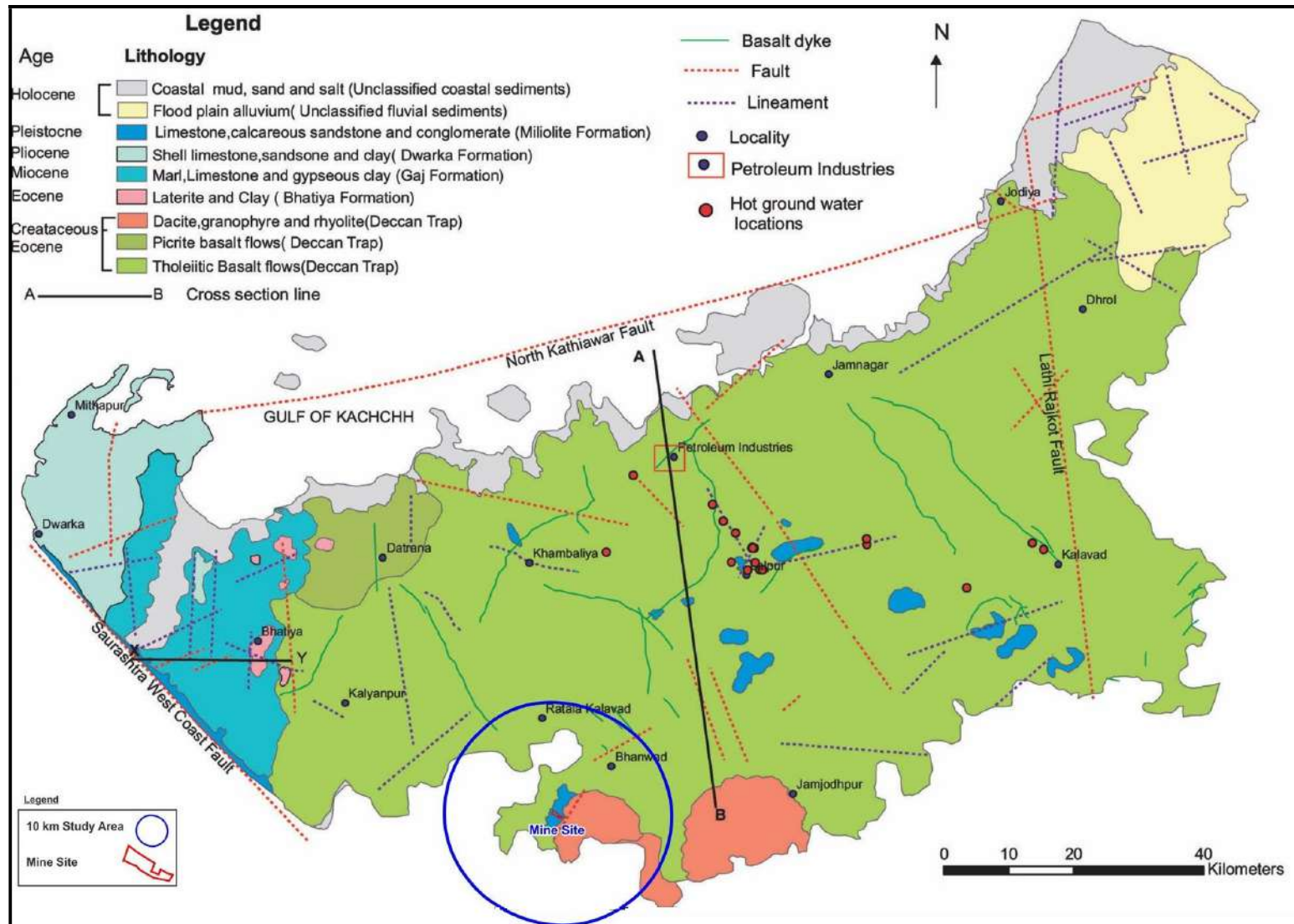


Figure 4.1: Map showing Geological Formations Prevailing on Regional Scale (Source: GSI)

4.2 LOCAL GEOLOGY

The area under investigation comprises a large body of sub-volcanic acid rocks emplaced within basaltic lava flows of Deccan trap. The basaltic flows are highly shattered and intruded by thin dykes and large satellitic bodies of rhyolite and felsites which are thought to be coeval with the main massif of Barda hills. The basaltic lava flows, probably belonging to the upper sequence of Deccan traps are exposed around the Barda hills and are also intruded by basaltic and dolerite dykes. The Barda hill comprises mainly granophyres and felsites. No line demarcating the boundaries between the two were, however, drawn. During the present investigation, remarkable sharp contacts between the granophyres and felsites are found in the field. The granophyres are fine to coarse-grained granular, whereas the felsites are aphanitic without visible granular character. However, in the southern part of the area, the boundaries between the felsite and granophyres are not quite sharp and seem to be gradational to some extents. A large number of small dykes and plugs of both felsites and granophyres are found emplaced within and at the contact of different granophyre bodies. Mainly three types of granophyres are identified. The contact between the older basaltic lava flows and the main massif of Barda Hills is always covered by bedded deposits of miliolitic limestone thin small patches of soil, alluvium and recent conglomerate are exposed away from the Barda Hills. The stratigraphic succession of the area is given below while geological formations in and around study area are shown in **Figure 4.2**.

Soil, alluvium and Conglomerate	
Miliolitic Limestone	
Intrusive bodies of Granophyres, felsites and rhyolites	
Basaltic and dolerite dykes	
Basaltic Lava Flows	Glomeroporphyritic Basalt
	Fine grained Amygdules

The basaltic lava flows exposed in the area are classified into two units, viz., the lower unit of fine grained amygdular basalt and the overlying porphyritic to glomeroporphyritic basalt. Because of the absence of the physical continuity and a fairly high state of weathering it cannot be clearly said whether the exposures of fine grained amygdular basalt are of the same flow. The upper porphyritic to glomeroporphyritic basalt exposures are also physically discontinuous, but because of their similar porphyritic nature of rock, they may perhaps belong to a single unit.

The granophyres and felsites are recognized by carefully observing the grain size and/or crystallinity of the rocks in the field. The granophyres are fine to coarse grained, granular rocks, whereas the felsites are aphanitic without visible granular character.

The Miliolitic limestone formation of Pleistocene to sub-recent age is practically horizontal bedded and rests unconformably over the trap (Basalt) rocks of Eocene age, which is also the

oldest basement rock exposed in the area. Limestone is generally off-white to buff in colour and soft, porous and friable in nature, but also compact and hard at the top surface. The thickness of limestone varies widely in depth due to undulating basalt floor. Mineralization and disposition of this marine sedimentary deposit is mainly restricted to foot hills of ridge and also along valley portion.

The limestone formation is practically horizontal bedded and is generally off white to buff in colour. The limestone is soft, porous and friable in nature but also compact, hard and bouldary at many places. The limestone bed of 15 m thickness is followed by marl layer of 4 meter thickness as observed in the area and also encountered in five number of boreholes drilled in the area, which lies unconformably over basalt base rock in the area and also in old pits. This marl layer will be useful to be blended with high grade limestone to form raw mix suitable for cement making. It will substitute partly for Silica as being used in most of the cement plants in the area. Local stratigraphic sequence in applied Pachhtardi lease area:

Geological Age	Formation	Thickness (Average)	Rock Type
Pleistocene to Sub-recent	Miliolitic limestone	15 meters	Miliolitic Limestone
	Marl	4 meters	Marl
Unconformity			
Cretaceous Eocene	Deccan Trap	Thickness not known	Basaltic trap rock altered at top

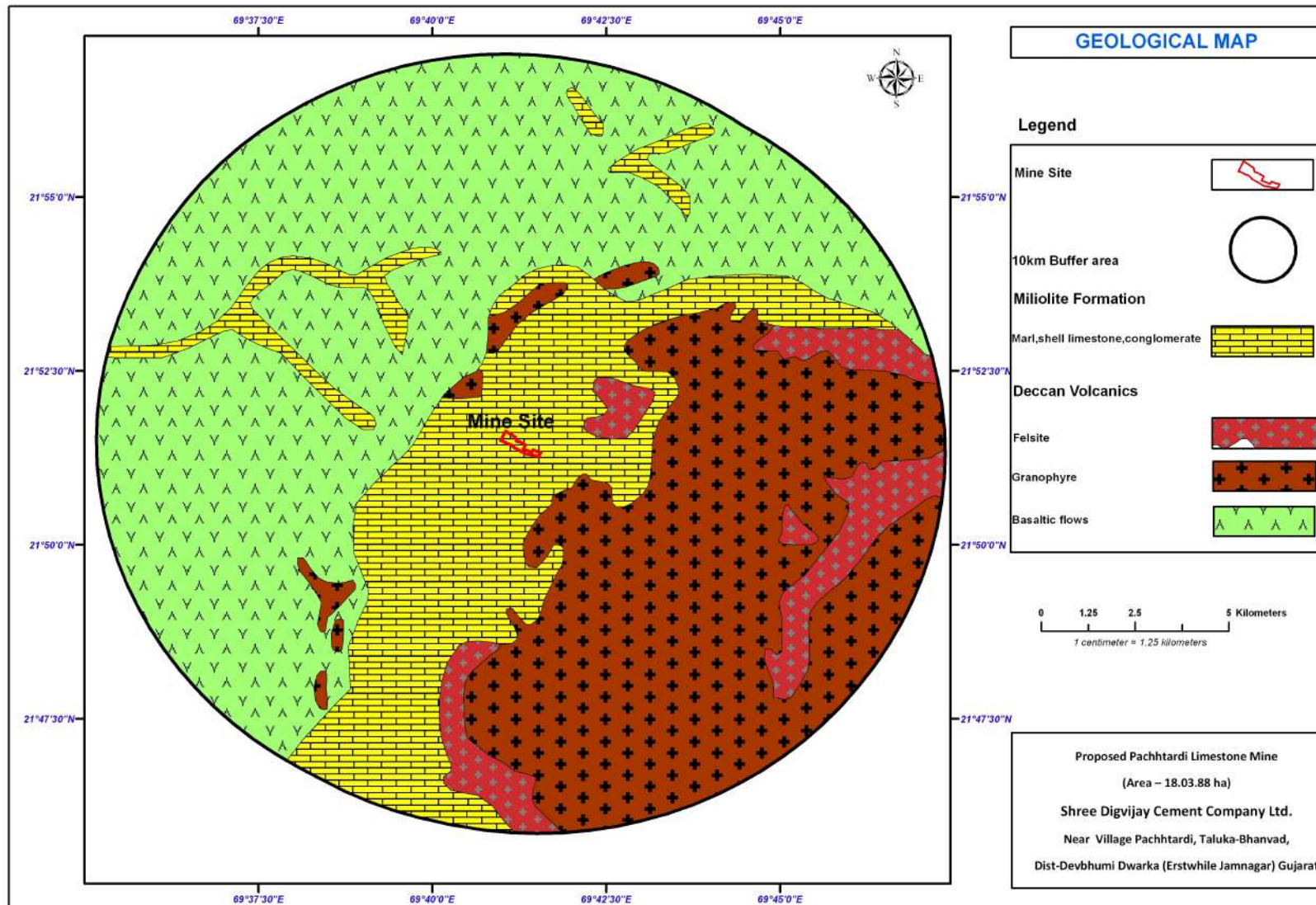


Figure 4.2: Geological Formations in Buffer zone, Shri Digvijay Cement Company Ltd., Devbhoomi Dwarka (Source: GSI)

CHAPTER-5

HYDROGEOLOGY

5.1 REGIONAL HYDROGEOLOGY OF THE AREA

All the rock units, found in this region, are capable of yielding water. The yield in different rock types, however, varies with differences in permeability. Most of the wells are dug or open with the exception of some which are dug-cum-bore wells.

Groundwater occurs in water table as well as semi-confined to confined conditions. The water table aquifer occurs from 0 to 20 m or less. Since the saturated thickness of water table aquifer is not consistent it is highly variable laterally. The top clays, fractured limestones and sandstones of Miliolite Limestone and Dwarka formations form the water table aquifer. The sandstones of Dwarka Formation form the semi-confined or confined aquifer. The description of various aquifers is presented below.

WATER IN MILIOLITE ROCKS - Miliolites, comprised of limestone, calcareous sandstone, and shelly sand, are the most important water bearing formations in the area. Groundwater circulating through porous Miliolite limestone through its numerous sink holes is arrested by the impervious beds of the Gaj series. The Miliolites therefore act as good reservoir for shallow groundwater. Water occurs in the Miliolite limestone under water-table conditions. Recharge to this formation, is affected mainly by direct precipitation over these porous formations, and by influent seepage from perennial and other ephemeral streams. Recharge is also affected by applied irrigation water. Dug wells piercing Miliolite limestone are numerous, each irrigating a small plot of land of 2 to 5 acres. The hydraulic gradient is towards the Arabian Sea.

Discharge of groundwater from the infiltration limestones is mainly affected by withdrawal of water for irrigation and other uses by dug-wells or dug cum-bore wells and by evapo-transpiration. Dug-wells in the Miliolite limestone are generally 10 x 10 feet. They yield on an average about 15,000 gallons per day. Most of the wells, using, mechanical pumps for lifting water, are however, capable of yielding 50,000 gallons per day. Such wells are commonly seen between Varaval, Chorwad, Mangrol and Sil and north of Degam and Kolikhara.

The chemical quality of water in Miliolite limestone is generally good. The average chloride content ranges from 150-250 parts per million. The total hardness and bicarbonates are comparatively high. The hardness-range, during winter season, is between 200 and 300 parts per million, while the bicarbonate range is between 300 and 400, during the same period. Close to the sea however, the Salinity increases. Although the chloride content increases considerably, the bicarbonates and hardness do not seem to increase in the same proportion.

WATER IN DWARKA BEDS - Dwarka beds are composed of yellow gypseous clays below and foraminiferal sandy limestone above, water in Dwarka beds occurs mainly under water-table conditions. Recharge to this formation is affected mainly by rain water percolating through its

porous formations exposed in the central part of the Okhamandal, comprising the localities of Gadhechi – Kalianpur - Dhraśanvel.

Groundwater moves towards the Arabian Sea in the west and to the Okha Rann in the east. The central part thus forms a groundwater mound. Discharge is affected by withdrawal of water for industrial and irrigational purposes. Some groundwater seepages are seen towards East around Charakla and Tupni in the vicinity of the Okha Rann. Such seepages and evapo-transpiration appear to contribute much to the discharge of groundwater. Because of the clayey nature of the formations and the narrow stretch of sandy limestone exposed to recharge, the rocks of the Dwarka beds are generally poor aquifers. The average diameter of wells in this rock series is approx. 10 feet.

The chemical quality of water in the rocks of Dwarka series is generally poor. They are high in Chloride content (average range between 500 and 700 parts per million). The bicarbonates range between 400 and 600 parts per million. Close to creeks and to the Rann, the quality of water deteriorates considerably.

WATER IN GAJ SERIES - The rocks of the Gaj series consist of yellow and brown limestone, clays and grits often nearly and gypsiferous. Water in the rocks of this series occurs both under confined and water-table conditions. Recent drilling results have shown that the deeper aquifers yield meager supplies of groundwater; the quality of water is extremely saline. Recharge to this formation is affected by rain water percolating through its granular beds, exposed northward close to Deccan Trap boundary. Since the upper granular beds are immediately underlain by impervious clay beds of fairly good thicknesses, the deeper permeable beds of the Gaj hardly get any recharge. Moreover the area, over which they are exposed to recharge, is restricted only to a few miles (about 2 to 4). The upper granular beds however, get good recharge through rain and through infiltration from perennial and ephemeral streams. The movement of the groundwater is to the south and south-west, towards the Arabian Sea. In the absence of reduced level data, the magnitude of the hydraulic gradient could not be determined.

Discharge of groundwater from the Gaj beds is mainly affected by withdrawal of water for irrigation and other uses. The upper granular bed of the Gaj series, consisting of limestone and grit, is a good aquifer, for shallow groundwater.

WATER IN ALLUVIUM - The alluvial deposits of this region invariably yield highly saline water-unsuitable for irrigation or domestic uses. As such, wells are very rare in this area. Water for domestic use is generally drawn from the nearby stream, if any, or from the village pond. Very few of the wells are used for irrigation purposes. Small scale irrigation is done only locally from wells located on the banks of perennial or ephemeral streams. Because of the clayey nature of alluvium, recharge is poor.

The groundwater development in the area is mainly through dug wells, dug cum bore wells, bore wells and tube wells. The district can be broadly divided into two units. The major area is covered by hard rock formation i.e. Deccan traps. Groundwater development in this area is by dug well

and bore wells. The yield ranges from 80-150 lpm in dug wells and 60-300 lpm in bore wells. The soft rock formation in the district has limited resources. The discharge in these formation ranges from 200-300 lpm in dug well zone and 200-400 lpm in tube well zones. The yield potential and suitability of drilling techniques is given below:

Taluka	Wells feasible	Drilling Technique	Depth of Well	Discharge (Liters per minute)
Dwarka, Kalyanpur, Jodiya	Dug Wells	Manual	10-25	200-300
	Tube Wells	Direct Rotary, Reverse Rotary	50-100	200-400
Jamnagar, Khambaliya, Lalpur, Kalawad, Jam Jodhpur, Bhanvad, Dhrol, Kalyanpur	Dug Wells	Manual	10-25	80-150
	Bore Wells	Down the Hole Hammer	100-200	60-300

The hydro-geological map of area is shown in **Figure 5.1**.

GROUNDWATER RESOURCES OF THE AREA

Devbhoomi Dwarka district was created from Jamnagar district on August, 2013. Groundwater assessment was done in year 2011 for the area. The groundwater resources potential as on March 2011 of Jamnagar district and stage of groundwater development are presented in **Table 5.1**. It may be observed from the table that all the assessment units (Talukas) fall under safe category and the stage of groundwater development of the district on an average is 64.21%.

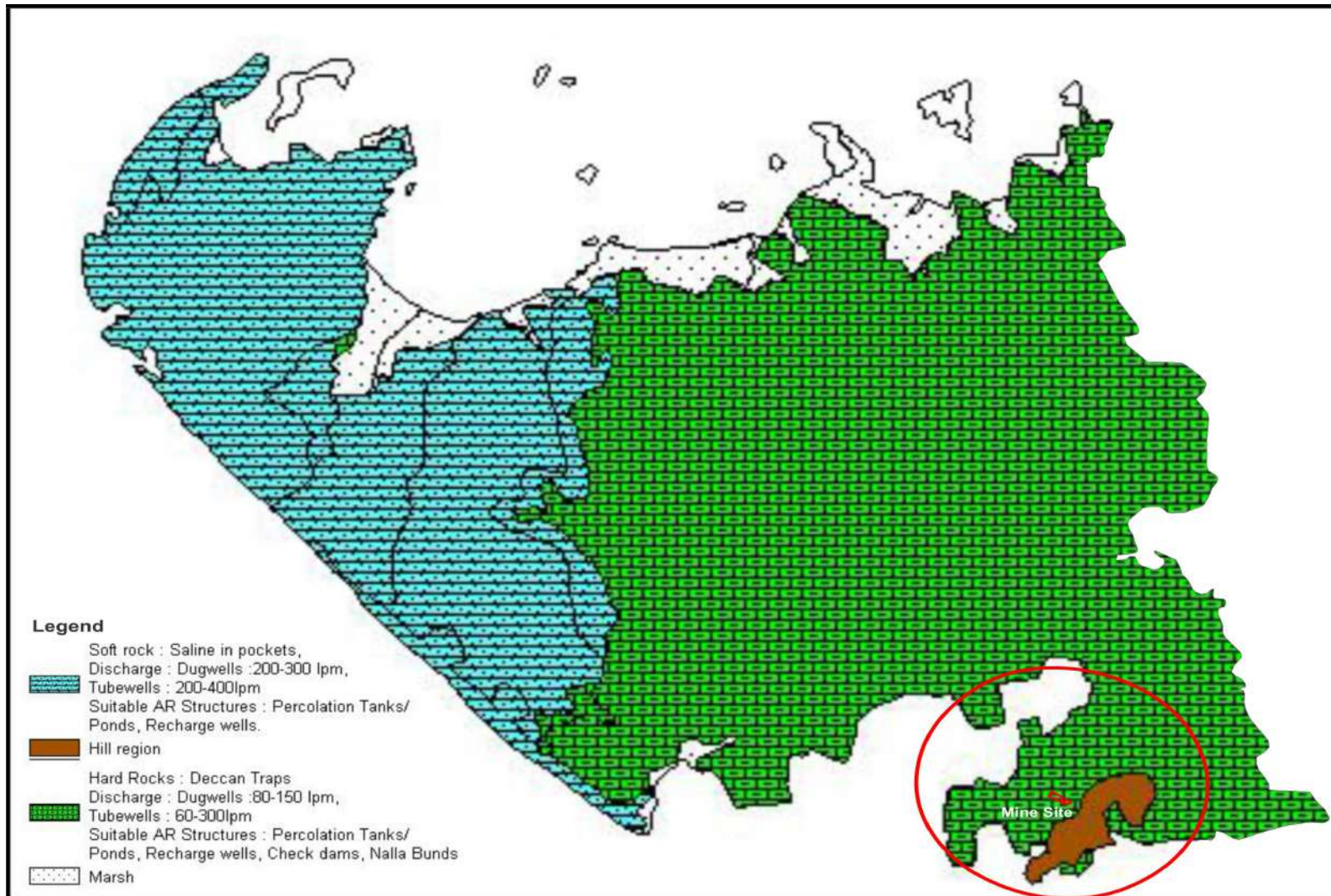


Figure 5.1: Hydro-geological Map showing Groundwater Potential of Various Formations (Source: GSI)

Table 5.1: Groundwater Availability, Utilization and Development Stage

Taluka	Net Groundwater Availability (Ham)	Annual Groundwater Draft (Ham)			Projected Demand for Domestic and Industrial Uses (Ham)	Groundwater Availability for Future Irrigation (Ham)	Groundwater Development Stage (%)
		Irrigation	Domestic and Industrial Uses	Total			
Dhrol	5871.12	3332.20	113.00	3445.20	152.00	2386.92	58.68
Bhanvad	9198.72	4769.70	331.00	5100.70	444.00	3985.02	55.45
Jodiya	4435.87	2660.00	147.00	2807.00	198.00	1577.87	63.28
Jamnagar	11805.99	6473.40	1443.00	7916.40	1934.00	3398.59	67.05
Kalyanpur	7198.64	4176.30	486.00	4662.30	652.00	2370.34	64.77
Khambhalia	10046.96	6038.30	633.00	6671.30	847.00	3161.66	66.40
Kalavad	12610.65	8066.30	412.00	8478.30	552.00	3992.35	67.23
Jamjodhpur	12536.55	7730.70	355.00	8085.70	476.00	4329.85	64.50
Lalpur	9449.7	5891.90	307.00	6198.90	412.00	3145.82	65.60
Okhamandal	2359.02	1273.40	273.00	1546.40	366.00	719.62	65.55
Total	85513.26	50412.20	4500.00	54912.20	6033.00	29068.06	64.21

5.2 DEPTH OF GROUNDWATER

Groundwater in the area is being tapped up to 100 m depth. However, in general it is being exploited up to 50 m depth. Depth wise occurrence of groundwater has been classified into three zones namely shallow (< 8m), moderately deep (8 to 20m) and deep (> 20m). These zones have been collated and correlated with the geology of the area.

Groundwater occurs at shallow depth near coast in the Holocene sediments, Miliolite limestone, Dwarka and Gaj limestone. Landward ground water occurs at moderate depth in Deccan basalt, and also in Dwarka and Gaj limestone. Groundwater at deeper levels in pockets is encountered in the Deccan basalt area along the major lineaments, dykes and faults due to deep percolation of water. These features are aligned in NNW-SSE direction. A generalized depth to water map of district is shown in **Figure 5.2**.

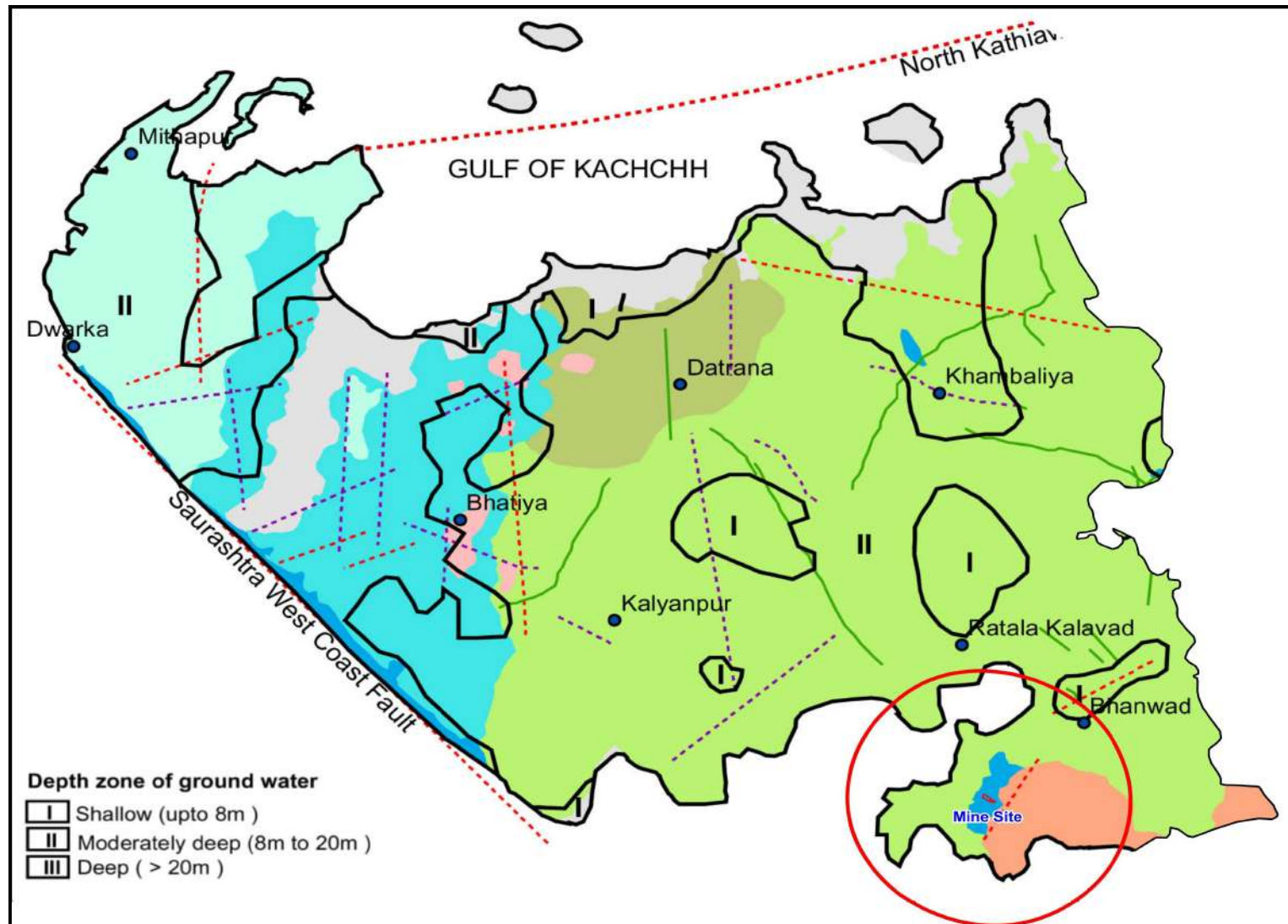


Figure 5.2: Map showing Depth Zone of Groundwater in and around Study Area (Source: GSI)

5.3 HYDROGEOLOGY OF STUDY AREA/GROUNDWATER LEVEL MONITORING

Groundwater occurs in water table as well as semi-confined and confined conditions. Underground water occurs and flows along pore-spaces, cracks, fissures, shears, faults, cavities and other openings within the country-rocks and its availability for the water supply depends mainly on the porosity and permeability of the rocks in which they occur. The distribution of groundwater in a region depends on the nature and structure of rocks and soils forming the country. Recharge of ground water depends on the drainage basin area, precipitation and infiltration rate.

Infiltration rate depends on the lithology, slope and drainage characteristics. The area is having low precipitation, limited drainage length and poor infiltration rate. Basalt in general is poor ground water aquifer but at places due to secondary permeability it forms good groundwater potential zones. Deccan basalt province generally yields fresh ground water. In this area at shallow depth groundwater occurs in weathered tholeiite basalts, dissected by joints and having interconnected vesicular cavities. It also occurs at deeper levels along the sheared and weathered permeable contacts of basaltic flows. Picrite basalt forms relatively poor aquifer. The acid igneous rocks (granophyre, granite porphyry and rhyolite) are relatively less weathered and jointed, therefore, form poor ground water source in the area. Storage capacity of basalt is very less. Groundwater at depth occurs along major discontinuities (shears, joints and faults). Ground water in Bhatiya Formation occurs at shallow depth along the contact of basalt and overlying laterite. This water is not potable due to its brackish nature.

Gaj Formation (limestone, marl and gypseous clay) is having multiple aquifers. In general groundwater in this formation is brackish due to the inherent salinity of rocks. However, ground water at shallow depth (4 to 6 m) is fresh generally after monsoon due to displacement and replenishment of saline water by the rain water along joints and shears. The discharge rates in this formation are poor.

Ground water in Dwarka Formation (flaggy and well jointed limestone) is potable but the discharge rates are poor.

Rocks of Miliolite Formation (porous and permeable limestone and calcareous sandstone) form good aquifers with moderately high discharge rates (2000 to 5000 lph). Ground water in this formation occurs along porous and permeable rock mass and interconnected cavities. Miliolite limestone patches occurring in inland areas yields good quality of water whereas near coast it is brackish due to sea water intrusion.

Low discharge rate (<2000 lph) has been observed in the western part of the area occupied by Tertiary sediments. Moderate (2000 to 5000 lph) to high discharge rate (>5000 lph) rates (liters per hour) have been noticed in the wells located in tholeiitic basalt whereas the area covered by picrite basalt is having low discharge rate indicating that picrite basalt is relatively less permeable.

The Gaj and Dwarka limestone overlying the Deccan basalt are having low discharge rate (< 2000 lph). Sharp change from high to low discharge rate is noticed from basaltic terrain to the limestone terrain. Contrary to this Miliolite limestone along coast and in isolated patches in river valleys show high discharge rate due to its permeable nature (**Figure 5.3**).

A detailed groundwater level monitoring has been carried out during February, 2018 at about 21 different locations within buffer zone from existing dug wells and bore wells and the same was taken into account for depth to water level status. The ground elevation of monitoring locations in the buffer zone of proposed limestone mine project is varying from minimum 24 m amsl to maximum 128 m amsl respectively (**Table 5.2**). Photographs showing groundwater level monitoring are presented in **Figure 5.4**. Depth to water table at different places in buffer zone was found to vary between 4.6 m bgl to 22 m bgl indicating water table to be moderately deep at most of the places. However, in and around proposed mine site, depth to water level is ranging between 16 m to 22 m bgl. Groundwater contour map has been prepared and represented in **Figure 5.5**. Based on contour map, it is observed that water table is generally moderately deep along the Barda foot hills, while relatively shallow towards plains. A clear pattern is observed when the same has been interpolated with respect to mean sea level (**Figure 5.6**).

The surface drainage/flow direction is towards Vartu River in the north/north-west direction, merges with Sorti River before draining itself into Arabian Sea. The shape of the water table contours is perpendicular to the Vartu River. The highest water table elevation contour of observed locations in the area is 110 meters above mean sea level. The overall flow direction in buffer zone is from south/south-east to west/north-west west direction with hydraulic gradient towards sea or almost parallel to coastline.

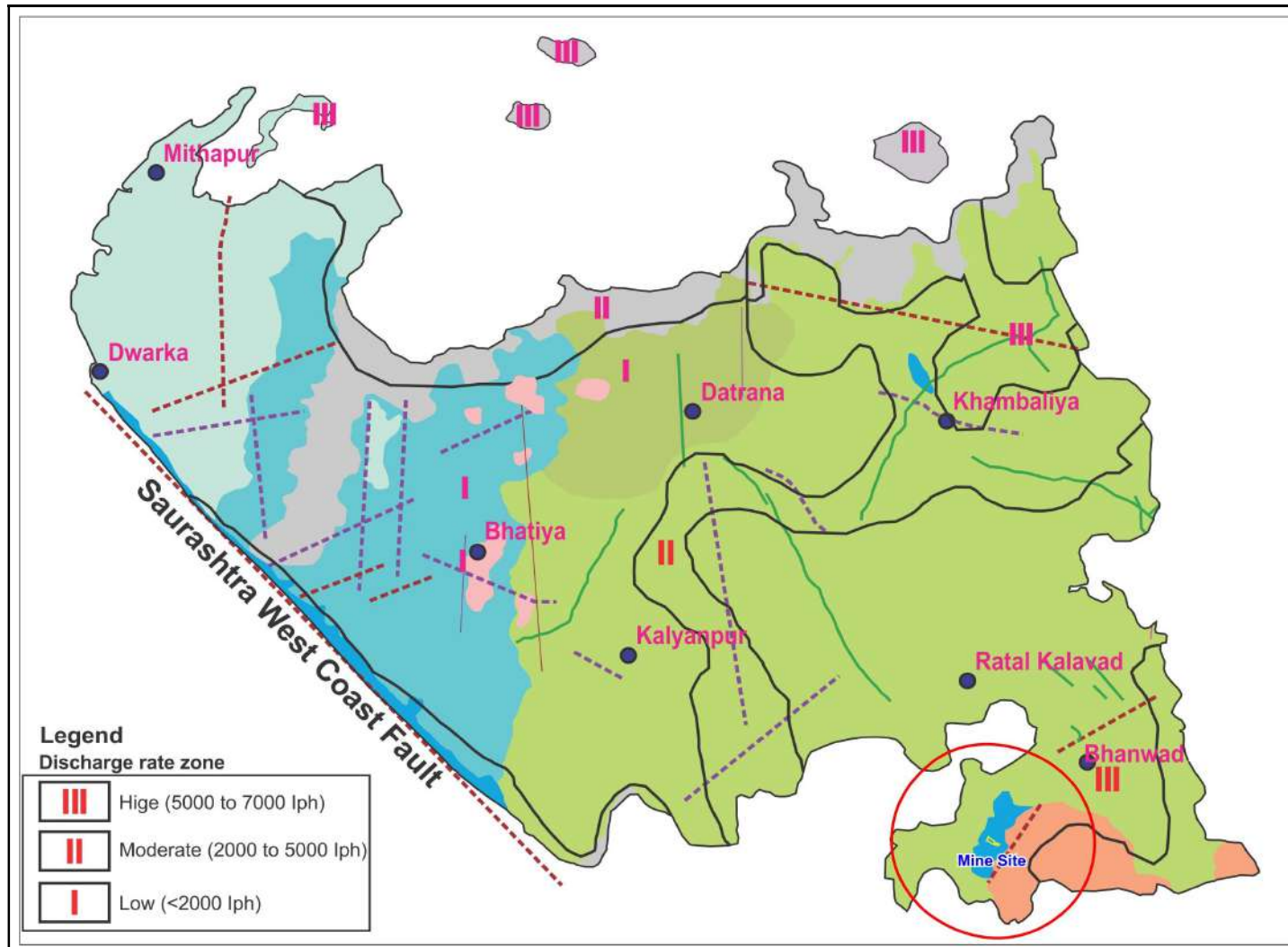


Figure 5.3: Map Showing Groundwater Potential of Various formations in the District Dev Bhoomi Dwarka

Table 5.2: Details of Groundwater Level Monitoring in Buffer Zone, Shri Digvijay Cement Company Limited, Dev Bhoomi Dwarka

S.No.	Location	Latitude			Longitude			Type of Well	Water Level (m bgl)	Elevation (m amsl)	Water Level (m amsl)
1	Mine Site (6.64.89 Ha)	21	53	43.6	69	43	7.0	Open Well	15.9	66	50.1
2	Mine Site (67.17.37 Ha)	21	52	43.5	69	42	0.7	Bore Well	15.5	81	65.6
3	Pachhtardi	21	51	37.5	69	40	56.5	Open Well	15.8	70	54.2
4	Dhebar	21	53	35.6	69	42	5.0	Open Well	12.6	60	47.4
5	Mokhana	21	54	1.2	69	44	37.5	Open Well	11.1	72	60.9
6	Jharena	21	54	35.3	69	40	43.3	Open Well	4.9	32	27.1
7	Bhavneswar	21	53	2.7	69	41	31.5	Open Well	16.1	64	47.9
8	Rojhda	21	48	51.0	69	37	24.9	Open Well	16.2	28	11.8
9	Bhanvad	21	55	30.4	69	47	4.4	Open Well	4.6	56	51.5
10	Bhenakvad	21	54	39.9	69	43	29.9	Open Well	11.7	54	42.3
11	Nagka	21	49	1.0	69	39	40.4	Open Well	15.3	62	46.7
12	Barda Hills	21	51	10.8	69	42	23.0	Bore Well	18.0	128	110.0
13	Pachhtar	21	51	41.8	69	41	25.9	Open Well	16.6	78	61.4
14	Dhebar	21	54	1.6	69	42	42.3	Open Well	15.0	52	37.0
15	Bhenakvad	21	54	37.8	69	43	16.7	Open Well	10.6	51	40.4
16	Pachhtardi	21	51	19.6	69	40	54.2	Open Well	15.7	71	55.3
17	Gadu	21	51	15.2	69	39	15.6	Open Well	15.0	45	30.0
18	Hathla	21	51	8.2	69	36	54.0	Open Well	10.0	26	16.0
19	Morana	21	52	31.5	69	37	2.9	Open Well	7.7	24	16.3
20	Paravada	21	53	18.9	69	39	32.9	Open Well	8.1	36	27.9
21	Pachhtar Mine	21	51	24.3	69	41	32.4	Drilling well	22.0	87	65.0



Figure 5.4: Monitoring of Groundwater Regime in Study Area, Shri Digvijay Cement Company Limited, Devbhoomi Dwarka

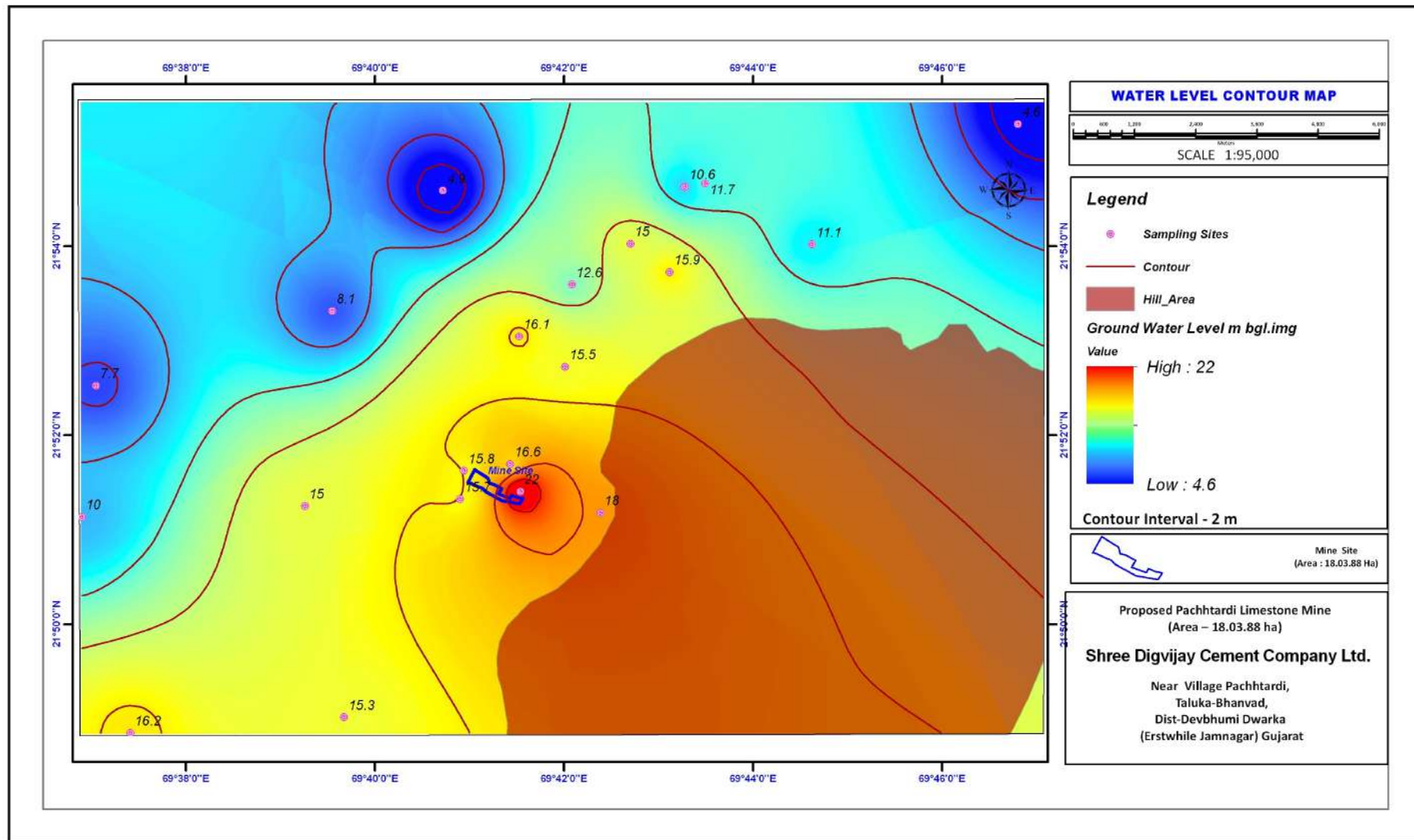


Figure 5.5: Water Level Pattern (Depth to Water Level) in Buffer Zone, Shri Digvijay Cement Company Ltd., Devbhoomi Dwarka

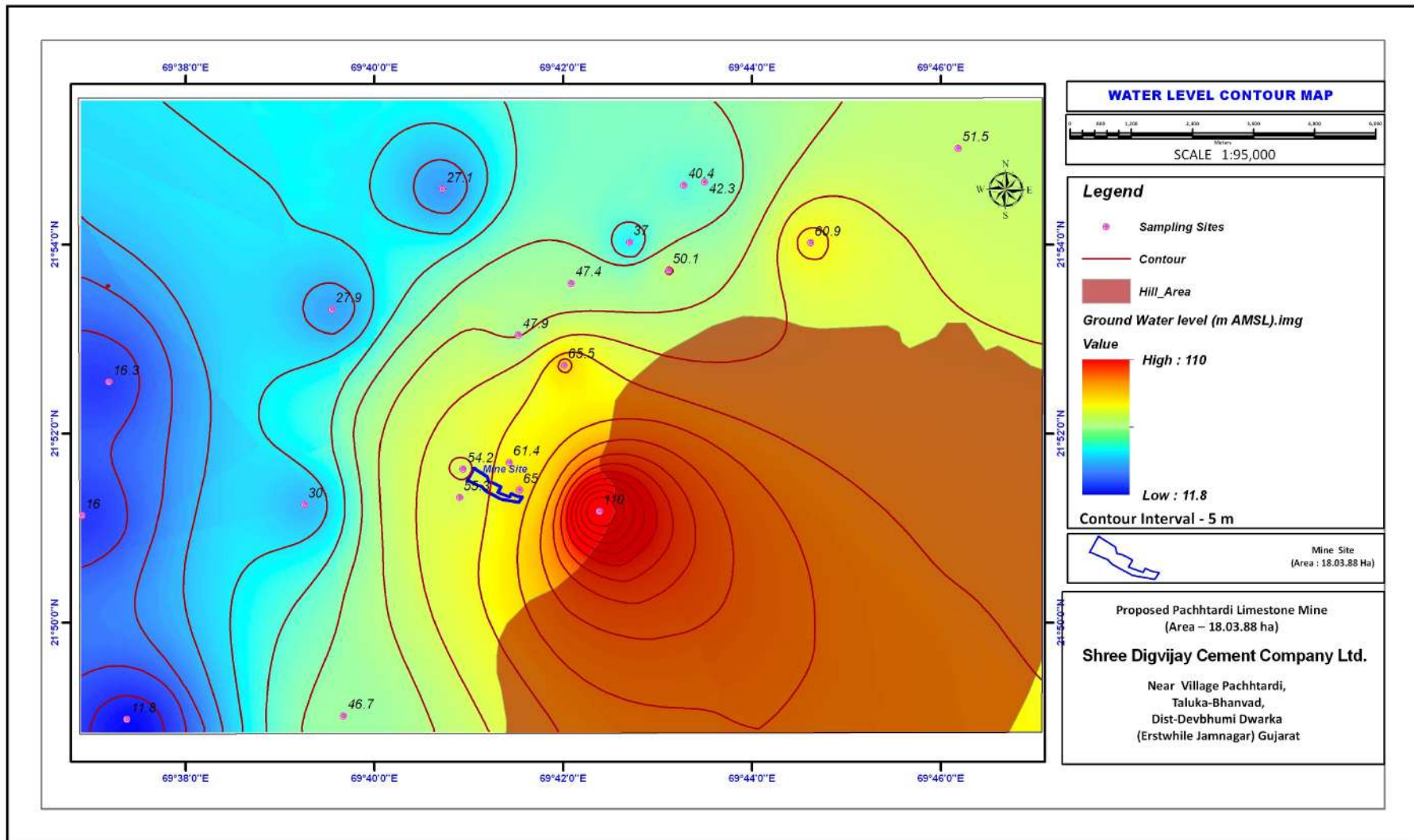


Figure 5.5: Water Table Pattern (above mean sea level) in Buffer Zone, Shri Digvijay Cement Company Ltd., Devbhoomi Dwarka

5.4 GROUNDWATER QUALITY

The quality of groundwater in the shallow aquifers is studied from the analytical results of groundwater samples collected from shallow dug wells whereas water quality of deeper aquifers are deciphered from the analytical data of samples from bore/tube wells. The salinity of groundwater is normally measured in terms of its Specific Electrical Conductance (EC) and Chloride (Cl) content.

Primary sources of potable water in the area are mainly dug wells, shallow/deep bore wells. Groundwater samples were collected from the available water resources in and around mine site area. The samples were collected and tested from ten different representative sites through bore wells and dug wells. Details of groundwater sampling locations and their distance as well as directions are given in the **Table 5.2** and **Figure 5.7** while results are presented in **Table 5.3**.

Table 5.3: Location of Groundwater Sampling Stations

S. No.	Sampling Station	Distance & direction from Mine
W1	Mine site area of 18.0388 ha	-
W2	Village Dhebar	~4.0 km (NNE)
W3	Village Bhaveshwar	~2.5 km (North)
W4	Near Village Mokhana	~7.0 km (NNE)
W5	Village Bhanakvad	~7.0 km (NNE)
W6	Near Village Pachhtardi	~1.5 km (SW)
W7	Village Rojhda	~7.5 km (SW)
W8	Village Jharera	~5.5 km (NNW)

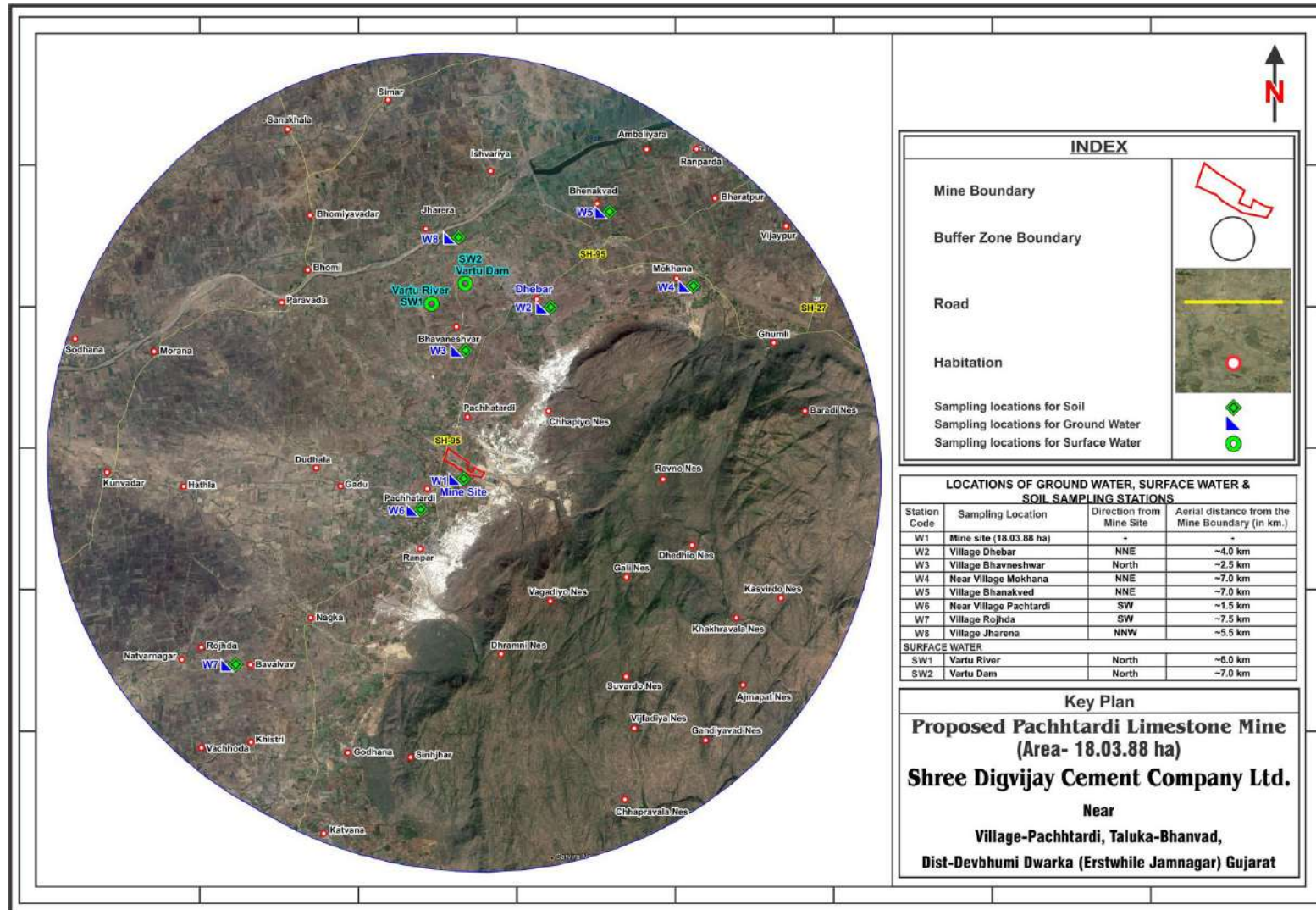


Figure 5.7: Locations of Groundwater Quality Monitoring, Shree Digvijay Cement Company Limited, Devbhoomi Dwarka

TABLE 5.4: Groundwater Analysis, Study Period – Winter Season (December, 2017 to February, 2018)

S. No	Parameters	Unit	Mine Site of Area 18.0388Ha	Village Dhebar	Village Bhavneshwar	Specification as per IS 10500- 2012	
						Requirement (Acceptable Limit)	Permissible Limit (Max.)
1.	pH (at 25°C)	-	7.85	7.56	7.93	6.5-8.5	No Relaxation
2.	Colour	Hazen Unit	BDL (DL 5Hazen)	BDL (DL 5Hazen)	BDL (DL 5Hazen)	5	15
3.	Turbidity	NTU	BDL (DL 1.0 NTU)	BDL (DL 1.0 NTU)	BDL (DL 1.0 NTU)	1	5
4.	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6.	Total Hardness as CaCO ₃	mg/l	210.52	248.24	324.62	200	600
7.	Calcium as Ca	mg/l	40.04	46.49	68.94	75	200
8.	Alkalinity as CaCO ₃	mg/l	108.50	264.60	294.00	200	600
9.	Chloride as Cl	mg/l	68.75	142.93	102.10	250	1000
10.	Cyanide as CN	mg/l	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	0.05	No Relaxation
11.	Magnesium as Mg	mg/l	26.88	32.14	37.09	30	100
12.	Total Dissolved Solids	mg/l	284.00	485.00	540.00	500	2000
13.	Sulphate as SO ₄	mg/l	22.42	17.85	35.84	200	400
14.	Fluoride as F	mg/l	0.26	0.12	0.21	1	1.5
15.	Nitrate as NO ₃ -N	mg/l	10.32	2.44	13.95	45	No Relaxation
16.	Iron as Fe	mg/l	0.06	BDL (DL 0.05 mg/l)	BDL (DL 0.05 mg/l)	1.0	No Relaxation
17.	Aluminium as Al	mg/l	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	0.03	0.2

Hydro-geological study Report of Shree Digvijay Cement Company Ltd. for Proposed Pachhtardi Limestone Mine (Area- 18.03.88 ha) with Production Capacity of Limestone 0.35 Million TPA At Survey No 78/p, Village: Pachhtardi, Taluka: Bhanvad, District: Devbhumi Dwarka (erstwhile Jamnagar)(Gujarat)							
Hydro-geological study Report							

18.	Boron	mg/l	BDL (DL 0.20 mg/l)	BDL (DL 0.20 mg/l)	BDL (DL 0.20 mg/l)	0.5	1
19.	Phenolic Compounds	mg/l	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	0.001	0.002
20.	Anionic Detergents as MBAS	mg/l	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	0.2	1
21.	Chromium as Cr	mg/l	BDL (DL 0.002 mg/l)	BDL (DL 0.002 mg/l)	BDL (DL 0.002 mg/l)	0.05	No Relaxation
22.	Zinc as Zn	mg/l	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	5	15
23.	Copper as Cu	mg/l	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	0.05	1.5
24.	Manganese as Mn	mg/l	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	0.1	0.3
25.	Cadmium as Cd	mg/l	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	0.003	No Relaxation
26.	Lead as Pb	mg/l	BDL (DL 0.008 mg/l)	BDL (DL 0.008 mg/l)	BDL (DL 0.008 mg/l)	0.01	No Relaxation
27.	Arsenic as As	mg/l	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	0.01	0.05
28.	Mercury as Hg	mg/l	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	0.001	No Relaxation
29.	Sodium as Na	mg/l	4.00	73.5	60.82	--	--
30.	Potassium as K	mg/l	1.20	0.53	0.42	--	--
31.	Nickel	mg/l	BDL (DL 0.005 mg/l)	BDL (DL 0.005 mg/l)	BDL (DL 0.005 mg/l)	0.02	No Relaxation
32.	Conductivity	µs/cm	448.00	760.00	845.00	--	--
33.	Hexa Chromium as Cr ⁺⁶	mg/l	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	--	--
34.	Phosphate as Po ₄	mg/l	BDL(DL0.02mg/l)	BDL(DL0.02mg/l)	BDL(DL0.02mg/l)	--	--

S. No	Parameters	Unit	Village Mokhana	Village Bhanvad	Village Pachhtardi	Village Rojhada	Village Jharena	Specification as per IS 10500- 2012	
								Requirement (Acceptable)	Permissible Limit (Max.)

								Limit)	
1.	pH (at 25°C)	-	7.98	7.88	7.15	7.59	7.68	6.5-8.5	No Relaxation
2.	Colour	Hazen Unit	BDL (DL 5Hazen)	BDL (DL 5Hazen)	BDL (DL 5Hazen)	BDL (DL 5Hazen)	BDL (DL 5Hazen)	5	15
3.	Turbidity	NTU	BDL (DL 1.0 NTU)	BDL (DL 1.0 NTU)	BDL (DL 1.0 NTU)	BDL (DL 1.0 NTU)	BDL (DL 1.0 NTU)	1	5
4.	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
5.	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
6.	Total Hardness as CaCO ₃	mg/l	144.85	380.32	1070.65	320.2	330.4	200	600
7.	Calcium as Ca	mg/l	46.62	134.13	296.80	104.21	104.21	75	200
8.	Alkalinity as CaCO ₃	mg/l	115.40	204.00	163.80	240.80	201.60	200	600
9.	Chloride as Cl	mg/l	135.87	127.62	756.40	122.52	161.26	250	1000
10.	Cyanide as CN	mg/l	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	0.05	No Relaxation
11.	Magnesium as Mg	mg/l	6.93	11.10	80.22	14.63	17.11	30	100
12.	Total Dissolved Solids	mg/l	358.00	502.00	1456.00	486.00	475.00	500	2000
13.	Sulphate as SO ₄	mg/l	18.41	33.56	114.43	22.15	16.24	200	400
14.	Fluoride as F	mg/l	0.45	0.60	0.36	0.33	0.29	1	1.5
15.	Nitrate as NO ₃ -N	mg/l	2.34	9.43	9.01	6.30	4.33	45	No Relaxation
16.	Iron as Fe	mg/l	BDL (DL 0.05 mg/l)	BDL (DL 0.05 mg/l)	BDL (DL 0.05 mg/l)	0.11	BDL (DL 0.05 mg/l)	1.0	No Relaxation
17.	Aluminium as Al	mg/l	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	0.03	0.2
18.	Boron	mg/l	BDL (DL 0.20 mg/l)	BDL (DL 0.20 mg/l)	BDL (DL 0.20 mg/l)	BDL (DL 0.20 mg/l)	BDL (DL 0.20 mg/l)	0.5	1
19.	Phenolic Compounds	mg/l	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	0.001	0.002
20.	Anionic Detergents as	mg/l	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	0.2	1

	MBAS								
21.	Chromium as Cr	mg/l	BDL (DL 0.002 mg/l)	BDL (DL 0.002 mg/l)	BDL (DL 0.002 mg/l)	BDL (DL 0.002 mg/l)	BDL (DL 0.002 mg/l)	0.05	No Relaxation
22.	Zinc as Zn	mg/l	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	5	15
23.	Copper as Cu	mg/l	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	BDL (DL 0.02 mg/l)	0.05	1.5
24.	Manganese as Mn	mg/l	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	BDL (DL 0.10 mg/l)	0.1	0.3
25.	Cadmium as Cd	mg/l	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	0.003	No Relaxation
26.	Lead as Pb	mg/l	BDL (DL 0.008 mg/l)	BDL (DL 0.008 mg/l)	BDL (DL 0.008 mg/l)	BDL (DL 0.008 mg/l)	BDL (DL 0.008 mg/l)	0.01	No Relaxation
27.	Arsenic as As	mg/l	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	BDL (DL 0.0005 mg/l)	0.01	0.05
28.	Mercury as Hg	mg/l	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	BDL (DL 0.001 mg/l)	0.001	No Relaxation
29.	Sodium as Na	mg/l	55.01	39.15	41.37	33.04	25.60	--	--
30.	Potassium as K	mg/l	0.36	0.40	0.86	0.37	0.55	--	--
31.	Nickel	mg/l	BDL (DL 0.005 mg/l)	BDL (DL 0.005 mg/l)	BDL (DL 0.005 mg/l)	BDL (DL 0.005 mg/l)	BDL (DL 0.005 mg/l)	0.02	No Relaxation
32.	Conductivity	µs/cm	565.00	784.00	2265.00	762.00	748.00	--	--
33.	Hexa Chromium as Cr ⁺⁶	mg/l	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	BDL (DL 0.03 mg/l)	--	--
34.	Phosphate as Po ₄	mg/l	BDL(DL0.02mg/l)	BDL(DL0.02mg/l)	BDL(DL0.02mg/l)	BDL(DL0.02mg/l)	BDL(DL0.02mg/l)	--	--

BDL – Below Detectable Limit, DL - Detection Limit

The ground water analysis for all the 8 sampling stations shows that the pH of collected water samples varied from 7.15 to 7.98. Total hardness varied from 144.85 mg/l to 1070.65 mg/l. Total dissolved solids varied from 284.0 mg/l to 1456.0 mg/l. The water samples contain chloride from 68.75 to 756.40 mg/l, SO₄ varied from 16.24 to 114.43 mg/l, Ca from 40.04 to 296.80 mg/l, Mg varied from 6.93 to 80.22 mg/l.

Some of the parameters like Turbidity (NTU) (DL 1.0 NTU), Cyanide as CN (DL 0.02 mg/l), Aluminium as Al (DL 0.03 mg/l), Boron (DL 0.20 mg/l), Phenolic Compounds (DL 0.001 mg/l), Anionic Detergents as MBAS (DL 0.02 mg/l), Hexa Chromium as Cr+6 (DL 0.03 mg/l), Zinc as Zn (DL 0.1 mg/l), Copper as Cu (DL 0.02 mg/l), Manganese as Mn (DL 0.10 mg/l), Cadmium Cd (DL 0.0005 mg/l), Lead as Pb (DL 0.008 mg/l), Arsenic as As (DL 0.0005 mg/l), Mercury as Hg (DL 0.001 mg/l), Chromium as Cr (DL 0.002 mg/l), Phosphate as PO₄ (mg/l)(DL 0.02 mg/l) & Nickel as Ni (DL 0.005 mg/l) were analysed and not detected. Other than the above, Total Coliform & E-Coli were absent in the samples analysed.

- No adverse impact on water quality is envisaged due to the proposed mining project as there is no surface water body exists within the lease area and no waste water will be discharged out side lease boundary.

CHAPTER-6

GROUNDWATER RESOURCES EVALUATION

6.1 GROUNDWATER RESOURCES EVALUATION

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

1. Dynamic Groundwater Resources
2. Static Groundwater Resources

6.2 DYNAMIC GROUNDWATER RESOURCES

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

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

6.3 GROUNDWATER RESOURCES IN THE CORE ZONE

The proposed limestone mine covers about 18.03.88 ha (0.18 sq.km.) of land. The main source of groundwater recharge is due to rainfall by direct percolation.

6.3.1 RECHARGE DUE TO RAINFALL

(a) By Groundwater Table Fluctuation Method

In the core zone, dominant geological formations are Porbandar formation consisting of Miliolitic Limestone and Marl formation. Limestone is soft, porous and friable in nature but also compact, hard and bouldary at many places. Average specific yield can be taken as 2.5% for such formations while seasonal fluctuation is taken as 3 m. Recharge due to rainfall computed by specific yield and water table fluctuation method is as follows:-

$$R_{r1} = A \times Sf \times Sy$$

Where,

$$R_{r1} = \text{Recharge}$$

$$A = \text{Area}$$

$$Sf = \text{Seasonal Fluctuation}$$

$$Sy = \text{Specific Yield}$$

Here,

$$A = 18.03 \text{ Hectare}$$

$$Sf = 3 \text{ m}$$

$$\begin{aligned} S_y &= 2.5\% \\ R_{r1} &= 18.03 \text{ Ha} \times 2.5\% \times 3 \text{ m} \\ &= 0.18 \text{ sq.km.} \times 0.025 \times 3 \\ &= 0.014 \text{ mcm/annum} \end{aligned}$$

(b) By Rainfall infiltration factor method

In the area where groundwater level monitoring is not adequate in space and time, rainfall infiltration method may be adopted. The groundwater estimation committee, Govt. of India (2009) has suggested norms for recharge from rainfall under various hydro-geological conditions. Rainfall infiltration factor has been taken as 8% for geological formation as prevailing in study area, Devbhoomi Dwarka district.

$$\begin{aligned} R_{r2} &= \text{Area} \times \text{Rainfall} \times \text{RI factor} \\ \text{Rainfall} &= 742 \text{ mm (annual rainfall, 2004-2017)} \\ \text{RI factor} &= 8\% \\ \text{Area} &= 18.03 \text{ Hectare} \\ \\ R_{r2} &= 18.03 \text{ Ha} \times 742 \text{ mm} \times 8\% \\ &= 0.18 \text{ Sq.km.} \times 0.742 \text{ m} \times 0.08 \\ &= 0.011 \text{ mcm/annum} \end{aligned}$$

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

The difference between the two is 0.003 mcm/annum or 26.3%, thus the rainfall recharge for normal monsoon is to be taken as 1.2 times, the value estimated by rainfall infiltration factor method i.e. 0.013.

It shows that $R_r = 0.013 \text{ mcm/annum}$

6.3.2 TOTAL DYNAMIC RESERVES OF CORE ZONE

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

$$R_r = 0.013 \text{ mcm/annum}$$

6.3.3 GROUNDWATER DRAFT OF CORE ZONE

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

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

Where,

D_t = Total Groundwater Draft

D_i = Groundwater Draft for irrigation in the area

D_d = Groundwater draft for domestic use

D_{in} = Groundwater Draft for industrial use

D_w = Groundwater Draft for irrigation and Domestic use

D_{et} = Groundwater Draft by way of evapo-transpiration

D_o = Groundwater Draft as out flow from Confined aquifer

Here,

Total Groundwater Draft- Total water requirement for the proposed mining project including mine operations, drinking and domestic purposes, dust suppression and green belt development etc. shall be about 22 KLD (cum/day) which will be sourced initially from groundwater and in later stages, mine sump water as and when developed. Therefore, proposed groundwater draft within the core zone for project activities is given below.

$$D_t = 6600 \text{ Cum/annum (based on 300 mine working days)}$$

Net recharge of core zone is 0.013 mcm/annum while net draft is coming almost 0.006 mcm/annum. Groundwater development stage in the core zone will be about 46% than the total groundwater recharge; hence it is coming under safe category.

6.4 GROUNDWATER RESOURCES FOR BUFFER ZONE

Area of buffer zone is coming about 339.10 sq.km. as per land use-land cover map. This buffer zone has mainly Miliolite Limestone and Marl formation of Porbandar group and Granophyres, Felsite and Basaltic flows of Deccan Volcanics formation which acts as principal aquifers in the area. Rainfall is the principal source of groundwater but seepage from surface water bodies, return flow from applied irrigation as well as infiltration factor also plays a significant role in raising the groundwater level.

Geographical area, specific yield and infiltration index are the parameters for determining the amount of water which is stored in the aquifer.

6.4.1 RECHARGE DUE TO RAINFALL

(a) BY GROUNDWATER TABLE FLUCTUATION METHOD

The buffer zone has Limestone and Marl of Porbandar Group along with Felsite, Granophyres and Basaltic flows of Deccan Volcanics as main aquifer; groundwater recharge occurs due to these formations. It has been observed that average seasonal fluctuation of water table is varying between 2 to 4 m in limestone while more than 4 m in Deccan traps/Basaltic flows. At an average level, it can be taken as 3 m for limestone and 4 m for Deccan traps. On an

average, specific yield can be taken as 2.5% for limestone and 3% for Deccan traps. Recharge due to rainfall in the buffer zone computed by specific yield and water table fluctuation for different formations as given below:

Groundwater Recharge by Porbandar formation= Area x SF x Sy

$$= 69.67 \text{ sq.km.} \times 3 \text{ m} \times 2.5\%$$

$$= 69.67 \times 3 \times 0.025$$

$$= 5.23 \text{ mcm/annum}$$

Groundwater Recharge by Deccan Volcanics= Area x SF x Sy

$$= 269.43 \text{ sq.km.} \times 4 \text{ m} \times 3\%$$

$$= 269.43 \times 4 \times 0.03$$

$$= 32.33 \text{ mcm/annum}$$

$$R_{r1} = 5.23 + 32.33 = 37.56 \text{ mcm/annum}$$

(b) BY RAINFALL INFILTRATION FACTOR

The groundwater recharge can also be roughly estimated by rainfall infiltration method. For geological formations as prevailing in buffer zone i.e. Porbandar Group (Limestone and Marl) and Deccan Volcanics, rainfall infiltration has been suggested as 9% and 12% respectively (GEC, 1997). Recharge due to rainfall in the buffer zone computed by Rainfall infiltration Factor for different formations as given below:

Groundwater Recharge by Porbandar formation= Area x Rainfall x RI Factor

$$= 69.67 \text{ sq.km.} \times 742 \text{ mm} \times 9\%$$

$$= 69.67 \times 0.742 \times 0.09$$

$$= 4.65 \text{ mcm/annum}$$

Groundwater Recharge by Deccan Volcanics= Area x Rainfall x RI Factor

$$= 269.43 \text{ sq.km.} \times 742 \text{ mm} \times 12\%$$

$$= 269.43 \times 0.742 \times 0.12$$

$$= 23.99 \text{ mcm/annum}$$

$$R_{r1} = 4.65 + 23.99 = 28.64 \text{ mcm/annum}$$

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

The difference between the two is 8.91 mcm/annum or 31.1%, thus the rainfall recharge for normal monsoon is to be taken as 1.2 times, the value estimated by rainfall infiltration factor method i.e. 34.37 mcm/annum.

6.4.2 RETURN FLOW FROM APPLIED IRRIGATION

As suggested by the GEC committee, groundwater recharge from the return flow of irrigation water is normally taken as 30% of the total water applied for irrigation in an area consists of limestone and shale. Total groundwater applied for irrigation is 5.78 mcm/annum (see section 6.5.1). Groundwater recharge from the above factors is as under:

$$\begin{aligned} R_{iB} &= 5.78 \times 0.3 \\ &= 1.74 \text{ mcm/annum} \end{aligned}$$

6.4.3 SEEPAGE FROM SURFACE WATER BODIES

As per the land use pattern of the buffer zone, total area under surface water bodies and seasonal water bodies work out to be 10.04 Sq.km. As per the GEC, groundwater recharge through surface water bodies can be taken as 40% of the total water spread area. Hence, groundwater recharge from the above factors is as under

$$\begin{aligned} S_{rB} &= 3.38 \text{ sq.km.} \times 0.4 \\ &= 1.35 \text{ mcm/annum} \end{aligned}$$

6.4.4 TOTAL RECHARGE OF BUFFER ZONE

$$\begin{aligned} R_B &= 34.37 + 1.74 + 1.35 \\ &= 37.46 \text{ mcm/annum} \end{aligned}$$

6.5 GROUNDWATER DRAFT OF BUFFER ZONE

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

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

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

Irrigation water requirement is majorly (more than 80%) fulfilled by groundwater water and within the buffer zone, groundwater draft for irrigation takes place mainly by dug wells and few shallow/deep bore wells. There are about 2194 dug wells and 72 shallow/deep bore wells tapping the aquifer consist of limestone, marl and basaltic formations. These bore wells usually have an average discharge of 60 m³/day. However, dug wells are having a discharge of 20 m³/day (Source: CGWB). The annual draft has been calculated after considering that these structures generally operate for 4 months in a year. The annual groundwater withdrawal from these wells is calculated as-

$$\begin{aligned}\text{Groundwater draft by dug wells} &= 2194 \times 120 \text{ days} \times 20 \text{ m}^3/\text{day} \\ &= 5.265 \text{ mcm/ annum}\end{aligned}$$

$$\begin{aligned}\text{Groundwater draft by bore wells} &= 72 \times 120 \text{ days} \times 60 \text{ m}^3/\text{day} \\ &= 0.518 \text{ mcm/ annum}\end{aligned}$$

$$\begin{aligned}\text{Total groundwater draft due to applied irrigation} &= 5.265 + 0.518 \\ &= 5.78 \text{ mcm/annum}\end{aligned}$$

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

The total population in buffer zone area was around 52,168 according to census figure for 2011 which has increased to 57,054 in 2017 as per population growth rate of 13.38% per decade. Groundwater quality in general is found fit for drinking purposes in major parts of buffer zone including shallow (being recharged by rainfall) as well as deeper aquifer. The same is being utilized to meet domestic/drinking requirements. In and around study area, domestic water supplies are majorly based on groundwater. Considering 10 Liters (0.1 m^3) as domestic use in rural and semi urban area (GEC, 2009), the total groundwater withdrawal for domestic use will be.

$$\begin{aligned}D_{dB} &= 57,054 \times 0.1 \times 365 \\ &= 20,82,471 \\ &= 2.08 \text{ mcm/ annum}\end{aligned}$$

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

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

$$\begin{aligned}D_{lB} &= 2.08 \times 0.05 \\ &= 0.10 \text{ mcm/annum}\end{aligned}$$

6.5.4 DRAFT DUE TO INDUSTRIAL USE (D_{inB})

There are no major industries within 10 km buffer zone. Only one existing limestone mine of Shree Digvijay Cement Company is falling within the 10 km radius namely Pachhtar Mine, along with a number of illegal stone cutting/mining operators. Total water requirement of Pachhtar mine is 10 KLD only being sourced from nearby areas through tanker supplies while a small water quantity for drinking purpose only is needed by these small stone cutter/miners. Therefore, total groundwater withdrawal for industrial use may be considered nil in the area.

$$D_{inB} = \text{NIL}$$

6.5.5 TOTAL DRAFT OF BUFFER ZONE

$$\begin{aligned}D_{tB} &= D_{iB} + D_{dB} + D_{lB} \\ &= 5.78 + 2.08 + 0.10 \\ &= 7.97 \text{ mcm/annum}\end{aligned}$$

Total recharge of the buffer zone is 37.46 mcm/annum while total groundwater draft is 7.97 mcm/annum. The groundwater development in the area is about 21.3% only of the total groundwater recharge. Therefore, buffer zone is coming under Safe category as per groundwater development status indicating basin is surplus in groundwater resources and available for future utilization and development.

6.6 ALLOCATION OF GROUNDWATER FOR DOMESTIC USE FOR FUTURE DEVELOPMENT

Domestic use of population within 10 km radius of project site has been projected for year 2038. Considering population growth percentage @13.38% per decade, population in year 2038 is estimated to be 73,343 persons. Dependency of population in this area is mainly on groundwater drawn through dug wells and shallow/deep bore wells. Considering 100 litres (0.1 m³) as domestic consumption in rural and semi urban area, the total water withdrawal for domestic use will be:

$$D_{dB} = 73,343 \times 0.1 \times 365 \text{ days}$$

$$= 2.68 \text{ mcm/annum}$$

Present draft due to domestic use is 2.08 mcm/annum; hence additional water allocated for future domestic use works out to be 2.68 - 2.08 = 0.60 mcm/annum.

6.7 SUMMARY OF BUFFER ZONE WATER BALANCE

	In MCM/Year
A. Groundwater Recharge in 10 km radius area	
1. Recharge due to Rainfall	34.37
2. Recharge from other sources:	
a) Return Flow from Applied Irrigation	1.74
b) Seepage from Surface Water Bodies	1.35
Gross Recharge	37.46
B. Groundwater Draft in 10 km radius area	
1. Draft due to Applied irrigation	5.78
2. Draft due to Domestic use	2.08
3. Draft due to Livestock	0.10
4. Draft due to Industries	-
Gross Draft	7.97
C. Net Ground Water Available (A-B)	29.49
D. Percentage of Groundwater development	21.3%
E. Category of the area for ground water development	SAFE
F. Allocation for future domestic purpose (in addition to present consumption)	0.60

CHAPTER-7

IMPACT OF MINING ON WATER RESOURCES OF THE AREA

7.1 WATER REQUIREMENT OF LIMESTONE MINE

In the mining operation, the major requirement of water is for the suppression of dust, mostly generated along haul roads, Surface Miner/Dozer Ripper and during excavation. Water shall also be required for plantation and cleaning and washing of mining machineries i.e. excavators, dumpers and surface miner/dozer ripper. Small quantity is required for drinking purpose.

Total estimated water requirement for the proposed mining project will be maximum of 22 KLD (Peak Demand). The water supply shall be sourced initially from groundwater (Proposed bore wells) and surface water from mine pits (accumulated rainwater) later on. No waste water will be generated. Water Balance chart is given in **Figure 7.1**.

Particulars	Quantity in KLD
Dust Suppression	12
Green Belt	4
Drinking and Sanitation	2
Surface Miner/Dozer Ripper	4
Total	22

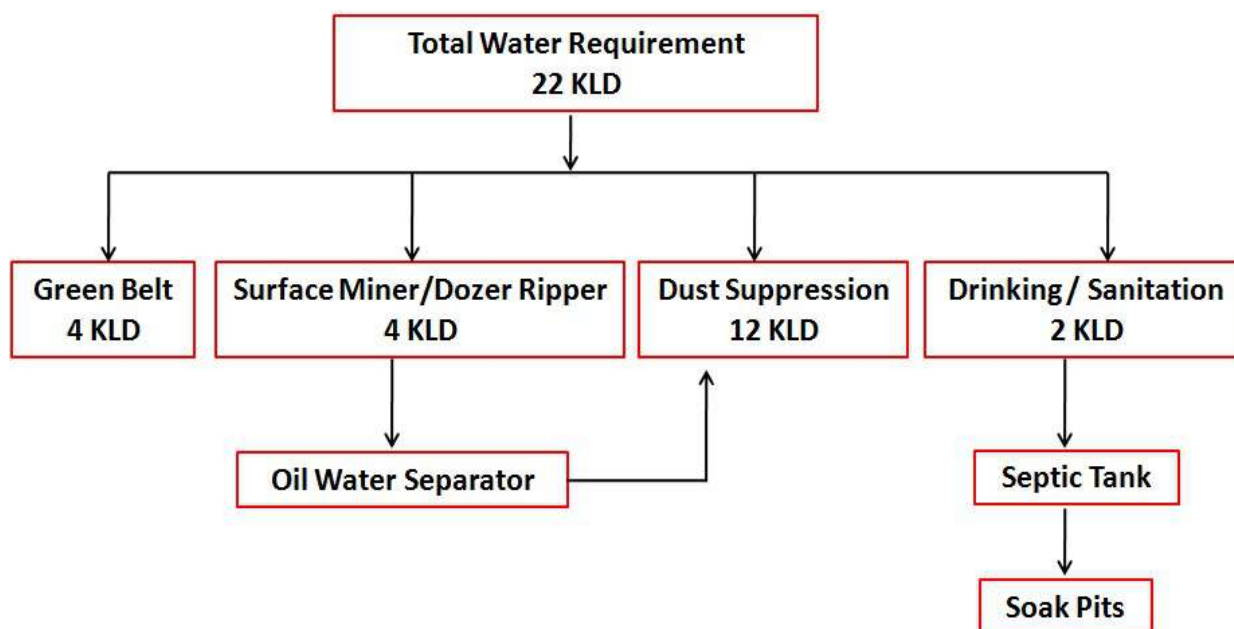


Figure 7.1: Water Balance Chart of Pachhtardi Limestone Mine

7.2 PROPOSED METHOD OF MINING AND YEAR WISE DEVELOPMENT OF MINES

From the uniformity of deposit, observed in the area (bore holes, open wells and old pits) and extensiveness of Milliolitic limestone deposit in the region, limestone reserves in the entire

limestone bearing area up to 15 m depth be considered as proved and further marl reserves up to 4 m depth be considered as proved.

In the lease hold area of Pachhtardi mine, high grade limestone lies over low grade limestone called marl. Marl is having 25 to 30% silica. Though marl is not cement grade limestone but it can be used as a siliceous material. It can be mixed with high grade limestone in a ratio of 10 to 20% depending upon the raw mix. This will help in conservation of high grade limestone and prolong the life of mine.

The mining will be done by fully mechanized method; eco-friendly methods of mining either by deployment of Surface Miner and loader combination or by Ripper dozer and excavator combination. The mine is proposed to be worked in two shifts.

Alternative-I: the surface miner mill the limestone according to its drum capacity of maximum 2.2 meters and maximum cutting depth of 250 mm. the depth of cut will depend upon the characteristics of limestone and capacity of the surface miner. The length of the cut will be maximum 300 meters in one direction depending upon the availability of the area. There will be no boulder generation with surface miner-loader combination.

Alternative-II: with ripper dozer, mining will be done from one end of the deposit. The single shank ripper dozer will be used and the ripped and dozed out material will be loaded by excavator of suitable size in trucks/dumpers. Around less than 1% of big boulders will be left out by excavator in ripper dozer/excavator operation.

It is proposed to carry out mining by developing two number of benches with average height of 7.5 meters from one end of applied area at RL- 100 to 92.5 m and 92.5 m to 85 m in the first and second year, 94 to 86.5 m and 86.5 to 79 m in third year, 92 to 84.5 m and 84.5 to 77 m in the fourth year and 90 to 82.5 m and 82.5 to 75 m and advancing in the west side. A ramp of 1 in 15 gradient is proposed to be made in the first year. Yearly development of mines in proposed plan period has been depicted in **Table 7.1**.

Mining Parameters

Method of mining	Opencast, Fully Mechanized method using HEMM including deep hole drilling and blasting
Bench Height	10 m
Bench Width	Minimum 25-30 m (10 m at the time of closure of mine)
Bench Face Angle	80° from Horizontal (Limestone)
Road Gradient	1:16
Stripping Ratio Waste: Mineral	0.03:1 as no overburden; only soil cover in the area
Number of working days/year	300
Ultimate Pit slope	45° (With 10 m bench height and width and 80° slope of the bench face)

First Year Development and Production

In the first year of mining, a total of two numbers of benches will be developed at RL 100 to 92.5 m and 92.5 to 85 m from one end of the deposit and advancing towards west direction. Total limestone produced in the first year will be 3,48,104 tonnes.

Second Year Development and Production

In the second year of mining, total two numbers of benches will be developed at RL 100 to 92.5 m and 92.5 to 85 m from one end of the deposit and advancing towards west direction. Total limestone produced in the second year will be 3,48,974 tonnes.

Third Year Development and Production

In the third year of mining, total two numbers of benches will be developed at RL 94 to 86.5 m and 86.5 to 79 m and advancing towards the west direction. Total limestone produced in the third year will be 3,43,200 tonnes.

Fourth Year Development and Production

In the fourth year of mining, total two numbers of benches will be developed at RL 92 to 84.5 m and 84.5 to 77 m and advancing towards west direction. Total limestone produced in the third year will be 3,50,400 tonnes.

Fifth Year Development and Production

In the fifth year of mining, total two numbers of benches will be developed at RL 90 to 82.5 m and 82.5 to 75 m and advancing towards west direction. Total limestone produced in the fourth year will be 3,50,400 tonnes.

Conceptual Stage

Ultimate Pit Limits

The conceptual mining limit has been deriving on the basis of geological plan, geological section studies considering slope of working faces and sequence of mine development. The ultimate pit boundary shows the extent of extraction from the area. The ultimate size of the pit at the end of life of mine has been considered that all the reserves up to proved category will be mined out. This area will be the whole area excluding 7.5 m boundary barrier and electric line barrier.

Reclamation and Rehabilitation

Since no over-burden or other material is available in or nearby the applied area for backfilling, therefore the excavated area will be converted into a water reservoir. The fencing will be done around the worked out pit to stop un-authorized entry of human and cattle. Plantation will be done around the excavated area to enhance the aesthetic beauty.

Table 7.1: Mine workings during Five Year Plan Period and up to Conceptual Stage

Year	Bench RL		Pit Length	Pit Width	Bench Height	Excavated Area (Ha)	Cumulative Area (Ha)	Total Production
	Top	Bottom						
1 st Year	100	92.5	118	112	7.5	1.28	1.28	3,48,104
	92.5	85	103	97	7.5			
2 nd Year	100	92.5	125	99	7.5	1.42	2.70	3,48,974
	92.5	85	110	99	7.5			
3 rd Year	94.0	86.5	78	160	7.5	1.26	3.95	3,43,200
	86.5	79.0	65	160	7.5			
4 th Year	92	84.5	190	64	7.5	1.14	5.09	3,50,400
	84.5	77	175	64	7.5			
5 th Year	90	82.5	190	64	7.5	1.22	6.32	3,50,400
	82.5	75	175	64	7.5			

7.3 IMPACT ON TOPOGRAPHY AND DRAINAGE AND SUGGESTIVE MEASURES

Shri Digvijay Cement Company Ltd. (Limestone Mine) having a lease area over 18.3088 hectare which is entirely Government waste land. Regionally, area is having a gently rolling monotonous topography. Regional slope of the area is from north-east towards south-west direction. The general slope of the terrain is towards west and south-west.

The applied mining lease area is having a gentle sloping topography. The elevation range of outcrops of the limestone deposits are in the range of 80 m RL to 102 m RL.

The proposed mining activities shall bring about some changes in topography of the area. However, the same will be restricted to the excavated mine pits only. The ultimate size of the pit at the end of life of mine has been considered that all the reserves up to proved category will be mined out. This area will be the whole area excluding 7.5 m boundary barrier and electric line barrier. Since no over-burden or other material is available in or nearby the applied area for backfilling, therefore the entire excavated area (13.62 Hectare) will be converted into a water reservoir.

No major perennial river/stream is occurs in and around proposed mine site; however, a number of seasonal/ephemeral stream channels are found within buffer zone and are mostly 1st to 3rd order streams. These streams generally get activated during monsoon season. Mining lease is in general free from streams, nallahs; however, a fairly wide (12-15 m width) seasonal nallah is flowing adjacent of lease area along northern boundary in south-east to north-west direction. It carries flow only during rainy season, remains dry for most part of the year. Another seasonal nallah near southern boundary of mining lease also carries run-off water. **A safety barrier of 15**

meter shall be left towards seasonal nallah together with protective bund and plantation all along northern side mine lease boundary.

Natural surface water in the area is limited as monsoonal precipitation is the only source of the surface water. Therefore, earth dams and a number of check dams on the effluent streams/channels have been constructed to store/recharge the surface water.

7.4 IMPACT ON WATER RESOURCES AND ITS QUALITY

7.4.1 IMPACT OF MINING ON SURFACE WATER

All the mining activity proposed to be carried out in next five years will not interfere anywhere with the natural drainage pattern. However, to prevent the entry of surface run-off in the active mining pit, it is proposed to make bund around the pit so that the rainwater will be channelized towards temporary unused pit/water reservoir. Moreover, no stored water shall be released directly to streams; hence no possibility of any siltation in natural streams and reduction of vertical percolation. It is therefore apparent that there is hardly any impact of mining on the surface water regime.

7.4.2 IMPACT OF MINING ON GROUNDWATER

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

Garland drains will be provided all around the excavation to prevent flow of surface rainwater and from surrounding areas in the working pit. The drains shall be lined with stone masonry and shall be of adequate size to carry the storm water without overflow. The rain water which will get accumulated in working pit will be pumped out by diesel pump of adequate capacity. The rainwater accumulated in the excavated out area or in mine sump (proposed to be at 72 mRL during five year plan period) shall be collected and utilized for water spraying on haul roads and other dust prone areas, green belt etc.

According to groundwater table monitoring, water table is moderately deep in and around the applied lease area and depth to water level/major aquifer is occurring between 16 m bgl to 22 m bgl. The mineral availability and depth of mine working will go up to 15 m bgl (77 mRL) in present five year mine plan period and 20 m bgl (72 mRL) at the end of life of mine. Hence, there is no possibility of groundwater table intersection by mine workings during five year plan period, and also up to conceptual stage, the chances of same are very remote. Any significant adverse impacts of mining activities on groundwater regime of the area are not envisaged at all.

7.5 RAINWATER ACCUMULATION IN MINE PITS-YEARWISE DETAILS

Total quantity of rainwater accumulated in mine pits during five year mine plan period and up to conceptual year has been calculated using year wise pit development plans, year wise pit sections for proposed mining and average annual rainfall in the area. This entire water will be available in

excess amount which may be utilized for various purposes in mine activities i.e. dust suppression, green belt development and domestic purposes other than drinking or can be discharged through pump for usage of local villagers.

Total rainwater accumulated in the mine pits during next five years works out to be 0.15 mcm respectively. The daily water availability shall be minimum 13 cubic meters in 1st year and maximum 65 cubic meters in 5th year respectively. The total water requirement for mine activities shall be 22 KLD which shall amount to 0.006 mcm. After 2nd year of mining operations, rainwater accumulated in mine pits shall be able to cater the needs of overall water requirement i.e. 22 KLD even after reduction of annual losses in the form of Evaporation and Groundwater recharge (up to 50%). At the end of life of mine/conceptual stage, rainwater accumulated in area left for water reservoir will be approximately 0.10 mcm/annum.

Year	Excavated Area (Ha)	Depth (m bgl)	Average Annual Rainfall (m)	Annual Rain water Stored (Cum)	Annual Losses (50%) {i.e. Evaporation -30% & Groundwater Recharge - 20%}	Daily Available Rainwater (Cum)
Five Year Mine Plan Period						
I Year	1.28	15	0.752	9,626	4,813	13
II Year	2.7	15	0.752	20,304	10,152	28
III Year	3.95	15	0.752	29,704	14,852	41
IV Year	5.09	15	0.752	38,277	19,138	52
V Year	6.32	15	0.752	47,526	23,763	65
Total				1,45,437	72,718	
Conceptual Stage (Water Reservoir)	1,36,240	20	0.752	1,02,452	51,226	140

7.6 DEWATERING OF MINES

Based on groundwater level monitoring and pattern, during first five year plan period as well as up to Conceptual mine plan, mining will be done above groundwater table. Hence, no groundwater seepage will be occurred. Total water volume to be intercepted in mine pits during five year plan period shall be rainwater accumulation only which needs to be dewatered.

Year	Volume of Rainwater Accumulated (Cum)	Volume of Groundwater Seepage (Cum)	Total Volume to be Dewatered (Cum)
1st Year	9,626	-	9,626
2nd Year	20,304	-	20,304
3rd Year	29,704	-	29,704
4th Year	38,277	-	38,277
5th Year	47,526	-	47,526
Total	1,45,437		1,45,437

= Maximum Rainwater Accumulation in Mine Pits

= 1,45,437 Cum

= 0.15 mcm

7.7 IMPACT ASSESSMENT OF MINING IN THE AREA

There is only one major source of intercepted water in the lease area i.e. Rainwater Accumulation. The overall impact of this component on the quantity of groundwater availability in the area is analyzed as under:

Total Water Availability-

Due to rainwater accumulation in mine pits = 1,45,437 Cum
= 0.15 mcm

Total Water Draft-

Due to water requirement for mining activities @ 22 cum/day for 300 days * 5 years
= 33,000 or 0.033 mcm

Surplus Water Availability = 0.15 mcm – 0.033 mcm
= 0.12 mcm

Above analysis reveals that proposed mining activity in Shri Digvijay Cement Company Limited limestone mine will not cause adverse or negative impact on groundwater resources regarding quantitative aspects.

Apart from that additional recharge through mined out pits/reservoirs would help in improving groundwater regime. It is also proposed that apart from direct rainfall in excavated mine pits, surface runoff from lease area may be diverted to mine pits/unused pits through proper plan of garland drains and settling ponds which would enhance the water availability for various uses. Hence, overall a positive impact on groundwater regime of the area has been envisaged due to mining activities.

CHAPTER-8

RAINWATER HARVESTING PLAN

8.1 RAINWATER HARVESTING

Rainwater harvesting is a technique of collection and storage of rainwater into natural reservoirs or tanks, or the infiltration of surface water into subsurface aquifers (before it is lost as surface runoff). Uses include water for garden, water for livestock, water for irrigation, water for domestic use with proper treatment, and indoor heating for houses etc. In many places, the water collected is just redirected to a deep pit with percolation. The harvested water can be used as drinking water as well as for storage and other purposes like irrigation.

It makes use of a natural resource and reduces flooding, storm water runoff, erosion, and contamination of surface water with pesticides, sediment, metals, and fertilizers. Also, it is an excellent source of water for landscape irrigation, with no chemicals such as fluoride and chlorine, and any dissolved salts and minerals from the soil.

The basic principal of Rainwater harvesting systems is to channelize rainwater from a catchment surface (roof or other raised solid surface), through a distribution system (gutters, downspouts and pipes) and then into storage tank. The storage tank can be above ground or underground and can be made from a variety of materials including plastic and metal. Water storage tanks should be covered to prevent mosquito breeding and to reduce evaporation losses, contamination and algal growth.

8.2 NEED FOR RAINWATER HARVESTING / ARTIFICIAL GROUNDWATER RECHARGE

Rainwater harvesting/Artificial groundwater recharge is to be done to minimize the undesirable effect on groundwater status. It is necessary that groundwater storage of an area must be arranged by rainwater harvesting so that the existence of any industry does not adversely affect the groundwater situation.

The artificial recharge to groundwater aims at augmentation of groundwater reservoir by modifying the natural movement of surface water utilizing suitable civil construction techniques. Artificial recharge techniques normally addresses to following issues –

- (i) To enhance the sustainable yield in areas where over-development has depleted the aquifer.
- (ii) Conservation and storage of excess surface water for future requirements, since these requirements often change within a season or a period.
- (iii) To improve the quality of existing ground water through dilution.
- (iv) To remove bacteriological and other impurities from sewage and waste water so that water is suitable for re-use.

The basic purpose of artificial recharge of ground water is to restore supplies from aquifers depleted due to excessive groundwater development.

The total fresh water requirement for proposed Limestone mine of Shri Digvijay Cement Company Limited is 22 KLD which shall be met out from ground water supplies in initial stages and from mine sump water/accumulated rainwater (as and when developed). Although, the zone in which mine site is falling i.e. Bhanvad taluka, coming under Safe Category (CGWB), yet no significant deficit in groundwater storage in nearby areas. However, rainwater harvesting measures should be practiced for minimizing dependency on groundwater resources as well as betterment and augmentation of natural resources in a long run.

8.3 FACTORS AFFECTING RUN-OFF

Rainfall is the only source of water in the area; rainfall and evapo-transpiration are two major factors controlling the quantum of rainwater available for recharge. The other important factors controlling the natural recharge to groundwater are rainfall intensity, hydro-geological conditions and depth of water level.

i. Rainfall Pattern

District has a hot semi-arid climate. There are three defined seasons. The "hot" season lasts from March to May and is extremely hot and humid, before giving way to the "wet" season with extremely erratic monsoonal rainfall that averages around 630 millimeters (25 in). The "cool" season from October to February remains hot during the day but has negligible rainfall, low humidity and cool nights, so it is by far the most comfortable time of year.

This region is under the influence of South-west monsoon. The average annual rainfall of Devbhoomi Dwarka district is around 742 mm (average of last fourteen years rainfall data from 2004-2017) varying from minimum 367 mm in 2012 to maximum 1506 mm in 2010 (**Figure 8.1**).

The number of rainy days in each year has been computed considering the day having rainfall greater than 2.5 mm is a rainy day.

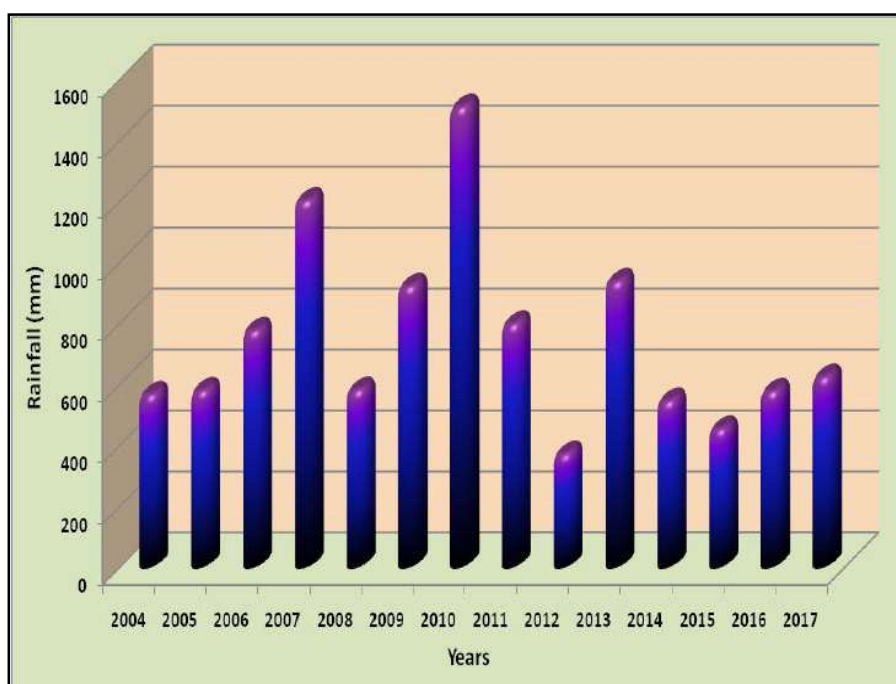


Figure 8.1: Rainfall data of District Devbhoomi Dwarka (2004-2017)

ii. Evaporation Losses

Some of water, which infiltrates during rainy period, is entrapped in the soil and rest of the water is ultimately lost due to potential Evapo-transpiration. The rates of potential Evapo-transpiration (PET) is very high in the area. Thus any rainwater harvesting by indirect techniques should be such that most of the water stored on surface is put to use within the shortest possible time to avoid losses. Temperature profile of district Devbhoomi Dwarka is given in **Table 8.1** and **Figure 8.2**.

Monthly evaporation loss is computed Khosla's Formula $L_m = 0.48 \times T_m$ cm

Where L_m = Evaporation loss (Centimeters)

T_m = Monthly average temperature (°C)

The monthly temperature and evaporation losses are given in the table below:

Table 8.1: Monthly Evaporation Losses

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Max Temp (°C)	25	26	27	29	31	31	30	29	29	30	30	27	
Min Temp (°C)	15	17	21	24	27	27	27	26	25	24	20	16	
Mean Temp (°C)	20.0	21.5	24.0	26.5	29.0	29.0	28.5	27.5	27.0	27.0	25.0	21.5	
Evaporation loss (cm)	9.6	10.3	11.5	12.7	13.9	13.9	13.7	13.2	13.0	13.0	12.0	10.3	147.1

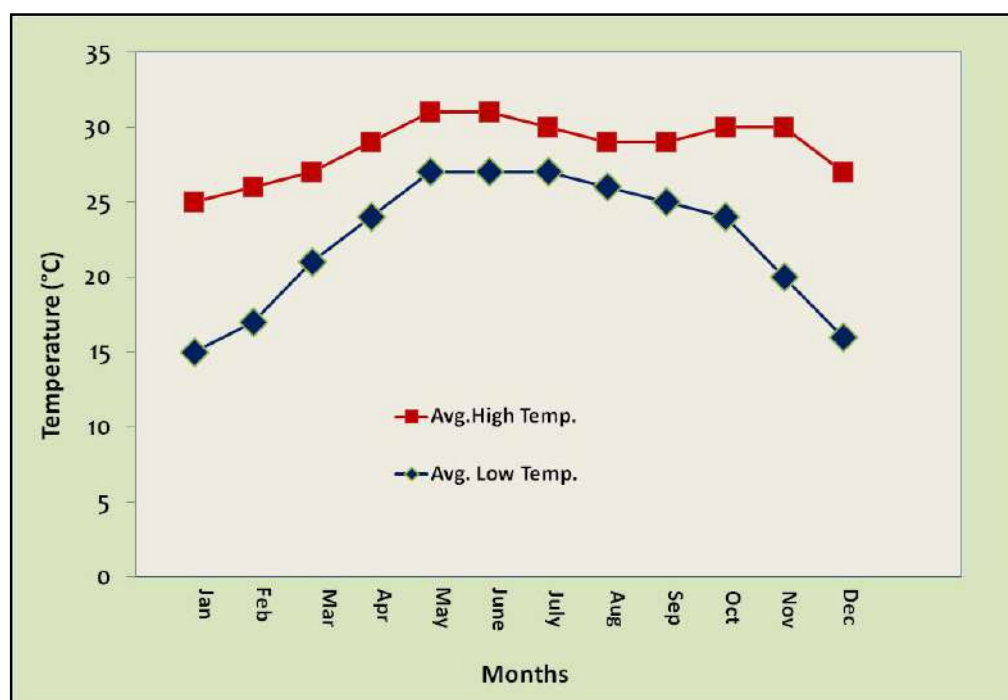


Figure 8.2: Temperature Profile of District Devbhoomi Dwarka

iii. Geological Formation

Hydro-geologically, the study area, area around Shri Digvijay Cement Company Limited is underlain by Miliolitic limestone of Porbandar Group and basaltic flows of Deccan volcanics. Water generally occurs in Milliolute Limestone under water table conditions. Groundwater is circulating through porous limestone through its numerous sinkholes. The most feasible artificial recharge structures in such area may be percolation tanks, spreading ponds, irrigation tanks, check dams etc. Dug wells can also be used for artificial recharge. However, the source water should be properly filtered before being put in the wells.

8.4 RAINWATER HARVESTING/ARTIFICIAL GROUNDWATER RECHARGE OUTSIDE PROPOSED MINE LEASE AREA

Proposed Limestone Mine (ML Area- 18.03.88 Ha) of Shri Digvijay Cement Company Limited is located at village- Pachhtardi, Taluk- Bhanvad, District- Devbhoomi Dwarka, Gujarat. Block Bhanvad is coming under 'Safe' zone as per Central Ground Water Board/Central Ground Water Authority categorization. In case of mining industries (non-water intensive) in safe zone, to withdraw groundwater for project activities, there is no such mandatory requirement of artificial groundwater recharge. However, rainwater harvesting/ artificial groundwater recharge should be undertaken in order to minimizing the negative impacts and for betterment and augmentation of groundwater resources in a sustainable way.

The gross fresh water requirement of proposed mine is 22 KLD or 6,600 cum/annum based on 300 mine working days which shall be sourced from proposed bore wells. As per guidelines by Central Ground Water Authority for groundwater abstraction, industry has to implement artificial

groundwater recharge/rainwater harvesting practices in the same block for augmenting groundwater resources of the area. Therefore, industry has proposed groundwater recharge measures by constructing and rejuvenating a large village pond within the same block.

Geologically, the area is underlain by sub-volcanic acid rocks emplaced within basaltic lava flows of Deccan traps. The Miliolitic limestone formation is practically horizontal bedded and rests unconformably over the traps (basalts) rocks. This limestone deposit is mainly restricted to foot hills of ridge and also along valley portions. The soils are shallow, medium black with average depth as 25 cm. The applied mining lease area is having a gentle sloping topography. The elevation range of outcrops of the limestone deposits are in the range of 80 mRL to 102 mRL. Groundwater in this area is developed through dug wells and shallow/deep bore wells which are used for domestic and agricultural activities both. Groundwater occurs under phreatic or unconfined conditions in limestone and Basaltic rocks and depth to water level is moderate to relatively deep in and around project site i.e. 16-22 m bgl or less in nearby area whereas semi-confined to confined conditions in deeper zones. It is logical that any recharge activity implemented in surrounding areas will raise the water level and surely benefit dug wells and bore wells of the area. SDCCL has taken one large village pond at village Pachhtar about 1.2 km from mine site in north direction which shall store and recharge rainwater runoff from surrounding hilly area during monsoon period (**Figure 8.3**). The catchment area of the pond has been marked based on slope/ gradient of the ground in the vicinity of the natural pond. Water divide for the catchment of the pond is based on flow direction derived from the contour map prepared from the spot height data/contour map of the area (**Figure 8.4**). The area receives an annual rainfall of 742 mm (average of last 14 year annual rainfall data from 2004-2017). After rejuvenating this village pond, the monsoon runoff water from the catchment of the pond shall be collected in the pond for groundwater recharge. Details of approximate artificial recharge to groundwater by proposed recharge pond near village- Pachhtar, Taluka- Bhanvad, District-Devbhoomi Dwarka is described and presented below.

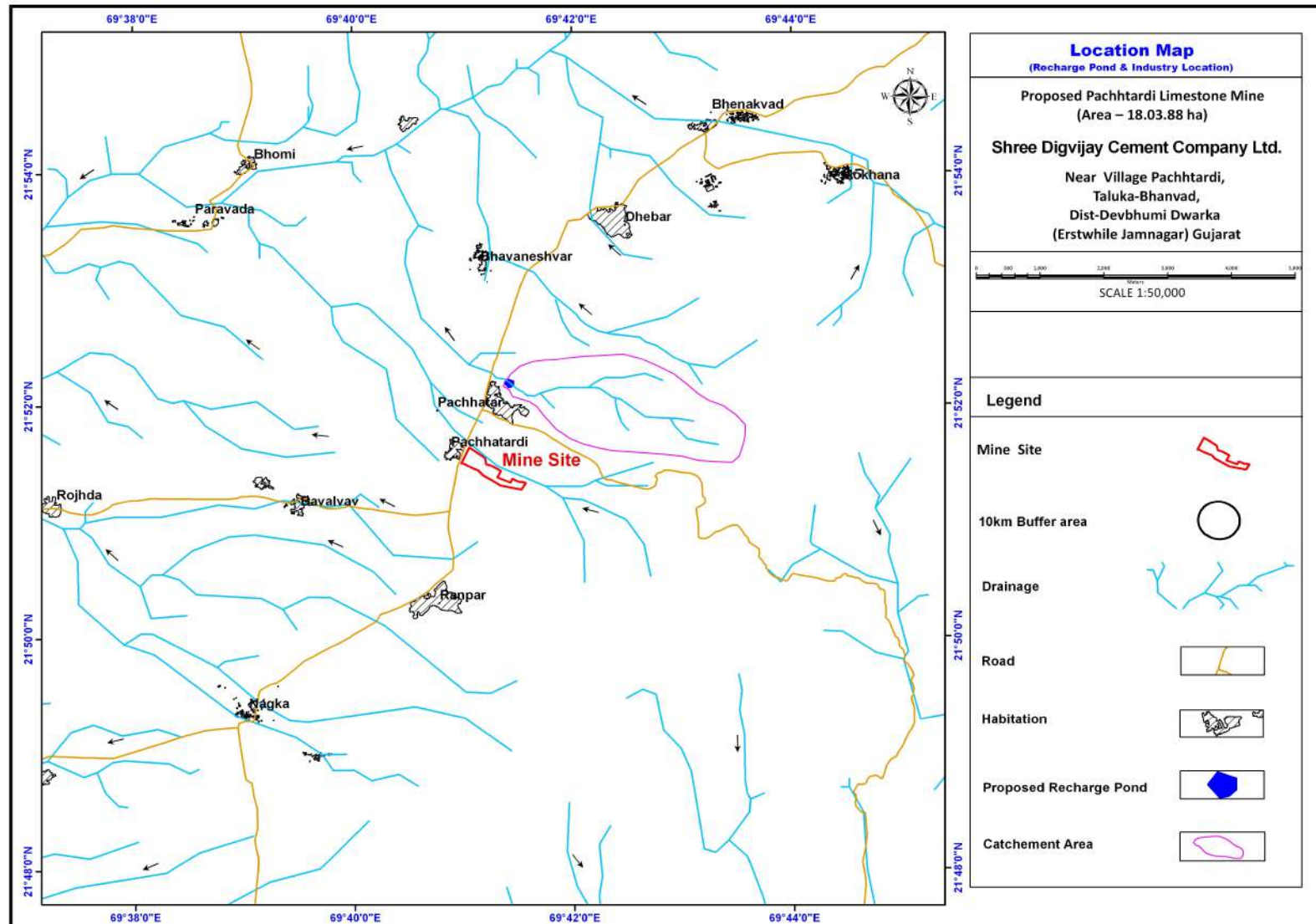


Figure 8.3: Location of Groundwater Recharge Structures vis-à-vis Location of the Mine Site

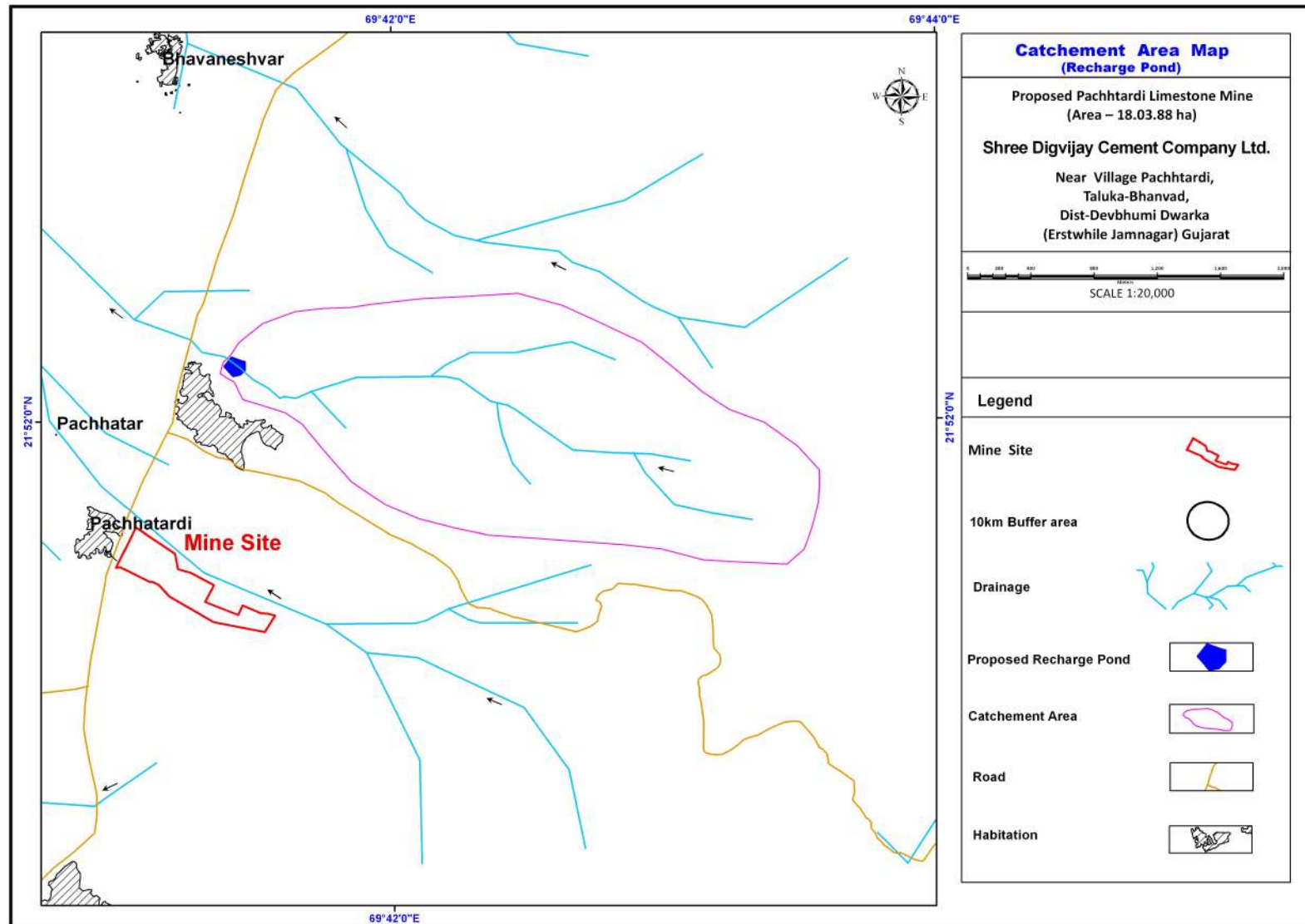


Figure 8.4: Location of Recharge Pond and its Catchment Area at Village Pachhtar

QUANTUM OF NATURAL PERCOLATION FROM RECHARGE POND AT VILLAGE PACHHTAR

Catchment area of pond=3.51 sq.km. (35,10,000 sq.m.)

Spread of Pond= 10,000 sq.m.

Bed of Pond= 80% of Spread area= 8,000 sq.m.

Average depth of pond= 3.0 m

Storage capacity of pond= bed of pond × average depth

8,000 sq.m. × 3 m = 24,000 Cum

Average rainfall in the area= 742 mm

Available water in catchment area= average rainfall × catchment area × 15%

= 0.742 × 35,10,000 × 0.15

= 3,89,550 Cum

- Thus, the water available in the catchment of the pond (3,89,550 Cum) is about **16 times** more than the storage capacity of the pond (24,000 Cum).
- Considering minimum 3-4 fillings of the pond in the monsoon season, the total quantity of water available for recharge would be **96,000 Cum** (24,000 cum × 4 fillings).
- Considering 30% evaporation (Less evaporation rate in Monsoon days due to high humidity) and other losses, quantum of water available for groundwater recharge = 96,000 × 70% = **67,200 Cum/annum**
- Approximate 50% of Stored Water Quantity (67,200 cum/annum) shall be recharged by proposed recharge pond.
- Natural Percolation from recharge pond = 33,600 Cum

Quantity of natural percolation by recharge pond is coming of the order of 33,600 cum/annum. Remaining quantity/run-off available after natural percolation from bed of pond may further recharged by recharge well/injection well in the storage area which shall ensure increase in total recharge or additional recharge.

Recharge well/injection well may be defined as a well that admits water from the surface to fresh water aquifers. The flow in the recharge well is the reverse of a pumping well, but its construction may or may not be the same. If water is admitted into a well, a cone of recharge will be formed that is similar in shape but is the reverse of cone of depression surrounding a pumping well. It is considered that the rainfall water is admitted for recharge into recharge well at ground level. The total depth of recharge well is taken as the depth of water in recharge well (hw₁) for calculation purpose. The equation for the curve can be derived in a similar manner to that for a pumping well. The Radial flow from recharge well penetrating into unconfined aquifer is shown in **Figure 8.5**.

For an unconfined aquifer with water being recharged into a completely penetrating well at a rate Q_R , the approximate steady-state expression is given in Equation 1.1.

$$Q_{rw} = \pi K (h_{w1}^2 - H^2) / \ln (r_o / r_w) \quad (1.1)$$

where, K - hydraulic conductivity in m/day,

h_{w1} - distance between pumping water level and impermeable stratum in m,

h_o - distance between groundwater table and impermeable stratum in m,

r_o - radius of influence circle in m,

r_w - radius of recharge well in m.

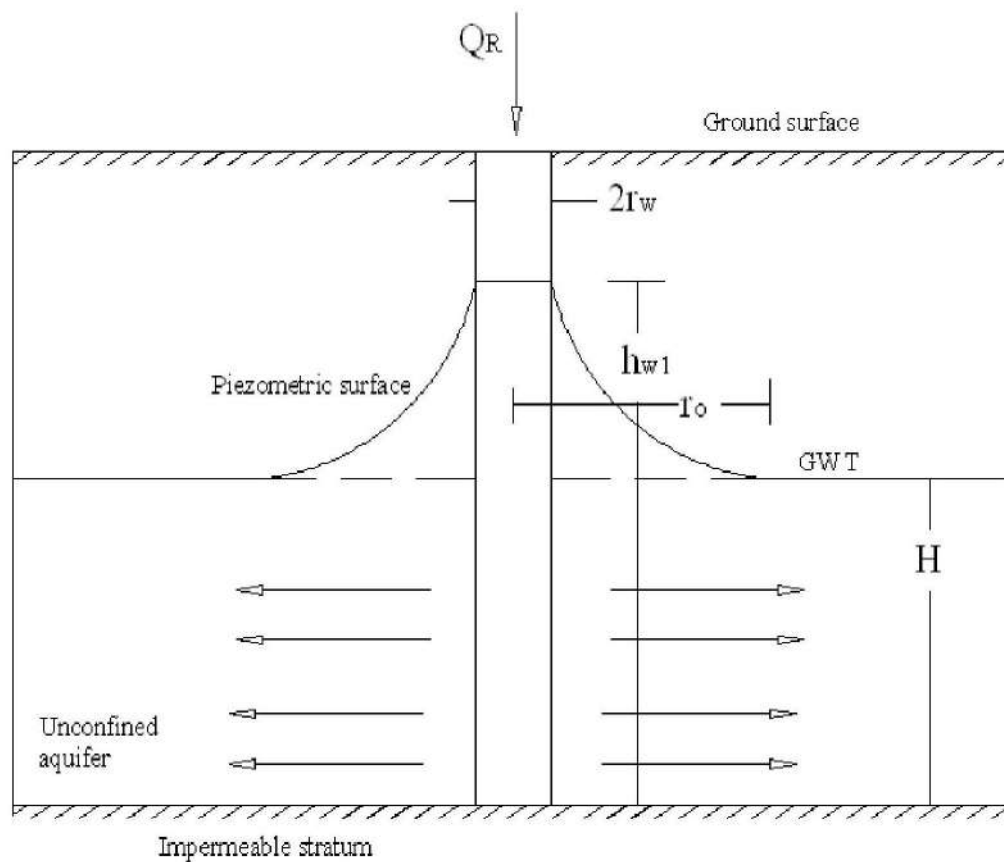


Figure 8.5: Radial Flow from Recharge Well Penetrating into Unconfined Aquifer

A bore of 8 inches diameter dug to a depth of 30 m below ground level (Bed of Pond). 10 mm aggregate is filled up to a height of about 2 m from below. A 6 inches perforated pipe is inserted and top of the pipe is kept higher than the ground level about 2 m. The upper portion of pvc pipe can be used in future for back washing. 10 mm gravel is filled in the bore well. A well type concrete structure is constructed around the shaft above the bed of pond to maintain at least 1.5 m of dead storage. This well type structure is filled with filter media (layers of coarse aggregates, fine aggregates and top as sand). A desilting chamber may be provided before entry into the well so that the water entering the well, loose considerable amount of silt and therefore avoiding frequent clogging. Schematic diagram of proposed recharge shaft is shown in **Figure 8.6**.

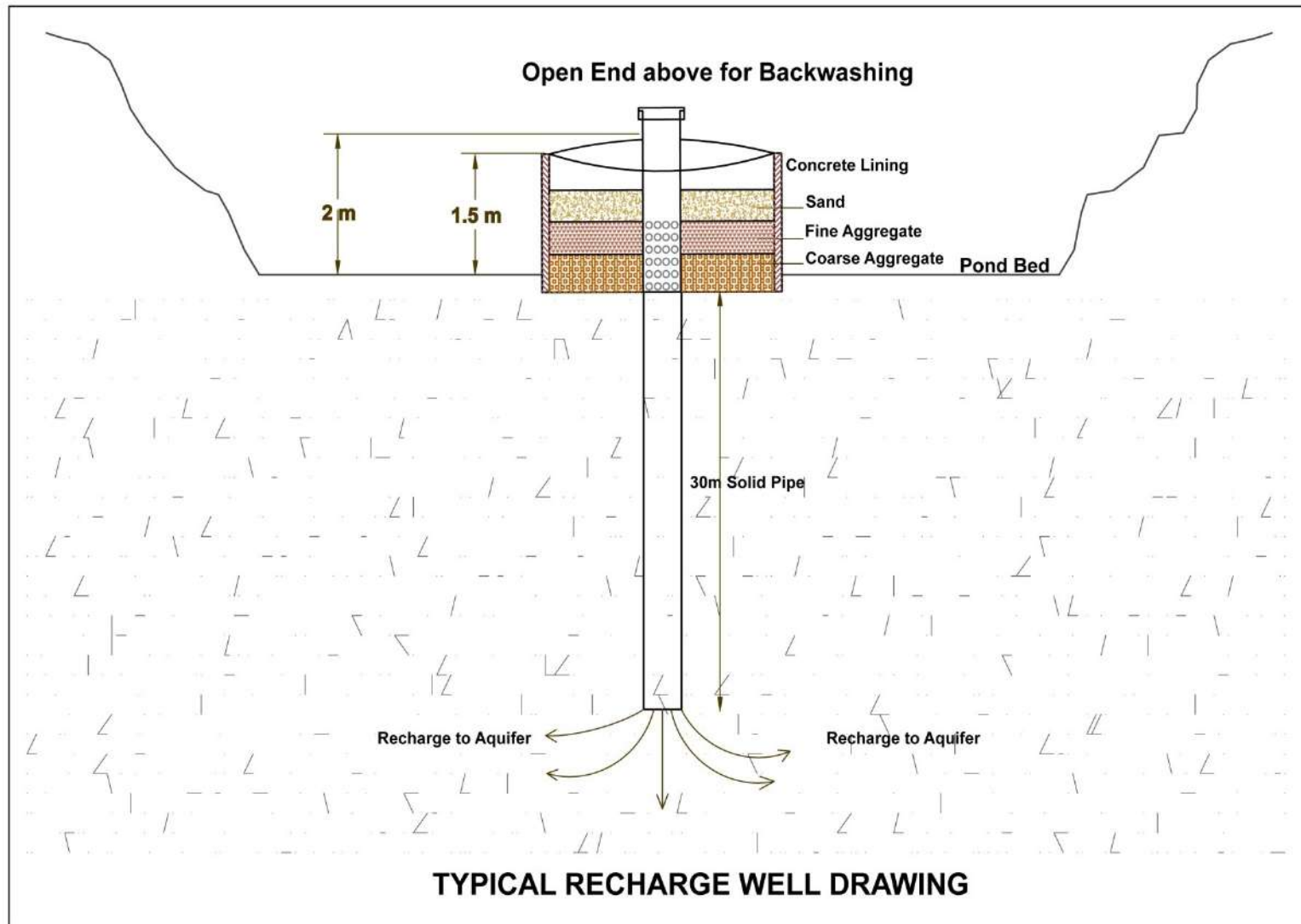


Figure 8.6: Schematic Drawing of Typical Recharge Shaft

Total Groundwater requirement for Mining Project: 22 KLD = 6,600 cum/annum (300 mine working days)

Recharge potential to be created= No Mandatory Quantum for mine industry in Safe Zone

Artificial groundwater recharge proposed = **33,600 Cum or 0.034 mcm**

Therefore, an estimated 33,600 Cum water shall be recharged by one large village pond against no mandatory requirement by Shri Digvijay Cement Company Limited.

SUMMARY AND CONCLUSION

- M/s Shree Digvijay Cement Company Limited has proposed Pachhtardi Limestone Mine (M.L. area- 18.03.88 Ha) with production capacity 0.35 million TPA in order to meet requirement of Limestone for manufacturing of cement in their cement plant situated at Digvijaygram (Sikka), District Jamnagar.
- The study area falls at survey No 78, Village: Pachhtardi, Taluka: Bhanvad, District: Devbhumi Dwarka (Erstwhile Jamnagar) (Gujarat).
- The total water requirement of proposed limestone mine is 22 cum/day i.e. 6,600 cum/annum (considering 300 mine working days) which shall be met initially from groundwater (proposed bore wells) and later on from mine sump water (accumulated rainwater).
- The average annual rainfall of Devbhoomi Dwarka district is around 742 mm (average of last fourteen years rainfall data from 2004-2017) varying from minimum 367 mm in 2012 to maximum 1506 mm in 2010.
- The applied mining lease area is having a gentle sloping topography. The elevation range of outcrops of the limestone deposits are in the range of 80 mRL to 102 mRL.
- No major river/stream occurs in and around proposed mine site area. However, a fairly wide seasonal nallah (12-15 m width) is flowing adjacent of lease area along northern boundary in south-east to north-west direction.
- Regionally, the area comprises a variety of geological formations broadly grouped under hard rocks comprising 'Deccan Traps' and soft rocks comprising 'Tertiaries and Alluvium'.
- The area under investigation comprises a large body of sub-volcanic acid rocks emplaced within basaltic lava flows of Deccan trap. The basaltic flows are highly shattered and intruded by thin dykes and large satellitic bodies of rhyolite and felsites which are thought to be coeval with the main massif of Barda hills.
- In the buffer zone, groundwater occurs under water-table conditions in the different formations of the area. Occurrence of groundwater is based on the process of genesis and fractures/joints/cavities present in the rocks. The weathered and fractured zones present in the rocks provide scope of groundwater occurrence, storage and its movement.
- Basalt in general is poor ground water aquifer but at places due to secondary permeability it forms good groundwater potential zones. Deccan basalt province generally yields fresh ground water. In this area at shallow depth groundwater occurs in weathered tholeiite basalts, dissected by joints and having interconnected vesicular cavities. It also occurs at deeper levels along the sheared and weathered permeable contacts of basaltic flows.
- Rocks of Miliolite Formation (porous and permeable limestone and calcareous sandstone) form good aquifers with moderately high discharge rates (2000 to 5000 lph). Ground water in this formation occurs along porous and permeable rock mass and interconnected cavities. Miliolite

limestone patches occurring in inland areas yields good quality of water whereas near coast it is brackish due to sea water intrusion.

- Depth to water table at different places in buffer zone was found to vary between 4.6 m bgl to 22 m bgl indicating water table to be moderately deep at most of the places. However, in and around proposed mine site, depth to water level is ranging between 16 m to 22 m bgl.
- Based on contour map, it is observed that water table is generally moderately deep along the Barda foot hills, while relatively shallow towards plains.
- The shape of the water table contours is perpendicular to the Vartu River. The highest water table elevation contour of observed locations in the area is 110 meters above mean sea level. The overall flow direction in buffer zone is from south/south-east to west/north-west west direction with hydraulic gradient towards sea or almost parallel to coastline.
- Chemical analysis of groundwater samples reveals that groundwater near project site and buffer zone is not fit for drinking purposes in general as certain major parameters were found within permissible range for drinking water standards. However, the same is being utilized for other domestic purposes.
- For buffer zone (10 km radius) total recharge due to rainfall, irrigation return flow and seepage from surface water bodies works out to be 37.46 mcm/annum. Total discharge due to applied irrigation, domestic and livestock uses works out to be 7.97 mcm/annum. The groundwater development in the area is about 21.3% of total groundwater recharge. Therefore, buffer zone is coming under Safe category.
- Mining activity proposed to be carried out during five year plan period will not interfere anywhere with the natural drainage pattern. Hence, no diversion is required and there is hardly any impact of mining on the surface water regime. Similarly, as no stored water shall be released directly to streams of nearby areas, possibilities of any siltation in natural streams and reduction of percolation is quite less.
- There is no possibility of any land subsidence due to heavy pumping or mining as the rocks are hard, compact, relatively less pervious, which can withstand on its own. Apart from that, there is no heavy pumping for groundwater extraction.
- During present mining plan period, mineral availability and depth of mine working will go up to 15 m bgl while up to 20 m bgl in conceptual period. Therefore, possibility of groundwater table intersection by mine workings is almost nil.
- As mining progresses with time, rainwater will get accumulated in excavated pits which work out to be of the order of 0.15 mcm/annum during five year plan period. Total water availability even after reduction of annual losses i.e. evaporation, groundwater recharge and handling losses, would be approximately 72,718 Cum or 0.073 mcm.
- During five year plan period, within core zone, total water availability (due to rain water accumulation in mine pits) is about 0.15 mcm whereas total water draft (Water requirement for

mine activities) works out to be 0.033 mcm. Surplus water availability would be of the order of 0.12 mcm. Therefore, a positive impact on groundwater regime of the area has been envisaged due to mining activities.

- Shri Digvijay Cement Company Limited has proposed to revive/rejuvenate a large village pond (Area: 10,000 sq.m. and Depth: 3 meter) at Village-Pachhtar, for artificial groundwater recharge purpose. Approximately 33,600 Cum/annum of groundwater is expected to be recharged by this pond through natural percolation.

**Royal****Environment Auditing & Consultancy Service**Plot No. 19 & 20, B/s. The North Star Nest School, Masoom School Road, Mota Mava, RAJKOT - 360 005.
Ph.: +91 9099919954 ■ E-mail : royalenvironment@live.com ■ admin@royalconsultancy.com**Annexure-5**

Ref. No. : 497/04/2023-24

Date:01/05/2023

REPORT OF AMBIENT NOISE LEVEL MEASUREMENT**Name of company : Shree Digvijay Cement Company Limited**

Digvijaygram - 361 140.

District : Jamnagar.

Sampling Date : 18/04/2023

Sr. No.	Location of Sampling	Noise Level Avg. in dB (A)	
Time of sampling		Day Time 06:00 AM to 10:00 PM	Night Time 10:00 PM to 06:00 AM
01.	GOP Mines Adm. Building	58.4	49.7
02.	Chorbedi Mines Adm. Building	55.7	47.5
03.	Pachhtar and Pachhtardi Mines Adm. Building	51.9	43.6

CPCB Standards

Area Code	Category of Area / Zone	Limit in dB(A) Leq.	
		Day Time	Night Time
A	Industrial Area	75.0	70.0
B	Commercial Area	65.0	55.0
C	Residential Area	55.0	45.0
D	Silence Zone	50.0	40.0

Reference : Limits As Per The Noise Pollution Regulation and Control Rules, 2000 Schedule See Rule 3(1) and 4(1).

Instruments used : Sound level meter, model : SL-4030. (LUTRON)

Calibration done on : 04/03/2023

Royal Environment Auditing & Consultancy Service



Analyst



Royal

Environment Auditing & Consultancy Service

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Ref. No. : 498/04/2023-24

Date: 01/05/2023

WORK ZONE NOISE LEVEL MEASUREMENT

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sampling Date : 18/04/2023

Sr. No.	Location of Sampling	dB(A)		
Permissible Limits for 8:00 Hrs.		90 dBA		
CHORBEDI MINES		Inside Cabin	15 Mtr. Away from m/c.	50 Mtr. Away from m/c.
01.	Dozer D8 - N (CAT)	78.6	68.4	65.8
02.	Hyundai - 140 (LC - 9)	79.8	70.3	66.5
03.	Tata - 200 Excavator	80.3	72.8	63.7
Pachhtar and Pachhtardi Mines		Inside Cabin	15 Mtr. Away from m/c.	50 Mtr. Away from m/c.
04.	Dozer BD 355 Dozer(New)	84.2	71.6	65.6
05.	Hyundai - 140 Excavator	78.4	64.8	63.2
06.	Tata - 200 Excavator	76.3	70.4	64.7
GOP MINES		Inside Cabin	15 Mtr. Away from m/c.	50 Mtr. Away from m/c.
07.	Dozer D8 - N (CAT)	84.6	71.3	64.2
08.	Hyundai - 140 (LC - 9)	72.8	67.5	62.4

Instruments used : Sound level meter, model : SL-4030. (LUTRON)

Calibration done on : 04/03/2023

Royal Environment Auditing & Consultancy Service



Analyst



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Ref. No. : 597/05/2023-24

Date:01/06/2023

REPORT OF AMBIENT NOISE LEVEL MEASUREMENT

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sampling Date : 25/05/2023

Sr. No.	Location of Sampling	Noise Level Avg. in dB (A)	
		Day Time 06:00 AM to 10:00 PM	Night Time 10:00 PM to 06:00 AM
01.	GOP Mines Adm. Building	59.4	48.1
02.	Chorbedi Mines Adm. Building	54.6	46.1
03.	Pachhtar and Pachhtardi Mines Adm. Building	50.3	42.3

CPCB Standards

Area Code	Category of Area / Zone	Limit in dB(A) Leq.	
		Day Time	Night Time
A	Industrial Area	75.0	70.0
B	Commercial Area	65.0	55.0
C	Residential Area	55.0	45.0
D	Silence Zone	50.0	40.0

Reference : Limits As Per The Noise Pollution Regulation and Control Rules, 2000 Schedule See Rule 3(1) and 4(1).

Instruments used : Sound level meter, model : SL-4030. (LUTRON)

Calibration done on : 04/03/2023

Royal Environment Auditing & Consultancy Service



Analyst



Royal

Environment Auditing & Consultancy Service

Plot No. 19 & 20, B/s. The North Star Nest School, Masoom School Road, Mota Mava, RAJKOT - 360 005.
Ph.: +91 9099919954 ■ E-mail : royaleenvironment@live.com ■ admin@royalconsultancy.com

Ref. No. : 598/05/2023-24

Date: 01/06/2023

WORK ZONE NOISE LEVEL MEASUREMENT

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sampling Date : 25/05/2023

Sr. No.	Location of Sampling	dB(A)		
Permissible Limits for 8:00 Hrs.		90 dBA		
CHORBEDI MINES		Inside Cabin	15 Mtr. Away from m/c.	50 Mtr. Away from m/c.
01.	Dozer D8 - N (CAT)	77.1	66.4	62.1
02.	Hyundai - 140 (LC - 9)	79.4	69.5	64.2
03.	Tata - 200 Excavator	81.2	71.5	64.5
Pachhtar and Pachhtardi Mines		Inside Cabin	15 Mtr. Away from m/c.	50 Mtr. Away from m/c.
04.	Dozer BD 355 Dozer(New)	83.1	70.8	66.4
05.	Hyundai - 140 Excavator	77.6	63.4	62.8
06.	Tata - 200 Excavator	75.1	69.8	65.4
GOP MINES		Inside Cabin	15 Mtr. Away from m/c.	50 Mtr. Away from m/c.
07.	Dozer D8 - N (CAT)	83.4	70.12	65.7
08.	Hyundai - 140 (LC - 9)	73.1	68.4	61.6

Instruments used : Sound level meter, model : SL-4030. (LUTRON)

Calibration done on : 04/03/2023

Royal Environment Auditing & Consultancy Service



Analyst



Royal

Environment Auditing & Consultancy Service

Plot No. 19 & 20, B/s. The North Star Nest School, Masoom School Road, Mota Mava, RAJKOT - 360 005.
Ph.: +91 9099919954 ■ E-mail : royalenvironment@live.com ■ admin@royalconsultancy.com

Ref. No. : 697/06/2023-24

Date:01/07/2023

REPORT OF AMBIENT NOISE LEVEL MEASUREMENT

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sampling Date : 26/06/2023

Sr. No.	Location of Sampling	Noise Level Avg. in dB (A)	
		Day Time 06:00 AM to 10:00 PM	Night Time 10:00 PM to 06:00 AM
01.	GOP Mines Adm. Building	60.2	44.9
02.	Chorbedi Mines Adm. Building	62.3	43.2
03.	Pachhtar and Pachhtardi Mines Adm. Building	49.8	44.6

CPCB Standards

Area Code	Category of Area / Zone	Limit in dB(A) Leq.	
		Day Time	Night Time
A	Industrial Area	75.0	70.0
B	Commercial Area	65.0	55.0
C	Residential Area	55.0	45.0
D	Silence Zone	50.0	40.0

Reference : Limits As Per The Noise Pollution Regulation and Control Rules, 2000 Schedule See Rule 3(1) and 4(1).

Instruments used : Sound level meter, model : SL-4030. (LUTRON)

Calibration done on : 04/03/2023

Royal Environment Auditing & Consultancy Service



Analyst



Royal

Environment Auditing & Consultancy Service

Plot No. 19 & 20, B/s. The North Star Nest School, Masoom School Road, Mota Mava, RAJKOT - 360 005.
Ph.: +91 9099919954 ■ E-mail : royaleenvironment@live.com ■ admin@royalconsultancy.com

Ref. No. : 698/06/2023-24

Date:01/07/2023

WORK ZONE NOISE LEVEL MEASUREMENT

Name of company : Shree Digvijay Cement Company Limited

Digvijaygram - 361 140.

District : Jamnagar.

Sampling Date : 26/06/2023

Sr. No.	Location of Sampling	dB(A)		
Permissible Limits for 8:00 Hrs.		90 dBA		
CHORBEDI MINES		Inside Cabin	15 Mtr. Away from m/c.	50 Mtr. Away from m/c.
01.	Dozer D8 - N (CAT)	78.2	69.6	61.5
02.	Hyundai - 140 (LC - 9)	77.4	68.4	61.8
03.	Tata - 200 Excavator	73.2	67.6	63.4
Pachhtar and Pachhtardi Mines		Inside Cabin	15 Mtr. Away from m/c.	50 Mtr. Away from m/c.
04.	Dozer BD 355 Dozer(New)	79.6	68.2	62.1
05.	Hyundai - 140 Excavator	78.1	67.2	63.4
06.	Tata - 200 Excavator	74.3	66.1	61.2
GOP MINES		Inside Cabin	15 Mtr. Away from m/c.	50 Mtr. Away from m/c.
07.	Dozer D8 - N (CAT)	79.8	67.8	60.8
08.	Hyundai - 140 (LC - 9)	74.6	65.9	60.9

Instruments used : Sound level meter, model : SL-4030. (LUTRON)

Calibration done on : 04/03/2023

Royal Environment Auditing & Consultancy Service

Rajkot



Analyst

भारत सरकार
खान मंत्रालय
भारतीय खान ब्यूरो
क्षेत्रीय खान नियंत्रक का कार्यालय
माखपुरा औद्योगिक क्षेत्र अजमेर 305002
ई-मेल: ro.ajmer@ibm.gov.in



Government of India
Ministry of Mines
Indian Bureau of Mines
Office of the Regional Controller of Mines.
Makhupura Industrial Area, Ajmer- 305002
Ph-145-2695165 / 2695476 Fax-2695202

सं. 684(4)(1)/MP-295/2020-21-GNR

दिनांक : 28/01/2021

प्रेषित : **M/s Digvijay Cement Company Ltd.**
Digvijaygram,
Sikka,
District-Jamnagar,
Gujarat-361 140
E-mail – anil.nigam@digvijaycement.com

Sub : Approval of Review of Mining Plan along-with Progressive Mine Closure Plan in respect of **Pachhtardi** Mining lease for mineral **Limestone** near village Pachhtardi Tehsil Bhanvad & District **Devbhoomi Dwarka**, Gujarat over an area of 18.0388 hect., Survey No. 78/P (Old) ; 141 & 208 (New) submitted under Rule 17(2) of MCR, 2016 in favour of **M/s Digvijay Cement Company Ltd.**

Ref : 1. Your letters, as received in IBM on 23.11.2020 and 11.01.2021
2. IBM's Scrutiny letter of even no. dated 11.01.2021

Sir,

In exercise of the powers conferred by the clause (b) of sub section (2) of Section 5 of Mines and Minerals (Development & Regulation) Act, 1957 read with Government of India Order number S.O. 445 (E), dated 28.04.87 and Indian Bureau of Mines Gazette Notification S.O. 1872 (E) dated 18th May, 2016, I hereby **APPROVE** the above said Review of Mining Plan. This approval is subject to the following conditions:

- (i) This Review of Mining Plan is approved without prejudice to any other laws applicable to the mine area from time to time whether made by the Central Government, State Government or any other authority and without prejudice to any order or direction from any court of competent jurisdiction.
- (ii) The proposals shown on the plates and/or given in the document is based on the lease map/sketch submitted by the applicant/lessee and is applicable from the date of approval.
- (iii) It is clarified that the approval of your aforesaid Review of Mining Plan does not in any way imply the approval of the Government in terms of any other provisions of the Mines and Minerals (Development & Regulation) Act, 1957 or the Minerals (Other Than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016 and any other laws including Forest(Conservation) Act, 1980, Environment(Protection) Act, 1986 or the rules made there under, Mines Act, 1952 and Rule & Regulations made there under.
- (iv) Indian Bureau of Mines has not undertaken verification of the mining Lease boundary on the ground and does not undertake any responsibility regarding correctness of the boundaries of the precise area as furnished by the applicant/ lessee.
- (v) Lease boundary pillars shall be maintained at all times in accordance with the rule 12(1)(v) of Minerals (Other Than Atomic and Hydro Carbons Energy Minerals) Concession Rules, 2016.

- (vi) At any stage, if it is observed that the information furnished, data incorporated in the document are incorrect or misrepresent facts, the approval of the document shall be revoked with immediate effect.
- (vii) The inventory of mineral/ore stock above the limit prescribed in the threshold values of minerals and below the cut off grade shall be maintained in a bound register indicating the quantity and quality of material stacked. The month wise inventory of such materials shall be updated, and the annual summary shall be submitted to Regional Controller of Mines, IBM, Gandhinagar before 30th June of every year.
- (viii) The lessee shall ensure grassing/re-grassing in the reclaimed land in the lease area in accordance with the Hon'ble Supreme Court judgement dated 08.01.2020.
- (ix) The Performance Security in form of Bank Guarantee submitted to the State Govt. enclosed as Annexure-8 is valid till 31.03.2022 where as the Mining Plan period is from 01.04.2021 to 31.03.2026. Therefore, the copy of the renewed Performance Security under Rule 8(3)(a) of MCR, 2016, beyond 31.03.2022 shall be submitted on or before 31.12.2021 to the Regional Office, IBM, Gandhinagar office, failing which the approval of Review of Mining Plan shall be deemed as null and void without any further notice.
- (x) This approval has been given for the proposals given in the documents for the year 2021-22 to 2025-26.

Encl: One copy of approved Review of Mining Plan.

भवदीय



(बी. एल. कोटड़ीवाला)
क्षेत्रीय खान नियंत्रक
भारतीय खान ब्यूरो

Copy for kind information to:-

1. The Commissioner, Department of Geology & Mining, Govt. of Gujarat, Block 1, 7th Floor, Udyog Bhawan, Sector-11, Gandhinagar, Gujarat along with a copy of approved Review of Mining Plan by Registered Parcel.
2. Sh. Deepak Gaur, Mining Engineer, Office No 614, 6th Floor. Shree Ugati Corporate Park, Opp. Pratik Mall, Kudasan, Gandhinagar, Gujarat.
E-mail : dgaur@mining360services.com

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क्षेत्रीय खान नियंत्रक
भारतीय खान ब्यूरो









Annexure-8

PACHHTARDI LIMESTONE MINES
YEARLY EXPENDITURE STATEMENT
FOR ENVIRONMENT MANAGEMENT
(For the Period of April - 2023 to September - 2023)

Sr. No.	WORK	Grand Total
1	Ambient Air & Noise Monitoring	29160.00
2	Water Sprinkling on haul roads	3200.00
3	Plantation	42498.00
3	Security and Maintenance	45000.00
	Total	119858.00

Signature
(Manager Mines)