ADS
(ADDITIONAL DETAIL SOUGHT)
REPLY

FOR

Sugala Limestone and Marl Mine
(ML Area 417.3584 ha)
with Limestone Production Capacity of 1.29 Million TPA

At
Villages - Sugala and Jagatiya,
Taluka - Kodinar,
District - Gir somanth (Erstwhile Junagad) (Gujarat)

PROJECT PROPONENT

Ambuja Cement

M/s. Ambuja Cements Ltd.

P.O. Ambujanagar,
Taluka Kodinar, Distt Gir-Somnath,
Gujarat - 362715
E-mail: ramarao.sukuru@ambujacement.com
Telephone No. 02795-221137, Fax No. 02795 220328

Ambuja Cement

13-October-2020

To,
Member Secretary (IA Division) (Non- Coal Mining),
Ministry of Environment, Forest and Climate Change,
Govt. of India, Indira Paryavaran Bhavan,
Jorbag Road, Aliganj,
Delhi – 110 003

Subject- Sugala Limestone and Marl Mine (ML Area 417.3584 ha) with production capacity of 1.29 Million TPA at Villages Sugala and Jagatiya, Taluka- Kodinar, District- Girsomnath (erstwhile Junagadh) (Gujarat) by Ambuja Cement Limited**- Reg Submission of ADS Reply**

Ref:
1. MOEFCC File No J-11015/154/2018-IA.II (M) and Proposal Number- IA/GJ/MIN/77357/2018
2. ADS Letter dated: 12th December, 2019

Dear Sir,

This has reference to the aforesaid subject and above cited reference matter; we would like to inform you that the online application for obtaining Environmental Clearance for the above mentioned proposal was uploaded on MoEFCC web portal on 31st August, 2019. Subsequently, Essential Details Sought (EDS) by MoEF & CC on 7th September, 2019 which was met vide our reply dated 27th September, 2019.

Based on information submitted, our project was considered in the 10th EAC (Non Coal Mining) Meeting held on 21st October, 2019 and an ADS letter was issued on 12th December, 2019.

Now, in compliance of ADS issued by MoEFCC, we are submitting herewith the ADS Reply.

We would like to humble request to you kindly consider our proposal in upcoming EAC (Non Coal Mining) meeting agenda.

Thanking you,

Yours faithfully,
For **Ambuja Cement Ltd.,**

(Authorized Signatory)
Sukuru Ramarao
Manufacturing Cluster Head (NW & SW)

AMBUJA CEMENTS LIMITED Unit AMBUJA NAGAR 362 715

Encl: As above

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F. No. J-11015/154/2018-IA.II (M)
Government of India
Ministry of Environment, Forest and Climate Change
Impact Assessment Division
******

Indira Paryavaran Bhavan
Agni Wing, 1st Floor, Aliganj,
Jor Bagh Road, New Delhi-110 003

Dated: 12 December 2019

To,

M/s Ambuja Cement Ltd
P.O. Ambujanagar
Taluka Kodinar, District-Gir-Somnath
Guajrat-362715.

Subject: Sugala Limestone and Marl Mine by M/s Ambuja Cement Ltd with Limestone production capacity of 1.29 Million TPA and topsoil 0.25 MPTA (Total excavation 1.54 MTPA) in the mining lease area of 417.35.84 ha located at Villages Sugala and Jagatiya, Taluka- Kodinar, District- Gir Somanth, Gujarat-Consideration of Environmental Clearance-Information/Clarification-Reg.

Ref.: Proposal No: IA/GJ/MIN/77357/2018

Sir,

This is in reference to your above mentioned proposal for Sugala Limestone and Marl Mine with Limestone production of 1.29 MTPA and topsoil 0.25 MPTA (Total excavation 1.54 MTPA) in the mining lease area of 417.35.84 ha. The mine lease area is located at Villages Sugala and Jagatiya, Taluka- Kodinar, District- Gir Somanth, Gujarat. The mine lease area falls in the Survey of India Topo-Sheet No. 41L/13 (restricted). The latitudes and longitudes of the mine lease area are$20^0$52' 45.16" N to 20^0 54' 51.12" N and $70^0$45' 33.23" E to 70^0 46' 37.41" E.

2. The EC proposal was considered in the 10th EAC meeting held during October 21-22, 2019. Based on the presentation made by PP and the discussion held, the Committee **deferred the proposal** and sought following addition information further consideration.

(i). PP submitted compliance to the ToR conditions which are generic and not adequate. PP is required to submit the quantitative data for compliance of existing EC conditions along with more specific compliance status of the ToR conditions.

(ii). PP submitted that earlier public hearing conducted 17.12.1998. The Committee asked the PP for compliance report for the concerns raised during the meeting, however, PP unable to explain the same and did not have any compliance report for the same. PP needs to submit details of concern raised during public hearing, assurance/measurement given for addressing the concerns and the current status of the compliance to public concern. In addition, the Committee asked the PP to meet the public and record the current concern of the public and submit the corresponding measurement with the timeline.

(iii). PP has not presented results and analytical data for current baseline data. PP needs to present the same. In addition, the PP needs to submit progressive EIA data and their comparative values (i.e. values obtained in during earlier EC appraisal, entire monitoring period and current baseline data collection period) for all parameters and explain how environmental quality has varied.

(iv). PP submitted compliance status to EC specific condition vi (a), however, the Committee is of the view that PP needs to get certificate from the Irrigation Department, Government of Gujarat that no drought has been taken place. The same needs to be supported with the analytical data and other documentary evidences.

(v). PP requires to submit the results of ground water level and quality analysis. In addition, PP needs to show comparative data (i.e. different time period) for ground water quality analysis.

(vi). As part of existing EC condition "(v) Fencing (other than barbed wire) all around the lease area should be provided", however, the compliance report mentioned that fencing is provided along the lease boundary, and certain area where surface right is under progress. The Committee is of the view that specific EC condition should be followed and completed as early as possible. PP needs to submit timeline for obtaining the surface right and carrying out the fencing all around lease area.

(vii). EIA study provides location and the data with predictable values by running the model. PP needs to validate the predictable data with respect to air quality data and area source. In addition, the emission factors considered for the modeling may be specified and its agreement with the accepted factors considered in Indian scenario developed by CMPDI/ISM. PP requires to carry out particle size analysis for upwind and downwind direction of dust.

(viii). PP submitted that water requirement is 225 KLD; the Committee is of the view that the water requirement is high. So, the Committee asked the PP to submit water budget for the same and also futuristic approach on decreasing the water requirement.

(ix). As part of specific EC condition (x), greenbelt should be developed all around the ML, however, PP still in the process of complying doe the area where surface right is not available and is under process of acquiring. In addition, PP was unable to show/explain the plantation in KML. PP needs to submit the KML file having proper marking of plantation area and their corresponding coordinates.

(x). PP requires to submit the details of plantation carried out till today all along the lease boundary with photographic images. In addition, the timeline for carrying out plantation all around lease area as well as obtaining the surface right.

(xi). As per the Industries and Mines Department, Government of Gujarat, the lease is granted for 417.35.84 ha not for 417.3584 ha. PP submitted that in Gujarat state revenue records are mentioned in area format of "Hectare. Are. Square Meter" where 1 Hectare = 100 Are and 1 Are = 100 Square Meter thus in Gujarat lease orders are written in format of 417.35.84 ha. The Committee is of the view that PP's clarification needs to be verified and PP should provide certificate from the Competent Authority of State Mines and Geology w.r.t mine lease area.

(xii). PP needs to submit the compliance status of the all conditions stipulated by CGWA, specifically implementation of water recharge measures (13,72,885 cu.m/year). In addition, PP needs to submit copy of CGWA approval since inception of mining.

(xiii). PP requires to submit the R & R plan for the affected populace for the area the getting the surface right is under process.

(xiv). During ToR appraisal, the Committee noted that PP has mined without CTO prior to 2003 and therefore will come under the ambit of the common cause judgement of the Hon'ble Supreme Court. PP needs to submit details of action taken by the Competent Authority against the PP activity.

(xv). PP submitted that a village road connecting Jagatiya to Sugala is passing through the mine lease area. The Committee is of the view that PP needs to submit details of any diversion of road undertaken, if not then PP needs to submit futuristic approach for the village road and their accessibility.

(xvi). PP requires to submit revised conceptual land use pattern for the mine lease area.

(xvii). PP needs to submit authenticated specific target plan for conservation of Lions and their movement. The committee observed that the plans as approved by the competent authority needs to be examined in detail as the Gir Sancturay is the only habitat for Lions and requires to be assessed more specifically considering its importance. PP should ensure that

the approved plan is received by EAC domain experts (Dr. A.K. Malhotra and Dr. Asha Rajvanshi) 15 days in advance to ensure that proper examination is completed.

(xviii). In EIA/EMP report, PP submitted 27.408 Million Tonnes of Limestone as total geological reserve, however, during presentation PP mentioned that 39.458 Million Tonnes as total geological reserve. PP needs to submit clarification for the same.

(xix). PP requires to submit details of precautionary steps applied till date for protection of electric power lines exist in the mine lease area.

(xx). PP needs to submit details of environment management cell since inception of mining, performance including monitoring and their educational backgrounds.

(xxi). PP submitted hydrogeological study for the mine lease area; however, PP not submitted the details of laboratory conducted the study and their accreditation certificate.

(xxii). PP needs to revise the CER budget as per the provisions of OM No. F. No. 22-65/2017-IA-III dated 01 May 2018.

3. In view of above, the undersigned is directed to request you to kindly submit the requisite information to the Ministry online at PARIVESH PORTAL at the earliest for taking further necessary action in this regard.

4. This issues with the approval of the Competent Authority.

Yours faithfully,

(Sandeep)
Director/Scientist 'F'

Copy to:

1. **The Additional Principal Chief Conservator of Forests (C)**, Ministry of Environment, Forest and Climate Change, Regional Office (WZ), E-5, Kendriya Paryavaran Bhawan, E-5 Arera Colony, Link Road-3, Ravishankar Nagar, Bhopal – 462016.
2. **The Member Secretary**, Gujarat State Pollution Control Board, Paryavaran Bhavan, Sector-10A, Gandhinagar-382010.
3. **The Secretary**, Department of Environment, Government of Gujarat, Secretariat, Gandhinagar.
4. **The Secretary**, Department of Forest, Government of Gujarat, Secretariat, Gandhinagar.
5. **The Commissioner,** Department of Geology and Mining, Government of Gujarat, Block 1st, 7th Floor, Udhyog Bhavan, Sector - 11, Gandhinagar, Gujarat.
6. **The Principal Chief Conservator of Forest & Head of Forest Force (HoFF)**, "Aranya Bhavan", Near CH-3 Circle,Sector-10 A, Gandhinagar – 382010.
7. **The District Collector,** District- **Gir Somanth**, State of Gujarat.
8. **Guard File**.
9. **Parivesh Portal**.

(Sandeep)
Director/Scientist 'F'

ADS REPLY

Point No. 1	**PP submitted Compliance to the TOR conditions which are generic conditions and not adequate. PP is required to submit the quantitative data for compliance of existing EC conditions along with more specific compliance status of the TOR Conditions.**
Reply	Specific compliance status of the TOR Conditions is enclosed as ***Annexure I.*** Quantitative data for compliance of existing EC conditions is enclosed as ***Annexure II***
Point No. 2	**PP submitted that earlier public hearing conducted on 17.12.1998. The committee asked the PP for compliance report for the concern raised during the meeting, however PP unable to explain the same and did not have any compliance report for the same. PP needs to submit details of concern raised during Public hearing, assurance/ measurement given for addressing the concerns and current status of the compliance to public concern. In addition, the committee asked the PP to meet the public and record the current concern of the public and submit the corresponding measurement with the timeline.**
Reply	A meeting with Sugala and Jagatiya mines Sarpanch and other villagers held in presence of leaders from ACL. Snaps and Video captured. MOM of the meeting is enclosed herewith as ***Annexure III*** covering the concerns raised by village representative during meeting. Details of concerns raised during public hearing and action plan against the concerns are updated and attached as ***Annexure IV.***
Point No. 3	**PP has not presented results and analytical data for current baseline data. PP needs to present the same. In addition, the PP needs to submit progressive EIA data and their comparative values (i.e values obtained in during earlier EC appraisal, entire monitoring period and current baseline data collection period) for all parameters and explain how environmental quality has varied.**
Reply	Comparison of analytical data has been done and copy of report is enclosed as **Annexure V.**
Point No. 4	**PP submitted compliance status to EC specific conditions vi (a), however, the committee is of the view that PP needs to get certificate from the Irrigation department, Government of Gujarat that no drought has been taken place. The same needs to be supported with the analytical data and other documentary evidences.**
Reply	Letters for the said requirement has been received from Office of Deputy Executive Engineer's Irrigation Sub Division, Kodinar vide letter No PB/Certificate/38 dated 28.01.2020 and from Gujarat Water supply and sewerage Board vide letter no PB/49 dated 29.01.2020 which states that there is not reported any report of drought during 2002 to 2020. Copy is enclosed herewith as ***Annexure VI.***
Point No. 5	**PP requires to submit the results of ground water level and quality analysis. In addition, PP needs to show comparative data (i.e different time period) for ground water quality analysis.**

Reply Company is regularly monitoring water level data from 13 nos of monitoring wells (6 wells are in within lease area and 7 outside the lease area within close proximity of mine) and 2 nos of manual piezometer and 2 nos of digital piezometer. Comparative data of ground water level is enclosed as **Annexure VIIA & VIIB.** Comparative data of ground water quality analysis is covered in **Annexure V.**

Point No. 6 **As part of existing EC condition (v), Fencing (other than barbed wire) all around the lease area should be provided. However, the compliance report mentioned that fencing is provided along the lease boundary, and certain area where surface right is under progress. The committee is of the review that specific EC condition should be followed and completed as early as possible. PP needs to submit timeline for obtaining the surface right and carrying out the fencing all around lease area.**

Reply At present, surface right of 279.0079 ha land have been obtained and remaining 138.3505 ha land is under process. Timeline for obtaining surface right for remaining 138.3505 ha area is given as per under:

S. No	Year	Area (Ha)
1.	2020-21	10
2.	2021-22	10
3.	2022-23	10
4.	2023-24	10
5.	2024-25	10
6.	2025-26	10
7.	2026-27	10
8.	2027-28	10
9.	2027-28	10
10.	2028-29	10
11.	2029-30	10
12.	2030-31	10
13.	2031-32	10
14.	2032-33	8.3505
	Total	**138.3505**

Total peripheral boundary wall along the lease periphery is 11.2 km. Out of this, 3.3 kms has already been constructed and 2.2 kms is under construction while remaining 5.7 km boundary wall to be constructed (surface right to be acquired) for which the time line is as follows:

S. No	Year	Length (km)
1.	2021-22	1.0
2.	2022-23	1.0
3.	2023-24	1.0
4.	2024-25	1.0
5.	2025-26	1.0

6.	2026-27	0.7
	Total	**5.7**

Point No. 7 **EIA study provides location and the data with predictable values by running the model. PP needs to validate the predictable data with respect to air quality data and area source. In addition, the emission factors considered for the modeling may be specified and its agreement with the accepted factors considered in Indian Scenario developed by CMPDI/ ISM. PP requires to carry out particle size analysis for upwind and downwind direction of dust.**

Reply

- Environmental Clearance for existing Limestone and Marl Mine for production Capacity of 1.29 Million TPA limestone was obtained from MoEF&CC vide letter No. J-11015/6/2000-IA.II (M) dated 20.06.2002 under the provision of EIA Notification, 1994.
- In compliance of MoEF&CC Notification dated 06.04.2018, ACL has applied for EC validation/ regularization of Sugala Limestone and Marl Mine (ML Area 417.3584 ha) with production capacity of 1.29 Million TPA at Villages Sugala and Jagatiya, Taluka- Kodinar, District- Gir Somnath (erstwhile Junagadh) (Gujarat).
- As there is no change in production capacity, so modelling has already covered baseline data collected during study period. The incremental concentrations have been covered in the Background Ambient Air Quality Monitoring.
- Mainly fugitive emission will be generated from mining operation which will be restricted within the lease boundary by using dust suppression measures. As per the topography and micrometeorological pattern of the study area, the impacts identified are not cumulative.
- This is an existing mine & there is no change in production capacity. Thus, there will be no change in GLC due to mining project. However, mitigation measures are being adapted to control the emission within the prescribed standard.

Point No. 8 **PP submitted that water requirement is 225 KLD; the committee is of the view that the water requirement is high. So, the committee asked the PP to submit water budget for the same and also futuristic approach on decreasing the water requirement.**

Reply Earlier water requirement was presented as 225 KLD which has been reduced now as 190 KLD. Water requirement is being met through Rain water harvesting/mine pit. Ground water is not being/will be used. Breakup of water requirement is given below:

S. No.	Water Requirement	Total Requirement (KLD)
1.	Dust suppression	123
2.	Greenbelt	56
3.	Domestic	11
Total		**190**

Details of water budget is given as ***Annexure VIII.***

Point No. 9 **As part of specific condition (x), greenbelt should be developed all around the ML, however, PP still in the process of complying due the area where surface right is not available and is under process of acquiring. In addition, PP was unable to show/explain the plantation in KML. PP needs to submit the KML file having proper marking of plantation area and their corresponding coordinates.**

Reply

- As on date 11.0 ha area has been covered under greenbelt/Plantation. (3.69 ha along the lease periphery and 7.31 ha along road and bund and near office.
- Detailed breakup of greenbelt /plantation with corresponding coordinates are given as ***Annexure IX***
- These areas have also been shown on kml file and screenshot of the same is enclosed as ***Annexure X.***

Point No. 10 **PP requires to submit the details of plantation carried out till today all along the lease boundary with photographic images. In addition, the timeline for carrying out plantation all around lease area as well as obtaining the surface right.**

Reply

- Total area under greenbelt/plantation up to conceptual stage is 46.0 ha (22.77 ha under greenbelt and 23.23 ha under plantation).
- As on date 11.0 ha area has been covered under greenbelt/Plantation. (3.69 ha along the lease periphery and 7.31 ha along road and bund and near office.
- Remaining 35 ha area will be covered under greenbelt/Plantation up to conceptual stage.
- Detailed breakup of greenbelt /plantation with corresponding coordinates are given as ***Annexure IX.***
- At present, surface right of 279.0079 ha land have been obtained and remaining 138.3505 ha land is under process. Surface right for remaining 138.3505 ha area will be done till year 2032-33. Year wise planning for obtaining surface right is given in reply of point no 6.

Point No. 11 **As per the Industries and Mines Department, Government of Gujarat, the lease is granted for 417.35.84 ha not for 417.3584 ha. PP submitted that in Gujarat State revenue records are mentioned in area format of "Hectare Are. Square Meter" where 1 hectare = 100 Are and 1 Are = 100 Square Meter thus in Gujarat lease orders are written in format of 417.35.84 ha. The committee is of view that PP's clarification needs to be verified and PP should provide certificate from the Competent Authority of State Mines and Geology w.r.t mine lease area.**

Reply A letter has been received from the Competent Authority of State Mines and Geology w.r.t. mine lease area clarification vide letter No. GG/ML/Ambuja/15 dated 02.01.2020. Copy of same is enclosed as ***Annexure XI.***\\

Point No. 12 **PP needs to submit the compliance status of the all conditions stipulated of water recharge measures (13,72,885 cum/year). In addition, PP needs to submit copy of CGWA approval since inception of Mining.**

Reply

- Permission from CGWA has been obtained vide letter no CGWA/NOC/MIN/ORIG/2018/3015 dated

31.01.2018

- Application for renewal of existing NOC submitted to CGWB, Ahmadabad and Inspection done by CGWB Ahmadabad officials on 03.01.2020 and same has been recommended by CGWB, Ahmedabad vide their letter no 21-4/1599/GJ/MIN/2016/Renewal_1/2020-469 dated 19.08.2020. Copy of CGWA permission dated 31.01.2018 with recommendation letter of CGWB Ahmedabad is enclosed as ***Annexure XII.***
- Compliance status of all conditions stipulated in NOC granted by CGWA is submitted on 08.01.2020. Copy enclosed as ***Annexure XIII.***
- With respect to the implementation of water recharge measures (13,72,885 cum/year) as per the NOC no amount has been dewatered so far however water has been harvested to the tune around 2.0 MCM through existing 33 nos of various size of pits in Sugala Mining lease area.

Point No. 13 **PP requires to submit the R&R plan for the affected populace for the area getting the Surface right is under process.**

Reply

- Total mining lease area is 417.3584 ha in which 2.5091 ha area is Govt waste land and 414.8493 ha area is Private Land.

S. No.	Villages	Area in ha					
		Government barren Land		Private land		Total Area	
		Possessed	To be possessed	Acquired	To be acquired	Acquired	To be acquired
1	Sugala	2.5091	---	208.3384	90.9651	210.8475	90.9651
2	Jagatiya	-	-	68.1604	47.3854	68.1604	47.3854
	Total	**2.5091**	**---**	**276.4988**	**138.3505**	**279.0070**	**138.3505**
		2.5091		**414.8493**		**417.3584**	

- Out of the total 414.8493 Private land; 276.4988 ha land is acquired and 138.3505 ha land is to be acquired.
- ACL is under process of purchasing remaining land of 135.87 ha of lease area and had made a plan.
- The planning to purchase the land is given below:

S. No	Year	Area (Ha)
1.	2020-21	10
2.	2021-22	10
3.	2022-23	10
4.	2023-24	10
5.	2024-25	10
6.	2025-26	10

7.	2026-27	10
8.	2027-28	10
9.	2027-28	10
10.	2028-29	10
11.	2029-30	10
12.	2030-31	10
13.	2031-32	10
14.	2032-33	8.3505
	Total	**138.3505**

Details of Project Affected Families of which land to be acquired is given in R&R plan and the same is annexed as ***Annexure XIV.***

Point No. 14 **During the TOR appraisal, the committee noted that PP has mined without CTO prior to 2003 and therefore will come under the ambit of the common cause judgement of the Hon'ble Supreme Court. PP needs to submit details of action taken by the Competent Authority against the PP activity.**

Reply There is no violation and mine has been operated with valid CCA since 2002 (CTO Order No. 20261 granted by GPCB, Gandhinagar 01.11.2002 thus doesn't come under the ambit of the common cause judgement of the Hon'ble Supreme Court. Copy of CTO dated 01.11.2002 is enclosed as ***Annexure XV.***

Point No. 15 **PP submitted that a village road connecting Jagatiya to Sugala is passing through the mine lease area. The committee is of the view that PP needs to submit details of any diversion of road undertaken, if not then PP needs to submit futuristic approach for the Village road and their accessibility.**

Reply

- A village road (cart track) having an area of 1.692 ha connecting Jagatiya to Sugala is passing through the mine lease area.
- ACL has not diverted the village road connecting Jagatiya to Sugala passing through the mine lease and in future also there is no plan for diversion. The Villagers are being/ will be allowed to use the same and proper safety measures have been adopted.
- Safety barrier has been left along both the side of road and plantation has been done in the safety barrier.

Point No. 16 **PP requires to submit revised conceptual land use pattern for the mine lease area.**

Reply Conceptual land use pattern for the mine lease area as per approved mining plan is enclosed as ***Annexure XVI.***

Point No. 17 **PP needs to submit authenticated specific target plan for conservation of Lions and their movement. The Committee observed that the plans as approved by the competent authority needs to be examined in detail as the Gir Sanctuary is the only habitat for Lions and requires to be assessed more specifically considering its importance. PP should ensure that the approved plan is received by EAC domain experts (Dr. A.K Malhotra and Dr. Asha Rajvanshi) 15 days in advance to ensure that proper examination is completed.**

Reply An impact study of the mining project on Wildlife has been carried out by Gujarat Institute of Desert Ecology, Kachchh Gujarat. Based on the study, Conservation and Management Plan for significant species (including Schedule-I) has been approved by Chief Wildlife Warden, Gujarat vide their letter no WLP/32/B/8598-99/2018-19 dated 10.12.2018 and necessary funds of Rs. 2 Crores for 30 years has been allocated towards implementation of plan.

Approved CMP dispatched by post to Dr. A.K Malhotra and Dr. Asha Rajvanshi in hard copy on dated 28.02.2020 for their necessary examination and guidance. Screenshot of delivery status is enclosed as ***Annexure XVIII.***

Point No. 18 **In EIA/EMP report, PP submitted 27.408 Million Tonnes of Limestone as total geological reserve, however, during presentation PP mentioned that 39.458 Million Tonnes as total geological reserve, PP needs to submit clarification for the same.**

Reply

- Total geological reserves of Limestone = 24.708 Million Tonnes
- Total geological reserves of Marl = 12.050 Million Tonnes
- Total Geological reserves of Limestone & Marl = 39.458 Million Tonnes

Above information is also covered in the EIA/EMP Report.

Point No. 19 **PP requires to submit details of precautionary steps applied till date for protection of electric lines exist in the mine lease area.**

Reply There are few domestic electric lines remains in lease area for agriculture purpose of those landowners whose land are not under possession of ACL. These lines are de-electrified and scrapped after purchasing the land and are also diverted to their land. ACL has also raised the height of electrical pole as per DGMS guidelines and also electrical lines are equipped with guard if crossing through the haulage road. If any electrical line remains till the end of lease, then Ambuja Cement Ltd will follow the specified procedure for diversion permission from State Electricity Board and DGMS.

Point No. 20 **PP needs to submit details of environment management cell since inception of Mining, Performance including monitoring and their educational backgrounds.**

Reply Details are enclosed as ***Annexure XVII.***

Point No. 21 **PP submitted hydrogeological study for the mining lease area; however, PP not submitted the details of laboratory conducted the study and their accreditation certificate.**

Reply Hydro-geological study has been conducted by M/s. JM EnviroNet Pvt Ltd. is an NABET Accredited consultant.

Point No. 22 **PP needs to revise the CER budget as per the provisions of OM No. F. No. 22-65/2017-IA-III dated 01 May,2018.**

Reply The various activities proposed through CER (Corporate Environment Responsibility) would help in upgradation of basic infrastructure, amenities. Corporate Environment Responsibility (CER) will be done nearby mine site as per MoEFCC Office Memorandum F. No. 22-65/2017-IA.II, dated 01.05.2018; according to that project having capital investment of 288.5 Cr.

Total cost for this Project is Rs. 288.5 Cr. have to spend as per tax slab of capital investment. Total project cost is divided according to different slabs in 2 parts as 100 crore and 188.5 crore. Upto 100 crore CER for brownfield projects will be 1 crores (1%) and for 188.5 crores CER will be 1.41 crores (0.75%). Therefore, total 2.41 crores will be allocated towards CER activities (for 5 Years) according to Office Memorandum.

TOR COMPLIANCE

Point wise compliance of ToR Points issued by MoEFCC, New Delhi vide letter no. J-11015/154/2018-IA.II (M) dated 10th December, 2018 for Sugala Limestone and Marl Mine (ML Area 417.3584 ha) with limestone production capacity of 1.29 Million TPA at Villages Sugala and Jagatiya, Taluka- Kodinar, District- Girsomnath (erstwhile Junagadh) (Gujarat) by M/s. Ambuja Cements Ltd.

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
1.	The TOR will not be operational till such time the Project Proponent complies with all the statutory requirements and judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors.	Affidavit in compliance of the judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors has been submitted during submission of application as well as EIA/EMP report.	***Annexure 1***
2.	Department of Mining & Geology, State Government shall ensure that mining operation shall not commence till the entire compensation levied, 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 the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors.	Noted	-
3.	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification, 1994 came into force w.r.t. the highest production achieved prior to 1994. The production details need to submit since inception of mine duly authenticated by Department of Mines & Geology, State Government.	Mine is in operation since year 2002. Authenticated year wise production details since year 2002 has been obtained from State Mines Department vide their letter No GJ/ML/General/3688 dated 10.08.2018. Copy of letter is enclosed with this EIA/EMP report.	**Annex II** *Chap II, Para 2.6.6, pg no 45*
4.	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Initially, Mining lease was granted in favour of Gujarat Ambuja Cements Ltd. (GACL) on 19.07.2002 for a period of 30 years. Company name of GACL	***Annex III***

<table>
<tr><th>ToR Ref</th><th>ToR Point</th><th colspan="3">Compliance</th><th>Ref in EIA / EMP Report</th></tr>
<tr><td></td><td></td><td colspan="3">was changed to ACL and accordingly, the State Government changed the name of the lessee to M/s. Ambuja Cements Ltd vide letter dated 17.10.2017 & 18.09.2017.
Same information is given in this EIA/EMP Report.</td><td>Chap I, Para 1.2.1 C, pg no 28</td></tr>
<tr><td>5.</td><td>All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.</td><td colspan="3">All the documents including approved Mining Plan and EIA are compatible with each other and are in the name of lessee i.e, M/s. Ambuja Cements Limited.
The public hearing has already been conducted on 17.12.1998 for same production capacity of 1.29 Million TPA and the concerns of the general public have already been considered. Now the instant project is submitted under notification dated 06.04.2018 hence, public hearing is exempted.
Details of concerns raised during public hearing and action plan against the concerns are enclosed as <u>Annexure IV</u> with ADS Reply.
As per ADS by MoEFCC, a meeting with Sugala and Jagatiya mines Sarpanch and other villagers held in presence of leaders from ACL. Snaps and Video captured. MOM of the meeting is enclosed herewith as <u>Annexure III</u> with ADS Reply covering the concerns raised by village representative during meeting.</td><td></td></tr>
<tr><td></td><td>S No</td><td>Particulars</td><td>Description</td><td>Ref. in Approved Mining Plan</td><td>Ref. in EIA / EMP Report</td></tr>
<tr><td></td><td>1.</td><td>Mining Lease Area</td><td>417.3584 ha</td><td>Page no 1.</td><td>Chap I, Para 1.2.1 A, pg no 28</td></tr>
<tr><td></td><td>2.</td><td>Proposed Production Capacity</td><td>Limestone Capacity 1.29 Million TPA</td><td>Page no 61</td><td>Chap I, Para 1.2.1 A, pg no 28</td></tr>
<tr><td></td><td>3.</td><td>Waste generation & its management</td><td>There is neither any sort of overburden nor any interstitial waste.</td><td>Page no 79</td><td>Chap II, Para 2.6.8, pg no 47</td></tr>
<tr><td></td><td>4.</td><td>Mining Technology</td><td>Fully Mechanized Opencast mining without drilling & blasting.</td><td>Page no 57</td><td>Chap II, Table 2.8, Pg no 44</td></tr>
</table>

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
6.	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/toposheet, topographic sheet, geomorphology and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Map showing mining lease area with geographical corner coordinates, geomorphology and geology of the area, superimposed on Toposheet has been prepared and incorporated. Land use /land cover map of study area based on satellite imagery has been incorporated in EIA/EMP Report.	*Chap II, Fig 2.2, Pg no 34* *Chap III, Para 3.4, pg no 53 to 62.*
7.	Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams & river and soil characteristics.	Map showing geomorphology of land forms of the area, soil characteristics & type, important water bodies, stream, rivers and existing mineral has been prepared and incorporated in this EIA/EMP report.	*Chap II, Fig 2.2, Pg no 34*
8.	Details about the land proposed for mining activities should be given with information as to whether mining confirms to the land use policy of the state; land diversion for mining should have approval from state land use board or the concerned authority.	This is an existing mine and Lease was granted for Mining Purpose. Out of the total area (417.3584 ha) 279.0070 ha land has been acquired out of which 225.1707 ha land has been converted into Non Agricultural Land as on date. And the remaining land will be purchased and converted into NA land area by the end of year 2033. Process of conversion of agricultural land to non-agricultural (NA) land is one of the major aspects of land purchase and NA conversion is being undertaken on regular basis.	-
9.	It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions	Yes, The company has well laid down Corporate Environment Policy (CEP) approved by Board of Directors of Ambuja Cements Ltd. Information of the same is given in this EIA/EMP report.	***Annex IV*** *Chap X, Para 10.3, Pg no 150*

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
	may also be given. The system of reporting of non-compliances /violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the proposed safeguard measures in each case should also be provided.		
10.	Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	Being an opencast mine, occurrence of subsidence is not envisaged. Topography of the area is almost flat to gentle sloping towards South and shallow depth mining is being undertaken using eco-friendly surface miner without drilling & blasting. Therefore, slope and blasting studies are not applicable. Details of the same are given in this EIA/EMP Report.	*Chap IV, Para 4.2.2.3, Pg no 112*
11.	The study area will comprise of 10 km zone around the mine lease from lease Periphery and the data contained in the EIA such as waste generation etc should be for the life of the mine / lease period.	The study area comprises of 10 km radius zone around the mining lease periphery. Map showing study area has been incorporated in this EIA/EMP report. Based on available reserves, life of mine is calculated as 18 years, which may slightly change further based on market demand and change in dispatches from the mine, if any. Further, a few more years will be required for mine closure and therefore, the mining and closure operations shall continue for about 25 years. There is neither overburden nor any interstitial waste and around 360 ha will be excavated out of which 1.80 ha will be used for public/haul road, 100 ha converted to water reservoir, 260 ha will be reclaimed by agri-farm, 46 ha will be covered by Greenbelt/plantation, 1.48 ha covered under water bodies (river/nallah/canal/pond) and 8.08 ha area will remain undisturbed till life of mine. Details of same have been incorporated in this EIA/EMP report.	*Chap III, Fig 31, Pg no 51* *Chap II, table 2.8, Pg no 44*
12.	Land use of the study area delineating forest	Land use of the study area is majorly consisting of	

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
	area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given	Agricultural Land which covers 69.34% (28852.8 ha) & Open scrub land covers 14.01% (5828.82 ha). Other than these following land use are also exist in the study area such as: Water bodies (ponds) (1.33%), River/Nallah/Canal (1.14%), Plantation/vegetation (5.02%), Stony Land (5.36%), Mine Quarry (1.04%), Open Land (0.71 %), Waste Land (0.53%), Human Settlement (1.30%), Industry (0.22%). There is Gir Wildlife sanctuary 6.25 km far away from mine site. Land use / land cover map of the study area has been prepared & incorporated in this EIA/EMP Report. Land use plan of the mine lease area in pre-operational, operational and post operational phases including impact due to change of land use is given in this EIA/EMP Report.	*Chap III, Para 3.4, pg no 53 to 62.* *Chap IV, Table 4.3, Pg no 115*
13.	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	There is no OB generation. Hence, there is no proposal of OB dumping. Same information is given in this EIA/EMP report.	*Chap II, Para 2.6.8, pg no 47*
14.	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	As per revenue records, Total mining lease area i.e 417.3584 ha is falling under non-forest area. Certificate has been obtained from Dy. Conservator of Forest regarding no forest land within ML Area vide letter no K/LND/T-13/41/2019-20 dated 10.04.2019. Details of the same are given in this EIA/EMP Report.	***Annex V*** *Chap II, Para 2.3.3, pg no 35*
15.	Status of forestry clearance for the broken up area and virgin forestland involved in the	Not applicable as the proposed mining lease area	

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
	Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	does not have any forest land.	
16.	Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	There is no forest area within the mining lease. So, Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 are not applicable.	-
17.	The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	Biological Study has been conducted for the project. Vegetation in the RF/PF of the study area consists of *Acacia catechu* (Khair), *Aegle marmelos* (Bel), *Acacia nilotica* (Babool), *Anogeissus latifolia* (Dhaura) *etc*. List of vegetation are given in this EIA/EMP Report.	*Chap III, Para 3.15, pg no 94*
18.	A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.	An impact study of the mining project on Wildlife has been carried out. Based on the study, Conservation and Management Plan for significant species (including Schedule - I) has been approved by Chief Wildlife Warden, Gujarat vide their letter no WLP/32/B/8598-99/2018-19 dated 10.12.2018 and necessary funds of Rs. 2 Crores for 30 years has been allocated towards implementation of plan. Details have been given in this EIA/EMP Report.	**Annex VI** **Annex VII** *Chap III, Para 3.15, pg no 94*
19.	Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar Site Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the standing committee of National Board of Wildlife and copy furnished.	There is no National Park, Biospehere Reserves, Wildlife Corridors, Ramsar Site, and Tiger/Elephant Reserves within the 10 km of study area except Gir Wildlife sanctuary which is at 6.25 km far away from mine site. (Gir National Park exists at 10.775 km from the lease boundary). Authenticated Location map showing distance of wildlife sanctuary and national park has been obtained from Chief Wildlife Warden vide letter no. WLP/32/C/435-36/2018-19 dated 12.07.2019. NBWL Clearance has also been obtained from Office of the Principal Chief Conservator of Forests vide letter no WLP/32/B/512-18/2018-19 dated	**Annex VIII** **Annex IX** *Chap III, Para 3.15, pg no 94*

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
		20.04.2018 and corrigendum issued vide letter No WLP/32/B/562-68/2018-19 dated 04.05.2018. Same information is given in this EIA/EMP Report.	
20.	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Biological Study for the study area (core zone & buffer zone) has been conducted and as per the study and field survey Three Sch-I species namely Peafowl, Asiatic Lion, and Leopard are found within the study area. Conservation Plan for Schedule I species has been prepared in consultation with State Forest and Wildlife Department and same has been approved by Chief Wildlife Warden/PCCF vide letter no WLP/32/B/8598-99/2018-19 dated 10.12.2018 and necessary funds of Rs. 2 Crores for 30 years has been allocated towards implementation of plan. Authenticated list of flora and fauna has been obtained from Dy. Conservator of Forest vide letter no K/JAMAN/Te 13/31/2019-20 dated 10.04.2019. Same information is given in this Final EIA/EMP report.	**Annex VII** **Annex VI** **Annex X** *Chap III, Para 3.15, pg no 94*
21.	Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. should be secured and furnished to the effect that the proposed mining activities could be considered.	No Critically Polluted areas as notified by the Central Pollution Control Board are located within 10 km from the boundary of mining lease. The ML area does not fall under Aravali range as mine site falls in Gir-Somnath District of Gujarat State.	*Chap III, Table 3.1, pg no 49 to 50*
22.	Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL. HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain	Mining lease area is about 16 km far from sea, hence does not fall in Coastal Regulation Zone (CRZ).	*Chap III, Para 3.15, pg no 94*

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
	approval of the concerned Coastal Zone Management Authority).		
23.	R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of Village(s) including their R&R and socio-economic aspects should be discussed in the report.	Total Mining Lease area is 417.3584 ha, out of which 2.5091 ha is Government land and 414.8493 ha is Private land. Out of the total 414.8493 Private land; 276.4988 ha land is acquired and 138.3505 ha land is to be acquired. ACL is under process of purchasing remaining land of 135.87 ha of lease area and had made a plan. Details of Project Affected Families of which land to be acquired is given in R&R plan and the same is annexed as ***Annexure XIV*** with ADS reply.	*Chap II, Para 2.3.3, pg no 35*
24.	One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post-monsoon season); December-February (winter season) primary baseline data on ambient air quality as per CPCB notification, 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant	One season primary baseline data for ambient air quality, (as per CPCB quality Notification, 2009), water quality, noise level, soil and flora & fauna has been collected during winter Season (Dec. 2018 to Feb, 2019). Details regarding the same have been incorporated in this EIA/EMP Report. Detailed AAQM tables of sampling locations have been enclosed with this EIA/EMP Report. Site-specific meteorological data has been recorded and enclosed with this EIA/EMP Report. The dominant wind direction is from West direction to East direction. Eight monitoring stations were selected keeping in view the pre- dominant downwind direction and location of the sensitive receptors and also that they represent whole of the study area. One location has been selected in downwind direction	*Chap III, Para 3.10 (Pg 68) to 3.15 (Pg 94)* **Annex XI** **Annex XII**

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
	downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.	at 500m from the lease boundary. Details of the same are given in this EIA/EMP Report.	*Chap III, Table 3.8, pg no 73*
25.	Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.	Environmental Clearance for existing Limestone and Marl Mine for production Capacity of 1.29 Million TPA limestone was obtained from MoEF&CC vide letter No. J-11015/6/2000-IA.II (M) dated 20.06.2002 under the provision of EIA Notification, 1994. In compliance of MoEF&CC Notification dated 06.04.2018, ACL has applied for EC validation/ regularization of Sugala Limestone and Marl Mine (ML Area 417.3584 ha) with production capacity of 1.29 Million TPA at Villages Sugala and Jagatiya, Taluka- Kodinar, District- Gir Somnath (erstwhile Junagadh) (Gujarat). As there is no change in production capacity, so modelling has already covered baseline data collected during study period. The incremental concentrations have been covered in the Background Ambient Air Quality Monitoring. ➢ Mainly fugitive emission will be generated from mining operation which will be restricted within the lease boundary by using dust suppression measures. As per the topography and micrometeorological pattern of the study area, the impacts identified are not cumulative. ➢ This is an existing mine & there is no change in production capacity. Thus, there will be no change in GLC due to mining project. However, mitigation measures are being adapted to control the emission within the prescribed standard. ➢ Details are incorporated in EIA/EMP report.	*Chap IV, Para 4.2.1, pg no 109 to 111*
26.	The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the	Earlier water requirement was presented as 225 KLD which has been reduced now as 190 KLD. Water requirement is being met through Rain water harvesting/mine pit. Ground water is not	*Chap II, Para 2.6.1.1, pg no 37 to 38*

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
	Project should be indicated.	being/will be used. No fresh water is being or will be sourced for mining purpose. Same information along with detailed water balance is given in this EIA/EMP Report.	
27.	Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water is being sourced from rain water harvesting and mine sump. Same information is given in this EIA/EMP Report.	*Chap II, Para 2.6.1.1, pg no 37 to 38*
28.	Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Water conservation measures such as, 10 KLD of domestic waste water generated from mine office will be disposed in soak pit via septic tank. Rainwater collected in the mine sump will be used in mining activities eventually other than these various methods to conserve water will be adopted for the project have been incorporated in EIA/EMP Report. For Rainwater harvesting, 56.334 has been converted into water reservoir at present and around 100 ha will be converted at conceptual stage. Other than these other measures are also proposed to be adopted in the project and the same has been incorporated in EIA/EMP Report. Details of water budget is given as ***Annexure VIII*** with ADS Reply.	*Chap IV, Para 4.2.3.4, pg no 114* Chap VII, Para 7.3, pg no 133 to 135
29.	Impact of the project on the water quality, both surface and groundwater should be assessed and necessary safeguard measures, if any required, should be provided.	There is a sub canal passing through the lease area and a canal is passing adjacent to the lease area, there is/will be no as such impact on the surface water bodies as no mining activity will interfere the natural drainage pattern and also to prevent the surface run-off bunds will be prepared and drains will be prepared to channelize the rainwater towards temporary unused pit/water reservoir. There is/will be no waste water generation due to mining. There will be marginal impact on ground water quality due to intersection of water table & dewatering of water for mining activities for which	*Chap IV, Para 4.2.3, pg no 113 to 114* **Annexure XIV**

<table>
<tr><th>ToR Ref</th><th>ToR Point</th><th>Compliance</th><th>Ref in EIA / EMP Report</th></tr>
<tr><td></td><td></td><td>necessary permission from CGWA has been obtained vide letter no CGWA/NOC/MIN/ORIG/2018/3015 dated 31.01.2018 and to mitigate the impact domestic waste water will be disposed in soak pit and regular ground water monitoring will be done.
Necessary safeguard measures proposed to be adopted have also been incorporated in this Final EIA/EMP Report.</td><td></td></tr>
<tr><td>30.</td><td>Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished</td><td><table><tr><td>Elevation Range:</td><td>36 m to 54 m AMSL</td></tr><tr><td>Water Table</td><td>Pre Monsoon: 6.0 to 12.0 m bgl</td></tr><tr><td></td><td>Post Monsoon: 4.8 to 10.7 m bgl</td></tr><tr><td>Present working depth</td><td>5 to 12 m</td></tr><tr><td>Ultimate Working Depth:</td><td>5 to 12 m</td></tr></table>The above figures show that the mining working has intersected ground water table. Necessary perission from CGWA has been obtained vide letter no CGWA/NOC/MIN/ORIG/2018/3015 dated 31.01.2018.
Detailed Hydro-geological study has been carried out and incorporated in this EIA/EMP Report.</td><td>Chap II, Table 2.8, pg no 44
<u>Annex XIII</u>
<u>Annex XIV</u>
Chap VII, Para 7.3, pg no 133 to 135</td></tr>
<tr><td>31.</td><td>Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out</td><td>There is a sub canal passing through the lease area passing through the lease area. All safety measures are being/ will be taken. A safety distance of 50 m is left from existing canal.</td><td></td></tr>
<tr><td>32.</td><td>Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.</td><td><table><tr><td>Elevation Range:</td><td>36 m to 54 m AMSL</td></tr><tr><td>Water Table</td><td>Pre Monsoon: 6.0 to 12.0 m bgl</td></tr><tr><td></td><td>Post Monsoon: 4.8 to 10.7 m bgl</td></tr><tr><td>Present working</td><td>5 to 12 m</td></tr></table></td><td>Chap II, Table 2.8, pg no 44</td></tr>
</table>

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
		depth | Ultimate Working Depth: | 5 to 12 m A schematic diagram showing all mining details for the same is enclosed with this EIA/EMP Report.	
33.	A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project. Phase wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for greenbelt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species & the species which are tolerant to pollution.	Total area under greenbelt/plantation up to conceptual stage is 46.0 ha (22.77 ha under greenbelt and 23.23 ha under plantation). As on date 11.0 ha area has been covered under greenbelt/Plantation. (3.69 ha along the lease periphery and 7.31 ha along road and bund and near office. Remaining 35 ha area will be covered under greenbelt/Plantation up to conceptual stage. Detailed breakup of greenbelt /plantation with corresponding coordinates are given as ***Annexure IX***. With ADS reply Species selected for green belt will have greater ecological value and good utility value to local population. Local Species are being/will be selected with consultation of local forest dept. Detailed Time bound Progressive Greenbelt Development Plan in a tabular form has been prepared and incorporated in this Final EIA/EMP Report.	*Chap X, Para 10.5, Pg no 151 to 154*
34.	Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road	This is an existing mine. The excavated limestone with no change in production capacity is loaded into tippers by wheel loaders and then transported by tippers (16-18 tonens)/tip trailers from Sugala mine to cement plant located at Ambujanagar, Gujarat. Hence, there will be neither increase in truck traffic in the present road network nor there will be additional load on local transport infrastructure due to the project. Details are included in this EIA/EMP Report.	*Chap IV, Para 4.2.8, Pg no 120 to 121*

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
	Congress Guidelines.		
35.	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA report.	Infrastructure facilities like rest shelter, drinking water facilities, first aid centers etc. have been provided to the mine workers. Sugala mine is situated about 13 Kms from Plant at Ambujanagar where all the amenities are available for employees. Most of the staff members are staying at company's colony near Cement Plant at Ambujanagar and in surrounding villages of mine. Accommodation has been provided for staff members. Transport facility from Ambujanagar to mine has also been provided by company for staff to discharge their duties. Details have been incorporated in this EIA/EMP Report.	*Chap II, Para 2.4.1, Pg no 36*
36.	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report	Post-Mining (Conceptual) Land Use of Core Zone with Environment Management has been prepared. At the conceptual stage, total mined-out area will be 360 ha out of which 1.80 ha will be used for public/haul road, 100 ha converted to water reservoir, 260 ha will be backfilled followed by Agro-farm, 46 ha will be covered by Greenbelt/plantation (including safety zone around the mining lease periphery, along the road etc.), 1.48 ha covered under water bodies (river/nallah/canal/pond) and 8.08 ha area will remain undisturbed till life of mine. Conceptual Plan and sections have been enclosed.	*Chap II, Para 2.7, Pg no 47* ***Annex XVD***
37.	Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.	Occupational hazards involved in mines are related to dust pollution, noise pollution, and injuries from equipment and fall from high places. DGMS guidelines regarding occupational health are followed. Personal Protective Equipments are provided to all people working in mine. Pre-placement Medical examination is being done during the time of joining of the employee and periodical medical examination is being/will be done at an interval of	*Chap X, Para 10.6, Pg no 154 to 155*

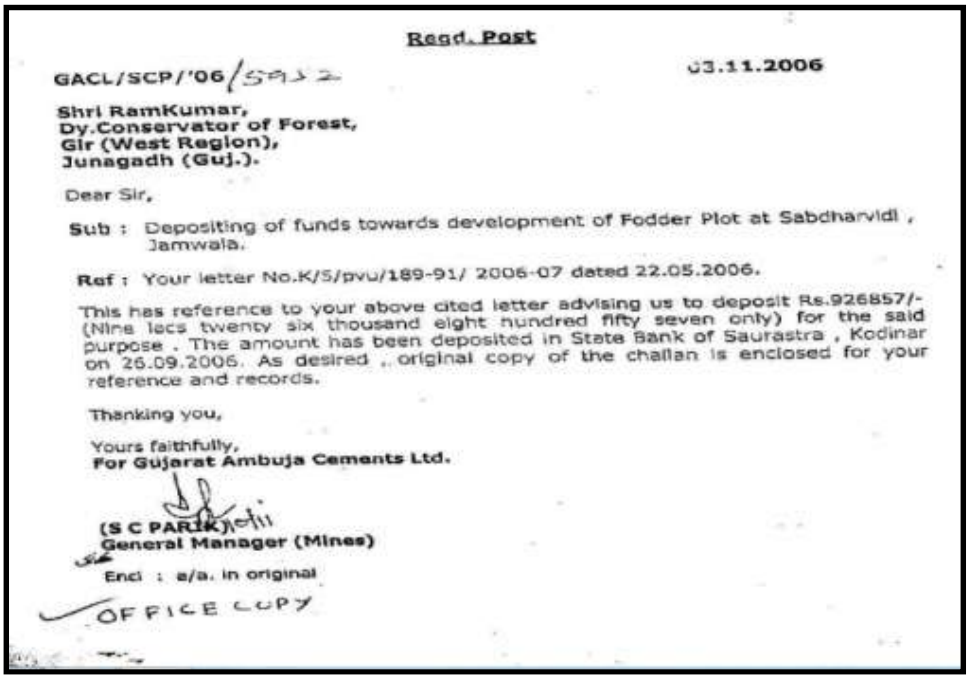
ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
		every 5 years for workers of below 45 years of age and at an interval of 3 years for the workers above the age of 45 years. Details of pre-placement and periodical medical examination schedule are given in EIA/EMP Report.	
38.	Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	The most common diseases prevailing in the region are viral fever, malaria fever, enteric fever, bronchitis, gastroenteritis, hypotension, general weakness, diabetes mellitus, scabies, anorexia, conjunctivitis etc. None of these can be related to the project and allied activities of the project. Public health implications of the project and related activities for the population in the impact zone have been evaluated and common diseases were identified. The same is given in this EIA/EMP Report	*Chap IV, Para 4.2.7, Pg no 119*
39.	Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.	Ambuja Cement Foundation (ACF), a CSR arm of ACL, has been undertaking community development works on water resource, drinking water, agriculture, animal husbandry, health, education and skill development in Lodhva village since 1999. Details of community welfare activities to be done for the local community, along with proposed budget have been incorporated in this EIA/EMP report.	*Chap VIII, Para 8.2.4.1 to 8.2.4.2, pg no 144 to 147.*
40.	Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.	Environmental management plan (EMP) for this mining project has been prepared and incorporated in this EIA/EMP report.	*Chap X, Pg no 150 to 155*
41.	Public hearing points raised and commitment of the Project Proponent on the same along with time bound action plan with budgetary provisions to implement the same should be provided and also incorporated in the draft	The public hearing has already been conducted on 17.12.1998 for same production capacity of 1.29 Million TPA and the concerns of the general public have already been considered. Now the instant project is submitted under notification dated	

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
	EIA/EMP Report of the Project	06.04.2018 hence, public hearing is exempted. Details of concerns raised during public hearing and action plan against the concerns are enclosed as ***Annexure IV*** with ADS Reply. As per ADS by MoEFCC, a meeting with Sugala and Jagatiya mines Sarpanch and other villagers held in presence of leaders from ACL. Snaps and Video captured. MOM of the meeting is enclosed herewith as ***Annexure III*** with ADS Reply covering the concerns raised by village representative during meeting.	*Chap VII, Para 7.2, Pg no 133*
42.	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the project should be given	There is no litigation pending against the project in any court.	
43.	The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.	• Total Project cost: Rs.288.5 Crores/- including land and machinery • Capital Cost for EMP: Rs. 10 Lakhs/- • Annual Recurring Cost for EMP: Rs. 51 Lakhs per annum/- Details of the same are given in this EIA/EMP Report.	*Chap VI, Para 6.4, Pg no 132*
44.	A disaster management plan shall be prepared and included in the EIA/EMP report.	Disaster Management and Risk Assessment Plan has been prepared and incorporated in this EIA/EMP report	*Chap VII, Para 7.4, Pg no 135 to 142*
45.	Benefits of the project if the project is implemented should be spelt out. The benefits of the project shall clearly indicate environmental, social, economic, employment potential etc.	Benefits of the Project clearly indicating environmental, social, economic, employment potential, etc. have been incorporated in this EIA/EMP Report	*Chap VIII, Pg no 143 to 148*
46.	The activities and budget earmarked for Corporate Environmental Responsibility (CER) shall be as per Ministry's O.M No 22-65/2017-IA. II (M) dated 01.05.2018 and the action plan on the activities proposed under CER shall be submitted at the time of appraisal of the project included in the	Corporate Environment Responsibility (CER) will be done nearby mine site as per MoEFCC Office Memorandum F. No. 22-65/2017-IA.II, dated 01.05.2018; according to that project having capital investment of 288.5 Cr. Total cost for this Project is Rs. 288.5 Cr. have to spend as per tax slab of capital investment. Total	*Chap VIII, Para 8.2.4.2, Pg no 147*

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
	EIA/EMP Report.	project cost is divided according to different slabs in 2 parts as 100 crore and 188.5 crore. Upto 100 crore CER for brownfield projects will be 1 crores (1%) and for 188.5 crores CER will be 1.41 crores (0.75%). Therefore, total 2.41 crores will be allocated towards CER activities (for 5 Years) according to Office Memorandum.	
47.	The Action Plan on the compliance of the recommendations of the CAG as per Ministry's Circular No. J-11013/71/2016-IA. I (M), dated 25.10.2017 need to be submitted at the time of appraisal of the project and included in the EIA/EMP Report.	Noted and complied	-
48.	Compliance of the Ministry's Office Memorandum No. F: 3-50/2017-IA. III (Pt.), dated 30.05.2018 on the judgment of Hon'ble Supreme Court, dated the 2nd August,2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India needs to be submitted and included in the EIA/EMP Report.	Undertaking against the judgment of Hon'ble Supreme Court dated the 2nd August 2017 in Writ Petition (Civil) No. 114 of 2014 in the matter of Common Cause versus Union of India and Ors has been submitted during application submission and same is also enclosed with this EIA/EMP report.	**Annex I**
Besides the above, the below mentioned general points are also to be followed			
a)	All documents to be properly referenced with index and continuous page numbering.	Complied with	-
b)	Where data are presented in the Report especially in tables, the period in which the data were collected and the sources should be indicated.	Complied with.	-
c)	Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC / NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the project.	Analysis results of water, air, soil, noise etc. for the project have been incorporated in this report. Noted.	Chap III, Para 3.11 to 3.14, pg no 72 to 93
d)	Where the documents provided are in a language other than English, an English translation should be provided.	Complied with.	

ToR Ref	ToR Point	Compliance	Ref in EIA / EMP Report
e)	The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Questionnaire for environmental appraisal of mining projects is enclosed with this EIA/EMP report.	***Annex XVI***
f)	While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should also be followed.	Complied with	
g)	Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the Final EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	Complied with	
h)	As per the circular no.J-11011/618/2010-IA.II(I) dated 30.05.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.	Certified Compliance Report of existing EC has been obtained from MoEFCC regional Office vide their letter No 3-7/2002 (ENV)/393 dated 26.06.2019. Same information is given in this EIA/EMP Report	***Annex-XVIII C*** Chap I, Table 1.1, Pg no 28
i)	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Complied with.	

SUGALA LIMESTONE MINES - EC COMPLIANCE - October'2019 - March'2020

S.No.	Condition	Compliance Status	Details
A. Specific Conditions			
i	Mining activities including transportation of material from the mine site should be carried out only during day time (6 a.m. to 6 p.m.)	Complied	• Mining activities including transportation of material from the mine site is being carried out only during day time (6 a.m. to 6 p.m.). No mining is being done after 6 p.m.
ii	Company should contribute for development of fodder plots in the nearby reserve forests areas.	Complied	• We have developed 9.0 hectares of fodder plot at Sabdharvidi, Jamvalajointly with Forest Department.The fund was allotted in two stages: In first stage, fund of Nine Lakhs Twenty Six Thousand Eight Hundred and Fifty Seven thousand (926857/-) was released vide our letter No. GACL/SEP/06/5952 dated 03/11/2006. In second Stage, fund of Twelve Lakhs Ninety Nine Thousand Eight Hundred Thirty Nine (1299839/-) was released vide our letter No. GACL/GEO/TRR/05 Dated 15/02/2005. Details of fodder plot developed has been already submitted to MoEF vide our submission dated 25.12.2010 vide letter no. ACL/EMD/F-16/2010/55926.
`			
iii	Prior permission from the Forest Department / concerned authorities should be taken for cutting of trees for any mining activity in the lease area.	Complied	• No tree has been cut for any mining activity till date. Although permission has been obtained from Mamlatdar, Kodinar for cutting of trees in mine lease area. Copy of permission granted by Mamlatdar has been already submitted to MoEFCC vide our **submission dated 25.12.2010 vide letter no.ACL/EMD/F-16/2010 /55926.**

Regd. Post

GACL/SCP/'06/5932 03.11.2006

Shri RamKumar,
Dy.Conservator of Forest,
Gir (West Region),
Junagadh (Guj.).

Dear Sir,

Sub : Depositing of funds towards development of Fodder Plot at Sabdharvidi , Jamwala.

Ref : Your letter No.K/5/pvu/189-91/ 2006-07 dated 22.05.2006.

This has reference to your above cited letter advising us to deposit Rs.926857/- (Nine lacs twenty six thousand eight hundred fifty seven only) for the said purpose . The amount has been deposited in State Bank of Saurastra , Kodinar on 26.09.2006. As desired , original copy of the challan is enclosed for your reference and records.

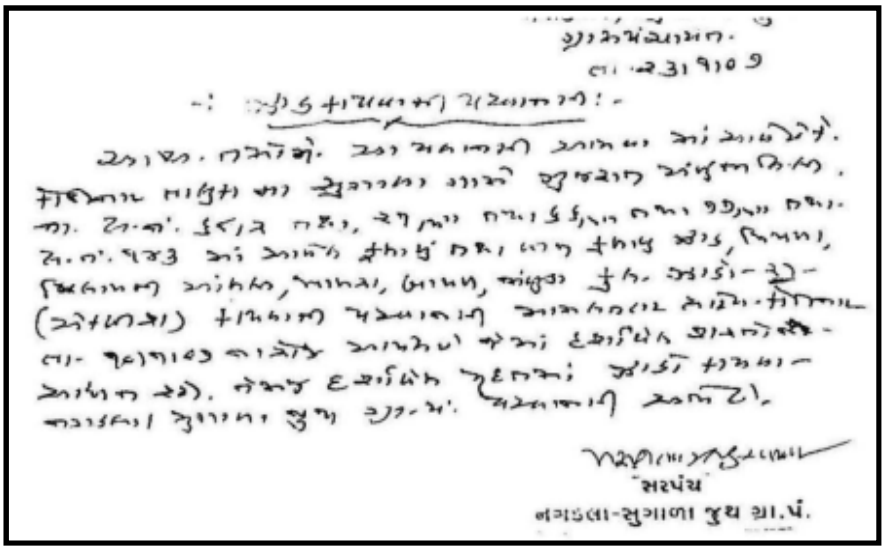
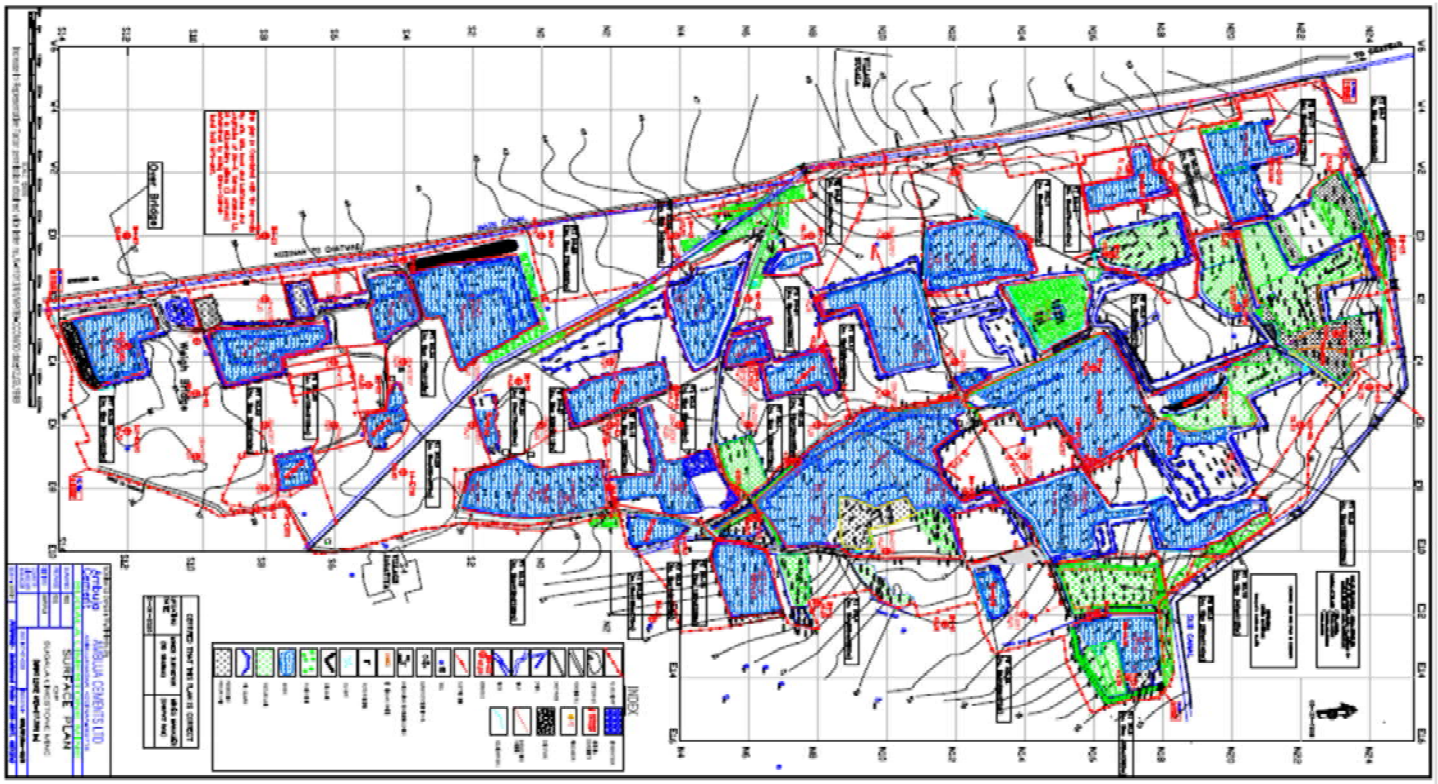
Thanking you,

Yours faithfully,
For Gujarat Ambuja Cements Ltd.

(S C PARIKH)
General Manager (Mines)

Encl : a/a. in original

OFFICE COPY

			
iv	A 250 m wide corridor along the nearest bank of singoda river should be kept undisturbed.	Complied	• Corridor along the nearest bank of Singoda River has been kept undisturbed. Surface plan is attached as under showing 250 m wide corridor is kept undisturbed.
			
v	Fencing (other than barbed wire) all around the lease area should be provided.	Complied & ongoing process as the mining faces advance	• Total peripheral boundary wall along the lease periphery is 11.2 km. Out of this, 3.3 kms has already been constructed and 2.2 kms is under construction while remaining 5.7 km boundary wall to be constructed, where surface right is under progress. • Peripheral fencing of bella stone is provided along the excavated area. Total 8021.45 meters of brick wall, 30290.50 meters of barbed wire a meters fencing have

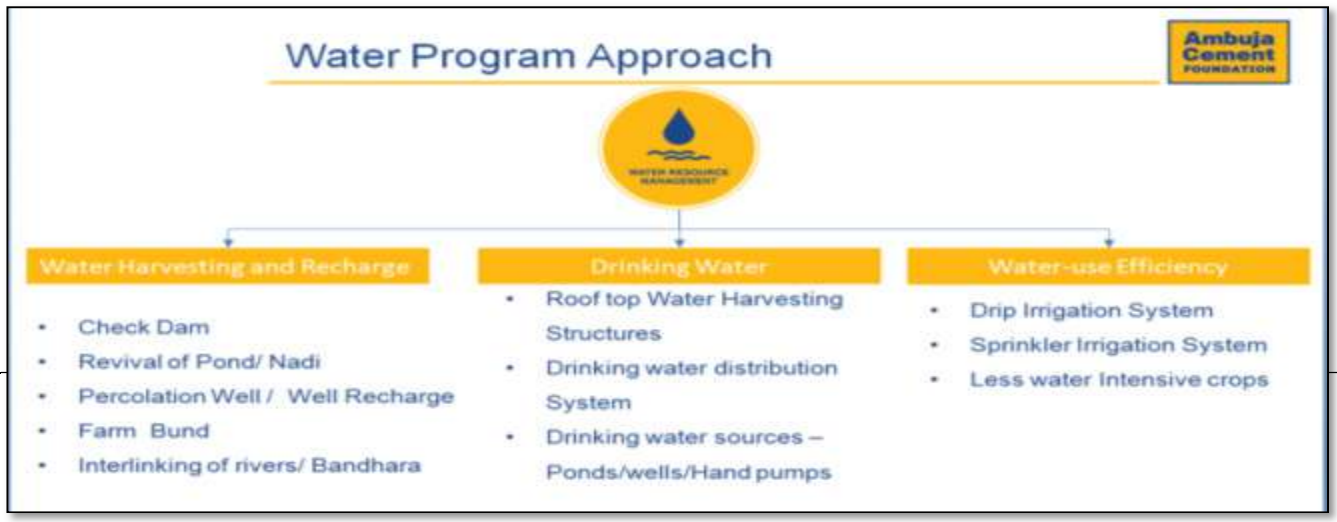
			been done.

Mines	Completed Till 29th Feb 2020 (metres)		
	No of Pits	**Brick Wall**	**Barbed Wire**
SUGALA	**33**	**8021.45**	**30290.50**

Bella Stone Wall Fencing

Barbed Wire Fencing

vi (a)	In the eventuality of any drought in the area, the project authorities should take prior approval of the Central Ground Water Authority for dewatering the mine and Ministry of Environment & Forest should be kept informed.	Noted and Complied as there has been no drought in the area till date	• So far there has been no drought condition. Letters for the same has been received from Office of Deputy Executive Engineer's Irrigation Sub Division, Kodinar vide letter No PB/Certificate/38 dated 28.01.2020 and from Gujarat Water supply and sewerage Board vide letter no PB/49 dated 29.01.2020 which states that there is not reported any report of drought during 2002 to 2020. • In case of any drought conditions prevailing in future, we will take necessary approval from Central Ground Water Authority for dewatering the mine and will also inform the same to Ministry of Environment & Forest. More-over we have not dewater till date.
vi (b)	In case of depletion of water in the wells of nearby villages, the project authorities should provide water supply free of cost to the villagers.	There is no depletion of water in surrounding area wells	• We have done several measures under water resource management through our Ambuja Cement Foundation; which has help to improve the water regime of the area. This has increased water level of all the nearby wells in and around mining lease. In case of depletion of water in the wells of nearby villages, we will supply water on free of cost basis.



FARMING DONE WITH DRIP IRRIGATION METHOD AT JAGATIYA VILLAGE

DRIP INSTALLATION WORK AT FARM

vii	Construction of check dam(s) in the shingoda river and also release of mine water discharge should be undertaken with prior approval of Chief Wild Life Warden (CWLW), Government of Gujarat to ensure undisturbed movement of lions through the Shingoda river bed, which is an established migratory route for lions and other animals.	➢ Complied related to construction of check dams (06 Nos.). ➢ No mine water discharge ➢ CWCL permission obtained	• Mines are Zero Water discharge. • In addition rain water is being stored in mined out pit area developed as a water reservoir. So far we have constructed 06 nos. of Check dams on river Shingoda and 01 no. of tidal regulator at Muldwarka. All the check dams constructed on Shingoda River are located in downstream area from mine lease boundary on Shingoda River. All the check dams have been constructed under partnership with Govt. of Gujarat. Permission granted by Govt. of Gujarat, has been already submitted to MoEF vide our submission on 25.12.2010 vide letter no. ACL/EMD/F-16/2010/55926. List of Check dams constructed are enclosed as under :

Details of Check dams across Shingoda River:

Sr. No.	Name of Village	Type of Structure	Year of Construction	Total Cost Rs. In Lacs	Storage Capacity in MCFT
1	Ronaj	Construction of Check dam	2002	35.17	6.31
2	Dudana (Fruit Nursery)	Check dam height raising	2001	7.1	3.51
3	Chhachhar	Construction of Check dam	2004	12.06	6.2
4	Dudana	Construction of Check dam	2004	47.62	5.25
5	Kodinar (Kubeshwar)	Construction of Check dam	2004	23.1	4.17
6	Muldwarka	Construction of Tidal Regulator	2009	79.58	57.64
7	Ronaj (Bhekheshwar Dam)	Dam , Under construction	Start in 2009	840	35.0

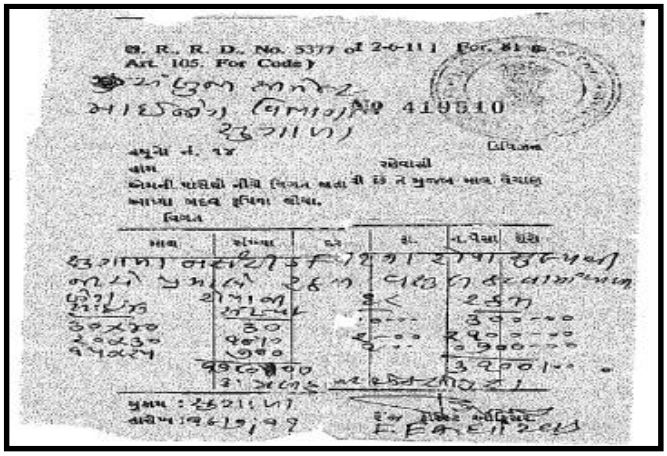
CHECK DAM CONSTRUCTED AT JAGATIYA FOR WATER CONSERVATION

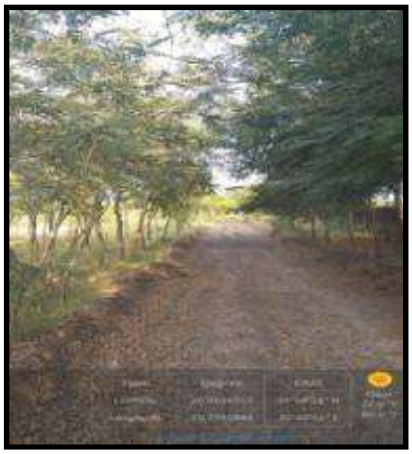
CHECK DAM AT SUGALA MINES BUFFER ZONE VILLAGE

Viii	Top soil should be properly stacked at earmarked dump site(s) with adequate measures and should be used for reclamation and rehabilitation of mined out areas.	Complied	• All the mining activities in said period are restricted within already broken area and top soil as and when removed is directly being utilized for reclamation and rehabilitation of mined out area. • So far 32.87 Ha areas have been reclaimed and rehabilitated and this will be ongoing process.

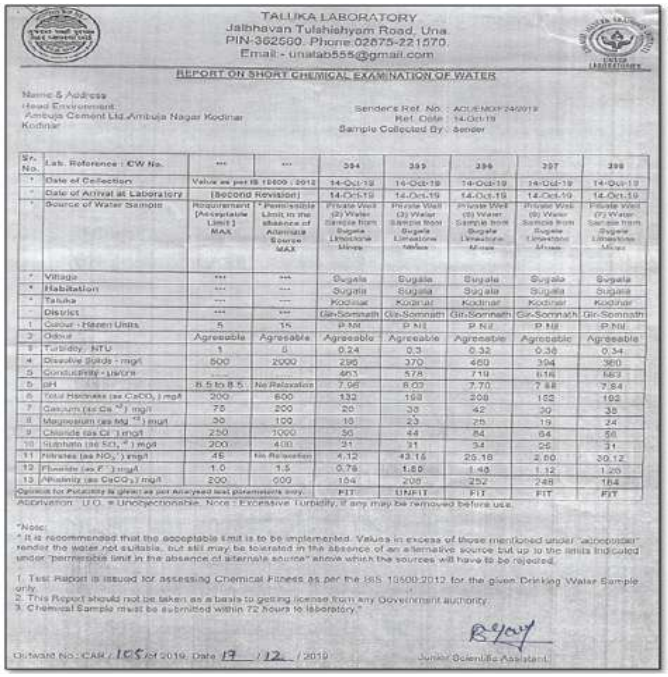
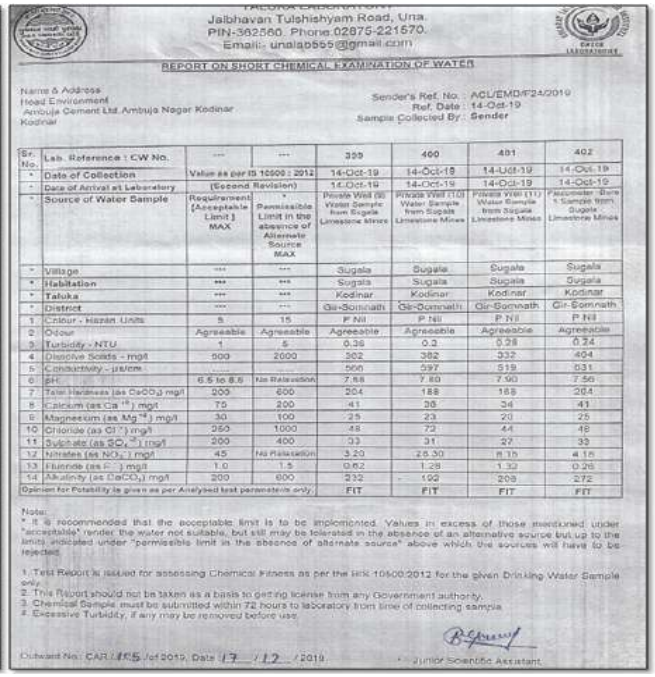
S. No.	Year	Excavated Area (In Ha)	Reclamation Work (In Ha)	
			Agri Farm	Water Reservoir
1	2002 - 03	10	0	0
2	2003 - 04	28.4	0	0
3	2004 - 05	4.1	0	0
4	2005 - 06	13.82	0	0
5	2006 - 07	6.93	0	0
6	2007 - 08	2.97	1	0
7	2008 - 09	11.06	1.27	0
8	2009 - 10	14.28	2.79	0
9	2010 - 11	4.0616	7.0261	0
10	2011 - 12	19.5677	1.4245	0
11	2012-13	11.6447	3.095	0
12	2013-14	7.6909	3.3944	0
13	2014-15	7.8389	5.9361	0
14	2015-16	15.1005	2.2633	0
15	2016-17	9.8151	3.1481	13.0982
16	2017-18	13.6487	1.4129	0
17	2018-19	8.4378	0.1148	0
	Total	189.3659	32.8752	13.0982

ix	Catch dams and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows soil and mineral dumps. The water so collected should be utilized for watering the mine area, roads, green belt	Complied	Garland drains have been constructed around the working mine pits to channelize rain water flowing into working mine pit Catch drains and siltation ponds have also been constructed within mine lease to check flow of surface runoff as well as to prevent siltation of natural courses

	development etc. The drains should be regularly desilted and maintained. Garland drain (Size, gradient & length) and sump capacity should be designed keeping 50 % safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material.		
X	A green belt of adequate width all around the ML area should be developed by planting the native plant species in consultation with local DFO/ Agriculture Department. At least 2000 plant species / ha. Should be planted. Plantation should also be raised along the roads, canal, dump sites etc.	Complied and on-going process	• Total area under greenbelt/plantation up to conceptual stage is 46.0 ha (22.77 ha under greenbelt and 23.23 ha under plantation). As on date 11.0 ha area has been covered under greenbelt/Plantation. (3.69 ha along the lease periphery and 7.31 ha along road and bund and near office. Remaining 35 ha area will be covered under greenbelt/Plantation up to conceptual stage • We are in the process of obtaining surface right of remaining lease boundary area to develop further green belt. • Saplings are being provided by local forest department for plantation. Invoice of the same is attached as under: 
	Interactions are being carried out with Agriculture University, Forest department &KVK for plantation/afforestation. Even forest dept. is using sapling from our nursery for tree plantation. Details of mines reclamation and plantation are enclosed as under : **SUGALA MINES Greenbelt & Plantation Details** 		



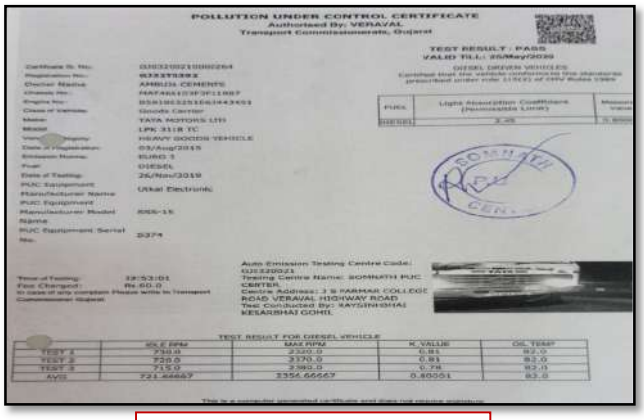
xi	The North block of the mine should be fully converted to agricultural farms; the middle block should also be converted to agricultural farms/orchards and partly for water harvesting. Southern block of the mine should be converted to reservoir for water storage. Efforts should be made to backfill the worked out areas concurrently to the extent possible.	Complied and on-going process.	• **Area of 32.87 Ha** has been developed as agri-farm land in Consultation with **Krishi Vigyan Kendra (KVK), Gir-Somnath** has shown in Surface Plan attached as under:
xii	A detailed mine decommissioning plan should be submitted to the Ministry of Environment & Forests 5 years in advance for approval.	Will be compiled at the time of decommissioning of mine	• Point noted and will be compiled at the time of mine closure. We will submit detailed mine decommissioning plan to the Ministry of Environment, Forest & Climate Change & **IBM 5 years in advance for approval. As our mining lease is valid up to 01.09.2052.**

xiii	Regular monitoring of ground water level and quality should be carried out by establishing a network of existing wells and constructing new piezometers. Monitoring should be done four times a year – pre- monsoon (April/May), monsoon (August), post-monsoon (November), and winter (January). Data thus collected should be sent at regular `intervals to MoEF& the Central Ground Water Authority.	Complied	• Complied. Water quality testing is carried out with the help of MoEF&CC certified third party laboratory on Quarterly basis. Water levels are being recorded in 13 open wells of buffer zone and 2 piezometers are constructed in mines area core zone. • Data collected is being communicated regularly to **CGWA, New Delhi, MoEF&CC Regional office (SEZ)** Bhopal, CGWB Regional Director Gandhinagar. • Ground water level & quality monitoring is being done regularly by establishing a network of ground water monitoring stations. **Report is submitted to MoEF&CC regional office Bhopal on six monthly basis. Ground water level & quality monitoring reports are enclosed as under :**
	 TALUKA LABORATORY Jalbhavan Tulshishyam Road, Una. PIN-362560. Phone:02875-221570. Email:- unalab555@gmail.com REPORT ON SHORT CHEMICAL EXAMINATION OF WATER Name & Address Head Environment Ambuja Cement Ltd.Ambuja Nagar Kodinar Kodinar Sender's Ref. No. : ACL/EMD/F-24/2019 Ref. Date : 14-Oct-19 Sample Collected By : Sender Sr. No. / Lab. Reference : CW No. / --- / --- / 394 / 399 / 396 / 397 / 398 * Date of Collection / Value as per IS 10500 : 2012 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 * Date of Arrival at Laboratory / (Second Revision) / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 * Source of Water Sample / Requirement (Acceptable Limit) MAX / * Permissible Limit in the absence of Alternate Source MAX / Private Well (2) Water Sample from Sugala Limestone Mines / Private Well (3) Water Sample from Sugala Limestone Mines / Private Well (5) Water Sample from Sugala Limestone Mines / Private Well (6) Water Sample from Sugala Limestone Mines / Private Well (7) Water Sample from Sugala Limestone Mines * Village / --- / --- / Sugala / Sugala / Sugala / Sugala / Sugala * Habitation / --- / --- / Sugala / Sugala / Sugala / Sugala / Sugala * Taluka / --- / --- / Kodinar / Kodinar / Kodinar / Kodinar / Kodinar * District / --- / --- / Gir-Somnath / Gir-Somnath / Gir-Somnath / Gir-Somnath / Gir-Somnath 1 Colour - Hazen Units / 5 / 15 / P.Nil / P.Nil / P.Nil / P.Nil / P.Nil 2 Odour / Agreeable / Agreeable / Agreeable / Agreeable / Agreeable / Agreeable / Agreeable 3 Turbidity - NTU / 1 / 5 / 0.24 / 0.3 / 0.32 / 0.36 / 0.34 4 Dissolve Solids - mg/l / 500 / 2000 / 296 / 370 / 460 / 394 / 380 5 Conductivity - µs/cm / --- / --- / 463 / 578 / 719 / 616 / 593 6 pH / 6.5 to 8.5 / No Relaxation / 7.96 / 8.03 / 7.70 / 7.88 / 7.84 7 Total Hardness (as $CaCO_3$) mg/l / 200 / 600 / 132 / 168 / 208 / 152 / 192 8 Calcium (as Ca^{+2}) mg/l / 75 / 200 / 20 / 38 / 42 / 30 / 38 9 Magnesium (as Mg^{+2}) mg/l / 30 / 100 / 16 / 23 / 25 / 19 / 24 10 Chloride (as Cl^{-}) mg/l / 250 / 1000 / 50 / 44 / 64 / 54 / 56 11 Sulphate (as SO_4^{-2}) mg/l / 200 / 400 / 31 / 31 / 34 / 24 / 31 12 Nitrates (as NO_3^{-}) mg/l / 45 / No Relaxation / 4.12 / 43.15 / 25.16 / 2.60 / 30.12 13 Fluoride (as F^{-}) mg/l / 1.0 / 1.5 / 0.76 / 1.80 / 1.48 / 1.12 / 1.20 14 Alkalinity (as $CaCO_3$) mg/l / 200 / 600 / 184 / 208 / 252 / 248 / 184 Opinion for Potability is given as per Analysed test parameters only. / FIT / UNFIT / FIT / FIT / FIT / FIT / FIT Abbrivation : U.O. = Unobjectionable, Nice : Excessive Turbidity, if any may be removed before use. *Note: * It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under "acceptable" render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under "permissible limit in the absence of alternate source" above which the sources will have to be rejected. 1. Test Report is issued for assessing Chemical Fitness as per the IS 10500:2012 for the given Drinking Water Sample only. 2. This Report should not be taken as a basis to getting license from any Government authority. 3. Chemical Sample must be submitted within 72 hours to laboratory. Outward No.: CAR / 165 /of 2019, Date 17 / 12 / 2019 Junior Scientific Assistant	 Jalbhavan Tulshishyam Road, Una. PIN-362560. Phone:02875-221570. Email:- unalab555@gmail.com REPORT ON SHORT CHEMICAL EXAMINATION OF WATER Name & Address Head Environment Ambuja Cement Ltd.Ambuja Nagar Kodinar Kodinar Sender's Ref. No. : ACL/EMD/F-24/2019 Ref. Date : 14-Oct-19 Sample Collected By : Sender Sr. No. / Lab. Reference : CW No. / --- / --- / 395 / 400 / 401 / 402 * Date of Collection / Value as per IS 10500 : 2012 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 * Date of Arrival at Laboratory / (Second Revision) / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 / 14-Oct-19 * Source of Water Sample / Requirement (Acceptable Limit) MAX / * Permissible Limit in the absence of Alternate Source MAX / Private Well (9) Water Sample from Sugala Limestone Mines / Private Well (10) Water Sample from Sugala Limestone Mines / Private Well (11) Water Sample from Sugala Limestone Mines / Piezometer Bore Sample from Sugala Limestone Mines * Village / --- / --- / Sugala / Sugala / Sugala / Sugala * Habitation / --- / --- / Sugala / Sugala / Sugala / Sugala * Taluka / --- / --- / Kodinar / Kodinar / Kodinar / Kodinar * District / --- / --- / Gir-Somnath / Gir-Somnath / Gir-Somnath / Gir-Somnath 1 Colour - Hazen Units / 5 / 15 / P.Nil / P.Nil / P.Nil / P.Nil 2 Odour / Agreeable / Agreeable / Agreeable / Agreeable / Agreeable / Agreeable 3 Turbidity - NTU / 1 / 5 / 0.36 / 0.2 / 0.28 / 0.24 4 Dissolve Solids - mg/l / 500 / 2000 / 362 / 382 / 332 / 404 5 Conductivity - µs/cm / --- / --- / 566 / 597 / 519 / 631 6 pH / 6.5 to 8.5 / No Relaxation / 7.68 / 7.80 / 7.90 / 7.56 7 Total Hardness (as $CaCO_3$) mg/l / 200 / 600 / 204 / 188 / 188 / 264 8 Calcium (as Ca^{+2}) mg/l / 75 / 200 / 41 / 36 / 34 / 41 9 Magnesium (as Mg^{+2}) mg/l / 30 / 100 / 25 / 23 / 20 / 25 10 Chloride (as Cl^{-}) mg/l / 250 / 1000 / 48 / 72 / 44 / 48 11 Sulphate (as SO_4^{-2}) mg/l / 200 / 400 / 33 / 31 / 27 / 33 12 Nitrates (as NO_3^{-}) mg/l / 45 / No Relaxation / 3.20 / 25.30 / 8.15 / 4.15 13 Fluoride (as F^{-}) mg/l / 1.0 / 1.5 / 0.62 / 1.28 / 1.32 / 0.26 14 Alkalinity (as $CaCO_3$) mg/l / 200 / 600 / 232 / 192 / 208 / 272 Opinion for Potability is given as per Analysed test parameters only. / FIT / FIT / FIT / FIT Note: * It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under "acceptable" render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under "permissible limit in the absence of alternate source" above which the sources will have to be rejected. 1. Test Report is issued for assessing Chemical Fitness as per the IS 10500:2012 for the given Drinking Water Sample only. 2. This Report should not be taken as a basis to getting license from any Government authority. 3. Chemical Sample must be submitted within 72 hours to laboratory from time of collecting sample. 4. Excessive Turbidity, if any may be removed before use. Outward No.: CAR / 165 /of 2019, Date 17 / 12 / 2019 Junior Scientific Assistant	
Xiv	Digital processing of the entire lease area using remote sensing technique should be carried out regularly once in three years for monitoring land use pattern and physiographic of the area and report submitted to the Ministry and its Regional Office at Bhopal.	Complied	• We carry out digital processing of the entire lease area once in every three year. Year 2019 report has been submitted to MoEFCC, New Delhi and its Regional Office Bhopal on Dated 02.03.2020 **vide letter No. ACL/EMD/F-9/2020/2092/87092.** Ambuja Cement ACL/EMD/F-9/2020/ Dt. 02.03.2020 The Director (e), Ministry of Environment, Forest and Climate Change (MoEF&CC), Regional Office, Western Region, Ground Floor, Vayu Shaswt, Link Road No.3, Near Shankar Nagar, Bhopal (M.P.) 462016. Subject : Digital processing report of land use pattern & physiography of the entire lease area using remote sensing Toolkesan for our Sugala Limestone Mines Reference No : EC - J-11015/6/2000-IA II (M) dated 20.02.2002 Dear Sir, This is with reference to EC granted by your good office vide letter No. – J-11015/6/2000-IA II (M) dated 20.02.2002 to our Sugala Limestone Mines Project of M/s Ambuja Cements Limited, located at village Sugala & Jagetiya, Taluka : Kodinar, District Gir-Somnath, Gujarat. As per the Specific condition No. XIV of the Environment Clearance, we are pleased to submit digital processing report of land use pattern & physiography of the entire lease area using remote sensing technique conducted in October 2019 as Annexure - I. This is for your kind information and record please. Thanking You, Yours Faithfully, For Ambuja Cements Limited Head-Environment Encl: As above CC: Ministry of Environment, Forest and Climate Change, 3rd Floor, Pollut Wing Indira Paryavaran Bhawan, Jor Bagh, New Delhi-110003	

Xv	Vehicular emissions should be kept under control and regularly monitored.	Complied	• Vehicular emissions are being checked & monitored regularly. Detail of P.U.C certificate by Somnath P.U.C. center (Approved by : Veraval transport commissionerate, Gujarat) is attached as under :

S.No	Machinery	Nos.(in use)
Heavy Earth Moving Machinery		
a)	Volvo Loader (4.6 m3)	01
b)	TATA tipper (3118 TC)	25
c)	Surface Miner – SM 2200	01
d)	Ripper Dozer D275A KOMATSU	01
e)	L580 Liebherr Loader	01
f)	Surface Miner – SM 2100	01
g)	Mahindra – 3118 TC	25

Details of Machinery



P.U.C Certificate

B. General Conditions

I	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment and Forests.	Complied	• There is no change in mining technology and scope of working.
Ii	No change in the calendar plan including excavation, quantum limestone and marl, waste / OB dumps should be made.	Complied	• There is no change in the calendar plan. As per approval from MoEF&CC ; we have annual mining capacity of 1.29 MTPA • Also the past yearwise actual production v/s sanctioned capacity is enclosed herewith.

LIMESTONE PRODUCTION DETAILS

S. No.	Year	EC Sanctioned Capacity (TPA)	Actual Limestone production (TPA)	Actula Marl production (TPA)
1	2002 - 03	1040000	73251	0
2	2003 - 03	1040000	1039953	0
3	2004 - 05	1040000	1039818	0
4	2005 - 06	1040000	1039777	0
5	2006 - 07	1040000	1039881	0
6	2007 -08	1290000	1289499	0
7	2008 - 09	1290000	1281161	0
8	2009 - 10	1290000	1289843	0
9	2010 - 11	1290000	1277822	0
10	2011 - 12	1290000	1231742	0
11	2012 -13	1290000	1257075	0
12	2013 - 14	1290000	1218109	0
13	2014 - 15	1290000	1281714	0
14	2015 -16	1290000	1289577	0
15	2016 -17	1290000	1288637	0
16	2017 - 18	1290000	1245886	0
17	2018 - 19	1290000	1277707	0
18	2019 - 2020 (Till March)	1290000	1278091	0

Iii	Five ambient air quality monitoring stations should be established in the core zone as well as buffer zone for SPM, RSPM, SO2, NOx and CO monitoring. Location of the	Complied	• **Five ambient air quality monitoring stations have been established in core & buffer zone.** Ambient air quality monitoring of core zone and buffer zone is being done every month. Monitoring reports are submitted on monthly basis to Regional Office, Junagadh of **Gujarat State Pollution Control Board.**

	ambient air quality stations should be decided on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultations with the State Pollution Control Board.		• Ambient air quality monitoring results for the period **October'2019 to March'2020** is enclosed as under. The location of the monitoring stations is finalized in consultation with **GPCB and renowned consultant Sh. B Padmanabh Murthy, Professor of JNU and former Director of IMD Met-Dept**.
iv	Data on ambient air quality should be regularly submitted to the Ministry including its Regional Office at Bhopal and the State Pollution control Board/ Central Pollution Control Board once in six months.	Complied	• Half yearly **ambient air quality monitoring report is being regularly submitted to MoEF&CC,** our last submission was on **25.11.2019 vide letter No. ACL/EMD/F-16/2019/2052.** • Ambient air quality monitoring results for the period **October'2019 to March'2020** is enclosed as under.

Ambient Air Quality Monitoring Results

(October 2019 - March 2020)

Month	Working Place					Sugala Village					Jagatiya Village				
	PM2.5	PM10	SO2	NOx	CO	PM2.5	PM10	SO2	NOx	CO	PM2.5	PM10	SO2	NOx	CO
Unit >	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(mg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(mg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(mg/m3)
Oct. 2019	35.00	60.00	12.30	16.30	BDL	28.00	56.00	11.80	15.40	BDL	26.00	49.00	11.20	15.20	BDL
	29.00	62.00	11.40	15.60	BDL	25.00	53.00	12.20	16.30	BDL	27.00	50.00	13.10	16.90	BDL
Nov.2019	27.48	46.90	9.50	17.00	BDL	28.62	51.15	11.20	12.60	BDL	29.65	50.12	10.60	16.48	BDL
	29.65	50.26	9.80	14.60	BDL	25.64	51.48	10.50	19.60	BDL	29.89	49.68	12.10	15.26	BDL
Dec.2019	29.65	48.59	9.90	16.30	BDL	26.45	50.15	10.20	13.30	BDL	28.19	53.67	10.40	15.48	BDL
	26.59	48.95	10.10	15.20	BDL	27.15	53.26	9.80	18.70	BDL	25.48	51.49	11.20	17.48	BDL
Jan. 2020	28.00	59.00	11.50	15.70	BDL	23.00	47.00	12.60	16.20	BDL	25.00	52.00	11.90	15.40	BDL
	30.00	56.00	11.90	15.20	BDL	27.00	54.00	12.40	16.10	BDL	26.00	48.00	11.30	15.60	BDL
Feb. 2020	24.15	46.25	10.20	13.60	BDL	26.90	51.18	10.80	13.40	BDL	24.15	49.68	9.90	14.50	BDL
	26.31	49.65	10.40	13.50	BDL	23.57	51.24	11.20	14.50	BDL	26.58	52.35	9.90	12.30	BDL
March 2020	27.00	48.00	11.30	14.20	BDL	25.00	50.00	12.50	15.78	BDL	20.00	46.00	11.60	15.30	BDL
	33.00	54.00	11.70	16.10	BDL	29.00	58.00	12.80	15.20	BDL	26.00	52.00	11.70	14.90	BDL
Minimum	**24.15**	**46.25**	**9.50**	**13.50**	**0.00**	**23.00**	**47.00**	**9.80**	**12.60**	**0.00**	**20.00**	**46.00**	**9.90**	**12.30**	**0.00**
Maximum	**35.00**	**62.00**	**12.30**	**17.00**	**0.00**	**29.00**	**58.00**	**12.80**	**19.60**	**0.00**	**29.89**	**53.67**	**13.10**	**17.48**	**0.00**
Average	**28.82**	**52.47**	**10.83**	**15.28**	#DIV/0!	**26.28**	**52.21**	**11.50**	**15.59**	#DIV/0!	**26.16**	**50.33**	**11.24**	**15.40**	#DIV/0!
Month	Chhachhar Village					Nagadala Village					Kansariya Village				
	PM2.5	PM10	SO2	NOx	CO	PM2.5	PM10	SO2	NOx	CO	PM2.5	PM10	SO2	NOx	CO
Unit >	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(mg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(mg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(µg/m3)	(mg/m3)
Oct. 2019	29.00	52.00	10.90	15.20	BDL	27.00	48.00	11.40	16.10	BDL	31.00	50.00	10.50	14.80	BDL
	27.00	49.00	12.40	16.20	BDL	29.00	53.00	11.90	15.10	BDL	26.00	47.00	10.70	15.90	BDL
Nov.2019	26.54	49.36	12.00	15.70	BDL	27.15	47.15	12.60	17.50	BDL	29.68	48.69	13.60	14.95	BDL
	30.26	48.45	13.70	13.30	BDL	27.90	50.26	11.60	14.60	BDL	24.62	52.15	11.20	15.89	BDL
Dec.2019	30.15	52.15	11.30	13.70	BDL	29.68	51.49	13.70	15.00	BDL	30.14	49.68	10.90	15.29	BDL
	28.95	50.12	14.70	16.30	BDL	29.31	49.62	10.60	15.90	BDL	22.48	48.15	13.30	13.26	BDL
Jan. 2020	25.00	52.00	11.90	15.50	BDL	22.00	46.00	12.60	16.60	BDL	27.00	49.00	11.40	15.20	BDL
	29.00	51.00	12.50	15.30	BDL	27.00	48.00	11.70	14.70	BDL	30.00	53.00	10.80	14.20	BDL
Feb. 2020	23.68	52.18	11.20	15.20	BDL	25.48	53.27	10.80	16.40	BDL	24.15	47.59	12.40	15.80	BDL
	25.17	54.18	11.60	14.90	BDL	24.19	50.18	12.60	13.50	BDL	21.47	55.29	11.00	16.80	BDL
March 2020	28.00	54.00	12.30	14.10	BDL	21.00	42.00	11.60	15.60	BDL	21.00	40.00	10.40	16.20	BDL
	23.00	53.00	12.60	15.10	BDL	24.00	48.00	12.70	14.60	BDL	25.00	51.00	11.60	15.00	BDL
Minimum	**23.00**	**48.45**	**10.90**	**13.30**	**0.00**	**21.00**	**42.00**	**10.60**	**13.50**	**0.00**	**21.00**	**40.00**	**10.40**	**13.26**	**0.00**
Maximum	**30.26**	**54.18**	**14.70**	**16.30**	**0.00**	**29.68**	**53.27**	**13.70**	**17.50**	**0.00**	**31.00**	**55.29**	**13.60**	**16.80**	**0.00**
Average	**27.15**	**51.45**	**12.26**	**15.04**	#DIV/0!	**26.14**	**48.91**	**11.98**	**15.47**	#DIV/0!	**26.05**	**49.30**	**11.48**	**15.27**	#DIV/0!

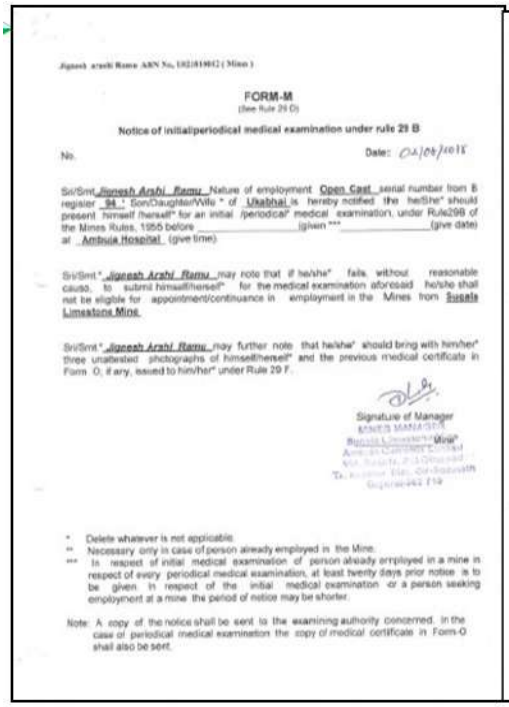
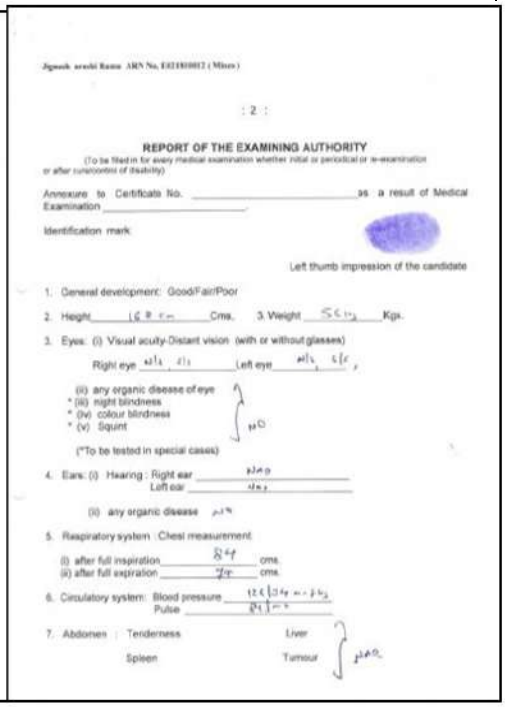
v	Adequate measures for control of fugitive emissions should be taken during drilling and blasting operations, loading and transportations of minerals etc.	Drilling and blasting is not applicable in our case. All other conditions complied	• Drilling and blasting is not applicable in our cases as we are using environment friendly Surface Miner machine. On all haul roads regular water sprinkling is being done by water tankers. Monitoring results of Air borne dust survey is enclosed below. All transportation vehicles are equipped with multi cap to transport material in covered condition

Air Borne Dust Survey - Sugala Mines (October-2019 to March-2020)											
Machine : Surface Miner				*Machine : Dozer*				*Machine : Loader*			
Date	Period	Location	RSPM (mg/m3)	Date	Period	Location	RSPM (mg/m3)	Date	Period	Location	RSPM (mg/m3)
22-Oct-19	14:00-22:00	Inside Cabin	0.31	23-Oct-19	14:00-22:00	Inside Cabin	0.26	24-Oct-19	14:00-22:00	Inside Cabin	0.29
6-Nov-19	6:00-14:00		0.30	7-Nov-19	6:00-14:00		0.28	8-Nov-19	6:00-14:00		0.27
10-Dec-19	14:00-22:00		0.32	11-Dec-19	14:00-22:00		0.28	12-Dec-19	14:00-22:00		0.41
8-Jan-20	6:00-14:00		0.28	9-Jan-20	6:00-14:00		0.32	10-Jan-20	6:00-14:00		0.39
12-Feb-20	14:00-22:00		0.28	13-Feb-20	14:00-22:00		0.26	14-Feb-20	14:00-22:00		0.36
4-Mar-20	6:00-14:00		0.36	5-Mar-20	6:00-14:00		0.29	6-Mar-20	6:00-14:00		0.45

Vi	Adequate measures should be taken for control of noise levels below 85 dB (A) in the work environment.	Complied	• All the machines are emitting noise well below 85 dB(A). We have deployed loader from LIEBHERR Germany which is the lowest noise generating machine in the world. Result of **Ambient noise monitoring** as well as **HEMM noise monitoring** report is attached below:

Ambient Noise Level Monitoring - Sugala Mines (October-2019 March-2020)										
Month	Noise Levels in dB(A)									
	Near Surface Miner		Haul road		Mines Office		Sugala Village		Chidivav Village	
	Leq (Day)	Leq (Night)	Leq (Day)	Leq (Night)	Leq (Day)	Leq (Night)	Leq (Day)	Leq (Night)	Leq (Day)	Leq (Night)
Oct-19	63	56	67	64	65	55	50	44	48	35
Nov-19	62	56	68	63	61	57	51	44	47	42
Dec-19	63	52	65	62	62	55	56	52	53	51
Jan-20	65	51	65	60	58	56	58	56	58	52
Feb-20	64	53	63	61	60	57	60	57	54	53
Mar-20	68	65	70	68	63	60	58	55	55	53

Noise Level of HEMM - Sugala Mines (October-2019 March-2020)									
Machine	Surface Miner			Loader			Dozer		
Month	Conditions	Noise Levels (dB)		Conditions	Noise Levels (dB)		Conditions	Noise Levels (dB)	
		At 5m. distance	At 10m. distance		At 5m. distance	At 10m. distance		At 5m. distance	At 10m. distance
Oct-19	While dozing the material	71	67	While loading to tipper	73	70	While mining	69	67
Nov-19		70	68		70	66		70	63
Dec-19		70	67		70	68		66	63
Jan-20		65	62		67	64		70	67
Feb-20		74	71		71	68		66	63
Mar-20		69	65		68	66		65	62

Vii	Personnel working in dusty areas should wear protective respiratory device and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance programme of the workers should be undertaken periodically to observe any contraction due to exposures of dust and corrective measures, if needed.	Complied	• All personnel working in mines are provided with PPE's i.e. dust masks, safety shoes, safety goggle, Safety Reflective Jacket & Helmet. Occupational health surveillance program of all the workers (Including Third party workmen) are being undertaken every year by our Occupational Health Centre through our AMH Ambuja Multi Hospital. There is no case of any contraction due to exposure of dust in any workmen. • They are also provided adequate training and information on safety and health aspects.
	 FORM-M (See Rule 29 C) Notice of initial/periodical medical examination under rule 29 B No. Date: 02/09/2018 Shri/Smt./Jignesh Arshi Ramu Nature of employment Open Cast serial number from B register 94 * Son/Daughter/Wife * of Ukabhai is hereby notified the he/She* should present himself /herself* for an initial /periodical* medical examination, under Rule29B of the Mines Rules, 1955 before (given)*** (give date) at Ambuja Hospital (give time). Shri/Smt.*Jignesh Arshi Ramu may note that if he/she* fails without reasonable cause, to submit himself/herself* for the medical examination aforesaid he/she shall not be eligible for appointment/continuance in employment in the Mines from Sugala Limestone Mine. Shri/Smt.*Jignesh Arshi Ramu may further note that he/she* should bring with him/her* three unattested photographs of himself/herself* and the previous medical certificate in Form O, if any, issued to him/her* under Rule 29 F. Signature of Manager Mine* * Delete whatever is not applicable. ** Necessary only in case of person already employed in the Mine. *** In respect of initial medical examination of person already employed in a mine in respect of every periodical medical examination, at least twenty days prior notice is to be given. In respect of the initial medical examination of a person seeking employment at a mine the period of notice may be shorter. Note: A copy of the notice shall be sent to the examining authority concerned. In the case of periodical medical examination the copy of medical certificate in Form-O shall also be sent.	 FORM - O (See Rule 29 (2) and 29 L) Report of Medical Examination under Rule 29B (To be issued in triplicate) Certificate No. Certificate that Shri/Shrimati Jignesh Arshi Ramu employed as Tipper-Operator in Sugala Limestone Mine Form B No. 94 has been examined for an initial/periodical* medical examination. He/She appears be 15/05/1992 Years of age. The findings of the examining authority are given in the attached sheet. It is considered that Shri/Smt Jignesh Arshi Ramu * (a) is medically fit for any employment in mines, * (b) is suffering from and is medically unfit for: (i) any employment in mine; or (ii) any employment below ground ; or (iii) any employment or work (c) is suffering from and should be again examined within a period of months. He/She will appear for re-examination with the result of test of " and the opinion of specialist from He/She* may be permitted/not* permitted to duties during this period. Signature of the Examining Authority Name and Designation in Block Letters. Place : Date : * Delete whatever not applicable. ** One copy of the certificate shall be handed over to the person concerned and another copy shall be sent to Manager of the mine concerned by register post, and the third copy shall be retained by the examining authority.	 : 2 : REPORT OF THE EXAMINING AUTHORITY (To be filled in for every medical examination whether initial or periodical or re-examination or after cure/control of disability) Annexure to Certificate No. as a result of Medical Examination Identification mark Left thumb impression of the candidate 1. General development: Good/Fair/Poor 2. Height Cms. 3. Weight Kgs. 3. Eyes: (i) Visual acuity-Distant vision (with or without glasses) Right eye (left eye (ii) any organic disease of eye * (iii) night blindness * (iv) colour blindness * (v) Squint ("To be tested in special cases) 4. Ears: (i) Hearing : Right ear Left ear (ii) any organic disease 5. Respiratory system : Chest measurement (i) after full inspiration cms (ii) after full expiration cms 6. Circulatory system: Blood pressure Pulse 7. Abdomen : Tenderness Liver Spleen Tumour
Viii	The fund earmarked for Environmental protection measures should be kept in separate account and not diverted for other purpose. Year wise expenditure should be reported to the Ministry of Environment & Forests.	Complied	• We have separate cost centre for environmental expanses and details of capital and recurring expenditure for environmental protection measures are attached below. Expenses incurred against Environment protection for **October'2019 to March'2020 is Rs. 42.56 Lakhs**.

Expenditure incurred in Environment Management Plan - SUGALA		
A. Capital Cost		
S.No	**Particulars**	**Cost**
1	Monitoring Equipments	37.08
2	Environment Laboratory	10
3	Others (Monitoring Van, DG Sets etc.	10
	Total (In Lacs INR)	**57.08**
B. Recurring Cost (October'19 to March'20)		
S.No	**Particulars**	**Cost**
1	Green belt development & Dust suppression	9.89
2	Manpower Cost *	28.51
3	House Keeping	1.68
5	Other Env. Protection (Environmental Monitoring)	1.23
6	Environment Awareness *	1.25
	Total (In Lacs INR)	**42.56**
* Expenditures are common for all the plants & mines.		

AMBUJA CEMENT FOUNDATION - AMBUJANAGR

EXP. DETAILS FOR THE PERIOD OF APRIL 2019 TO FEBRUARY 2020

Sr. No.	Programmes (List of activities /inputs)	ACF - ACL	From Govt	From Other Sources	Direct Funding	Community	TOTAL
1	WATAER RESOURC MANAGEMENT	76.39	9.78		0	5.2	91.37
2	AGRO BASED LIVELIHOOD	32.6		11.05	128.73	96.18	268.56
3	BCI	6.96		139.63	23.2	17.08	186.87
4	Krishi Vigyan Kendra (KVK)	3.75	121.69				125.44
5	SEDI- Ambujanagar	29.64		133.92		13.72	177.28
6	SEDI- Rajula			52.42			52.42
7	HEALTH & SANITATION	23.76			70.56	41.16	135.48
8	WOMEN EMPOWERMENT	11.58					11.58
9	INFRASTRUCTURE/ACL WELFARE	93.78					93.78
10	NON PLAN						0
11	ESTABLISHMENT	18.09					18.09
	TOTAL	296.55	131.47	337.02	222.49	173.34	1160.87

ix	The Regional Office of this Ministry located at Bhopal shall monitor compliance of the stipulated Environmental safeguards. The project authority should send one set of EIA/ EMP report and mining plan to them and extend full co-operation to officer(s) of the Regional Office by furnishing the requisite data/information/monitoring reports.	Complied and noted	• Point noted. Full support and co-operation is being extended during the visit of officers from **Ministry of Environment & Forest and Climate Change, CPCB as well as GPCB.**
x	The project authority should inform to the Regional Office located at Bhopal as well as to the Ministry of Environment & Forests regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work.	Noted and will be complied as & when required.	• Point noted. This is an existing and on-going project. • This is a running mine and lease is valid till 01/09/2032 (extended till 01/09/2052) Once we will reach at final phase of mine closure we will intimate to inform to the Regional Office located at Bhopal as well as to the Ministry of Environment & Forests and Climate Change.
xi	The State Pollution Control Board should display a copy of the clearance letter at the Regional Office , District Industry	Complied	• GPCB & District Industrial had complied the condition.
xii	The Project authorities should advertise at least in two Local newspapers widely circulated around the project, one of which	Complied	• Advertisement was published in two local newspapers as attached below. Copy of advertisement has been submitted to **MoEF on 25.12.2010 vide letter no. ACL/EMD/F16/2010/55926.**

	shall be in the vernacular language of the locality concerned within seven days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and may also be seen at web site of the Ministry of Environment & Forests at http://envfor.nic.in.and a copy of this ministry at Bhopal.	 Gujarat Pollution Control Board Paryavaran Bhavan, Sector 10 A, Gandhinagar 382 043 PUBLIC NOTICE It is hereby informed that the Ministry of Environment and Forests, Government of India, New Delhi vide its Notification No. S.O. 318 (E) S.O. 319 (E) dated April 10, 1997 and as per schedule IV of the notification, **Environmental Public Hearing** has been introduced and organised for **M/s Gujarat Ambuja Cement Ltd.**, (Ambujanagar district Junagadh) for operating the lease of lime stone (129 million tonnes/year) mines, located at survey numbers 21 to 26,32,34 to37,39,41 to 48,50 to 84,87 to 88,90 to 98,127 to 162,167,168,172,173,190 and 191 of village Sugala and also survey nos. 33 to 46 and 67 to 80 of village Jagatiya Taluka Kodinar of Junagadh district. The suggestions, views comments & objections related to the aforesaid project, if any of the general public & interested/ affected groups are invited within 30 days from today, should be communicated to the Gujarat Pollution Control Board in oral/ in written. The concerned persons shall be provided access to the Executive Summary of the Project at the following places, namely:- District Collector Office, Junagadh, Dist: Junagadh. District Industry Centre, Junagadh, Dist: Junagadh. District Panchayat Office, Junagadh, Dist: Junagadh. Gujarat Pollution Control Board, Gandhinagar. Regional Office, Gujarat Pollution Control Board, Race Course Ring Road, Rajkot 360001. Deputy Secretary, Forest & Environment Department, Government of Gujarat, 14/8, Sardar Patel Bhavan, Gandhinagar 382 010. The Environmental Public Hearing is scheduled to be held on December 17, 1998 at 12.00 hrs. at Meeting Room of District Collectorates, Junagadh. H. J. PATEL Date: 12-11-1998 R.O. GPCB and Member Secretary to the District Level Environmental Public Hearing Committee, Junagadh. INF 784-98 	
3	The Ministry or any other competent authority may stipulate any further condition for environmental protection.	Noted	• Point Noted and any further condition of Ministry and competent authority shall be complied for environment protection.
4	Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance.	Noted	• Point Noted. All the mentioned conditions are being complied.
5	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.	Complied	• All mentioned conditions 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 are being complied.

Ambuja Cement Foundation (Unit: Ambujanagar, Kodinar, Gujarat)

Key Performance Indicators up to March 2020

Sr. No	Details of Work/activities	Unit	Cummulative up to 2018-19	Achievements during April 2019 to March 2020	Cummulative up to 2019-20 (March 2020)
1A	**Water Resources Management and Drinking Water Projects**				
	a. Checkdam construction / Renovation	No	222	4	226
	c. Well Recharging / Percolation well	No	1268	0	1268
	d. Ponds Construction / Renovation	No	119	0	119
	e. Link Channels / Canals construction	Km	67.29	1.97	69.26
	f. Water Storage Tank / Farm Ponds	No	734	0	734
	g. Total surface water harvested	MCM	38.24	0.54	38.78
B	**Drinking Water Projects**				
	a. RRWHS Construction	No	3909	61	3970
	b. Drinking water wells / Bore wells / Renovation of Saline Wells	No	119	1	120
	c. Overhead / Cistern Tank construction/underground sump	No	25	0	25
	d. Community Based Driniking Water Project	No	58	0	58
C	**Soil and Water Conservation**				
	a. Area Treated (Gully Control / Gabion / loose boulder structure / weir crates / Khadine	Ha	11876	0	11876
2A	**Agriculture Development**				
	a. Micro Irrigation system, Drip and Sprinklers	Acre	11848.66	808.32	12656.98
	No. of farmers covered	No	2580	237	2817
	No of units	No	326	0	326
	No of families		299	0	299
	d. Training & Exposure visits	No	5900	4532	10432
	Farmers trained	No	177463	135964	313427
	e. Vermi / NADEP Composting	No	158	0	158
	g. Aquaculture	No	120	0	120
	i. Seed Production programme	Acre	1166	0	1166
	j. Better Cotton Initiative - Area covered	Acre	34677	111698	146375
	- Farmers covered	No	26222	8504	34726
	k. Farmer producer organization	No	1	0	1
	l. No of members	No	1811	0	1811
B	**Farm Forestry and Afforestation**				
	a. Horticulture Plantation	Acre	12215.075	409.27	12624.345
	No of plants	nos	904112	22086	926198
	b. Agro-Farm Forestry	Acre	5391.01	0	5391.01
	c Afforestation	Acre	17.77	0	17.77
	d. Avenue plantation / Roadside plantation	Km	8.68	0	8.68
3	**Animal Husbandry Programme**				
	a. Cattle Health Camps	No	223	0	223
	Cattles Treated	No	174541	0	174541
	Cattle Immunised	No	26066	0	26066
	b. Fodder Demonstrations	Acre	2571.1	0	2571.1
	c. Artificial Insemination	No	49123	0	49123
	d. Integrated cattle feeding system	No	1394	0	1394
	e. Dairy co-operatives formed	No	1	0	1
	g. No of families benefited by AH programme		10463	0	10463
4	**Non Conventional Energy**				
	a. Biogas Plants	No	526	0	526
	b. Smokeless *Chullahs*	No	4671	0	4671
5	**Education Development**				
	b. School / Anganwadi (Balwadi)Support Programme	No	19	0	19
	h. Village / School Library	No	3	0	3
	i. Village Knowledge Centre / Computer education	No	3	0	3
	j. Adolescent Education Programme	No	4	0	4
	l. Students training / exposure visits	No	157	1	158
	n. Schools benefited	No	52	6	58
	o.No of students benefited under Education Development		8482	995	9477

7	**Health and sanitation Programme**				
	a. No of camps organised (include all general and speciality health camps)	No	334	24	358
	Patients benefited	No	58669	4129	62798
	b. Villages benefited under mobile & weekly dispensary	No	22	0	22
	Patients treated	No	350102	0	350102
	c. Sakhis (Village Health Functionaries)	No	19	0	19
	d. Villages covered by *Sakhis* / Patients treated by *Sakhis*	No	14	15	15
	No of Patients treaded		32828	2555	35383
	e. Khelwadi sessions conducted by *Sakhis*	No	3611	0	3611
	f. Health intervention trainings done (include trainings of Sakhis / Govt. health fucntioneries)	No	36	16	52
	Participants in trainings	No	1089	351	1440
	g. Construction of Toilet Blocks / Sulabh Sauchalaya / Soak Pits	No	10900	773	11673
	h. Villages where Total Sanitation Campaign initiated	No	208	19	227
	i. No of Village Health Sanitation Committees activated	No	73	0	73
8A	**HIV/AIDS Awareness Programme (Community)**				
	h. No of people benefited	No	138828	0	138828
B	**Workplace Programme**				
	a. Awareness session for Staff / Families / contract staff / laboures / Truckers / Students / Rural community	No	10818	0	10818
	b. Master Trainers / peer educators		64	0	64

9	**Skill and Entrepreneurship Development Programme - Ambujanagar**				
	a. No of institute	No	2	3	3
	b. No of batches / courses	No	221	47	268
	c. Entrepreneurs trained under SEDI / ITI	No	4348	1000	5348
	d. No of trainees placed	No	3554	778	4332
	e. No of trainees persuing (Continuation)			305	305
10	Women and Youth Development				
	a. No of SHG formed	No	600	100	700
	No of members	No	7413	1064	8477
	b. Training & Exposure (women)	No	1058	203	1261
	No of participants	No	35888	7154	43042
	c. Training & Exposure (Youth)		81	8	89
	No of participants	No	4823	259	5082
	d. No of Federations Formed	No	1	0	1
11	Rural Infrastructure Development Programme				
	a. Construction of Common Pathways / Village Roads	No / Mtrs	81387.4	9107	90494.4
	b. Street Light installation	No	97	130	227
	c. Drainage construction	Mtrs	1075	0	1075
	d. Crematorium / Ghats construction/ Drinking water facilities	No	31	1	32
	e. Community Centre construction / School classroom	No	119	12	131
	f. Support for Social and Cultural Events	No	300	8	308
	g. House repairing	No	0	0	0
	h. Construction of culverts / bridge	No	9	7	16
	j.Construction of new School / school repairing	No	3	2	5
	k. No of villages covered	No	69	0	69
	l.const.of compoundwall for common area	Rmt	920	548	1468
12	Gir Forest Conservation project				
	a. Construction of Parapet wall around wells to protect wild animals	No	1702	150	1852
13	Krishi Vigyan Kendra - Kodinar				
	a. No of villages covered	No	310	0	310
	b. No of farmers trained	No	120974	3379	124353
	c. No of technology transferred (FLD)	No	229	25	254
	d. No of technology tested (OFT)	No	83	6	89
14	Over all coverage				
	a.No of villages	No	409	101	510
	a.Approx No of People benefited	No	875088	167907	1042995
15	KVY III programmes				
	a. IPM,INM&IDM practice adopted	Acre	67757	0	67757
	b.Soil testing	Farmers	3389	0	3389
	c.Village information centre	Villages	36	0	36
	d. SMS base agri. information system 3 SMS/month	Farmers	31645	0	31645
16	Community safety awarness programmes				
	Community Safety	No	826	445	1271
	Total participant in community safety	No	22365	25137	47502

Minutes of Meeting (MOM)

Introduction :

A meeting was organised with Sugala & Jagatiya village stakeholders at KVK, Training Hall, Ambujanagar, Kodinar on 21st Dec. 2019 for discussion on various issues of Sugala & Jagatiya villagers with respect to our mining activity & expectations. Representatives of Ambuja Cement & Villagers attended the meeting and participated in the discussion. The Points raised diuring Public hearing dated 17.12.1998 were also presented before village representatives and their opinion/suggestions were compiled as under:

1) At proposed location only surface mining shall be allowed (Old PH point).

In addition to the above point Sh. Golanbhai Makwana said : Is there further mining at the lower benches ? Whether blasting will be used in mining ?

Ambuja Cement Management Representative Replied : Mining will be done without blasting activity. We are using only Surface miners for mining in Sugala Mines. 02 Nos. of surface minors are deployed at Sugala Mines for mining with inbuilt Water Sprinklers for Dust Suppression.Mining will be carried out as per Approved mining plan. No mining will be carried out below the lower benches.

2. Topsoil will be removed and stored properly before undertaking mining and the same will be used for reclaimed and rehabilitation (Old PH point).

In addition to the above point Sh. KanubhaiKalabhaiDabhi said :This area has very thin layer of top soil which is very fertile. Whether the company will conserve this fertile soil after mining for reclaimation ?

Ambuja Cement Management Representative Replied : As per IBM guidelines, weare storing the top soil at earmarked site and whenever there is need; we use these for Agri Farming, Plantation, landscape development, reclaimation& rehabilitation.

3)Used mines will be reclaimed to make it flat land for agriculture use (Old PH point).

In addition to the above point Sh. Manbhai Makwana said :Due to mining in our area, small pits have been created which may create fall hazard to our cattle and wildlife.

Ambuja Cement Management Representative Replied : Sustainable mining practices is adopted for mining activity. Mines is properly reclaimed as per Approved mining plan. After mining mined out land is finally converted for agri-farming or water reserviors or plantation as mentioned in mining plan. Fencing of the pits is a continuous process and will be completed before final closing of the mines.

4.The company shall submit firm time bound programme for short term and long term socio-economic development of Sugala and Jagatiya villages (Old PH point).

In addition to the above point Sh. MansinhDabhi and Sh. Manbhai Makwana said :Our main earning source is Agriculture and therefore our school drop out youths are unemployed and unengaged. What assistance company will provide forupliftment of our socio-economic development ?

Ambuja Cement Management Representative Replied : Ambuja Cements Ltd has been proactively fulfilling its social responsibility since its inception. Ambuja Cement Foundation (ACF), the CSR arm of

ACL, was established in 1993. ACF works primarily with rural communities on the need-based issues on participative basis along with the Govt. of Gujarat, NGOs and the community. The major areas of ACF's intervention are water, agriculture based livelihoods, skill development programmes, community health, sanitation, education, women empowerment and infrastructure development.

Agriculture being the primary source of livelihood of rural community in the Gir peripheral and coastal region of Gir Somnath district. ACF focuses on extension of proven technologies among the farmers. ACF understood the farmers prevailing practices and identified the gaps. It then started organizing training for farmers, including farm-women, on variety of topics.

wehave focued on the activities of:

- Dissemination of Agriculture Knowledge and Information through ICT
- Soil and Water testing
- Development of horticulture
- Animal Husbandry
- Support for critical agriculture Inputs to farmers
- Frmers training on agriculture practices
- We are very focus to divert people towards organic farming.

Establishment of Krishi Vigyan Kendra (KVK) : Ambuja Cement through Ambuja Cement Foundation also help the farmer by establishing a state of art Krishi Vigyan Kendra (KVK) which provide technical assistance and support to farmer. Agriculture is a dynamic field with new technological advances emerging every year. In order to support farmers to stay abreast of and adopt these new approaches, ACF, in collaboration with the Indian Council of Agriculture Research, established a KrishiVigyan Kendra in 2007 at Kodinar in Gir Somnath, Gujarat. KVK provides regular training programs and front line demonstrations on farm testing, farm development, seed production and other extension activities - to help bridge the gap between research and extension, and to equip farmers with the latest developments in agriculture.

For Off farm employement generation, Ambuja Cement through Ambuja Cement Foundation emphasis of providing employable skill to youth of the villages of sugala, Jagatiya and Surroundings villagesthroght establishment of Skill & Entrepreneurship Development Institutes (SEDI)

Skill &Entrepreneurship Development Institutes(SEDI):ACF establishes training institutes in rural areas to provide youth with a wide variety of skilling opportunities to give them choices in life.

SEDI centre was established at Kodinar in April, 2011. Since inception, SEDI has a vision to bridge skill gap amongst underprivileged youth and empowering them through skill training and placement assistance. We have made rapid strides in empowering youth through quality training and placement support in Industrial Electrical, General Duty Assistant, Hospital Assistant technician, Business process outsourcing, Welder and Machine Operator trades. SEDI Kodinar trained 5300 youth since inception with the tremendous placement record of 84%.

- SEDI is very important because it's provide employment to very needy families and support in getting employment to those people having less qualification.

5.The open well / bore well digging will be allowed to the company in the proposed land. The company shall arrange at their own for their water requirement (Old PH point).

In addition to the above point Sh. PratapDayabhaiVaja said : Is company withdraw water from River or dams to meet their plant and mines water requirement ?

Ambuja Cement Management Representative Replied : Company has obtained permission from CGWA for withdrawl of water from borewells in our lease premisesto meet our water requirement.No water is being / will be taken from nearby river or dams. Only harvested water in mines pit is being used to cater the water requirement of mines activity.

Company has taken many Water conservation measures in & around our mine lease areas, which resulted in increase of ground water table.

After understanding the prevailing situation completely, ACF began engaging with the community to find solutions. The community suggested various measures like check dams, pond renovation and deepening etc, which was technically verified by ACF and a comprehensive programme on water harvesting was drawn up and launched. Over a period of time, ACF also started addressing drinking water issues. Households in coastal villages were helped to construct Roof Top Rain Water Harvesting Structures for securing drinking water for the family at household level. Further, drinking water wells, Drinking water distributionsystem for ensuing availability of drinking water at household level.

The major focus in the area was on construction of check dams in a series on all the rivers of the region. Percolation wells were constructed in ponds and riverbeds for increasing ground water recharge. Further, farmers were encouraged to recharge their wells. Deepening of ponds and construction of waste weirs increased the water storage capacity of the traditional ponds. Construction of nalla plug, small check dams was undertaken on small rivulets to increase recharge. Projects on interlinking of rivers and reservoirs were undertaken in the areas to take the water resource development and management programme further. Innovative rehabilitation of mined- out areas by converting them into reservoirs resulted in harvesting of huge quantities of water. All the measures were implemented in an integrated manner and in a pre-defined, fixed area.

Sr no	Structure	Unit	Total Nos
1	Construction / renovation of Check dams	Nos	225
2	Contruction/Renovation of Percolation Tank	Nos	119
3	Construction of Link canals(kms)	Kms	69.26
4	Percolation well/Well Recharge	Nos	1268
5	Renovation of Saline well	Nos	40
6	Roof Rainwater Harvesting Structures	Nos	3970
7	Drip Irrigation system	Hectare	5035
8	Drinking water distribution schemes	Nos	58

- Surrounding villages have very positive impact due to mines water recharging and they are cropping three variety of crop due to surplus water.

- Ambuja Cement supports promotion of drip irrigation to farmers. In Sugala and Jagatiya village many farmers have covered under drip irrigation. Due to drip irrigation initiative yield of water melon has increased.

6. **Plantation and Greenbelt development:- Local species will be planted by the company for plantation and greenbelt development as promised by the company (Old PH point).**

In addition to the above point Sh. N. B. Dodiya said :Company has planted dense plantation in mining area but the number of local species is less.

Ambuja Cement Management Representative Replied : We have planted Local species for greenbelt development in consultation with forest department. Local species like Neem, Amla, Karanj, Aam, Bargad, Peepal, Chiku, Coconut etc. are planted as a Mass Plantation drive.

Ambuja Cements through ACF promotes development of horticulture plantation for development of green belt by plantation of mango, coconut and other fruit species as alternative income source for villagers We have been developed 5109 ha area including 717 Ha in Sugala, Jagatiya and buffer zone villages under Horticulture & Agro forestry plantation. The agro forestry plantation has been carried on private farmers field and have survival on more than 80%

7) The company will make arrangement for the pacca roads for transportation of mined limestone and maintain the same as well as provide water spraying arrangement for dust suppression on haulage road and in working area and surrounding zone (Old PH point).

In addition to the above point Sh. Manbhai Makwana said :The company is transporting limestone through Big Dumpers which may create dust pollution.

Ambuja Cement Management Representative Replied : The company has made pacca roads for transportation of mined limestone and maintain the same.Dedicated water tankers has been provided for dust suppression on haulage roads. The tankers are plying on haulage road round the clock during day time to wet the haulage road and to suppress the dust emission.

8. The company will organise awareness programme on crop productivity, afforestation, Community health and sanitation for the local people (Old PH point).

In addition to the above point Sh. Manbhai Makwana said Our main earning source is Agriculture.What assistance company will provide forupliftment of our Agriculture, Community Health and socio-economic development ?

Ambuja Cement Management Representative Replied :

The company through ACF is organising various awareness programme on crop productivity and afforestation for the local people with the help of Scientist of KVK.

ACF also supports to farmers for critical agriculture inputs support for enhance their agriculture productivity and reduce cost of agri inputs.

ACF promote new crops/cropping partern change for making agriculture occupation profitable. At the Sugala and jagatiya villages, promoted fruits and vegetable crops at large scale which has been increased agriculture net retunrs.

We promoted new technologies adoiption in agricultureand the farmers of Sugala and Jagatiya villages adopted drip irrigation, mulching at large scale. Now farmers able to take three crops in a year.

Ambuja Cement Foundation adds value to the lives of the people through its process of engagement. The Foundation undertakes programmes and projects on developmental issues in line with needs of people in partnership with them. Under health community health care, curative and preventive interventions have been taken up respectively,

1. Curative – Mobile dispensary Van and Health Camps
2. Preventive and pro-motive – Village Health Functionaries (Sakhi's)

In health programme Ambuja Cement is organising different types of health camp and we are atteningmeeting with women federation and advertise more so more people can get benefits of camp.

ACF promote sanitation and hygines in the villages under the Swachh Bharat Mission. We have developed 12 villages under open Defication free and Sugala and jagatiya become the ODF villages.

We are also working on PMJAY-Pradhan Mantri Jan ArogayaYojana through this initiatives / scheme health insurance card is provided by Govt. namely Ayushyman Bharat Card that covered 5.00 lakhs insurance per family. Many families from villages are touched to issue this card by starting village based camp. In Sugala and Jagatiya villages camps held and health card distributed.

Ambuja Cement covered many family of surrounding villages through health camp mainly Eye camps where people approached from many villages and many patient operated, treated and benefitted.

Empowering women is also an indispensable tool for advancing development and reducing poverty. Empowered women contribute to the health and productivity of whole families and communities and to improved prospects for the family as well as next generation. ACF undertakes this initiative in the villages through developing saving habits among women by group formation. The SHGs provide the benefits of economies of scale reducing costs in certain areas of the production process which the members may decide to undertake as a common action. The group also provides a cost effective credit delivery system.

ACF has facilitated the formation of 700 SHGs having 8477 women members. They were trained on issues like micro credit, bank linkage, developing credit rotation plan. Members of SHGs has formed a women federation known as Sorath MahilaSahkariMandli based at Kodinar which has 7500+ women members of strong presence in the SHGs

9. What is the safety assurance of the workers working in mines area (Old PH point)?

In addition to the above point Sh. MansinhDabhi said:The company should follow high level of safety standard for safety and occupational health of employees during the operation of mines.

Ambuja Cement Management Representative Replied : Ambuja Cement is believe in compliance of Rule and Regulation stipulated by GoI and GoG. Ambuja Cement follow direction of D.G.M.S. for safety and occupational health of employees during the operation of mines. Regular Medical Check is conducted on annual basis for all Employees and Workmen. Roads are provided with Safety Signage boards, Awareness Boards & Night Vision Light reflectors.

10. Our main earning source is Agriculture and therefore most of us are unemployed and unengaged. Is there any direct or indirect employementoppurtunityavailable (Old PH point)?

In addition to the above point Sh. Golanbhai Makwana said :Indirect employment avenues will be created by the company to the local by way of transportation of minerals from mines to plant through tractors.

Ambuja Cement Management Representative Replied : Transportation of Raw Materials through tractors is not allowed as Ambuja Cement follows highest standards of safety inside & outside the premises and in all activities. However, indirect employment is created by the company by deploying village youth as driver for mineral transportation through trucks and tipplers. All trucks are fitted with GPS System and proper training sessions are conducted for all drivers to Ensure their safety.

In addition to the above Ambuja Cement is contually working for the upliftment of rural area youths by establishing SEDI to upgrade their skill level. We provides skill training in the employable trades of Industrial Electrical, General Duty Assistant, Hospital Assistant technician, Business process outsourcing, Welder and Machine Operator, fitter febriacation trades. SEDI Kodinar trained 5300 youth since inception with the tremendous placement record of 84%.

11. Many programs for Socio economic development at our area has been started by ACF but we feel that the mining should not be further allowed till the programmes are at satisfying stage (Old PH point).

In addition to the above point Sh. Golanbhai Makwana said :The company should further strenghten the Socio-economic programmes in older mining and plant areas.

Ambuja Cement Management Representative Replied : Team of Ambuja Experts had visited the Site for assessment & possibilities of the Socio-Economic Development around the mining area. Soon after the assessment, Ambuja Cement Foundation (ACF) has started Socio Economic development programmes. Ambuja Cement always take the participation of local community at the upfront. Initiatives like construction of School Building, water tank construction, Ambulance & medical facilities, Awareness Sessions for farmers etc. are ongoing activities of Ambuja Cement Foundation. After the Commencement of the ACF Initiatives, mining activity has been started.

Members Present in the Meeting :

1. Sh. A. K. Sharma, Sr. VP (Mines &Comml.), ACL Ambujanagar
2. Sh. Chandrakant Kumbhani, GM (CDP), ACF Ahmedabad
3. Sh. Govindbhai Bhola, Sarpanch, Lodhva village
4. Sh. Manbhai Dadubhai, Sarpanch, Jagatiya village Gram panchayat
5. Sh. Golanbhai Rajabhai, Up Sarpanch, Jagatiya village Gram Panchayat
6. Dr. P D Kumavat, Sr. Scientist & Head Sugarcane Research Farm Kodinar
7. Sh. Pratap Dayabhai Vaja, Farmer Sugala village
8. Sh. Kanubhai Kalubhai Dabhi, Farmer Sugala village
9. Sh. Mansinh Dabhi, Up Sarpanch Sugala Gram Panchayat
10. Sh. Vikram Singh Dahima- Programme Manager-ACF
11. Sh. Anand Prakash- Head, Env. Dept.ACL Ambujanagar
12. Mrs. Deviben Punjabhai Vala Director Women federation – Lodhava
13. Mrs. Manishaben Gowswami, Director Women federation
14. Mrs. R B Ben, SHG member, Singsar village
15. Mrs. Badi Ben, SHG member, Singsar village
16. Sh. Satish Hadiyal SMS, Soil Scientist, KVK Ambujanagar
17. Sh. Ajit Barad, Principal, SEDI Ambujanagar
18. Sh. Kalusingh Mori, Project coordinator ACF
19. Sh. N. B. Dodiya, Retd. Range Forest Officer,Panch Pipalva village
20. Sh. Pravinbhai kanabhai Vaja, Sarpanch, Singsar village
21. Sh. Babubhai Solanki, Up Pramukh Matth & President, Taluka Panchayat Kodinar
22. Sh. Satendar Singh, Head, Geocycle, Ambujanagar
23. Sh. Jagdish Pandya, Asst. Manager, Ambujanagar Multi Specialty Hospital
24. Sh. Saurabh Singh, Env. Officer, ACL Ambujanagar
25. Sh. Dalasukh Vaghasiya, DGM - ACF

Ambuja Cement Ltd.

Unit: Ambujanagar

CAP Meeting

Date: 21-12-2019

Time: 11-30 am

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23.	[illegible]	[illegible]	[illegible]	
24.	Saurabh Singh	Ambujanagar	Env. Officer	Singh
25.	Dalsukh Vaghasiya	—11—	DGM ACF.	

AMBUJA CEMENTS LTD.

Status of Conditions of Public Hearing conducted on 17.12.1998

1) At proposed location only surface mining will be allowed

❖ We are only using Surface minors for mining in Sugala Mines. 02 Nos. of surface minors are deployed at Sugala Mines for mining with inbuilt Water Sprinklers for Dust Suppression.

USE OF ECO FRIENDLY SURFACE MINING TECHNOLOGY

AMBUJA CEMENT STRONGLY BELIEVES IN SUSTAINABLE MINING

2) Topsoil will be removed and stored properly before undertaking mining and the same will be used for reclaimed and rehabilitation.

We have a practice to store the top soil at earmarked site and whenever there is need we use these for Agri Farming , Plantation , landscape development & Ecological Restoration

Restoration of Land by Back filling

Development of land for Agro Farming

Crop Nurturing

Crop Harvesting

3) Used mines will be reclaimed to make it flat land for agriculture use

❖ **Mines is properly reclaimed after sustainable mining as per mining plan and is finally converted for agri-farming**

Agri farming

Stages of Agri – Farming :

Stage I - Removal of Top soil using Ripper Dozer
Stage II - Mining of Limestone using State of Art Surface Miner
Stage III - Spreading of Top soil in Mined out area up to 0.75m
Stage IV - Land filling on periphery of Mined out area , grass turfing and construction of Garland drainage.
Stage V - Improving soil quality using agriculture techniques like Vermi-Composting , Drip irrigation , Sprinkler , Manure etc.
Stage VI - Soil testing

4) The company shall submit firm time bound programme for short term and long term socio-economic development of Sugala and Jagatia villages

There is a separate dedicated CSR arm of Ambuja called as Ambuja Cement Foundation (ACF). ACF has a specific routine job for organising awareness programme on crop productivity, afforestation, Community health & Socio-economic development sanitation for the local people.

In Ambujanagar location total 36 SHG members including six widow has started individual income generation activity and they are earning well. One group has started onion nursery and it is group base activity. There is no need of special training for individual income generation activity because they are learn by doing. Federation is operating a sewing centre total 359 women get benefit of sewing training and out of this some has started work in village. Year by year more SHG benefited due to focus on toilet construction work under Swatch Bharat mission through federation. This year our SHGs linked with Mission Mangal for getting revolving fund.

Ambuja Cement Work For Socio-Economic Development of the Society

Ambuja Cement has transformed many livelihoods by upgrading their socio-economic status

Kadaviben Ranjitbhai Gohil has turned into an entrepreneur & upgrading her Economic Status by taking a loan of 50,000 from Ambuja Self Help Group. She is running milk business smoothly with the help of Economic Support.

Bhanuben Kishorbhai has transformed life by upgrading her Economic Status by setting up of her own small vegetable business.Ambuja Self Help Group made this possible by Quick Loan & repayment facility

5) The open well / bore well digging will be allowed to the company in the proposed land. The company shall arrange at their own for their water requirement.

No Digging of Open Well/Borewell is done till now. Harvesting Rain water is the culture of mining in Ambuja Cements Limited. We have Converted many mined out pits into Huge water reservoirs which is the source of water for plantation, Agri farming, dust suppression in Surface Miners, Flora & fauna. Due to this step, the Water table of the nearby area is increased and there is no shortage of water during summer season. Many Bird species reach the mined out water reservoirs to quench their thirst.

Routine Visiting Guests at Our Mines

6) Plantation and Greenbelt development:- Local species will be planted by the company for plantation and greenbelt development as promised by the company

Ecological Restoration & Enhancement is the core of Ambuja work culture. Our Experts have selected best available local species for greenbelt development. Mass Plantation is done every year & Greenbelt is maintained despite of change in climatic factors. Our Mines Site is a dwelling place for many species of

Well developed thick plantation/ hedge grows in and around mines and Haul roads to control Noise, dusting and provides additional habitat to variety of fauna.

7) The company will make arrangement for the pacca roads for transportation of mined limestone and maintain the same as well as provide water spraying arrangement for dust suppression on haulage road and in working area and surrounding zone.

A Very Well Development network of internal roads is made to facilitate local transport. Roads are provided with Safety Signage boards, Awareness Boards & Night Vision Light reflectors.

8) The company will organise awareness programme on crop productivity, afforestation, Community health and sanitation for the local people.

There is a separate dedicated CSR arm of Ambuja called as Ambuja Cement Foundation (ACF). ACF has a specific routine job for organising awareness programme on crop productivity, afforestation, Community health and sanitation for the local people.

KRISHI VIGYAN KENDRA – Ambujanagar Highlights 2018-19

Krishi Vigyan Kendra, Ambujanagar achievements during 2018-19 total 92 Training; 42 on campus, 25 off campus and 16 Sponsored, 02 extension functionary, 04 vocational and 3 skill development training conducted for 2611 farmers / farmwomen. Total 219 hector area covered under 31 different Front Line Demonstration (FLDs) on Groundnut, Cotton, Coconut, Mango, Brinjal, Wheat, Onion, Green Gram, Sesame and Sugarcane crop for 703 farmers/farmwomen.

Under On Farm Testing (OFTs) 07 trails conducted on different crops like Groundnut, Wheat, Okra, Onion, Pearl millet and Coriander for 35 farmers.

Ambuja Cement Awareness for Crop Productivity Enhancement

Krishi Mela cum Technology Exhibition and Pre Rabi Sammelan celebrated and Live samples and models display through various 34 stalls for framing community. Total 3963 farmers/ farmwomen of Junagadh & Gir Somnath District. Hon'ble PM's 3 Live webcasting programmes organized at KVK premises and 207 farmer/farmwomen participated. During the year, Swachhta Hi Seva Pakhvada was celebrated twice on different themes and brought awareness near about 6005 farmers/farmwomen and school children about Swachhata.

Ambuja Cement Work For Community Health

Specialized Health camps services details

With the coordination of Ambujanagar Multispecialty Hospital, Shivananand Mission Hospital Rajkot and Midlife Foundation Ahmedabad speciality health camps have been streamlined and conducted 27 such health camps in the project villages. Number of specialized camps are increased and reached to 27 in 2018-19. Total 4921 patients have been benefitted in specialized health camps this year The specialized health camps are focused on cataract screening and operation, Orthopaedic, Skin , Dental, ANC/PNC,ENT,Cleft plate and Cleft lips, BP , Diabetic, Paediatric, Acute case finding of presumptive cases of Tuberculosis etc. With the coordination of Ambujanagar Multispecialty hospital this years. Specialized services are offered to the communities on Orthopaedic, ENT, Gynaecology, MD and Dental etc.

અંબુજા સિમેન્ટ ફાઉન્ડેશન દ્વારા કોડીનારના મઠ મુળદ્વારકા ગામે યોજાયો આરોગ્ય નિદાન કેમ્પ.

જોઇએ છે

Ambuja Cement Work For Sanitation & Hygiene

We are working with sanitation project. Household based toilet construction is apart of Project. After two year journey with many learning we diverted from toilet construction to sanitation as a project mode. Regarding to that we focus on behaviour change of community by campaigning and during 2018-19 we focused on Menstrual Hygiene Management issues.

9) The company will follow direction of D.G.M.S. for safety and occupational health of employees during the operation of mines

Ambuja Cements Limited is committed to follow all the Directions of DGMS Office for Occupational Health & Safety.

Regular Medical Check is conducted on annual basic for all Employees and Workmen.

10) Indirect employment avenues will be created by the company to the local by way of transportation of minerals from mines to plant through tractors.

Transportation of Raw Materials through tractors is not allowed as Directorate General of Mines Safety is has prohibitated the usages of tractors in mining area. However company has engaged small tippers which directly gives employments to the local people.

11) The company will not start mining in this new mining area till the Socio-economic programmes are not satisfactorily completed in older mining and plant areas.

Team of Ambuja Experts had visited the Site for assessment & possibilities of the Socio-Economic Development around the mining area. Soon after the assessment , Ambuja Cement Foundation (ACF) has started Socio Economic development programmes. Ambuja Cement always take the participation of local community at the upfront. Initiatives like construction of School Building, water tank construction, Ambulance & medical facilities, Awareness Sessions for farmers etc. are ongoing activities of Ambuja Cement Foundation. After the Commencement of the ACF Initiatives, mining activity has been started.

COMMUNITY HEALTH SERVICES

THANKS FOR YOUR VALUABLE TIME

Annexure V_ADS Reply

PROJECT: Proposal under EIA Notification 2006 and Ministry's Notification vide S.O. (E) 1530, Dated 06.04.2018 for Sugala Limestone and Marl Mine (ML Area 417.3584 ha) with Limestone production capacity of 1.29 Million TPA At Villages Sugala and Jagatiya, Taluka- Kodinar, District- Girsomanth (erstwhile Junagad) (Gujarat).

MoEF&CC has asked PP to submit following Additional Details regarding baseline data:

Point No. 3 - PP has not presented results and analytical data for current baseline data. PP needs to present the same. In addition, the PP needs to submit progressive EIA data and their comparative values (i.e., values obtained in during earlier EC appraisal, entire monitoring period and current baseline data collection period) for all parameters and explain how environmental quality has varied.

Point No. 5 - PP requires to submit the results of ground water level and quality analysis. In addition, PP needs to show comparative data (i.e., different time period) for ground water quality analysis.

Reply of above mentioned points are given below:

1.1 INTRODUCTION

M/s. Ambuja Cements Ltd have an existing Sugala Limestone and Marl Mine (ML Area 417.3584 ha) with Limestone production capacity of 1.29 Million TPA at Villages Sugala and Jagatiya, Taluka Kodinar, District- Girsomanth (erstwhile Junagad) (Gujarat)

In compliance of MoEF&CC Notification dated 06.04.2018, ACL has applied for EC validation/ regularization of Sugala Limestone and Marl Mine (ML Area 417.3584 ha) with production capacity of 1.29 Million TPA at Villages Sugala and Jagatiya, Taluka- Kodinar, District- Gir Somnath (erstwhile Junagadh) (Gujarat).

As per the Ministry's Notification S.O. 1530 (E) dated 6.04.2018 wherein it has mentioned that "the Hon'ble Supreme Court vide judgment dated the 7th February, 2018 in Special Leave to Appeal (Civil) No. 32138 of 2015 in the matter of Goa Foundation versus M/s Sesa Sterlite Ltd. & Ors. has reiterated that the validity of the environmental clearance for mining projects granted under the EIA Notification, 1994 shall be five years" and "whereas, all mining projects mentioned in clause (b) of fourth paragraph above are required to obtain environmental clearance under the EIA Notification, 2006.

Environmental Clearance for existing Limestone and Marl Mine for production Capacity of 1.29 Million TPA limestone was obtained from MoEF&CC vide letter No. J-11015/6/2000-IA.II (M) dated 20.06.2002 under the provision of EIA Notification, 1994.

ToR Letter has been issued by Ministry of Environment, Forest and Climate Change, Govt of India, New Delhi vide letter no. J-11015/154/2018-IA.II (M) dated December 10, 2018 in accordance to the EIA Notification – 2006 and amended as on date.

1.2 PURPOSE

MoEF&CC sought Additional Detail regarding comparative analysis data of ambient air quality (AAQ), Noise quality, soil quality and groundwater quality therefore in compliance of same this report has been prepared which shows comparative analysis (2002 onwards) of ***Ambient Air Quality (AAQ), Noise quality, soil quality and groundwater quality*** (2003 onwards) within the locality of the mine lease area and study area on quarterly basis.

The monitoring data used for the current study with regard to above environmental aspects is given by ACL for the period stating from 2002 to 2020 considered as study period. The comparison of the environmental parameters is analyzed in concomitance with limestone production levels within the study period. This is done to understand the impact of mining on the surrounding environment of ACL mine.

The comparison and analysis results are presented in the subsequent paragraphs.

1.3 STRUCTURE OF THE REPORT

This Report consists of following Chapters which describes regarding:

INTRODUCTION

This paragraph discuss about the introduction of the project & report and regarding the purpose and structure of the report or study.

COMPARISON OF AMBIENT AIR QUALITY DATA

This paragraph discuss about the comparative analysis of the ambient and workplace air quality monitoring data in the surrounding of the project.

COMPARISON OF NOISE QUALITY DATA

This paragraph discusses about the comparative analysis of the workplace and residential area noise quality monitoring data in the surrounding of the project.

COMPARISON OF SOIL QUALITY DATA

This paragraph discuss about the comparative analysis of the soil quality monitoring data in the surrounding of the project.

COMPARISON OF GROUNDWATER QUALITY DATA

This paragraph presents the comparative analysis of the groundwater quality monitoring data in the groundwater sources near the project area.

OBSERVATIONS

This paragraph presents the observations inferred from the comparative analysis of the ambient air, noise, soil quality and groundwater quality in the vicinity of the project.

1.4 COMPARISION OF AIR QUALITY MONITORING DATA

This chapter presents the comparative analysis of ambient air quality parameters. Ambient air is monitored regularly at designated locations within and in the locality of ML area and are currently in progress at periodic intervals.

1.4.1 AMBIENT AIR QUALITY MONITORING LOCATIONS

The ambient air quality data is collected for six locations regularly monitored near the ACL Limestone mines are as below:

1. Working Place Area
2. Sugala Village
3. Jagatiya Village
4. Chhachhar Village
5. Chadiavav Village
6. Nagdala Village
7. Kansariya Village

1.4.2 AMBIENT AIR QUALITY MONITORING RESULTS

The quarterly AAQ monitoring results of each parameter at each location is compared over the study period starting from first quarter of 2002 to last quarter of 2020. The comparison of AAQ levels at each location is presented graphically in the following sections. The highest and lowest values of AAQ parameters in each quarter (throughout the study period) are presented in following sub-sections. The year of occurrence of highest and lowest AAQ levels within the study period is given in the parenthesis.

Effort has been made to analyse the impact of mining through study of change in pollutant levels in the study period. It is presented in the Section 2.3 below. The applicable National Ambient Air Quality Standards (NAAQS) and parameter wise Quarterly comparison of AAQ data are presented in following paragraph.

1.4.2.1 AAQ OBSERVATIONS WORKING PLACE AREA

A. Quarter 1 - AAQ Values of Working Place Area (Jan 2003- March 2020)

Table 1

Quarter 1 - (Jan-March, 2003-2020)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2003	SPM	130.95	RSPM	28.265	11.181	19.4	NA
2004	SPM	129.35	RSPM	43.6	12.38	16.6	
2005	SPM	128.77	RSPM	41.16	11.95	16.65	
2006	SPM	110.43	RSPM	44.21	12.11	15.67	
2007	SPM	120.47	RSPM	27	12.08	15.55	
2008	SPM	125.93	RSPM	26.5	11.31	15.0	
2009	SPM	125.085	RSPM	24.8	11.3	15.43	
2010	SPM	128.77	RSPM	28	11.9	15.3	
2011	SPM	129	RSPM	27.1	10.32	13.36	
2012	SPM	128.35	RSPM	42.83	12.13	14.82	
2013	PM 2.5	30.00	PM10	46.00	11.73	19.10	0.35
2014	PM 2.5	25.67	PM10	42.50	11.95	16.53	0.43
2015	PM 2.5	35.67	PM10	48.83	11.75	15.80	B.D.L
2016	PM 2.5	32.50	PM10	56.00	12.17	16.22	BDL
2017	PM 2.5	28.00	PM10	57.00	11.60	15.03	BDL
2018	PM 2.5	31.83	PM10	57.50	11.52	15.17	BDL
2019	PM 2.5	30.67	PM10	51.67	11.87	14.98	BDL
2020	PM 2.5	27.12	PM10	52.73	11.00	14.50	BDL

INTERPRETATION

- The highest and lowest values of SPM in Quarter 1 from year (2002-2012) of working place area ranges between 110.43 µg/m3 (2006) to 130.95 µg/m3 (2003) and for RSPM it ranges between 26.5 µg/m3 (2008) to 44.21 µg/m3 (2006).
- PM2.5 in quarter 1 for Working Place Area ranges between 25.67 µg/m3 (2014) to 35.67 µg/m3 (2015).
- PM10 value ranges between 42.50 µg/m3 (2014) to 57.50 µg/m3 (2018) for Working Place area.

- SO2 ranges between 10.32 µg/m3 (2011) to 12.38 µg/m3 (2004), NOx ranges from 14.50 µg/m3 (2020) to 19.44 µg/m3 (2003) and CO value ranges from 0.43 µg/m3 (2014) to 0.35 µg/m3 (2013)

B. Quarter 2 - AAQ Values of Working Place Area (April 2002-June 2019)

Table 2

Quarter 2 - (April-June, 2002-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2003	SPM	127.02	RSPM	43.00	11.32	21.42	NA
2004	SPM	128.31	RSPM	44.33	12.75	20.68	
2005	SPM	128.79	RSPM	42.00	12.25	17.05	
2006	SPM	121.26	RSPM	35.33	11.88	14.95	
2007	SPM	123.09	RSPM	27.83	12.27	15.57	
2008	SPM	127.44	RSPM	26.50	11.88	15.25	
2009	SPM	126.72	RSPM	27.83	11.58	15.37	
2010	SPM	127.02	RSPM	33.83	11.48	14.40	
2011	SPM	127.98	RSPM	39.17	11.47	15.83	
2012	PM2.5	24.33	PM10	42.83	10.57	19.40	0.40
2013	PM 2.5	27.83	PM10	46.17	12.37	20.60	0.38
2014	PM 2.5	26.33	PM10	43.67	11.73	16.45	0.40
2015	PM 2.5	35.83	PM10	59.83	11.82	15.45	B.D.L
2016	PM 2.5	32.17	PM10	58.00	12.22	15.80	B.D.L
2017	PM 2.5	28.00	PM10	56.83	11.53	15.30	B.D.L
2018	PM 2.5	27.83	PM10	54.50	11.47	15.13	B.D.L
2019	PM 2.5	28.00	PM10	56.83	11.53	15.30	B.D.L

INTERPRETATION

- The highest and lowest values of SPM in quarter 2 for Working Place Area is 121.26 µg/m3 (2006) to 128.79 µg/m3 (2005) ,RSPM ranges between 26.50 µg/m3 (2008) to 44.33 µg/m3 (2004).
- PM2.5 value ranges between 24.33 µg/m3 (2012) to 35.83 µg/m3 (2015) and PM 10 value ranges from 42.83 µg/m3 (2012) from 59.83 µg/m3 (2015)
- SO2 ranges between 10.57 µg/m3 (2012) to 12.75 µg/m3 (2004), NOx ranges between 14.40 µg/m3 (2010) to 21.42 µg/m3(2003). CO ranges from 0.38 µg/m3(2013) to 0.40 µg/m3 (2012).

C. Quarter 3 - AAQ Values of Working Place Area (July-September 2002-2019)

Table 3

Quarter 3 - (July-September, 2002-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2002	SPM	127.98	RSPM	25.50	11.00	19.87	NA
2003	SPM	130.92	RSPM	44.17	12.07	19.60	
2004	SPM	128.59	RSPM	43.13	12.33	18.36	
2005	SPM	127.68	RSPM	39.36	12.38	17.20	
2006	SPM	128.02	RSPM	31.17	12.22	15.07	
2007	SPM	130.38	RSPM	25.67	11.87	15.92	
2008	SPM	128.12	RSPM	26.50	11.28	15.35	
2009	SPM	127.63	RSPM	25.83	11.40	15.77	
2010	SPM	130.92	RSPM	22.07	11.42	13.60	

2011	SPM	140.94	RSPM	43.83	10.83	15.67	
2012	PM 2.5	26.67	PM10	38.50	11.12	19.52	0.42
2013	PM 2.5	24.50	PM10	45.00	12.20	18.55	0.35
2014	PM 2.5	23.25	PM10	40.25	11.50	16.70	0.40
2015	PM 2.5	33.00	PM10	62.33	12.13	15.17	B.D.L
2016	PM 2.5	28.50	PM10	54.67	11.02	15.25	B.D.L
2017	PM 2.5	30.67	PM10	60.00	11.33	15.40	B.D.L
2018	PM 2.5	30.67	PM10	53.83	11.65	14.65	B.D.L
2019	PM 2.5	30.67	PM10	60.00	11.33	15.40	B.D.L

INTERPRETATION

- The highest and lowest values of SPM in quarter of Working Place Area is 127.63 µg/m3 (2009) to 140.94 µg/m3 (2011), RSPM ranges between 25.50 µg/m3 (2002) to 44.17 (2003).
- The values ranges between 23.25 µg/m3(2014) to 33.00 µg/m3 (2015) for PM2.5 and for PM10 it ranges between 38.50 µg/m3 (2012) to 62.33 µg/m3 (2015).
- SO2 ranges from 10.83 µg/m3 (2011) to 12.38 µg/m3 (2005) and NOx ranges from 14.65 µg/m3 (2018) to 19.87 µg/ m3 (2002) and for CO it ranges from 0. 42 µg/ m3 (2012) to 0.35 µg/ m3 (2013).

D. ***Quarter 4 - AAQ Values of Working Place Area(Oct-Dec 2002-2019)***

Table 4

Quarter 4 - (Oct-Dec, 2002-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2002	SPM	140.94	RSPM	24.33	11.28	19.73	NA
2003	SPM	132.00	RSPM	42.50	12.20	17.32	
2004	SPM	126.59	RSPM	43.83	11.68	17.42	
2005	SPM	130.47	RSPM	41.00	12.32	17.18	
2006	SPM	129.78	RSPM	27.17	11.93	15.22	
2007	SPM	114.23	RSPM	29.17	11.62	15.67	
2008	SPM	124.10	RSPM	29.33	11.77	15.88	
2009	SPM	126.59	RSPM	25.67	11.73	15.02	
2010	SPM	132.00	RSPM	26.43	12.07	14.87	
2011	SPM	130.95	RSPM	41.33	11.67	14.90	
2012	PM 2.5	34.33	PM10	41.83	11.03	21.13	0.42
2013	PM 2.5	26.33	PM10	45.50	12.08	16.50	0.40
2014	PM 2.5	28.33	PM10	37.33	11.47	16.55	0.37
2015	PM 2.5	31.67	PM10	59.83	12.15	15.72	BDL
2016	PM 2.5	29.50	PM10	57.83	11.20	15.40	BDL
2017	PM 2.5	33.50	PM10	61.83	12.03	16.07	BDL
2018	PM 2.5	28.33	PM10	50.50	11.60	14.80	BDL
2019	PM 2.5	29.56	PM10	52.78	10.50	15.83	BDL

INTERPRETATION

- The highest and lowest values of SPM in quarter 4 of Working Place Area is 114.23 µg/m3 (2007) to 140.94 µg/m3 (2002), RSPM ranges between 24.33 µg/m3 (2002) to 43.83 µg/m3 (2004) .
- The value of PM2.5 ranges between 26.33 µg/m3 (2013) to 34.33 µg/m3 (2012) and PM 10 ranges

from 37.33 µg/m3 (2014) to 61.83 µg/m3 (2017).

- Whereas SO2 ranges from 10.50 µg/m3 (2019) to 12.32 µg/m3 (2005), NOx ranges from 14.80 µg/m3 (2018) to 19.73 µg/m3(2002) and CO ranges between 0.42 µg/m3 (2012) and 0.40 µg/m3 (2013).

1.4.2.2 AAQ OBSERVATIONS OF SUGALA VILLAGE

A. Quarter 1 - AAQ Values of Sugala Village (Jan 2003- March 2020)

Table 5

Quarter 1 – (Jan-March, 2003–2020)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2003	SPM	131.80	RSPM	42.10	11.58	19.20	NA
2004	SPM	131.83	RSPM	43.17	12.07	16.70	
2005	SPM	121.25	RSPM	46.17	11.78	15.93	
2006	SPM	120.56	RSPM	45.50	11.90	15.87	
2007	SPM	107.28	RSPM	28.67	11.55	15.15	
2008	SPM	134.15	RSPM	26.50	11.97	15.50	
2009	SPM	125.75	RSPM	27.83	12.07	16.17	
2010	SPM	121.25	RSPM	30.00	12.00	15.28	
2011	SPM	131.83	RSPM	27.01	11.41	15.05	
2012	SPM	133.11	RSPM	33.67	11.27	15.08	
2013	PM 2.5	30.50	PM10	46.50	11.22	19.42	0.32
2014	PM 2.5	27.67	PM10	44.33	12.53	16.82	0.40
2015	PM 2.5	33.20	PM10	48.60	12.00	15.72	BDL
2016	PM 2.5	29.33	PM10	50.33	11.62	15.00	BDL
2017	PM 2.5	27.17	PM10	53.67	12.02	15.62	BDL
2018	PM 2.5	26.00	PM10	52.83	11.78	15.97	BDL
2019	PM 2.5	27.67	PM10	54.50	12.28	15.30	BDL
2020	PM 2.5	25.12	PM10	50.86	11.75	15.05	BDL

INTERPRETATION

- The highest and lowest values of SPM are 107.28 µg/m3 (2007) to 134.15 µg/m3 (2008) and for RSPM it is 26.50 µg/m3 (2008) to 46.17 µg/m3 (2005).
- PM2.5 in quarter 1 ranges between 25.12 µg/m3 (2020) to 33.20 µg/m3 (2015) and PM10 value ranges between ranges from 44.33 µg/m3 (2014) to 54.50 µg/m3 (2019).
- Whereas SO2 ranges from 11.22 µg/m3(2013) to 12.53 µg/m3(2014), NOx ranges from 15.00 µg/m3 (2016) to 19.20 µg/m3(2003) and CO ranges between 0.32 µg/m3 (2013)and 0.40. µg/m3 (2014).

B. Quarter 2 – AAQ Values of Sugala Village (April 2003-June 2019)

Table 6

Quarter 2 – (April-June, 2003-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2003	SPM	132.48	RSPM	42.83	11.83	20.00	NA
2004	SPM	129.30	RSPM	40.67	12.28	16.98	
2005	SPM	110.08	RSPM	40.67	11.67	17.18	
2006	SPM	127.44	RSPM	31.83	12.13	15.45	

2007	SPM	124.29	RSPM	28.67	11.97	15.55	
2008	SPM	119.97	RSPM	27.17	11.70	15.82	
2009	SPM	129.30	RSPM	28.83	12.12	15.83	
2010	SPM	132.48	RSPM	29.17	11.45	15.48	
2011	SPM	131.97	RSPM	36.17	10.83	15.98	
2012	PM 2.5	22.00	PM10	44.00	12.50	20.13	0.37
2013	PM 2.5	26.17	PM10	43.33	12.03	18.83	0.33
2014	PM 2.5	26.00	PM10	43.67	12.33	17.10	0.37
2015	PM 2.5	32.33	PM10	47.33	11.80	15.35	B.D.L
2016	PM 2.5	30.33	PM10	50.00	11.55	14.93	B.D.L
2017	PM 2.5	26.33	PM10	52.17	12.00	15.98	B.D.L
2018	PM 2.5	24.67	PM10	49.50	11.23	14.17	B.D.L
2019	PM 2.5	26.60	PM10	52.20	12.12	16.14	B.D.L

INTERPRETATION

- The highest and lowest values of SPM are 110.08 µg/m3 (2005) to 132.48 µg/m3 (2010) and for RSPM it is 27.17 µg/m3 (2008) to 42.83 µg/m3 (2003).
- PM2.5 in quarter 2 ranges between 22 µg/m3 (2012) to 32.33 µg/m3 (2015) and PM10 value ranges between ranges from 43.33 µg/m3 (2013) to 52.20 µg/m3 (2019).
- Whereas SO2 ranges from 10.83 µg/m3(2011) to 12.28 µg/m3(2004), NOx ranges from 14.17 µg/m3 (2018) to 20.00 µg/m3 (2003) and CO ranges between 0.37 µg/m3 (2012)and 033. µg/m3 (2013).

C. ***Quarter 3 - AAQ Values of Sugala Village (July 2003 – September 2020)***

Table 7

Quarter 3 – (July-September, 2003 –2020)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2002	SPM	131.72	Rspm	45.00	13.26	20.90	
2003	SPM	132.49	Rspm	44.17	11.70	19.15	
2004	SPM	128.65	Rspm	38.67	12.32	16.65	
2005	SPM	115.93	Rspm	37.10	11.84	16.52	
2006	SPM	130.26	Rspm	29.00	12.23	15.38	Na
2007	SPM	125.01	Rspm	26.33	11.62	15.35	
2008	SPM	118.32	Rspm	27.00	12.17	16.17	
2009	SPM	128.65	Rspm	27.67	12.23	15.57	
2010	SPM	132.49	Rspm	21.62	10.30	12.55	
2011	SPM	134.47	Rspm	36.67	10.22	15.60	
2012	Pm 2.5	27.83	Pm10	38.33	10.73	20.95	0.37
2013	Pm 2.5	24.67	Pm10	44.17	12.23	18.95	0.28
2014	Pm 2.5	26.50	Pm10	43.00	12.43	17.15	0.40
2015	Pm 2.5	32.00	Pm10	60.00	11.63	15.32	B.D.L
2016	Pm 2.5	30.83	Pm10	50.00	12.10	15.87	B.D.L
2017	Pm 2.5	25.17	Pm10	52.50	11.95	16.20	B.D.L
2018	Pm 2.5	28.17	Pm10	56.67	10.55	15.20	B.D.L
2019	Pm 2.5	25.17	Pm10	52.50	11.95	16.20	B.D.L

INTERPRETATION

- The highest and lowest values of SPM are 115.93 µg/m3 (2005) to 134.47 µg/m3 (2011) and for RSPM it is 21.62 µg/m3 (2010) to 45.00 µg/m3 (2002).
- PM2.5 in quarter 3 ranges between 24.67 µg/m3 (2013) to 32.00 µg/m3 (2015) and PM10 value ranges between ranges from 38.33 µg/m3 (2012) to 56.67 µg/m3 (2018).
- Whereas SO2 ranges from 10.22 µg/m3(2011) to 13.26 µg/m3(2006), NOx ranges from 15.32 µg/m3 (2015) to 20.90 µg/m3(2003) and CO ranges between 0.28 µg/m3 (2013)and 0.40 µg/m3 (2014)

D. Quarter 4 - AAQ Values of Sugala Village Oct-Dec 2002-2019)

Table 8

Quarter -4 (October – September, 2002- 2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2002	SPM	134.47	RSPM	41.00	11.90	20.77	NA
2003	SPM	128.24	RSPM	44.17	12.12	18.13	
2004	SPM	126.34	RSPM	38.83	12.07	16.58	
2005	SPM	121.30	RSPM	37.67	12.05	16.60	
2006	SPM	112.06	RSPM	28.00	11.57	15.52	
2007	SPM	123.53	RSPM	29.50	11.83	15.60	
2008	SPM	122.02	RSPM	27.33	12.10	15.95	
2009	SPM	126.34	RSPM	27.83	11.83	15.18	
2010	SPM	128.24	RSPM	26.09	11.27	13.80	
2011	SPM	131.80	RSPM	33.67	11.00	14.98	
2012	PM 2.5	32.17	PM10	41.33	10.98	19.95	0.55
2013	PM 2.5	25.17	PM10	43.33	12.57	17.38	0.38
2014	PM 2.5	27.50	PM10	41.00	12.23	17.15	0.37
2015	PM 2.5	28.33	PM10	52.00	12.07	16.00	B.D.L
2016	PM 2.5	33.67	PM10	56.50	11.77	15.92	B.D.L
2017	PM 2.5	27.67	PM10	55.50	12.33	15.93	B.D.L
2018	PM 2.5	25.67	PM10	53.17	11.37	14.92	B.D.L
2019	PM 2.5	26.81	PM10	52.51	10.95	15.98	B.D.L

INTERPRETATION

- The highest and lowest values of SPM are 112.06 µg/m3 (2006) to 134.47 µg/m3 (2002) and for RSPM it is 26.09 µg/m3 (2010) to 44.17 µg/m3 (2003).
- PM2.5 in quarter 4 ranges between 25.17 µg/m3 (2013) to 33.67 µg/m3 (2016) and PM10 value ranges between ranges from 41.00 µg/m3 (2014) to 56.50 µg/m3 (2016).
- Whereas SO2 ranges from 10.95 µg/m3(2019) to 12.57 µg/m3 (2013), NOx ranges from 13.80 µg/m3 (2010) to 20.77 µg/m3 (2002) and CO ranges between 0.37 µg/m3 (2014)and 0.55 µg/m3 (2012)

1.4.2.3 AAQ OBSERVATIONS OF JAGATIYA VILLAGE

A. Quarter 1 - AAQ Values of Jagatiya Village (Jan-March, 2002-2020)

Table 9

Quarter -1 (Jan-March, 2002-2020)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2003	SPM	138.22	RSPM	39.10	12.62	21.20	NA
2004	SPM	138.67	RSPM	41.33	12.25	15.98	

2005	SPM	131.43	RSPM	59.67	12.02	15.88	
2006	SPM	122.21	RSPM	36.17	11.85	16.57	
2007	SPM	122.90	RSPM	28.17	11.87	15.40	
2008	SPM	126.11	RSPM	24.17	12.12	16.12	
2009	SPM	118.28	RSPM	24.67	10.08	15.77	
2010	SPM	121.25	RSPM	26.17	12.18	14.73	
2011	SPM	138.67	RSPM	25.39	12.09	14.97	
2012	SPM	126.36	RSPM	39.33	11.33	14.80	
2013	PM 2.5	29.33	PM10	47.17	12.17	20.43	0.35
2014	PM 2.5	27.17	PM10	43.50	11.95	17.45	0.33
2015	PM 2.5	26.00	PM10	39.67	11.78	15.60	nil
2016	PM 2.5	27.33	PM10	50.00	11.08	15.22	BDL
2017	PM 2.5	24.83	PM10	49.17	11.32	15.20	BDL
2018	PM 2.5	21.67	PM10	45.17	11.15	15.63	BDL
2019	PM 2.5	23.50	PM10	49.33	12.32	14.95	BDL
2020	PM 2.5	25.43	PM10	50.51	10.75	14.45	BDL

INTERPRETATION

- The highest and lowest values of SPM are 118.28 µg/m3 (2009) to 138.67 µg/m3 (2011) and for RSPM it is 24.17 µg/m3 (2008) to 59.67 µg/m3 (2005).
- PM2.5 in quarter 1 ranges between 21.67 µg/m3 (2018) to 29.33 µg/m3 (2013) and PM10 value ranges between ranges from 39.67 µg/m3 (2015) to 50.51 µg/m3 (2020).
- Whereas SO2 ranges from 10.75 µg/m3 (2020) to 12.62 µg/m3(2003), NOx ranges from 14.45 µg/m3 (2020) to 21.20 µg/m3(2003) and CO ranges between 0.33 µg/m3 (2014) and 0.35 µg/m3 (2013).

B. Quarter 2 - AAQ Values of Jagatiya Village (April-June, 2003-2019)

Table 10

Quarter -2 (April-June, 2003-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2003	SPM	131.77	RSPM	42.17	10.60	19.65	
2004	SPM	131.60	RSPM	41.83	11.73	17.10	
2005	SPM	128.79	RSPM	44.50	11.65	14.45	
2006	SPM	113.11	RSPM	32.83	11.98	15.60	
2007	SPM	130.87	RSPM	28.00	11.60	15.15	
2008	SPM	132.97	RSPM	26.83	11.53	15.55	
2009	SPM	129.30	RSPM	26.33	11.73	15.38	
2010	SPM	131.77	RSPM	31.00	11.90	15.62	
2011	SPM	131.34	RSPM	42.67	9.92	14.82	NA
2012	PM 2.5	24.67	PM10	47.50	11.33	20.85	0.37
2013	PM 2.5	27.67	PM10	42.67	12.37	20.70	0.50
2014	PM 2.5	25.67	PM10	46.17	12.18	16.97	0.37
2015	PM 2.5	29.17	PM10	42.00	11.82	15.15	BDL
2016	PM 2.5	26.83	PM10	48.33	11.68	15.40	BDL
2017	PM 2.5	25.17	PM10	51.00	11.32	15.35	BDL
2018	PM 2.5	23.33	PM10	46.67	11.02	15.10	BDL

2019	PM 2.5	25.17	PM10	51.00	11.32	15.35	BDL

INTERPRETATION

- The highest and lowest values of SPM are 113.11 µg/m3 (2006) to 132.97 µg/m3 (2008) and for RSPM it is 26.33 µg/m3 (2009) to 44.50 µg/m3 (2005).
- PM2.5 in quarter 2 ranges between 23.33 µg/m3 (2018) to 29.17 µg/m3 (2015) and PM10 value ranges between ranges from 42.00 µg/m3 (2015) to 51.00 µg/m3 (2017).
- Whereas SO2 ranges from 9.92 µg/m3 (2011) to 12.37 µg/m3(2013), NOx ranges from 14.45 µg/m3 (2005) to 20.85 µg/m3(2012) and CO ranges between 0.38 µg/m3 (2014) and 0.50 µg/m3 (2012).

C. ***Quarter 3 - AAQ Values of Jagatiya Village (July – September;2003-2020)***

Table 11

Quarter -3 (July – September; 2003-2020)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2002	SPM	131.34	RSPM	44.50	12.13	20.82	
2003	SPM	137.36	RSPM	42.67	11.42	18.48	
2004	SPM	125.83	RSPM	41.50	11.72	17.08	
2005	SPM	122.07	RSPM	42.00	12.68	16.00	
2006	SPM	119.63	RSPM	29.67	11.53	15.28	
2007	SPM	123.69	RSPM	23.67	10.97	15.03	
2008	SPM	125.19	RSPM	27.83	11.52	15.50	
2009	SPM	128.65	RSPM	25.50	11.67	14.17	
2010	SPM	137.36	RSPM	24.44	10.57	12.75	
2011	SPM	129.51	RSPM	41.17	10.73	14.40	NA
2012	PM 2.5	26.83	PM10	41.67	11.23	20.88	0.50
2013	PM 2.5	26.00	PM10	45.83	12.28	19.78	0.40
2014	PM 2.5	26.25	PM10	38.00	12.43	16.85	0.38
2015	PM 2.5	29.83	PM10	56.83	11.48	15.08	BDL
2016	PM 2.5	24.33	PM10	45.83	12.18	16.07	BDL
2017	PM 2.5	25.17	PM10	48.50	11.78	15.70	BDL
2018	PM 2.5	23.50	PM10	51.50	10.05	14.03	BDL
2019	PM 2.5	25.17	PM10	48.50	11.78	15.70	BDL

INTERPRETATION

- The highest and lowest values of SPM is 119.63 µg/m3 (2006) to 137.36 µg/m3 (2003) and for RSPM it is 23.67 µg/m3 (2007) to 44.50 µg/m3 (2002).
- PM2.5 in quarter 3 ranges between 23.50 µg/m3 (2018) to 29.83 µg/m3 (2015) and PM10 value ranges between ranges from 38.00 µg/m3 (2014) to 56.83 µg/m3 (2015).
- Whereas SO2 ranges from 10.05 µg/m3 (2018) to 12.68 µg/m3(2005), NOx ranges from 12.75 µg/m3 (2010) to 20.88 µg/m3(2012) and CO ranges between 0.38 µg/m3 (2014) and 0.50 µg/m3 (2012).

D. ***Quarter 4 - AAQ Values of Jagatiya Village (Oct-Dec 2002-2019)***

Table 12

Quarter -4 (Oct-Dec 2002-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2002	SPM	129.51	RSPM	41.33	11.22	20.32	NA

2003	SPM	127.05	RSPM	44.17	11.60	17.32	
2004	SPM	137.13	RSPM	43.33	11.50	17.23	
2005	SPM	117.71	RSPM	40.50	11.90	15.20	
2006	SPM	130.28	RSPM	30.33	11.60	15.22	
2007	SPM	120.64	RSPM	25.33	11.43	15.35	
2008	SPM	124.20	RSPM	28.83	11.53	15.55	
2009	SPM	126.34	RSPM	24.00	12.02	14.03	
2010	SPM	127.05	RSPM	28.34	11.27	17.07	
2011	SPM	138.22	RSPM	38.00	10.90	14.62	
2012	PM 2.5	29.50	PM10	41.50	11.47	20.13	0.50
2013	PM 2.5	27.17	PM10	45.00	13.05	17.17	0.37
2014	PM 2.5	27.57	PM10	37.71	12.74	16.30	0.38
2015	PM 2.5	28.50	PM10	55.50	11.45	14.85	B.D.L
2016	PM 2.5	28.33	PM10	50.83	12.13	15.83	B.D.L
2017	PM 2.5	25.17	PM10	48.67	11.32	15.25	B.D.L
2018	PM 2.5	21.17	PM10	47.83	11.15	14.02	B.D.L
2019	PM 2.5	27.70	PM10	50.66	11.43	16.13	B.D.L

INTERPRETATION

- The highest and lowest values of SPM is 117.71 µg/m3 (2005) to 138.22 µg/m3 (2011) and for RSPM it is 24.00 µg/m3 (2009) to 43.33 µg/m3 (2004).
- PM2.5 in quarter 4 ranges between 21.17 µg/m3 (2018) to 29.50 µg/m3 (2012) and PM10 value ranges between ranges from 37.71 µg/m3 (2014) to 55.50 µg/m3 .
- Whereas SO2 ranges from 11.15 µg/m3 (2018) to 13.05 µg/m3 (2013). NOx ranges from 14.03 µg/m3 (2009) to 20.32 µg/m3(2002) and CO ranges between 0.38 µg/m3 (2014) and 0.50 µg/m3 (2012).

1.4.2.4 AAQ OBSERVATIONS CHACHHAR VILLAGE

A. Quarter 1 – AAQ Values of Chachhar Village (Jan 2002- March 2020)

Table 13

Quarter -1 (Jan 2002- March 2020)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2003	SPM	131.13	RSPM	38.93	10.65	20.60	
2004	SPM	117.02	RSPM	41.00	12.18	17.15	
2005	SPM	122.09	RSPM	43.67	11.57	15.52	
2006	SPM	114.80	RSPM	31.17	11.12	15.28	
2007	SPM	125.71	RSPM	28.67	12.15	15.58	
2008	SPM	118.18	RSPM	32.00	11.85	15.55	
2009	SPM	131.39	RSPM	36.33	11.43	15.03	
2010	SPM	131.43	RSPM	29.33	11.17	15.45	
2011	SPM	117.02	RSPM	24.09	13.78	15.88	
2012	SPM	128.81	RSPM	42.83	12.13	15.45	NA
2013	PM 2.5	28.80	PM10	45.00	11.38	19.30	0.46
2014	PM 2.5	26.83	PM10	43.33	11.88	16.70	0.40
2015	PM 2.5	29.17	PM10	43.00	11.75	15.75	NIL

2016	PM 2.5	27.17	PM10	58.33	11.83	16.08	B.D.L
2017	PM 2.5	24.17	PM10	48.33	11.32	15.10	B.D.L
2018	PM 2.5	24.67	PM10	47.67	11.48	15.58	B.D.L
2019	PM 2.5	23.00	PM10	54.00	11.67	15.00	B.D.L
2020	PM 2.5	25.71	PM10	52.34	11.80	15.23	B.D.L

INTERPRETATION

- The highest and lowest values of SPM are 114.80 µg/m3 (2006) to 131.43 µg/m3 (2010) and for RSPM it is 24.09 µg/m3 (2011) to 43.67 µg/m3 (2005).
- PM2.5 in quarter 1 ranges between 23.00 µg/m3 (2019) to 29.17 µg/m3 (2015) and PM10 value ranges between ranges from 43.00 µg/m3 (2014) to 58.33 µg/m3 (2016).
- Whereas SO2 ranges from 10.65 µg/m3 (2003) to 13.78 µg/m3(2011), NOx ranges from 15.00 µg/m3 (2019) to 20.60 µg/m3(2003) and CO ranges between 0.40 µg/m3 (2014) and 0.46 µg/m3 (2013).

B. Quarter 2 – AAQ Values of Chachhar Village (April-June, 2003-2019)

Table 14

Quarter -2 (April-June, 2003-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2003	SPM	131.40	RSPM	42.33	12.33	19.47	NA
2004	SPM	124.97	RSPM	41.83	11.85	17.22	
2005	SPM	131.82	RSPM	32.50	12.25	15.30	
2006	SPM	128.55	RSPM	35.33	12.23	15.87	
2007	SPM	132.50	RSPM	31.83	11.62	15.50	
2008	SPM	119.97	RSPM	34.00	10.87	15.67	
2009	SPM	131.60	RSPM	26.17	11.27	15.38	
2010	SPM	131.40	RSPM	29.00	11.57	14.62	
2011	SPM	129.28	RSPM	39.17	11.33	15.80	
2012	PM 2.5	24.67	PM10	45.00	10.97	19.27	0.28
2013	PM 2.5	23.67	PM10	43.67	11.20	19.52	0.40
2014	PM 2.5	24.17	PM10	41.33	12.43	16.70	0.42
2015	PM 2.5	27.50	PM10	42.00	11.72	14.68	B.D.L
2016	PM 2.5	27.50	PM10	54.00	12.03	16.13	B.D.L
2017	PM 2.5	26.67	PM10	51.50	11.77	15.33	B.D.L
2018	**PM 2.5**	**23.17**	**PM10**	**49.33**	**11.73**	**15.45**	**B.D.L**
2019	**PM 2.5**	**26.67**	**PM10**	**51.50**	**11.77**	**15.33**	**B.D.L**

INTERPRETATION

- The highest and lowest values of SPM are 119.97 µg/m3 (2008) to 132.50 µg/m3 (2007) and for RSPM it is 26.17 µg/m3 (2009) to 42.33 µg/m3 (2003).
- PM2.5 in quarter 2 ranges between 23.17 µg/m3 (2018) to 27.50 µg/m3 (2015) and PM10 value ranges between ranges from 41.33 µg/m3 (2014) to 54.00 µg/m3 (2016).
- Whereas SO2 ranges from 10.87 µg/m3 (2008) to 12.33 µg/m3(2003), NOx ranges from 15.30 µg/m3 (2005) to 19.52 µg/m3(2013) and CO ranges between 0.28 µg/m3 (2012) and 0.42 µg/m3 (2014) .

C. ***Quarter 3 – AAQ Values of Chachhar Village (July –Sep, 2003-2019)***

Table 15

Quarter -3 (July –Sep, 2003-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2002	SPM	129.28	RSPM	45.00	11.37	19.60	
2003	SPM	142.64	RSPM	44.67	11.77	19.52	
2004	SPM	112.79	RSPM	44.33	11.57	16.65	
2005	SPM	115.77	RSPM	32.00	12.00	15.22	
2006	SPM	122.83	RSPM	30.67	12.37	15.73	
2007	SPM	129.81	RSPM	33.67	11.93	16.15	
2008	SPM	118.32	RSPM	35.67	10.47	15.30	
2009	SPM	125.83	RSPM	27.33	10.38	14.45	
2010	SPM	142.64	RSPM	25.03	11.17	13.60	
2011	SPM	128.99	RSPM	43.83	11.80	16.02	NA
2012	PM 2.5	26.60	PM10	40.20	10.88	20.14	0.48
2013	PM 2.5	24.00	PM10	43.83	11.48	19.33	0.35
2014	PM 2.5	26.29	PM10	42.14	12.17	16.51	0.41
2015	PM 2.5	27.33	PM10	44.50	11.73	15.52	BDL
2016	PM 2.5	24.83	PM10	51.17	11.30	14.90	BDL
2017	PM 2.5	26.00	PM10	50.83	11.55	15.38	BDL
2018	PM 2.5	21.00	PM10	53.83	11.20	14.62	BDL
2019	PM 2.5	26.00	PM10	50.83	11.55	15.38	BDL

INTERPRETATION

- The highest and lowest values of SPM are 112.79 µg/m3 (2004) to 142.64 µg/m3 (2010) and for RSPM it is 25.03 µg/m3 (2010) to 45.00 µg/m3 (2003).
- PM2.5 in quarter 3 ranges between 21.00 µg/m3 (2018) to 27.33 µg/m3 (2015) and PM10 value ranges between ranges from 40.20 µg/m3 (2012) to 53.83 µg/m3 (2018).
- Whereas SO2 ranges from 10.38 µg/m3 (2009) to 12.37 µg/m3(2006), NOx ranges from 15.22 µg/m3 (2005) to 20.14 µg/m3(2012) and CO ranges between 0.35 µg/m3 (2013) and 0.48 µg/m3 (2012).

D. ***Quarter 4 – AAQ Values of Chachhar Village (Oct-Dec;2002-2019)***

Table 16

Quarter -4 (Oct-Dec; 2002-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2002	SPM	128.99	RSPM	39.00	11.20	19.68	
2003	SPM	127.14	RSPM	42.67	12.32	17.78	
2004	SPM	123.25	RSPM	38.00	12.23	16.77	
2005	SPM	110.08	RSPM	33.33	11.77	15.22	
2006	SPM	108.80	RSPM	33.33	12.28	16.18	
2007	SPM	133.01	RSPM	32.67	12.07	16.00	
2008	SPM	130.29	RSPM	35.17	10.87	14.52	
2009	SPM	137.13	RSPM	26.33	10.87	14.72	
2010	SPM	127.14	RSPM	27.46	11.47	16.48	
2011	SPM	131.13	RSPM	41.33	11.25	15.57	NA
2012	PM 2.5	29.50	PM10	43.67	11.73	19.32	0.38

2013	PM 2.5	26.00	PM10	41.43	12.01	16.86	0.41
2014	PM 2.5	29.83	PM10	41.83	12.02	16.67	0.38
2015	PM 2.5	25.17	PM10	52.33	11.95	15.55	BDL
2016	PM 2.5	27.33	PM10	52.83	11.47	15.37	BDL
2017	PM 2.5	28.00	PM10	51.67	11.37	15.45	BDL
2018	PM 2.5	18.83	PM10	52.50	11.32	14.65	BDL
2019	PM 2.5	28.65	PM10	50.18	12.50	15.07	BDL

INTERPRETATION

- The highest and lowest values of SPM are 108.80 µg/m3 (2006) to 137.13 µg/m3 (2009) and for RSPM it is 26.33 µg/m3 (2009) to 42.67 µg/m3 (2003).
- PM2.5 in quarter 4 ranges between 18.83 µg/m3 (2018) to 29.83 µg/m3 (2014) and PM10 value ranges between ranges from 41.43 µg/m3 (2013) to 52.83 µg/m3 (2016).
- Whereas SO2 ranges from 10.87 µg/m3 (2009) to 12.50 µg/m3(2019), NOx ranges from 14.52 µg/m3 (2008) to 19.68 µg/m3(2002) and CO ranges between 0.38 µg/m3 (2012) and 0.41 µg/m3 (2013).

1.4.2.5 AAQ OBSERVATIONS VILLAGE CHADIAVAV

A. Quarter 1 – AAQ Values of Chadiavav Village (Jan-March, 2003-2012)

Table 17

Quarter -1 (Jan-March, 2003-2012)

Year	Parameters	Results	Parameters	Results	SO2	Nox
2003	SPM	132.10	RSPM	42.71	10.44	20.08
2004	SPM	132.72	RSPM	40.33	12.43	16.88
2005	SPM	126.68	RSPM	42.17	12.07	15.10
2006	SPM	122.21	RSPM	27.33	11.57	15.25
2007	SPM	126.08	RSPM	25.50	12.20	15.83
2008	SPM	133.92	RSPM	27.50	11.52	15.85
2009	SPM	125.75	RSPM	33.50	11.95	15.12
2010	SPM	122.09	RSPM	27.37	10.45	11.99
2011	SPM	132.72	RSPM	22.79	11.96	15.67
2012	SPM	132.00	RSPM	42.17	11.10	15.30

INTERPRETATION

- The highest and lowest values of SPM are 122.09 µg/m3 (2010) to 133.92 µg/m3 (2008) and for RSPM it is 22.79 µg/m3 (2011) to 42.71 µg/m3 (2003).
- Whereas SO2 ranges from 10.44 µg/m3 (2003) to 12.43 µg/m3(2004), NOx ranges from 15.12 µg/m3 (2009) to 20.08 µg/m3(2003).

B. Quarter 2 – AAQ Values of Chadiavav Village (April-June, 2003-2011)

Table 18

Quarter -2 (April-June, 2003-2011)

Year	Parameters	Results	Parameters	Results	SO2	Nox
2003	SPM	120.71	RSPM	43.50	11.70	20.05
2004	SPM	115.26	RSPM	39.83	11.63	16.43
2005	SPM	108.68	RSPM	30.67	12.03	14.93
2006	SPM	112.54	RSPM	28.67	11.85	15.78

2007	SPM	128.02	RSPM	28.33	11.92	15.05
2008	SPM	124.10	RSPM	32.33	11.82	15.35
2009	SPM	124.97	RSPM	34.85	11.48	15.50
2010	SPM	120.71	RSPM	31.00	10.93	14.75
2011	SPM	128.48	RSPM	36.50	11.58	15.25

INTERPRETATION

- The highest and lowest values of SPM are 108.68 µg/m3 (2005) to 128.48 µg/m3 (2011) and for RSPM it is 28.33 µg/m3 (2007) to 43.50 µg/m3 (2003).
- Whereas SO2 ranges from 10.93 µg/m3 (2010) to 12.03 µg/m3(2005), NOx ranges from 14.75 µg/m3 (2010) to 20.05 µg/m3(2003) .

C. ***Quarter 3 – AAQ Values of Chadiavav Village (July –September;2002-2011)***

Table 19

Quarter -3 (July –September; 2002-2011)

Year	Parameters	Results	Parameters	Results	SO2	Nox
2002	SPM	128.48	RSPM	43.17	13.03	20.47
2003	SPM	112.98	RSPM	41.17	11.45	19.22
2004	SPM	131.19	RSPM	35.26	11.49	16.25
2005	SPM	115.93	RSPM	28.00	12.07	15.55
2006	SPM	123.78	RSPM	24.83	12.30	15.93
2007	SPM	126.33	RSPM	28.33	11.72	15.93
2008	SPM	125.84	RSPM	32.00	11.67	14.75
2009	SPM	112.79	RSPM	22.60	11.18	14.08
2010	SPM	112.98	RSPM	25.39	10.72	13.15
2011	SPM	128.01	RSPM	34.50	11.32	14.95

INTERPRETATION

- The highest and lowest values of SPM are 112.79 µg/m3 (2009) to 128.48 µg/m3 (2002) and for RSPM it is 22.60 µg/m3 (2009) to 43.17 µg/m3 (2002).
- Whereas SO2 ranges from 10.72 µg/m3 (2010) to 13.03 µg/m3(2002), NOx ranges from 13.15 µg/m3 (2010) to 20.47 µg/m3(2002).

D. ***Quarter 4 – AAQ Values of Chadiavav Village (Oct-Dec, 2002-2011)***

Table 20

Quarter -4 (Oct-Dec, 2002-2011)

Year	Parameters	Results	Parameters	Results	SO2	Nox
2002	SPM	128.01	RSPM	41.17	11.40	20.33
2003	SPM	124.65	RSPM	43.83	12.22	17.20
2004	SPM	129.01	RSPM	39.50	11.55	16.63
2005	SPM	122.16	RSPM	25.71	11.97	15.47
2006	SPM	127.88	RSPM	28.00	11.67	15.53
2007	SPM	132.67	RSPM	28.67	11.48	15.83
2008	SPM	122.02	RSPM	31.67	11.85	15.43
2009	SPM	123.25	RSPM	25.81	11.60	14.28
2010	SPM	124.65	RSPM	25.35	11.10	15.22
2011	SPM	132.10	RSPM	41.17	11.43	15.62

INTERPRETATION

- The highest and lowest values of SPM are 122.02 µg/m3 (2008) to 129.01 µg/m3 (2004) and for RSPM it is 25.71 µg/m3 (2005) to 43.83 µg/m3 (2003).
- Whereas SO2 ranges from 11.10 µg/m3 (2010) to 12.22 µg/m3 (2003), NOx ranges from 14.28 µg/m3 (2009) to 20.33 µg/m3 (2002).

1.4.2.6 AAQ OBSERVATIONS VILLAGE NAGADALA

A. Quarter 1 – AAQ Values of Nagadala Village (Jan-March; 2013-2020)

Table 21

Quarter -1 (Jan-March, 2013-2020)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2013	PM 2.5	27.00	PM10	41.40	11.90	19.34	0.38
2014	PM 2.5	28.50	PM10	43.33	12.48	17.37	0.43
2015	PM 2.5	31.17	PM10	45.83	12.35	15.75	Nil
2016	PM 2.5	24.67	PM10	48.00	11.82	16.05	BDL
2017	PM 2.5	23.83	PM10	45.83	12.10	15.65	BDL
2018	PM 2.5	22.33	PM10	44.67	12.13	16.27	BDL
2019	PM 2.5	24.17	PM10	45.50	12.22	15.05	BDL
2020	PM 2.5	24.67	PM10	49.36	11.93	15.30	BDL

INTERPRETATION

- The highest and lowest values of PM2.5 are 22.33 µg/m3 (2018) to 31.17 µg/m3 (2015) and for PM10 it is 41.40 µg/m3 (2013) to 49.36 µg/m3 (2020).
- Whereas SO2 ranges from 11.90 µg/m3 (2013) to 12.48 µg/m3(2014), NOx ranges from 15.05 µg/m3 (2019) to 19.34 µg/m3(2013) and CO ranges between 0.38 µg/m3 (2013) and 0.43 µg/m3 (2014).

B. Quarter 2 – AAQ Values of Nagadala Village (April-June; 2012-2019)

Table 22

Quarter -2 (April-June; 2012-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2012	PM 2.5	25.17	PM10	46.67	12.60	19.82	0.35
2013	PM 2.5	24.67	PM10	42.67	11.83	19.68	1.17
2014	PM 2.5	27.83	PM10	42.50	11.67	17.23	0.40
2015	PM 2.5	27.33	PM10	43.17	12.27	15.28	BDL
2016	PM 2.5	28.50	PM10	52.00	11.70	15.87	BDL
2017	PM 2.5	25.83	PM10	48.83	11.82	15.82	BDL
2018	PM 2.5	24.83	PM10	47.5	12.2	15.75	BDL
2019	PM 2.5	25.83	PM10	48.83	11.81	15.81	BDL

INTERPRETATION

- The highest and lowest values of PM2.5 are 24.67 µg/m3 (2013) to 28.50 µg/m3 (2016) and for PM10 it is 42.50 µg/m3 (2014) to 52.00 µg/m3 (2016).
- Whereas SO2 ranges from 11.67 µg/m3 (2014) to 12.60 µg/m3(2012), NOx ranges from 15.28 µg/m3 (2015) to 19.82 µg/m3(2012) and CO ranges between 0.35 µg/m3 (2012) and 1.17 µg/m3 (2013).

C. ***Quarter 3 – AAQ Values of Nagadala Village (July-Sep; 2012-2019)***

Table 23

Quarter -3 (July-Sep; 2012-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2012	PM 2.5	27.80	PM10	39.60	11.84	19.58	0.4
2013	PM 2.5	22.50	PM10	42.33	11.73	19.85	0.40
2014	PM 2.5	26.50	PM10	42.00	11.87	17.22	0.35
2015	PM 2.5	28.50	PM10	50.33	11.95	15.22	B.D.L
2016	PM 2.5	24.00	PM10	49.50	12.30	15.97	B.D.L
2017	PM 2.5	26.67	PM10	50.00	12.15	16.03	B.D.L
2018	PM 2.5	24.83	PM10	47.83	12.10	15.45	B.D.L
2019	PM 2.5	26.67	PM10	50.00	12.15	16.03	B.D.L

INTERPRETATION

- The highest and lowest values of PM2.5 are 22.50 µg/m3 (2013) to 28.50 µg/m3 (2015) and for PM10 it is 39.60 µg/m3 (2012) to 50.33 µg/m3 (2015).
- Whereas SO2 ranges from 11.73 µg/m3 (2013) to 12.30 µg/m3(2016), NOx ranges from 15.22 µg/m3 (2015) to 19.85 µg/m3(2013) and CO ranges between 0.35 µg/m3 (2014) and 0.40 µg/m3 (2013).

D. ***Quarter 4 – AAQ Values of Nagadala Village (Oct-Dec; 2012-2019)***

Table 24

Quarter -4 (Oct-Dec; 2012-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2012	PM 2.5	27.86	PM10	42.29	12.70	19.39	0.41
2013	PM 2.5	26.83	PM10	44.17	12.07	17.92	0.42
2014	PM 2.5	29.00	PM10	40.17	11.82	16.98	0.40
2015	PM 2.5	24.33	PM10	48.50	11.98	15.55	BDL
2016	PM 2.5	27.33	PM10	49.67	12.22	15.77	BDL
2017	PM 2.5	25.33	PM10	47.33	11.50	15.53	BDL
2018	PM 2.5	22.67	PM10	44.83	11.88	14.87	BDL
2019	PM 2.5	28.34	PM10	49.92	11.97	15.70	BDL

INTERPRETATION

- The highest and lowest values of PM2.5 are 22.67 µg/m3 (2018) to 29.00 µg/m3 (2014) and for PM10 it is 40.17 µg/m3 (2014) to 49.92µg/m3 (2019).
- Whereas SO2 ranges from 11.82 µg/m3 (2014) to 12.70 µg/m3(2012), NOx ranges from 14.87 µg/m3 (2018) to 19.39 µg/m3(2012) and CO ranges between 0.40 µg/m3 (2014) and 0.42 µg/m3 (2013).

1.4.2.7 AAQ OBSERVATIONS VILLAGE KANSARIYA

A. ***Quarter 1 – AAQ Values of Kansariya Village (Jan-March; 2013-2020)***

Table 25

Quarter -1 (Jan-March; 2013-2020)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2013	PM 2.5	30.50	PM10	46.83	12.52	19.92	0.43
2014	PM 2.5	29.00	PM10	44.50	12.30	17.22	0.42
2015	PM 2.5	29.00	PM10	43.83	12.23	15.63	Nil

2016	PM 2.5	28.00	PM10	50.33	11.50	15.42	BDL
2017	PM 2.5	24.67	PM10	44.17	11.52	15.50	BDL
2018	PM 2.5	23.50	PM10	46.00	10.85	15.13	BDL
2019	PM 2.5	24.33	PM10	44.50	11.17	14.95	BDL
2020	PM 2.5	25.87	PM10	50.45	11.63	15.09	BDL

INTERPRETATION

- The highest and lowest values of PM2.5 are 23.50 µg/m3 (2018) to 30.50 µg/m3 (2015) and for PM10 it is 43.83 µg/m3 (2015) to 50.45 µg/m3 (2020).
- Whereas SO2 ranges from 10.85 µg/m3 (2018) to 12.52 µg/m3(2013), NOx ranges from 14.95 µg/m3 (2019) to 17.22 µg/m3(2014) and CO ranges between 0.42 µg/m3 (2014) and 0.43 µg/m3 (2013).

B. Quarter 2– AAQ Values of Kansariya Village (April-June; 2012-2019)

Table 26

Quarter -2 (April-June; 2012-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2012	PM 2.5	27.17	PM10	45.67	13.02	20.75	0.37
2013	PM 2.5	25.50	PM10	47.33	12.83	21.23	0.47
2014	PM 2.5	26.67	PM10	45.17	12.30	17.02	0.33
2015	PM 2.5	28.00	PM10	46.17	12.28	14.95	BDL
2016	PM 2.5	27.67	PM10	50.17	11.67	15.67	BDL
2017	PM 2.5	27.50	PM10	49.00	11.73	15.63	BDL
2018	PM 2.5	22.66	PM10	45.5	10.6	14.7	BDL
2019	PM 2.5	27.5	PM10	49	11.73	15.63	BDL

INTERPRETATION

- The highest and lowest values of PM2.5 are 25.50 µg/m3 (2013) to 28.00 µg/m3 (2015) and for PM10 it is 45.17 µg/m3 (2014) to 50.17 µg/m3 (2016).
- Whereas SO2 ranges from 10.6 µg/m3 (2018) to 13.02 µg/m3(2012), NOx ranges from 14.7 µg/m3 (2018) to 21.23 µg/m3(2013) and CO ranges between 0.33 µg/m3 (2014) and 0.47 µg/m3 (2013).

C. Quarter 3– AAQ Values of Kansariya Village (July-Sep; 2012-2019)

Table 27

Quarter -3 (July-Sep; 2012-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2012	PM 2.5	28.20	PM10	38.00	12.02	21.44	0.50
2013	PM 2.5	26.67	PM10	43.17	12.10	19.42	0.38
2014	PM 2.5	26.17	PM10	42.33	12.52	16.87	0.42
2015	PM 2.5	31.33	PM10	54.33	11.85	15.43	BDL
2016	PM 2.5	23.00	PM10	42.83	12.37	15.97	BDL
2017	PM 2.5	24.50	PM10	48.17	11.72	15.43	BDL
2018	PM 2.5	24.50	PM10	45.83	10.28	13.72	BDL
2019	PM 2.5	24.50	PM10	48.17	11.72	15.43	BDL

INTERPRETATION

- The highest and lowest values of PM2.5 are 23.00 µg/m3 (2016) to 31.33 µg/m3 (2015) and for PM10 it is 38.00 µg/m3 (2012) to 54.33 µg/m3 (2015).

- Whereas SO2 ranges from 10.28 µg/m3 (2018) to 12.52 µg/m3(2014), NOx ranges from 13.72 µg/m3 (2018) to 21.44 µg/m3(2012) and CO ranges between 0.38 µg/m3 (2013) and 0.50 µg/m3 (2012).

D. Quarter 4– AAQ Values of Kansariya Village (Oct-Dec ; 2012-2019)

Table 28
Quarter -4 (Oct-Dec; 2012-2019)

Year	Parameters	Results	Parameters	Results	SO2	Nox	CO
2012	PM 2.5	30.00	PM10	43.83	12.17	20.82	0.62
2013	PM 2.5	27.33	PM10	42.50	12.45	17.32	0.38
2014	PM 2.5	31.83	PM10	44.83	12.30	16.35	0.37
2015	PM 2.5	27.67	PM10	50.50	11.28	15.30	BDL
2016	PM 2.5	27.33	PM10	46.17	11.95	15.52	BDL
2017	PM 2.5	27.50	PM10	49.67	11.52	15.73	BDL
2018	PM 2.5	21.33	PM10	42.17	11.03	13.70	BDL
2019	PM 2.5	26.72	PM10	49.14	11.47	15.37	BDL

INTERPRETATION

- The highest and lowest values of PM2.5 are 21.33 µg/m3 (2018) to 31.83 µg/m3 (2014) and for PM10 it is 42.17 µg/m3 (2018) to 50.50 µg/m3 (2015).
- Whereas SO2 ranges from 11.03 µg/m3 (2018) to 12.45 µg/m3(2013), NOx ranges from 13.70 µg/m3 (2018) to 20.82 µg/m3(2012) and CO ranges between 0.37 µg/m3 (2014) and 0.62 µg/m3 (2012).

1.5 COMPARISION OF NOISE MONITORING DATA

This chapter presents the comparative analysis of ambient noise parameters. Ambient noise is monitored regularly at designated locations within and in the locality of ML area and are currently in progress at periodic intervals.

1.5.1 AMBIENT NOISE QUALITY MONITORING LOCATIONS

The ambient noise quality data is collected for locations regularly monitored by ACL are as below:

1. Noise Level HEMM
   - Surface Miner(While Mining/While dozing the material)
   - Loader (While loading to Tipper)
   - Dozer(While Mining)
2. Ambient Noise Level Monitoring –Sugala Mines
   - Near Surface Miners
   - Haul Road
   - Mines Office
   - Sugala Village
   - Chidivav Village
   - RSEB power grid

1.5.2 AMBIENT AIR QUALITY MONITORING RESULTS

The day time and night time noise equivalent noise levels at each location is compared over the study period between 2002 and 2020. The comparison of equivalent noise levels at each location is

presented in the following sub-sections. The highest and lowest values of day time and night time noise equivalent noise levels at each location (throughout the study period) is presented in the description below.

Effort has been made to analyse the impact of mining through study of change in noise levels in the study period. It is presented in the Section 3.3 below. The applicable Ambient Air Quality Standards in respect of Noise is presented in below table

1.5.2.1 NOISE OBSERVATIONS WORKING PLACE AREA

1.5.2.1.1 OBSERVATIONS: SURFACE MINER

A. Quarter 1 –Surface Miner (Jan 2003-March 2020)

Table No. - 29
Quarter 1 (Jan 2003-March 2020)

Years	Surface Miner	
	At 5 m distance	At 10 m distance
2003	76.33	72.33
2004	75.66	71.66
2005	75.33	71.66
2006	74	68.33
2007	71.66	68
2008	67.33	64.66
2009	75	69
2010	73.66	68.6
2011	71.6	68
2012	68.3	65.3
2013	57.3	40
2014	54.6	44
2015	64.6	69
2016	72	65
2017	74	70
2018	71.3	66.3
2019	70.66	65.6
2020	69.5	66.5

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 54.6 db(A)(2014) to 76.33 db(A)(2003) at a distance of 5m and 40 db(A) (2013) to 72.33 db(A) (2003) at a distance of 10 m.

B. Quarter 2- Surface Miner (April 2003-June 2019)

Table No. - 30
Quarter 2 (April 2003-June 2019)

Years	Surface Miner	
	At 5 m distance	At 10 m distance
2003	NIL	NI
2004	76.33	72.67
2005	77.66	74
2006	73.66	68.66

2007	72.33	68.3
2008	67.3	64
2009	76	72
2010	73.3	67
2011	72.3	68.3
2012	66.3	47.3
2013	51.6	41.6
2014	58.3	42.3
2015	71	64.3
2016	77	73.3
2017	73	68
2018	72	67
2019	71	67.6

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 51.6 db(A)(2013) to 77.6 db(A)(2005) at a distance of 5m and 41.6 db(A) (2013) to 74 db(A) (2005) at a distance of 10 m.

C. *Quarter 3- Surface Miner (July 2002-Sep 2019)*

Table No. - 31
Quarter 3 (July 2002-Sep 2019)

Years	Surface Miner	
	At 5 m distance	**At 10 m distance**
2002	76	70.3
2003	73.3	70
2004	73	68.6
2005	74.6	71.6
2006	72	67
2007	67.6	63.3
2008	69	66
2009	74	71.6
2010	72.6	67.33
2011	71.6	65.6
2012	59	39.3
2013	53.6	40.6
2014	61	41.3
2015	70.3	62
2016	74.6	70
2017	72.3	68
2018	71.3	66.3
2019	71.3	67.3

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 53.6 db(A)(2013) to 76 db(A)(2002) at a distance of 5m and 39.3 db(A) (2012) to 71.6 db(A) (2005) at a distance of 10m.

D. *Quarter 4- Surface Miner (Oct 2002-Dec 2019)*

Table No. - 32
Quarter 4 (Oct 2002-Dec 2019)

Years	Surface Miner	
	At 5 m distance	At 10 m distance
2002	74	70
2003	71.3	66.6
2004	75.3	71
2005	73.6	69.6
2006	72.3	68
2007	69	66
2008	71.6	66.3
2009	72.6	70
2010	71.3	67.3
2011	68	62.6
2012	57	39
2013	63.33	45
2014	57.6	41.3
2015	71	62
2016	72.3	69.3
2017	72	67.6
2018	71.3	68.33
2019	70.3	67

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 57 db(A) (2012) to 74 db(A)(2002) at a distance of 5m and 62 db(A) (2015) to 71 db(A) (2004) at a distance of 10 m

1.5.2.1.2 OBSERVATIONS: LOADER

A. Quarter 1 – Loader (Jan 2003-March 2020)

Table No. - 33
Quarter 1 (Jan 2003-March 2020)

Years	Loader	
	At 5 m distance	At 10 m distance
2003	73.6	70.3
2004	78	73.3
2005	76	71.6
2006	73.3	68.6
2007	72	68.6
2008	70.6	67.6
2009	77.6	75.3
2010	72.6	69
2011	70.6	68
2012	69.3	66.3
2013	54.3	39.3
2014	58.6	44
2015	75.6	61

2016	71.3	61
2017	72.3	67.6
2018	70.6	67.6
2019	71.6	67.3
2020	69	66

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 54.3 db(A) (2013) to 77.6 db(A)(2009) at a distance of 5m and 39.3 db(A) (2013) to 75.3 db(A) (2009) at a distance of 10 m.

B. Quarter 2 –Loader (April 2003-June 2019)

Table No. - 34

Quarter 2 (April 2003-June 2019)

Years	**Loader**	
	At 5 m distance	**At 10 m distance**
2003	73.3	70.3
2004	75.3	71.6
2005	77	72.3
2006	73	68
2007	74.3	70.3
2008	71.6	67
2009	74.6	71.6
2010	73.6	67.3
2011	71.6	69
2012	57	47
2013	55	41.6
2014	55.3	41
2015	71	55
2016	76.3	72.3
2017	69	64.3
2018	62.6	59
2019	67	62

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 55 db(A) (2013) to 76.3 db(A)(2016) at a distance of 5m and 41 db(A) (2014) to 72.3 db(A) (2016) at a distance of 10 m.

C. Quarter 3– Loader (July 2002-September 2019)

Table No. - 35

Quarter 3 (July 2002-September 2019)

Years	**Loader**	
	At 5 m distance	**At 10 m distance**
2002	73	70.3
2003	74	69.6
2004	75	70.3
2005	73.3	69

2006	70.3	65.3
2007	69.6	65
2008	69	65
2009	73.6	71
2010	71	66.3
2011	73	67
2012	58.3	41
2013	51.3	43
2014	53.6	46.6
2015	71	56.3
2016	73.6	70.6
2017	67	62
2018	66.3	62.6
2019	70	65.6

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 51.3 db(A) (2013) to 75 db(A)(2004) at a distance of 5m and 41 db(A) (2012) to 71 db(A) (2009) at a distance of 10 m.

D. Quarter 4– Loader (Oct 2002-December 2019)

Table No. - 36

Quarter 4 (Oct 2002-December 2019)

Years	**Loader**	
	At 5 m distance	**At 10 m distance**
2002	74	71
2003	69	65.6
2004	76.3	71.3
2005	74	70.3
2006	71.6	68
2007	71	67.6
2008	72.3	68.6
2009	73.3	69.6
2010	70.3	65.6
2011	70.6	68.3
2012	55	40.3
2013	55.33	45
2014	54.6	46
2015	70.3	53.6
2016	72.3	68.3
2017	66	62
2018	69.3	67
2019	71	68

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 54.6 db(A) (2014) to 76.3 db(A)(2004) at a distance of 5m and 40.3 db(A) (2012) to 71.3 db(A) (2004) at a distance of 10 m.

1.5.2.1.3 OBSERVATIONS: DOZER

A. Quarter 1 – Dozer (Jan 2003-March 2020)

Table No. – 37

Quarter 1 (Jan 2003-March 2020)

Years	Dozer	
	At 5 m distance	At 10 m distance
2003	73.3	69.6
2004	77.6	74
2005	76.6	72.3
2006	76.3	71.6
2007	74	69.6
2008	71.3	67.6
2009	77	73
2010	76.3	72
2011	73.3	68.3
2012	70.6	67.3
2013	55.6	39
2014	54.6	48.6
2015	73.3	59.3
2016	61.2	49
2017	73.6	69
2018	71.3	67
2019	69.6	66
2020	68	65

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 54.6 db(A) (2014) to 77.6 db(A)(2004) at a distance of 5m and 39 db(A) (2013) to 73 db(A) (2009) at a distance of 10 m.

B. Quarter 2 – Dozer (April 2003-June 2019)

Table No. – 38

Quarter 2 (April 2003-June 2019)

Years	Dozer	
	At 5 m distance	At 10 m distance
2003	73	69.3
2004	75.3	71
2005	77.3	74.3
2006	73.3	68.3
2007	74.3	70.3
2008	70.6	67
2009	76	71.3
2010	75	69.6
2011	73.6	70.3
2012	62.3	47
2013	56	42.6
2014	48.3	44

2015	70.3	63.3
2016	75.3	69.6
2017	73.3	68.3
2018	71.6	66.3
2019	72.6	66.6

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 48.3 db(A) (2014) to 77.3 db(A)(2005) at a distance of 5m and 42.6 db(A) (2013) to 74.3 db(A) (2005) at a distance of 10 m.

C. Quarter 3 – Dozer (July 2002-September 2019)

Table No. – 39

Quarter 3 (July 2002-September 2019)

Years	Dozer	
	At 5 m distance	**At 10 m distance**
2002	72.6	66
2003	72.3	68.6
2004	71.3	65.3
2005	74.3	70
2006	69.3	64.3
2007	73.6	67.6
2008	67.6	64
2009	74.6	71
2010	70.6	65
2011	74	70
2012	57.6	39
2013	57	43.3
2014	50.6	39.3
2015	70.6	59
2016	75	70.3
2017	71.6	67
2018	71.6	65.6
2019	71.3	68.3

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 50.6 db(A) (2014) to 74.6 db(A)(2009) at a distance of 5m and 39 db(A) (2012) to 71 db(A) (2009) at a distance of 10 m.

D. Quarter 4 –Dozer (Oct 2002-December 2019)

Table No. – 40

Quarter 4 (Oct 2002-December 2019)

Years	Dozer	
	At 5 m distance	**At 10 m distance**
2002	73.6	69.3
2003	68.3	64.6
2004	74.6	70.6

2005	75.3	71.3
2006	74	69
2007	74.3	71.3
2008	68	63.6
2009	74.6	69.6
2010	71.5	66
2011	75.3	70.3
2012	61.3	39.6
2013	51	45.6
2014	47	41
2015	71	59.6
2016	72	68.3
2017	72.6	65.6
2018	72.6	68.6
2019	68.3	64.3

INTERPRETATION

- The range of variation at a distance of 5m and at a distance of 10 m varies between 47 db(A) (2014) to 75.3 db(A)(2011) at a distance of 5m and 41 db(A) (2014) to 71.3 db(A) (2007) at a distance of 10 m.

1.5.2.1.4 OBSERVATIONS: SUGALA MINES – NEAR SURFACE MINER

A. Quarter 1- Sugala Mines – Near Surface Miner (Jan 2003-March 2020)

Table No. – 41

Quarter 1 (Jan 2003-March 2020)

year	Leq Day	Leq Night	Day LimitLeq(dB(A))	Night LimitLeq(dB(A))
2003	62	57.3	75	70
2004	61	55.3	75	70
2005	63.3	57	75	70
2006	68	65.3	75	70
2007	67	64	75	70
2008	67.3	62	75	70
2009	66.6	63	75	70
2010	70.5	64.5	75	70
2011	61	55.3	75	70
2012	68	65	75	70
2013	67	64	75	70
2014	63.3	57	75	70
2015	67.3	57	75	70
2016	64.3	53	75	70
2017	62	54	75	70
2018	62.3	53.6	75	70
2019	63.3	56.3	75	70
2020	64.5	52	75	70

INTERPRETATION

- The day time noise levels in this location varies between 61 db(A) and 70.5 db(A) and night time noise values are ranged between 52 db(A) and 65.3 db(A).

B. ***Quarter 2 - Sugala Mines – Near Surface Miner (April 2003-June 2019)***

Table No. – 42

Quarter 2 (April 2003-June 2019)

year	Leq Day	Leq Night	Day LimitLeq(dB(A))	Night LimitLeq(dB(A))
2003	67.3	56	75	70
2004	66	59.3	75	70
2005	67.3	63.3	75	70
2006	66	62	75	70
2007	66.6	61.6	75	70
2008	68	59.3	75	70
2009	67	62	75	70
2010	67.3	56	75	70
2011	66	62	75	70
2012	66	62	75	70
2013	63	55.3	75	70
2014	65.3	57.6	75	70
2015	61.6	57.6	75	70
2016	59.6	53.6	75	70
2017	64.3	57.6	75	70
2018	59	52	75	70
2019	61.6	54	75	70

INTERPRETATION

- The day time noise levels in this location varies between 59 db(A) and 67.3 db(A) and night time noise values are ranged between 52 db(A) and 63.3 db(A).

C. ***Quarter 3 - Sugala Mines – Near Surface Miner (July 2003-September 2019)***

Table No. – 43

Quarter 3 (July 2003-September 2019)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	63.3	56.3	75	70
2004	64.6	57.6	75	70
2005	67.6	59.3	75	70
2006	68	64	75	70
2007	67	63.3	75	70
2008	69.3	59.3	75	70
2009	68	59.6	75	70
2010	63.3	56.3	75	70
2011	68	64	75	70
2012	68	64	75	70
2013	62.6	55.3	75	70
2014	66	59.3	75	70

2015	61.6	53.6	75	70
2016	57.6	51.3	75	70
2017	65.6	54	75	70
2018	58.3	49	75	70
2019	62.6	52	75	70

INTERPRETATION

- The day time noise levels in this location varies between 57.6 db(A) and 69.3 db(A) and night time noise values are ranged between 49 db(A) and 64 db(A).

D. Quarter 4 - Sugala Mines – Near Surface Miner (October 2002-December 2019)

Table No. – 44

Quarter 4 (October 2002-December 2019)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2002	67	59.5	75	70
2003	67.3	53.6	75	70
2004	66.3	54.6	75	70
2005	63	61.3	75	70
2006	67.3	62	75	70
2007	65.3	62	75	70
2008	68.6	60.6	75	70
2009	68	63	75	70
2010	67.3	53.6	75	70
2011	67.3	62	75	70
2012	67.3	62	75	70
2013	63.66	57.6	75	70
2014	68	55.3	75	70
2015	61.6	54.3	75	70
2016	59	54.6	75	70
2017	63.6	56.6	75	70
2018	62	55.3	75	70
2019	62.6	54.6	75	70

INTERPRETATION

- The day time noise levels in this location varies between 59 db(A) and 68.6 db(A) and night time noise values are ranged between 53.6 db(A) and 62 db(A)

1.5.2.1.5 OBSERVATION: HAUL ROAD

A. Quarter 1- haul road (Jan 2003-March 2020)

Table No. – 45

Quarter 1- (Jan 2003-March 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	63.66	61.33	75	70
2004	62.66	53.66	75	70
2005	62.33	58.3	75	70

2006	67.3	61.6	75	70
2007	67.33	62	75	70
2008	67.3	64	75	70
2009	67	60.66	75	70
2010	64.5	58.5	75	70
2011	62.66	53.66	75	70
2012	66.5	63	75	70
2013	64	55	75	70
2014	45.33	41.33	75	70
2015	66.6	56.33	75	70
2016	68	65.33	75	70
2017	67	61.3	75	70
2018	66.6	60.66	75	70
2019	64	67	75	70
2020	64	60.5	75	70

INTERPRETATION

- The day time noise levels in this location varies between 45.33 db(A) and 67.33 db(A) and night time noise values are ranged between 53.66 db(A) and 65.33 db(A).

B. Quarter 2- haul road (April 2003-June 2020)

Table No. – 46

Quarter 2- (April 2003-June 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	63.3	59	75	70
2004	61.66	57.6	75	70
2005	67.3	60.3	75	70
2006	66.6	61.66	75	70
2007	70	62	75	70
2008	69.66	66.33	75	70
2009	68	61	75	70
2010	63.33	59	75	70
2011	66.6	61.66	75	70
2012	63.33	59	75	70
2013	44.33	41.33	75	70
2014	45.6	41.67	75	70
2015	63.66	58	75	70
2016	64	56.3	75	70
2017	67.6	63.33	75	70
2018	65	59.3	75	70
2019	67	48.66	75	70

INTERPRETATION

- The day time noise levels in this location varies between 44.33 db(A) and 70 db(A) and night time noise values are ranged between 41.33 db(A) and 66.33 db(A).

C. *Quarter 3- haul road (July 2003-September 2019)*

Table No. – 47

Quarter 3 - (July 2003-September 2019)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	61.6	53	75	70
2004	61.6	57.6	75	70
2005	68	62	75	70
2006	67	63.3	75	70
2007	68.33	64	75	70
2008	67.3	62.66	75	70
2009	66	63	75	70
2010	61.6	53	75	70
2011	67	63.3	75	70
2012	61.6	53	75	70
2013	43	41	75	70
2014	43.66	41	75	70
2015	67	58	75	70
2016	63	59.6	75	70
2017	65.3	60.66	75	70
2018	65.66	60	75	70
2019	67.6	64.33	75	70

INTERPRETATION

- The day time noise levels in this location varies between 43.66 db(A) and 68.33 db(A) and night time noise values are ranged between 41.00 db(A) and 64.33 db(A).

D. *Quarter 4- haul road (October 2002-December 2020)*

Table No. – 48

Quarter 4 - (October 2002-December 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2002	63	60.5	75	70
2003	62.66	57.66	75	70
2004	62.3	56.333	75	70
2005	67	60	75	70
2006	65.3	62	75	70
2007	67.3	62	75	70
2008	65.6	62.66	75	70
2009	67.3	62	75	70
2010	62.6	57.6	75	70
2011	65.33	62	75	70
2012	62.66	57.6	75	70
2013	45.33	40.66	75	70
2014	45.66	42	75	70
2015	67	59.3	75	70
2016	66.66	61.6	75	70

2017	64.6	60.3	75	70
2018	65.67	62	75	70
2019	66.6	63	75	70

INTERPRETATION

- The day time noise levels in this location varies between 45.33 db(A) and 67.3 db(A) and night time noise values are ranged between 40.6 db(A) and 63 db(A).

1.5.2.1.6 OBSERVATION: MINES OFFICE

A. Quarter 1- Mines Office (Jan 2003-March 2020)

Table No. – 49

Quarter 1 (Jan 2003-March 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	61.6	58.6	75	70
2004	63.3	51.66	75	70
2005	60	49.3	75	70
2006	62	57	75	70
2007	57.33	52.3	75	70
2008	54	47	75	70
2009	54	47.3	75	70
2010	57.5	53.5	75	70
2011	63.33	51.6	75	70
2012	57.5	52.5	75	70
2013	54	47.33	75	70
2014	46.66	44	75	70
2015	66.6	55.3	75	70
2016	60	50.66	75	70
2017	61.6	55.33	75	70
2018	59.6	54.6	75	70
2019	62.3	50.3	75	70
2020	59	56.5	75	70

INTERPRETATION

- The day time noise levels in this location varies between 46.6 db(A) and 66.6 db(A) and night time noise values are ranged between 44 db(A) and 58.6 db(A).

B. Quarter 2- Mines Office (April 2003-June 2020)

Table No. – 50

Quarter 2 (April 2003-June 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	61	49.3	75	70
2004	59	50.3	75	70
2005	62	57.6	75	70
2006	60.5	55.83	75	70

2007	55	48	75	70
2008	55	50	75	70
2009	57.3	53	75	70
2010	61	49.3	75	70
2011	59	54	75	70
2012	55	50	75	70
2013	41.3	38.33	75	70
2014	42.3	38.66	75	70
2015	60.3	56.3	75	70
2016	63	48.6	75	70
2017	55.2	47.8	75	70
2018	59.51	50.962	75	70
2019	59.24	49.1	75	70

INTERPRETATION

- The day time noise levels in this location varies between 41.3 db(A) and 61 db(A) and night time noise values are ranged between 38.3 db(A) and 55.8 db(A).

C. ***Quarter 3- Mines Office (July 2003-September 2019)***

Table No. – 51

Quarter 3 (July 2003-September 2019)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	63.6	53.3	75	70
2004	61.66	51.3	75	70
2005	63.33	56	75	70
2006	58	53.6	75	70
2007	54.3	46.3	75	70
2008	54.33	49.33	75	70
2009	54.3	51	75	70
2010	63.66	53.3	75	70
2011	58	53.6	75	70
2012	54.3	49.3	75	70
2013	44	40.3	75	70
2014	43	39.33	75	70
2015	60	55.66	75	70
2016	61	54.33	75	70
2017	60.3	55.6	75	70
2018	60.333	54	75	70
2019	60.33	47	75	70

INTERPRETATION

- The day time noise levels in this location varies between 43 db(A) and 63.6 db(A) and night time noise values are ranged between 39.3 db(A) and 55.6 db(A).

D. ***Quarter 4- Mines Office (October 2002-December 2020)***

Table No. – 52

Quarter 4 (October 2002-December 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2002	62.5	57	75	70
2003	61.66	54	75	70
2004	60.66	52	75	70
2005	62.3	54.6	75	70
2006	57.33	51	75	70
2007	55.66	47.3	75	70
2008	55.66	49	75	70
2009	57	52.3	75	70
2010	61.66	54	75	70
2011	57.3	51	75	70
2012	55.6	49	75	70
2013	43.6	40.3	75	70
2014	42.3	38.3	75	70
2015	62.6	57.3	75	70
2016	60.6	56.3	75	70
2017	59	53	75	70
2018	61.3	55.3	75	70
2019	62.6	55.6	75	70

INTERPRETATION

- The day time noise levels in this location varies between 42.3 db(A) and 62.6 db(A) and night time noise values are ranged between 38.3 db(A) and 57.3 db(A).

1.5.2.1.7 OBSERVATION: SUGALA VILLAGE

A. ***Quarter 1 – Sugala Village (Jan 2003-March 2020)***

Table No. – 53

Quarter 1 (Jan 2003-March 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	57.6	52.6	75	70
2004	55.6	50.6	75	70
2005	55.6	51	75	70
2006	56	46.3	75	70
2007	54	47	75	70
2008	57.3	52.3	75	70
2009	54	51	75	70
2010	51.5	49	75	70
2011	55.6	50.6	75	70
2012	54.5	46.5	75	70
2013	54	51	75	70
2014	42	39	75	70
2015	74	63	75	70
2016	48.3	39.3	75	70

2017	53	48	75	70
2018	49.3	46	75	70
2019	48	40	75	70
2020	59	56.5	75	70

INTERPRETATION

- The day time noise levels in this location varies between 48.3 db(A) and 57.6 db(A) and night time noise values are ranged between 39 db(A) and 56.5 db(A).

B. Quarter 2 – Sugala Village (April 2003-June 2020)

Table No. – 54

Quarter 2 (April 2003-June 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	51	48	75	70
2004	51	49.3	75	70
2005	56	49	75	70
2006	55	48	75	70
2007	59	54	75	70
2008	50.3	47.6	75	70
2009	52	50	75	70
2010	51	48	75	70
2011	55	48	75	70
2012	50.3	47.6	75	70
2013	40.3	36.6	75	70
2014	42	38	75	70
2015	66.6	59.3	75	70
2016	48	40	75	70
2017	53	47	75	70
2018	52	47	75	70
2019	54	44.6	75	70

INTERPRETATION

- The day time noise levels in this location varies between 40.3 db(A) and 66.6 db(A) and night time noise values are ranged between 36.6 db(A) and 59.3 db(A).

C. Quarter 3 – Sugala Village (July 2003-September 2019)

Table No. – 55

Quarter 3 (July 2003-September 2019)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	53.6	47.3	75	70
2004	53.6	49	75	70
2005	57.3	51	75	70
2006	54.3	46.3	75	70

2007	58	53.6	75	70
2008	54.3	46.6	75	70
2009	52.3	49.3	75	70
2010	53.6	47.3	75	70
2011	54.3	46.3	75	70
2012	54.3	46.6	75	70
2013	41.6	39	75	70
2014	42.6	39.3	75	70
2015	68	60.6	75	70
2016	51.3	44	75	70
2017	52.3	47.6	75	70
2018	52.3	46.6	75	70
2019	46	38	75	70

INTERPRETATION

- The day time noise levels in this location varies between 41.6 db(A) and 68 db(A) and night time noise values are ranged between 38 db(A) and 60.6 db(A).

D. **Quarter 4 (October 2002-December 2020)**

Table No. – 56

Quarter 4 (October 2002-December 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2002	53.5	48	75	70
2003	53.3	44.3	75	70
2004	53.3	49.3	75	70
2005	55	48	75	70
2006	55.6	47.3	75	70
2007	57.3	51	75	70
2008	55.6	47.6	75	70
2009	54.6	52	75	70
2010	55.8	50.2	75	70
2011	55.6	47.3	75	70
2012	55.6	47.6	75	70
2013	44	39.3	75	70
2014	43.6	40	75	70
2015	68.3	57.3	75	70
2016	50.6	47	75	70
2017	53.3	46.6	75	70
2018	58.6	52.3	75	70
2019	52.3	46.6	75	70

INTERPRETATION

- The day time noise levels in this location varies between 44 db(A) and 68.3 db(A) and night time noise values are ranged between 39.3 db(A) and 57.3 db(A).

1.5.2.1.8 OBSERVATION: CHIDIVAV VILLAGE

A. Quarter 1 – Chidivav Village (Jan 2003-March 2020)

Table No. – 57

Quarter 1 (Jan 2003-March 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	53.3	50	75	70
2004	52.3	42.3	75	70
2005	41.6	40	75	70
2006	51.3	43.3	75	70
2007	51.3	45.6	75	70
2008	54.6	44.6	75	70
2009	52.3	43.3	75	70
2010	53.5	50.5	75	70
2011	52.3	42.3	75	70
2012	50.5	45.5	75	70
2013	52.3	42.3	75	70
2014	43.3	37.3	75	70
2015	52.6	42.3	75	70
2016	49	38	75	70
2017	47.6	42	75	70
2018	45	44	75	70
2019	47	38.3	75	70
2020	56	52.5	75	70

INTERPRETATION

- The day time noise levels in this location varies between 41.6 db(A) and 54.6 db(A) and night time noise values are ranged between 38 db(A) and 52.5db(A).

B. Quarter 2 – Chidivav Village (April 2003-June 2019)

Table No. – 58

Quarter 2 (April 2003-June 2019)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	46.6	47.6	75	70
2004	45	41	75	70
2005	51	45	75	70
2006	53	48	75	70
2007	53.3	47.6	75	70
2008	51.3	46	75	70
2009	47.6	44	75	70
2010	46.6	47.6	75	70
2011	53	48	75	70
2012	46.6	47.6	75	70
2013	38.3	35.3	75	70
2014	41.6	38.6	75	70

2015	47.3	37.3	75	70
2016	48	38.3	75	70
2017	48	41.6	75	70
2018	45	42	75	70
2019	57	46	75	70

INTERPRETATION

- The day time noise levels in this location varies between 38.3 db(A) and 57 db(A) and night time noise values are ranged between 35.3 db(A) and 48 db(A).

C. Quarter 3– Chidivav Village (July 2003-September 2019)

Table No. – 59

Quarter 3 (July 2003-September 2019)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2003	50	42.6	75	70
2004	45.3	42	75	70
2005	53	45.6	75	70
2006	52	47	75	70
2007	55	45.6	75	70
2008	52	43.6	75	70
2009	50	47.6	75	70
2010	50	42.6	75	70
2011	52	47	75	70
2012	50	42.6	75	70
2013	41.3	37.3	75	70
2014	40.6	36	75	70
2015	46.6	36.6	75	70
2016	48.3	42.6	75	70
2017	46.3	42	75	70
2018	44.3	41	75	70
2019	45.6	39.3	75	70

INTERPRETATION

- The day time noise levels in this location varies between 40.6 db(A) and 55 db(A) and night time noise values are ranged between 36 db(A) and 47.6 db(A).

D. Quarter 4– Chidivav Village (October 2002 –December 2020)

Table No. – 60

Quarter 4 (October 2002 –December 2020)

year	Leq Day	Leq Night	Day Limit Leq(dB(A))	Night Limit Leq(dB(A))
2002	48.5	45	75	70
2003	49.6	44.6	75	70
2004	42	41	75	70
2005	52.3	47	75	70

2006	51.6	44.3	75	70
2007	56	48.3	75	70
2008	53.3	46	75	70
2009	53	49	75	70
2010	49.6	44.6	75	70
2011	51.6	44.3	75	70
2012	49.6	44.6	75	70
2013	41	36.3	75	70
2014	42	38	75	70
2015	48.3	37.6	75	70
2016	45.6	41.6	75	70
2017	45.6	41.3	75	70
2018	49.3	43.6	75	70
2019	49.3	42.6	75	70

INTERPRETATION

- The day time noise levels in this location varies between 41 db(A) and 53.3 db(A) and night time noise values are ranged between 36.3 db(A) and 49 db(A).

1.5.3 COMPARATIVE ANALYSIS

The noise levels at the core/industrial areas like Near Surface Miner, Haul road, Mines office, Sugala Village, Chidivav are impacted directly by ongoing mining activities. The background noise at the residential areas is not considered to have impacted the resultant noise levels due to mining activity in the Sugala Mine.

Thus comparison of work place noise ambient noise levels at industrial areas and ambient noise levels at the residential areas are discussed separately in the following sub-sections.

Surface Miner (Noise Level of HEMM & Second Location Near Surface Miner of Sugala Mines:

Sound sources contributing to the overall noise in and around the mine can be classified as stationary area source and moving noise sources. Shovels and drilling machines were considered as point sources and belt conveyors are represented as line source in the model. Occasional variations in the noise levels due to movements of water sprinkler, vehicles used for transportation of supervisory officials, etc. in the beginning and end of a shift were not taken into consideration. The Noise level of HEMM –Surface Miner, Loader & Dozer & second location Near Surface Miner of Sugala Village were monitored every year.

Haul Road:

This location lies within the Sugala ML area. The following observations were inferred from the comparative analysis:

- Both equivalent day time and night time noise levels have slightly increased in 2007 and 2008.
- Lowest equivalent day time and night time noise levels values were observed in 2013-2014.
- The day time equivalent noise levels are slightly higher than night time equivalent noise levels, while the noise levels are always within permissible limits at all time.

Mine office:

This location is within the Sugala ACL ML area. The following observations were inferred from the comparative analysis:

- Both, equivalent day time and night time noise levels have slightly increase in years the years 2003, 2005 & 2010,
- Lowest values of equivalent day time and night time noise levels are observed in 2013-14.
- The day time equivalent noise levels are slightly higher than night time equivalent noise levels, while the noise levels are always within permissible limits at all time.

Noise levels at residential areas:

Major sound sources contributing to the overall noise levels at the nearby residential areas of the ACL Sugala mines include noise due to movement of transport vehicles as moving noise sources and noise from the mining activity as area source.

The comparison of noise levels were monitored in the residential areas near ACL mines, include the village of Sugala & Chidivav in every year.

Sugala Village:

The following observations were inferred from the comparative analysis:

- Equivalent day time noise levels have increased in in the years 2015 to 2018.
- Lowest values of equivalent day and night time noise levels are observed in 2013-14.
- The day time equivalent noise levels are slightly higher than night time equivalent noise levels, while the noise levels are always within permissible limits at all time.

Chidivav Village:

The following observations were inferred from the comparative analysis:

- Equivalent day time noise levels have increased in in the years 2005, 2007-2008.
- Lowest values of equivalent day and night time noise levels are observed in 2013-14.
- The day time equivalent noise levels are slightly higher than night time equivalent noise levels, but the noise levels are always within permissible limits.

1.6 COMPARASION OF SOIL QUALITY MONITORING DATA

This chapter presents the comparative analysis of soil quality parameters. Soil is monitored regularly at designated locations that area Gujarat Ambuja Limestone Mine, Vadnagar, Solaj Limestone Mine, Rampara Limestone Mine, Sugala Limestone Mine, RKBA Limestone Mine, Vadnagar New Limestone Mine and are currently in progress at periodic intervals.

1.6.1 SOIL QUALITY MONITORING LOCATIONS

Soil samples were regularly monitored for nine different physico-chemical parameters of soil quality at 6 mining area that include Gujarat Ambuja Limestone Mine, Vadnagar, Solaj Limestone Mine, Rampara Limestone Mine, Sugala Limestone Mine, RKBA Limestone Mine, Vadnagar New Limestone Mine between 2002 and 2016 and for few locations from 2007-2012.

1.6.2 SOIL QUALITY MONITORING RESULTS

The values of pH, conductivity, M.H.C, Permeability, Bulk density, CaCO3, Sodium, Potassium, Chloride at monitored locations are presented below:

Table No.61
Soil Monitoring Results (2002-2016)
Sample A- Gujarat Ambuja Limestone Mine, Vadnagar

Years	Electric Conductivity	pH	M.H.C	Permeability	Bulk Density	CaCO3	Sodium	Potassium	Chloride
	mMho/cm		gm/cc	Cm/hrs	gm/c.cm	%	Ppm (mg/l)	ppm(mg/l)	Ppm (mg/l)
2002	0.28	8.87	61.5	0.62	1.75	violent above 59%	23	12	86
2003	0.3	8.1	62.5	0.65	1.86	violent above 55%	24	14	79
2004	NA	NA	NA	NA	NA	NA	NA	NA	NA
2005	0.35	7.96	67.5	0.42	1.24	30% Violen t	48	6.5	78
2006	0.23	7.3	64.5	0.98	1.25	86% Violen t	39	Nil	74
2007	NA	NA	NA	NA	NA	NA	NA	NA	NA
2008	0.42	7.5	67.3	0.26	1.3	28.5	66	8	107
2009	0.58	7.7	69.3	0.24	1.61	10.5	89	14	142
2010	0.18	7.42	66.8	0.28	1.3	NA	22	3.2	61.4
2011	1.87	7.48	66.3	0.29	1.18	NA	21	3.4	75.8
2012	2.01	7.32	62.1	0.39	1.12	NA	17	3.5	71
2013	1.85	7.37	55.7	0.39	1.23	NA	28	3.8	65.5
2014	1.42	7.25	53.2	0.36	1.26	NA	26	4.2	58.9
2015	1.92	7.24	57.6	0.42	1.24	NA	22	4.5	69.4
2016	1.19	7.38	45.6	0.38	1.48	NA	30	3.4	56.1

INTERPRETATION

The observed Parameters varies from 2002-16 as below

pH : 7.24 to 8.87.

Electrical conductivity (EC) : 0.18 to 2.01 mMho/cm

M.H.C : 45.6 to 67.5 gm/cc

Permeability : 0.24 to 0.98 Cm/hrs

Bulk density : 1.12 to 1.86 gm/c.cm.

CaCO3 : 10.5% to 86 %

Sodium : 17 to 89 ppm (mg/l)

Potassium : 3.2 to 14 ppm (mg/l)

Chloride : 56.1 to 142 ppm (mg/l)

Table No. 62
Soil Monitoring Results (2002-2016)
Sample B-Solaj Limestone Mine

	Electric Conductivity	pH	M.H.C	Permeability	Bulk Density	CaCO3	Sodium	Potassium	Chloride
Years	mMho/cm		gm/cc	Cm/hrs	gm/c.cm	%	ppm(mg/l)	ppm(mg/l)	ppm(mg/l)
2002	0.25	8.88	55.9	0.88	1.5	violent above 45%	20	11	80
2003	0.27	7.86	51.6	0.81	1.6	violent above 48%	22	13	86
2004	NA								
2005	0.9	8.1	71	0.34	1.38	37% Violent	126	18	187
2006	0.22			1.21	1.41	64% Violent	53	0.052	69
2007	NA								
2008									
2009									
2013	1.72	7.61	59.4	0.34	1.85		23	2.9	66.3
2014	1.56	7.36	51.3	0.32	1.38		25	2.7	62.5
2015	1.64	7.56	48	0.35	1.87		26	3.2	62.9
2016	1.32	7.85	51.9	0.31	1.72	NA	26	4.1	63.8

INTERPRETATION

The observed Parameters varies from 2002-16 as below

pH : 7.3 to 8.88.

Electrical conductivity (EC) : 0.22 to 1.72 mMho/cm

M.H.C : 48 to 59.4 gm/cc

Permeability : 0.31 to 1.21 Cm/hrs

Bulk density : 1.5 to 1.87 gm/c.cm.

CaCO3 : 37% to 64 %

Sodium : 20 to 126 ppm (mg/l)

Potassium : 0.052 to 18 ppm (mg/l)

Chloride : 62.5 to 187 ppm (mg/l)

Table No.63
Soil Monitoring Results (2002-2016)
Sample C-Rampara Limestone Mine

	Electric Conductivity	pH	M.H.C	Permeability	Bulk Density	CaCO3	Sodium	Potassium	Chloride
Years	mMho/cm		gm/cc	Cm/hrs	gm/c.cm	%	ppm(mg/l)	ppm(mg/l)	ppm(mg/l)

2002	0.22	8.14	54.1	0.82	1.45	violent above 40%	18	20	74
2003	0.23	8.38	52.5	0.77	1.5	violent above 42%	27	11	72
2004	NA								
2005	0.56	8.24	60.8	0.87	1.15	37% Violent	48	11	55
2006	0.21	7.2	67	0.93	1.23	64% Violent	42	NIL	65
2007									
2008									
2009	NA								
2013	1.72	7.61	59.4	0.34	1.85		23	2.9	66.3
2014	1.56	7.36	51.3	0.32	1.38		25	2.7	62.5
2015	1.64	7.56	48	0.35	1.87		26	3.2	62.9
2016	1.32	7.85	51.9	0.31	1.72	NA	26	4.1	63.8

INTERPRETATION

The observed Parameters varies from 2002-16 as below

pH : 7.2 to 8.38.

Electrical conductivity (EC) : 0.21 to 1.72 mMho/cm

M.H.C : 48 to 67 gm/cc

Permeability : 0.31 to 0.93 Cm/hrs

Bulk density : 1.15 to 1.87 gm/c.cm.

CaCO3 : 27% to 79 %

Sodium : 18 to 48 ppm (mg/l)

Potassium : 2.7 to 20 ppm (mg/l)

Chloride : 55 to 74 ppm (mg/l)

Table No. 64
Soil Monitoring Results (2002-2016)
Sample D-Sugala Limestone Mine

	Electric Conductivity	**pH**	**M.H.C**	**Permeability**	**Bulk Density**	**CaCO3**	**Sodium**	**Potassium**	**Chloride**
Years	**mMho/cm**		**gm/cc**	**Cm/hrs**	**gm/c.cm**	**%**	**ppm(mg/l)**	**ppm(mg/l)**	**ppm(mg/l)**
2002	0.26	7.92	58.5	0.9	1.55	violent above 60%	22	12	70
2003	0.23	7.71	55.1	0.86	1.4	violent above 58%	21	15	76
2004	0.31	7.88	56.4	0.92	1.59	violent above 55%	25	8	75

2005	0.7	8.56	72.3	0.38	1.43	37.5% Violent	102	14	146
2006	0.24	7.18	64.8	0.96	1.37	52% Violent	68	NIL	83
2007	0.4	7.8	63	1.95	1.52	52	57	15	105
2008	0.16	7.8	68.3	0.23	1.17	52	141	20	301
2009	0.45	8	67.2	0.26	1.57	38	67	13	108
2010	0.18	7.87	58.2	0.25	1.2	NA	28	3.5	60.2
2011	0.68	7.78	40.4	0.26	1.42	NA	29	4.8	72.2
2012	0.43	7.52	39.2	0.29	1.45	NA	22	4.1	63.5
2013	0.68	7.55	48.6	0.28	1.45	NA	29	5.3	63.5
2014	0.62	7.33	49.8	0.35	1.33	NA	28	4.6	60.4
2015	0.86	7.67	41.7	0.26	1.32	NA	30	4.9	59.2
2016	0.97	7.71	40.4	0.26	1.6	NA	35	4.9	59.7

INTERPRETATION

The observed Parameters varies from 2002-16 as below

pH : 7.18 to 8.56.

Electrical conductivity (EC) : 0.16 to 0.97 mMho/cm

M.H.C : 39.2 to 72.3 gm/cc

Permeability : 0.25 to 0.96 Cm/hrs

Bulk density : 1.17 to 1.6 gm/c.cm.

CaCO3 : 37.5 % to 60 %

Sodium : 21 to 102 ppm (mg/l)

Potassium : 3.5 to 20 ppm (mg/l)

Chloride : 59.5 to 301 ppm (mg/l)

Table No. 65
Soil Monitoring Results (2007)
Sample E-RKBA Limestone Mine

	Electric Conductivity	**pH**	**M.H.C**	**Permeability**	**Bulk Density**	**CaCO3**	**Sodium**	**Potassium**	**Chloride**
Years	**mMho/cm**		**gm/cc**	**Cm/hrs**	**gm/c.cm**	**%**	**ppm(mg/l)**	**ppm(mg/l)**	**ppm(mg/l)**
2007	0.3	7.7	72	0.18	1.43	2	41	6	60

INTERPRETATION

The observed Parameters varies from 2007 as below

pH : 7.7.

Electrical conductivity (EC) : 0.3 mMho/cm

M.H.C : 72 gm/cc

Permeability : 0.18 Cm/hrs

Bulk density : 1.43 gm/c.cm.

CaCO3 : 2 %

Sodium : 41 ppm (mg/l)

Potassium : 6 ppm (mg/l)

Chloride : 60 ppm (mg/l)

Table No. 66
Soil Monitoring Results (2002-2016)
Sample F-Vadnagar New Limestone Mine

	Electric Conductivity	pH	M.H.C	Permeability	Bulk Density	CaCO3	Sodium	Potassium	Chloride
Years	mMho/cm		gm/cc	Cm/hrs	gm/c.cm	%	ppm(mg/l)	ppm(mg/l)	ppm(mg/l)
2007	0.34	7.5	64.5	1.8	1.32	55	36	9	85
2008	0.45	7.7	71.6	0.21	1.37	34	72	11	124
2009	0.42	7.72	72.8	0.22	1.43	29.5	55	9	92
2010	0.19	7.59	44.8	0.23	1.24	NA	26	3	52.8
2011	0.97	7.69	55.9	0.22	1.24	NA	28	4.8	55.8
2012	0.52	7.49	52.3	0.32	1.23	NA	19	4.6	56.8

INTERPRETATION

The observed Parameters varies from 2007-12 as below

pH : 7.49 to 7.72.

Electrical conductivity (EC) : 0.19 to 0.97 mMho/cm

M.H.C : 44.8 to 72.8 gm/cc

Permeability : 0.21 to 1.8 Cm/hrs

Bulk density : 1.23 to 1.37 gm/c.cm.

CaCO3 : 29.5 % to 55 %

Sodium : 19 to 72 ppm (mg/l)

Potassium : 4.6 to 11 ppm (mg/l)

Chloride : 52.8 to 124 ppm (mg/l)

1.6.3 COMPARATIVE ANALYSIS

pH:

The pH in the soil quality reports were observed in the range of 7.24 to 8.87 for Gujarat Ambuja Limestone Mine, 7.3 to 8.88 for Solaj Limestone Mine, 7.2 to 8.38 for Rampara Limestone Mine, 7.18 to 8.56 for Sugala Limestone Mine ,RKBA Mine it is 7.7 and for Vadnagar New Limestone Mine its range between 7.49 to 7.72. The maximum pH value is observed as 8.88 in Solaj Limestone Mine and lowest value is observed at 7.2 in Rampara Limestone Mine. Soil pH determines whether the soil is acidic or alkaline in nature. The slight alkaline nature of soil in the mines area could be due to accumulation of limestone particles in the top layer of the soil dispersion during the process of limestone extraction.

Electrical conductivity (EC):

Soil containing an elevated amount of soluble slats when comes in contact with water will display elevated levels of electrical conductivity. In other words, the presence of significant amount of ions in the soil raises its EC. Soil quality reports exhibits EC values for Gujarat Ambuja Limestone Mine is between 0.18 to 2.01 mMho/cm, Solaj Limestone Mine value range between 0.22 to 1.72 mMho/cm, Rampara Limestone Mine 0.21 to 1.72 mMho/cm, Sugala Limestone Mine value range between 0.16 to 0.97 mMho/cm, RKBA Limestone Mine value range between 0.3 mMho/cm and for Vadnagar New Limestone Mine the value ranges between 0.19 to 0.97 mMho/cm.

The analysis showed that the EC level of the RKBA Limestone mining sites is lesser than that of the other Limestone Mines area. It is observed that calcium carbonate, the main constitutes of limestone, on dissolution is mainly responsible for an increase in EC value.

Bulk density:

The bulk density of the soil is the measures of particles contained in a unit volume of dry soil including pore spaces minimal disturbances coupled with vegetation growth accounts for the higher bulk density. The bulk density value of the mines were reported as Gujarat Ambuja Limestone Mine value range between 1.12 to 1.86 gm/c.cm, Solaj Limestone Mine value ranges between 1.5 to 1.87 gm/c.cm, Rampara Limestone Mine value ranges between 1.15 to 1.87 gm/c.cm, Sugala Limestone Mine ranges between 1.17 to 1.6 gm/c.cm and for RKBA limestone mine value range as 1.43 gm/c.cm and for Vadnagar New Limestone Mine the vale range between 1.23 to 1.37 gm/c.cm.

CaCO3:

The value CaCO3 for Gujarat Ambuja Limestone Mine is 10.5% to 86 %, Solaj Limestone Mine value ranges between 37% to 64 %, Rampara Limestone Mine value ranges between 27% to 79 % , Sugala Limestone Mine ranges between 37.5 % to 60 % for RKBA limestone mine value range as 2 % and for Vadnagar New Limestone Mine the vale range between 29.5 % to 55 %.

Chloride (Cl):

Chloride in soil is essential to maintain electrical charge balance as nutrient to plants. The chloride value during years in the mine site ranges between 56.1 to 142 ppm (mg/l),Solaj Limestone Mine the value ranges between 62.5 to 187 ppm (mg/l),Rampara Limestone mine the value ranges between 55 to74 ppm (mg/l),Sugala Limestone Mine value comes under 59.5 to 301 ppm (mg/l),RKBA Limestone Mine it ranges between 60 ppm (mg/l) and for New Vadnagar Limestone Mine the value ranges between 52.8 to 124 ppm (mg/l).

Potassium:

Concentration of potassium in the soil of the mine site area ranged between 3.2 to 14 ppm (mg/l) for Gujarat Ambuja Limestone mine, Solaj Limestone Mine the value ranges between 0.052 to 18 ppm (mg/l), Rampara Limestone Mine 2.7 to 20 ppm (mg/l), Sugala Limestone Mine 3.5 to 20 ppm (mg/l),RKBA Limestone Mine value ranges as 6 ppm(mg/l),Vadnagar New Limestone Mine 4.6 to 11 ppm (mg/l).

Sodium:

Concentration of Sodium in the soil of the mine site area ranged between 17 to 89 ppm (mg/l) for Gujarat Ambuja Limestone mine, Solaj Limestone Mine the value ranges between 20 to 126 ppm (mg/l), Rampara Limestone Mine 18 to 48 ppm (mg/l), Sugala Limestone Mine 21 to 102 ppm (mg/l),RKBA Limestone Mine value ranges as 41 ppm(mg/l),Vadnagar New Limestone Mine 19 to 72 ppm (mg/l).

1.7 COMPARASION OF GROUNDWATER QUALITY MONITORING DATA

The comparative analysis of ground water quality is carried out by considering the groundwater analysis carried out by M/s Ambuja cements Ltd.. Eleven groundwater parameters at various locations of sugala mines were considered for analysis and observations.

Geology

The Neogene-Quaternary biogenic Miliolitic Limestone of Saurashtra Coastal belt bears both marine and Aeolian depositional attributes. The limestone is an arenaceousfacies rock i.e. Sandstone which comprises sand size particles of calcareous shell fragments of milliolite. These particles are almost of pure calcium carbonate. During the process of deposition of these particles and the formation of Limestone beds, different volcanic sediments were mixed with these particles by erosion of volcanic hinterland which accounts for the impurities of SiO_2, Al_2O_3, and Fe_2O_3 etc. Limestone is formed by a combination of marine and Aeolian actions and thereby occasionally current bedding is exhibited by Limestone formation.

Aquifer Types

The area has been found to be occupied by brownish-black to black coloured soil , with medium size fraction constituting more than 80% and occurs over the limestone.

1.7.1 COMPARATIVE ANALYSIS

A. Location 1 – GW1:

Table No 67
(2003-2014)

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	Min	Max
PH	8	8	7.9	8.15	7.9	8	7.9	8.2	8.41	7.89	7.89	8.41
Total Hardness	320	900	320	320	360	320	360	320	600	340	320	900
Chloride	92	440	120	160	120	552	68	120	340	120	68	552
Dissolved Solids	710	1740	584	652	564	120	850	600	1286	630	120	1740
Sulphates	64	111	48	89	48	38	68	68	122	55	48	122
Fluoride	0.2	1.4	0.4	0.71	0.8	0.1	0.3	1.1	0.77	0.86	0.1	1.4
Nitrate	35.44	35.44	7.09	35.44	45	7	40.55	70.58	43.55	33.22	7	70.58
Calcium	64	162	84	112	96	80	80	68	104	68	68	162
Magnesium	80	130	40	45	40	30	40	49	82	41	30	130
Alkalinity	360	400	300	360	320	280	280	280	248	180	180	400
Turbidity	Nil	Nil	Nil	2	3	2					2	3

a) Hydrogen Ion Concentration (Ph)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. The pH range is found to be 7.89 to 8.41 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The trend of hardness values from the year 2003 – 2014 was found to be in the range of 320 mg/l to 900 mg/l respectively. The degree of hardness in the observed ranges are classified to be very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, TDS values ranges between 120 mg/l to 1740 mg/l. TDS in the study area is in moderate category when compared to Bucks and Gilbert 1979; (Moderate- 500-2000 mg/l).

d) Chlorides

The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. The chloride concentrations were found to be in the range of 68 mg/l to 552 mg/l in. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 48 mg/l to 122 mg/l respectively.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The concentrations were found to be in the range of 0.1 mg/l to 1.4 mg/l respectively. The maximum concentration observed in the year 2004 at SW1 location. The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 7 mg/l to 70.58 mg/l respectively.

h) Magnesium

Magnesium concentration was found between the range of 30 to m mol/l to 130 m mol/l respectively.

B. Location 2 - GW2

Table No. 68

2003-19

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	7.98	7.9	7.6	7.7	7.70	8	7.77	7.9	8.44	8.37	8.34	7.42	7.96	8.02	7.92	7.42	8.44
Total Hardness	360	480	436	320	320	320	320	280	540	328	300	224	248	248	240	224	540
Chloride	224	100	140	160	220	120	220	80	140	64	72	100	156	160	136	64	224
Dissolved Solids	680	764	584	782	746	552	720	496	810	530	510	582	606	626	568	496	810
Sulphates	46	84	48	76	48	34	60	60	118	56	49	49	40	41	39	34	118
Fluoride	0.2	0.2	0.2	1	1	0	0.9	1	0.52	0.81	1.12	0.76	0.7	0.76	0.8	0.2	1.12
Nitrate	35.44	14.18	0	53.16	26.5	7	44.3	82.59	44.3	17.72	20.4	60.2	62.1	66.2	63.1	7	82.59
Calcium	96	86	84	84	80	48	64	48	112	68	60	45	50	51	48	45	112
Magnesium	42	67	40	45	30	30	39	39	64	38	36	37	30	31	29	29	67
Alkalinity	360	360	300	400	320	280	400	200	240	240	300	152	140	144	172	140	400
Turbidity	Nil	Nil	Nil	Nil	2	1	-	-	1	-	1.74	0.52	0.68	0.7	0.48	0.48	2

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. The pH range is found to be 7.42 to 8.44 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The trend of hardness values from the year 2003 – 2014 was found to be in the range of 224 mg/l to 540 mg/l respectively. The degree of hardness in the observed ranges are classified to be very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limit as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, TDS values ranges between 496 mg/l to 810 mg/l. TDS in the study area is in moderate category when compared to Bucks and Gilbert 1979; (Moderate- 500-2000 mg/l).

d) Chlorides

The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. The chloride concentrations were found to be in the range of 64 mg/l to 224 mg/l in. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 34 mg/l to 118 mg/l respectively.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The concentrations were found to be in the range of 0.2 mg/l to 1.12 mg/l respectively. The maximum concentration observed in the year 2004 at SW2 location. The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 7 mg/l to 82.59 mg/l respectively.

h) Magnesium

Magnesium concentration was found between the range of 29 to m mol/l to 67 m mol/l respectively.

C. *Location 3 – GW3*

Table No. 69

2003-19

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	8	7.7	7.8	7.65	7.80	7.9	7.18	7.58	8.35	8.3	8.44	8.41	7.89	7.86	8.08	7.18	8.44
Total Hardness	400	348	422	280	360	200	646	280	408	272	240	392	336	392	344	200	646
Chloride	220	100	120	120	120	120	140	140	108	76	60	432	392	464	56	56	464
Dissolved Solids	750	628	598	802	568	430	720	520	806	476	342	1120	1040	1232	564	430	1232
Sulphates	48	48	60	89	70	44	50	80	108	48	39	63	54	63	56	44	108
Fluoride	0.4	0.6	1.8	1.4	0.2	0.4	0.5	0.5	0.75	1.4	1.46	0.82	0.81	0.84	1.72	0.4	1.8
Nitrate	34.4	14.18	7.09	53.18	23	7	35.01	39.04	42.8	20.08	20.7	34.1	40.16	59.05	57.09	7	59.05
Calcium	96	72	80	80	64	64	64	80	88	72	48	78	67	78	69	48	88
Magnesium	44	42	25	35	50	20	29	39	46	37	20	28	41	48	42	20	46
Alkalinity	428	300	320	380	320	280	400	120	160	200	260	205	212	244	200	120	428
Turbidity	Nil	Nil	Nil	2	2	Nil	5	Nil	1	Nil	1.24	0.38	0.32	0.38	0.28	0.28	5

a) Hydrogen Ion Concentration (pH)

In the study area, pH was found to be 7.18 to 8.44 i representing neutral category. The IS 10500

recommended limit for pH is from 6.5 to 8.5. The pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

The hardness was found to be in the range of 200 mg/l to 646 mg/l respectively. The degree of hardness in the observed ranges are classified to be hard to very hard in terms of the equivalent CaCO3 concentration. The observed hardness levels in groundwater may be due to presence of limestone deposits in the study area.(Hard 200-300 mg/l; Very hard >300 mg/l).

c) Total dissolved solids (TDS)

In the study area, during pre-monsoon TDS values ranges between 430 mg/l to 1232 mg/l. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l). The Total Dissolved Solids (TDS) IS 10500 limit for TDS is 500 mg/l to 2000* mg/l.

d) Chlorides

The chloride concentrations were found to be in the range of 56 mg/l to 464 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. chloride does not pose health hazard in principle consideration is in relation to palatability.

e) Sulphates

The sulphates concentrations were found to be in the range of 44 mg/l to 108 mg/l. As per IS 10500 limit for sulphates is 200 mg/l to 400* mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.4 mg/l to 1.8 mg/l.

The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 mg/l and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 7.0 mg/l to 59.05 mg/l .

h) Magnesium

Magnesium concentration was found between the range of 20 to m mol/l to 46 m mol/l respectively.

D. Location 4 – GW4

Table No. 70

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	7.9	7.9		7.7	8	8	7.33	8.18	8.35	8.37	8.44	8.4	7.6	8.08		7.33	8.44
Total Hardness	400	452		320	320	240	280	240	580	300	320	280	224	248		224	320
Chloride	140	100		120	280	120	240	160	80	120	80	60	176	188		60	240
Dissolved Solids	814	688		760	510	480	760	566	806	494	466	616	584	40		494	806
Sulphates	34	42		110	26	42	52	52	118	56	48	45	36	636		34	118
Fluoride	1	1.4		2	1.2	0.4	0.3	1	1	1.2	2.14	1.24	1.2	1.18	NA	0.3	2.14
Nitrate	17.72	35.44		35.44	17.7	9	44.3	16.52	24.78	31	20.7	179.6	38.7	42.38		9	179.6
Calcium	88	80		96	80	64	64	32	122	220	60	60	45	50		45	220
Magnesium	80	91		80	40	20	29	39	53	64	39	29	27	30		27	91
Alkalinity	260	320		360	320	280	360	240	172	284	200	200	160	208		160	360
Turbidity	Nil	Nil	NA	Nil	3	1	2	Nil	Nil	Nil	8.45	0.48	0.42	0.32		0.32	3

a) Hydrogen Ion Concentration (pH)

In the study area, pH was found to be 7.3 to 8.44 in representing neutral category, which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 224 mg/l to 320 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The total hardness value are found to be hard to very hard may (Hard 200-300 mg/l; Very hard > 300 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, TDS values ranges between 494 mg/l to 806 mg/l .TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 60 mg/l to 240 mg/l .The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 34 mg/l to 118 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.3 mg/l to 2.14 mg/l.The IS 10500 limit is 1 mg/l to 1.5* mg/l. The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 9 mg/l to 179.6 mg/l.

h) Magnesium

Magnesium concentration was found between the range of 27 to m mol/l to 91 m mol/l respectively.

E. Location 5 – GW5

Table No. 71

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	7.3	7.6	7.8	7.45	7.9	7.8	7.6	8.12	8.43	8.22	8.35	8.35	8.04	7.86	7.68	7.45	8.43
Total Hardness	360	600	300	280	260	280	312	360	600	326	280	300	224	244	216	224	600
Chloride	199	160	120	120	320	80	320	120	108	72	72	60	248	200	80	60	248
Dissolved Solids	680	686	582	592	652	468	738	640	664	514	464	400	856	612	440	400	856
Sulphates	48	64	48	48	32	48	66	78	81	52	44	48	49	37	32	32	81
Fluoride	0.2	0.6	2	1.4	1.1	0.2	0.8	0.9	0.9	0.9	1.47	0.53	0.81	0.84	1.44	0.2	1.4
Nitrate	17.72	17.72	10.63	21.26	40.7	14	39.79	33.19	26.28	14.48	19.93	11.2	40.16	19.38	24.5	11.2	40.16
Calcium	104	96	96	80	112	80	80	80	48	280	54	44	61	76	40	40	280
Magnesium	72	85	25	30	30	20	29	39	104	64	34	35	37	28	24	20	104
Alkalinity	320	280	320	320	320	320	400	440	176	288	252	180	212	128	240	176	320
Turbidity	Nil	Nil	Nil	3	1	Nil	Nil	Nil	Nil	Nil	7.07	0.53	0.36	24	0.3	0.36	3

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.45 to 8.43 . The IS 10500 recommended limit for pH is from 6.5 to 8.5. The pH values are observed to be within the limit.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 224 mg/l to 600 mg/l. The IS 10500 limit for TH is 200 mg/l -600*mg/l. The total hardness value are found to be hard to very hard may be due to presence of limestone deposits in the study area. (Hard 200-300 mg/l; Very hard > 300 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, during pre-monsoon TDS values ranges between 400 mg/l to 856 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 60 mg/l to 248 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 32 mg/l to 81 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.2 mg/l to 1.4 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 11.2 mg/l to 40.16 mg/l.

h) Magnesium

Magnesium concentration was found between the range of 20 to m mol/l to 104 m mol/l respectively.

F. Location 6 –GW6

Table No. 72

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	7.9	7.8	7.7	7.6	7.8	7.7	7.75	8.25	7.98	8.47	8.24	8.4	7.70	8.1	7.84	**7.6**	**8.4**
Total Hardness	386	400	252	400	320	200	280	320	568	340	300	420	224	240	140	**140**	**568**
Chloride	180	120	100	180	160	80	220	80	320	120	120	120	240	248	72	**72**	**320**
Dissolved Solids	680	774	492	740	706	200	622	450	910	620	654	788	652	716	646	**200**	**910**
Sulphates	48	60	28	100	48	34	60	68	114	58	48	68	36	39	23	**23**	**114**
Fluoride	1.4	1.4	0.4	1.22	1.1	0.1	1.1	0.2	1.4	1.2	1.15	1.13	1.19	0.98	1.07	**0.1**	**1.22**
Nitrate	10.63	8.86	17.72	53.16	51.3	18	61.57	56.31	100.85	42.08	44.5	98.7	58.4	42.91	24.5	**8.86**	**98.7**
Calcium	96	80	80	80	96	48	32	80	128	70	64	84	58	48	28	**28**	**128**
Magnesium	30	86	13	50	160	20	40	29	60	39	36	51	27	29	17	**17**	**160**
Alkalinity	280	300	280	360	320	280	320	320	140	320	236	152	212	216	240	**140**	**320**
Turbidity	**Nil**	**Nil**	**Nil**	**Nil**	4	1	1	**Nil**	**Nil**	-	0.97	0.3	0.36	4.44	0.35	**0.35**	**4.4**

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.6 to 8.4 representing neutral category. The IS 10500 recommended limit for pH is from 6.5 to 8.5. The pH values are observed to be within the limit.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 140 mg/l to 568 mg/l. The IS 10500 limit for TH is 200 mg/l -600*mg/l. The total hardness value are found to be hard to very hard may be due to presence of limestone deposits in the study area. (Hard 200-300 mg/l; Very hard > 300 mg/l).

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, during pre-monsoon TDS values ranges between 200 mg/l to 910 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 72 mg/l to 320 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in

relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 23 mg/l to 114 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.1 mg/l to 1.22 mg/l. The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 8.86 mg/l to 98.7 mg/l. IS 10500 limit is 45 mg/l.

h) Magnesium

Magnesium concentration was found between the range of 17 to m mol/l to 160 m mol/l respectively.

G. Location 7 - GW7

Table No. 73

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	7.8	7.9	7.7	7.9	7.7	7.6	8.1	7.72	8.19	8	8.15	8.4	7.7	8.1	7.84	7.6	8.4
Total Hardness	766	668	280	320	400	240	320	360	600	320	320	260	265	280	180	180	766
Chloride	200	140	120	160	120	120	240	80	380	128	120	320	236	248	48	80	380
Dissolved Solids	766	1010	510	726	640	200	880	580	746	630	608	128	710	757	328	128	1010
Sulphates	64	86	28	88	52	30	84	78	120	51	52	42	41	45	29	29	88
Fluoride	1	1.5	1.5	3	1.3	0.2	0.4	0.5	2.1	1.03	1.11	1.40	1.05	1.32	1.2	0.2	3
Nitrate	17.72	14.18	17.72	53.16	42.5	14	68.33	61.57	40.5	44.5	43.3	43.4	43.7	36.8	25.2	14.18	68.3
Calcium	112	139	80	72	80	48	48	48	132	51	64	64	31	56	36	48	139
Magnesium	36	86	20	40	120	30	49	49	66	38	39	36	31	34	22	20	120
Alkalinity	300	280	300	320	380	280	400	480	260	212	292	152	188	176	160	176	400
Turbidity	Nil	Nil	Nil	Nil	2	1	Nil	Nil	Nil	0.2	0.8	0.25	0.46	0.32	0.36	0.2	2

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.6 to 8.4 which is in the recommended limit of IS-10500 - 6.5 to 8.5. Ph values in both the season are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 180 mg/l to 766 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, during pre-monsoon TDS values ranges between 128 mg/l to 1010 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 80 mg/l to 380 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 29 mg/l to 88 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.2 mg/l to 3 mg/l. The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 14.18 mg/l to 68.3 mg/l. IS 10500 limit is 45 mg/l.

h) Magnesium

The Mg concentration was found to be in the range of 20 m mol/l to 120 m mol/l.

H. Location 8 GW8

Table No. 74

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	NA		7.6	7.85	7.9	NA	7.18	7.15	7.83	7.76	8.3	NA	8.1	8.16	NA	7.6	8.3
Total Hardness			320	300	280		520	280	600	300	232		280	232		232	600
Chloride			160	120	160		120	80	220	140	88		200	240		80	240
Dissolved Solids			600	630	594		510	600	1098	548	444		700	680		444	1098
Sulphates			48	69	42		52	68	118	48	39		47	37		39	118
Fluoride			2	1.2	1.1		0.3	1.2	1.5	1.03	1.11		1.16	1.2		0.3	2
Nitrate			14.8	7.09	30.1		75.39	31.54	40.55	44.43	44.2		25.7	30.72		14.8	75.39
Calcium			80	64	64		32	48	122	60	50		58	47		32	122
Magnesium			30	35	30		39	39	68	36	29		35	36		29	68
Alkalinity			280	320	280		280	320	280	224	252		240	208		208	320
Turbidity			Nil	Nil	2		2	Nil	Nil	0.2	0.72		0.47	0.42		0.2	0.72

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.6 to 8.3 which is in the recommended limit of IS-10500 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 232 mg/l to 600 mg/l. And the observed values are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, TDS values ranges between 444 mg/l to 1098 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 80 mg/l to 140 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 39 mg/l to 118 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.3 mg/l to 2 mg/l. The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 14.8 mg/l to 75.39 mg/l.

h) Magnesium

The mg concentration was found to be in the range of 29 m mol/l to 68 m mol/l .

I. Location 9 GW9:

Table No. 75

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	NA		7.6	NA	7.7	NA	8.13	7.1	8.47	8.07	8.4	8.46	8.1	8.05	8.02	7.1	8.47
Total Hardness			280		160		510	320	440	260	300	380	196	280	264	160	440
Chloride			120		120		120	80	140	128	120	120	208	220	200	120	220
Dissolved Solids			490		382		520	600	682	562	1248	726	770	720	658	382	1248
Sulphates			30		22		56	80	88	43	41	61	32	45	43	22	88
Fluoride			1.4		1.5		1.2	1.3	0.66	0.9	0.8	0.74	0.86	0.8	0.6	0.6	1.5
Nitrate			14.8		15.9		62.32	70.5	66.41	44.3	25.7	33.1	26.18	30.18	29.1	14.8	70.5
Calcium			72		32		48	48	86	52	72	73	39	56	53	32	86
Magnesium			25		20		39	49	41	31	44	46	24	34	40	20	49
Alkalinity			300		320		200	200	200	126	272	156	216	208	224	126	320
Turbidity			Nil		1		1	Nil	Nil	0.2	0.5	1	0.43	0.48	0.3	0.2	1

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.1 to 8.47 which is in the recommended limit of IS-10500 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 160 mg/l to 440 mg/l respectively. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, TDS values ranges between 382 mg/l to 1248 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 120 mg/l to 220 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 22 mg/l to 88 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and

mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.6 mg/l to 1.5 mg/l .The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate:

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 14.8 mg/l to 70.5 mg/l.

h) Magnesium

The Mg concentration was found to be in the range of 20 m mol/l to 49m mol /l.

J. ***Location GW10***

Table No. 76

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH		7.9			8		7.7	8.31	8.5	7.79	8.27	8.3	8	7.9	8.04	7.7	8.5
Total Hardness		340			280		240	300	600	312	320	380	176	256	180	176	600
Chloride		160			80		240	160	140	136	120	120	80	240	64	64	240
Dissolved Solids		630			506		450	680	1356	630	608	390	490	710	354	390	1356
Sulphates		60			42		50	68	90	50	52	53	29	41	29	29	90
Fluoride	NA	1.2	NA		1.2		0.4	1	1.4	1	3.02	0.79	0.8	1.3	5.1	0.4	3.02
Nitrate		10.63			53.1		75.39	70.58	42.8	42.08	34	27.6	10.16	30.2	27.7	10.63	75.39
Calcium		128			80		32	64	85	62	64	46	35	51	36	32	128
Magnesium		45			20		39	49	58	37	39	28	22	31	22	20	58
Alkalinity		280			280		320	280	360	168	220	160	224	224	224	168	360
Turbidity		Nil			1		Nil	Nil	Nil	Nil	Nil	1	0.49	0.4	0.1	0.1	1

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.7 to 8.5 which is in the recommended limit of IS-10500 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 176 mg/l to 600 mg/l .And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, .TDS values ranges between 390 mg/l to 1356 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 64 mg/l to 240 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle

consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 29 mg/l to 90 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.4 mg/l to 3.02 mg/l. The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 10.63 mg/l to 75.39 mg/l.

h) Magnesium

The Mg concentration was found to be in the range of 20 m mol/l to 58m mol /l.

K. Location GW11 :

Table No. 77

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	NA				7.9		8.21	7.6	8.45	7.92	8.19	8.45	8.02	7.78	7.81	7.6	8.45
Total Hardness					240		320	280	600	368	272	300	120	284	124	120	600
Chloride					160		130	120	100	59	160	76	88	208	88	59	208
Dissolved Solids					572		610	520	1082	946	608	524	374	688	268	268	1082
Sulphates					50		60	44	120	59	44	39	27	46	26	26	120
Fluoride					0.8		0.5	0.9	1.7	1.5	2.45	1.14	1.13	0.81	1.04	0.5	2.45
Nitrate					37.2		71.33	30.78	32.28	28.78	24.8	18.5	36.12	23.8	14.98	14.98	71.33
Calcium					80		64	64	118	73	42	60	34	57	25	25	118
Magnesium					10		39	29	75	45	25	29	20	34	15	10	75
Alkalinity					280		400	280	272	180	256	168	180	188	120	120	400
Turbidity					2		2	NIL	NIL	NIL	NIL	0.47	0.18	0.3	1.5	0.3	1.5

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.6 to 8.45 which is in the recommended

limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 120 mg/l to 600 mg/l . And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. TDS values ranges between 268 mg/l to 1082 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 59 mg/l to 208 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 26 mg/l to 120 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.5mg/l to 2.45 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit. The nitrate concentration was found to be in the range of 14.98 mg/l to 71.33 mg/l.

h) Magnesium

The Mg concentration was found to be in the range of 10 m mol/l to 75 m mol /l.

L. Location GW12 :

Table No. 78

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH	NA				7.8	NA	7.41	8.1	8.35	8.06	8.38	8.38	NA			7.41	8.38
Total Hardness					240		240	200	400	296	260	268				200	400
Chloride					120		160	120	100	180	84	80				80	160
Dissolved Solids					240		712	600	660	606	606	596				240	660
Sulphates					38		50	50	82	53	47	72				38	82
Fluoride					0.9		1.2	1	0.8	1	1.32	0.52				0.8	1.2
Nitrate					24.8		101.89	18.02	15.77	42.75	42.1	43.5				15.77	101.89
Calcium					64		32	64	88	59	47	54				32	88
Magnesium					20		39	29	44	36	29	32				20	44
Alkalinity					240		400	360	360	200	200	152				152	400
Turbidity					2		1	NIL	1	NIL	NIL	NIL				1	2

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.41to 8.38 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 200 mg/l to 400 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively. In the study area, during pre-monsoon TDS values ranges between 240 mg/l to 660 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 80 mg/l to 160 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 38 mg/l to 82 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.8 mg/l to 1.2 mg/l .The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 15.77 mg/l to 101.89 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 20 m mol/l to 44 m mol/l .

M. Location GW13 :

Table No. 79

Years	2003	2004	2005	2006	2007	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019	Min	Max
PH					7.8		8.13		8.04	8.39	8.46	8.38	7.94	7.79	8.02	7.8	8.46
Total Hardness					320		440		340	180	248	328	156	180	220	156	440
Chloride					120		160		128	29	112	100	64	80	88	29	160
Dissolved Solids					596		990		782	336	670	480	318	388	376	318	990
Sulphates					52		90		55	29	55	53	25	29	36	25	90
Fluoride			NA		1	NA	0.5	NA	0.52	0.36	1.08	0.29	0.84	0.74	0.56	0.29	1
Nitrate					38.9		75.08		15.5	33.4	65.1	21.1	19.1	19.1	25.8	15.5	75.08
Calcium					96		96		68	36	50	66	31	32	32	31	96
Magnesium					20		49		41	21	30	40	19	22	27	19	49
Alkalinity					280		360		160	136	328	100	182	212	180	100	360
Turbidity					1		NIL		NIL	NIL	NIL	NIL	0.28	0.42		0.28	1

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.8 to 8.46 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 156 mg/l to 440 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent CaCO3 concentration. The observed hardness levels in ground water may be due to widespread abundance of the metals in rock formation.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges between 318 mg/l to 990 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 29 mg/l to 160 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle

consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 25 mg/l to 90 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.29 mg/l to 1mg/l .The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 15.5 mg/l to 75.08 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 19 m mol/l to 49 m mol/l .

1.8 SURFACE WATER SUGALA MINES (SURFACE WATER)

A. Location 1 (S1)

Table No. 80

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH	7.91	7.4	8.11	7.9	8.4	7.8	7.5		7.38	7.24	7.32	7.71			7.4	8.4
Total Hardness (as CaCo3)mg/l	-	310	-	310	310	350	330		-	-	-	200			200	350
Calcium as mg/l	-	60	-	82	82	140	132		-	-	-	23			23	140
Magnesium as Mg (mg/l)	-	38	-	26	26	85	81		-	-	-	21			26	85
Chlorides (as Cl)mg/l	90	35	120	37	60	74.96	79.96		65	42	42	235			42	235
Sulphates as So4 mg/l	11	35	4	32	32	35	30	NA	40	34	34	7	NA		4	35
Nitrates as mg/l	-	7.5	-	7.2	7.25	7.35	19		-	-	-	42			7.25	42
Fluorides mg/l	-	0.6	-	0.55	0.78	1.25	0.77		-	-	-	0.45			0.45	1.25
Alkalinity mg/l	-	275	-	260	120	320	70		-	-	-	45			45	320
sodium	-		-	27	27	28	21		-	-	-	21			21	28
Turbidity	-	2	-	NIL	1	1	NIL		-	-	-	-			1	2
Total dissolved solids	269	464	431	670	500	572	249.8		238	238	252	247			238	670

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.4 to 8.4 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 200 mg/l to 350 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) **Total dissolved solids (TDS)**

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 238 mg/l - 670 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 42 mg/l-235 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphate

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 4 mg/l.-35mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.45 mg/l to 1.25 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 7.25 mg/l -42 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 26 m mol/l -85 m mol/l.

B. Location 2 (S2)

Table No. 81

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH		7.2		8	8.1	8	7.2								7.2	8.1
Total Hardness (as CaCo3)mg/l		300		310	290	310	320								290	320
Calcium as mg/l		62		82	77	124	128								62	128
Magnesium as Mg (mg/l)		39		26	24	76	78								24	78
Chlorides (as Cl)mg/l		105		108	80	75	74.98								74.98	108
Sulphates as So4 mg/l	NA	36	NA	35	38	40	29				NA				29	38
Nitrates as mg/l		8.47		8.33	8.18	7.85	17								7.82	17
Fluorides mg/l		0.8		0.72	0.88	0.88	0.92								0.72	0.92
Alkalinity mg/l		310		320	110	330	100								100	330
sodium				27	31	35	22								22	35
Turbidity		NIL		NIL	1	NIL	NIL								NIL	1
Total dissolved solids		450		580	520	460	254.1								254.1	580

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.2 to 8.1 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 290 mg/l to 320 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 254.1 mg/l - 580 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) **Chlorides**

The chloride concentrations were found to be in the range of 74.98 mg/l-108 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle

consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 29 mg/l.-38mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.72 mg/l to 0.92 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 7.82 mg/l -17 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 24 m mol/l -78 m mol/l.

C. Location 3 (S3)

Table No. 82

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH		7.2		8.1	7.9	7.8	7.1								7.1	8.1
Total Hardness (as CaCo3)mg/l		290		290	310	326	270								270	326
Calcium as mg/l		53		77	82	116	108								53	82
Magnesium as Mg (mg/l)		36		24	26	71	66								24	71
Chlorides (as Cl)mg/l		90		90	70	49.98	54.96								49.98	90
Sulphates as So4 mg/l	NA	30		33	29	28	26				NA				26	33
Nitrates as mg/l		7.02		7.14	7.12	7.35	21								7.02	7.35
Fluorides mg/l		0.88		0.81	0.76	0.77	0.68								0.68	0.88
Alkalinity mg/l		310		310	140	300	50								50	310
sodium				25	26	33	18								18	33
Turbidity		2		1	1	1	NIL								1	2
Total dissolved solids		384	NA	510	530	412	187.4								187.4	530

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid

is acid or alkaline. In the study area, pH was found to be 7.1 to 8.1 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 270 mg/l to 326 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 187.4 mg/l - 530 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 49.98 mg/l-90 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 26 mg/l.-33 mg/l.

f) **Fluoride**

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.68 mg/l to 0.88mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 7.02 mg/l -7.35 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 18 m mol/l -33 m mol/l.

D. Location 4 (S4)

Table No. 83

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH		7.3		8	8.3	7.9	7.7								7.3	8.3
Total Hardness (as CaCo3)mg/l		270		270	340	350	390								270	390
Calcium as mg/l		62		71	90	152	158								62	158
Magnesium as Mg (mg/l)		28		22	28	93	95								22	95
Chlorides (as Cl)mg/l		85		88	60	70	49.98								49.98	88
Sulphates as So4 mg/l	NA	28		28	27	26	25				NA				25	28
Nitrates as mg/l		3.5		4	6.78	7.11	14								3.5	14
Fluorides mg/l		1.15		1.12	1.02	0.76	0.62								1.02	1.12
Alkalinity mg/l		320		330	140	300	110								110	330
sodium				28	28	30	23								23	30
Turbidity		NIL		NIL	NIL	1	1								NIL	1
Total dissolved solids		300	NA	490	490	410	181.5								181.5	490

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.3 to 8.3 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 270 mg/l to 390 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 181.5 mg/l - 490 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l)

d) Chlorides

The chloride concentrations were found to be in the range of 49.98 mg/l-88 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle

consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 25 mg/l.-28 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 1.02 mg/l to 1.12 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 3.5 mg/l -14 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 22 m mol/l -95 m mol/l.

E. Location 5 (S5)

Table No. 84

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH		7.5		7.9	8.1	7.9	8								7.5	8.1
Total Hardness (as CaCo3)mg/l		310		310	370	360	280								280	310
Calcium as mg/l		63		82	98	120	112								63	120
Magnesium as Mg (mg/l)		42		26	31	95	68								26	95
Chlorides (as Cl)mg/l		155		120	70	80	59.96								59.96	155
Sulphates as So4 mg/l	NA	34		34	32	32	30				NA				30	34
Nitrates as mg/l		8.11		8.22	8.22	8	16								8	16
Fluorides mg/l		0.71		0.85	0.88	0.78	0.97								0.71	0.97
Alkalinity mg/l		270		280	130	330	100								100	330
sodium				30	26	31	19								19	31
Turbidity		1		2	1	NIL	NIL								1	2
Total dissolved solids		410	NA	560	540	420	198.4								198.4	560

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid

is acid or alkaline. In the study area, pH was found to be 7.5 to 8.1 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 280 mg/l to 310 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 198.4 mg/l -560 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 59.96 mg/l- 155 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 30 mg/l.-34 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.71 mg/l to 0.97 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 8 mg/l -16 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 26 m mol/l -95 m mol/l.

F. Location 6 (S6)

Table No. 85

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH		7.2		7.8	8.1	7.8	7.9								7.2	8.1
Total Hardness (as CaCo3)mg/l		410		390	270	430	400								270	430
Calcium as mg/l		94		103	71	172	160								71	172
Magnesium as Mg (mg/l)		48		32	22	105	98								22	105
Chlorides (as Cl)mg/l		170		170	70	75	59.96								59.96	170
Sulphates as So4 mg/l	NA	46		44	42	35	34				NA				34	46
Nitrates as mg/l		10.51		10.11	9.96	9.96	22								9.96	10.51
Fluorides mg/l		1.19		1.15	1.13	1.13	0.88								0.88	1.19
Alkalinity mg/l		240		250	110	300	70								70	300
sodium				31	24	30	16								16	31
Turbidity		1		NIL	NIL	1	NIL								NIL	1
Total dissolved solids		403	NA	660	490	410	199.4								199.4	660

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.2 to 8.1 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) **Total Hardness (TH)**

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 270 mg/l to 340 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 199.4 mg/l -660 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 59.96 mg/l- 170 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 34 mg/l.-46 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.88 mg/l to 1.19 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 9.96 mg/l -10.51 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 22 m mol/l -105 m mol/l.

G. Location 7 (S7)

Table No. 86

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH		7.25		8.1	7.9	7.9	7.1								7.1	8.1
Total Hardness (as CaCo3)mg/l		310		320	400	360	430								310	430
Calcium as mg/l		60		84	106	160	172								60	172
Magnesium as Mg (mg/l)		40		27	33	96	105								27	105
Chlorides (as Cl)mg/l		102		110	95	134.96	144.98								95	144.98
Sulphates as So4 mg/l	NA	35		39	40	32	21				NA				21	40
Nitrates as mg/l		6.9		7.2	7.1	6.75	14								6.9	14
Fluorides mg/l		1.48		1.35	1.25	1.25	0.85								0.85	1.48
Alkalinity mg/l		280		290	260	310	60								60	310
sodium				23	25	28	17								17	28
Turbidity		NIL		NIL	1	1	NIL									1
Total dissolved solids		448	NA	550	580	400	248.8								248.8	580

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid

is acid or alkaline. In the study area, pH was found to be 7.1 to 8.1 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 310 mg/l to 430 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 248.8 mg/l -580 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 95 mg/l- 144.98 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 21 mg/l.-40 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.85 mg/l to 1.48 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 6.9 mg/l -14 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 27 m mol/l -105 m mol/l.

H. Location 8 (S8)

Table No. 87

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH		7.1		8	7.98	7.8	8.1								7.1	8.1
Total Hardness (as CaCo3)mg/l		290		300	390	390	370								290	390
Calcium as mg/l		62		79	103	156	148								62	156
Magnesium as Mg (mg/l)		34		25	32	95	90								25	95
Chlorides (as Cl)mg/l		169		175	120	85	74.98								85	175
Sulphates as So4 mg/l	NA	42		46	42	35	23				NA				23	46
Nitrates as mg/l		5.4		6.8	6.12	19	18								5.4	19
Fluorides mg/l		0.98		0.95	0.93	0.75	0.72								0.72	0.98
Alkalinity mg/l		270		260	240	330	90								90	330
sodium				26	25	30	19								19	30
Turbidity		NIL		NIL	1	NIL	NIL									1
Total dissolved solids		465	NA	570	600	530	192.6								192.6	600

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.1 to 8.1 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 290 mg/l to 390 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent CaCO3 concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 192.6 mg/l -600 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 85 mg/l- 175 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 23 mg/l.-46 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.72mg/l to 0.98mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 5.4 mg/l -19 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 25 m mol/l -95 m mol/l.

I. Location 9 (S9)

Table No. 88

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH	NA			7.9	8.1	7.5	7	NA							7	8.1
Total Hardness (as CaCo3)mg/l				290	420	410	330								290	420
Calcium as mg/l				77	111	144	132								77	144
Magnesium as Mg (mg/l)				24	35	86	81								24	86
Chlorides (as Cl)mg/l				170	100	84	94.98								84	170
Sulphates as So4 mg/l				50	48	40	21								21	50
Nitrates as mg/l				7.02	7.34	8	15								7.02	15
Fluorides mg/l				0.9	0.94	0.72	0.97								0.72	0.97
Alkalinity mg/l				270	270	310	60								60	310
sodium				22	32	35	22								22	35
Turbidity				1	1	NIL	NIL									1
Total dissolved solids				570	640	600	238.1								238.1	600

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7 to 8.1 which is in the recommended limit

of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 290 mg/l to 420 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 238.1 mg/l - 600 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 84 mg/l- 170 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 21 mg/l.-50 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.72mg/l to 0.97 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 7.02 mg/l -15 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 24 m mol/l -86 m mol/l.

J. ***Location 10 (S10)***

Table No. 89

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH	NA			8.2	8.2	7.8	7.4	NA							7.4	8.2
Total Hardness (as CaCo3)mg/l				210	360	390	380								210	390
Calcium as mg/l				55	95	156	152								55	156
Magnesium as Mg (mg/l)				17	30	95	93								17	95
Chlorides (as Cl)mg/l				100	110	134.96	139.96								100	139.6
Sulphates as So4 mg/l				33	33	32	19								19	33
Nitrates as mg/l				3.5	5.6	6	13								3.5	13
Fluorides mg/l				1.02	1.11	0.84	0.78								0.78	1.11
Alkalinity mg/l				250	300	330	110								110	330
sodium				24	26	28	20								20	28
Turbidity				2	2	1	NIL								1	2
Total dissolved solids				450	620	590	219.2								219.2	620

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.4 to 8.2 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 210 mg/l to 390 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 219.2mg/l - 620 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 100 mg/l- 139.6 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle

consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 19 mg/l.-33 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.78mg/l to 1.11mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 3.5 mg/l -13 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 17 m mol/l -95 m mol/l.

K. Location 11 (S11)

Table No. 90

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH	NA			7.8	8.2	8.1	7.9	NA							7.8	8.2
Total Hardness (as CaCo3)mg/l				390	380	440	420								380	440
Calcium as mg/l				103	100	176	166								100	176
Magnesium as Mg (mg/l)				32	32	107	102								32	107
Chlorides (as Cl)mg/l				220	130	274.91	264.91								130	274.91
Sulphates as So4 mg/l				59	56	48	29								29	59
Nitrates as mg/l				8.11	7.26	7	12								7	12
Fluorides mg/l				0.72	0.8	0.7	0.64								0.64	0.8
Alkalinity mg/l				370	290	350	70								70	370
sodium				30	31	35	21								21	35
Turbidity				1	2	NIL	1								1	2
Total dissolved solids				970	730	834	391.3								391.3	970

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.8 to 8.2 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 380 mg/l to 440 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 391.3 mg/l - 970 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 130 mg/l- 274.91 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 29 mg/l.-59 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.64 mg/l to 0.8 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 7 mg/l -12 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 32 m mol/l -107 m mol/l.

L. ***Location 12 (S12)***

Table No. 91

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH				7.7	8.04	8.2	8.1								7.7	8.2
Total Hardness (as CaCo3)mg/l				310	300	460	450								300	460
Calcium as mg/l				82	79	184	180								79	184
Magnesium as Mg (mg/l)				26	25	112	110								25	112
Chlorides (as Cl)mg/l				100	100	105	44.96								44.96	105
Sulphates as So4 mg/l	NA			40	45	40	27	NA							27	45
Nitrates as mg/l				8.02	7.8	8	21								7.8	21
Fluorides mg/l				0.89	0.98	0.86	0.88								0.86	0.98
Alkalinity mg/l				300	360	300	100								100	360
sodium				20	32	35	18								18	35
Turbidity				2	2	1	1								1	2
Total dissolved solids				550	480	510	213.1								213.1	550

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.7 to 8.2 which is in the recommended limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 300 mg/l to 460 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent CaCO3 concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 213.1 mg/l - 550 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 44.96 mg/l- 105 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 27 mg/l.-45 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.86 mg/l to 0.98 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 7.8 mg/l -21 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 25 m mol/l -112 m mol/l.

M. Location 13 (S13)

Table No. 92

Years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Min	Max
pH					7.8	8.3	8.1								7.8	8.3
Total Hardness (as CaCo3)mg/l					520	500	470								470	520
Calcium as mg/l					137	200	188								37	200
Magnesium as Mg (mg/l)					43	122	115								43	122
Chlorides (as Cl)mg/l					95	99.97	94.91								94.91	99.97
Sulphates as So4 mg/l			NA		42	35	25				NA				25	42
Nitrates as mg/l					8	7	20								7	20
Fluorides mg/l					0.96	0.63	0.73								0.63	0.96
Alkalinity mg/l					340	560	70								70	560
sodium					27	32	20								20	32
Turbidity					2	1	NIL								1	2
Total dissolved solids					770	630	311								311	770

a) Hydrogen Ion Concentration (pH)

pH is the negative logarithm of the hydrogen ion concentration, which measures whether the liquid is acid or alkaline. In the study area, pH was found to be 7.8 to 8.3 which is in the recommended

limit of IS-10500 - 6.5 to 8.5. pH values are found to be neutral which is within the range of palatable water.

b) Total Hardness (TH)

Hardness is a natural characteristic of water which can enhance its palatability. The hardness was found to be in the range of 470 mg/l to 520 mg/l. And the observed values in both the seasons are found to be compatible with IS-10500 standard for hardness - 200 mg/l -600*mg/l. The degree of hardness in the observed ranges are classified to be hard to very hard (<180 mg/l) in terms of the equivalent $CaCO_3$ concentration.

c) Total dissolved solids (TDS)

The TDS of the water reflects the ionized and non-ionized matter in the water. The acceptable and permissible limits as per IS-10500 is 500 and 2000 mg/l respectively.TDS values ranges as 311 mg/l - 770 mg/l. TDS in the study area is in minor to moderate category when compared to Bucks and Gilbert 1979; (Minor < 500 mg/l; Moderate- 500-2000 mg/l).

d) Chlorides

The chloride concentrations were found to be in the range of 94.91 mg/l- 99.97 mg/l. The IS 10500 limit for chlorides is 250 mg/l to 1000* mg/l. Chloride does not pose a health hazard in principle consideration is in relation to palatability.

e) Sulphates

The water contains sulphate in the form of ions which are mostly soluble. As per IS-10500 desirable limit for sulphate is 200 and 400 mg/l in permissible limit respectively. The sulphates concentrations were found to be in the range of 25 mg/l.-42 mg/l.

f) Fluoride

Fluoride occurs rare in quiet instances. As per IS-10500-2012 desirable limit for fluoride is 1 and 1.5 mg/l in permissible limit. The fluoride concentration was found to be in the range of 0.63 mg/l to 0.96 mg/l.The higher concentration in the region may be due to the climate of the area which is a control factor for fluoride and the presence of accessory minerals in the rock mineral assemblage through which the ground water is circulated.

g) Nitrate

Nitrate is present in water and mainly in the form of NO_3. As per IS-10500 desirable limit for nitrate is maximum 45 and no relaxation in permissible limit.The nitrate concentration was found to be in the range of 7 mg/l -20 mg/l .

h) Magnesium

The Mg concentration was found to be in the range of 43 m mol/l -122 m mol/l.

NOTARY
K. L. DAHIMA
Ta.: Kodinar
Dist.: Junagadh
Reg.No. 1441/2010
GOVT. OF GUJARAT

Gujarat Water Supply and Sewerage Board
Office of Deputy Executive Engineer's .
Health and Family Welfare Deptt
Behind Grain Warehouse , Veraval Road, Kodinar -362720
Phone No. 02795-221456
Email phskodinar@gmail.com

Book No. 37
Page No. 62
Serial No. 927
Date 8 FEB 2020

No. PB/49 , Dt. 29-01-2020

To
Vice President
Ambuja Cements Limited
Kodinar

Subject: Your Letter ACL/EMD/F-9/2020/2067, Dt. 06.01.2020.

With *Jay Bharat* in your above reference that our reply about you enquiry is there is not reported any report of drought during 2002 to 2020 in our office from the area of Sugala and Jagatiya villages, Taluka-Kodinar. This certificate for the purpose.

Deputy Executive Engineer.
H.F.W. Deptt
Kodinar

NOTARY CERTIFICATE
Certified that the Original in Gujarat Translated into English is Verified and Found Correct
K. L. DAHIMA
Advocate & Notary
KODINAR (GUJARAT)
8 FEB 2020

NOTARY * K. L. DAHIMA * GOVERNMENT OF GUJARAT (INDIA)
Ta.Kodinar
Dist. Junagadh
Regd.No. 1441/10

ગુજરાત પાણી પુરવઠા અને ગટર વ્યવસ્થા બોર્ડ
નાયબ કાર્યપાલક ઈજનેરની કચેરી, જાહેર આરોગ્ય સુખાકારી પેટા વિભાગ કોડીનાર
અનાજના ગોડાઉન પાછળ, વેરાવળ રોડ- કોડીનાર-૩૬૨૭૨૦ ફોન નં. 02795-221456
email.phskodinar@gmail.com

નં.પાબા/૧૬૯

તા.૨૯-૦૧-૨૦૨૦

પ્રતિ,
શ્રી વાઈસ પ્રેસિડેન્ટ
અંબુજા સિમેન્ટ લિમિટેડ
કોડીનાર,

વિષય :- દુષ્કાળ બાબત.

સંદર્ભ :- આપના દ્વારા આવેલ પત્ર ACL/EMD/F-9/2020/2067, તા. ૦૬-૦૧-૨૦૨૦

જયભારત સાથ ઉપરોક્ત વિષય અન્વયે જણાવવાનું કે, સંદર્ભિત પત્ર થી આપના દ્વારા માંગવામાં આવેલ માહિતી મુજબ કોડીનાર તાલુકાના સુગાલા તેમજ જગતિયા ગામે ૨૦૦૨ થી ૨૦૨૦ સુધીમાં પાણીનાં કોઈ પણ પ્રકારનો દુષ્કાળ ઉપલબ્ધ થયેલ નથી. જેનું આથી પ્રમાણ પત્ર આપવામાં આવે છે.

નાયબ કાર્યપાલક ઇજનેર
જા.આ.સુ.પેટા વિભાગ
કોડીનાર

NOTARY
K. L. DAHIMA
Ta.: Kodinar
Dist.: Junagadh
Regd. No. 1441/2010
GOVT. OF GUJARAT

Office of Deputy Executive
Engineer's Irrigation
Sub Division, Kodinar
Doctor House, 1st Floor, Jungleswar mandir road, Kodinar.
Phome (Fax) 02795-221448. , (Off.): 02795-221448.

Letter No. PB/Certificate / 38, Dt. 28/01/2020.

To
Ambuja Cements Limited
Kodinar

Book No. 97
Page No. 62
Serial No. 926
Date 8 FEB 2020

Subject: *Achhat*/ Draught Certificate regarding.

Ref: ACL/EMD/f-9/2020/2066/date-06/01/2020.

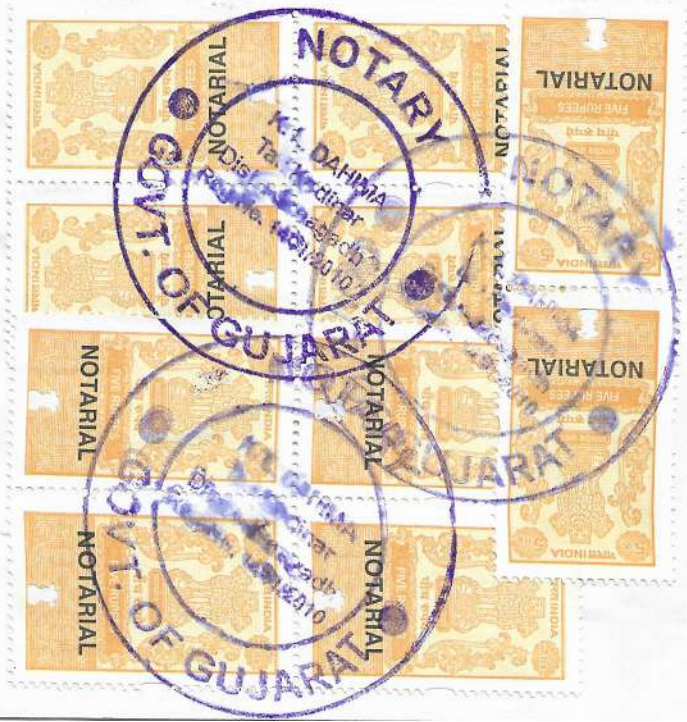
With your above reference letter that our department is looking for Shingoda Irrigation Plan and related work for collection of water in Shingoda Dam for the purpose of ravi's crop irrigation for operation of canal and drinking water as per water board.

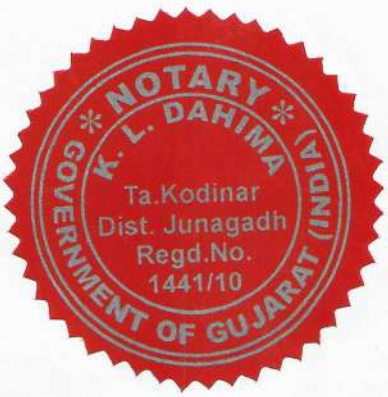
Therefore, we able to disclose an information about rain and accumulation of water in said dam and its related canal in respect to irrigation only. Our department is not have any information drought (*achhat*) regarding. It may be asked from Water supply deptt and suggestion for the same to contact with them.

-----sd------
Deputy Executive
Engineer's Irrigation
Sub Division, Kodinar

NOTARY CERTIFICATE
Certified that the Original in Gujarat Translated into Englis is Verified and Found Correct
K. L. DAHIMA
Advocate & Notary
KODINAR (GUJARAT)
8 FEB 2020

Copy to :
Water Supply(*Purvatha*) Board, Kodinar





Office of the Deputy Executive
Engineer's Irrigation
Sub Division, kodinar
Doctor House, 1st Floor,Jungleshwar
mandir Road, Kodinar.
Phone:- (Fax):-02795-221448,
(Offi.):-02795-221448.

Equity
Efficiency
Sustainability
WRD
Deputy Executive Engineer
નાયબ કાર્યપાલક ઇજનેર

નાયબ કાર્યપાલક ઇજનેરની કચેરી,
સિંચાઇ પેટા વિભાગ, કોડીનાર
ડોક્ટોર હાઉસ, પહેલા માળે, જંગલેશ્વર
મંદિર રોડ, કોડીનાર
ફોનઃ (ફેકસ) ૦૨૭૯૫-૨૨૧૪૪૮
(ઓ.) ૦૨૭૯૫-૨૨૧૪૪૮.

પત્ર નં.- પીબી/પ્રમાણ પત્ર/૩૮ તા.- ૨૮/ ૦૧/૨૦૨૦

પ્રતિશ્રી
અમ્બુજા સિમેન્ટ,
લીમીટેડ - કોડીનાર

વિષય :- અછત/ દુષ્કાળ નું પ્રમાણ પત્ર આપવા બાબત

સંદર્ભ – ACL/EMD/f-9/2020/2066/Date-06/01/2020

ઉપરોક્ત વિષય અને સંદર્ભિત પત્ર અન્વયે જણાવવાનું કે અત્રે ની કચેરી નાયબ કાર્યપાલક ઇજનેર સિંચાઈ પેટા વિભાગ કોડીનાર ની કચેરી હેઠળ શિંગોડા સિંચાઈ યોજનાની કામગીરી કરવામાં આવે છે જેમાં શિંગોડા ડેમ માં વરસાદનું પાણી સંગ્રહ કરવામાં આવે છે અને રવિ ખરીફ સીજન માટે સિંચાઈ નું કેનાલમાં પાણી, અને પાણી પુરવઠા બોર્ડ ને પીવા માટે નું પાણી આપવામાં આવે છે .

વધુમાં આપના ઉપરોક્ત સંદર્ભિત પત્ર અન્વયે એ જણાવવાનું કે આપનાં દ્વારા દુષ્કાળ (અછત) અંગે નું પ્રમાણ પત્ર માંગવામાં આવેલું છે જે અત્રે ની પેટા કચેરી દ્વારા વરસાદ- ડેમ અને કેનાલ-સિંચાઈ ની માહિતી આપી શકાય , દુષ્કાળ (અછત) અંગે ની માહિતી અત્રે ઉપલબ્ધ નથી એ પ્રમાણ પત્ર પાણી પુરવઠા બોર્ડ પાસેથી લઇ શકાય જે આપને જાણ તથા વિદિત થવા વિનતી

• નકલ રવાના
પાણી પુરવઠા બોર્ડ કોડીનાર તરફ જાણ સારૂ..
ના. કા. ઈજી,

નાયબ કાર્યપાલક ઇજનેર
સિંચાઇ પેટા વિભાગ,
કોડીનાર.

Scanned by CamScanner

Ambuja Cement Limited - Sugala Mines Water Table Monitoring

Depth of water Table from the surface (mtr)

Date	Well No-1	Well No-2	Well No-3	Well No-4	Well No-5	Well No-6	Well No-7	Well No-8	Well No-9	Well No-10	Well No-11	Well No-12	Well No-13	Pizometer-01	Pizometer-02
07-01-2005	5.10	4.45	3.10	1.95	8.70	1.53	10.35	4.20						12.40	12.50
18-03-2005	7.70	5.30	3.20	3.50	8.30	2.00	8.00	2.80						13.20	13.40
13-06-2005	12.10	12.10	11.55	5.00	12.90	2.80	13.30	5.60						8.80	10.20
16-09-2005	3.50	4.15	1.40	0.55	5.80	0.70	1.10	2.14						4.80	4.10
13-12-2005	6.80	5.45	11.50	1.10	7.05	1.40	4.74	3.10						8.80	8.00
24-03-2005	6.75	5.65	4.40	1.94	8.40	1.55	8.03	1.90						16.40	13.80
12-06-2006	7.15	6.70	12.22	5.17	11.20	2.20	7.38	5.00						11.20	10.20
11-04-2006	3.30	5.65	3.40	2.30	8.40	1.90	3.30	3.60						10.20	8.20
12-12-2006	2.60	5.70	8.00	1.90	7.20	1.45	9.20	2.30						8.80	11.80
16-04-2007	6.00	6.40	4.22	3.23	10.90	2.00	6.50	2.50						18.00	16.20
30-08-2007	5.40	3.00	1.30	0.00	3.50	0.00	0.00	0.00	Additional location identified and sampling started					6.20	3.20
27-11-2007	4.10	6.45	4.10	2.75	10.00	1.50	5.80	2.30	8.00	1.70	7.80	3.45	5.40	8.20	9.60
16-01-2008	4.20	7.00	4.50	2.70	10.60	1.60	5.80	2.15	9.35	2.20	6.10	4.10	6.30	10.10	12.50
03-04-2008	4.50	6.10	4.90	2.60	10.10	1.70	5.60	2.05	12.00	2.50	4.40	4.50	7.00	3.20	4.80
13-09-2008	5.20	7.00	2.75	1.60	6.55	0.60	3.00	4.00	5.65	0.80	2.80	1.00		4.80	9.20
22-12-2008	7.10	6.90	5.10	2.20	8.50	2.00	4.15	3.80	8.10	1.90	2.73	2.70	3.80	6.60	2.00
26-02-2009	10.10	11.70	5.20	3.30	8.60	2.00	9.00	4.40	9.30	2.80	2.80	4.00	7.20	9.20	4.20
28-05-2009	10.80	10.60	6.00	2.30	9.60	3.20	7.40	5.20	13.20	4.70	3.10	6.60	8.30	8.10	8.80
07-09-2009	5.90	6.10	3.50	1.50	7.00	0.80	5.50	3.80	7.60	1.00	2.80	1.80	5.80	13.60	2.00
25-12-2009	16.40	12.60	7.20	2.00	7.70	1.70	5.70	4.00	11.30	2.30	2.70	2.60	5.20	8.20	3.10
20-03-2010	22.80	11.30	5.90	5.00	12.20	2.80	9.90	5.60	12.40	4.50	2.90	7.80	11.80	10.10	8.10
15-06-2010	22.90	12.10	10.00	10.90	15.20	7.80	17.00	8.80	15.50	12.20	7.80	10.60	12.20	5.20	11.20
29-11-2010	9.70	7.60	5.60	3.80	9.70	2.00	3.10	4.30	7.30	1.00	4.00	3.20	3.00	6.20	5.40
13-01-2011	7.00	8.00	1.40	4.30	8.90	2.30	3.00	3.50	6.50	1.00	3.50	3.00	3.00	8.10	6.20
27-04-2011	22.00	9.10	7.00	7.70	13.20	3.70	7.20	6.20	13.20	3.00	6.30	18.80	12.10	2.20	8.30
10-09-2011	5.60	5.40	5.30	1.00	5.70	1.30	0.60	3.60	2.40	0.00	2.90	1.40	1.00	2.10	3.20
12-12-2011	6.70	6.10	10.50	2.00	7.60	2.20	6.30	4.20	7.50	1.40	3.00	2.30	3.80	2.10	3.70
20-02-2012	9.00	6.50	5.50	2.00	8.50	2.00	4.00	4.00	10.00	1.50	3.00	1.00	5.50	6.20	3.40
24-09-2012	8.76	6.40	4.80	2.35	8.90	3.60	8.60	5.60	11.00	3.60	3.00	8.20	11.60	7.56	3.40
05-10-2012	11.20	6.78	5.27	5.40	11.70	4.40	6.50	6.20	12.30	3.60	3.60	7.30	6.00	8.00	3.40
24-12-2012	22.70	7.10	5.12	8.10	16.60	11.00	18.00	10.30	19.00	12.80	10.50	11.20	12.40	13.80	5.80
25-02-2013	22.30	6.23	8.41	15.00	16.80	11.00	18.70	9.81	20.50	13.40	14.60	12.00	12.50	17.00	8.20
29-05-2013	22.50	8.12	14.00	18.20	22.00	12.10	17.90	7.54	23.00	15.70	13.20	13.60	12.68	19.00	11.00
08-10-2013	8.00	6.00	5.00	1.00	6.50	1.50	1.00	4.00	4.00	2.00	2.50	1.50	2.00	4.00	2.00
07-01-2014	6.40	7.10	7.20	2.30	8.00	4.00	14.60	4.00	6.20	2.60	3.00	2.60	3.20	1.30	2.40
17-04-2014	7.20	7.50	7.80	4.00	9.10	3.60	12.20	5.30	10.50	3.50	3.00	5.50	9.10	5.10	3.20
17-09-2014	5.80	6.50	6.50	1.40	5.30	2.00	7.70	3.70	3.80	0.00	3.00	1.50	1.36	2.90	1.70
17-01-2015	6.40	7.00	11.70	2.40	8.10	4.40	8.00	4.30	10.30	9.60	2.70	2.50	5.30	5.30	2.50
24-04-2015	24.30	9.70	13.10	7.70	12.00	4.40	10.00	8.20	14.00	4.70	3.60	9.50	12.00	6.10	3.40
08-08-2015		6.80	7.00	10.20	9.40	3.50	2.60	4.00	9.40	2.10	2.20	2.90	4.30	3.50	1.90

27-11-2015	Monitoring discontinued	7.40	7.30	13.60	11.80	5.50	7.30	6.00	11.00	2.50	2.50	8.30	7.00	4.80	2.70
19-03-2016		7.20	7.00	12.60	9.20	6.20	10.00	Monitoring discontinued	11.20	3.70	2.20	7.50	6.58	5.20	2.80
27-08-2016		6.70	6.00	2.00	9.00	2.80	1.60		6.30	2.50	1.70	2.30	5.20	3.90	2.10
31-01-2017		6.00	6.00	4.00	8.00	4.50	6.30		8.00	4.50	3.50	4.50	5.00	5.70	3.00
30-05-2017		6.80	11.70	3.50	9.20	2.30	8.40		12.00	4.90	2.80	4.57	11.20	6.30	3.00
03-08-2017		4.00	7.10	Monitoring discontinued	10.00	0.50	0.50		5.00	0.50	3.00	9.50	5.10	4.80	2.50
12-12-2017		8.65	8.20		12.60	4.00	7.00		11.00	9.20	3.50	6.20	7.00	8.50	4.50
31-01-2018		6.60	6.40		12.80	3.60	5.20		8.60	3.10	2.00	9.20	6.90	5.50	3.10
12-04-2018		7.80	7.90		13.50	5.30	11.20		12.70	7.70	7.80	Monitoring discontinued	9.80	6.90	3.70
27-08-2018		6.60	5.70		9.70	3.20	2.80		6.20	1.70	2.70		3.70	5.20	2.70
20-11-2018		7.80	7.40		11.30	3.60	6.30		9.90	8.30	3.20		6.30	6.80	3.60
24-01-2019		5.90	5.80		11.50	3.20	4.70		7.70	2.80	1.80		6.20	5.20	2.80
09-05-2019		11.50	8.60		9.90	10.40	1.60		8.20	7.50	4.50		11.70	7.90	4.20
12-10-2019		1.10	2.00		0.50	2.10	1.60		1.90	2.20	0.90		2.50	1.30	0.50
15-11-2019		8.50	9.20		13.10	7.90	7.50		7.40	9.20	4.50		6.50	9.50	5.50
25-01-2020		10.20	10.70		10.90	6.70	6.20		10.80	8.40	5.50		9.20	11.60	6.50
03-06-2020		18.20	20.00		11.00	17.00	15.40		9.10	15.20	22.60		18.20	19.60	14.20

Digital Piezometer -1				Digital Piezometer -2		
Date	Time	Height(m)		Date	Time	Height(m)
01-01-2020	00:00	8.99		01-01-2020	00:00	3.59
01-01-2020	06:00	8.92		01-01-2020	06:00	3.59
01-01-2020	12:00	9.17		01-01-2020	12:00	3.79
01-01-2020	18:00	9.14		01-01-2020	18:00	3.7
02-01-2020	00:00	9.01		02-01-2020	00:00	3.58
02-01-2020	06:00	8.94		02-01-2020	06:00	3.55
02-01-2020	12:00	9.15		02-01-2020	12:00	3.76
02-01-2020	18:00	9.07		02-01-2020	18:00	3.66
03-01-2020	00:00	8.94		03-01-2020	00:00	3.56
03-01-2020	06:00	8.98		03-01-2020	06:00	3.54
03-01-2020	12:00	9.13		03-01-2020	12:00	3.69
03-01-2020	18:00	9.14		03-01-2020	18:00	3.64
04-01-2020	00:00	8.93		04-01-2020	00:00	3.53
04-01-2020	06:00	8.95		04-01-2020	06:00	3.52
04-01-2020	12:00	9.11		04-01-2020	12:00	3.68
04-01-2020	18:00	9.05		04-01-2020	18:00	3.65
05-01-2020	00:00	8.92		05-01-2020	00:00	3.54
05-01-2020	06:00	8.91		05-01-2020	06:00	3.54
05-01-2020	12:00	9.02		05-01-2020	12:00	3.67
05-01-2020	18:00	9.05		05-01-2020	18:00	3.65
06-01-2020	00:00	8.84		06-01-2020	00:00	3.52
06-01-2020	06:00	8.84		06-01-2020	06:00	3.53
06-01-2020	12:00	9.05		06-01-2020	12:00	3.69
06-01-2020	18:00	9.04		06-01-2020	18:00	3.65
07-01-2020	00:00	8.91		07-01-2020	00:00	3.53
07-01-2020	06:00	8.91		07-01-2020	06:00	3.52
07-01-2020	12:00	9.14		07-01-2020	12:00	3.76
07-01-2020	18:00	9.15		07-01-2020	18:00	3.67
08-01-2020	00:00	8.96		08-01-2020	00:00	3.53
08-01-2020	06:00	8.97		08-01-2020	06:00	3.53
08-01-2020	12:00	9.16		08-01-2020	12:00	3.75
08-01-2020	18:00	9.14		08-01-2020	18:00	3.67
09-01-2020	00:00	8.99		09-01-2020	00:00	3.53
09-01-2020	06:00	8.89		09-01-2020	06:00	3.51
09-01-2020	12:00	9		09-01-2020	12:00	3.68
09-01-2020	18:00	9.1		09-01-2020	18:00	3.67
10-01-2020	00:00	8.91		10-01-2020	00:00	3.54
10-01-2020	06:00	8.9		10-01-2020	06:00	3.55
10-01-2020	12:00	9.01		10-01-2020	12:00	3.73
10-01-2020	18:00	9.02		10-01-2020	18:00	3.7
11-01-2020	00:00	8.9		11-01-2020	00:00	3.6
11-01-2020	06:00	8.86		11-01-2020	06:00	3.59
11-01-2020	12:00	9.02		11-01-2020	12:00	3.75
11-01-2020	18:00	8.96		11-01-2020	18:00	3.74
12-01-2020	00:00	8.87		12-01-2020	00:00	3.63
12-01-2020	06:00	8.89		12-01-2020	06:00	3.63
12-01-2020	12:00	9.04		12-01-2020	12:00	3.83
12-01-2020	18:00	9.02		12-01-2020	18:00	3.74
13-01-2020	00:00	8.93		13-01-2020	00:00	3.64
13-01-2020	06:00	8.93		13-01-2020	06:00	3.62
13-01-2020	12:00	9.02		13-01-2020	12:00	3.75
13-01-2020	18:00	9.02		13-01-2020	18:00	3.74
14-01-2020	00:00	8.9		14-01-2020	00:00	3.58
14-01-2020	06:00	8.88		14-01-2020	06:00	3.55
14-01-2020	12:00	9		14-01-2020	12:00	3.75
14-01-2020	18:00	8.96		14-01-2020	18:00	3.67
15-01-2020	00:00	8.82		15-01-2020	00:00	3.53
15-01-2020	06:00	8.71		15-01-2020	06:00	3.52
16-01-2020	00:00	8.66		15-01-2020	12:00	3.74
16-01-2020	06:00	8.51		15-01-2020	18:00	3.65
16-01-2020	12:00	8.66		16-01-2020	00:00	3.51

16-01-2020	18:00	7.64		16-01-2020	06:00	3.47
17-01-2020	00:00	7.44		16-01-2020	12:00	3.67
17-01-2020	06:00	7.37		16-01-2020	18:00	3.64
17-01-2020	12:00	7.57		17-01-2020	00:00	3.48
17-01-2020	18:00	7.59		17-01-2020	06:00	3.46
18-01-2020	00:00	7.42		17-01-2020	12:00	3.68
18-01-2020	06:00	7.31		17-01-2020	18:00	3.62
18-01-2020	12:00	7.53		18-01-2020	00:00	3.49
18-01-2020	18:00	7.37		18-01-2020	06:00	3.46
19-01-2020	00:00	7.17		18-01-2020	12:00	3.68
19-01-2020	06:00	7.2		18-01-2020	18:00	3.65
19-01-2020	12:00	7.36		19-01-2020	00:00	3.48
19-01-2020	18:00	7.33		19-01-2020	06:00	3.48
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27-03-2020	18:00	8.13		27-03-2020	18:00	4.23
28-03-2020	00:00	7.98		28-03-2020	00:00	4.13
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28-03-2020	12:00	8.09		28-03-2020	12:00	4.3
28-03-2020	18:00	8.11		28-03-2020	18:00	4.3
29-03-2020	00:00	7.93		29-03-2020	00:00	4.15
29-03-2020	06:00	7.92		29-03-2020	06:00	4.15
29-03-2020	12:00	8.19		29-03-2020	12:00	4.34
29-03-2020	18:00	8.19		29-03-2020	18:00	4.31
30-03-2020	00:00	7.93		30-03-2020	00:00	4.16
30-03-2020	06:00	7.96		30-03-2020	06:00	4.16
30-03-2020	12:00	8.12		30-03-2020	12:00	4.36
30-03-2020	18:00	8.07		30-03-2020	18:00	4.32
31-03-2020	00:00	7.89		31-03-2020	00:00	4.16
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31-03-2020	12:00	7.87		31-03-2020	12:00	4.31
31-03-2020	18:00	7.95		31-03-2020	18:00	4.34
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02-04-2020	12:00	7.86		02-04-2020	12:00	4.43
02-04-2020	18:00	7.84		02-04-2020	18:00	4.38
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04-04-2020	06:00	7.35		04-04-2020	06:00	4.16

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05-04-2020	00:00	7.28		05-04-2020	00:00	4.15
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05-04-2020	12:00	7.42		05-04-2020	12:00	4.38
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06-04-2020	00:00	7.2		06-04-2020	00:00	4.13
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08-04-2020	18:00	7.31		08-04-2020	18:00	4.21
09-04-2020	00:00	7.24		09-04-2020	00:00	4.06
09-04-2020	06:00	7.34		09-04-2020	06:00	4.05
09-04-2020	12:00	7.5		09-04-2020	12:00	4.25
09-04-2020	18:00	7.53		09-04-2020	18:00	4.22
10-04-2020	00:00	7.45		10-04-2020	00:00	4.08
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10-04-2020	12:00	7.67		10-04-2020	12:00	4.26
10-04-2020	18:00	7.69		10-04-2020	18:00	4.24
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11-04-2020	06:00	7.67		11-04-2020	06:00	4.08
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12-04-2020	06:00	7.69		12-04-2020	06:00	4.15
12-04-2020	12:00	7.6		12-04-2020	12:00	4.29
12-04-2020	18:00	7.68		12-04-2020	18:00	4.18
13-04-2020	00:00	7.73		13-04-2020	00:00	4.12
13-04-2020	06:00	7.69		13-04-2020	06:00	4.14
13-04-2020	12:00	7.94		13-04-2020	12:00	4.33
13-04-2020	18:00	8		13-04-2020	18:00	4.28
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14-04-2020	06:00	7.79		14-04-2020	06:00	4.16
14-04-2020	12:00	8.08		14-04-2020	12:00	4.36
14-04-2020	18:00	8.25		14-04-2020	18:00	4.3
15-04-2020	00:00	8.18		15-04-2020	00:00	4.19
15-04-2020	06:00	8.1		15-04-2020	06:00	4.19
15-04-2020	12:00	8.45		15-04-2020	12:00	4.43
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16-04-2020	00:00	8.49		16-04-2020	00:00	4.25
16-04-2020	06:00	8.41		16-04-2020	06:00	4.22
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17-04-2020	06:00	8.54		17-04-2020	06:00	4.27
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18-04-2020	00:00	8.29		18-04-2020	00:00	4.29
18-04-2020	06:00	8.16		18-04-2020	06:00	4.28
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18-04-2020	18:00	8.32		18-04-2020	18:00	4.43
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21-04-2020	18:00	7.7		21-04-2020	18:00	4.44
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22-04-2020	12:00	7.41		22-04-2020	12:00	4.5
22-04-2020	18:00	7.66		22-04-2020	18:00	4.43
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24-04-2020	12:00	7.63		24-04-2020	12:00	4.42
24-04-2020	18:00	7.69		24-04-2020	18:00	4.41
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25-04-2020	12:00	7.6		25-04-2020	12:00	4.38
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26-04-2020	00:00	7.5		26-04-2020	00:00	4.21
26-04-2020	06:00	7.4		26-04-2020	06:00	4.18
26-04-2020	12:00	7.47		26-04-2020	12:00	4.35
26-04-2020	18:00	7.42		26-04-2020	18:00	4.3
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03-05-2020	00:00	8.15		03-05-2020	00:00	4.23
03-05-2020	06:00	8.16		03-05-2020	06:00	4.24
03-05-2020	12:00	8.26		03-05-2020	12:00	4.41
03-05-2020	18:00	8.28		03-05-2020	18:00	4.39
04-05-2020	00:00	8.18		04-05-2020	00:00	4.27
04-05-2020	06:00	8.19		04-05-2020	06:00	4.26
04-05-2020	12:00	8.33		04-05-2020	12:00	4.43
04-05-2020	18:00	8.39		04-05-2020	18:00	4.43
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08-05-2020	12:00	8.76		08-05-2020	12:00	4.59
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09-05-2020	00:00	8.52		09-05-2020	00:00	4.44
09-05-2020	06:00	8.43		09-05-2020	06:00	4.44
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				10-05-2020	06:00	4.46
				10-05-2020	12:00	4.67
				10-05-2020	18:00	4.59
				11-05-2020	00:00	4.48
				11-05-2020	06:00	4.49
				11-05-2020	12:00	4.65
				11-05-2020	18:00	4.63
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				12-05-2020	06:00	4.52
				12-05-2020	12:00	4.68
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				13-05-2020	06:00	4.54
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				29-05-2020	06:00	4.33
				29-05-2020	12:00	4.52
				29-05-2020	18:00	4.42
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				30-05-2020	06:00	4.29
				30-05-2020	12:00	4.48
				30-05-2020	18:00	4.44
				31-05-2020	00:00	4.3
				31-05-2020	06:00	4.27
				31-05-2020	12:00	4.47
				31-05-2020	18:00	4.42
				01-06-2020	00:00	4.27
				01-06-2020	06:00	4.24
				01-06-2020	12:00	4.45
				01-06-2020	18:00	4.42
				02-06-2020	00:00	4.27
				02-06-2020	06:00	4.26
				02-06-2020	12:00	4.48
				02-06-2020	18:00	4.33
				03-06-2020	00:00	4.27
				03-06-2020	06:00	4.27
				03-06-2020	12:00	4.45
				03-06-2020	18:00	4.36
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				04-06-2020	12:00	4.44
				04-06-2020	18:00	4.39
				05-06-2020	00:00	4.23
				05-06-2020	06:00	4.24
				05-06-2020	12:00	4.43
				05-06-2020	18:00	4.38
				06-06-2020	00:00	4.27
				06-06-2020	06:00	4.24

WATER BUDGET

1.0 WATER REQUIREMENT

Earlier water requirement was presented as 225 KLD which has been reduced now as 190 KLD. Water requirement is being met through Bore wells/Rain water harvesting/mine pit.

There are basically two sources of intercepted water in the lease area i.e. Rainwater Accumulation and, Mine Seepage.

Existing quantity of water available in mine pits are 2.01 million cum. Details are given as per below:

Table 1.0

Existing Water Quantity in Sugala Mine

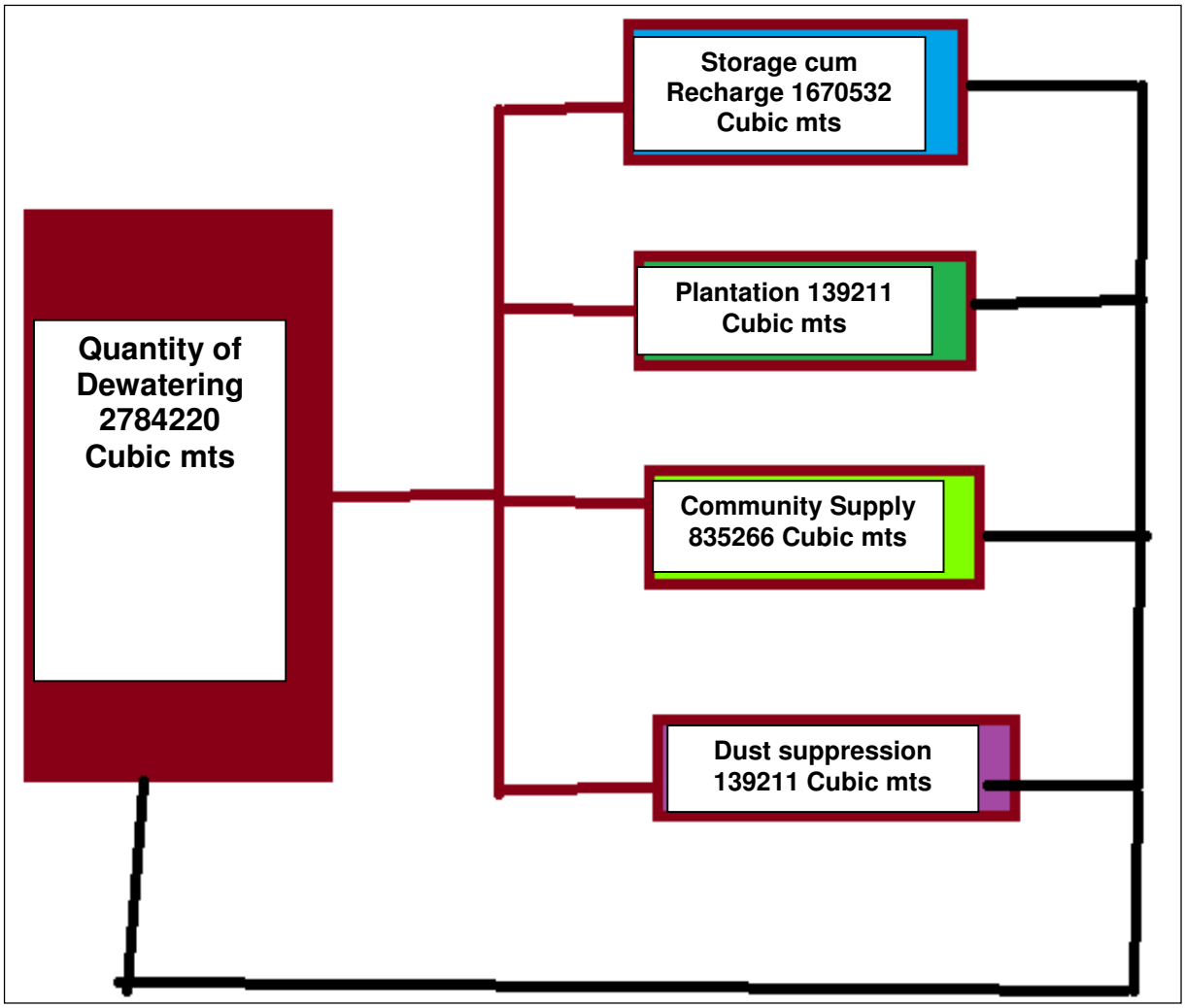
S. No	Pit No	Water logged area (SqM)	WL	Pit Bottom	Av Depth (m)	Volume (Cum)
1	Pit 3, 15	25401.1329	40.67	39.5	1.17	29719.33
2	Pit 4	133249.425	39.99	39.27	0.72	95939.59
3	Pit 5	21425.0298	44.16	43.05	1.11	23781.78
4	Pit 8	116995.8952	40.763	38	2.763	323259.66
5	Pit 10	44295.4566	41.62	39.25	2.37	104980.23
6	Pit 11	47353.8044	42.61	37.15	5.46	258551.77
7	Pit 13	55864.9472	39.79	36.87	2.92	163125.65
8	Pit 14	50478.3005	41.9	38.15	3.75	189293.63
9	Pit 16	29430.0336	40.48	39.5	0.98	28841.43
10	Pit 17	32760.6158	46.9	45.28	1.62	53072.20
11	Pit 18	19153.5465	46.07	44.6	1.47	28155.71
12	Pit 19	24412.6246	46.41	44.35	2.06	50290.01
13	Pit 20	34085.1468	32.89	30.75	2.14	72942.21
14	Pit 21	5679.846	40.1	38.65	1.45	8235.78
15	Pit 22	14669.6369	39.12	38.11	1.01	14816.33
16	Pit 23	35157.7278	33.41	28	5.41	190203.31
17	Pit 24	18797.4913	37.73	33.6	4.13	77633.64
18	Pit 25	70472.5551	38.08	36.75	1.33	93728.50
19	Pit 26	33972.8334	38.95	35.5	3.45	117206.28
20	Pit 27	26675.5613	38.97	37.75	1.22	32544.18
21	Pit 28	9083.7205	39.79	38.5	1.29	11718.00
22	Pit 29	7131.8224	37.57	36.25	1.32	9414.01
23	Pit 30	7789.2776	35.28	32.65	2.63	20485.80
24	Pit 31	2991.2146	39.46	37.95	1.51	4516.73
25	Pit 32	7288.2787	42.1	41.26	0.84	6122.15
26	Pit 33	4256.0962	37.77	37.45	0.32	1361.95
Total						2009939.85

Besides, permission for abstraction of 2784220 cum/year through proposed nine bore wells for dewatering only on account of mining intersecting the water table has been taken from CGWA vide letter no 21-4/1599/GJ/MIN/2016-175 dated 31.01.2018. utilization of dewatered water is given below:

Utilization details of Sugala Mines dewatered water

Sl. No	Activity	Quantity in %	Total Quantity of Water in m^3/Year based on 365 days in year
1	Storage cum Recharge	60%	16,70,532
2	Plantation	5%	139,211
3.	Community supply	30%	835,266
4.	Dust Suppression	5%	139,211
	Total	100%	27,84,220

CHART FOR UTILIZATION OF MINE WATER



Total available water per annum is 7628 cum/day. The pumped water is proposed to be used for the following purposes:

1. Utilization in Mining Activities
2. Storage in already existing Mine Pits/Reservoirs
3. Agricultural Purpose in nearby area
4. Drinking/Domestic water supply to nearby villages

1. MINING ACTIVITIES:

Total water requirement for the existing Sugala limestone mine is 190 KLD (56 cum/day shall be utilized to meet daily water requirement of Greenbelt/Plantation, 123 cum/day for dust suppression and the remaining 11 cum/day for drinking requirement) which is being sourced from mine sump/ mined out water reservoir in later stages of mining. The same shall be continued.

Greenbelt/Plantation in Mine lease

Plantation on Backfilled Area

2. STORAGE IN MINE PITS:

It is proposed to divert the pumped water into the already excavated nearby mines/mine pits so that the water can be stored in these mine pits for further usage. A number of existing excavated mine pits are available for storage of excess water which is already filled up with rainwater (photographs shown

below). About 4576 KLD of accumulated water is planned to be diverted to the already excavated nearby mine pits.

Existing Mine Pits/Water Reservoir in Mine leas

3. FOR AGRICULTURE IN THE NEARBY FIELDS:

Land use in the area is chiefly for agricultural purpose and the land around the Mine area is agriculture land. Water pumped from the mines will be diverted to the nearby agricultural lands for irrigation purposes. The two canals nearby will be used to transport the pumped water, which is suitable for agriculture. Necessary permission to divert the pumping water from the concerned authorities will be taken as per requirement. This will lessen the burden of cost of pumping to the farmers during the dewatering period and will benefit the farmers around the mining area

Agricultural Fields in Nearby Area

4. DRINKING/DOMESTIC WATER SUPPLY TO NEARBY VILLAGES:

Remaining quantity (2289 KLD) after utilization for mining activities and transfer to existing canals for agriculture purpose, shall be provided to nearby villages to fulfil their drinking/domestic water supply which will reduce the additional groundwater withdrawal for the same.

2.0 ARTIFICIAL RECHARGE ACTIVIIES UNDERTAKEN BY ACL

Ambuja Cements Limited has undertaken several recharge activities listed below and the details are submitted herewith:

- Small and large Check dams,
- Percolation tanks,
- Roof top harvesting works in villages,
- Direct recharge of open wells,
- Link canals,
- Spreading channels,
- Salinity ingress prevention works etc

Activity Recommended by High Level Committee (Government of Gujarat)	Interventions by Team Ambuja Cements
Check Dams	Renovation and construction of over 165 check dams. A total of 79 villages benefitted from the check dams. Water table in the area increased in the range of 2-12 m.
Recharge Well /Percolation wells	Over 1030 wells recharged and percolation wells constructed to help improve groundwater recharge. 1226 families have benefitted in terms of increased area under irrigation and enhanced agricultural production.
Ponds constructed/ deepened	Over 100 such structures constructed/deepened
Link Canals	Over 68 kms of link channels/canals constructed leading to conservation of every drop of water as no water is allowed to flow into the sea and go waste. Water bodies, tidal regulators and rivers have also been interlinked.
Farm Ponds	Construction of over 730 ponds on farmers fields to provide support irrigation during Kharif season
Conversion of mined out pits into water reservoirs (including interlinking of the mined out pits)	340 MCFT harvested in mined out pits. Mined out pits have also been interlinked. This is a unique effort to convert what would otherwise be waste land into a water reservoir. Usually companies under take afforestation in mined out pits.
Change in Cropping Pattern	Over 300 training and exposure visits for more than 17000 farmers enabling them to switch to less water intensive crops, salinity resistant crops and better agricultural practices. Agriculture demonstration carried out in over 5000 acres of land. Promotion of horticulture in over 5300 acres of land
Regulation of Groundwater abstraction through water management in agriculture	Awareness programs on judicious use of water and promotion of micro irrigation. Over 1400 acres covered under drip and sprinkler irrigation
Afforestation	Over 7.5 lakh trees planted for the community and over 2.6 lakh trees planted in mines and other surrounding areas.

Mined-out pits Refilled with rainwater in Kodinar

Check Dams- 222 Numbers

Check dam Under Road

Percolation Well in Valadar Village

Interlinking of Rivers- 67.6 KMs

Major Dam, Bhekeshwar

Salinity Prevention Structure

Percolation Tank/Pond- 119 numbers

Percolation/Recharge Wells- 126 Numbers

PLANTATION / GREEN BELT STATISTICS

•PLANTATION / GREEN BELT:

Total
46.00 Ha

- **Green Belt 22.77 Ha**
- **Along Canal 17.82 Ha**
- **Near Office, Along road and bund 5.41 Ha**

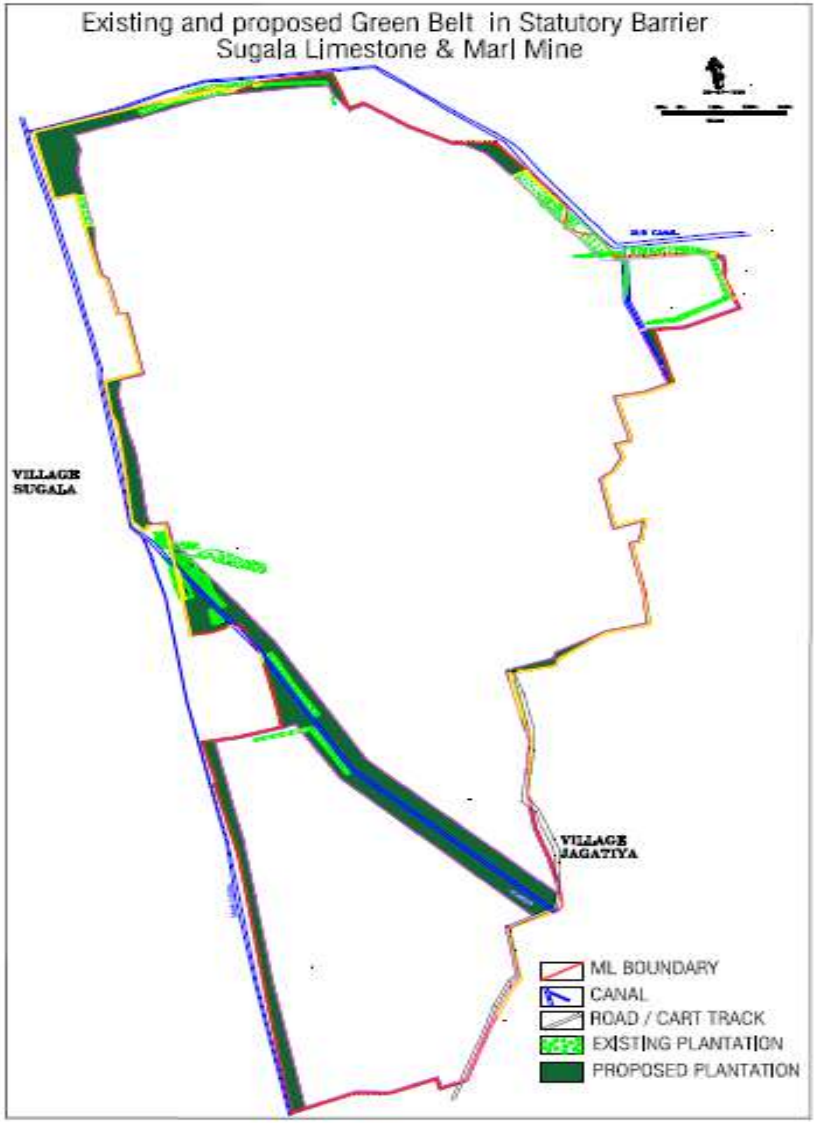
Existing
11 Ha

→ **Others (Along road and bund) 4.21 Ha**

- **Green Belt 3.69 Ha**
- **Along Canal 1.90 Ha**
- **Near Office 1.20 Ha**

Balance
35.0 Ha

- **Green Belt 19.08 Ha**
- **Along Canal (GB) 15.92 Ha**



Existing details of Greenbelt/ Plantation

YEAR	Lattitude	Longitude	Green Belt/Plantation				Afforestation in pasture land		Total NO OF PLANTATION ML AREA	OML along ML				SURVIVED	Plantation in Buffer Zone	
			PLANTATION AREA	PLANTATION IN 7.5Ha	SURVIVAL RATE %	Survived Plantation	PLANTATION AREA	PLANTATION IN BACKFILLED		Lattitude	Longitude	NO OF PLANTS IN OML AREA	SURVIVAL RATE %		Area	No Of Plants
2002-03			-	-					-						670.74	87606
2003-04	20 53 55.94	70 45 37.00	0.28	129	75	97			129	20 53 54.28	70 45 34.89	598	75	449		
2004-05	20 53 56.24	70 45 39.47	0.45	915	75	686			915	20 54 51.20	70 45 53.84	1513	70	1059		
2005-06	20 53 52.42	70 45 44.35	4.54	9646	70	6752			9646	20 53 54.28	70 45 34.89	785	60	471		
2006-07	20 54 21.85	70 46 27.22	1.90	850	60	510			850	20 54 21.40	70 46 33.75	66	50	33		
2007-08	20 53 47.36	70 46 6.29	0.7304	1554	60	932			1554	20 53 32.24	70 46 6.87	300	40	120		
2008-09	20 54 20.77	70 46 33.68	In filling	1550	60	930			1550							
2009-10	20 53 56.50	70 46 18.56					0.9276	1550	1550						71.55	15823
2010-11	20 54 50.04	70 45 56.03	In filling	1556	60	934			1556						75.31	13761
2011-12	20 53 26.50	70 46 0.79	In filling	1565	60	939			1565						45.48	8049
2012-13	20 53 28.89	70 45 46.18	0.7919	900	60	540			1920						80.19	15389
	20 54 17.65	70 46 33.37					0.5847	1020								
2013-14	20 54 13.31	70 46 27.47	0.9369	2303	60	1382			2303						53.28	12486
2014-15	20 54 25.34	70 46 25.55	In filling	2405	75	1804			2405						63.24	14195
2015-16	20 54 4.68	70 46 13.22	In filling	1690	75	1268			1690						90.33	12976
2016-17	20 53 57.92	70 46 0.65	In filling	2320	80	1856			2320						69.58	11126
2017-18	20 53 51.89	70 45 37.58	In filling	2000	80	1600			2616						18.09	2208
	21 54 19.68	71 45 54.48						616								
2018-19	20 54 19.68	70 45 54.48					3.54	1671	1671						38.66	4700
2019-20	21 54 19.68	71 45 54.48						1563	3563						33.09	4123
	20 53 19.52	70 46 4.32	1.3665	2000	80	1600										
TOTAL			**11.00**	**31383**		**21829**	**5.0523**	**6420**	**37803**			**3262**		**2132**	**1309.54**	**202442**

PROPOSED PLAN OF GRENBELT/PLANTATION					
Year	**Area (Ha)**	**No of Plants**	**Lattitude**	**Longitude**	**Location**
2020-21	**2.25**	**3375**	20 53 24.08	70 45 35.25	P1
2021-22	**2.25**	**3375**	20 53 6.46	70 45 34.56	P2
2022-23	**2.25**	**3375**	20 52 51.27	70 45 34.10	P3
2023-24	**2.25**	**3375**	20 53 27.43	70 45 46.67	P4
2024-25	**2**	**3000**	20 53 28.82	70 45 47.13	P5
2025-26	**2**	**3000**	20 53 16.59	70 45 54.85	P6
2026-27	**2**	**3000**	20 53 19.95	70 45 53.03	P7
2027-28	**2**	**3000**	20 52 51.72	70 45 54.30	P8
2028-29	**2**	**3000**	20 54 8.33	70 45 34.81	P9
2029-30	**2**	**3000**	20 53 55.41	70 46 19.07	P10
2030-31	**2**	**3000**	20 54 39.72	70 45 38.55	P11
2031-32	**2**	**3000**	20 539.41	70 46 1.33	P12
2032-33	**3**	**4500**	20 54 9.43	70 45 43.36	P13
2033-34	**3**	**4500**	20 54 9.81	70 46 10.44	P14
2034-35	**2**	**3000**	20 54 25.45	70 45 39.25	P15
2035-36	**2**	**3000**	20 53 47.14	70 45 39.65	P16
Total	35	52500			

W6 W4 W2 E0 E2 E4 E6 E8 E10 E12 E14 E16

N24 N22 N20 N18 N16 N14 N12 N10 N8 N6 N4 N2 N0 S2 S4 S6 S8 S10 S12 S14

TO GHATWAD

05-07-1999

SUB CANAL

VILLAGE SUGALA

VILLAGE JAGATIYA

MAIN CANAL

TO KODINAR

ROAD TO KODINAR

BACK FILL AREA

PASTURE LAND

WL=42.10

SUB CANAL

CANTEEN

AQUARIUM

GARDEN

INDEX

- ML BOUNDARY
- ROAD(METAL)
- CART TRACK
- CANAL
- NALA
- SOIL STACK
- BARBED WIRE FENCING
- BOUNDARY WALL
- PLANTATION
- WATER
- PIT / QUARRY WITH NUMBER
- EXISTING GREEN BELT / PLANTATION
- EXISTING PASTURE LAND
- PROPOSED GREEN BELT

50m 0m 100m 200m 300m 400m 500m 600m 700m 800m 900m 1000m 1100m 1200m

SCALE 1:5000

RECLAMATION PLAN OF SUGALA LIMESTONE MINE

Annexure X_Sugala KML File
Sugala
Jagatiya

Translation Gujarati to English

Office of Geologist
Geology and Mineral Department
Room No. 348-354, Collectroate Office Building, At-Inaj, Taluka-Veraval , District Gir Somnath.
Phone no. 02876-285040, Email geologist-girsomnath@gujarat.gov.in

Letter No. GG/ML/Ambuja/15

DT. 02.JAN.2020

TO
Ambuja Cements Limited
At Ambujanagar, Tal. Kodinar
District Gir Somnath.

Subject: Sugala Limestone/ Marl Mineral Mining Lease Area clarity Regarding.

Ref: Your Letter , Dt. 08.12.2019.

Dear Sir

In above subject and reference that your Mining Lease , area 417.35.84 Hectare of limestone/ Marl Minerals was granted vide Govt Order Dated 19/7/2002 for 30 years and its agreement was made on 2/9/2002.

You show above an area of above mining lease area is 417.3584 Ha instead of 417.35.84 Ha in your correspondence with MoEF. This letter is a reference for MoEF Delhi for the clarity on the matter that both are same.

-sd-
Geologist
Geology and Mineral Department
District Gir Somnath

(Incharge)

NOTARY CERTIFICATE
ertified that the Original in
ujarat Translated into English
s Verified and Found Correct.

HARIBHAI G. VALA
Advocate & Notary
ODINAR (GUJARAT)
01 FEB 2020
Book No. 01
Page No. 67
Serial No. 1060
Date 01 FEB 2020

ભુસ્તરશાસ્ત્રીશ્રીની કચેરી,
ભુસ્તર વિજ્ઞાન અને ખનિજ ખાતુ,

કલેકટર કચેરી બિલ્ડીંગ, રૂમ નં. ૩૪૮ થી ૩૫૪, મુ.ઈણાજ, તા.વેરાવળ, જિ.ગીર સોમનાથ
ફોન નંબર : ૦૨૮૭૬-૨૮૫૦૪૦, E-MAIL - geologist-girsomnath@gujarat.gov.in

નં.જીજી/એમએલ/અંબુજા/ ૧૫૮ તા.

2 JAN 2020

પ્રતિ,
મે.અંબુજા સીમેન્ટ લી.,
મુ.અંબુજાનગર, તા.કોડીનાર,
જિ.ગીર સોમનાથ.

વિષય :- સુગાળા લાઈમસ્ટોન/માર્લ ખનિજની માઈનીંગલીઝ વિસ્તારની સ્પષ્ટતા બાબત.

સંદર્ભ :- આપનો તા.૮/૧૨/૨૦૧૯ નો પત્ર.

ઉપરોકત વિષય અને સંદર્ભે જણાવવાનું કે, આપને ગીર સોમનાથ જિલ્લાના કોડીનાર તાલુકાના સુગાળા અને જગતીયા ગામના જુદાજુદા સર્વેનંબરોમાં ૪૧૭.૩૫.૮૪ હે.વિસ્તારની લાઈમસ્ટોન/માર્લ ખનિજની માઈનીંગલીઝ સરકારશ્રીના હુકમ તા.૧૯/૭/૨૦૦૨ થી મંજુર કરવામાં આવેલ છે. જેનું કરારખત તા.૨/૯/૨૦૦૨ ના રોજ ૩૦(ત્રીસ) વર્ષની મુદત માટે કરવામાં આવેલ.

આપના ધ્વારા એમ.ઓ.ઈ.એફ. સાથે થયેલ પત્રવ્યવહારમાં સદરહુ લીઝનો વિસ્તાર ૪૧૭.૩૫.૮૪ ને બદલે ૪૧૭.૩૫૮૪ હેકટર દર્શાવવામાં આવેલ છે. જે બંન્ને વિસ્તાર એક જ છે. સદરહુ સ્પષ્ટતા આપને એમ.ઓ.ઈ.એફ., દિલ્હી માટે જરૂર હોઈ, આ પત્ર ફકત એમ.ઓ.ઈ.એફ., દિલ્હીના કામે જ માન્ય ગણાશે.

ભુસ્તરશાસ્ત્રી
ભુસ્તર વિજ્ઞાન અને ખનિજ ખાતુ,
ગીર સોમનાથ (ઈ.ચા.)

भारत सरकार / Govt. of India
जल शक्ति मंत्रालय / Ministry Jal Shakti
जल संसाधन, नदी विकास और गंगा संरक्षण विभाग
Department of Water Resources, River Development & Ganga Rejuvenation
केन्द्रीय भूमि जल बोर्ड / Central Ground Water Board
पश्चिम मध्य क्षेत्र/ West Central Region
स्वामीनारायण कॉलेज बिल्डिंग,शाहआलम टोलनाका , अहमदाबाद-22, गुजरात
टेलीफ़ोन : 079-25320476, 25330009, फ़ैक्स : 079-25329379,
ईमेल : rdwcr-cgwb@nic.in, tswcr-cgwb@nic.in, वैबसाइट : cgwb.gov.in

File No.21-4/1599/GJ/MIN/2016/Renewal_1/2020 -469 Date 19.08.2020

19 AUG 2020

To,
The Member Secretary
Central Ground Water Authority
Ministry of Water Resources, River Development & Ganga Rejuvenation
18/11, Jamnagar House, Mansingh Raod
New Delhi 110011

Sub: 1st Renewal of NOC in respect of M/S Sugala Limestone Mines, Village-Sugala, Taluka-Kodinar, District - Gir Somnath, State- Gujarat.

Sir,
Kindly find enclosed Evaluation proforma with checklist for 1st renewal of NOC in respect M/S Sugala Limestone Mines, Village-Sugala, Taluka-Kodinar, District - Gir Somnath, State-Gujarat for abstraction of 7628m^3/day groundwater. The NOC is recommended for first renewal and is submitted for necessary action at your end. (attached).

Yours faithfully

Sourabh Gupta
Regional Director

Encl: . As above.

Copy to:
Mr Anand Praksh, (Dy. General Manager-Environment), Ambuja Cements Ltd, Ambuja Nagar, Taluka- Kodinar, Districts-Gir Somnath, State- Gujarat-362715 for information

19/8/20

Sourabh Gupta
Regional Director

केन्द्रीय भूमि जल प्राधिकरण
जल संसाधन, नदी विकास एवं
गंगा संरक्षण मंत्रालय
भारत सरकार
Central Ground Water Authority
Ministry of Water Resources
River Development & Ganga Rejuvenation
Government of India

MEMBER SECRETARY

File No: - 21-4/1599/GJ/MIN/2016 - 175

NOC No: - CGWA/NOC/MIN/ORIG/2018/3015

Date:- 31 JAN 2018

To
M/s Ambuja Cements Limited
PO Ambujanagar
Taluka Kodinar, District Gir Somnath,
Gujarat - 362715

Sub: - NOC for ground water withdrawal to M/s Ambuja Cements Limited in respect of their proposed Limestone Mine project located at Village Sugala And Jagatiya, Taluka Kodinar, District Gir Somnath, Gujarat – reg.

Refer to your application on the above cited subject. Based on recommendations of Regional Director, Central Ground Water Board, West Central Region, Ahmedabad vide their recommendations dated 19/05/2017 and further deliberations on the subject, the NOC of Central Ground Water Authority is hereby accorded to **M/s Ambuja Cements Limited in respect of their proposed Limestone Mine project located at Village Sugala And Jagatiya, Taluka Kodinar, District Gir Somnath, Gujarat.** The NOC is, however subject to the following conditions:-

1. The firm may abstract **7,628 cu.m/day** for 300 days (not exceeding **27,84,220 cu.m/year**) through proposed nine (9) tube wells for dewatering only on account of mining intersecting the water table. Remaining dewatering structures shall be made non- operational. No additional dewatering structures shall be constructed for this purpose without prior approval of the CGWA. The dewatered quantum of ground water shall be put to gainful use as proposed.
2. All the wells shall be fitted with water meter by the firm at its own cost and monitoring of ground water abstraction shall be undertaken accordingly on regular basis, at least once in a month.
3. **M/s Sugala Limestone Mines,** in consultation with the Regional Director, Central Ground Water Board, West Central Region, Ahmedabad shall implement ground water recharge measures to the tune of **13,72,885 cu.m/year** as proposed, for augmenting the ground water resource of the area. Firm shall report compliance within six months from the date of issue of this letter. Firm shall also undertake periodic maintenance of recharge structures at its own cost.
4. The photographs of the recharge structures after completion of the same shall be furnished immediately to the Regional Director, Central Ground Water Board, West Central Region, Ahmedabad for verification and under intimation to this office.
5. The firm at its own cost shall install five (5) observation wells fitted with automatic water level recorder having telemetry system at suitable locations for regular ground

water level monitoring in consultation with the Central Ground Water Board, West Central Region, Ahmedabad. The firm shall share user ID and password with the Regional Director, Central Ground Water Board, West Central Region, Ahmedabad. In addition, monitoring of key wells for both core and buffer zones shall be carried out to check the impact on ground water levels due to mine dewatering.

6. The ground water quality shall be monitored twice in a year during pre- monsoon and post- monsoon periods.

7. The ground water monitoring data in respect of S. No. 2, 5 & 6 to be submitted to Central Ground Water Board, West Central Region, Ahmedabad on regular basis at least once in a year.

8. The firm shall ensure proper recycling and reuse of waste water after adequate treatment.

9. Action taken report in respect of S. No. 1 to 8 may be submitted to CGWA within one year period.

10. The permission is liable to be cancelled in case of non-compliance of any of the conditions as mentioned in S. No. 1 to 9.

11. The firm shall report self compliance online in the website (www.cgwa-noc.gov.in) within one year from the date of issue of this NOC.

12. This NOC is subject to prevailing Central/State Government rules/laws or Court orders related to construction of tubewell/ ground water withdrawal/ construction of recharge or conservation structures/ discharge of effluents or any such matter as applicable.

13. This NOC does not absolve the applicant / proponent of his obligation / requirement to obtain other statutory and administrative clearances from other statutory and administrative authorities.

14. The NOC does not imply that other statutory / administrative clearances shall be granted to the project by the concerned authorities. Such authorities would consider the project on merits and be taking decisions independently of the NOC.

15. This NOC is valid from 01/01/2018 till 31/12/2019.

Member Secretary

Copy to:

1. The Member Secretary, Gujarat Pollution Control Board Paryavaran Bhavan, Sector 10 A, Gandhinagar 382010, Gujarat **with a request to ensure that the conditions mentioned in the NOC are complied by the firm in consultation with the District Collector, District Gir Somnath, Gujarat.**
2. The District Collector, District Gir Somnath, Gujarat for necessary action.
3. The Regional Director, Central Ground Water Board, West Central Region, Ahmedabad. This has reference to your recommendation dated 19/05/2017.
4. TS to the Chairman, Central Ground Water Authority, Shram Shakti Bhawan, Rafi Marg, New Delhi.
5. Guard File 2017-18.

Member Secretary

A COMPLIANCE REPORT ON

GROUND WATER ABSTRACTION NOC

GRANTED BY CENTRAL GROUND WATER AUTHORITY

FOR SUGALA LIMESTONE MINES

SUBMITTED BY :

M/s. AMBUJA CEMENTS LTD, AMBUJANAGAR, KODINAR,

DISTRICT : GIR SOMNATH (GUJARAT)

Introduction:

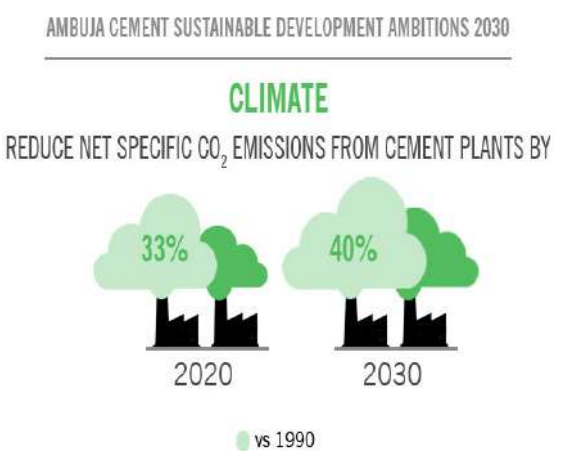
Ambuja Cement aspires to be the most competitive and sustainable company in the cement manufacturing industry. Acting in a sustainable manner is not only a business imperative but also provides the company with a competitive advantage. Ambuja cement continues to set industry benchmarks in tackling carbon emissions and creating sustainable solutions. Aligned with the vision of LafargeHolcim, the parent company, Ambuja Cement is committed to group-level targets to mitigate the effects of climate change. The company has also taken the lead in encouraging the construction sector to formulate sustainable development strategies in India.

Ambuja cement's sustainable development initiatives cover a wide spectrum. From harnessing clean technology to using industrial wastes in production, energy conservation to exploiting renewable energy resources, emissions reduction to creating institutionalised mechanisms to monitor environmental risks and strict adherence to the company's 'zero non-compliance' regime, Ambuja Cement's sustained efforts have helped ingrain the sustainability agenda in the company's DNA.

All Ambuja Cements Limited plants are ISO 14001 certified. Ambuja cement's vision to become the most competitive and sustainable company in the industry has led the company to adopt True Value, the triple bottom-line accounting method which encompasses the three pillars of sustainability – people, planet, and profit. Good corporate governance practices, an overarching corporate environment policy, CSR initiatives, thrust on health and safety at workplace and a sustainable supply chain policy have helped the company cement its sustainability agenda. With an eye on the future, Ambuja cement has conceived the Sustainable Development Ambition 2030 providing strategic direction to the company's long-term sustainability vision.

Lafarge Holcim's Sustainability Strategy:

The 2030 Plan envisions a construction sector which will be innovative, climate neutral and circular in its use of resources. It will be respectful of water and nature, and inclusive – thus enhancing the quality of life. The Sustainable Development Ambition 2030 provides a broad framework for the company's strategies to meet the challenges in four broad thematic areas: Climate, Circular Economy, Water & Nature, and People & Communities.



Water conservation :

Ambuja Cements Limited has always been aware of the vulnerability of the water resources in our operational geographies. Water scarcity affects different stakeholders and is identified as a risk for business. We believe in 'giving back more than we take'; our CSR arm, Ambuja Cement Foundation (ACF), works extensively in the Company's neighbourhoods to manage water resources through conservation and harvesting. ACF's multidimensional approach included setting up roof rain water harvesting structures (RRWHS); enhancement of water sources by installing percolation wells and check dams; farming low water intensive crops; and creation of a potable water distribution system. Similarly, renovation of traditional water reservoirs, pond deepening, RRWHS and reverse osmosis systems have improved the lives of people in the area. ACF's interventions give the people access to water for drinking and irrigation, and also sensitise communities about conserving precious resources. Water user associations ensure equitable distribution of water and maintenance of structures; farmers are trained in better techniques and practices such as micro irrigation to improve the quality and sustainability of their lands. Ambuja group is the only industry became water positive more than four times and it is certified by a third party regularly. Ambujanagar unit (Plant&TPP, all mines and BCT etc) is remains more than 12 time water positive (Since 2014 we started auditing our water harvesting, recharge, conservation and consumption) Inline with LH sustainability 2020 targets Ambuja Cements Limited's has taken target in 2015 is to become five times water positive by 2020 which is achieved in 2016.

Ambuja cements Ltd has not restricted our water positive mission within our fence but we have made interventions for water conservation recharge and harvesting within in the 50 KM periphery of our fence.

Biodiversity :

Ambuja Cement is committed to the conservation of biodiversity and follows an active policy to protect valuable ecosystems. Sustainable mining practices, water bodies and pastureland development, and land rehabilitation have helped enhance the landscape and biodiversity of the area around the company's sites. Biodiversity (flora and fauna) studies have been conducted by third parties for almost all mining areas.Ambuja is a signatory to the India Business and Biodiversity Initiative (IBBI) of Confederation of Indian Industry (CII) and Gesellschaft für Internationale Zusammenarbeit. The company has also been active in International Union for Conservation of Nature (IUCN) Leader for Nature (LfN) initiative. Ambuja Cement follows the Group Biodiversity Directive that requires it to prepare a biodiversity action plan (BAP) for sensitive sites. The Company is committed to making a 'positive change on Biodiversity' by 2030 compared to baseline score generated through Biodiversity Indicator and Reporting System (BIRS) in 2017. BIRS has been developed by experts from International Union for Conservation of Nature (IUCN).

Ambujanagar Team with Dr. Dheeraj Mittal , DCF Gir-Somnath (Chief Guest) witnesssing World Wildlife Celebrations at Ambujanagar, Kodinar

Sugala Limestone & Marl Mine of M/s. Ambuja Cements Ltd. has Limestone Production Capacity of 1.29 MTPA of Mining Lease (ML 417.3584 Ha.) at Villages – Sugala and Jagatiya, Taluka – Kodinar, District – Gir Somnath (Gujarat). The limestone will be used in existing integrated cement plant for cement manufacturing. A brief description of project is as below.

Table–1: Salient Features of the Project

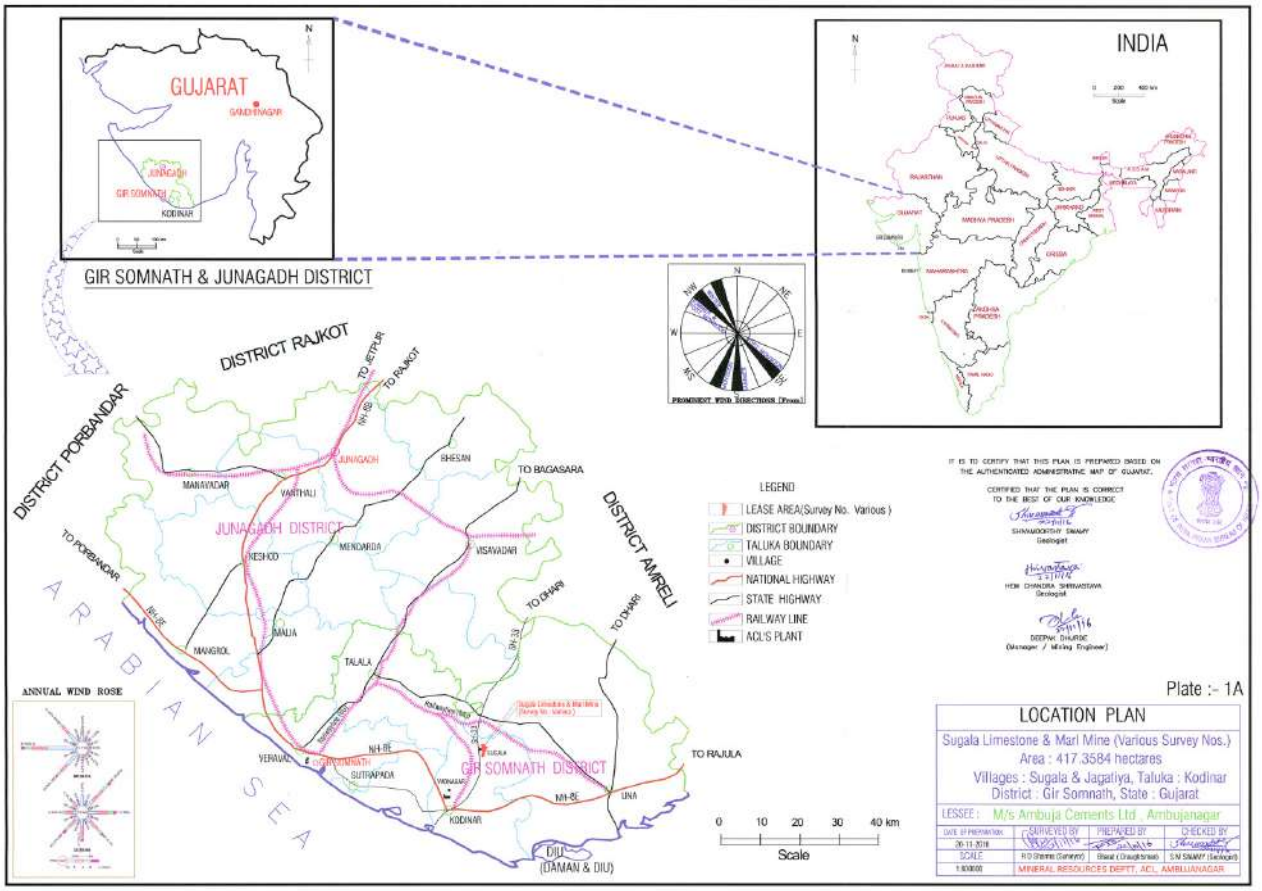
S. No.	Particulars	Details
A.	Nature of project	Sugala Limestone Mining (ML 417.3584 Ha.) located at Villages – Sugala and Jagatiya of M/s. Ambuja Cements Ltd., Ambujanagar Kodinar, District – Gir Somnath (Gujarat).
B.	Size of project	
1.	Mining Lease area	ML 417.3584 Ha. (Private Land: 414.8493 ha and Govt. Waste Land :2.5091 ha)
2.	Production capacity	1.29 MTPA
C.	Project Location	
1.	Villages	Sugala and Jagatiya
2.	Tehsil	Kodinar
3.	District	Gir Somnath
4.	State	Gujarat
5.	Latitude	20 ° 52 ´45.16" N to 20 °54 ´51.12"N
6.	Longitude	70 ° 45 ´ 33.23" E to 70 ° 46 ´ 37.41" E
7.	SOI Toposheet No.	41 L/13 (Restricted)
8.	Location Map and Map showing Geographical Co-ordinates of the Mine Site have been given in map No-1 and 2, respectively	
D.	Environmental Settings Details of the Area (with approx. aerial distance & direction from the mining lease boundary)	
1.	Nearest Highway	SH-33 (20 to 50 m in West Direction) Nh-8E (~8.5 km in South direction) SH-98 (~7.5 km in North direction)
2.	Nearest Railway Station	Ghatwad (~2.0 km in NNW direction) Kodinar (~11.34 Km in SSW direction)
3.	Nearest Airport	Diu Airport (~ 25 km in SE direction).
4.	Nearest Habitation	Village Sugala (~0.5 km)
5.	National Park, Wild Life Sanctuaries, Biosphere Reserves, Wildlife corridors, Tiger/Elephant Reserves etc. within 10 km radius study area	Gir Protected Area (~6.25 km).
6.	Water Bodies within 10 km radius of the mine site	There is no perennial water body flowing through ML Area. One canal (Adjacenet to lease area in West direction) Sub Canal (Passing through the lease area) Nallah (Passing Through the lease area) Shingoda river (~250m to 500 m inWest direction) BhageshwarTalav(~8.0 km in East direction)
8.	Inter District Boundary	None
9.	Aravali Range	None
10.	Seismic Zone	Zone – III as per IS: 1893 (Part-I) : 2002

2.0. Location and Accessibility –

Sugala Limestone & Marl Mine of M/s. Ambuja Cements Ltd. is located near Sugala and Jagatiya Villages in Kodinar Block of Gir Somnath district, Gujarat. The location falls in Survey of India Topo-sheet No 41L/13 (scale1:50,000) and bounded by co-ordinates 20 ° 52 ´45.16" N to 20 °54 ´51.12"N latitudes and 70 ° 45 ´ 33.23" E to 70 ° 46 ´ 37.41" E longitudes. The lease area is accessible from Kodinar town. The nearest railway station is Gir Somnath Railway Station, which is about ~ 35 km away from the mine site in West direction. The nearest airport is Ahmedabad, which is about ~ 450 km from mine site. Post office, Hospital, Bank, Education and all market facilities are available in Kodinar town.

SUGALA Limestone Mines is utilizing state-of-art technology for excavation of limestone is carried out with Surface Miner. The conventional method of Drilling & Blasting and its associated hazards are totally avoided. Fuel efficient new generation Liebherr loaders are being used for loading. The material is then transported through in-house built system of auto-covering fitted dump trucks after loading to avoid spillage on roads. The water use is very less in mining activity.

No processing of limestone is carried out within the mining lease except identification of various qualities in different sections of the mines for the purpose of maintaining certain blend quality for cement manufacturing. However, crushing and screening is carried out in plant located in various locations. Mines supply mined limestone to the cement plants located at Ambujanagar within Gir-Somnath (erstwhile Junagadh) district.



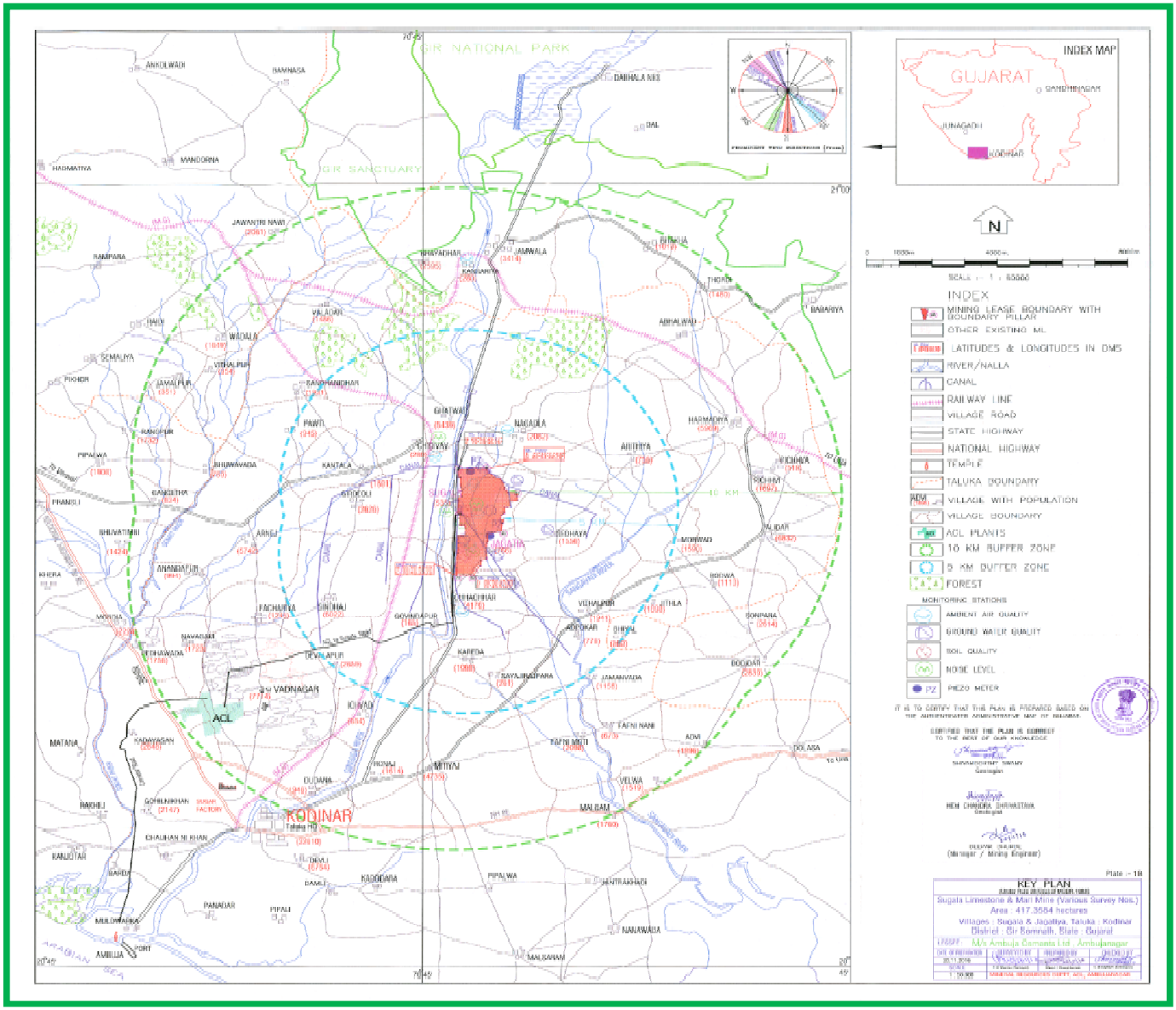


Fig 2: Location of Project area demarcating in Toposheet No. 41 L/1

Ground Water Level & Quality monitoring

It is being done regularly by establishing a network of ground water monitoring stations. Report is submitted to MoEF regional office Bhopal on six monthly basis. Ground water level & quality monitoring reports are enclosed as under :

TALUKA LABORATORY
Jalbhavan Tulshishyam Road, Una.
PIN-362560. Phone:02875-221570.
Email:- unalab555@gmail.com

GWSSB LABORATORIES

REPORT ON SHORT CHEMICAL EXAMINATION OF WATER

Name & Address
Head Environment
Ambuja Cement Ltd.Ambuja Nagar Kodinar
Kodinar

Sender's Ref. No. : ACL/EMD/F24/1046/2019
Ref. Date : 16-May-19
Sample Collected By : Sender

Sr. No.	Lab. Reference : CW No.	***	***	200	201	202	203	204
*	Date of Collection	Value as per IS 10500 : 2012		16-May-19	16-May-19	16-May-19	16-May-19	16-May-19
*	Date of Arrival at Laboratory	(Second Revision)		17-May-19	17-May-19	17-May-19	17-May-19	17-May-19
*	Source of Water Sample	Requirement [Acceptable Limit] MAX	* Permissible Limit in the absence of Alternate Source MAX	Private Well (2) Water Sample from Sugala Limestone Mines	Private Well (3) Water Sample from Sugala Limestone Mines	Private Well (5) Water Sample from Sugala Limestone Mines	Private Well (6) Water Sample from Sugala Limestone Mines	Private Well (7) Water Sample from Sugala Limestone Mines
*	Village	***	***	Sugala	Sugala	Sugala	Sugala	Sugala
*	Habitation	***	***	Sugala	Sugala	Sugala	Sugala	Sugala
*	Taluka	***	***	Kodinar	Kodinar	Kodinar	Kodinar	Kodinar
*	District	***	***	Gir-Somnath	Gir-Somnath	Gir-Somnath	Gir-Somnath	Gir-Somnath
1	Colour - Hazen Units	5	15	P Nil	P Nil	P Nil	P Nil	P Nil
2	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Turbidity - NTU	1	5	0.22	0.28	0.3	0.34	0.36
4	Dissolve Solids - mg/l	500	2000	310	366	440	394	328
5	Conductivity - µs/cm	.....	.....	484	572	688	616	513
5	pH	6.5 to 8.5	No Relaxation	7.92	8.08	7.68	7.84	7.80
6	Total Hardness (as $CaCO_3$) mg/l	200	600	140	180	200	140	180
7	Calcium (as Ca^{+2}) mg/l	75	200	28	36	40	28	36
8	Magnesium (as Mg^{+2}) mg/l	30	100	17	23	24	17	22
9	Chloride (as Cl^-) mg/l	250	1000	60	48	80	72	48
10	Sulphate (as SO_4^{-2}) mg/l	200	400	23	30	32	23	29
11	Nitrates (as NO_3^-) mg/l	45	No Relaxation	3.10	42.10	24.50	0.10	25.20
12	Fluoride (as F^-) mg/l	1.0	1.5	0.80	1.72	1.44	1.07	1.20
13	Alkalinity (as $CaCO_3$) mg/l	200	600	172	200	240	240	160
Opinion for Potability is given as per Analysed test parameter/s only.				FIT	UNFIT	FIT	FIT	FIT

Abbrivation : U.O. = Unobjectionable, Note : Excessive Turbidity, if any may be removed before use.

"Note:
* It is recommended that the acceptable limit is to be implemented. Values in excess of those mentioned under "acceptable" render the water not suitable, but still may be tolerated in the absence of an alternative source but up to the limits indicated under "permissible limit in the absence of alternate source" above which the sources will have to be rejected.

1. Test Report is issued for assessing Chemical Fitness as per the BIS 10500:2012 for the given Drinking Water Sample only.
2. This Report should not be taken as a basis to getting license from any Government authority.
3. Chemical Sample must be submitted within 72 hours to laboratory."

Outward No.: CAR /38../of 2019, Date 25 / 06 / 2019

Junior Scientific Assistant.

TALUKA LABORATORY
Jalbhavan Tulshishyam Road, Una.
PIN-362560. Phone:02875-221570.
Email:- unalab555@gmail.com

REPORT ON SHORT CHEMICAL EXAMINATION OF WATER

Name & Address
Head Environment
Ambuja Cement Ltd.Ambuja Nagar Kodinar
Kodinar

Sender's Ref. No. : ACL/EMD/F24/1046/2019
Ref. Date : 16-May-19
Sample Collected By : **Sender**

Sr. No.	Lab. Reference : CW No.	***	***	205	206	207	208	209
*	Date of Collection	Value as per IS 10500 : 2012		16-May-19	16-May-19	16-May-19	16-May-19	16-May-19
*	Date of Arrival at Laboratory	(Second Revision)		17-May-19	17-May-19	17-May-19	17-May-19	17-May-19
*	Source of Water Sample	Requirement [Acceptable Limit] MAX	* Permissible Limit in the absence of Alternate Source MAX	Private Well (9) Water Sample from Sugala Limestone Mines	Private Well (10) Water Sample from Sugala Limestone Mines	Private Well (11) Water Sample from Sugala Limestone Mines	Private Well (13) Water Sample from Sugala Limestone Mines	Piezometer - Bore 1 Sample from Sugala Limestone Mines
*	Village	***	***	Sugala	Sugala	Sugala	Sugala	Sugala
*	Habitation	***	***	Sugala	Sugala	Sugala	Sugala	Sugala
*	Taluka	***	***	Kodinar	Kodinar	Kodinar	Kodinar	Kodinar
*	District	***	***	Gir-Somnath	Gir-Somnath	Gir-Somnath	Gir-Somnath	Gir-Somnath
1	Colour - Hazen Units	5	15	P Nil	P Nil	P Nil	P Nil	P Nil
2	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Turbidity - NTU	1	5	0.38	0.16	0.24	0.22	0.26
4	Dissolve Solids - mg/l	500	2000	334	354	316	376	378
5	Conductivity - µs/cm	.....	.....	522	553	494	588	591
5	pH	6.5 to 8.5	No Relaxation	7.54	7.82	7.81	7.72	7.52
6	Total Hardness (as $CaCO_3$) mg/l	200	600	200	180	160	220	200
7	Calcium (as Ca^{+2}) mg/l	75	200	40	36	32	44	40
8	Magnesium (as Mg^{+2}) mg/l	30	100	24	22	19	27	24
9	Chloride (as Cl^-) mg/l	250	1000	40	60	40	48	40
10	Sulphate (as SO_4^{-2}) mg/l	200	400	32	29	26	36	32
11	Nitrates (as NO_3^-) mg/l	45	No Relaxation	0.20	27.70	7.10	25.80	3.00
12	Fluoride (as F^-) mg/l	1.0	1.5	0.60	1.18	1.22	0.56	0.23
13	Alkalinity (as $CaCO_3$) mg/l	200	600	220	184	200	180	260
Opinion for Potability is given as per Analysed test parameter/s only.				FIT	FIT	FIT	FIT	FIT

Abbrivation : U.O. = Unobjectionable, Note : Excessive Turbidity, if any may be removed before use.

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2. This Report should not be taken as a basis to getting license from any Government authority.
3. Chemical Sample must be submitted within 72 hours to laboratory."

Outward No.: CAR /138../of 2019, Date 25 / 06 / 2019

Junior Scientific Assistant.

Summary of CSR initiatives at Sugala Mines

Ambuja Cement Foundation (Unit: Ambujanagar, Kodinar, Gujarat)

Key Performance Indicators up to Sept. 2019

Details of Work/activities	Unit	Cummulative up to 2018-19	Achievements during 2019-20 (Sept. 19)	Cummulative up to 2019-20 (Sept. 19)
Water Resources Management and Drinking Water Projects				
a. Checkdam construction / Renovation	No	222	3	225
c. Well Recharging / Percolation well	No	1268	0	1268
d. Ponds Construction / Renovation	No	119	0	119
e. Link Channels / Canals construction	Km	67.29	0	67.29
f. Water Storage Tank / Farm Ponds	No	734	0	734
g. Total surface water harvested	MCM	38.24	0.49	38.73
Drinking Water Projects				
a. RRWHS Construction	No	3909	20	3929
b. Drinking water wells / Bore wells / Renovation of Saline Wells	No	119	0	119
c. Overhead / Cistern Tank construction/underground sump	No	25	0	25
d. Community Based Driniking Water Project	No	58	0	58
Soil and Water Conservation				
a. Area Treated (Gully Control / Gabion / loose boulder structure / weir crates / Khadine	Ha	11876	0	11876

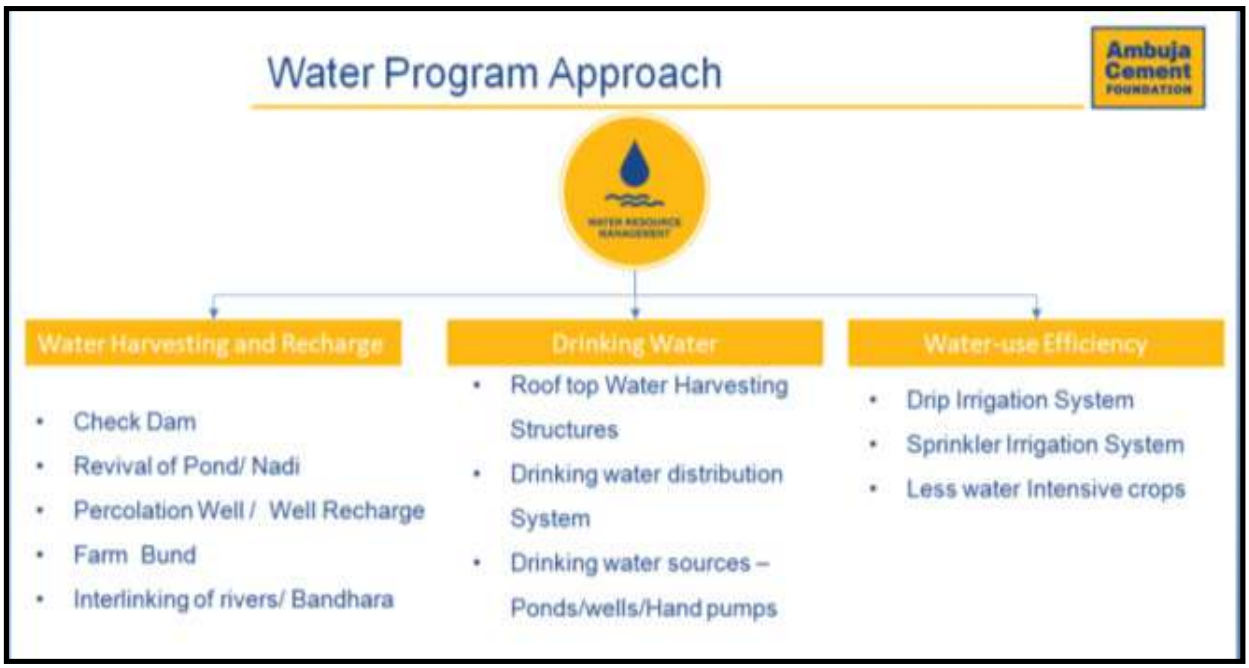
Health and sanitation Programme				
a. No of camps organised (include all general and speciality health camps)	No	334	10	344
Patients benefited	No	58669	1915	60584
b. Villages benefited under mobile & weekly dispensary	No	22	0	22
Patients treated	No	350102	0	350102
c. Sakhis (Village Health Functionaries)	No	19	0	19
d. Villages covered by *Sakhis* / Patients treated by *Sakhis*	No	14	0	14
No of Patients treaded		32828	1324	34152
e. Khelwadi sessions conducted by *Sakhis*	No	3611	0	3611
f. Health intervention trainings done (include trainings of Sakhis / Govt. health fucntioneries)	No	36	7	43
Participants in trainings	No	1089	197	1286
g. Construction of Toilet Blocks / Sulabh Sauchalaya / Soak Pits	No	10900	123	11023
h. Villages where Total Sanitation Campaign initiated	No	208	13	221
i. No of Village Health Sanitation Committees activated	No	73	0	73
HIV/AIDS Awareness Programme (Community)				
h. No of people benefited	No	138828	0	138828
Workplace Programme				
a. Awareness session for Staff / Families / contract staff / laboures / Truckers / Students / Rural community	No	10818	0	10818
b. Master Trainers / peer educators		64	0	64
Skill and Entrepreneurship Development Programme - Ambujanagar & Rajula				
a. No of institute	No	2	0	2
b. No of batches / courses	No	221	25	246
c. Entrepreneurs trained under SEDI / ITI	No	4348	476	4824
d. No of trainees placed	No	3554	309	3863
e. No of trainees persuing (Continuation)			601	601
Women and Youth Development				
a. No of SHG formed	No	600	40	640
No of members	No	7413	437	7850
b. Training & Exposure (women)	No	1058	62	1120
No of participants	No	35888	1822	37710
c. Training & Exposure (Youth)		81	0	81
No of participants	No	4823	0	4823
d. No of Federations Formed	No	1	0	1

Rural Infrastructure Development Programme				
a. Construction of Common Pathways / Village Roads	No / Mtrs	81387.4	1670	83057.4
b. Street Light installation	No	97	130	227
c. Drainage construction	Mtrs	1075	0	1075
d. Crematorium / Ghats construction/ Drinking water facilities	No	31	0	31
e. Community Centre construction / School classroom	No	119	5	124
f. Support for Social and Cultural Events	No	300	8	308
g. House repairing	No	0	0	0
h. Construction of culverts / bridge	No	9	2	11
j.Construction of new School / school repairing	No	3	0	3
k. No of villages covered	No	69	0	69
l.const.of compoundwall for common area	Rmt	920	140	1060
Gir Forest Conservation project				
a. Construction of Parapet wall around wells to protect wild animals	No	1702	0	1702
Krishi Vigyan Kendra - Kodinar				
a. No of villages covered	No	310	0	310
b. No of farmers trained	No	120974	2607	123581
c. No of technology transferred (FLD)	No	229	19	248
d. No of technology tested (OFT)	No	83	5	88
Over all coverage				
a.No of villages	No	409	101	510
a.Approx No of People benefited	No	875088	167907	1042995
KVY III programmes				
a. IPM,INM&IDM practice adopted	Acre	67757	0	67757
b.Soil testing	Farmers	3389	0	3389
c.Village information centre	Villages	36	0	36
d. SMS base agri. information system 3 SMS/month	Farmers	31645	0	31645
Community safety awarness programmes				
Community Safety	No	826	51	877
Total participant in community safety	No	22365	3232	25597

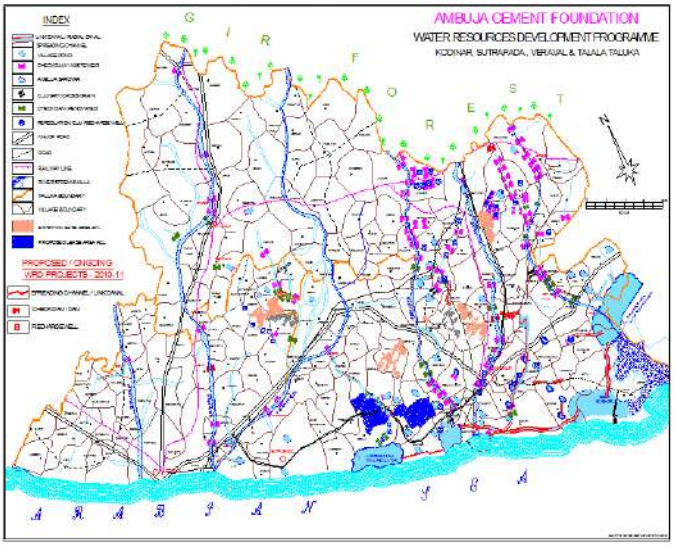
Water Resource Management

We have done several measures under water resource management through our Ambuja Cement Foundation; which has help to improve the water regime of the area. This has increased water level of all the nearby wells in and around mining lease. In case of depletion of water in the wells of nearby villages, we will supply water on free of cost basis

5



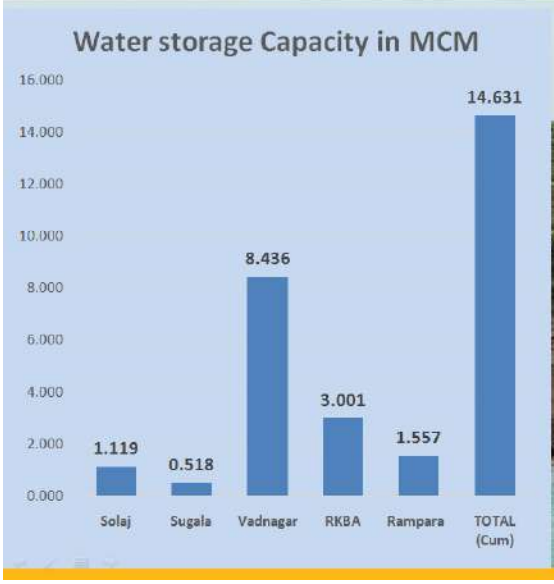
Water Resources Development



Activity	No.
• Construction of Check dam	222
• Well Recharging / Percolation Well	1268
• Percolation Tank/Village Ponds	119
• Interlinking Project	67 KM
• RRWHS	3909
• Drinking water wells	119
• Surface water storage created	38.34 MCM

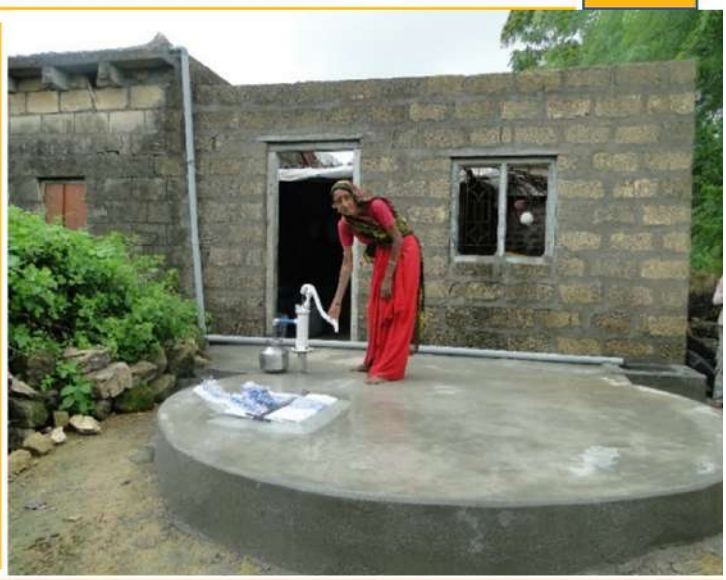
6

Innovation: Rehabilitation of Mined out pits



Ensured Safe Drinking Water

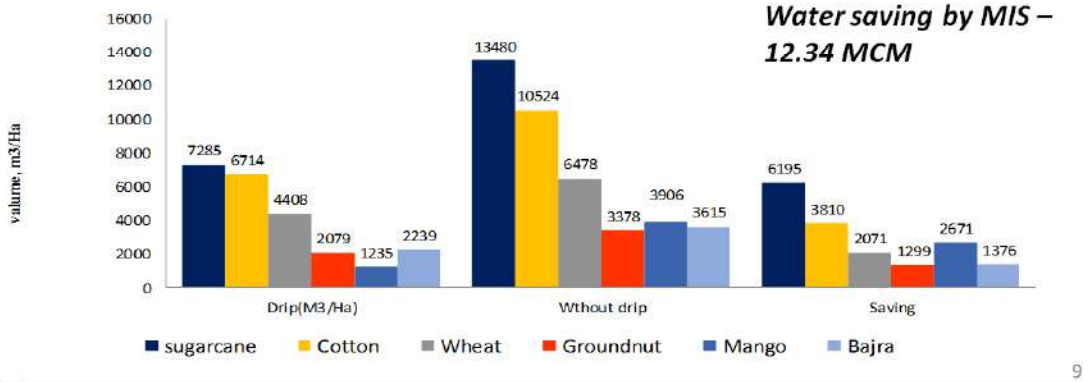
- Drinking water distribution schemes in 59 coastal villages covered 17446 HHs
- 13 core villages all households has covered under DW facility
- Roof Top Rain Water Harvesting Structures – 3909 HHs
- Renovation of Well/ Installation of hand pump- -115 nos
- Developed drinking DW Quality test system



Efficient Use of Water in Agriculture

ACF's efforts are not limited to Ground water recharges

Under GGRC, GoG, promotes Drip & Sprinkler Irrigation- covered 11849 acres crops



9

Drip Irrigation -

Impact study conducted by Institute of Financial Management and Research

Ambuja Cement FOUNDATION

- Water saving due to drip irrigation : 30-49%
- Increased Agriculture produces :
- Reduce Fertilizer consumption :
- Reduce man-hours for irrigation :
- Reduce Consumption of electricity: 40%
- Change in Cropping pattern :
- Improve quality of Produces : 75% farmers
- Financial saving used for : Education-50%, Farm equipment-35%, Health & other-15%
- Increased crop diversity by introduce new crops –fruits, vegetables

10

Received First National Water Mission Award 2019 from Ministry of Water Resources, Govt. of India

3. Compliance of the conditions of NOC -

In response to the our application, NOC was granted by Central Ground Water Authority, Ministry of Water Resources, Government of India, New Delhi vide NOC No:-CGWA/NOC/MIN/ORIG/2018/3015 dtd.31.01.2018 for withdrawal of ground water 7628 m^3/day for 300 days (not exceeding 27,84,220 cu.m/year) through proposed nine (9) tube wells for dewatering only on account of mining intersecting the water table.

Copy of Ground Water Withdrawal NOC of Sugala Limestone Mines

MEMBER SECRETARY

केन्द्रीय भूमि जल प्राधिकरण
जल संसाधन, नदी विकास एवं
गंगा संरक्षण मंत्रालय
भारत सरकार
Central Ground Water Authority
Ministry of Water Resources
River Development & Ganga Rejuvenation
Government of India

File No: - 21-4/1599/GJ/MIN/2016 - 175

NOC No: - CGWA/NOC/MIN/ORIG/2018/3015

Date:- 31 JAN 2018

To
M/s Ambuja Cements Limited
PO Ambujanagar
Taluka Kodinar, District Gir Somnath,
Gujarat - 362715

Sub: - NOC for ground water withdrawal to M/s Ambuja Cements Limited in respect of their proposed Limestone Mine project located at Village Sugala And Jagatiya, Taluka Kodinar, District Gir Somnath, Gujarat – reg.

Refer to your application on the above cited subject. Based on recommendations of Regional Director, Central Ground Water Board, West Central Region, Ahmedabad vide their recommendations dated 19/05/2017 and further deliberations on the subject, the NOC of Central Ground Water Authority is hereby accorded to **M/s Ambuja Cements Limited in respect of their proposed Limestone Mine project located at Village Sugala And Jagatiya, Taluka Kodinar, District Gir Somnath, Gujarat.** The NOC is, however subject to the following conditions:-

1. The firm may abstract **7,628 cu.m/day** for 300 days (not exceeding **27,84,220 cu.m/year**) through proposed nine (9) tube wells for dewatering only on account of mining intersecting the water table. Remaining dewatering structures shall be made non- operational. No additional dewatering structures shall be constructed for this purpose without prior approval of the CGWA. The dewatered quantum of ground water shall be put to gainful use as proposed.
2. All the wells shall be fitted with water meter by the firm at its own cost and monitoring of ground water abstraction shall be undertaken accordingly on regular basis, at least once in a month.
3. **M/s Sugala Limestone Mines,** in consultation with the Regional Director, Central Ground Water Board, West Central Region, Ahmedabad shall implement ground water recharge measures to the tune of **13,72,885 cu.m/year** as proposed, for augmenting the ground water resource of the area. Firm shall report compliance within six months from the date of issue of this letter. Firm shall also undertake periodic maintenance of recharge structures at its own cost.
4. The photographs of the recharge structures after completion of the same shall be furnished immediately to the Regional Director, Central Ground Water Board, West Central Region, Ahmedabad for verification and under intimation to this office.
5. The firm at its own cost shall install five (5) observation wells fitted with automatic water level recorder having telemetry system at suitable locations for regular ground

West Block - 2, Wing - 3, Sector - 1, R.K. Puram, New Delhi - 110066
Tel : 011-26175362, 26175373, 26175379 Fax : 011-26175369
Website : www.cgwb.gov.in, www.mowr.gov.in

water level monitoring in consultation with the Central Ground Water Board, West Central Region, Ahmedabad. The firm shall share user ID and password with the Regional Director, Central Ground Water Board, West Central Region, Ahmedabad. In addition, monitoring of key wells for both core and buffer zones shall be carried out to check the impact on ground water levels due to mine dewatering.

6. The ground water quality shall be monitored twice in a year during pre- monsoon and post- monsoon periods.
7. The ground water monitoring data in respect of S. No. 2, 5 & 6 to be submitted to Central Ground Water Board, West Central Region, Ahmedabad on regular basis at least once in a year.
8. The firm shall ensure proper recycling and reuse of waste water after adequate treatment.
9. Action taken report in respect of S. No. 1 to 8 may be submitted to CGWA within one year period.
10. The permission is liable to be cancelled in case of non-compliance of any of the conditions as mentioned in S. No. 1 to 9.
11. The firm shall report self compliance online in the website (www.cgwa-noc.gov.in) within one year from the date of issue of this NOC.
12. This NOC is subject to prevailing Central/State Government rules/laws or Court orders related to construction of tubewell/ ground water withdrawal/ construction of recharge or conservation structures/ discharge of effluents or any such matter as applicable.
13. This NOC does not absolve the applicant / proponent of his obligation / requirement to obtain other statutory and administrative clearances from other statutory and administrative authorities.
14. This NOC does not imply that other statutory / administrative clearances shall be granted to the project by the concerned authorities. Such authorities would consider the project on merits and be taking decisions independently of the NOC.
15. This NOC is valid from 01/01/2018 till 31/12/2019.

Member Secretary

Copy to:

1. The Member Secretary, Gujarat Pollution Control Board Paryavaran Bhavan, Sector 10 A, Gandhinagar 382010, Gujarat **with a request to ensure that the conditions mentioned in the NOC are complied by the firm in consultation with the District Collector, District Gir Somnath, Gujarat.**
2. The District Collector, District Gir Somnath, Gujarat for necessary action.
3. The Regional Director, Central Ground Water Board, West Central Region, Ahmedabad. This has reference to your recommendation dated 19/05/2017.
4. TS to the Chairman, Central Ground Water Authority, Shram Shakti Bhawan, Rafi Marg, New Delhi.
5. Guard File 2017-18.

Member Secretary

The following conditions were stipulated in the NOC ;

1. The firm may abstract 7,628 cu.m/day for 300 days (not exceeding 27,84,220 cu.m/year) through proposed nine (9) tube wells for dewatering only on account of mining intersecting the water table. Remaining dewatering structures shall be made non-operational. No additional dewatering structures shall be constructed for this purpose without prior approval of the CGWA. The dewatered quantum of ground water shall be put to gainful use as proposed.

Compliance - From the start of mine it is our practice to mine upto pre-monsoon period only on dry surface area as our mining equipment surface minors can work on dry surface only and don't work under submerged area. As we are mining on the available dry surfaces only thus due to our mining activity ground water table was never intersected thus no tube well required till date for dewatering.

In case mining is going to intersect water table; we will install tube wells in advance as approved in the NoC to dewater ground water. We assure you that no additional dewatering structures shall be constructed without prior approval of the CGWA. The dewatered quantum of ground water shall be put to gainful use as proposed.

We would like to draw your kind notice that rain water is storing in the working pits and we are totally not able to mine during rain due to operational constraint of surface minor to work only in dry surfaces.

After rain our mining is limited to dry surface only; we need to dewater the stored rain water from mine pit to continue mining by installing appropriate / required capacity pumps.

2. All the wells shall be fitted with water meter by the firm at its own cost and monitoring of ground water abstraction shall be undertaken accordingly on regular basis, at least once in a month.

Compliance – *In case mining is going to intersect water table; we will install tube wells in advance as approved in the NoC to dewater ground water which will be equipped with water meters to monitor the abstracted amount of ground water. Presently there is no lifting of any water nor disturbing water regime.*

3. M/S Sugala Limestone Mines, in consultation with the Regional Director, Central Ground Water Board, West Central Region, Ahmedabad shall implement ground water recharge measures to the tune of 13,72,885 cu.m/year as proposed, for augmenting the ground water resource of the area. Firm shall report compliance within six months from the date of issue of this letter. Firm shall also undertake periodic maintenance of recharge structures at its own cost.

Compliance*- The proposed recharge measures as suggested in our hydro geological report are already been completed. Our CSR implementation wing Ambuja Cement Foundation (ACF) is dedicated for working on ground water upliftment by constructing recharge dams, check dams, deepening of nallah and we also using mined out pits for storage of rain water. We are maintaining recharge structures of our core zone on regular basis. We had communicated the compliance status to CGWB, Ahmedabad and CGWA, New Delhi vide our letter No. ACL/EMD/F-9/2019/992/84918 dtd. 4th*

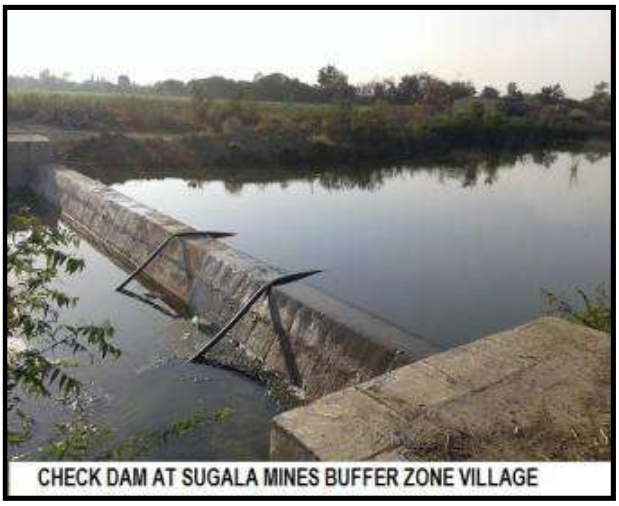
February 2019 and ACL/EMD/F-9/2019/993/84937 dtd. 8th February 2019. Copy is enclosed as Annexure-A.

Table 2: Detailed computation of ground water recharge structures made is as below:

Sr No.	Type of rain water harvesting structure	Recharge potential (m3 / year)
1	Roof top rain water harvesting	85479
2	Water trenches	89490
3	Water pond near Sugala & Jagatiya Village	929836
4	Check dam at various Village, desilting and maintenance of same every year	666971
	Total	**1771776**

4. Check Dams –

CHECK DAM CONSTRUCTED AT JAGATIYA FOR WATER CONSERVATION



CHECK DAM AT SUGALA MINES BUFFER ZONE VILLAGE

Photographs of Water supply of surrounding villages -

Water supply pipe line for Utilization of mine water for agricultural uses in nearby villages

FARMING DONE WITH DRIP IRRIGATION METHOD AT JAGATIYA VILLAGE

DRIP INSTALLATION WORK AT FARM

4 The photographs of the recharge structures after completion of the same shall be furnished immediately to the Regional Director, Central Ground Water Board, West Central Region, Ahmedabad for verification and under intimation to this office.

Compliance - The proposed recharge measures as suggested in our hydrogeological report are already been completed. Our CSR implementation wing Ambuja Cement Foundation (ACF) is dedicated for working on ground water upliftment by constructing recharge dams, check dams, deepening of nallah and we also using mined out pits for storage of rain water. Photographs of recharge structures are attached herewith as Annexure-B.

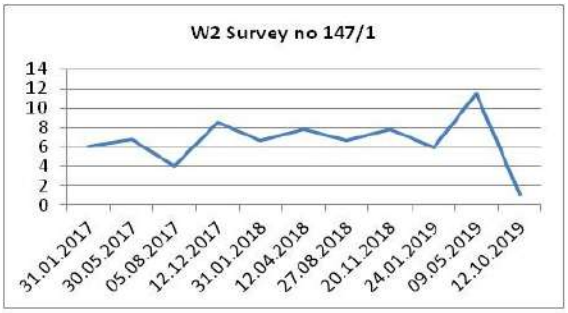
5. The firm at its own cost shall install five (5) observation well fitted with automatic water level recorder having telemetry system at suitable locations for regular ground water level monitoring in consultation with the Central Ground Water Board, West Central Region, Ahmedabad. The firm shall share user ID and password with the Regional Director, Central Ground Water Board, West Central Region, Ahmedabad. In addition, monitoring of key wells for both core and buffer zones shall be carried out to check the impact on ground water levels due to mine dewatering.

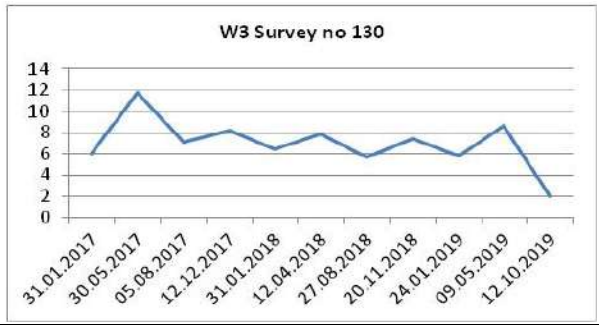
Compliance - We have installed 02 Nos. telemetry type piezometers. As per CGWA, New Delhi circular No. CGWA 25-23/CGWA/NOCAP/2018 Dated 01.02.2019, on the uniformity of the installation of Piezometer at different sites. As per this guideline we comes under the category of greater than 500 cum/day ground water withdrawal & installation of 2 no's of Piezometer is applicable to us. Photographs and piezometer water level data is given in Annexure-C.

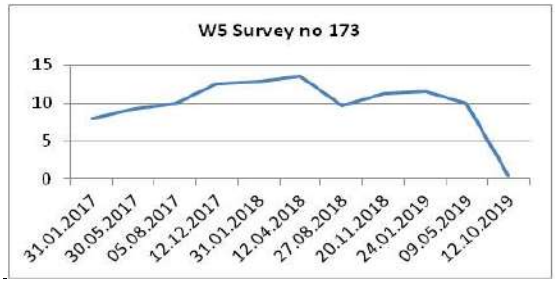
A network of 12 nos of water level monitoring wells has been established in core and buffer zone area and water levels are being monitored on quarterly basis. Last two years data is given below.

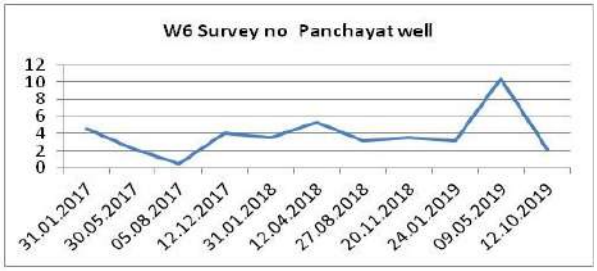
Ground water levels of Sugala Mines area

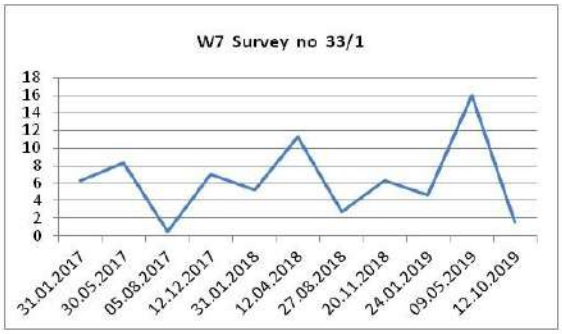
Date of water level measurment	Well Water Level (in meter)									Piezometers Water Level (in meter)	
	W2 Survey no 147/1	W3 Survey no 130	W5 Survey no 173	W6 Survey no Panchayat well	W7 Survey no 33/1	W9 Survey no 30	W10 Survey no 181	W11 Survey no 03	W13 Survey no 102	PIEZO NO-1	PIEZO NO-2
31.01.2017	6	6	8	4.5	6.3	8	4.5	3.5	5	2.7	3
30.05.2017	6.8	11.7	9.2	2.3	8.3	12	4.9	2.8	11.2	2.4	3
05.08.2017	4	7.1	10	0.5	0.5	5	0.5	3	5.1	2.1	2.5
12.12.2017	8.6	8.2	12.6	4	7	11	9.2	3.5	7	3.5	4
31.01.2018	6.6	6.4	12.8	3.6	5.2	8.6	3.1	2	6.9	2.1	3.1
12.04.2018	7.8	7.9	13.5	5.3	11.2	12.7	7.7	7.8	9.8	3.9	3.7
27.08.2018	6.6	5.7	9.7	3.2	2.8	6.2	1.7	2.7	3.7	2.1	2.7
20.11.2018	7.8	7.4	11.3	3.6	6.3	9.9	8.3	3.2	6.3	2.8	3.6
24.01.2019	5.9	5.8	11.5	3.2	4.7	7.7	2.8	1.8	6.2	2.6	2.8
09.05.2019	11.5	8.6	9.9	10.4	16	8.2	7.5	4.5	11.7	3.9	4.2
12.10.2019	1.1	2	0.5	2.1	1.6	1.9	2.2	0.9	2.5	0.4	0.5

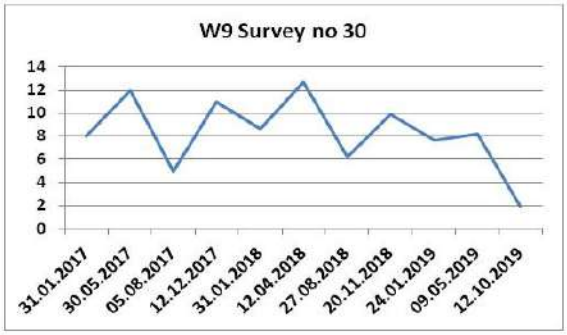

W2 Survey no 147/1
14
12
10
8
6
4
2
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019

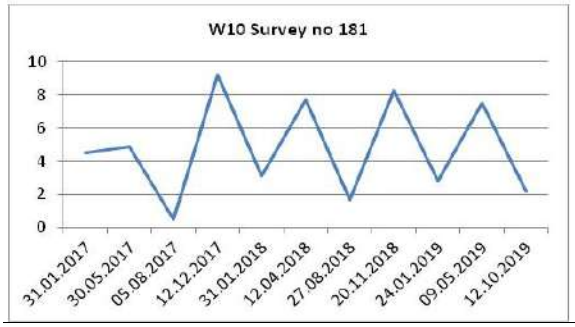

W3 Survey no 130
14
12
10
8
6
4
2
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019

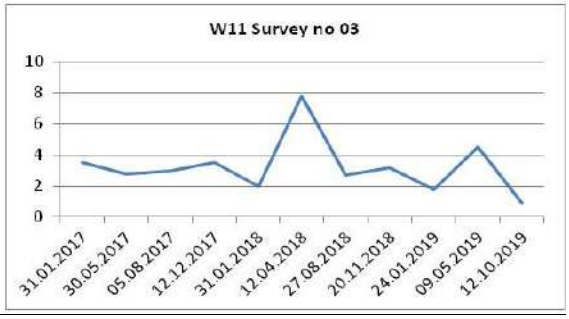

W5 Survey no 173
15
10
5
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019

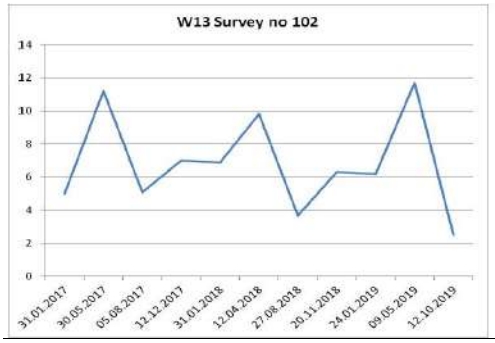

W6 Survey no Panchayat well
12
10
8
6
4
2
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019

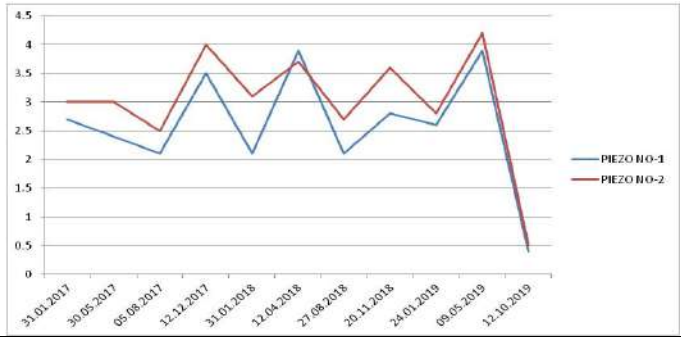

W7 Survey no 33/1
18
16
14
12
10
8
6
4
2
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019


W9 Survey no 30
14
12
10
8
6
4
2
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019

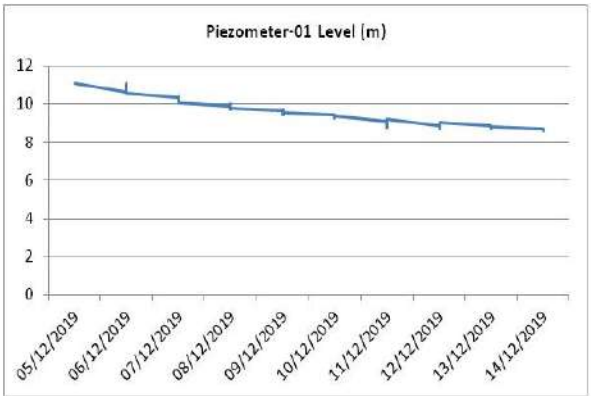

W10 Survey no 181
10
8
6
4
2
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019

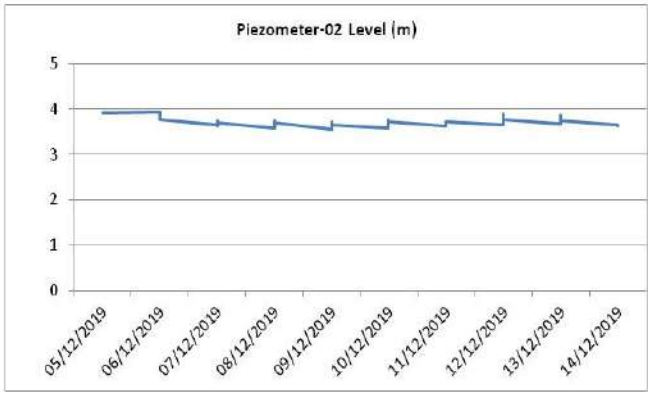

W11 Survey no 03
10
8
6
4
2
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019


W13 Survey no 102
14
12
10
8
6
4
2
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019


4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
31.01.2017
30.05.2017
05.08.2017
12.12.2017
31.01.2018
12.04.2018
27.08.2018
20.11.2018
24.01.2019
09.05.2019
12.10.2019
PIEZO NO-1
PIEZO NO-2

DWLR Telemetry Piezometer Data					
PIEZOMETER LOCATION -1			PIEZOMETER LOCATION - 2		
Date	Time	Height(m)	Date	Time	Height(m)
05-12-2019	16:20	11.99	05-12-2019	17:46	3.77
05-12-2019	16:22	10.86	05-12-2019	18:02	3.91
05-12-2019	16:24	11.36	06-12-2019	11:13	3.93
05-12-2019	16:26	11.51	06-12-2019	12:00	3.8
05-12-2019	18:00	11.05	06-12-2019	18:00	3.78
06-12-2019	00:00	10.61	07-12-2019	00:00	3.65
06-12-2019	12:00	11.09	07-12-2019	06:00	3.63
06-12-2019	18:00	10.54	07-12-2019	12:00	3.75
07-12-2019	00:00	10.31	07-12-2019	18:00	3.71
07-12-2019	06:00	10.17	08-12-2019	00:00	3.58
07-12-2019	12:00	10.41	08-12-2019	06:00	3.57
07-12-2019	18:00	10.04	08-12-2019	12:00	3.74
08-12-2019	00:00	9.87	08-12-2019	18:00	3.71
08-12-2019	06:00	9.69	09-12-2019	00:00	3.56
08-12-2019	12:00	9.97	09-12-2019	06:00	3.55
08-12-2019	18:00	9.79	09-12-2019	12:00	3.73
09-12-2019	00:00	9.63	09-12-2019	18:00	3.64
09-12-2019	06:00	9.43	10-12-2019	00:00	3.59
09-12-2019	12:00	9.72	10-12-2019	06:00	3.57
09-12-2019	18:00	9.56	10-12-2019	12:00	3.78
10-12-2019	00:00	9.4	10-12-2019	18:00	3.72
10-12-2019	06:00	9.24	11-12-2019	00:00	3.62
10-12-2019	12:00	9.39	11-12-2019	06:00	3.62
10-12-2019	18:00	9.35	11-12-2019	12:00	3.66
11-12-2019	00:00	9.09	11-12-2019	18:00	3.73
11-12-2019	06:00	8.77	12-12-2019	00:00	3.64
11-12-2019	12:00	9.14	12-12-2019	06:00	3.64
11-12-2019	18:00	9.17	12-12-2019	12:00	3.89
12-12-2019	00:00	8.84	12-12-2019	18:00	3.78
12-12-2019	06:00	8.7	13-12-2019	00:00	3.67
12-12-2019	12:00	8.99	13-12-2019	06:00	3.67
12-12-2019	18:00	9.01	13-12-2019	12:00	3.87
13-12-2019	00:00	8.87	13-12-2019	18:00	3.75
13-12-2019	06:00	8.68	14-12-2019	00:00	3.65
13-12-2019	12:00	8.85	14-12-2019	06:00	3.62





6. The ground water quality shall be monitored twice in a year during pre-monsoon and post-monsoon periods.

Compliance - Agreed and being complied.
As per EC condition we are monitoring ground water quality & water level in 04 seasons which covers Pre-monsoon and Post-monsoon periods. We have regularly monitoring ground water level and quality is being regularly submitted to the Central Ground water Board, Ahmedabad. Year 2018 Ground Water level and quality monitoring report is submitted to CGWA, Ahmedabad vide our office letter No. ACL/EMD/F-09/2019/1003/85080 dtd. 4th March 2019 and details same below.

7. The ground water monitoring data in respect of S. No. 2, 5 & 6 to be submitted to Central Ground Water Board, West Central Region, Ahmedabad on regular basis at least once in a year.

Compliance - We are submitting the ground water quality and water level monitoring data on once in a year basis to CGWB, Ahmedabad and CGWA, Gandhinagar. Year 2018 Ground Water level and quality monitoring report is submitted vide letter No. ACL/EMD/F-09/2019/1003/85080 dtd. 4th March 2019. Copy is enclosed as Annexure-D.

8. The firm shall ensure proper recycling and reuse of waste water after adequate treatment.

Compliance - Agreed and being complied.
No waste water is generated due to our mining activity. However we have installed oil & grease separator to extract oil from wastewater generated from HEMM cleaning activity. The water collected thus is being utilised for dust suppression on haul road.

9. Action taken report in respect to S. No. 1 to 8 may be submitted to CGWA within one year period.

Compliance – Agreed and being complied.
We have submitted the compliance status to CGWB, Ahmedabad and CGWA, New Delhi vide our letter No. ACL/EMD/F-9/2019/992/84918 dtd. 4th February 2019 and ACL/EMD/F-9/2019/993/84937 dtd. 8th February 2019.

o/c

Ambuja Cement

ACL/EMD/F- 9/2019/992/84918

February 4, 2019

Regional Director,
Central Ground Water Board,
West Central Region, Swami Narayan Building,
Shah Alam Tolnaka,Ahmedabad (Gujarat)-PIN- 380022

Subject : Regarding Submission of the Compliance Status of the NOC for Ground water withdrawal to M/s Ambuja Cements Limited in respect of their proposed Limestone Mine Project located at Village Sugala & Jagatiya , Taluka Kodinar, District Gir-Somnath, Gujarat.

Dear Sir,

This is with reference to NOC granted by your good office vide letter No-21-4/1599/GJ/MIN/2016-175 & NOC No. CGWA/NOC/MIN/ORIG/2018/3015 dated 31 Jan 2018 to our Sugala Limestone Mining Project of M/s Ambuja Cements Limited ,located at Village Sugala & Jagatiya , Taluka Kodinar, District Gir-Somnath, Gujarat.
We are pleased to submit the point wise compliance of the conditions mentioned in the NOC as attached.

We would be pleased to submit further information, if required.

Thanking You,

Yours faithfully,

For **Ambuja Cements Limited**

S. Ramarao
Unit Head

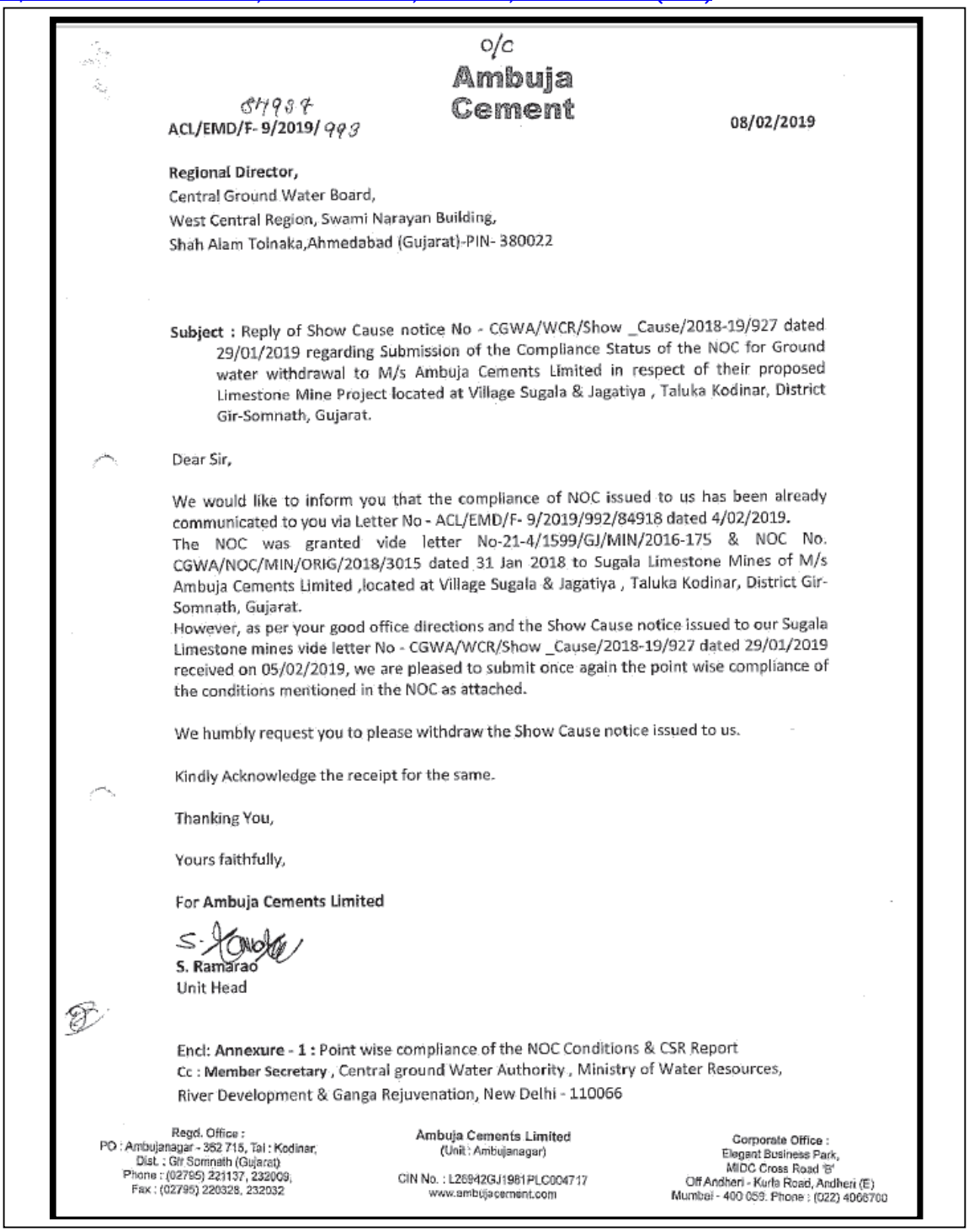
Encl: **Annexure - 1** : Point wise compliance of the NOC Conditions. & CSR Report

Cc : **The Member Secretary,** Central Ground Water Authority, Ministry of Water Resources, River Development & Ganga Rejuvenation, New Delhi - 110066

Regd. Office :
PO : Ambujanagar - 362 715, Tal : Kodinar,
Dist. : Gir Somnath (Gujarat)
Phone : (02795) 221137, 232009,
Fax : (02795) 220328, 232032

Ambuja Cements Limited
(Unit : Ambujanagar)
CIN No. : L26942GJ1981PLC004717
www.ambujacement.com

Corporate Office :
Elegant Business Park,
MIDC Cross Road 'B'
Off Andheri - Kurla Road, Andheri (E)
Mumbai - 400 059. Phone : (022) 4066700



o/c

Ambuja Cement

ACL/EMD/F- 9/2019/993

08/02/2019

Regional Director,
Central Ground Water Board,
West Central Region, Swami Narayan Building,
Shah Alam Tolnaka,Ahmedabad (Gujarat)-PIN- 380022

Subject : Reply of Show Cause notice No - CGWA/WCR/Show _Cause/2018-19/927 dated 29/01/2019 regarding Submission of the Compliance Status of the NOC for Ground water withdrawal to M/s Ambuja Cements Limited in respect of their proposed Limestone Mine Project located at Village Sugala & Jagatiya , Taluka Kodinar, District Gir-Somnath, Gujarat.

Dear Sir,

We would like to inform you that the compliance of NOC issued to us has been already communicated to you via Letter No - ACL/EMD/F- 9/2019/992/84918 dated 4/02/2019.
The NOC was granted vide letter No-21-4/1599/GJ/MIN/2016-175 & NOC No. CGWA/NOC/MIN/ORIG/2018/3015 dated 31 Jan 2018 to Sugala Limestone Mines of M/s Ambuja Cements Limited ,located at Village Sugala & Jagatiya , Taluka Kodinar, District Gir-Somnath, Gujarat.
However, as per your good office directions and the Show Cause notice issued to our Sugala Limestone mines vide letter No - CGWA/WCR/Show _Cause/2018-19/927 dated 29/01/2019 received on 05/02/2019, we are pleased to submit once again the point wise compliance of the conditions mentioned in the NOC as attached.

We humbly request you to please withdraw the Show Cause notice issued to us.

Kindly Acknowledge the receipt for the same.

Thanking You,

Yours faithfully,

For **Ambuja Cements Limited**

S. Ramarao
Unit Head

Encl: **Annexure - 1 :** Point wise compliance of the NOC Conditions & CSR Report
Cc : **Member Secretary** , Central ground Water Authority , Ministry of Water Resources, River Development & Ganga Rejuvenation, New Delhi - 110066

Regd. Office :
PO : Ambujanagar - 362 715, Tal : Kodinar,
Dist. : Gir Somnath (Gujarat)
Phone : (02795) 221137, 232009,
Fax : (02795) 220328, 232032

Ambuja Cements Limited
(Unit : Ambujanagar)
CIN No. : L26942GJ1981PLC004717
www.ambujacement.com

Corporate Office :
Elegant Business Park,
MIDC Cross Road 'B'
Off Andheri - Kurla Road, Andheri (E)
Mumbai - 400 059. Phone : (022) 4066700

10. The permission is liable to be cancelled in case of non-compliance of any of the above conditions as mentioned in S. No. 1 to 9

Compliance – Point noted and agreed.

11. The firm shall report self compliance online in the website (www.cgwa-noc.gov.in) within one year from the date of issue of this NOC.

Compliance - Agreed and being complied.
We tried to upload the compliance report on the website (www.cgwa-noc.gov.in) but couldn't completed due to some technical issue. We have submitted the compliance status to CGWB, Ahmedabad and CGWA, New Delhi vide our letter No. ACL/EMD/F-9/2019/992/84918 dtd. 4th February 2019 and ACL/EMD/F-9/2019/993/84937 dtd. 8th February 2019 to CGWB, Ahmedabad and CGWA, New Delhi. We are herewith submitting the same again and request to arrange to upload on the website (www.cgwa-noc.gov.in). Refer copy enclosed as Annexure-A.

12. This NOC is subjected to prevailing Central/State Government rules/laws or Court orders related to construction of tubewell/ground water withdrawal/construction of recharge or conservation structures/discharge of effluents or ant such matter as applicable.

Compliance - Pointed noted and agreed please.

13. This NOC does not absolve the applicant / proponent of his obligation / requirement to obtain other statutory and administrative clearances from other statutory and administrative authorities.

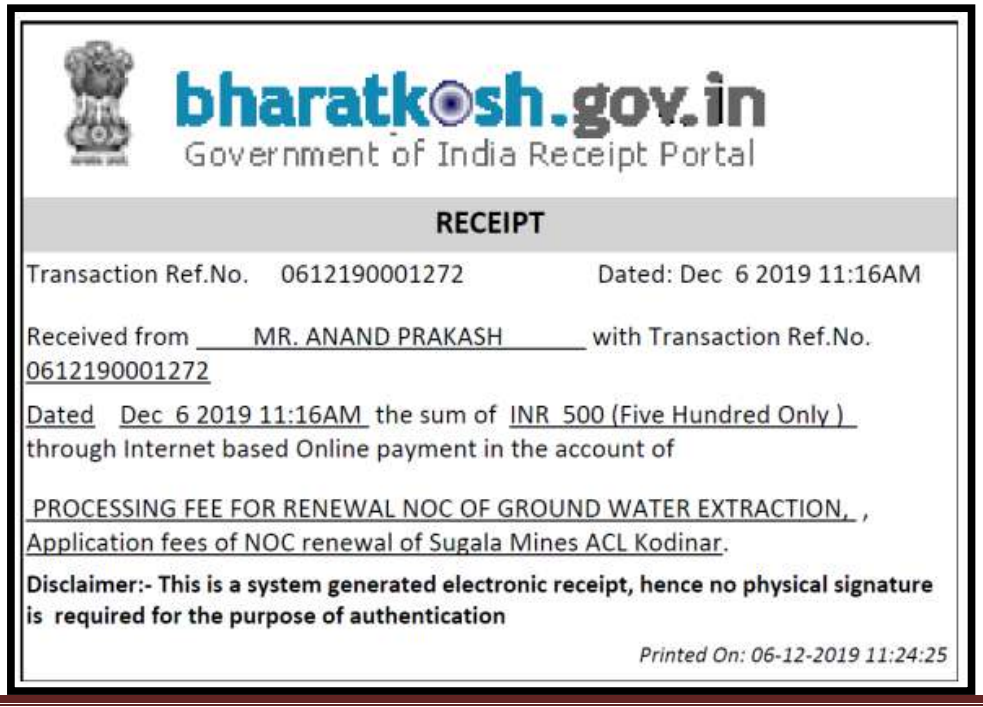
Compliance - Pointed noted and agreed please.

14. The NOC does not imply that the other statutory / administrative clearances shall be granted to the project by the concerned authorities. Such authorities would consider the project on merits and be taking decisions independently of the NOC.

Compliance - Pointed noted and agreed please.

15. This NOC is valid from 01/01/2018 till 31/12/2019.

Compliance - Pointed noted and agreed please Renewal application processes has been started and the fees for renewal .



bharatkosh.gov.in
Government of India Receipt Portal

RECEIPT

Transaction Ref.No. 0612190001272 Dated: Dec 6 2019 11:16AM

Received from MR. ANAND PRAKASH with Transaction Ref.No. 0612190001272

Dated Dec 6 2019 11:16AM the sum of INR 500 (Five Hundred Only) through Internet based Online payment in the account of

PROCESSING FEE FOR RENEWAL NOC OF GROUND WATER EXTRACTION, , Application fees of NOC renewal of Sugala Mines ACL Kodinar.

Disclaimer:- This is a system generated electronic receipt, hence no physical signature is required for the purpose of authentication

Printed On: 06-12-2019 11:24:25

Manual Water Level monitoring is being done on Regular basis at 12 Locations In & Around Sugala limestone Mines Area as per NOC. Some of the Locations with LAT. LONG. are as below:

Latitude: 20.882964
Longitude: 70.761455
Elevation: 47.13m
Accuracy: 6.0m
Time: 15-12-2019 11:36
Note: Sugala QW - 3

Latitude: 20.884509
Longitude: 70.760974
Elevation: 45.36m
Accuracy: 6.0m
Time: 15-12-2019 11:30
Note: Sugala QW - 2
Powered by NoteCam

Latitude: 20.886481
Longitude: 70.775515
Elevation: 45.54m
Accuracy: 4.0m
Time: 15-12-2019 10:18
Note: Sugala QW - 11
Powered by NoteCam

Latitude: 20.902811
Longitude: 70.759172
Elevation: 48.27m
Accuracy: 8.0m
Time: 15-12-2019 11:16
Note: Sugala QW - 4
Powered by NoteCam

As per the Latest Notification by CGWA Dated 01/02/2019, We have also Installed TWO Telemetry Piezometers at our Sugala Limestone Mines area

भारत सरकार
केन्द्रीय भूमि जल प्राधिकरण
जल संसाधन, नदी विकास
और गंगा संरक्षण मंत्रालय

Government of India
Central Ground Water Authority
Ministry of Water Resources,
River Development & Ganga Rejuvenation

File No. 25-23/CGWA/NOCAP/2018

NOTICE

Date: 01/02/2019

Subject: Modification of conditions of NOCs of CGWA

CGWA has been receiving numerous queries from proponents who have been granted NOC for ground water extraction with regard to mandatory conditions stipulated in respect of i) implementation of village water security plans, ii) instrumentation required for water level monitoring and iii) requirement of water level monitoring and water quality analysis in cases where quantum of ground water extraction is less than 10 m^3/day. These have been examined and the following modifications are hereby incorporated in the existing guidelines of CGWA for grant of NOC for ground water extraction:

1. In view of the difficulties encountered in the implementation of Water Security Plan and as this activity is being covered under various schemes of Govt. of India/State Governments, the mandatory condition for formulation & implementation of Water Security Plan is waived off.
2. The norms for instrumentation for water level monitoring shall be as below:

No. of Piezometers to be constructed & Type of Monitoring Mechanism					
Sl.No	Quantum of Ground water withdrawal (cum/d)	No. of piezometer(s) required	Monitoring mechanism		
			Manual	DWLR*/AWLR*	DWLR/AWLR with Telemetry
1	<10	0	0	0	0
2	11-50	1	1	0	0
3	51-500	1	0	1	0
4	>500	2	0	1	1

*DWLR=Digital Water Level Recorder, AWLR= Automatic Water Level Recorder

3. For proponents with NOC for withdrawing ground water up to 10 m^3/d, construction of piezometer/ installation of DWLR, monthly monitoring of water level and submission of water level data and water quality to Regional office shall not be mandatory.

This issue with the approval of Chairman, CGWA

Member (CGWA)

18/11, Jamnagar House, Mansingh Road, New Delhi-110011
Phone : (011) 23383561 Fax : 23382051, 23386743
Website: www.cgwa.noc.gov.in

स्वच्छ सुरक्षित जल - सुन्दर खुशहाल कल
CONSERVE WATER - SAVE LIFE

Telemetry Piezometers installed at Two locations at Sugala Limestone Mines

REHABILITATION AND RESETTLEMENT PLAN FOR

Sugala Limestone and Marl Mine

(ML Area 417.3584 ha)

At

Sugala and Jagatiya, Taluka- Kodinar, District- Girsomnath (erstwhile Junagadh) (Gujarat).

PROJECT PROPONENT

M/S. AMBUJA CEMENTS LIMITED

Ambuja Cement

Corporate Office: *Elegant Business Park, MIDC Cross Road 'B', Off Andheri-Kurla Road, Andheri (E), Mumbai 400059*

Registered Office: *Ambujanagar, Taluka - Kodinar, Dist. Gir Somnath, Gujarat*

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ABBREVIATIONS

RRP : Rehabilitation and Resettlement Action Plan

ML : Mining Lease

NH : National Highway

PAFs : Project Affected Family

PAPs : Project Affected Persons

NGOs : Non-Governmental Organizations

LA : Land Purchase

AF : Affected Family

PAF : Project Affected family

CSR : Corporate Social Responsibility

FGD : Focused Group Discussion

ID : Involuntary Displacement

RAP : Resettlement Action Plan

LAO : Land Purchase Officer

GRC : Grievance Redressal Committee

E&S : Environment And Social Management

GRC : Grievance Redressal Cell

M&E : Monitoring and Evaluation

CAP : Community Advisory Panel

MA : Monitoring Agency

IGS : Income Generation Scheme

RF : Reserved Forest

SC : Schedule Caste

ST : Schedule Tribe

OC : Other Class

BC : Backward

CHAPTER-I
INTRODUCTION of R & R

1.1 INTRODUCTION

The resettlement& rehabilitation plan (RRP) is for the remaining private land to be purchase for the existing Sugala limestone and marl Mine project which has been under operation since November 2002. The Sugala Limestone and marl Mine (Ml-417.3584 ha) with lime stone production capacity of 1.29 Million TPA at village Sugala and Jagaitya, Taluka Kodinar, district –Gir Somnath (erstwhile–Junagadh) Gujarat, was allotted to ACL for the captive use of Limestone and marl for cement manufacturing plant located at Ambujanagar, Kodinar, Dist- GirSomnath. The resettlement & rehabilitation plan (RRP) is necessary to take care of the persons/ villagers whose land is to be purchase by ACL for mining and allied purposes. In this regards, a compatible resettlement & rehabilitation plan has been developed based on Government of India and Government of Gujarat policy.

Out of the total ML area (417.3584 ha) of the existing Limestone and marl Mine only 138.3505 ha private land to be purchase from the land owners. Therefore there is a need to establish and harmonize relationship amongst the land owners and ACL. The RRP aims at addressing the rights and privileges of the land owners, ensures over and above the compensation as per LARR act 2013, to facilitate comprehensive socio- economic upliftment of the land owners. As the some part of their land is come under lease area therefore no displacement or resettlement and rehabilitation take place. As the some part of their land is coming under lease hence the mutually agreed compensation will be paid to land owner. Govt. of India has passed the “The Right to fair Compensation and Transparency in Land Purchase, Rehabilitation and Resettlement Act- 2013” (LARR Act, 2013) which came into force w.e.f. 1st January, 2014.This Act provides guidelines for land purchase as well as compensation for the project affected persons. The LARR Act, 2013and its subsequent amendments served as the guide to the development of the Rehabilitation and Resettlement Action Plan for this project. As mentioned above, the Rehabilitation & Resettlement Plan (RRP) for the affected families of the remaining land to be purchase for the existing Limestone Mine mines follows the guidelines of the LARR Act, 2013and its subsequent amendments and Govt. of Gujarat policy.

This mine has been allotted by department of Industries &Mines, Govt. of Gujarat to ACL vide their Order No. MCR-1096-3711-CHH1 Dtd. 19.07.2002 and extension granted vide Order No. MCR-1096-3711-CHH1 Dtd. 02.01.2020 valid upto 01.09.2052. The mining lease area falls in villages Sugala and Jagatiya, Tehsil Kodinar, Dist-GirSomnath in Gujarat.

1.2 SCOPE OF THE STUDY

On the basis of analysis of data, detail information collected, the study provides directional inputs with cost estimates and budgetary allocations for the resettlement and rehabilitation of the project affected families (PAFs). The study, in particular, provides the following:

(i) Details of land which would be purchased;

(ii) Details of land to be acquired, number of PAFs, their land holding and land compensation;

(iii) Assessment of the socio economic conditions of the PAFs with their demographic, educational and economic profile;

1.3 METHODOLOGY FOR BASELINE DATA

The baseline data was collected based on field survey and from primary and secondary sources in the study area.

Primary Source: Household survey, Personal Interview, Group Discussion in community meetings etc.

Secondary Source: Revenue department, LARR Act, 2013, State Government policies.

The preliminary survey and secondary data collection helped to understand the physical, social, economic and cultural setup of the area before undertaking the field survey. The PAFs household survey was conducted by the using a well-structured questionnaire. The questionnaires were designed to suit the subjects considering their rural background enabling to furnish correct information and data as far as possible. Format of Questionnaire is annexed with this Report as Annexure.

1. Additionally, public consultations and focus group discussions were held during the fieldwork to understand views of people affected, with reference to purchase of land, its due compensation, ensure participation of community in project implementation, monitoring and to develop a comprehensive coordination amongst the stakeholders for successful implementation of the project.

CHAPTER –II

LAND REQUIREMENT AND PURCHASE

Out of the existing Sugala Limestone and Marl Mines (ML : 417.3584 Ha) requires only 138.3505 Ha. Private land to be purchased. Ambuja Cement has gathered the information of survey numbers and sub-division numbers of the plots proposed for purchase and the names of owners of these lands along with a cadastral map showing the proposed lands for purchase.

2.1. PLAN FOR PURCHASE OF LAND

Various acts related to purchase of land serve as a guide for purchasing land from the land holders whose some part of lands are falling in the ML area. These are listed below:

1. The Right to Fair Compensation and Transparency in Land Purchase, Rehabilitation and Resettlement Act 2013 with amendments. (LARR Act, 2013) and its subsequent amendments.
2. The Right to Fair Compensation and Transparency in Land Purchase, Rehabilitation and Resettlement Rules 2017.
3. The land for the proposed mine is being purchase as per provisions of above mentioned Act which entitles the lease holder to purchase land from private owners on a government DLC rate.

ACL has the following options for purchase of land for its proposed mining project:

- Acquire land falling in the mining lease area as per provisions of LARR Act, 2013 with its amendments time to time.
- Purchase of land through mutual agreement with the land holders falling in the mining lease area at negotiated rates and terms and conditions.
- Land purchase with the help of local administration.

ACL adopted the methods which are mentioned in the above point to fulfill its land requirement, as the experience related to land acquisitions tells that land acquisition is a long, tiresome and time taking process. On the other hand, purchase of land through prevalent DLC rates of land are beneficial to land holders and company, it is time saving and develop confidence in all the stake holders. ACL efforts are under practice for purchase

of land and approached Village Panchayats of Sugala and Jagatiya and received NOC for the purchase of land falling in the mining lease area.

Purchase of lands for the mines under the above said method is voluntary, since the land owners will agree to sell their land at Government of Gujarat DLC rates. No involuntary land purchasing for the project is proposed by ACL from the private owners as the land will be purchased only from the landowners willing to sell their land after fulfilling legal formalities. The compensation rate proposed by ACL for purchasing of land will be as per the Govt of Gujarat guideline.

2.2. STEPWISE PROCEDURE FOR LAND PURCHASE

The following steps will be followed all throughout the period for the land purchase for the proposed mining project:

(i) Identification of the exact area and rightful land owners and demarcation of the areas to be purchase, through Revenue/Tehsil office of Kodinar.

(ii) Carrying out the Socio-Economic Survey of the Project Affected Persons (PAFs).

(iii) Discussions with landowners from time to time to offer the applicable rates to land owners on the prevailing DLC rates decided by the Government of Gujarat.

(iv) To sign the agreement with land owners to purchase their land, after getting their consent and to submit the application to the revenue authorities for registration of Lands.

(v) Part of the agreed compensation amount to be released immediately after registration of the land by the Tehsil Office and receipt of the documents. The payments to the land owners are to be made through cheques directly.

(vi) Final payment of compensation to be released only after physical possession of the land & Registration of land in the name of Ambuja Cement Limited at the market rate.

(vii) To set up a Dispute Redressal System, so that the land holder/land loser can approach the project proponent for his/her grievances.

2.3. LAND BREAKUP OF MINE LEASE AREA

S.No	Particulars	Total Area (ha)	Land to be Acquired (ha)
1.	Government land	2.5091	0
2	Private land	276.4988	138.3505
3	Charagah/Pasture	Nil	Nil
Total		**279.0070**	**138.3505**

2.4 LAND USE DETAILS OF SUGALA AND JAGATIYA VILLAGE

Land falls in mining lease area is represented by cultivated and govt. land. It comprises of loamy soil. There are two crop season in the area i.e. Kharif and Rabi. The Kharif or the rain fed crops are sown in June-July and harvested in September-October. The most important Kharif crops are groundnut, castor, jowar and bajri. The main Rabi crop is wheat. There are also long duration crop like sugarcane and cotton which overlap rabi and kharif seasons. The area is well irrigated by canals, bore wells and small check dams developed in last few years. A canal from a reservoir on Shingoda river in the north of the area is running along the northern and eastern periphery of the mining lease area and a branch canal from lower part of the lease area. The seepage from these canals and as well as excess irrigated water from surrounding fields causes water logging in the mining lease area. As a result, double cropping is possible in most of the area. This area also has large number of mango and coconut plantation mainly in northern part near Gir Reserve Forest.

Major class within Mine Lease is Agricultural land which covers 221.57Ha (53.09%). Other classes include mining pits 73.75Ha (17.67%) and wastelands consisting of only open scrub which is 31.56Ha (7.56%). In this zone, there is no forest, river or lake/pond. Mine sump covers 83.54Ha (20.02%). Gross Sown Area (GSA) and Net Sown Area (NSA) of core zone works out to be 257.40Ha and 173.83Ha resulting into cropping intensity of 148%.

Land Use Details of land to be purchased (138.3505 Ha) of Sugala and Jagatiya Village

Sr. No.	Land Use Details	Sugala Village (Area in Ha.)	Jagatiya Village (Area in Ha.)
1.	Irrigated Land (Of the total Cultivable Land) (in hectares)	90.9651	47.3854

2.	Un-irrigated Area (in hectares)	Nil	Nil
3.	Forest Land (in hectares)	Nil	Nil
4.	Land needs to purchased(in hectares)	90.9651	47.3854

The area falling in the mining lease i.e. 138.3505 ha. consist of private land given in above table.

CHAPETR – III

DETAILS OF HOMESTEAD OUTEES

3.1 DETAILS OF HABITATION INSIDE THE LEASE AREA

As per khasra details there are 179 PAFs involved in the lease area out of which, no one will be displaced due to the mining activity. Total number of homestead oustees and its total population inside the mine area as details are given in following table.

HABITATION INSIDE THE MINE LEASE

Sr. No	Village name	Total PAFs	Habitation Inside Mine Lease
1.	Sugala	130	Nil
2.	Jagatiya	49	Nil

These people are not directly affected due to existing project however they come under PAF because some part of their agriculture land lies within existing mining lease area.

CHAPTER – IV

SOCIO-ECONOMIC PROFILE OF THE AFFECTED POPULATION

Socio economic study related to socio economic condition of the people in the area constitutes an integral part of environment study. These study includes demographic structure of the affected population, provision of the basic amenities viz. housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern etc. at the baseline level. This study would help in visualization and predicting the likely impacts depending upon the nature of resettlement and rehabilitation activists of the proposed project.

4.1 PROCIDURE FOR SOCIO-ECONOMIC SURVEY

The Objectives of the survey are given below:

a. To conduct the household survey in the lease area.
b. To know the current scenario of the region to cover the resettlement and rehabilitation of the affected people.
c. To help in further planning for providing better compensation to upliftment of living standards to the PAFs based on their needs identified during survey.

4.2 METHODOLOGY ADOPTED FOR COLLECTION OF DATA & PRESENTATION OF DATA & ANALYSIS

Methodology adopted for collection of data as well as presentation of data & analysis has been detailed in Chapter 1, para 1.3 of this report.

4.3 DEMOGRAPHY OF SUGALA AND JAGATIYA VILLAGE

Number of PAF from Sugala and Jagatiya Village are 179 and PAP are731, which is 4.08 persons per house. These villages are located at a distance of 2 to 3 KM from the existing lease area and no habitants are affected due to this running project.

4.4 INFRASTRUCTUREFACILITIESINREVENUEVILLAGE

The facilities that are available in the village include Anganwadi (Pre-school), Primary School, High School (Metric) and Drinking Water (Table 3.1)

Facility	Sugala	Jagatiya
Primary school	1	1
Middle school	1	No
Secondary school	No	No
Senior secondary school	No	No
Primary health centre	No	No
Primary health sub centre	No	No
Maternity and child welfare centre/TB clinic	No	No
Dispensary	No	No
Veterinary hospital	No	No
Mobile health centre	No	No
Non-Government Medical facilities Medicine	No	No
Tap Water	Y	Y
Tube Wells/Borehole	Y	Y
Tank/Pond	No	No
Post Office	No	No
Bus Service	Y	Y
Taxi availability	Y	Y
Tractors availability	Y	Y
National Highway/State Highway	Y	Y
BLakhk Topped (pucca) Road	Y	Y
Bank and ATM facility	No	No
Public Distribution System (PDS) Shop	Y	Y
Community Centre	Y	Y
Daily Newspaper Supply	Y	Y
Power Supply	Y	Y

Other facilities such as Government hospital, Clinics/Nursing home, Graduate College, Adult Education Centre, Theater, Police station are not available. However these are available at Kodinar Taluka place at a distance of around 8 Km.

Economic Activities: the agriculture is the main economic activities in the area. Farmers also keep cow, buffalo, sheep for their alternative source of earning. The other economic activities in the area are related to small business. A summary of economic activities in the area could identify about economic activities like-provision store, music &sound, tent house cement suppliers, beauty parlor, hair cutting saloon, polish work, electrical and hardware

shops, medical store, auto repair shops, tailoring, tea shop, furniture shop, sweet shops, fruits and vegetable shops, gas stove repair shops, photo studio etc.

4.5 SOCIO-ECONOMIC AND DEMOGRAPHIC DETAIL OF SURVEYED PAFS

Socio-economic survey and verification of the affected persons were undertaken to address the possible adverse impacts if any that may emerge during and after the course of the project implementation. Socio-economic survey carried out serves as base line information and provides a cut off point for eligibility to compensation or assets on the lands are also surveyed to decide on the compensation. The detailed questionnaires were designed to suit the subjects considering their rural background enabling them to furnish correct information and data as far as possible. Formats included questions and problems concerning of the affected families, their choices for infrastructure improvement, additional facilities required. It was decided that as far as possible each of the selected Project Affected Family should be interviewed at the time convenient to them. Before data collection, family members including heads of families of affected families were briefed about need and procedure of the study. A few focused group discussions involving representative members of 5-6 families were also conducted.

In the public consultations undertaken by organizing Focus Group Discussions (FGDs) in the village, people participating in the group discussions were informed about the project and then members were asked to state their concerns regarding the project activities. Their participation helped in identifying social issues and incorporating suggestions in the R&R measures wherever feasible. Therefore the objective of the public consultation was to inform, make them aware and participate in the project planning. The focus group discussion were conducted to elicit the views of the affected persons and other stakeholders on displacement, compensation, employment, gender issue, infrastructure, education, health care, sanitation and any other advised/raised by the stakeholders. Views expressed by participants have been incorporated in the project design wherever feasible. On an average 10-15 persons including women of the village who are likely to be affected participated in the focus group discussion.

The number of participants increased as the consultation progressed. The issueswere raised, views were expressed and suggestions were provided by the participants. Summary of public consultation is as below:

- Employment opportunities will increase for local people with the development work both as construction worker as well as service providers.
- Price of land will increase.
- Loss of land properties and disruption of livelihood of those close to the project area.
- Majority people preferred Cash for land compensation.
- In some cases, people were interested to get employment for their survival and betterment.

Based on the survey conducted in the village Sugala and Jagatiya along with the affected family's clear picture of socio-economic and demographic profile is being shown in table below

S.No.	**SOCIO-ECONOMIC AND DEMOGRAPHIC PROFILE OF PAFS/PAPS**				
1.	**Village Name**	**Sugala**		**Jagatiya**	
2.	Total Land of mine lease (In Ha.)	90.9651		45.3854	
3.	PAFs in mine lease	130		49	
4.	Surveyed PAFs in mine lease	130		49	
5.	Surveyed PAPs in mine lease	507		224	
6.	Sex ratio (woman/1000 Male)	850.4		851.2	
7.	Literacy rate (%)	54.83		54.46	
8.	**Literacy of PAPs**				
	Education Level	***No.* of persons**	**Percentage (%)**	***No.* of persons**	**Percentage (%)**
	Illiterate and below primary school	229	45.17	102	45.54
	Primary	152	29.98	69	30.80

	Secondary	60	11.83	29	12.95
	Higher Secondary	46	9.07	18	8.04
	Graduation and above	20	3.94	6	2.68
	Total	507	100.00%	224	100.00%

9. Occupation of PAPs

	Primary Occupation	**PAPs**	**Percentage (%)**	**PAPs**	**Percentage (%)**
	Agriculture	377	94.01	146	90.12
	Govt. Services	4	1	1	0.62
	Pvt. Services	7	1.75	2	1.23
	Business	12	2.99	10	6.17
	Total	401	100	162	100

10. Caste Composition of Surveyed PAFs

	Caste Category	**PAFs**	**Percentage (%)**	**PAFs**	**Percentage (%)**
	General	1	0.77	3	6.12
	OBC	118	90.77	36	73.47
	SC	11	8.46	10	20.41
	ST	0	0	0	0
	Total	130	100	49	100

11. Age group and Gender of PAPs

	Age group	**Population**	**Gender**			**Population**	**Gender**		
			Male	**Female**	**%**		**Male**	**Female**	**%**
	Below 5	40	24	16	7.89	26	14	12	11.61
	5-15	82	50	32	16.17	39	26	13	17.41
	15-25	65	39	26	12.82	21	13	8	9.38
	25-35	71	42	29	14.00	31	17	14	13.84
	35-45	89	45	44	17.55	36	18	18	16.07
	45-55	94	50	44	18.54	28	14	14	12.5
	Above -55	66	24	42	13.02	43	19	24	19.19
	Total	507	274	233	100	224	121	103	100

12.	**Family Type of PAFs**				
	Family	**Total No.**	**Percent (%)**	**Total No.**	**Percent (%)**
	Joint	39	30	26	53.06
	Nuclear	91	70	23	46.94
13.	**Family Size of PAFs**				
	Family Size	**Number**	**Percent (%)**	**Number**	**Percent (%)**
	up to 4	104	80.00	28	57.14
	5 to 7	22	16.92	14	28.57
	Above 8	4	3.08	7	14.29
	Total	130	100	49	100

14.	**Marital Status of PAPs**		
	Marital Status	**No. of PAPs in Sugala Village**	**No. of PAPs in Jagatiya Village**
	Married	269	127
	Unmarried	209	89
	Widow/Widower	29	8
	Total	507	224

15.	**Household Composition of PAFs**			
	Male Headed Family	**Woman Headed Family**	**Male Headed Family**	**Woman Headed Family**
	78.95%	21.05%	90%	10%

The socio economic study of the village gives clear picture of its population, average household size, literacy rate, sex ratio etc. The literacy rate is poor among surveyed Project Affected population. The village possesses average infrastructural facilities in comparison to the facilities available in other parts of the district; this area lacks in higher level of amenities like medical facilities, drinking water and higher education. Villagers have to commute outside from their village for higher education. However, the area is well connected with road transport and communication facilities.

CHAPTER –V

LEGAL FRAMEWORK

Purchasing of land for limestone mine project is an ongoing process and would always be site specific. The land purchasing is based on compensation mutually agreed between two parties over and above the Govt. Circle rate of the area. Due permission from Govt. of Gujarat is obtained for each and every land purchased.

S. No.	Resettlement policy	Description of policy
1.	Land purchase on market rate and provision of LARR Act.	Land will be purchased by legal process (according to market / circle rate), No Involuntary Displacement (ID) will be there.
2.	Assistance in Re-establishment	Affected Persons will be assisted to re- establish themselves, if required, to restore the pre-project income or improve their living standards by improving their skill level through ACF SEDI (Skill and Education Development Institute).
3.	Gender Equality	Gender equality will be ensured and adhered to; and vulnerable AFs will be favourably considered for restoring their livelihoods.
4.	RRP and project related information	RRP and project related information will be informed to AFs from time to time.
5.	Land for Land	Replacement land is the Policy of ACL and it is ensured that a AF must have a Land for Land shall also be an option for compensation and in most cases it is the most preferably option adopted by AFs. In the absence of replacement land and AFs not opting for land, option for cash-for-land is executed.
6.	Compensation for loss of land and other assets	Compensation for loss of land, trees, other assets (Structure & standing crops) and income will be based on market value and full replacement cost will be paid

		before taking physical possession of the land. Compensation will include transaction cost also.
7.	Compensation payments prior to the commencement of project	All compensation payments and related activities will be completed prior to the acquiring the land belongs to AFs.
8.	Transparency in Payments	All compensation will be paid by Cheque only to ensure the PAPs are getting compensation in full.
8	Grievance Redress Mechanism	A Grievance Redressal Mechanism will be set up at the unit level
9	Involvement of women and vulnerable APs	Project will ensure involvement of women and vulnerable PAPs also in all activities related to resettlement planning, implementation, and monitoring.
10	Adequate Budget	ACL will ensure adequate budgetary support to cover implementation cost.
11	Monitoring	ACL will conduct monitoring and evaluation of the implementation of RRP.

5.1 ELIGIBILITY FOR COMPENSATION AND ENTITLEMENT MATRIX

Compensation for purchase of land for the project is fixed according Govt. Circle rate of the area Consequent to Resettlement Policy and considering socio-economic profile and impacts, eligibility and entitlement matrix has been drawn for the project to ensure that affected persons have a better economic and social status.

This matrix takes into consideration provisions not only for land compensation but also entitlements for the families whose livelihood is primarily dependent land and provisions for infrastructural facilities and basic minimum amenities for population.

Compensation Policy Matrix

S. No.	Type of Loss	Application	Definition of Entitled Person	Compensation Policy	Responsible Agency
1.	Loss of Private Land	Agricultural Land Homestead land or vacant plot	Mostly farmers	• Compensation at market value or Transitional allowance • Notice to harvest standing seasonal crops. If notice cannot be given, compensation for share of crops will be provided • Additional compensation for vulnerable household.	ACL through its Land Purchase Officer (LAO) or through the appropriate Government officials (District magistrate office/ Revenue office) will determine value. ACL will ensure provision of notice. ACL will verify the extent of impacts through a 100% survey of APs determine assistance, and identify vulnerable household.
2.	Loss of structure	Residential / commercial buildings and other assets	Legal title holders	• Compensation at Replacement value based on current market rate of the structure and other assets, if remainder is viable • Fees, taxes, and other changes related to Replacement structure. • Shifting assistance • Right to salvage materials from structure and other assets with no deductions from Replacement value. • Additional compensation for vulnerable households.	Within lease area no structure exist however ACL through its Land Purchase Officer (LAO) or through the appropriate Government officials (District magistrate office/ Revenue office) will determine value of the other assets available in the respective land. ACL will ensure provision of notice. ACL will verify the extent of impacts through a 100% survey of APs determine assistance, and identify vulnerable household.

The entitlement matrix has been derived on the basis of LARR Act 2013 and survey carried out for purchase of land for Limestone mine. During implementation, if additional impacts are identified, the entitlement matrix will be updated by including compensation and assistance. The proposed entitlement framework will be applicable only in the case of land purchase for mining lease area.

Note: Vulnerable group like women headed / Orphans / physically handicapped / disabled families under Section 3 (C) (i& ii) of LARR, 2013 shall be considered for additional need based benefits.

5.2 INITIATIVES FOR INCOME RESTORATION OF PAFS

Major impacts identified for the land purchase project is related to loss of income of PAFs. Loss of income may then affect socio cultural systems of affected families. Thus restoration of pre-project levels of income is an important part of restoring socio- economic and cultural systems of affected persons. Income restoration interventions are much more complex due to the following considerations:

(i) Large variation of income levels,
(ii) Varying numbers of dependent family members,
(iii) Large variation in total land holdings of PAFS
(iv) PAFs not able to provide dependable data on their present agriculture income and
(v) More than one registered owner in same khasras (plots of land).

This complex nature of occupational diversity and income variation poses a problem for mitigation measures in the context of economic rehabilitation. However, the entitlement matrix proposed for the project has adequate provisions for restoration of livelihood of affected persons/families. The focus of restoration of livelihoods is to ensure that the PAFs are able to at least regain their living standards.

Income Generation Programme: To restore and further enhance the economic conditions of the PAFs, certain income generation and income restoration programs are incorporated by ACL as part of the RRP. Salient essentials of these initiatives

are listed below:

S.No.	Income generation programme	Descriptions
1.	Compensation for Land	Aside from payment of full compensation for acquired/ purchased land at negotiated rates, vulnerable PAFs who are to lose all their land will be assisted by ACL in utilizing their cash compensation for buying alternate land in nearby area, as per the availability of land.
2.	Compensation for Crop	Compensation for the standing crop and for the land purchased by the project will be paid at the market value.
3.	Assistance in Alternate Land	ACL would advise PAFs for purchase of alternative land as well as to invest in fixed deposit in banks, so that they are assured of good return of income.
4.	Guidance and consultations for purchase of agriculture land	ACL will provide guidance and consultations for purchase of agriculture land that will generate income equivalent to the loss of land and it will also provide guidance and assistance for availing fixed deposit schemes of the banks.
5.	Productivity Enhancement	ACL provides facilities for availing consultations and advice from KVK experts on best practices for improving productivity and to optimize requirement of fertilizers, water and manpower and information on market for the produce.
6.	Vocational Training	The Company will organize vocational training, entrepreneur development programmes for the PAFs including women members and will provide advice for starting suitable small scale industry. ACL will encourage entrepreneurship amongst PAFs or their qualified family members by awarding services, contracts for activities such as canteens, vehicle hiring, maintenance of gardens, office services and cleanliness, courier services, and material supplies.

The entitlement matrix has been derived on the basis of LARR Act 2013 and guidelines issued by Govt. of Gujarat and survey carried out for purchase of land for

Limestone mine. During implementation, if additional impacts are identified, the entitlement matrix will be updated by including compensation and assistance. The proposed entitlement framework will be applicable only in the case of land purchase for mining lease area.

Note: Vulnerable group like women headed / Orphans / physically handicapped / disabled families under Section 3 (C) (i& ii) of LARR, 2013 shall be considered for additional need based benefits

5.3 CONTINUATION OF PUBLIC CONSULTATION

The effectiveness of the RRP program is directly related to the degree of continuing involvement of those affected by the project. During the preparatory stage, consultations were held at local level. Several additional rounds of consultations with PAPs have been planned in the action plan during RRP implementation. Consultations during RRP implementation will involve agreement on compensation, assistance options, and entitlement package and income restoration. The other round of consultations will occur when compensation and assistance are provided. For continued consultations, following steps have been envisaged in the project:

- Community Advisory Panel (CAP) will be Grievance Redressal Committees (GRCs) at ACL. The village representatives will be associated with committee.
- Key features of the entitlements will be displayed in billboards on the project site office.
- ACL with the help of the local community leaders will encourage the participation of the PAPs in RRP implementation.
- Attempt shall be made to ensure that vulnerable groups understand the process and their needs are specifically taken into consideration.

5.4 INFORMATION CAMPAIGN & FUTURE PLANS

PAFs will be invited to the proposed Redressal System for a quick, inexpensive and amicable settlement of claims. They will also be advised to get their records of rights updated. All possible efforts will be put forth to motivate the affected landowners

and structure owners for a voluntary and amicable settlement of their claims outside the court.

Most of the issues will be settled, out of court as far as possible. Handouts will be distributed by CAP members and ACL representatives among all the affected persons highlighting the prospects of amicable settlement of disputes outside the court for speedy resolution and in a less expensive way along with the timetable of inquiries and spot inspections of the committee. Besides this, public announcements will be made in affected areas and Press notes will be released in local newspapers to aid publicity.

5.5 COST & BUDGET OUTLAYS

The budget is indicative of outlays for the different expenditure categories and is calculated. The costs are based on the information collected by the socio-economic and Census of the PAPs and from the Revenue department. These costs will be updated and adjusted to the inflation rate as the project continues and more specific information, such as extra number of PAPs during the implementation. Unit cost will be updated if the findings of the district level committee on market value assessment justify it.

Socio - Economic rehabilitation support :

Ambuja Cements Ltd has been proactively fulfilling its social responsibility since its inception. Ambuja Cement Foundation (ACF), the CSR arm of ACL, was established in 1993. ACF works primarily with rural communities on the need-based issues on participative basis along with the Govt. of Gujarat, NGOs and the community. The major areas of ACF's intervention are water, agriculture based livelihoods, skill development programmes, community health, sanitation, education, women empowerment and infrastructure development.

Agriculture being the primary source of livelihood of rural community in the Gir peripheral and coastal region of Gir Somnath district. ACF focuses on extension of proven technologies among the farmers. ACF understood the farmers prevailing

practices and identified the gaps. It then started organizing training for farmers, including farm-women, on variety of topics.

We have focused on the following activities:

- Dissemination of Agriculture Knowledge and Information through ICT
- Soil and Water testing
- Development of horticulture
- Animal Husbandry
- Support for critical agriculture Inputs to farmers
- Farmers training on agriculture practices
- We are very focus to divert people towards organic farming.

Establishment of Krishi Vigyan Kendra (KVK) : Ambuja Cement through Ambuja Cement Foundation also help the farmer by establishing a state of art Krishi Vigyan Kendra (KVK) which provide technical assistance and support to farmer. Agriculture is a dynamic field with new technological advances emerging every year. In order to support farmers to stay abreast of and adopt these new approaches, ACF, in collaboration with the Indian Council of Agriculture Research, established a Krishi Vigyan Kendra in 2007 at Kodinar in Gir Somnath, Gujarat. KVK provides regular training programs and front line demonstrations on farm testing, farm development, seed production and other extension activities - to help bridge the gap between research and extension, and to equip farmers with the latest developments in agriculture.

For Off farm employment generation, Ambuja Cement through Ambuja Cement Foundation emphasis of providing employable skill to youth of the villages of sugala, Jagatiya and Surroundings villages through establishment of Skill & Entrepreneurship Development Institutes (SEDI)

Skill & Entrepreneurship Development Institutes (SEDI):ACF establishes training institutes in rural areas to provide youth with a wide variety of skilling opportunities to give them choices in life. SEDI centre was established at Kodinar in April, 2011. Since inception, SEDI has a vision to bridge skill gap amongst underprivileged youth and empowering them through skill training and placement assistance. We have

made rapid strides in empowering youth through quality training and placement support in Industrial Electrical, General Duty Assistant, Hospital Assistant technician, Business process outsourcing, Welder and Machine Operator trades. SEDI Kodinar trained 5300 youth since inception with the tremendous placement record of 84%.

M/s. ACL follows The Right to fair compensation and Transparency in Land Purchase, Govt. of Gujarat Land Compensation Policy. The objectives of this Regulation is to provide guidelines to support to the vulnerable families whose land is to acquired/purchased so that their livelihood is not affected.

Land Compensation: - As per the Govt. of Gujarat Land Compensation Policy &LARR, 2013 (with amendment) land compensation calculation is given below.

Accordingly, the price per unit has been worked out as given below:

- The value of land in Sugala and Jagatiya village are taken from Registration and stamps department Govt. of Gujarat.
- Market value of land for village Sugala and Jagatiya is taken by socio economic survey.
- Solatium - 100% of the market value of land mentioned against factor multiplication as per Govt. of Gujarat defined rates.

The land purchasing is based on compensation mutually agreed between two parties over and above the Govt. Circle rate of the area. Based on these determinants the land compensation rate per hectare works out.

Compensation as per Schedule I of LARR Act, 2013

S. No.	Component of compensation package in respect of land purchased under the Act	Manner of determination of value	Value
1.	Market value of land	Govt. of Gujarat Circle Rate (Annexure I)	40 Lakh per hect
2.	Factor by which the market value is to be multiplied in the case of rural areas	1 (One) to 2.00 (Two) based on the distance of project from urban area as may be notified by the appropriate Government	A factor of 1.5 is ensured while purchasing the land.
3.	Factor by which the market value is to be multiplied in the case of urban areas	1 (One).	Not applicable

4.	Value of assets attached to land or building	To be determined as provided under section 29.	Not applicable as no asset available within the lease area.
5.	Solatium	Equivalent to one hundred per cent of the market value of land mentioned against serial number 1 multiplied by the factor specified against serial number 2 for rural areas or serial number 3 for urban areas plus value of assets attached to land or building mentioned against serial number 4 under column(2) plus solatium mentioned against serial number 5 under column (2)	ACL will give Solatium over and above the Govt. Circle rate of the area. A minimum factor 1.5 is ensured while purchasing land.
6.	Final award in rural areas	Market value of land mentioned against serial number 1 multiplied by the factor specified against serial number 2 plus value of assets attached to land or building mentioned against serial number 4 under column(2) plus solatium mentioned against serial number 5 under column(2)	According to the provision the final award is Rs. 1 Crore per ha for Sugala and Jagatiya village.
7.	Final award in urban areas	Market value of land mentioned against serial number 1 multiplied by the factor specified against serial number 3 plus value of assets attached to land or building mentioned against serial number 4 under column(2) plus solatium mentioned against serial number 5 under column(2)	Not applicable
8.	Other component if any to be included	-----	Not applicable
9.	Provision of housing units in case of displacement	If a house is lost in rural areas, a constructed house shall be provided as per the Pradhanmantri Awas Yojana (earlier it was Indra awas yojna) specification. If a house is lost in urban areas. A constructed house shall be provided, which will be not less than 50 sqmts in plinth area. The benefits listed above shall also be extended to any affected family which is without homestead land and which has been residing in the area continuously for a period of not less than three years preceding the date of notification of the affected area and which has been	Not applicable. This is total agriculture land and no permanent structure available.

		involuntarily displaced from such area. Provided that any such family in urban areas which opts not to take the house offered, shall get a one-time financial assistance for house construction, which shall not be less than one lakh fifty thousand rupees Provided further that if any affected family in rural areas so prefers, the equivalent cost of the house any be offered in lieu of the constructed house: Provided also that no family affected by purchase shall be given more than one house under the provisions of this Act. Explanation- The house in urban areas may, if necessary, be provided in multi- storied building complexes.	
10.	Land of Land	In the case of irrigation project, as far as possible and in lieu of compensation to be paid for land acquired, each affected family owning agricultural land in the affected area and whose land has been purchased or lost, or who has, as a consequence of the purchase or loss of land, been reduced to the status of a marginal farmer or landless, shall be allotted, in the name of each person included in the records of rights with regard to the affected family, a minimum of one area of land in the command area of the project for the which the land is acquired. Provided that in every project those persons losing land and belonging to the Scheduled Castes or the Scheduled Tribes will be provided land equivalent to land purchased or two and a one-half areas, whichever is lower.	ACL have Policy Land of Land. We ensure that minimum same area of alternate land should be made in the name of landowner before it is purchased by ACL.
11.	Offer for Developed Land	In case the land is purchased for urbanization purposes, twenty percent of the developed land will be reserved and offered to land owning project affected families, in proportion to the area of their land purchase and at a price equal to the cost of purchase and the cost of development. Provided that in case the land owning project affected family wishes to avail of this offer, an equivalent amount will be deducted from the land purchase compensations package payable to it.	Not applicable
12.	Choice of Annuity or Employment	The appropriate Government Shall ensure that the affected families are provided with the following options: Where jobs are created through the project, after providing suitable training and skill development in	One time settlement is being done by ACL. The land

		the required field, make provision for employment at a rate not lower than the minimum wages provided for in any other law for the time being in force, to at least one member per affected family in the project or arrange for a job in such other project as may be required; or Onetime payment of five lakhs rupees per affected family; or A) Annuity policies that shall pay not less than two thousand rupees per month per family for twenty years, with appropriate indexation to the Consumer Price Index for Agricultural Labourers. B) Provide compulsory employment to at least one member of PAFs of farm labour.	purchasing is based on compensation mutually agreed between two parties over and above the Govt. Circle rate of the area.
13.	Subsistence grant for displaced families for a period of one year	Each affected family which is displaced from the land purchased shall be given a monthly subsistence allowance equivalent to three thousand rupees per month for a period of one year from the date of award. In addition to this amount, the Scheduled Castes and the Scheduled Tribes displaced from Scheduled Area shall receive an amount equivalent to fifty thousand rupees. In cases of displacement from the Scheduled Areas, as far as possible the Affected families shall be relocated in a similar ecological zone, so as to preserve the economic opportunities, language, and culture and community life of the tribal communities.	Not applicable. No displacement will be done.
14.	Transportation cost for displaced families	Each affected family which is displaced shall get a one-time financial assistance of fifty thousand rupees as transportation cost for shifting of the families, building materials, belongings and cattle.	Not applicable. No displacement will be done.
15.	Cattle shed/petty shops cost	Each affected family having cattle or having petty shops shall get one-time financial assistance of such amount as the appropriate Government may, by notification, specify subject to a minimum of twenty- five thousand rupees for construction of cattle shed or petty shop as the case may be.	Not applicable
16.	One-time grant to artisan, small traders and certain others	Each affected family of an artisan, small trader or self-employed person or an affected family which owned non- agricultural land or commercial, industrial or institutional structure in the affected area, and which	Not applicable

		has been involuntarily displaced from the affected area due to land purchase, shall get one-time financial assistance of such amount as the appropriate Government may, by notification, specify subject to a minimum of twenty- five thousand rupees. In addition to this amount, the Scheduled Castes and the Scheduled Tribes displaced from Scheduled Area shall receive an amount equivalent to fifty thousand rupees. In cases of displacement from the Scheduled Areas, as far as possible the Affected families shall be relocated in a similar ecological zone, so as to preserve the economic opportunities, language, and culture and community life of the tribal communities.	

Summary of Land Compensation & RRP Budget

Based on the above, the summary of the budgetary allocations is as under:

SNo.	Particulars	Villages	
		Sugala	Jagatiya
1.	Govt. rate per ha./ ACL rate per ha. inclusive of land and other associated items costs	40 Lakh per hect	
2.	Solatium (Multiplied factor 1.5)	60 Lakh per hect	
3.	Total Cost (ACL rate +Solatium) per ha.	1 Crore per hect	
4.	Total Compensation / Total cost for private land (for Pvt. Land 138.3505 ha)	138.35 Crore	
5.	Monitoring & Evaluation (CAP)	0.15 Crore	
	Grand Total RRP Budget	**138.5 Crore**	

Note - ACL will purchase land on mutually agreed terms and conditions.

CHAPTER-VI
MONITORING AND EVALUATION

6.1 NEED FOR MONITORING

ACL has formulated Community Advisory Panel (CAP) for monitoring the CSR activities and project being implemented in core and buffer zone areas of mines. The CAP has representatives from local bodies, CSR team and management.

Through the periodic assessment of planned activities CAP providing midway inputs, facilitates changes and gives necessary feedback of activities and the directions in which they are going.

Whereas evaluation is an activity aimed at assessing whether the activities have actually achieved their intended goals and purposes. The monitoring and evaluation (M&E) mechanism will measure project performance and fulfilment of the project objectives. RRP implementation for the project will be closely monitored by the duly constituted Community Advisory Panel (CAP). CAP Monitoring Cell will be at the helm of all activities related to the RRP implementation. Components of monitoring include performance monitoring, impact monitoring and external evaluation. Monitoring and evaluation will be carried out post-implementation and social audits in consultation with the Gram Sabha. Two broad categories of indicators are to be monitored during the project are: (i) input and output indicators and (ii) outcome and impact indicators. Input and output indicators related to physical progress of the work should include items such as:

- Census, assets inventories, assessments and socio-economic studies completed. Records of Socio-Economic data of all the PAPs are maintained and are retrievable when needed.
- Monitoring Agency (MA) will be recruited within schedule.
- Meetings of GRCs.
- CAP Monitoring Cell is the plateform for taking action on Grievance of PAFs
- Entitlement Matrix will be effectively used for ascertaining compensation
- Corporate Social Responsibility activities are designed and will be implemented on schedule for the benefits of PAPs and outcome recorded.

- Infrastructure facilities and community welfare activities as arising out of public consultation will be implemented and records will be maintained.
- Skill development by training of PAPs will be done.
- Income restoration activities will be done.
- Information and data on alternate lands acquired/ purchased and income generated due to newly purchased land by PAPs be obtained and recorded.
- Monitoring and Evaluation reports will be timely submitted.

The monitoring will be carried out by the CAP Monitoring team which will monitor and proactively evaluate the RRP objectives. CAP Monitoring Cell will be required to submit biannual monitoring reports and a final evaluation report before the due date.

6.2 METHODOLOGY FOR MONITORING

- Random sample of PAPs to be interviewed by CAP Monitoring Cell.
- Participatory rapid appraisal of the RRP implementation in the revenue village.
- Consultations with senior community members.
- Review of grievance appeals.
- Comparison of standard of living of PAPs before and after implementation of land purchase project.

6.3 INPUT AND OUTPUTS MONITORING

Internal monitoring will be the responsibility of the CAP Monitoring Cell (CAPMC). On a monthly basis, the PMC will report on each of the indicators stated herein and other indicators that mightemerge as project implementation proceed forward. PMC will monitor the following activities:

(i) Verification exercise (final number of PAPs and affected households (AH)

(ii) Progress of land purchase

(iii) Consultations on entitlements (no. of consultations, number of PAPs/s attended)

(iv) Training of staff and PAPs (number of PAPs and staff trained, type and effectiveness of skills/livelihood training provided), (staff for PMC recruited, office facilities provided, vehicles provided).

6.4 ROLE OF MONITORING AGENCY (CAP)

M/s. ACLwill carry out Monitoring & Evaluation of the RRP through CAP Monitoring Cell. CAP Monitoring Cell has members from village representatives, KVK Specialist and Industry representatives. The CAP monitoring Cell will monitor the following:

(i) Reactions from PAPs; information from PAPs on entitlements, options, alternatives and relocation related issues.
(ii) Visits to sites.
(iii) Valuation of property.
(iv) Use of grievance procedure.
(v) Disbursement of compensation.
(vi) Changes in land assets status.
(vii) Annual incomes, assets, capabilities of family members to contribute to the family income, impact of training availed etc. to compare economic & social status with pre purchase.

6.5 REPORTING

Reports documenting progress on resettlement implementation and completion reports will be submitted by the CAP Monitoring Cell to the Chief Executive/Corporate Office of ACL.

6.6 BUDGETARY ALLOCATION

A budgetary allocation of Rs. 15 Lakh is provided for CAP Monitoring Cell.

CHAPTER-VII

IMPLEMENTATION SCHEDULE

7.1 IMPLEMENTATION

Implementation is a critical activity in a rehabilitation operation. The implementation of RRP is to be carried out by M/s. ACL for which an environment and social management (E&S) team is constituted. The E&S team will take up the implementation. The key function of the E&S team as follows:

- Conduct surveys on environmental and social aspect to finalize the route for the projects.
- Interact with revenue authorities for land purchase and follow it up with authorized agencies for implementation of RRP.

Implementation of Rehabilitation and Resettlement Plan

The implementation of RRP will be following these 8 activities:

- Identifying the project affected persons
- Awareness campaign at project site
- Finalization of bank for providing rehabilitation assistance
- Mobilization for IGS (Income Generation Scheme)
- Implementation of IGS (Income Generation Scheme)
- Implementation of other development works
- Review process
- Evaluation and assessment

The implementation of RRP has been divided into above 9 basic activities and each activity has been identified as specific mile stone on which implementation of RRP is based.

SCHEDULED FOR IMPLEMENTATION OF REHABILITATION PLAN

Sr. No.	Activity	Target/Completion Date
A.	Socio-Economic Survey & Impact Assessment	Start after Two year from operation
B.	Land Purchase, Physical Possession of all the lands and Disbursement of Compensation amounts	Land procurement will be done within two years.
C.	Implementation of Training Programs, advice for purchase of alternative lands and investment of compensation amounts.	To be continued till a satisfactory outcome is obtained.
D.	Evaluation & Monitoring	After Land Purchase every year.

All these activities are quite crucial for successful implementation of RRP in the project area.

CHAPTER VIII

GRIEVANCE REDRESSAL SYSTEM

8.1 NEED FOR GRIEVANCE REDRESSAL

In case of projects involving Land Purchase (LA), the grievance procedure and appeal mechanism are an important aspect related to RRP of the PAFs. The LARRA Act has provisions at different stages of land purchase, for the affected party, to object to the Award announced by the acquiring authority. They can also receive compensation under protest and move to the court for enhancement of the Award. Experience shows that litigation causes unnecessary delay and cost overrun of the project. Keeping in mind legal procedures involving such cases Gujarat Government would have provision for Grievance redress mechanism which will provide a forum for people to express their dissatisfaction over compensation and R & R provisions. It does not imply that the affected will be debarred from moving to the court on compensation. Company will adopt land purchase.

8.2 GRIEVANCE REDRESS COMMITTEE

According to the ACL Policy, Grievance Redressal Committee shall be formed at ACL's internal level comprising following members:

(i) Functional Head
(ii) Head of Department- Land & Liaison
(iii) Head of Department – Mines
(iv) District Administrative in case of land purchase.

8.3 GRIEVANCE REDRESS MECHANISM

The main objective is to provide a step by step process for registering and addressing the grievances. It is expected that this mechanism will ensure Redressal to the aggrieved party. The PAFs will have access to the committee which will function throughout the project period.

8.4 RESPONSE TIME

The Grievance Redressal Cell (GRC) will hear grievances once in a month. Since the entire rehabilitation process has been completed before construction work starts the Grievance Redressal Cell may meet more than once in a month depending upon the number of such cases. The GRC (Grievance Redressal Cell) will inform the concerned Entitled Person of their decision within 15 days of the hearing of grievance.

NEED BASED ASSESSMENT

1.1 INTRODUCTION

A Need based assessment is a tool to identify the gap between problems and basic need of the project affected people and families. A need assessment is a focused on the things currently are and the way things can be in order to fill the gap of specific need and problems.

1.2 SCOPE OF NEED BASEC ASSESSMENT

- Collecting information about a target population or community
- Deciding what needs are being met and what resources exist
- Determining what needs are not being addressed

1.3 METHODOLOGY FOR NEED BASED ASSESSMENT

Method using in need based data collection carried out in primary survey are given below:

TABLE – 1.1

Focus Group	• A method of interviewing a carefully selected small group of people, who participate in a pre-determined, focused discussion led by an experienced evaluator • Helpful when working to collect specific in-depth thoughts and opinions on a topic
Key Informant Interviews	• Intensive interviewing with an individual who meets specific selection criteria based on their personal experience. • A way to obtain in-depth information about feelings and perspectives.
Community Meetings	• Community meetings include gathering information about individuals in a target population or community. • Does not provide as in-depth information as a focus group or key informant interview but is a way to gather information from larger groups.
Surveys	• A method of data collection that provides evaluators with specific information that can be used to create a statistical summary of the thoughts, beliefs, feelings, and opinions of a target population.

1.4 BASIC PROBLEMS / NEEDS OF THE REVENUE VILLAGE

Basic problems and needs of the affected villagers as per above methodology are given below:

TABLE – 1.2

Basic Problems / Needs in the Revenue Village

S. No.	Village Name	Basic Problem / Need
1.	**Sugala**	Drainage, drinking water problem, maintenance of roads inside the village, need for awareness regarding diseases and employment etc.
2.	**Jagatiya**	

તા.૧૮/૦૪/૨૦૧૧ ના સરકારશ્રીના મહેસુલ વિભાગના ઠરાવ અન્વયે અમલ માં આવેલ જંત્રી

જીલ્લા . JUNAGADH તાલુકા. KODINAR AnneXure I

ગામનુ નામ. SUGALA Rs. per Sq.Mts

ગામતળ રહેણાંક – 235 ગામતળ વાણિજય – 285

સર્વે નંબર	બીનખેતી જમીન				
	રહેણાંક	વાણિજય	ઔધોગિક	ખનિજ તત્વોવાળી	
165, 170, 171, .	240			310	રાષ્ટીય/રાજય ધોરીમાર્ગ ઉપર
174, 175, 191, .	240				રાષ્ટીય/રાજય ધોરીમાર્ગ ઉપર
6, 8, 9, 10, 164, .			405		રાષ્ટીય/રાજય ધોરીમાર્ગ ઉપર
7, .	283		405	330	રાષ્ટીય/રાજય ધોરીમાર્ગ ઉપર
-/192TO200, 4, 5, 7/1, 11, 23, 23/Paiki, 24, 25, 26, 26/Paiki, 27, 30, 31, 32, 32/Paiki, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 76, 151, 152, 153, 161, 162, 163, 188, 190, 202, 280, 281, 282, 283, 284, .			405		સામાન્ય
12, 13, 14, 15, 16, 17, 18, 19, 28, 29, 212, .	283		405	330	સામાન્ય
141, 142, 149, 157, 158, 159, 160, 166, 167, 168, 169, 172, 176, 178, 179, 180, 181, 182, 183, 184, .	240		405	310	સામાન્ય
148, 150, 154, 155, 156, 173, 177, 186, 187, 189, .	240		405		સામાન્ય
85, 86, 89, 102, 118, 119, 120, 121, .				310	સામાન્ય
87, 98, 102/Paiki, 103, .				330	સામાન્ય
97, 99, 100, 101, 104, 104/1, 105, 108, 109, 110, 111, .				330	સામાન્ય

* Other Survey numbers if any.
** Rs. per sq.mts is the base rate for calculation

જીલ્લા . JUNAGADH
તાલુકા. KODINAR
ગામનુ નામ. JAGATIYA
Rs. per Sq.Mts
ગામતળ રહેણાંક – 260
ગામતળ વાણિજય – 310

સર્વે નંબર	બીનખેતી જમીન				
	રહેણાંક	વાણિજય	ઔધોગિક	ખનિજ તત્વોવાળી	
39, 40/2, 40/1, 41, 46/1, 46/2, 50, 65, 66, .			445		રાષ્ટીય/રાજય ધોરીમાર્ગ ઉપર
3, 19, 22, 23, 33/1, 33/2, 34, 35, 98, 100, .			445		જીલ્લા મુખ્ય/ અન્ય જીલ્લા માર્ગ ઉપર
1/2, 2/1, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 24, 25, 26, 27, 28, 29, 30, 31, 32, 36, 37, 38, 42, 43, 44, 45, 47, 48, 49, 51, 52, 53, 54, 55, 60, 62, 64, 67, 68, 69, 70/1, 70, 71, 76, 77, 78, 96, 97, 99, .			445		સામાન્ય
59, 61, .	315				સામાન્ય
63, .	315		445		સામાન્ય

S.No	SOCIO-ECONOMIC AND DEMOGRAPHIC PROFILES OF PAFS/PAPS OF SUGALA L/s MINE LEASE AREA				
1	Description	Sugala		Jagatiya	
2	Land Owner Name	Asgarbhai Hasabhai Barad			
3	Land Belong to village	✓			
4	Survey No.	153/2	153/p2/p2	154/p1	154/p4 52/p2
5	Literacy of PAPs				
	Education Level	Nos. of Persons			
	Illiterate and Below Primary school				
	Primary				
	Secondary	02			
	Higher Secondary	04			
	Graduation and above	04			
6	Occupation of PAPs				
	Primary Occupation	PAPs			
	Agriculture	06 ✓			
	Govt. Service				
	Pvt. Service				
	Business	04 ✓			
7	Caste Composition of Surveyed PAFs				
	Caste Category	PAFs			
	General				
	OBC	03 ✓			
	SC				
	ST				
8	Age group and Gender of PAPs				
	Age group	Population	Gender: Male	Gender: Female	
	Below 5				
	5 - 15				
	15 - 25				
	25 - 35		02	02	
	35 - 45				
	45 - 55		02	02	
	Above - 55		01	01	
9	Family Type of PAFs				
	Family Type	Total No			
	Joint	01			
	Nuclear	02 ✓			
10	Family Size of PAFs				
	Family Size of PAFs	Number			
	Up to 4	02			
	5 to 7	01			
	Above 8	✓			
11	Marital Status of PAPs				
	Marital Status	No of PAPs			
	Married	06			
	Unmarried	04			
	Widow/Widower				
12	Household Composition of PAFs				
	Male Head Family		Woman Head Family		
	✓				

November 14, 2002

Annexure XV_CCA dated 2002

To,

Accounts Department
Ambujanagar

Sub.:- Consent to Operate under Air & Water Act for Sugala Mining project from Gujarat Pollution Control Board.

Please find enclosed herewith-original copies of Consent to operate orders for Sugala Limestone Mine, which are valid up to 31.07.2003.

This is for your information and record please.

Regards,

(A. K. Singh)
DGM (Env. & Safety)

CC: Jt.P. (W)/Jt.P. (M & G)/Jt.P. (Comm.)/ Sr.V.P.(O)- for information please.
GM (Geology)/ DGM (Mines)- Pl. send the comments, if any
Env. & Safety Dept.

O/C

14/11/02

Gujarat Pollution Control Board
Paryavaran Bhavan, Sector 10-A, GANDHINAGAR-382043.
Phone : 22756, 22095, 22096 Gram : CLEANWATER
Fax : (02712) 32156

U.P.C.

CONSENT ORDER NO.20261

Consent for operation of the plant under Section 21 of the Air (Prevention and Control of Pollution) Act-1981.

With reference to the consent application No.8516 vide letter No. nil , dated.3-7-02 and subsequent correspondence, CONSENT is hereby granted under Section 21 of the Air (Prevention and Control of Pollution) Act-1981 (hereinafter referred to as the Act) and the Rules made thereunder to M/s.GUJARAT AMBUJA CEMENT LTD.(SUGALA & JAGATIYA MINIG).((hereinafter referred to as the 'applicant') authorizing them to operate their MINE plants located at,at SUGALA & JAGATIYA,TA:-KODINAR.DIST:-JUNAGADH.Air Pollution Control Areas notified, subject to the conditions stated below :-

1. The consent order is valid up to31.7.2003 operate industrial plant for the manufacture of following products :

PRODUCTS	QUANTITY
LIME STONE	1.04 MTPA

2. There shall be no use of fuel hence there shall be no flue gas emission.

3. The concentration of suspended Particulate Matter in ambient air at a distance of 40 meters from Mining area shall not exceed 600 mictogram /m^3.

4. The applicant shall install & operate following measures so that the emission of particulate matter shall not exceed the concentration mentioned at (3) above.

   a) Water spraying system.
   b) crusher shall be equipped with necesary Air Pollution Control Measures.
   c) Adequate plantation shall be carriedout in and around mining area.
   d) Transporatation of product Material(I,e Lime Stone and l)shall be carried out in close/covered trucks.
   e) Mining shall be carried out as per approval of (as per approved Plan of)Indian Beaura of mines.

5. The air pollution control equipment shall be installed and operated so that the gaseous emission conforms to the standards specified in condition no.3 above

6. The consent to operate the industrial plant shall lapse if at any time the parameters of the gaseous emission are not within the tolerance limits specified in the condition no.3 above.

arat Pollution Control Board
aryavaran Bhavan, Sector 10-A, GANDHINAGAR-382043.
Phone : 22756, 22095, 22096 Gram : CLEANWATER
Fax : (02712) 32156

7. The applicant shall at his own cost get samples of ambient air quality collected and analysed from an approved laboratory once in every three month for the parameters indicated in condition no.3 and shall submit in duplicate the report there of to the Board by the 10th of the succeeding month. The applicant shall also maintain records of the analytical results properly and shall keep these records/charts open for inspection.

8. The environmental management unit/cell shall be set up to ensure implementation and monitoring of environmental safeguasrds and other conditions stipulated by statutory authorities.The Environmental Management cell/unit shall directly report to the chief Executive of the organisatisation and shall work as a focal point for internalising environmental issues,These cells/units shall also coordinate the exercise of environmental audit and proeparation of enviornmental statements.

9. The applicant shall have to make necessary arrangements for sampling of gaseous emission for the analysis of various parameters stated in condition no. 3 above.

10. In case of change of ownership managemnt the name and address of the new owners/partners/directors/propeietor should immediately be intimated to the Board..

11. The consent granted shall lapse at at any time if any parameters or any condition of this consent order are not complited with.

12. The applicant shall also comply with the general conditions (NO.1TO28) as per Annexure I enclosed, (whicheverapplicable)

13. The applicant shall abo comply with condtion given in Env clearamse from MOEF.

PENAL PROVISIONS :- If the applicant fails to comply with the conditions of this order and other directives issued by the Board he is liable for prosecution under Section 37,38,39 and other penal provisions of the Act.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD

1/11/02

(V.R.GHADGE)
ENVIRONMENTAL ENGINEER

NO:AIR/JNG-300/ 36198 7 - NOV 2002

ISSUED TO :
M/S.GUJARAT AMBUJA CEMENT LTD.
(SUGALA & JAGATIYA MINIG,
SUGALA & JAGATIYA,TA:-KODINAR.DIST:-JUNAGADH.

ANNEXURE I- ::

GENERAL CONDITIONS

i) The applicant shall take adequate measure for the control of fugitive emission.

ii) The the event the emission of any air pollution into the atmosphere in excess of the standards laid down by this Board occurance or is apprehended to occur due to accident or unforeseen act or even, the applicant or the person incharge of the premises shall forthwieth intimate the fact of such occurance to the Regional Officer of the Board under intimation to the Member Secretary. In accordance with the Section 23 (1) of the Act.

iii) In case of such accidental discharge/emission referred in (ii) above the applicant shall take immediate action to bring the emission level within the limits prescribed in the item 2 & 3 of this order.

iv) Good-house keeping shall be mainted within the factory and in the premises. Alh hoods pipes, valves shall be leak proof.

v) An inspection book containing the records on operation of air pollution control equipment and relevant data shall be made open and shall be made available to the officers of the Board through their Board to the factory.

vi) The applicant shall furnish to the visiting officer of the Board any information regarding the construction installation and operation of air pollution control equipment/system and such other particulars may be pertinent to the control of air pollution.

cv/11295.....

Gujarat Pollution Control Board
Paryavaran Bhavan, Sector 10-A, GANDHINAGAR-382043.
Phone : 22756, 22095, 22096 Gram : CLEANWATER
Fax : (02712) 32156

U.P.C.

CONSENT ORDER NO.28801

IN EXERCISE of the powers conferred by Section 26 read with Subsections (1) & (4) of Section 25 of the Water (Prevention and Control of Pollution) Act-1974 (hereinafter referred to as the 'Act') the consent is granted to M/s.GUJARAT AMBUJA CEMENT LTD.(SUGALA & JAGATIYA),(hereinafter referred to as the 'applicant') for the use of the existing/new outlet for the discharge of effluent from their industrial plant located at SUGALA & JAGATIYA,TA:-KODINAR.DIST:-JUNAGADH.subject to the following conditions :

1. The Consent is valid upto 31.7.2003 for the discharge of effluent arising as a result of the manufacture of the following items:

ITEM	CAPACITY
LIME STONE	1.04 MTPA

2. There shall be no generation of industrial effluent from the manufacturing process and other ancilliary industrial operations.

3. Quantity of the sewage shall not exceed 5000 lit/day.

4. Material handling shall be improved so as to prevent spillage of materials closed/covered trucks shall be used for transportation of productes materials (lime stone).

5. Reclamation of used minet suould be undertake as per approved mining plan.

6. Sewage shall be disposed of through septic tank/soak pit system.

7. In order to enable the Board to perform its functions of ascertaining the standards of effluent laid down by it for the discharge of the effluent under the condition no.4 of this order are complied with by the Company while causing discharge of effluent, the applicant shall have to submit very month the analysis report of the samples of effluent at collected and analysed by one of the laboratories recognised by the State Board.

8. The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organisation and shall work as a focal point for internalising environmental issues. These cells/units also coordinate the exercise of environmental audit and preparation of environmental statements.

ollution Control Board
an Bhavan, Sector 10-A, GANDHINAGAR-382043.
e: 22756, 22095, 22096 Gram: CLEANWATER
ax: (02712) 32156

9. The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitting to this State Board latest by 30th September every year.

10. The applicant shall also comply with the General Conditions as per Annexure - I enclosed.

11. The Board reserves the right to review and/or revoke the consent and/or make variations in the conditions which the Board deems fit in accordance with Section 27 of the Act.

12. In case of change of ownership/management the name and address of the new owners/partners/directors/proprietor should immediately be intimated to the Board.

13. The consent to operate the industrial plant shall lapse if at any time the any conditions of this consent order are not complied with.

14. The applicant shall also comply with condtion given in Env clearamse from MOEF.

PENALTY PROVISIONS :If the applicant fails to comply with the conditions and other directives issued by this Board as laid down in this order, the applicant is liable for prosecution under section 43 & 44 and other penal provisions of the Act and shall on conviction, be liable for punishment and imprisonment as provided in the said Act.

For and on behalf of
GUJARAT POLLUTION CONTROL BOARD

1/11/02
(V.R.UNADKAT)
ENVIRONMENTAL ENGINEER

NO:PC/JNG-657/ 36150
ISSUED TO
M/s.GUJARAT AMBUJA CEMENT LTD.
(SUGALA & JAGATIYA MINES),
SUGALA & JAGATIYA,TA:-KODINAR.
DIST:-JUNAGADH.

1 - NOV 2002

of factories in respect of safety measures.

ANNEXURE-I

GENERAL CONDITIONS:-

1. Arrangement for the measurement of the flow rate of the effluent shall be provided within the terminal man hole near the outlet of the effluent from the factory or premises of the applicant or from the premises of the local body. No effluent shall be admmited in the pipe. Sewer or channel down-stream of the flow measurement system or the terminal manhole. No effluent shall find its way to any place other than the collection system desigend & provided for the same. Measurement of flow shall be maintained by the applicant and records shall be available to the officers of the Staff whenever called for.

2. Solid waste arising from the manufacturing process and/or from the treatment of the effluent shall be disposed of by incineration or by sanitary land filling at a site approved by the Board.

3. The applicant shall have to plant atleast 3 variaties of trees along the boundaries of the industrial premises with a density of not less than 1000trees/acre.

4. Storm water shall not be mixed with the industrial effluent.

5. Good house keeping shall be maintained within the factory and the industrial premises. All pipes, valves and drains shall be leak proof. Floor washing shall be admmited into the effluent collection system for subsequent treatment and disposal.

6. The applicant shall provide facilities for collection of sample of the effluent by the Staff of the Board.

7. The applicant shall intimate the occurance of any accident, act or event resulting in discharge of poisonous, noxious or polluting matter or the likelihood of the same into a stream or well, to the Regional Officer under the intimation to the Member Secretary in accordance with Section 31(1) of the Water Act.

8. Clearance shall be obtained from the Chief Inspectorate of Factories in respect of safety measures.

RA/191096...

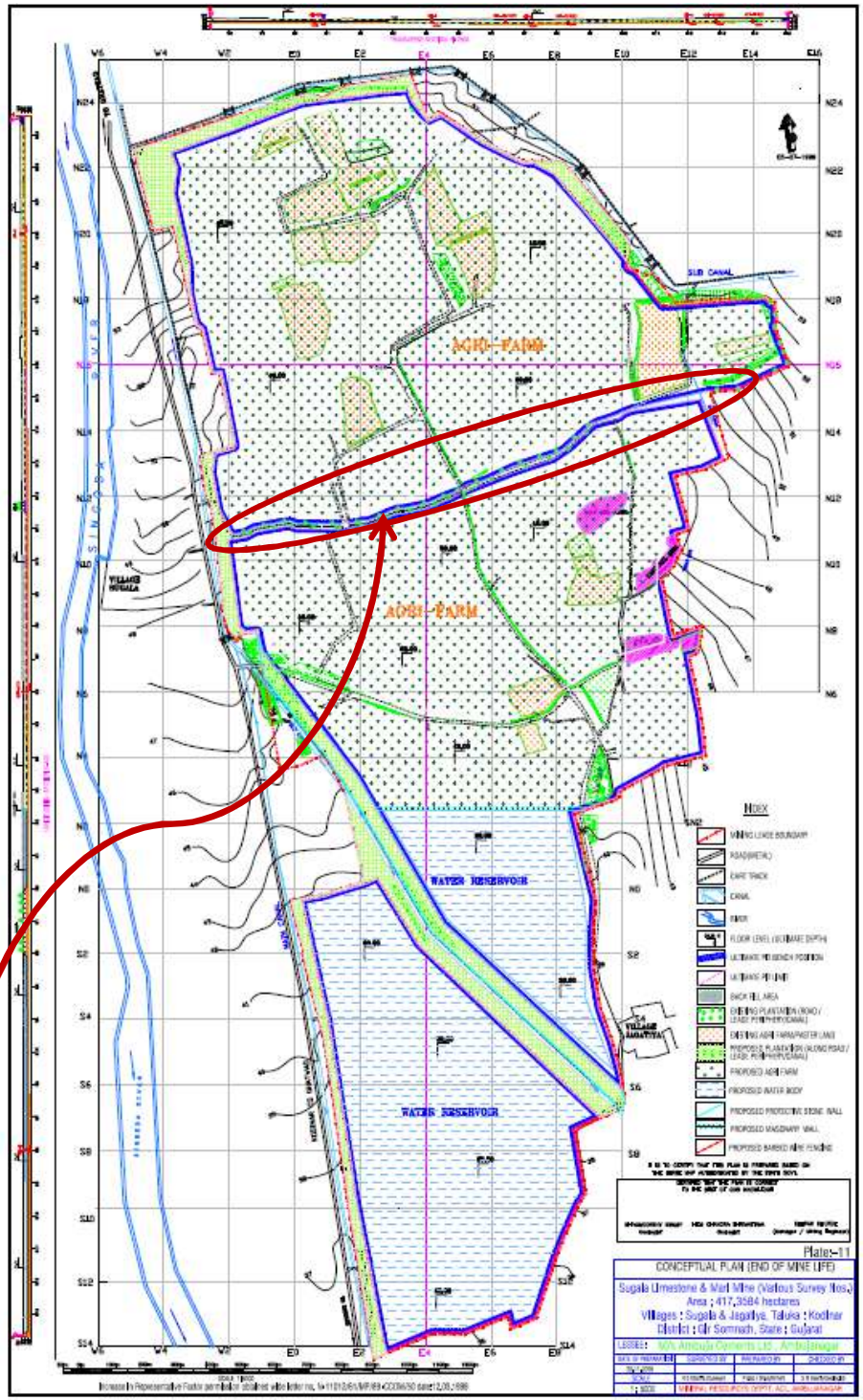
UN-DISTURBED LAND LOCATION

- **CONCEPTUAL LAND STATISTICS:**

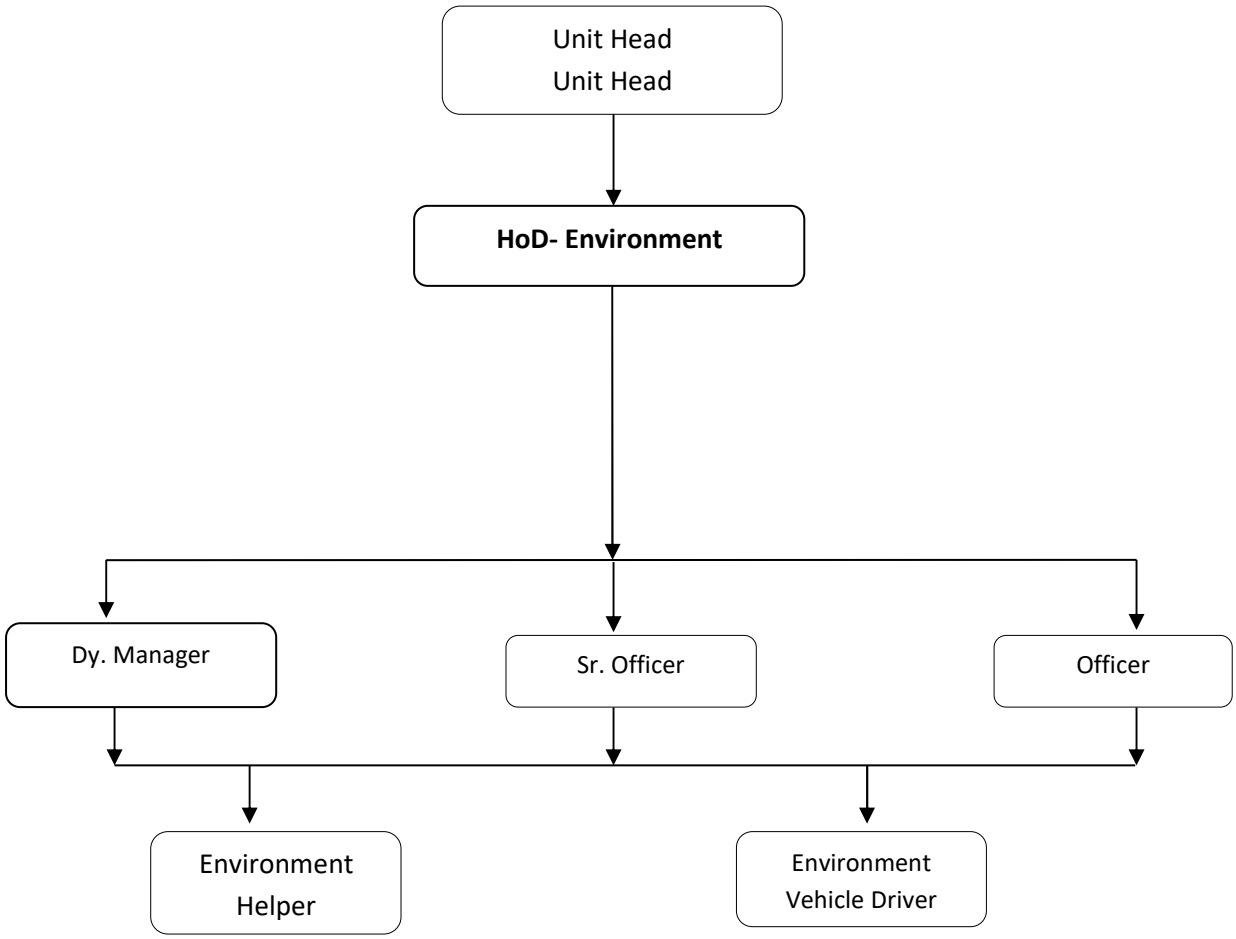
S. No	Land Use Category	Conceptual Statistic (Ha)
1.	Top Soil, Waste Dump & Mineral Storage	-
2.	Water Reservoir	100.00
	Agri farming/ Pasture land	260
3.	**Road / cart track (*)**	**0.5116**
4.	Infra-structure / Built up	-
5.	Green belt /Plantation	46.00
6	**Undisturbed area (**)**	**10.8468**
	Total	**417.3584**

* Road / Cart track (shown in map) are haul roads, presently using for transportation.

** Un-disturbed land (10.85 ha) is shown in stat. barrier (15m) either side of village road including Village road area (2.52 ha) .



1. Departmental Organization Chart of Ambuja Cement, Ambujanagar



2. Individual Responsibility and Authorities

The Environment Department has been assigned responsibility of monitoring of various parameters like air, water, soil, noise and gives feed back to Production & other concerned departments for preventive and corrective measures, environmental clearance/s and permission/s, maintain register of legal requirement, ensure regulatory compliance, Holcim compliance & disseminate environmental awareness for continual improvement. The responsibilities and authority are summarized below:

No.	Designation	Role	Responsibility and Authority
6.1	HoD (Environment)	- Overall planning of activities internal and external co-ordination, communication and arrangement of resources - EMS-Core Group / EMS audit	To co-ordinate with various departments within organization and external with Govt. Authorities for effective and efficient operation and maintenance of pollution control equipment, ensure timely submission of Periodical Environmental Audit report, Annual Environmental Statements, monthly reports, Cess

		team member	reports and other requirements of local and national regulatory institutions and ensure its compliance & also responsible to all enviro-legal compliance during AFR activities in consultation with Head – AFR. Environment Clearance of Proposed project, Biodiversity study etc
6.2	Dy. Manager (Environment)	Responsible for TPP, Singsar, Sugala Mines, STP and DG Sets related Environmental issues and administrative back activities related to Environment.	Coordination for Environment Audit and its regular submission to concerned Govt. Bodies, CEMS as a project, Third Party/ self monitoring of stacks, AAQ etc as per EMP, Lab Analysis & Equipment calibration, Climate Change Mitigation Program, EC Compliance & CTE/CCA of respective areas, Support for various days celebration, , Submission of periodic documents/ reports to Govt. bodies, Preparation and submission of various returns and documents like Environment Statement, Water Cess etc, Budget preparation for various days celebration; Area: TPP & DG Sets, STP and Singsar, Sugala Mines.
6.3	Sr. Officer (Environment)	Responsible for Ambuja & Gajambuja Unit, RKBA, GALM survey no. 44, Solaj Mines and BCT related Environmental issues.	Co-ordination for AFR in Environmental issues, Training co-ordination, Records and follow ups,, Submission of Periodic reports internally and to corporates, EC Compliance & CTE/CCA compliance of respective area, documentation of OHS Safety Pyramid, Coordinator for various days celebration like Environment Day, Ozone Day etc., XGN data entry for all the area of concerns, PEP activities of plant, EC, CTE & CCA compliance of respective area, Corridor Project Coordination and misc. jobs given by HOD-Environment. Areas: Ambuja, Gajambuja Unit, BCT, RKBA, GALM survey no. 44, Solaj Mines.
6.4	Officer (Environment)	Responsible for Environmental issues and administrative back activities related to Environment.	Third Party/ self monitoring of stacks, AAQ etc as per EMP, Lab Analysis

Ambujanagar Environment Cell Mapping							
Sr. No	**Employee No**	**Employee Name**	**Department**	**Date of Joining**	**Date of Exit**	**Designation**	**Qualification**
1	1140	Vinit Kumar	Environment	13-06-1995	25-08-2004	Asst Manager Environment	M.Sc Environmental Science
2	1158	Arvind Singh	Environment	1995	2007	Asst Manager Environment	M.Sc Environmental Science
3	1374	Dr. AK Singh	Environment	01-03-1996	Jul-08	General Manager Environment	PhD Environment
7	2001158	ABHIJIT KAR	Environment	11-09-1996	30-08-2009	Manager (Safety)	B.Sc Environment Management & Diploma in Industrial Safety
8	1670	Sandeep Narang	Environment	16-12-2003	02-06-2004	Sr. Manager	
9	1635	Dhaval Gadwani	Environment	09-11-2002	04-02-2004	Engineer	
10	2001328	ASHWANI KUMAR KARWARIYA	Environment	01-02-2005	04-07-2008	Environmental Scientist	M.Sc Environmental Science
11	2001421	SHAILESHKUMAR PARMAR	Environment	19-10-2006	31-01-2014	Senior Chemist	M.Sc Environmental Science
12	2001428	DUSHYANT JAVIYA	Environment	12-02-2007	20-02-2009	Assistant Officer (Safety)	Diploma Industrial Safety
13	2001457	SUBHASH SAHOO	Environment	12-06-2007	23-09-2008	Senior Manager (Safety)	Diploma Industrial Safety
14	2001459	MEHUL DALKI	Environment	16-06-2007	24-04-2010	Officer (Safety)	Diploma Industrial Safety
15	2001462	ASHOK KUMAR PANDEY	Environment	25-06-2007	30-06-2011	Dy. Manager - Environment & Safety	M.Sc Environment Science & Diploma Industrial Safety
16	2001535	CHIRAG PAREGI	Environment	15-03-2008	17-09-2010	Officer Env & Safety	M.Sc Environment Science
17	2005435	BHAVIK GOHIL	Environment	25-06-2008	24-01-2011	Assistant Safety Officer	Diploma Industrial Safety
18	2005441	SHWETAL SHAH	Environment	11-08-2008	20-04-2009	Trainee (Environment)	M.Sc Environmental Science
19	2006128	VIRAL PATEL	Environment	21-05-2009	21-12-2009	Senior Engineer Safety	B.E Mechanical & Diploma Industrial Safety
20	2006682	NEELAN RANA	Environment	12-07-2010	31-01-2013	Manager - Environment	M.Sc Environmental Science
21	2006703	Suresh Hadwani	Environment	06-08-2010	28-09-2012	DGM & Head Environment & Safety	M.Sc. Environment & PG Diploma in Industrial Safety
22	2007329	JAI DODIYA	Environment	08-08-2011	17-12-2013	Engineer (Environment)	B.Tech (Bio-Medical) & Diploma Industrial Safety
23	2008246	Saurabh Agarwal	Environment	09-02-2013	28-08-2015	Assistant Manager (Environment)	M.Phil & M.Sc Environment Science
24	2008458	Anand Kumar RAI	Environment	17-06-2013	20-08-2018	Deputy General Manager (Environment)	PhD & M.Sc Botany
25	2008616	Abhimanyu Singh Shekhawat	Environment	22-07-2013	15-07-2017	Senior Engineer Environment	B.Tech Mining
26	2008910	Abhay KUMAR	Environment	12-04-2014	25-06-2018	Senior Engineer Environment	B.Tech Environmental Engineering
27	2008526	Sweety Zenith	Environment	22-07-2016	28-08-2019	Asst Manager Environment	B.Tech Electrical
28	2009905	Saurabh Singh	Environment	01-11-2017	Present	Officer Environment	M.Sc Environmental Science
29	2010150	Anand Singh Chouhan	Environment	13-07-2018	Present	Sr. Officer Environment	M.Sc Environmental Science
30	2010298	Anand Prakash	Environment	22-10-2018	Present	DGM & Head Environment	M.Tech Environment
31	2007678	Sashikant Alhat	Environment	14-08-2019	Present	Dy. Manager - Environment	M.Sc. Environment

Ambuja Cement

87920

ACL/EMD/F-16/2020/ 2215

Date: 03.10.2020

To,

Dr. A K Malhotra,
C-6, SubhavnaNiketan, Road No. 41,
Pitampura, Delhi-110034

Dr. (Ms.) AshaRajvanshi,
Wildlife Institute of Inida, P.B. # 18,
Chandrabani, Dehradun 248001

Subject- Sugala Limestone and Marl Mine by Ambuja Cements Ltd with Limestone production capacity of 1.29 Million TPA and topsoil 0.25 MTPA (Total excavation 1.54 MTPA) in the mining lease area of 417.3584 ha located at Villages Sugala and Jagatiya, Taluka- Kodinar, District- Girsomanth (erstwhile Junagad) (Gujarat) - **Consideration of Environmental Clearace –Information/Clarification –Reg.**

Ref: **1. MOEFCC File No. J-11015/154/2018-IA.II (M) and Proposal Number- IA/GJ/MIN/77357/2018**
2. Point no (xvii) of MoEFCC letter no F. No. J- 11015/154/2018-IA.II (M) 12th December, 2019
3. Our letter no ACL/EMD/F-16/2020/2080/86901 dtd 28.01.2020

Sir/Madam,

This has reference to the aforesaid subject and above cited reference 2 matter; we would like to inform you that our project case was considered in the 10thEAC (Non Coal Mining) Meeting held on 21st October, 2019 and an ADS letter was issued on 12th December, 2019. Subsequently in reply of ADS point no (xvii) we had sent the copy of the approved CMP to you vide our letter no **ACL/EMD/F-16/2020/2080/86901 dtd 28.01.2020.** But we have not received any comments or reply from you hence again sending herewith enclosed the copy of the same for your review and comment or suggestion for the strengthening of the CMP.

Thanking You

Yours Faithfully

For Ambuja Cement Ltd.,

Anand Prakash
Dy. General manager (Environment)

Encl: As above

CC: Member Secretary, IA-II (Non- Coal Mining),
Ministry of Environment, Forest and Climate Change,
Govt. of India, Indira ParyavaranBhavan,
Jorbag Road, Aliganj, Delhi – 110 003

Regd. Office :
PO : Ambujanagar - 362 715, Tal : Kodinar,
Dist. : Gir Somnath (Gujarat)
Phone : (02795) 221137, 232009,
Fax : (02795) 220328

Ambuja Cements Limited
(Unit : Ambujanagar)
CIN No. : L26942GJ1981PLC004717
www.ambujacement.com

Corporate Office :
Elegant Business Park,
MIDC Cross Road 'B'
Off Andheri - Kurla Road, Andheri (E)
Mumbai - 400 059. Phone : (022) 4066700

Ambuja Cement

86901

ACL/EMD/F-16/2020/2080

Dtd. : 28.01.2020

Dr. A.K. Malhotra,
C-6, Subhavna Niketan, Road No. 41,
Pitampura, Delhi-110034

Dr. Asha Rajvanshi,
WII, P.B# 18, Chandrabani,
Dehradun-248001, Uttarakhand

Subject : Sugala Limestone and Marl Mine by M/s Ambuja Cement Ltd with Limestone production capacity of 1.29 Million TPA and topsoil 0.25 MTPA (Total excavation 1.54 MTPA) in the mining lease area of 417.3584 ha located at Villages Sugala and Jagatiya , Taluka- Kodinar, District- Gir-Somnath, Gujrat- **Consideration of Environmental Clearance- information/Clarification –Reg.**

Ref -1 : Proposal No: IA/GJ/MIN/77357/2018
Ref-2: Point No. xvii of MoEFCC letter No F.No. J-11015/154/2018-IA.II (M) dtd 12.12.2019

Respected Sir,

This has with reference to the above subject matter and clarification sought by EAC committee vide letter no F.No. J-11015/154/2018-IA.II (M) dtd 12.12.2019 and point No. xvii.

We would like to draw your kind attention that we have approved CMP by Chief Wildlife Warden vide letter no WLP/32/B/8598-99/2018-19 dtd 10.12.2018 as per the prevailing guidelines of Govt. of India.

We are submitting herewith CMP copy and Chief Wild Life Warden, Gandhinagar approval letter in-lieu with the point no. (xvii) of the letter dtd 12.12.2019 for proper examination. Kindly provide your valuable suggestion and input if any for better implementation.

Thanking you,

Yours Faithfully,
For Ambuja Cements Ltd.

S. Ramarao

S. Ramarao
MCH (W & S)

CC: **Member secretory ,**
Shri. Sundeep, Director/Scientist 'F'
IA-Division (Non-coal Mining sector)
A-106, Agni Block, 1st Floor, Indira Paryavaran Bhawan,
Ministry of Environment, Forest &Climate Change,
Jor bagh Road, New Delhi-110003

Encl : Copy of CMP & Approval letter

Regd. Office :
O : Ambujanagar - 362 715, Tal : Kodinar,
Dist. : Gir Somnath (Gujarat)
Phone : (02795) 221137, 232009,
Fax : (02795) 220328, 232032

Ambuja Cements Limited
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CIN No. : L26942GJ1981PLC004717
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Elegant Business Park,
MIDC Cross Road 'B'
Off Andheri - Kurla Road, Andheri (E)
Mumbai - 400 059. Phone : (022) 4066700

O/C

Ambuja Cement

86901

ACL/EMD/F-16/2020/2080

Dtd. : 28.01.2020

Dr. A.K. Malhotra,
C-6, Subhavna Niketan, Road No. 41,
Pitampura, Delhi-110034

Dr. Asha Rajvanshi,
WII, P.B# 18, Chandrabani,
Dehradun-248001, Uttarakhand

Subject : Sugala Limestone and Marl Mine by M/s Ambuja Cement Ltd with Limestone production capacity of 1.29 Million TPA and topsoil 0.25 MTPA (Total excavation 1.54 MTPA) in the mining lease area of 417.3584 ha located at Villages Sugala and Jagatiya , Taluka- Kodinar, District- Gir-Somnath, Gujrat- **Consideration of Environmental Clearance- information/Clarification –Reg.**

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Thanking you,

Yours Faithfully,
For Ambuja Cements Ltd.

S. Ramarao

S. Ramarao
MCH (W & S)

CC: **Member secretory ,**
Shri. Sundeep, Director/Scientist 'F'
IA-Division (Non-coal Mining sector)
A-106, Agni Block, 1st Floor, Indira Paryavaran Bhawan,
Ministry of Environment, Forest &Climate Change,
Jor bagh Road, New Delhi-110003

Encl : Copy of CMP & Approval letter

DEPARTMENT OF POST

REGISTERED - LETTER STATEMENT

Date:-30.01.2020

Place : Ambujanagar

RG = Registered letter , CG = Registered Parcel , EG = Speed Post

Sr. No	Regd No	Name of party	Place	Rs.	Docket No.	Remarks
1		Dr A K Malhotra-Sadbhavna Niketan	Delhi-Pitampura	71	EG795504455IN	86901 Emd
2		Dr Asha Rajvanshi	Dehradun-Uttarakhand	71	EG795504464IN	86901/2 Emd
3		Member Secretary -Shri Sandeep Director/Scientist	New Delhi	71	EG795504478IN	86901/3 Emd
4						
5						
6						
7						
8						
9						
10						

Total : 213

213
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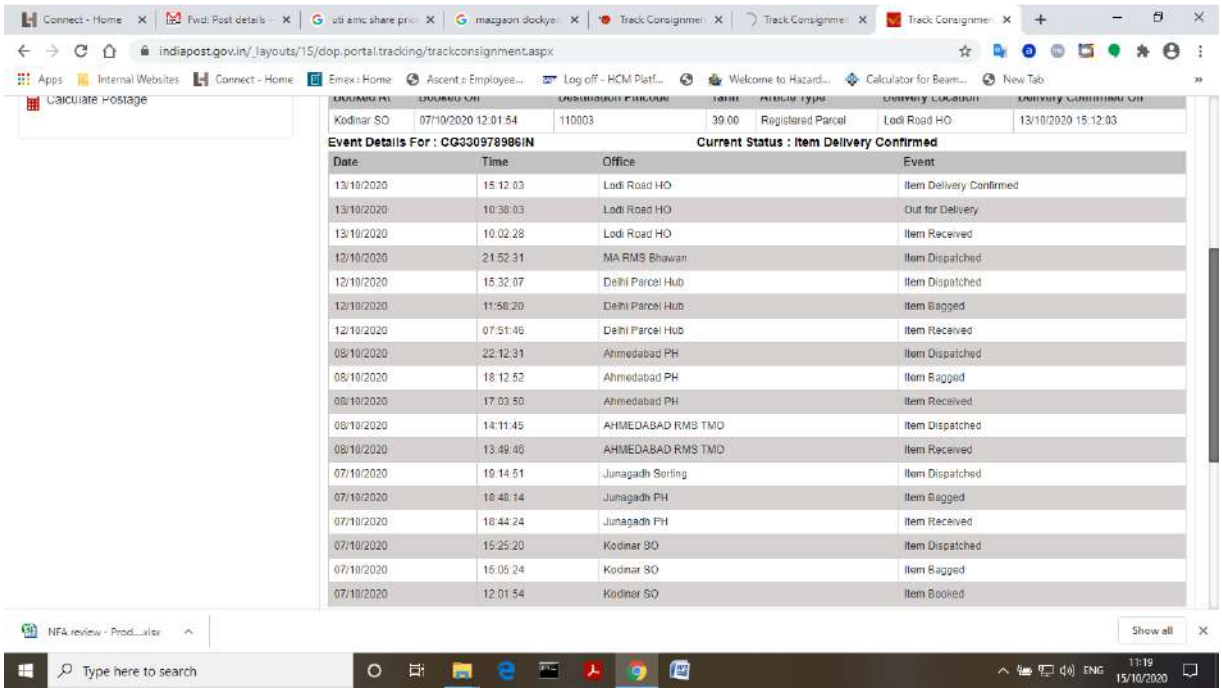
213

Senders Signature

Ambuja Cements Ltd
PO : Ambujanagar
Tal : Kodinar
Dist : Gir Somnath

Postal Deptt

SUB POSTMASTER
KODINAR MDG
362720



Calculate Postage

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Event Details For : CG330978986IN **Current Status : Item Delivery Confirmed**

Date	Time	Office	Event
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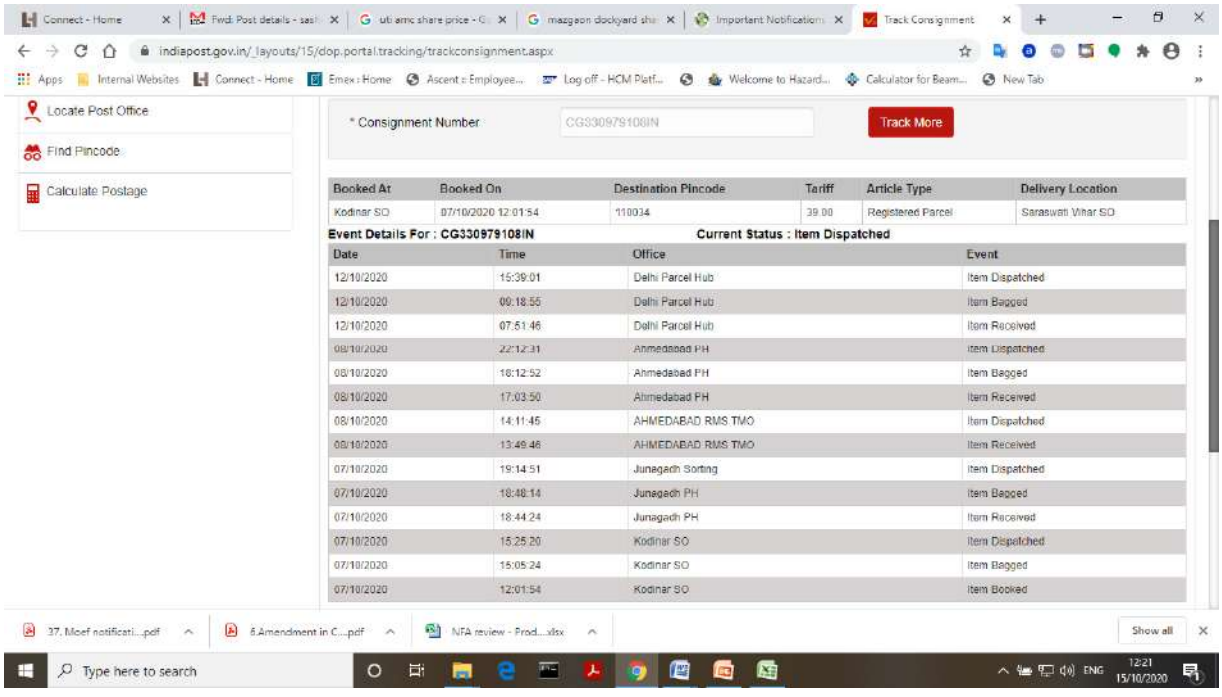
13/10/2020	10:38:03	Lodi Road HO	Out for Delivery
13/10/2020	10:02:28	Lodi Road HO	Item Received
12/10/2020	21:52:31	MA RMS Bhawan	Item Dispatched
12/10/2020	15:32:07	Delhi Parcel Hub	Item Dispatched
12/10/2020	11:58:20	Delhi Parcel Hub	Item Bagged
12/10/2020	07:51:46	Delhi Parcel Hub	Item Received
08/10/2020	22:12:31	Ahmedabad PH	Item Dispatched
08/10/2020	18:12:52	Ahmedabad PH	Item Bagged
08/10/2020	17:03:50	Ahmedabad PH	Item Received
08/10/2020	14:11:45	AHMEDABAD RMS TMO	Item Dispatched
08/10/2020	13:49:46	AHMEDABAD RMS TMO	Item Received
07/10/2020	19:14:51	Junagadh Sorting	Item Dispatched
07/10/2020	18:48:14	Junagadh PH	Item Bagged
07/10/2020	18:44:24	Junagadh PH	Item Received
07/10/2020	15:25:20	Kodinar SO	Item Dispatched
07/10/2020	15:05:24	Kodinar SO	Item Bagged
07/10/2020	12:01:54	Kodinar SO	Item Booked



Locate Post Office

Find Pincode

Calculate Postage

* Consignment Number CG330979108IN Track More

Booked At	Booked On	Destination Pincode	Tariff	Article Type	Delivery Location
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Event Details For : CG330979108IN **Current Status : Item Dispatched**

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12/10/2020	07:51:46	Delhi Parcel Hub	Item Received
08/10/2020	22:12:31	Ahmedabad PH	Item Dispatched
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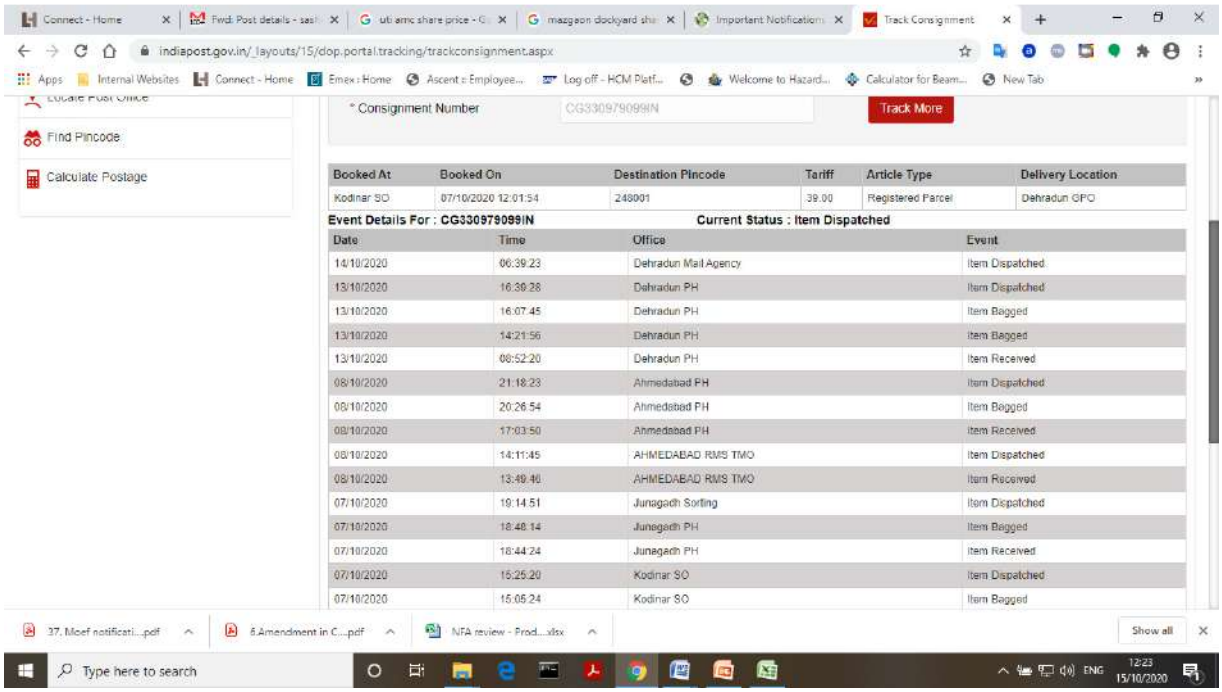
08/10/2020	14:11:45	AHMEDABAD RMS TMO	Item Dispatched
08/10/2020	13:49:46	AHMEDABAD RMS TMO	Item Received
07/10/2020	19:14:51	Junagadh Sorting	Item Dispatched
07/10/2020	18:48:14	Junagadh PH	Item Bagged
07/10/2020	18:44:24	Junagadh PH	Item Received
07/10/2020	15:25:20	Kodinar SO	Item Dispatched
07/10/2020	15:05:24	Kodinar SO	Item Bagged
07/10/2020	12:01:54	Kodinar SO	Item Booked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Track Consignment
Apps
Internal Websites
Connect - Home
Locate Post Office
Find Pincode
Calculate Postage
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CG330979099IN
Track More
Booked At
Booked On
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37. Moef notificati....pdf
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15/10/2020