

Environmental Impact Assessment Report & Environmental Management Plan

(Submitted for Public Consultation as Per EIA Notification 2006)

SHIRALE BAUXITE MINE

Area : 278.85 Ha

**Mouje Shirale turf Malkapur, Panundre and Mhalaswade Villages of
Shahuwadi Taluka, Kolhapur District, Maharashtra.**

PROJECT PROPOSAL

PROPOSED PRODUCTION: 2.5 LTPA OF BAUXITE

PROJECT PROPONENT

**Anand Mines Products (P) Limited
1472 D ward Shukrawar Peth
Kolhapur – 416002**

EIA CONSULTANT

M/s Bhagavathi Ana Labs Ltd

**Corporate Office:
8-2-242/5/A/42, Venkateshwara Hills
Road No 3, Banjara Hills,
Hyderabad -500 034
Ph: 040-23356908; Fax: 23356909**

No. J-11015/262 /09- IA-II (M)
Government of India
Ministry of Environment & Forests

Tel no. 24363973
E mail: plahujarai@yahoo.com
Paryavaran Bhavan, C.G.O. Complex,
Lodi Road, New Delhi-110003
Dated the November 9, 2009

To

M/s Anand Mines Products Pvt. Ltd.,
1472 D- Ward, Shukrawar Peth,
District Kohlapur - 416 002,
Maharashtra

Sub: Bauxite Mine of M/s Anand Mines Products Private Limited at villages Mouje Shirale turf Malakpur, Panundre and Mhalaswade in District Kohlapur, Maharashtra (ML area 278.85 ha and production of 2.5 LTPA of bauxite) reg - TOR

Sir,

This is to inform that the above proposal was considered by the Expert Appraisal Committee-2(Mining) during its 2nd meeting held during 26-27th October, 2009 for determination of the Terms of Reference(TORs) for undertaking detailed EIA study in accordance with the provisions of the Environmental Impact Assessment Notification dated 14th September, 2006.

2. The Committee has prescribed following Terms of Reference for preparation of the EIA/EMP report:

- i) Detail contact address of the project proponent including telephone numbers, e-mail ID etc shall be provided. Request for consideration for environmental clearance or any other communication regarding the project shall be made by the project proponent/ authorised person and not by its legal representative / consultant.
- ii) Executive summary of the project indicating relevant details shall be provided and issues raised in public hearing along with action plan to address the same shall be provided in tabular form including requisite allocation of funds.
- iii) A copy of lease deed allocated (lease execution) in the name of the company shall be provided along with mining plan (including progressive mine closure plan).
- iv) Exact coordinates of the mine location shall be furnished.
- v) Primary survey of flora and fauna shall be carried out and report submitted along with EIA/EMP report.

- vi) Action plan for identification of local employable youth for training in skills relevant to the project for eventual employment in the project itself shall be formulated so that to the extent possible, their interests are protected
- vii) Layout plan indicating break-up of lease area indicating area for excavation for mining, waste dump, mineral storage, top soil storage, green belt, infrastructure, roads etc shall be provided
- viii) Photograph of the mine lease area, where mining activity is proposed to be undertaken shall be provided.
- ix) Satellite imagery or authenticated map indicating drainage, cropping pattern, water bodies (rivers, nallahs, ponds etc.), location of nearest villages, national parks, wildlife sanctuaries, tiger reserves, biosphere reserves, heritage sites, reserve forests, eco sensitive areas etc in the core and buffer zone shall be provided.
- x) Detailed action plan for reclamation of mined pit before working subsequent mineral bearing area shall be prepared.
- xi) Action Plan for preservation of buffer zone to be maintained between two consecutive mineral bearing deposits shall be prepared.
- xii) Approved mining plan including progressive mine closure plan shall be provided along with EIA report. Letter of approval from IBM shall also be enclosed.
- xiii) Detailed drawings indicating geological formation of Ores with respect to ground water table shall be submitted.
- xiv) Detailed action plan for demarcation and vegetation of 50 m barrier all along the side of the lease (inside the lease) facing nallahs/streams (if any) flowing in the lease or adjacent shall be provided.
- xv) Action Plan for ambient air quality monitoring shall be prepared, which shall constitute of adequate stations in core and buffer zones. The company shall monitor Mn in the air, water, soil and vegetation.
- xvi) Action plan for control of fugitive dust generation shall be prepared. The plan shall consist of schedule and methodology of monitoring of fugitive dust emission at locations of nearest human habitation (including schools and other public amenities located nearest to sources of dust generation as applicable).
- xvii) Detailed plan for raising Shelter belt i.e Wind Break of 30 m width and consisting of at least 5 tiers around lease facing the human habitation / agricultural fields (if any in the vicinity) etc. shall be submitted.
- xviii) A scientific mining scheme for every 5 years for the lease life of the mine shall be prepared.
- xix) Scheme for Rain water harvesting including road map for implementation shall be prepared.

- xx) Action plan for maintenance of village roads through which transportation of ores are undertaken to be carried out by the company regularly at its own expenses shall be prepared.
- xxi) Measures for prevention and control of soil erosion and management of silt shall be prepared. Assessment of total silt load likely to be generated shall be carried out. Proposal for protection of dumps against erosion by geo textile matting or other suitable material and plantations of native trees and shrubs at the dump slopes shall be prepared.
- xxii) Trenches/ garland drains proposed to be constructed at foot of dumps and installation of materials like coco filters at regular intervals to arrest silt from being carried to water bodies shall be prepared. Proposal for adequate number of Check Dams and Gully Plugs proposed to be constructed across seasonal / perennial nallahs (if any) flowing through the ML area shall be prepared. De-silting schedule at regular intervals shall be also provided
- xxiii) Land-use pattern of the nearby villages shall be studied, including identification of common property resources available for conversion into productive land and action plan for abatement and compensation for damage to agricultural land/ common property land (if any) in the nearby villages, due to mining activity shall be prepared.
- xxiv) Need based assessment for the near by villages shall be conducted to study economic measures which can help in upliftment of poor section of society. Income generating projects consistent with the traditional skills of the people besides development of fodder farm, fruit bearing orchards, vocational training etc. can form a part of such programme. This will be in addition to vocational training for individuals imparted to take up self employment and jobs. Separate budget for community development activities and income generating programmes shall be specified.
- xxv) Implementation of Occupational health and safety measures for the workers including identification of work related health hazards, training on malaria eradication, HIV, and health effects on exposure to mineral dust etc. shall be prepared, including record keeping procedures. Awareness programme for workers on impact of mining on their health and precautionary measures like use of personal equipments etc. to be carried periodically shall also be submitted.
- xxvi) Green belt development and selection of plant species shall be as per CPCB guidelines. Herbs and shrubs shall also form a part of afforestation programme besides tree plantation. Details of year wise afforestation programme including rehabilitation of mined out area shall be prepared.
- xxvii) Details of litigation pending or otherwise with respect to subject mine in any courts, tribunal etc. shall be provided.
- xxviii) The questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall be filled up and submitted in complete.

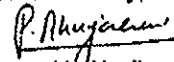
Besides the above, the below mentioned general points will also to be followed:-

- a) All documents to be properly referenced with index, page numbers and continuous page numbering.
- 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.
- c) Where the documents provided in a language other than English, an English translation should be provided.
- d) Approved mine plan along with copy of the approval letter for the proposed capacity should also be submitted.
- e) 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.

3. 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.

4. The Committee informed that the above specific Terms of Reference (TOR), if not already mentioned in the model TOR, shall be addressed by the proponent. It was further informed that these specific TORs shall be incorporated in the Draft EIA/EMP report along with the issues raised during the public hearing and response of the project proponent in tabular form. The EIA/EMP report shall thereafter be submitted to the Ministry along with requisite documents for appraisal by the EAC-2 (Mining) for consideration of environmental clearance in accordance with the provisions of the EIA notification dated September 14, 2006.

Yours faithfully,


(Dr. P. L. Ahujara)
Director

Copy to: The Chairman, Maharashtra Pollution Control Board, Kalpataru Points, 3rd & 4th Floor, Opp. Cine Planet, Sion Circle, Sion (E) Mumbai - 400 022.

**COMPLIANCE TO TERMS OF REFERENCE (TOR) ISSUED BY MOEF FOR
BAUXITE MINE OF ANAND MINES PRODUCTS PRIVATE LIMITED**

S.NO	TOR ISSUED BY MOEF	COMPLIANCE STATUS
1	Detail contact address of the project proponent including telephone numbers, e-mail ID etc shall be provided. Request for consideration for environmental clearance or any other communication regarding the project shall be made by the project proponent/authorized person and not by its legal representative/consultant	Detail contact address of the project proponent including telephone numbers, e-mail ID is given in chapter 1 of EIA/EMP report,
2	Executive summary of the project indicating relevant details shall be provided and issues raised in public hearing along with action plan to address the same shall be provided in tabular form including requisite allocation of funds.	Executive summary is enclosed in EIA report. Details of issues to be raised during public hearing and response from the project proponent will be submitted along with final EIA / EMP report.
3	A copy of lease deed allocated (lease execution) in the name of the company shall be provided along with mining plan (including progressive mine closure plan).	Copy of Government grant of lease deed is provided in Mining plan and will be included along with the Final EIA/EMP report
4	Exact coordinates of the mine location shall be furnished.	Exact coordinates of the mine location are enclosed in chapter 1 of EIA/EMP report
5	Primary survey of flora and fauna shall be carried out and report submitted along with EIA/EMP report.	Details of flora and fauna carried out are enclosed in chapter 3, Para 3.7 of EIA/EMP report.
6	Action plan for identification of local employable youth for training in skills relevant to the project for eventual employment in the project itself shall be formulated so that to the extent possible, their interests are	Action plan for identification of unskilled local youth for employment in various forms by imparting training as part of CSR activity is prepared and enclosed in chapter 7 Para 7.7 of EIA/EMP report

S.NO	TOR ISSUED BY MOEF	COMPLIANCE STATUS
	protected.	
7	Layout plan indicating break-up of lease area indicating area for excavation for mining, waste dump, mineral storage, top soil storage, green belt, infrastructure, roads etc shall be provided.	Layout plan indicating break-up of lease area indicating area for excavation for mining, waste dump, mineral storage, top soil storage, green belt, infrastructure, roads etc is enclosed in the EIA/EMP report.
8	Photographs of the mine lease area, where mining activity is proposed to be undertaken shall be provided.	Photographs of the mine lease area, where mining activity is proposed to be undertaken is enclosed in the Annexure IV
9	Satellite imagery / authenticated map indicating drainage, cropping pattern, water bodies (rivers, nallahs, ponds etc) location of nearest villages, national parks, wildlife sanctuaries, tiger reserves, biosphere reserves, heritage sites, reserve forests, eco sensitive areas etc in the core and buffer zone shall be provided.	Satellite imagery showing all the relevant features in the study area is enclosed in chapter 3 of EIA/EMP report.
10	Detailed action plan for reclamation of mined pit before working subsequent mineral bearing area shall be prepared.	Detailed plan for Reclamation and rehabilitation is enclosed in chapter 5 Para 5.8 of EIA/EMP report,
11	Action plan for preservation of buffer zone to be maintained between two consecutive mineral bearing deposits shall be prepared.	50 m of barrier zone will be maintained all along the mine lease boundary as per the statutory requirement and green belt will be maintained in the barrier zone.
12	Approved mining plan including progressive mine closure plan shall be provided along with EIA report. Letter of approval from IBM shall also be enclosed.	IBM approved mining plan letter is enclosed as Annexure V in the EIA/EMP Report
13	Detailed drawings indicating	Geological plan is enclosed along

S.NO	TOR ISSUED BY MOEF	COMPLIANCE STATUS
	geological formation of Ores with respect to ground water table shall be submitted.	with the EIA/EMP report.
14	Detailed action plan for demarcation and vegetation of 50m barrier all along the side of the lease (inside the lease) facing nallahs/streams (if any) flowing in the lease or adjacent shall be provided.	Methodology for demarcating of 50m barrier no mining zone along the side of the lease facing the river is prepared and indicated in the chapter 4, Para 4.1.4 of EIA/EMP report,.
15	Action plan for ambient air quality monitoring shall be prepared, which shall constitute of adequate stations in core and buffer zones. The company shall monitor Mn in the air, water, soil and vegetation.	Action plan for ambient air quality monitoring is prepared, which shall constitute of adequate stations in core and buffer zones is enclosed in chapter 8 of EIA/EMP report.
16	Action plan for control of fugitive dust generation shall be prepared. The plan shall consist of schedule and methodology of monitoring of fugitive dust emission at locations of nearest human habitation (including schools and other public amenities located nearest to sources of dust generation as applicable)	Action plan for control of fugitive dust generation is prepared. The plan consists of schedule and methodology of monitoring of fugitive dust emission at locations of nearest human habitation (including schools and other public amenities located of nearest to sources of dust generation as applicable)
17	Detailed plan for raising Shelter belt i.e Wind Break of 30m width and consisting of at least 5 tiers around lease facing the human habitation/agricultural fields (if any in the vicinity) etc. shall be submitted.	Human habitation is on the East direction i.e (Ambewadi at 1.4 Kms) from the lease area. Apart from the 50 m barrier zone a 30m width of wind break of 3 tiers of 10m will be provided
18	A scientific mining scheme for every 5 years for the lease life of the mine shall be prepared.	A Scientific mining scheme for every 5 years for the life of mine will be prepared and the same will be approved by IBM.
19	Scheme for Rain water harvesting including road map for	Scheme for Rain water harvesting including road map for

S.NO	TOR ISSUED BY MOEF	COMPLIANCE STATUS
	implementation shall be prepared.	implementation is prepared and is enclosed in chapter 4 para 4.3.7 of the EIA/EMP report,
20	Action plan for maintenance of village roads through which transportation of ores are undertaken to be carried out by the company regularly at its own expenses shall be prepared.	Haulage road from the ML area to the PWD road will be maintained. However in the PWD road maintenance will be undertaken with the help of PWD department.
21	Measures for prevention and control of soil erosion and management of silt shall be prepared. Assessment of total silt load likely to be generated shall be carried out. Proposal for protection of dumps against erosion by geo-textile matting or other suitable material and plantations of native trees and shrubs at the dump slopes shall be prepared.	The preventive measures of soil erosion are reported in EIA/EMP report chapter-5, Para 5.3 of EIA/EMP report
22	Trenches/garland drains proposed to be constructed at the foot of the dumps and installation of materials like coco filters at regular intervals to arrest silt from being carried to water bodies shall be prepared. Proposal for adequate number of Check Dams and Gully Plugs proposed to be constructed across seasonal/perennial nallahs (if any) flowing through the ML area shall be prepared. De-silting schedule at regular intervals shall be also provided.	Construction of garland drains and placement of coco filters at regular intervals to arrest silt are provided in chapter- 4 & 5 of EIA/EMP report
23	Land-use pattern of the nearby villages shall be studied, including identification of common property resources available for conversion	Land-use pattern of the nearby villages is studied, including identification of common property resources available for diversion into

S.NO	TOR ISSUED BY MOEF	COMPLIANCE STATUS
	into productive land and action plan for abatement and compensation for damage to agricultural land/common property land (if any) in the nearby villages, due to mining activity shall be prepared.	productive land and action plan for abatement and compensation for damage of agricultural common property land (if any) in the nearby villages, due to mining activity is also prepared.
24	Need based assessment for the near by villages shall be conducted to study economic measures which can help in upliftment of poor section of society. Income generating projects consistent with the traditional skills of the people besides development of fodder farm, fruit bearing orchards, vocational training etc can form a part of such programme. This will be in addition to vocational training for individuals imparted to take up self employment and jobs. Separate budget for community development activities and income generating programmes shall be specified.	Need based assessment for the near by villages will be conducted to study economic measures which can help in the help in the upliftment of the poor sections of the villagers such as development of fodder farm, fruit orchards, vocational training etc. Further proposed year wise allocation of funds for implementation of self help groups (SHG) The details are furnished in EIA/EMP report chapter-7 Separate budget for community development activities and income generating programs shall be specified.
25	Implementation of Occupational health and safety measures for the workers including identification of work related health hazards, training on malaria eradication, HIV, and health effects on exposure to mineral dust etc shall be prepared, including record keeping procedures. Awareness programme for workers on impact of mining on their health and precautionary measures like use of personal equipments etc to be carried periodically shall also be	Implementation of Occupational health and safety measures for the workers including identification of work related health hazards, training on malaria eradication, HIV and health effects on exposure to mineral dust etc is prepared in the chapter 5 of EIA/EMP report including record keeping procedures. Awareness programs for workers on impact of mining on their health and precautionary measures like use of personal equipments etc to be

S.NO	TOR ISSUED BY MOEF	COMPLIANCE STATUS
	submitted.	carried periodically are also submitted.
26	Green belt development and selection of plant species shall be as per CPCB guidelines. Herbs and shrubs shall also form a part of afforestation programme besides tree plantation. Details of year wise afforestation programme including rehabilitation of mined out area shall be prepared.	Green belt development and selection of plant species is as per CPCB guidelines. Herbs and shrubs also form a part of afforestation program besides tree plantation. Details of year wise afforestation program including rehabilitation of mined out area is prepared in the Chapter 5, Para 5.9 of EIA/EMP report.
27	Details of litigation pending or otherwise with respect to subject mine in any courts, tribunal etc shall be provided	No litigation pending against the project and/ or any direction/ order passed by any Court of Law against the project.
28	The questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall be filled up and submitted in complete.	Questionnaire will be submitted along with final EIA/EMP report.

C o n t e n t s

Chapter No	Title	Page No
	Executive Summary	
Chapter – I	PREAMBLE	1 – 5
1.1	Project Proponent	1
1.2	Address of Proponent	1
1.3	Aim of project	1
1.4	Methodology	2
1.5	Details of the Lease Area	5
1.6	Status & Stage of Regulatory Clearances	5
Chapter – II	PROJECT DESCRIPTION	6 – 13
2.1	Topography	6
2.2	Geology	6
2.2.1	Regional Geology	6
2.2.2	Local Geology	6
2.3	Drainage Pattern	6
2.4	Reserves	7
2.5	Exploration Details	7
2.6	Mining	8
2.7	Proposed rate of Production	9
2.8	Anticipated life of Mine	10
2.9	Conceptual mining plan	10
2.10	Extent of Mechanisation	10
2.11	Blasting	11
2.12	Mine Drainage	12
2.13	Stacking of Mineral Rejects & Disposal of Waste	12
2.14	Mineral Processing	12
2.16	Site services	13
2.17	Water	13
2.18	Employment	13
Chapter – III	BASELINE ENVIRONMENT	14 – 37
3.1	Baseline Environment	14
3.2	Air Environment	14
3.2.1	Climate & Meteorology	14
3.2.2	Criteria for site selection	16
3.2.3	Ambient Air Quality	19
3.3	Noise Environment	20
3.3.1	Baseline Status	20
3.4	Water Environment	22
3.4.1	Baseline status	22
3.4.2	Surface water	22

Chapter No	Title	Page No
3.4.3	Ground water	23
3.4.4	Water regime	23
3.5	Soil Quality	27
3.6	Land Environment	28
3.7	Biological Environment	30
3.8	Socioeconomic Environment	34
3.9	Occupational Health Environment	35
Chapter – IV	ENVIRONMENTAL IMPACTS	38 – 56
4.1	Air Environment	38
4.1.1	Anticipated Impacts	38
4.1.2	Emission Details	42
4.1.3	Data Analysis	44
4.1.4	Proposed Mitigation Measures	45
4.2	Noise Environment	45
4.2.1	Anticipated Impacts	45
4.2.2	Proposed Mitigation Measures	46
4.3	Water Environment	46
4.3.1	Anticipated Impacts	46
4.3.2	Water Consumption	46
4.3.3	Impact on Ground water table	47
4.3.4	Impact on Surface water	47
4.3.5	Mitigation measures	47
4.3.6	Runoff & turbidity	48
4.3.7	Rainwater harvesting	49
4.4	Land Environment	50
4.4.1	Anticipated Impacts	50
4.5	Biological Environment	52
4.5.1	Anticipated Impacts	52
4.5.2	Proposed Mitigation Measures	52
4.6	Socio Environment	52
4.6.1	Anticipated Impacts	52
4.6.2	Proposed Mitigation Measures	54
4.7	Occupation Health & Safety	55
4.7.1	Respiratory hazards	55
4.7.2	Physical hazards	56
4.7.3	Occupational health survey	56
Chapter – V	ENVIRONMENTAL MANAGEMENT PLAN	57 – 72
5.1	Air Quality Management	57
5.2	Noise Pollution Control	58
5.3	Water Quality Management	59
5.4	Waste water Management	60
5.5	Waste dump Management	60
5.6	Land Management	60
5.7	Top soil management	60
5.8	Land Reclamation & Rehabilitation	60
5.9	Afforestation program	61

Chapter No	Title	Page No
5.10	Wild life conservation plan	62
5.11	Occupational Health & Safety	70
5.12	Budget	72
Chapter – VI	ADDITIONAL STUDIES	73 - 77
6.1	Risk Assessment	73
6.2	Disaster Management Plan	76
Chapter – VII	PROJECT BENEFITS	78 – 85
7.1	Socio-economic benefits	78
7.2	Corporate social responsibility	78
7.3	Improvement in socio-economic status	79
7.4	Upliftment of poor section of society	80
7.5	Vocational training	83
7.6	Upliftment of SC & ST's	83
7.7	Need based assessment	83
Chapter – VIII	ENVIRONMENTAL MONITORING PROGRAM	86 – 88
8.1	Environmental Monitoring Program	86
8.2	Air quality monitoring	86
8.3	Noise level monitoring	86
8.4	Water quality monitoring	86
8.5	Soil quality assessment	86
Chapter – IX	DISCLOSURE OF CONSULTANTS	89

	ANNEXURE	
1	Ambient air quality data	
2	Noise level data	
3	Demographic details	
4	Photographs of Lease area	
5	Mining Plan Approval Letter	
6	Covering Letter from RFO	
	6 (a) Authenticated List of Flora and Fauna in the core zone	
	6 (b) Authenticated List of Flora and Fauna in study area	
7	NABET Certificates	

EXECUTIVE SUMMARY

INTRODUCTION

The Anand Mines Products is a Private Limited Company registered under the Companies Act, 1956 established in the year 1997. The Anand Mines Products Private Limited Company has applied to the Government of Maharashtra for the sanction of the Mining Lease over an area of 278.85 Ha situated in villages Mouje Shirale turf Malakpur, Panundre and Mhalaswade, Shahuwadi Taluka, Kolhapur district of Maharashtra State.

Anand Mines Products Private Limited Company, intends to produce 2.5 LTPA of Bauxite from the proposed mine.

PROJECT DESCRIPTION

- The total lease area of the project is 278.85 Ha (Private land: 206.136 Ha, Government land: 72.714 Ha)
- The elevation of the area ranges between 750 m – 900 m above MSL
- The maximum production of the mine will be 2.5 LTPA of Bauxite
- The total mineable reserves from the mine are about 1.02 million tons
- Mining is done by opencast mechanized method.
- Ripper Dozers, Hydraulic excavator Wheel loader include the mine machinery deployed for mining purposes
- Tippers and trucks will be used for transportation purposes
- The total man power requirement for the project is 63
- No waste generation is expected as the entire ROM is sealable
- Anticipated life of mine is 7 years

DESCRIPTION OF THE ENVIRONMENT

Baseline Environmental Study was carried out in an area of 10 km around the mine lease area.

Study period: Post monsoon 2009

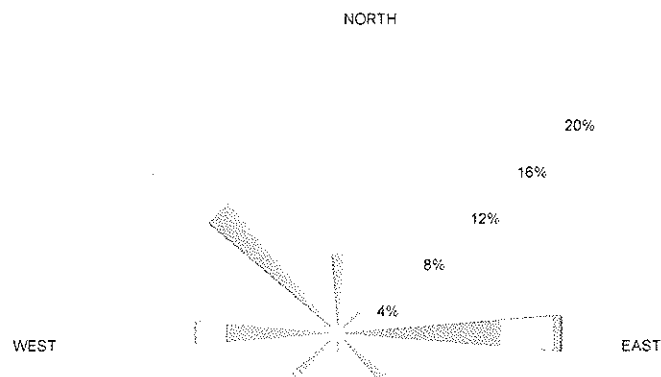
Predominant wind direction during study period is from NW

Executive Summary of Shirale Bauxite Mine of Anand Mines Products (P) Limited Company

WIND ROSE

WIND ROSE PLOT
SHIRALE BAUXITE MINE
POST MONSOON 2009

DISPLAY
Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

0.0 - 11.1
11.2 - 22.3
22.4 - 33.5
33.6 - 44.7
44.8 - 55.9
56.0 - 67.1
67.2 - 78.3
78.4 - 89.5
89.6 - 100.7
100.8 - 111.9
112.0 - 123.1
123.2 - 134.3
134.4 - 145.5
145.6 - 156.7
156.8 - 167.9
168.0 - 179.1
179.2 - 190.3
190.4 - 201.5
201.6 - 212.7
212.8 - 223.9
224.0 - 235.1
235.2 - 246.3
246.4 - 257.5
257.6 - 268.7
268.8 - 279.9
280.0 - 291.1
291.2 - 302.3
302.4 - 313.5
313.6 - 324.7
324.8 - 335.9
336.0 - 347.1
347.2 - 358.3
358.4 - 369.5
369.6 - 380.7
380.8 - 391.9
392.0 - 403.1
403.2 - 414.3
414.4 - 425.5
425.6 - 436.7
436.8 - 447.9
448.0 - 459.1
459.2 - 470.3
470.4 - 481.5
481.6 - 492.7
492.8 - 503.9
504.0 - 515.1
515.2 - 526.3
526.4 - 537.5
537.6 - 548.7
548.8 - 559.9
560.0 - 571.1
571.2 - 582.3
582.4 - 593.5
593.6 - 604.7
604.8 - 615.9
616.0 - 627.1
627.2 - 638.3
638.4 - 649.5
649.6 - 660.7
660.8 - 671.9
672.0 - 683.1
683.2 - 694.3
694.4 - 705.5
705.6 - 716.7
716.8 - 727.9
728.0 - 739.1
739.2 - 750.3
750.4 - 761.5
761.6 - 772.7
772.8 - 783.9
784.0 - 795.1
795.2 - 806.3
806.4 - 817.5
817.6 - 828.7
828.8 - 839.9
840.0 - 851.1
851.2 - 862.3
862.4 - 873.5
873.6 - 884.7
884.8 - 895.9
896.0 - 907.1
907.2 - 918.3
918.4 - 929.5
929.6 - 940.7
940.8 - 951.9
952.0 - 963.1
963.2 - 974.3
974.4 - 985.5
985.6 - 996.7
996.8 - 1007.9
1008.0 - 1019.1
1019.2 - 1030.3
1030.4 - 1041.5
1041.6 - 1052.7
1052.8 - 1063.9
1064.0 - 1075.1
1075.2 - 1086.3
1086.4 - 1097.5
1097.6 - 1108.7
1108.8 - 1119.9
1120.0 - 1131.1
1131.2 - 1142.3
1142.4 - 1153.5
1153.6 - 1164.7
1164.8 - 1175.9
1176.0 - 1187.1
1187.2 - 1198.3
1198.4 - 1209.5
1209.6 - 1220.7
1220.8 - 1231.9
1232.0 - 1243.1
1243.2 - 1254.3
1254.4 - 1265.5
1265.6 - 1276.7
1276.8 - 1287.9
1288.0 - 1299.1
1299.2 - 1310.3
1310.4 - 1321.5
1321.6 - 1332.7
1332.8 - 1343.9
1344.0 - 1355.1
1355.2 - 1366.3
1366.4 - 1377.5
1377.6 - 1388.7
1388.8 - 1399.9
1400.0 - 1411.1
1411.2 - 1422.3
1422.4 - 1433.5
1433.6 - 1444.7
1444.8 - 1455.9
1456.0 - 1467.1
1467.2 - 1478.3
1478.4 - 1489.5
1489.6 - 1500.7
1500.8 - 1511.9
1512.0 - 1523.1
1523.2 - 1534.3
1534.4 - 1545.5
1545.6 - 1556.7
1556.8 - 1567.9
1568.0 - 1579.1
1579.2 - 1590.3
1590.4 - 1601.5
1601.6 - 1612.7
1612.8 - 1623.9
1624.0 - 1635.1
1635.2 - 1646.3
1646.4 - 1657.5
1657.6 - 1668.7
1668.8 - 1679.9
1680.0 - 1691.1
1691.2 - 1702.3
1702.4 - 1713.5
1713.6 - 1724.7
1724.8 - 1735.9
1736.0 - 1747.1
1747.2 - 1758.3
1758.4 - 1769.5
1769.6 - 1780.7
1780.8 - 1791.9
1792.0 - 1803.1
1803.2 - 1814.3
1814.4 - 1825.5
1825.6 - 1836.7
1836.8 - 1847.9
1848.0 - 1859.1
1859.2 - 1870.3
1870.4 - 1881.5
1881.6 - 1892.7
1892.8 - 1903.9
1904.0 - 1915.1
1915.2 - 1926.3
1926.4 - 1937.5
1937.6 - 1948.7
1948.8 - 1959.9
1960.0 - 1971.1
1971.2 - 1982.3
1982.4 - 1993.5
1993.6 - 2004.7
2004.8 - 2015.9
2016.0 - 2027.1
2027.2 - 2038.3
2038.4 - 2049.5
2049.6 - 2060.7
2060.8 - 2071.9
2072.0 - 2083.1
2083.2 - 2094.3
2094.4 - 2105.5
2105.6 - 2116.7
2116.8 - 2127.9
2128.0 - 2139.1
2139.2 - 2150.3
2150.4 - 2161.5
2161.6 - 2172.7
2172.8 - 2183.9
2184.0 - 2195.1
2195.2 - 2206.3
2206.4 - 2217.5
2217.6 - 2228.7
2228.8 - 2239.9
2240.0 - 2251.1
2251.2 - 2262.3
2262.4 - 2273.5
2273.6 - 2284.7
2284.8 - 2295.9
2296.0 - 2307.1
2307.2 - 2318.3
2318.4 - 2329.5
2329.6 - 2340.7
2340.8 - 2351.9
2352.0 - 2363.1
2363.2 - 2374.3
2374.4 - 2385.5
2385.6 - 2396.7
2396.8 - 2407.9
2408.0 - 2419.1
2419.2 - 2430.3
2430.4 - 2441.5
2441.6 - 2452.7
2452.8 - 2463.9
2464.0 - 2475.1
2475.2 - 2486.3
2486.4 - 2497.5
2497.6 - 2508.7
2508.8 - 2519.9
2520.0 - 2531.1
2531.2 - 2542.3
2542.4 - 2553.5
2553.6 - 2564.7
2564.8 - 2575.9
2576.0 - 2587.1
2587.2 - 2598.3
2598.4 - 2609.5
2609.6 - 2620.7
2620.8 - 2631.9
2632.0 - 2643.1
2643.2 - 2654.3
2654.4 - 2665.5
2665.6 - 2676.7
2676.8 - 2687.9
2688.0 - 2699.1
2699.2 - 2710.3
2710.4 - 2721.5
2721.6 - 2732.7
2732.8 - 2743.9
2744.0 - 2755.1
2755.2 - 2766.3
2766.4 - 2777.5
2777.6 - 2788.7
2788.8 - 2799.9
2800.0 - 2811.1
2811.2 - 2822.3
2822.4 - 2833.5
2833.6 - 2844.7
2844.8 - 2855.9
2856.0 - 2867.1
2867.2 - 2878.3
2878.4 - 2889.5
2889.6 - 2900.7
2900.8 - 2911.9
2912.0 - 2923.1
2923.2 - 2934.3
2934.4 - 2945.5
2945.6 - 2956.7
2956.8 - 2967.9
2968.0 - 2979.1
2979.2 - 2990.3
2990.4 - 3001.5
3001.6 - 3012.7
3012.8 - 3023.9
3024.0 - 3035.1
3035.2 - 3046.3
3046.4 - 3057.5
3057.6 - 3068.7
3068.8 - 3079.9
3080.0 - 3091.1
3091.2 - 3102.3
3102.4 - 3113.5
3113.6 - 3124.7
3124.8 - 3135.9
3136.0 - 3147.1
3147.2 - 3158.3
3158.4 - 3169.5
3169.6 - 3180.7
3180.8 - 3191.9
3192.0 - 3203.1
3203.2 - 3214.3
3214.4 - 3225.5
3225.6 - 3236.7
3236.8 - 3247.9
3248.0 - 3259.1
3259.2 - 3270.3
3270.4 - 3281.5
3281.6 - 3292.7
3292.8 - 3303.9
3304.0 - 3315.1
3315.2 - 3326.3
3326.4 - 3337.5
3337.6 - 3348.7
3348.8 - 3359.9
3360.0 - 3371.1
3371.2 - 3382.3
3382.4 - 3393.5
3393.6 - 3404.7
3404.8 - 3415.9
3416.0 - 3427.1
3427.2 - 3438.3
3438.4 - 3449.5
3449.6 - 3460.7
3460.8 - 3471.9
3472.0 - 3483.1
3483.2 - 3494.3
3494.4 - 3505.5
3505.6 - 3516.7
3516.8 - 3527.9
3528.0 - 3539.1
3539.2 - 3550.3
3550.4 - 3561.5
3561.6 - 3572.7
3572.8 - 3583.9
3584.0 - 3595.1
3595.2 - 3606.3
3606.4 - 3617.5
3617.6 - 3628.7
3628.8 - 3639.9
3640.0 - 3651.1
3651.2 - 3662.3
3662.4 - 3673.5
3673.6 - 3684.7
3684.8 - 3695.9
3696.0 - 3707.1
3707.2 - 3718.3
3718.4 - 3729.5
3729.6 - 3740.7
3740.8 - 3751.9
3752.0 - 3763.1
3763.2 - 3774.3
3774.4 - 3785.5
3785.6 - 3796.7
3796.8 - 3807.9
3808.0 - 3819.1
3819.2 - 3830.3
3830.4 - 3841.5
3841.6 - 3852.7
3852.8 - 3863.9
3864.0 - 3875.1
3875.2 - 3886.3
3886.4 - 3897.5
3897.6 - 3908.7
3908.8 - 3919.9
3920.0 - 3931.1
3931.2 - 3942.3
3942.4 - 3953.5
3953.6 - 3964.7
3964.8 - 3975.9
3976.0 - 3987.1
3987.2 - 3998.3
3998.4 - 4009.5
4009.6 - 4020.7
4020.8 - 4031.9
4032.0 - 4043.1
4043.2 - 4054.3
4054.4 - 4065.5
4065.6 - 4076.7
4076.8 - 4087.9
4088.0 - 4099.1
4099.2 - 4110.3
4110.4 - 4121.5
4121.6 - 4132.7
4132.8 - 4143.9
4144.0 - 4155.1
4155.2 - 4166.3
4166.4 - 4177.5
4177.6 - 4188.7
4188.8 - 4199.9
4200.0 - 4211.1
4211.2 - 4222.3
4222.4 - 4233.5
4233.6 - 4244.7
4244.8 - 4255.9
4256.0 - 4267.1
4267.2 - 4278.3
4278.4 - 4289.5
4289.6 - 4300.7
4300.8 - 4311.9
4312.0 - 4323.1
4323.2 - 4334.3
4334.4 - 4345.5
4345.6 - 4356.7
4356.8 - 4367.9
4368.0 - 4379.1
4379.2 - 4390.3
4390.4 - 4401.5
4401.6 - 4412.7
4412.8 - 4423.9
4424.0 - 4435.1
4435.2 - 4446.3
4446.4 - 4457.5
4457.6 - 4468.7
4468.8 - 4479.9
4480.0 - 4491.1
4491.2 - 4502.3
4502.4 - 4513.5
4513.6 - 4524.7
4524.8 - 4535.9
4536.0 - 4547.1
4547.2 - 4558.3
4558.4 - 4569.5
4569.6 - 4580.7
4580.8 - 4591.9
4592.0 - 4603.1
4603.2 - 4614.3
4614.4 - 4625.5
4625.6 - 4636.7
4636.8 - 4647.9
4648.0 - 4659.1
4659.2 - 4670.3
4670.4 - 4681.5
4681.6 - 4692.7
4692.8 - 4703.9
4704.0 - 4715.1
4715.2 - 4726.3
4726.4 - 4737.5
4737.6 - 4748.7
4748.8 - 4759.9
4760.0 - 4771.1
4771.2 - 4782.3
4782.4 - 4793.5
4793.6 - 4804.7
4804.8 - 4815.9
4816.0 - 4827.1
4827.2 - 4838.3
4838.4 - 4849.5
4849.6 - 4860.7
4860.8 - 4871.9
4872.0 - 4883.1
4883.2 - 4894.3
4894.4 - 4905.5
4905.6 - 4916.7
4916.8 - 4927.9
4928.0 - 4939.1
4939.2 - 4950.3
4950.4 - 4961.5
4961.6 - 4972.7
4972.8 - 4983.9
4984.0 - 4995.1
4995.2 - 5006.3
5006.4 - 5017.5
5017.6 - 5028.7
5028.8 - 5039.9
5040.0 - 5051.1
5051.2 - 5062.3
5062.4 - 5073.5
5073.6 - 5084.7
5084.8 - 5095.9
5096.0 - 5107.1
5107.2 - 5118.3
5118.4 - 5129.5
5129.6 - 5140.7
5140.8 - 5151.9
5152.0 - 5163.1
5163.2 - 5174.3
5174.4 - 5185.5
5185.6 - 5196.7
5196.8 - 5207.9
5208.0 - 5219.1
5219.2 - 5230.3
5230.4 - 5241.5
5241.6 - 5252.7
5252.8 - 5263.9
5264.0 - 5275.1
5275.2 - 5286.3
5286.4 - 5297.5
5297.6 - 5308.7
5308.8 - 5319.9
5320.0 - 5331.1
5331.2 - 5342.3
5342.4 - 5353.5
5353.6 - 5364.7
5364.8 - 5375.9
5376.0 - 5387.1
5387.2 - 5398.3
5398.4 - 5409.5
5409.6 - 5420.7
5420.8 - 5431.9
5432.0 - 5443.1
5443.2 - 5454.3
5454.4 - 5465.5
5465.6 - 5476.7
5476.8 - 5487.9
5488.0 - 5499.1
5499.2 - 5510.3
5510.4 - 5521.5
5521.6 - 5532.7
5532.8 - 5543.9
5544.0 - 5555.1
5555.2 - 5566.3
5566.4 - 5577.5
5577.6 - 5588.7
5588.8 - 5599.9
5600.0 - 5611.1
5611.2 - 5622.3
5622.4 - 5633.5
5633.6 - 5644.7
5644.8 - 5655.9
5656.0 - 5667.1
5667.2 - 5678.3
5678.4 - 5689.5
5689.6 - 5700.7
5700.8 - 5711.9
5712.0 - 5723.1
5723.2 - 5734.3
5734.4 - 5745.5
5745.6 - 5756.7
5756.8 - 5767.9
5768.0 - 5779.1
5779.2 - 5790.3
5790.4 - 5801.5
5801.6 - 5812.7
5812.8 - 5823.9
5824.0 - 5835.1
5835.2 - 5846.3
5846.4 - 5857.5
5857.6 - 5868.7
5868.8 - 5879.9
5880.0 - 5891.1
5891.2 - 5902.3
5902

AIR ENVIRONMENT

Baseline Ambient Air Quality was monitored at 8 locations, 2 in core zone and 6 in buffer zone. The summary of air quality is as follows:

Summary of Ambient Air Quality (Maximum values)

Units: $\mu\text{g}/\text{m}^3$

LOCATION	SPM	RPM	SO ₂	NO _x	HC (PPM)	CO (PPM)
Mine Lease Area	130	39.8	7.9	11.0	<1.0	<1.0
Proposed haulage area	132	40.5	8.0	11.3	<1.0	<1.0
Patewadi	135	40.3	7.9	11.4	<1.0	<1.0
Sonurle	138	42.5	8.4	11.9	<1.0	<1.0
Chikalwadi	127	38.8	7.7	10.7	<1.0	<1.0
Panundre	131	40.1	7.9	11.2	<1.0	<1.0
Mahalsavde	136	41.8	8.3	11.7	<1.0	<1.0
Ambewadi	129	39.4	7.8	10.9	<1.0	<1.0

The ambient air quality observed during the study period is well within the prescribed National Ambient Air Quality Standards.

ANTICIPATED IMPACTS

Impact prediction has been carried out using ISC-AERMOD View. The maximum concentration of $5.85 \mu\text{g}/\text{m}^3$ will be observed within the mine lease area. This concentration is found to be reduced to $<1.00 \mu\text{g}/\text{m}^3$ at a distance of 0.5 km from the ML area.

MITIGATION MEASURES

- ☞ Transportation of ore through covered trucks
- ☞ Use of sharp drill bits for drilling holes
- ☞ Limiting blasting operations with small diameter drills
- ☞ Water sprinkling to suppress dust
- ☞ Maintenance of 50 m of barrier zone all along the mine lease boundary and maintenance of green belt in the barrier zone

NOISE ENVIRONMENT

The ambient noise levels were measured at 8 locations (same as AAQ stations). The results obtained are as follows.

Noise Levels during Study Period (Units: dB (A))

S.NO	LOCATION	Ld	Ln
N1	Mine Lease Area	45.8	37.9
N2	Proposed haulage area	44.0	36.9
N3	Patewadi	47.1	39.4
N4	Sonurle	45.6	38.4
N5	Chikalwadi	46.7	40.3
N6	Panundre	46.4	40.5
N7	Mahalsavde	47.9	39.7
N8	Ambewadi	45.8	38.6

It is observed that the noise values recorded were well within the prescribed Ambient Air Quality Standards with respect to Noise.

PROPOSED MITIGATION MEASURES

- ☐ Deploying suitable machinery as per IBM guidelines
- ☐ Lubrication & regular maintenance of Mine machinery
- ☐ Maintenance of transport vehicles
- ☐ The vibration due to blasting is minimized by careful planning, supervision and execution of each blast and using milli-second(M.S) delay detonators and proper stemming to prevent blow out of holes
- ☐ Maintenance of Green belt all around the working areas to screen the noise and also for arresting fugitive dust

WATER QUALITY

Five ground water samples and two surface water samples were collected and tested to know the water quality of study area. Physico-chemical analysis of water shows that the water quality is within the prescribed standards.

ANTICIPATED IMPACTS

The bauxite mining operations are confined to upper 1 to 2m of the area i.e. more than 100m above the regional ground water table. Therefore, there is no chance of bauxite mining operations on the yield or movement of ground water.

Bauxite mining operation does not dispose off any effluent in the surrounding water courses. Hence surface water is not going to be affected either qualitatively or quantitatively. As the area receives excess rainfall there is a possibility of siltation of the seasonal streams during the rainy season.

MANAGEMENT PLAN

- Retaining wall with garland drain is proposed surrounding the toe of the waste dump
- Grease traps will be provided in the workshops and at vehicle cleaning and filling stations, so as to trap the oil spill.
- Providing sufficient gully checks & check dams to check any silt flowing along with the surface run-off in the valleys

SOIL QUALITY

Soil samples were collected from 6 locations from the core and buffer zone to evaluate the soil quality in the study area. All the samples are showing moderately fertile nature.

BIOLOGICAL ENVIRONMENT

The flora in the study area generally consists of Jamun, Hirda, Rametha, Bajkara, Anjan, Shiras, Waras, Kogonda, Umber, Amba, Karvi, Fern, Shisham, Nana, Acacia, Sag, Suru, Dhaman, Waras, Wad, Chandeda, Ain, Chinch, Kumbhi, Nana, Karvand & Bakara. The lease area consists of Private & Govt. land.

The fauna in the study area consists of Indian bison, Wild boar, Jungle cat, Jungle cock, Indian hare, Indian cobra, Russles viper, Rat snake & Forest lizard

MITIGATION MEASURES

Due to mining activities habitat of flora and fauna will be disturbed and biodiversity of the area will be affected to certain extent.

Afforestation of mined out area in scientific way will improve the natural vegetation and also the species diversity

WASTE MANAGEMENT

No dumps as the entire ROM are sealable

Land Use Pattern (Area in Ha.)

S.NO	TYPE OF LAND USE	PRESENT	PLAN PERIOD	CONCEPTUAL PERIOD
1	Area of excavation	Nil	60.1350	85.0000
2	Infrastructure (Workshop, administrative building etc)	Nil	0.2000	0.2000
3	Roads	Nil	0.2000	2.0
4	Green belt	Nil	1.5000	1.5000
5	Others (reclamation of mined out pits)	Nil	*34.5	*70.0
6	Area which will remain untouched	278.85	215.0150	190.1500
	TOTAL	278.85	278.85	278.82

* Area reclaimed is the part of mined out area. Hence, it is not taken once again while totaling the area

LAND RECLAMATION & REHABILITATION

In the first five year of mining, it is proposed to disturb 60.135 Ha of land for direct development and production of bauxite. Out of this 34.5 Ha will be reclaimed by plantation.

LAND RECLAMATION

S.NO	YEAR	PLANATION ON VIRGIN AREA (Ha)	CHECK DAMS	RECLAMATION OF MINED OUT (Ha)
1	1 st	1.5	4	--
2	2 nd	--	4	1.5
3	3 rd	--	6	8.0
4	4 th	--	4	10.0
5	5 th	--	--	15.0
	TOTAL	1.5	18	34.5

AFFORESTATION PROGRAMME

Initially the afforestation has been planned in the slopes covering 1.0 Ha per year. Afforestation will commence from the second year of the modified planned period. Details of the plantation to be carried out are given below:

AFFORESTATION PROGRAMME

YEAR	AREA (Ha) GOING TO BE RECLAIMED BY AFFORESTATION	LOCATION
1 st	1.5	Along road virgin area
2 nd	1.5	Mined out pit
3 rd	8.0	Mined out pit
4 th	10.0	Mined out pit
5 th	15.0	Mined out pit
TOTAL	36.0	

It is proposed to plant about 10000 plants/Ha of local species. Along with plantation utmost importance will be given for post-plantation care. This includes addition of fertilizers & manures according to the requirement of each species and required amount of pesticides will be used to control the pests. All plants of age up to three years will be watered regularly once in a week.

SOCIO-ECONOMIC ENVIRONMENT

The socio-economic condition is summarized below.

Villages	House Holds	Total Population	Total Literate Population	Total working Population	Total Non - workers
47	11173	56583	30209	30967	25616

Village Details within 3kms radius

Area in ha.

Village	Area	Forest Area	Irrigated Area	Unirrigated Area	Cultivable Waste Land	Area not available for cultivation
Kodewadi	62	0	3	53	1	5
Shirale	902	383	1	485	15	18
Kasarwadi	625	50	0	0	0	0
Ambewadi	159	0	88	68	0	20
Panundre	1621	548	5	856	159	53
Mahalsavde	1093	655	2	357	63	16
Burambal	1143	254	3	95	778	13
TOTAL	5605	1890	102	1914	1016	125

SOCIAL DEVELOPMENTAL ACTIVITIES

- ☐ Provision of Medical facilities (Medical camps & free medicine supply)
- ☐ Strengthening Educational Facilities
- ☐ Donations to schools & Financial assistance for education
- ☐ Under community development programme, company will bring benefits to the area in terms of well maintained roads
- ☐ Conducting Environmental awareness programs
- ☐ Direct & Indirect employment to large number of people in Shahuwadi Taluka
- ☐ Drinking water facilities to nearby villages

OCCUPATIONAL HEALTH AND SAFETY

- Providing a working environment that is conducive to safety & health
- The management of occupational safety & health is the prime responsibility of mine management from the executive level to the first line supervisory level
- Employee involvement and commitment in the implementation of health and safety guidelines
- Provision of all necessary resources
- Implementing safety and health management system and assessing the effectiveness through periodic audits
- Setting of safety and health objectives based on comprehensive strategic plans and measure performance against these plans
- Monitoring the effects of mining activities on safety and health and conducting regular performance reviews
- Provision of necessary personal protective equipments
- Establishing and maintaining a system of medical surveillance for employees
- Ensuring employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities

ENVIRONMENTAL BUDGET

(Amount Rs. Lakhs)

S. NO	ACTIVITY	CAPITAL INVESTMENT	RECURRING EXPENSES / ANNUM
1.	Environmental pollution control	69.00	15.00
2.	Environmental monitoring	0.00	3.50
3.	Green belt and afforestation	5.00	3.00
4	Wild life conservation	3.00	2.00
5	Occupational health and safety	2.50	1.50
6	Social welfare activity	8.00	7.00
7	Economic upliftment	4.00	3.50
8	Others	2.00	1.50
	Total	93.50	37.00

CHAPTER 1: INTRODUCTION

1.1 IDENTIFICATION OF PROJECT PROPONENT AND PROJECT

The Anand Mines Products is a Private Limited Company registered under the Companies Act, 1956 established in the year 1997. The Anand Mines Products Private Limited Company has applied to the Government of Maharashtra for the sanction of the Mining Lease over an area of 278.85 Ha situated in villages Mouje Shirale turf Malakpur, Panundre and Mhalaswade, Shahuwadi Taluka, Kolhapur district of Maharashtra State. The Government of Maharashtra has given letter of intent for bauxite production to the company vide Ir no. MMN-1097/7399/IND-9 after getting approval from the Central Government under section 5(1) of the Mines and Minerals (Development and Regulation) Act, 1957 for a period of 20 years.

1.2 ADDRESS OF THE APPLICANT

M/s Prakash A. Gaikwad, (PAG Mine),
Office – 1464, shop no. 4, Ward Konda Lane, Laxmipuri,
Kolhapur – 416002
Phone: 0231 – 6617999
E-mail: pagmineudgiri@yahoo.com

1.3 AIM OF THE PROJECT

The Anand Mines Products Private Limited Company, intends to produce 2.5 LTPA of Bauxite ore.

In order to evaluate the possible environmental aspects and their associated impacts that would arise due to mining operations, M/s Anand Mines Products (P) Limited Company has appointed M/s Bhagavathi Ana Labs Ltd., Hyderabad to evaluate all the possible impacts and delineate the management plan, options to prevent, control, mitigate or minimize the adverse environmental impacts, if any.

M/s Bhagavathi Ana Labs Ltd., has carried out Environmental Study in an area of 10 Km around the mine lease area as per the Terms of Reference (TOR) issued by Ministry of Environment & Forests (MoEF), Government of India (GOI). The baseline data is collected during post monsoon season 2009 (September 2009 – November 2009)

1.4 METHODOLOGY / APPROACH

1.4.1 Methodology of EIA

Following Methodology was adopted for the studies.

- ❖ Collection of site-specific meteorological data at the mine site
- ❖ Carrying out a detailed biological study for the Core and Buffer Zone
- ❖ Literature review that includes identification of relevant data and articles from various publications, various government agencies and other sources for socio-economy, demography, meteorology, land use, ecology, etc
- ❖ Identification of various existing pollution loads due to mining and domestic activities in the buffer zone
- ❖ Evaluation of the predicted impacts on the various environmental attributes in the study area by using scientifically developed and widely accepted Environmental Impact Assessment (EIA) Methodologies

Preparation of Environmental Management Plan (EMP) outlining the measures for improving the environmental quality

TABLE 1.1: SALIENT FEATURES OF THE PROJECT

Details of the Area			
District & State	Kolhapur & Maharashtra		
Taluka	Shahuwadi		
Villages	Mouje Shirale turf Malakpur, Panundre and Mhalaswade		
Mine Lease Area	278.85 Ha		
Nature of the Area	Private Land (206.136 Ha) Government Land (72.714 Ha)		
Category	'A'		
Geographical Co-ordinates	CORNER	LATITUDE [N]	LONGITUDE [E]
	1	N16° 51' 41.75"	E73° 52' 51.74"
	2	N16° 50' 46.33"	E73° 53' 19.47"
	3	N16° 50' 45.93"	E73° 54' 28.49"
	4	N16° 50' 43.92"	E73° 54' 59.23"
	5	N16° 51' 35.29"	E73° 55' 09.92"
	6	N16° 51' 15.46"	E73° 55' 34.81"
	7	N16° 50' 44.71"	E73° 55' 31.30"
	8	N16° 50' 21.21"	E73° 55' 34.43"
	9	N16° 50' 28.78"	E73° 55' 58.08"
Accessibility			
Road Connectivity	The lease area is situated at a distance of about 10 Kms from Shahuwadi on Ratnagiri – Nagpur National Highway No 204		
Rail Connectivity	Kolhapur (50 Kms)		
Seaport	Ratnagiri seaport (100 Kms)		
General Climatic Conditions			
Wind Pattern during study period	Northwest		
Maximum Temperature	36.6 °C		
Minimum Temperature	20 °C		
Average Annual Rainfall (mm)	900		
Details of the Project			
Production	Production of 2.5 LTPA of Bauxite (0.25 mtpa)		
Anticipated Life of Mine	7 years		

Elevation	750m – 900m AMSL
Reserves	1.02 million tonnes
Historical / Important Places	
Archaeological/Historical/Ancient Monuments within 10 km area	None within 10 Km radius study area
Other Mines in study area	None within 10 Km radius study area
Names and distance of the national park, sanctuary Biosphere reserve, Tiger Reserve, Elephant reserve, Forest (RF/PF/Unclassified)	Shirale Reserve Forest (Adjacent to the lease boundary, ENE) Panundre Reserve Forest (Adjacent to the lease boundary, NE) Burambal Reserve Forest (Adjacent to the lease boundary, WSW) Mahalsavde Reserve Forest (Adjacent to the lease boundary, NW) Ambewadi Reserve Forest (1.3 Kms, ESE) Sonurle Reserve Forest (0.8 Kms, SE) Parli Reserve Forest (1.3 Kms, SE) Parkhandle Reserve Forest (4.2 Kms, ESE) Ghungur Reserve Forest (4.6 Kms, ESE) Paru Reserve Forest (3.2 Kms, SE) Nandari Reserve Forest (3.0 Kms, SSE) Pendakhale Reserve Forest (5.5 Kms, S) Savardi Reserve Forest (8.3 Kms, S) Pau Reserve Forest (8.0 Kms, S) Marle Reserve Forest (9.2 Kms, SSW) Kante Reserve Forest (5.1 Kms, WSW) Girgoan Reserve Forest (4.8 Kms, WSW) Mosum Reserve Forest (6.9 Kms, WSW) Manjre Reserve Forest (6.2 Kms, WSW) Parivne Reserve Forest (7.1 Kms, W) Man Reserve Forest (3.5 Kms, NNW) Yelvan Jugai Reserve Forest (4.6 Kms, NW) Kansarde Reserve Forest (6.7 Kms, NNW) Valur Reserve Forest (6.1 Kms, NNW) Yelur Reserve Forest (7.0 Kms, N) Uchat Reserve Forest (5.0 Kms, N) Karanjoshi Reserve Forest (6.3 Kms, NE)

	Kalgoan Reserve Forest (3.7 Kms, NNE) Ukole Reserve Forest (1.7 Kms, NE) Arul Reserve Forest (5.4 Kms, ENE) Wild Life Sanctuary: Chandoli (50 Kms)
--	--

1.5 DETAILS OF THE LEASE AREA

S. No	Village	Private Land	Government Land	Total
1	Mouje Shirale Turf Malkapur	86.899	-	86.899
2	Panundre	3.965	68.994	162.959
3	Mhalaswade	25.272	3.720	28.992
Total		116.136	72.714	278.85

1.5 STATUS & STAGE OF REGULATORY CLEARANCES

Regulatory Clearance	Status
Mining Plan	No. MP/KLP/GOA/(MAH)/BX-193-SZ dt 22.10.09
Terms of Reference by MoEF	Issued vide MoEF Ir. No: J-11015/262/09-IA.II(M)
Public Consultation	To be conducted
Environmental Clearance	To be applied
Forest Clearance	Not Applicable

CHAPTER 2: PROJECT DESCRIPTION

2.1 TOPOGRAPHY

Topography of the area is a part of the Western Ghats consisting of high rising hill ranges with extensive plateau top and dissected by narrow valleys. The hill ranges are generally ranging in NNW- SSE direction. The highest and lowest elevation of the applied area is 900m and 750m respectively above MSL. The area shows uneven and undulating topography resulting from the differential weathering of the bauxite.

2.2 GEOLOGY

2.2.1 REGIONAL GEOLOGY

Regional Geology corresponds to the geology of the Deccan Traps of Upper Cretaceous to Lower Ecocene Age. Bauxite appears to have formed as a residual deposit through the prolonged chemical weathering of the trap rock

2.2.2 LOCAL GEOLOGY

The applied area forms the slope part of the main Ringewadi – Girgoan plateau. The bauxitic boulders are derived from the main plateau and then fully or partly exposed or embedded in the clay bed. At higher altitude more and more boulders are exposed and at lower altitude more and more boulders are embedded in the clay bed.

2.3 DRAINAGE PATTERN

The area is having dendritic drainage pattern which is very typical characteristic of Deccan trap. Lower reaches of the plateau give rise to numerous ephemeral nallahs, which are generally dry during the dry season. Due to torrential rains controlled by southwest monsoon all the nallahs originating from the hill slopes are flooded. These nallahs join in the perennial rivulets known as Kadvi and Shali. All the rivers and rivulets are north westerly flowing and finally confluence with mighty river Krishna that is one of the most important rivers in the Peninsular India.

2.4 RESERVES

The entire mining lease area is not float ore bearing. The occurrence of the float ore in the area is controlled by the topography.

Mineable Ore: Considering the float nature of the ore body, 10% is considered as mining losses due to float ore boulders blocked within the 5m ultimate pit limit from the lease boundary and handling losses. Therefore 90% of the ore is considered as mineable resources i.e. 9, 18,000 tonnes.

TABLE 2.1: SUMMARY OF GEOLOGICAL AND MINEABLE RESERVES

BLOCK NO	TOTAL AREA (m2)	GEOLOGICAL RESERVES (tonnes)	MINEABLE RESERVES (tonnes)	UNFC CODE
1 to 5	850000	1020000	9, 18,000	(211)

2.5 EXPLORATION DETAILS

Exploration already carried out

Geological Survey of India and the Directorate of Geology and Mining, Govt. of Maharashtra have carried out exploration on the main Ringewadi Plateau. However, no exploration work has been carried out by any organization in the float bearing area.

Being the float ore deposit it is very difficult to prove the persistence of the ore deposit in the entire area. However, working mines of the same nature is considered for the estimation of the geological reserves.

Year wise future programme of exploration

Considering the float nature of the ore body, it is proposed to take 85 trail pits in all the five blocks to confirm the depth of persistence of the bauxite boulders. A detailed exploration programme with respect to the area and number of pits is given in the following table.

BLOCK NO	YEAR	NO.OF TRAIL PITS	DIMENSION
3	1 ST	15 (TP1 to TP15)	3m x 3m x 3m
4	4 TH	25 (TP16 to TP40)	
2	2 ND	10 (TP41 to TP50)	
1	2 ND	15 (TP51 to TP65)	
5	3 RD	20 (TP66 to TP85)	
	TOTAL	85	

2.6 MINING

The bauxite deposit occurring in the applied area is in the form of float ore boulders with an average thickness of about 1.5m. These boulders are fully exposed at higher elevation and partly embedded in the lithomarge clay at lower elevation. Considering the nature of the ore it is proposed to work with open cast mine by using mechanized method.

Development: Being float ore there is no overburden to be handled. Initial development work mainly involves development of internal road and necessary infrastructure. As the average thickness of the bauxite boulders is about 1.5m, the bauxite will be mined out by open cast mechanized method with jack hammer drilling and blasting.

Production: Production of bauxite will be carried for period of about 200 days in an year. During rainy season production will be suspended due to higher moisture content. Production of bauxite will be restricted only one shift i.e. general shift.

Bench: Considering the thickness of boulders there will be only one bench.

Pit slope angle/UPL: The maximum depth of the workings is not likely to exceed 1.5 m and is not likely to cause any slope stability problems. In order to control the erosion of material from the mined out pit a clear barrier of 3m will be maintained all along the periphery of the plateau.

Sizing: Secondary blasting with jack hammer and Rock breaker will be used for the fragmentation of the float boulders depending upon its physical condition. Further fragmentation or for size separation bauxite will be taken to screening plant.

Loading: Loading of bauxite at the production site will be done with the help of wheel loader.

Transport: Hired trucks will be used for transporting the bauxite.

a) Quantum of development and tonnage and grade of production expected pit wise is given below

TABLE 2.2: YEAR WISE DEVELOPMENT AND PRODUCTION

YEAR	ROM ORE (t)
1 ST	25200
2 ND	120360
3 RD	126960
4 TH	199200
5 TH	249900
TOTAL	721620

2.7 PROPOSED RATE OF PRODUCTION

Company has applied for Environmental Clearance from the Ministry of Environment and Forests for a maximum production of 2.5 LTPA.

2.8 ANTICIPATED LIFE OF MINE

7 years based on proved reserves. The proposed exploration will enhance the life of the mine.

2.9 CONCEPTUAL MINING PLAN

The ore in the applied area is occurring in the form of float boulders with variable thickness ranging from 0.5m to almost 3m height. Average height of the boulders is considered to be 1.5m. At higher elevation most of the boulders are exposed on the surface and at lower elevation many boulders are partly exposed and partly embedded in the clay bed. Hence, there is no overburden in the entire area. Considering the nature of the ore body and the production requirement it is proposed to produce the bauxite of this open cast mine by using mechanized method in a single bench.

2.10 EXTENT OF MECHANIZATION

1. Drilling Machines

TYPE	NO	DIA OF HOLE (mm)	SIZE/CAPACITY	MAKE	MOTIVE POWER	H.P
Jack Hammer	2	25	--	--	--	--
Compressor	1		300 cfm	Atlas Copco	Diesel	105

2. Loading Equipment

TYPE	NO	BUCKET CAPACITY IN cu.m	MAKE	MOTIVE POWER	H.P
Hydraulic excavator	1	3.60 m ³	L & T	Diesel	320
Wheel Loader	1	3.20 m ³	Hindustan	Diesel	160
Backhoe/Rock breaker	1	0.9 m ³	CK-90 (L&T)	Diesel	110

(a) Hydraulic Excavator will be used for loosening the embedded float ore from the clay bed

(b) Wheel loader – This machine will be deployed for the purpose of loading of crushed bauxite into trucks in & consecutive bauxite production months. (Bauxite dispatches will be suspended during monsoon).

3. Haulage and Transport Equipment

(a) Haulage within the mining lease-hold

TYPE	NO	SIZE/CAPACITY	MAKE	MOTIVE POWER	H.P
Dumper	3	35 tons	BEML	Diesel	380

(b) Details of hauling/transport equipment

TYPE	NO	SIZE/CAPACITY	MAKE	MOTIVE POWER	H.P
Trucks/Tipper	140	10 tonnes	Tata/Ashok Leyland etc	Diesel	110

2.11 BLASTING

The ore is present in the form of float ore with an average thickness of about 1.5m. In order to get better recovery it is proposed to use rock breaker as far possible and if needed secondary blasting will be carried out.

Secondary blasting: Jack hammer with provision of extended rod will be used for drilling the float ore.

a) i) Charge per hole: For 1m drilling 120 g of gelatin explosive will be used.

ii) Blasting pattern: Single boulder blasting

b) Storage Explosive: Gelatin cartridge will be stored in a portable magazine.

2.12 MINE DRAINAGE

The depth of water table observed in the near by areas varies from 80 to 100m below the ground level. The mining operations for bauxite are confined to 1 to 2m and hence there is no interference with ground water.

The storm water will get collected in the basin which will be harvested for afforestation and for dust suppression. The excess overflowing water and the surface storm water will be channelised through gully plugs, check dams & settling ponds.

2.13 STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE

a) **Nature and quantity of topsoil:** The float boulders are either fully exposed or partly embedded in the clay bed. Hence, there is no topsoil.

b) **Land selected for disposal of waste:** There is no waste as the entire ROM is sealable.

2.14 MINERAL PROCESSING

No mineral processing / beneficiation is done at the mines.

2.15 USE OF MINERAL

a) **End use of the mineral:** The bauxite that is going to be mined from the Shirale mine is of metal grade. The bauxite produced from the mines will be sold to alumina plant, alum manufacture and also to the cement industries. Export market will be explored for the available metal grade bauxite.

b) **Physical and chemical specifications:** The physical and chemical specification required by various buyers is as follows:

1. Physical Specifications: Size < 6"
2. Chemical Specifications: $\text{Al}_2\text{O}_3 > 45\%$, $\text{SiO}_2 < 5\%$, $\text{Fe}_2\text{O}_3 < 20\%$

Aluminous laterite will be sold to the various cement plants in Karnataka and Andhra Pradesh. In general, specifications required by these buyers are as follows:

3. Physical Specifications: Size – 1 to 6"
4. Chemical Specifications: Al_2O_3 38 to 44%
 $\text{SiO}_2 < 10\%$
 Fe_2O_3 – 25 to 30%

c) There is no proposal for blending of ore at the mine site.

2.16 SITE SERVICES

Office, Store, Workshop, Water tank, Electrical Power, Canteen and other facilities like First-Aid Center, Dispensary, and Rest Shelters etc are proposed to construct at the central part of the lease area.

2.17 WATER

The main source of water will be underground water. The underground water will be pumped into an overhead tank and from this main water tank, water will be supplied to office, canteen, rest shelter etc., after filtration and chlorination.

2.18 EMPLOYMENT POTENTIAL

Employment Potential for the proposed mining activity is 63 persons.

CHAPTER 3: BASELINE DATA: DESCRIPTION OF BASELINE STATUS OF ENVIRONMENT

3.1 BASELINE ENVIRONMENTAL DESCRIPTION

The EIA report for the project has to describe the existing environmental conditions surrounding the ML area.

3.2 AIR ENVIRONMENT

3.2.1 CLIMATE AND METEOROLOGY

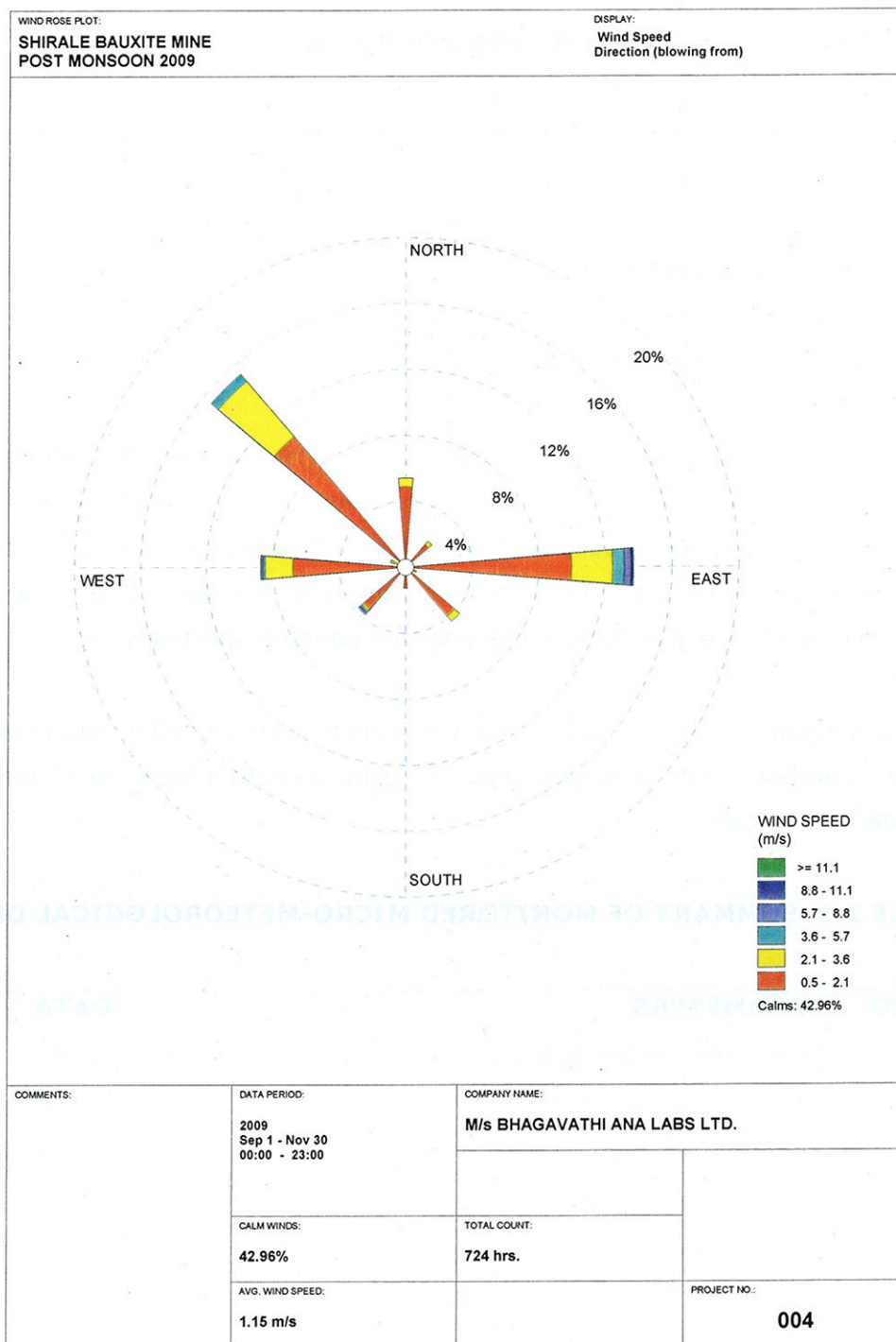
Micrometeorological data within the project area was assessed through a weather monitoring station during post-monsoon season 2009 (September 2009 – November 2009). Wind speed, wind direction, temperature and relative humidity were recorded in the met-station and parameters like cloud cover and rainfall were recorded by visual observations and rain gauge respectively.

Hourly average, maximum and minimum values were recorded continuously for 24-Hrs duration. The data generated is computed to obtain wind roses and summarized below:

TABLE 3.1: SUMMARY OF MONITORED MICRO-METEOROLOGICAL DATA

S.NO	PARAMETERS	DATA
1	Maximum temperature ($^{\circ}\text{C}$)	36.6
2	Minimum temperature ($^{\circ}\text{C}$)	20
3	Predominant wind direction	Northwest
4	Hourly Maximum Relative Humidity (%)	98
5	Hourly Minimum Relative Humidity (%)	16
6	Calm Wind Frequency (%)	42.96
7	Average Wind Speed (m/s)	1.15

WINDROSE (Post-monsoon 2009)



3.2.2 CRITERIA FOR SITE SELECTION OF AMBIENT AIR QUALITY MONITORING STATIONS

The ambient air quality monitoring stations to be put up for generating the baseline data and for further monitoring the model suggested by USEPA (1975b) has been adopted. The model suggests that the minimum number of stations should be four. However, the exact number has to be arrived at by knowing the wind rose (wind blowing directions and their respective frequencies) at site and the distances of the residential and sensitive areas from the project site in the buffer zone. This model suggested by Houghland and Stephens, 1976 (Ref. The Design of Air Quality Monitoring Network," R.E. Munn, 1981) is simple and reliable. It suggests setting up of monitoring stations at those locations where the probability of occurrence of maximum GLCs (Ground Level Concentrations) is high. The probability factor was found by determining the 'Coverage Factor (Ajk)' for residential locations around the proposed site, which are liable to be affected by pollutants. Coverage Factors 'Ajk' for all the potential locations were calculated by the following formula:

$$A_{jk} = \text{Freq. (k)} / (1 + D_j)$$

Where,

- A_{jk} = Coverage factor of monitoring station in the 'k'th downwind Sector from source
- Freq. (k) = Frequency of wind direction in the 'k'th sector
- D_j = Distance from the station to the source in Km.

Eight probable monitoring stations were selected all around the project site with due consideration to the wind direction and the distance from the site. For each of these stations coverage factor

'Ajk' was calculated and presented in the following table.

TABLE 3.2: COVERAGE FACTORS FOR AMBIENT AIR QUALITY MONITORING STATIONS

S.NO	MONITORING STATIONS	DISTANCE DJ KM	DIRECTION	FREQUENCY K %	AJK	AAQM RANKING
1	Malewadi	--	N	1.24	1.24	X
2	Dhanagarwadi	--	NW	4.28	4.28	II
3	Yelur	8.0	N	1.24	0.14	XXXI
4	Yelvan	6.6	NNE	0.00	0.00	--
5	Mutkalwadi	6.3	N	1.24	0.17	XXIX
6	Patewadi	--	E	8.70	8.70	I
7	Kodewadi	2.5	NE	3.72	1.06	XIII
8	Kolgaon	4.8	NNE	0.00	0.00	--
9	Ukoli	4.4	NE	3.72	0.69	XV
10	Arul	4.7	NE	3.72	0.65	XVII
11	Ambarde	4.1	ENE	0.27	0.05	XXXV
12	Shirale	1.8	ENE	0.27	0.10	XXXIII
13	Yelan Jugai	4.4	WNW	0.69	0.13	XXXII
14	Girgaon	3.8	WSW	0.13	0.03	XXXVI
15	Manjare	7.7	W	13.67	1.57	VIII
16	Parkhandale	6.6	E	8.70	1.14	XII
17	Ghungur	5.6	ESE	0.96	0.15	XXX
18	Parli	5.4	SE	15.47	2.42	V
19	Sonurle	4.6	SE	15.47	2.76	IV
20	Yelvadi	5.8	SSW	0.13	0.02	XXXVII
21	Kante	6.5	SW	2.07	0.28	XIV
22	Kumbhavde	7.5	SW	2.07	0.24	XXV
23	Barki	8.6	SW	2.07	0.22	XXVI
24	Karanjfen	7.1	S	5.38	0.66	XVI
25	Nandari	6.6	SSE	0.13	0.02	XXXVII
26	Savardi	9.2	S	5.38	0.53	XXI
27	Kasarwadi	3.0	ESE	0.96	0.24	XXV
28	Ambewadi	1.4	E	8.70	3.63	III
29	Mohande	5.0	E	8.70	1.45	IX
30	Yelwanwadi	6.5	W	13.67	1.82	VII
31	Pandarpaniwadi	4.3	WNW	0.69	0.13	XXVIII
32	Thanewadi	3.7	NNW	0.27	0.06	XXXIV

3.2.3 AMBIENT AIR QUALITY

The scenario of the existing Ambient Air Quality in the study zone of 10 kms radius around mine site has been assessed through a network of Ambient Air Quality locations. The design of monitoring network in the air quality surveillance program was based on emitters, pathway and the receptors with the following considerations.

- ❖ Topography / Terrain of the study area
- ❖ Human Settlements
- ❖ Wind pattern
- ❖ Health status
- ❖ Representation of Regional Background levels
- ❖ Accessibility of monitoring site
- ❖ Resource Availability

Pre-calibrated R.D. Samplers have been used for monitoring the existing AAQ status. Maximum, Minimum, Average and Percentile values have been computed from the raw data collected at all individual sampling stations to represent the Ambient Air Quality Status.

The Ambient Air Quality studies were carried out during post-monsoon 2009. The significant parameters viz., Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur dioxide (SO₂), Oxides of Nitrogen (NO_x) and Carbon monoxide (CO) were monitored in the core and buffer zones. The Ambient Air Quality studies were carried out during Post-monsoon 2009. The ambient air quality sampling locations are given in the table 3.3.

TABLE 3.3: DETAILS OF AMBIENT AIR QUALITY MONITORING STATIONS

S.NO	LOCATION	DIRECTION	DISTANCE (KM)
A1	Mine Lease Area	--	0.0
A2	Proposed haulage area	--	0.0
A3	Patewadi	E	0.0
A4	Sonurle	SE	4.6
A5	Chikalwadi	W	4.8
A6	Panundre	N	2.0
A7	Mahalsavde	NNW	1.6
A8	Ambewadi	E	1.4

S.NO	MONITORING STATIONS	DISTANCE DJ KM	DIRECTION	FREQUENCY K %	AJK	AAQM RANKING
33	Kelewadi	6.3	E	8.70	1.19	XI
34	Chikalwadi	4.8	W	13.67	2.36	VI
35	Mahalewadi	7.7	N	1.24	0.14	XXXI
36	Kalkewadi	--	ESE	0.96	0.96	XIV
37	Malkapur	6.8	NNE	0.00	0.00	--
38	Karanjoshi	5.8	NE	3.72	0.55	XX
39	Pendakhale	7.7	S	5.38	0.62	XVIII
40	Panundre	2.0	N	1.24	0.41	XXIII
41	Mahalsavde	1.6	NNW	0.27	0.10	XXXIII
42	Burambhal	3.0	SW	2.07	0.52	XXII
43	Man	3.2	NW	4.28	1.02	XIII
44	Kasarde	6.6	NW	4.28	0.56	XIX
45	Uchat	5.2	NNE	0.00	0.00	--
46	Valur	7.2	NNW	0.27	0.03	XXXVI
47	Mosum	8.6	WSW	0.13	0.01	XXXVII

The ambient air quality observed during the study period is well within the prescribed National Ambient Air Quality Standards. The Maximum values are given in table 3.4:

**TABLE 3.4: SUMMARY OF AMBIENT AIR QUALITY
(MAXIMUM VALUES)**

UNITS: $\mu\text{g}/\text{m}^3$

LOCATION	SPM	RPM	SO ₂	NO _x	HC (PPM)	CO (PPM)
Mine Lease Area	130	39.8	7.9	11.0	<1.0	<1.0
Proposed haulage area	132	40.5	8.0	11.3	<1.0	<1.0
Patewadi	135	40.3	7.9	11.4	<1.0	<1.0
Sonurle	138	42.5	8.4	11.9	<1.0	<1.0
Chikalwadi	127	38.8	7.7	10.7	<1.0	<1.0
Panundre	131	40.1	7.9	11.2	<1.0	<1.0
Mahalsavde	136	41.8	8.3	11.7	<1.0	<1.0
Ambewadi	129	39.4	7.8	10.9	<1.0	<1.0

3.3 NOISE ENVIRONMENT

3.3.1 BASELINE STATUS

NOISE LEVEL

A preliminary reconnaissance survey was undertaken to identify the major noise generating sources in the area. The noise at different noise generating sources based on the mining activities, commercial activities, traffic, etc have been identified. The monitoring of noise levels around the core zone and buffer zone were carried out to assess the impact of noise generated due to the activity.

Measured noise levels, displayed, as a function of time, is useful for describing the acoustical climate of the community. Noise levels recorded at each station with a time interval of about 60 minutes are computed for equivalent noise levels.

Equivalent noise level is a single number descriptor for describing time varying noise levels. The equivalent noise level is defined mathematically as

$$L_{eq} = 10 \log L / T \sum (10^{L_n/10})$$

Where L = Sound pressure level at function of time dB (A)

T = Time interval of observation

Noise levels during the night time generally drop, therefore to compute Equivalent noise levels for the night time, noise levels are increased by 10 dB (A) as the night time high noise levels are judged more annoying compared to the day time.

Noise levels at a particular station are represented as Day-Night equivalents (L_{dn}). Day Night equivalent is the single number index designed to rate environmental noise on daily / 24 hourly basis.

Mathematically L_{dn} is given by

$$L_{dn} = 10 \log \left\{ \frac{1}{24} (15 \times 10^{(L_d/10)} + 9 \times 10^{(L_n+10)/10}) \right\}$$

Where L_d = A weighed equivalent for day time period (6 am-9 pm)

L_n = A weighed equivalent for night time period (9 pm to 6 am)

ASSESSMENT OF NOISE LEVELS

The main objective of noise level assessment is to identify all the sources acceptable and unacceptable to study region. The acoustical environment varies dynamically in magnitude and character throughout most communities. The noise level variation can be temporal, spectral and spatial. The maximum impact of noise is felt on urban areas, which is mostly due to the commercial / mining activities and vehicular movement during peak hours of the day.

The assessment of noise pollution in the study area has been carried out keeping the above said considerations. The existing status of noise levels within the study zone has been undertaken through reconnaissance, identification of existing noise sources, land use pattern for monitoring of baseline noise levels.

Mining and allied activities usually cause noise pollution. Excessive noise levels will cause adverse effects on human beings and associated environment including domestic animals, wild life, natural ecosystem and structures.

To know the ambient noise levels in the study area, noise levels were recorded at mining area and nearby villages using noise level recorder.

Monitoring locations are given in the table 3.5.

TABLE 3.5: DETAILS OF NOISE QUALITY MONITORING LOCATIONS

S.NO	LOCATION	DIRECTION	DISTANCE (KM)
N1	Mine Lease Area	--	-
N2	Proposed haulage area	--	-
N3	Patewadi	E	-
N4	Sonurle	SE	4.6
N5	Chikalwadi	W	4.8
N6	Panundre	N	2.0
N7	Mahalsavde	NNW	1.6
N8	Ambewadi	E	1.4

The details of Noise levels are summarized below:

TABLE 3.6: NOISE LEVELS DURING STUDY PERIOD UNITS: dB (A)

	N1	N2	N3	N4	N5	N6	N7	N8
Min	35.2	35.0	36.4	34.6	38.0	38.2	37.3	35.0
Max	51.9	48.1	53.3	49.8	50.2	50.6	54.2	49.9
L_d	45.8	44.0	47.1	45.6	46.7	46.4	47.9	45.8
L_n	37.9	36.9	39.4	38.4	40.3	40.5	39.7	38.6

It was noted that the noise values obtained were within the prescribed Ambient Air Quality Standards with respect to Noise.

3.4 WATER ENVIRONMENT

3.4.1 BASELINE STATUS

Assessment of baseline data on water quality includes

- ❖ Identification of surface water sources
- ❖ Identification of ground water sources
- ❖ Collection of water samples
- ❖ Analyzing water samples collected for physico-chemical and biological parameters

3.4.2 SURFACE WATER

There are no watercourses passing through the mining leases. The drainage pattern is dendritic to sub-dendritic formed during monsoon season.

3.4.3 GROUND WATER

The most important source of water for drinking is the ground water. Assessment of water quality in the study area and in the mine area includes the quality assessment of parameters as per the Indian Standard IS-10500 (Drinking Water Standard). Ground water samples were collected from the nearby villages.

3.4.4 WATER REGIME

The area receives heavy rainfall. As a result of this large number of streams originate from the plateau top and flows down through the lease area and confluence with Kadvi river at a distance of about 10 Kms from the applied area. The streams exhibit a typical drainage pattern. Due to high gradient all the streams are seasonal in nature. There is no shallow aquifer in the vicinity of the applied area. The regional water table is about 80 to 100m below the ground level in the buffer zone.

TABLE 3.7: DETAILS OF WATER QUALITY MONITORING STATIONS

S. No	Location	Source	Direction	Distance in Km
SW1	Shali Nadi	Surface water	N	3.8
SW2	Kasari Nadi	Surface water	SW	6.6
GW1	Patewadi	Ground water	E	-
GW2	Burambal	Ground water	SW	3.0
GW3	Panundre	Ground water	N	2.0
GW4	Sonurle	Ground water	SE	4.6
GW5	Kalgoan	Ground water	NNE	4.8

TABLE 3.8: WATER QUALITY DATA-SURFACE WATER

	TESTS	SHALI NADI	KASARI NADI
I.	Essential Characteristics		
1.	Colour (Hazen Units)	5	5
2.	Odour	Un-objectionable	Un-objectionable
3.	Taste	Agreeable	Agreeable
4.	Turbidity, NTU	26	35
5.	pH	8.02	8.13
6.	Total Hardness as CaCO ₃ , mg/l	125	145
7.	Iron as Fe, mg/l	0.25	0.35
8.	Chlorides as Cl, mg/l	39	46
9.	Residual free Chlorine, mg/l	Nil	Nil
II.	Desirable Characteristics		
1.	Dissolved Solids, mg/l	340	380
2.	Calcium as Ca, mg/l	28	32
3.	Magnesium as Mg, mg/l	13	16
4.	Copper as Cu, mg/l	<0.01	<0.01
5.	Manganese as Mn, mg/l	<0.01	<0.01
6.	Sulphate as SO ₄ , mg/l	26	30
7.	Nitrate as NO ₃ , mg/l	2	3
8.	Fluoride as F, mg/l	0.50	0.60
9.	Phenolic Compounds as C ₆ H ₅ OH, mg/l	<0.001	<0.001
10.	Mercury as Hg, mg/l	<0.001	<0.001
11.	Cadmium as Cd, mg/l	<0.01	<0.01
12.	Selenium as Se, mg/l	<0.01	<0.01
13.	Arsenic as As, mg/l	<0.01	<0.01
14.	Cyanide as CN, mg/l	<0.01	<0.01
15.	Lead as Pb, mg/l	<0.01	<0.01
16.	Zinc as Zn, mg/l	<0.01	<0.01
17.	Anionic Detergents as MBAS, mg/l	<0.01	<0.01
18.	Chromium as Cr ⁶⁺ , mg/l	<0.01	<0.01
19.	Mineral Oil, mg/l	Absent	Absent
20.	Alkalinity, mg/l	170	185
21.	Aluminium as Al, mg/l	<0.01	<0.01
22.	Boron as B, mg/l	0.05	0.05
23.	Total Coliforms MPN per 100ml	16	25

TABLE 3.9: WATER QUALITY DATA-GROUND WATER (a)

	TESTS	PATEWADI	BURAMBAL	PANUNDRE
I.	Essential Characteristics			
1.	Colour (Hazen Units)	<5	<5	<5
2.	Odour	Un-objectionable	Un-objectionable	Un-objectionable
3.	Taste	Agreeable	Agreeable	Agreeable
4.	Turbidity, NTU	2	1	2
5.	pH	7.28	7.56	7.32
6.	Total Hardness as CaCO ₃ , mg/l	360	380	335
7.	Iron as Fe, mg/l	0.08	0.10	0.09
8.	Chlorides as Cl, mg/l	82	92	74
9.	Residual free Chlorine, mg/l	Nil	Nil	Nil
II.	Desirable Characteristics			
1.	Dissolved Solids, mg/l	680	760	670
2.	Calcium as Ca, mg/l	78	82	74
3.	Magnesium as Mg, mg/l	40	43	36
4.	Copper as Cu, mg/l	<0.01	<0.01	<0.01
5.	Manganese as Mn, mg/l	<0.01	<0.01	<0.01
6.	Sulphate as SO ₄ , mg/l	53	67	72
7.	Nitrate as NO ₃ , mg/l	28	31	22
8.	Fluoride as F, mg/l	1.10	1.30	1.20
9.	Phenolic Compounds as C ₆ H ₅ OH, mg/l	<0.001	<0.001	<0.001
10.	Mercury as Hg, mg/l	<0.001	<0.001	<0.001
11.	Cadmium as Cd, mg/l	<0.01	<0.01	<0.01
12.	Selenium as Se, mg/l	<0.01	<0.01	<0.01
13.	Arsenic as As, mg/l	<0.01	<0.01	<0.01
14.	Cyanide as CN, mg/l	<0.01	<0.01	<0.01
15.	Lead as Pb, mg/l	<0.01	<0.01	<0.01
16.	Zinc as Zn, mg/l	<0.01	<0.01	<0.01
17.	Anionic Detergents as MBAS, mg/l	<0.01	<0.01	<0.01
18.	Chromium as Cr ⁶⁺ , mg/l	<0.01	<0.01	<0.01
19.	Mineral Oil, mg/l	Absent	Absent	Absent
20.	Alkalinity, mg/l	320	340	310
21.	Aluminium as Al, mg/l	<0.01	<0.01	<0.01
22.	Boron as B, mg/l	0.06	0.07	0.07
23.	Total Coliforms MPN per 100ml	Absent	Absent	Absent

TABLE 3.9: WATER QUALITY DATA-GROUND WATER (b)

	TESTS	SONURLE	KALGOAN
I.	Essential Characteristics		
1.	Colour (Hazen Units)	<5	<5
2.	Odour	Un-objectionable	Un-objectionable
3.	Taste	Agreeable	Agreeable
4.	Turbidity, NTU	1	1
5.	pH	7.62	7.48
6.	Total Hardness as CaCO ₃ , mg/l	395	325
7.	Iron as Fe, mg/l	0.08	0.09
8.	Chlorides as Cl, mg/l	99	85
9.	Residual free Chlorine, mg/l	Nil	Nil
II.	Desirable Characteristics		
1.	Dissolved Solids, mg/l	800	740
2.	Calcium as Ca, mg/l	90	72
3.	Magnesium as Mg, mg/l	41	35
4.	Copper as Cu, mg/l	<0.01	<0.01
5.	Manganese as Mn, mg/l	<0.01	<0.01
6.	Sulphate as SO ₄ , mg/l	86	62
7.	Nitrate as NO ₃ , mg/l	24	29
8.	Fluoride as F, mg/l	1.30	1.20
9.	Phenolic Compounds as C ₆ H ₅ OH, mg/l	<0.001	<0.001
10.	Mercury as Hg, mg/l	<0.001	<0.001
11.	Cadmium as Cd, mg/l	<0.01	<0.01
12.	Selenium as Se, mg/l	<0.01	<0.01
13.	Arsenic as As, mg/l	<0.01	<0.01
14.	Cyanide as CN, mg/l	<0.01	<0.01
15.	Lead as Pb, mg/l	<0.01	<0.01
16.	Zinc as Zn, mg/l	<0.01	<0.01
17.	Anionic Detergents as MBAS, mg/l	<0.01	<0.01
18.	Chromium as Cr ⁶⁺ , mg/l	<0.01	<0.01
19.	Mineral Oil, mg/l	Absent	Absent
20.	Alkalinity, mg/l	350	300
21.	Aluminium as Al, mg/l	<0.01	<0.01
22.	Boron as B, mg/l	0.07	0.06
23.	Total Coliforms MPN per 100ml	Absent	Absent

3.5 SOIL QUALITY

The normal mineral composition of plants is altered by alteration in soil condition. Soil could well represent the topsoil cover, which is rich in nutrient content.

The soil samples from the core and buffer zones were analyzed for physico-chemical parameters. The sampling locations are given in Table 3.10.

TABLE 3.10: SOIL SAMPLING LOCATIONS

S.NO	LOCATION	DIRECTION	DISTANCE IN KM
S1	Mine Lease Area	--	--
S2	Proposed haulage area	--	--
S3	Malewadi	N	--
S4	Shirale	ENE	1.8
S5	Ambewadi	E	1.4
S6	Girgoan	WSW	3.8

TABLE 3.11: SOIL QUALITY (a)

S. No	Parameters	Unit	S1	S2	S3
1	pH (1:2 Soil Water Extract)	-	7.96	7.81	7.38
2	Electrical Conductivity	Micro mhos	160	390	190
3	Total Soluble Salts	Kg/ha	554.3	1253.2	626.6
4	Nitrate as N	Kg/ha	50.61	33.74	38.56
5	Phosphorous as P ₂ O ₅	Kg/ha	40.97	43.38	28.92
6	Potash as K ₂ O	Kg/ha	554.3	361.5	482
7	Sodium as Na ₂ O	Kg/ha	1566.5	1711.1	1229.1
8	Calcium as Ca	Kg/ha	6169.6	5687.6	4723.6
9	Magnesium as Mg	Kg/ha	1879.8	1807.5	1421.9
10	Chloride as Cl	Kg/ha	86.76	207.4	137.37
11	Organic carbon	%	0.59	0.51	0.53
12	Texture	-	SCL	SCL	SCL
13	Sand	%	42	44	49
14	Silt	%	23	25	21
15	Clay	%	35	31	30
16	Iron as Fe	Kg/Ha	65.78	48.33	55.98
17	Boron as B	Kg/Ha	0.4338	0.2892	0.3374

TABLE 3.11: SOIL QUALITY (b)

S. No	Parameters	Unit	S4	S5	S6
1	pH (1:2 Soil Water Extract)	-	7.76	7.78	7.48
2	Electrical Conductivity	Micro mhos	244	222	249
3	Total Soluble Salts	Kg/ha	197.62	183.16	197.62
4	Nitrate as N	Kg/ha	67.48	50.61	55.43
5	Phosphorous as P ₂ O ₅	Kg/ha	28.92	45.79	40.97
6	Potash as K ₂ O	Kg/ha	86.76	84.35	89.17
7	Sodium as Na ₂ O	Kg/ha	91.58	77.12	81.94
8	Calcium as Ca	Kg/ha	559.12	525.38	554.3
9	Magnesium as Mg	Kg/ha	260.28	209.67	228.95
10	Chloride as Cl	Kg/ha	33.74	28.92	33.74
11	Organic carbon	%	0.22	0.35	0.27
12	Texture	-	SCL	SCL	SCL
13	Sand	%	42	40	41
14	Silt	%	39	36	38
15	Clay	%	19	24	21
16	Iron as Fe	Kg/Ha	62.66	43.38	50.61
17	Boron as B	Kg/Ha	0.4338	0.2892	0.3374

Note: SCL – Silt clay loam, SL – Sandy Loam, SC – Silt Clay, LS – Loamy Sand

3.6 LAND ENVIRONMENT

Existing Land use pattern

The mining lease area is a part of the Western Ghats consisting of high rising hill ranges with extensive plateau top and dissected by narrow valleys. The hill ranges are generally ranging in NNW – SSE direction. The highest and lowest elevation of the applied area is 900 meters and 750 meters above MSL respectively. The area shows uneven and undulating topography resulting from the differential weathering of the bauxite. The total applied area is 278.85 Ha. Out of this 85 Ha is potential float bearing area and 193.85 Ha is sloping area with scanty vegetation.

Details of the existing land use, at the end of five year period and at the end of conceptual mining period is given below

TABLE 3.12: LAND USE PATTERN

S.NO	TYPE OF LAND USE	PRESENT	PLAN PERIOD	CONCEPTUAL PERIOD
1	Area of excavation	Nil	60.1350	85.0000
2	Storage for topsoil	Nil	Nil	Nil
3	Overburden dump	Nil	Nil	Nil
4	Mineral storage	Nil	Nil	Nil
5	Infrastructure (Workshop, administrative building etc)	Nil	0.2000	0.2000
6	Roads	Nil	0.2000	2.0
7	Railways	Nil	Nil	Nil
8	Green belt	Nil	1.5000	1.5000
9	Tailing pond	Nil	Nil	Nil
10	Effluent Treatment Plant	Nil	Nil	Nil
11	Mineral separation plant	Nil	Nil	Nil
12	Township area	Nil	Nil	Nil
13	Others (reclamation of mined out pits)	Nil	*34.5	*70.0
14	Area which will remain untouched	278.85	215.0150	190.1500
	TOTAL	278.85	278.85	278.82

* Area reclaimed is the part of mined out area. Hence, it is not taken once again while totaling the area

Study area

The land use of 10 km radius study area based on census 2001 records is given in Table 3.13. The detailed village wise land use is given in Annexure III.

TABLE 3.13: LANDUSE PATTERN OF STUDY AREA (AS PER CENSUS 2001)

DESCRIPTION	AREA (HA)	PERCENTAGE (%)
Forest area	13167	36
Irrigated area	728	2
Unirrigated area	17403	47
Cultivable waste land	3598	10
Area not available for cultivation	2171	6
Total	37066	100

Land Use as per Satellite Imagery**Satellite : IRS P VI****Sensor : LISS III**

DESCRIPTION	AREA (HA)	PERCENTAGE (%)
Agricultural single crop	3116.85	9.89
Agriculture fallow	1598.57	5.07
Open forest	2616.65	8.30
Scrub forest	6725.66	21.35
Forest blank	117.75	0.57
Open scrub	6655.33	21.12
Land with / without scrub	9894.76	31.40
Built up land	207.82	0.67
Water body	514.89	1.63
Total	31448.28	100

3.7 BIOLOGICAL ENVIRONMENT**FLORA IN CORE ZONE**

S.NO	LOCAL NAME	BOTANICAL NAME
1	Jamun	Fugenia jambolana
2	Hirda	Terminalia chebula
3	Rametha	Lasiosiphon erichephalus
4	Bajkara	-
5	Anjan	Memecylon takbotianum Brand
6	Shiras	Abizia procera
7	Waras	Heterophragma quadriculare
8	Kagonda	-
9	Bakara	Pleocaulis ritchiei (Clarke) Bremek

FLORA IN BUFFER ZONE

S.NO	LOCAL NAME	BOTANICAL NAME
1	Umber	Ficus glomerita
2	Jamun	Fugenia jambolana
3	Amba	Mangifera indica
4	Hirda	Therminalia chobula
5	Rametha	Lasiosiphon erichephalus
6	Karvi	Srobilanthus callosus
7	Fern	Pteris acquirina
8	Shisham	Dalbergia latifolia
9	Nana	Argastroema lanceolata
10	Acacia	--
11	Sag	Tectona grandis
12	Suru	--
13	Anjan	Memecylon takbotianum Brand
14	Shiras	Abizia procera
15	Ain	Terminalia tomentosa
16	Chandeda	Maeearanga roxburghii
17	Chinch	Tamarindus indicus
18	Kumbhi	Cariya arborea
19	Nana	Lagerstroemia lamceolata

S.NO	LOCAL NAME	BOTANICAL NAME
20	Karvand	Carrisa congesta Vahl Carrisa inermis Vahl
21	Wad	Ficus bengalensis
22	Waras	Heterophragma quadriculare
23	Dhaman	Crewia taliaefolia
24	Bakara	Pleocaulis ritchiei (Clarke) Bremek

Density of trees around the lease is given in the following

S.NO	LOCATION	DENSITY
1	North West Slope (Mhalsvede R.F)	0.6
2	Northern Slope (Panundre R.F)	0.6
3	South East (Sonurle R.F)	0.6
4	Dhangarwadi	0.5
5	South West (Burumbal R.F)	0.3

Flora Details of the Forest Area

<i>Abrus precatorious</i>
<i>Abutilon indicum</i>
<i>Abutilon ranadei</i>
<i>Abutilon ramosum</i>
<i>Acacia catechu</i>
<i>Acacia chundra</i>
<i>Acacia wightii</i>
<i>Acanthephippium bicolor</i>
<i>Acampe ochracea</i>
<i>Achyranthes aspera</i>
<i>Achyranthes coynei</i>
<i>Actinodaphne angustifolia</i>
<i>Actinodaphne bourdellonii</i>
<i>Actinodaphne bourneae</i>
<i>Actinodaphne campanulata</i>
<i>Actinodaphne hookeri</i>
<i>Actinodaphne lanata</i>
<i>Actinodaphne lawsonii</i>
<i>Actinodaphne malabarica</i>
<i>Actinodaphne salicina</i>
<i>Actinodaphne tadulingamii</i>
<i>Adenosma malabaricum</i>
<i>Adenanthera pavonia</i>
<i>Adatoda beddomei</i>
<i>Adathoda vesica</i>
<i>Adina cordifolia</i>
<i>Aegle marmelos</i>
<i>Aerides maculosum</i>
<i>Aerides ringens</i>

<i>Aerva wightii</i>
<i>Aerva persica</i>
<i>Ageratum conyzoides</i>
<i>Aglaia barberi</i>
<i>Aglaia canarensis</i>
<i>Aglaia elaeagnoidea</i>
<i>Aglaia exstipulata</i>
<i>Aglaia indica</i>
<i>Aglaia jainii</i>
<i>Aglaia lawii</i>
<i>Aglaia littoralis</i>
<i>Aglaia maiae</i>
<i>Aglaia malabarica</i>
<i>Aglaia per-viridis</i>
<i>Aglaia simplicifolia</i>
<i>Aglaia talbotii</i>
<i>Albizia lebbek</i>
<i>Albizzia odoratissima</i>
<i>Albizzia procera</i>
<i>Allophylus concanicus</i>
<i>Alstonia scholaris</i>
<i>Amomum microstephanum</i>
<i>Amorphophallus bulbifer</i>
<i>Amorphophallus dubius</i>
<i>Amorphophallus hohenackeri</i>
<i>Amorphophallus mysorensis</i>
<i>Amorphophallus sylvaticus</i>
<i>Ampelocissus arnottiana</i>
<i>Anacardium occidentale</i>
<i>Anacolosa densiflora</i>
<i>Ananas comosus</i>
<i>Anaphyllum weightii</i>
<i>Anaphalis barnesii</i>
<i>Aneilema ochraceum</i>
<i>Anisochilus carnosus</i>
<i>Anisochilus verticillatus</i>
<i>Anona racemosa</i>
<i>Anona squamosa</i>
<i>Calamus dransfieldii</i>
<i>Calamus karnatakensis</i>
<i>Calamus lacciferus</i>
<i>Calamus lakshmanae</i>
<i>Calamus metzianus</i>
<i>Calamus nagbettai</i>
<i>Calamus prasinus</i>
<i>Calamus stoloniferus</i>

<i>Calamus thwaitesii</i>
<i>Calamus travancoricus</i>
<i>Calamus vattayila</i>
<i>Calophyllum austroindicum</i>
<i>Debregaesia ceylanica</i>
<i>Decaschistia triloba</i>
<i>Dendrobium aphyllum</i>
<i>Dendrobium crepidatum</i>
<i>Dendrobium jerdonianum</i>
<i>Dendrobium macrostachyum</i>
<i>Dendrobium microbulbon</i>
<i>Dendrobium peguanum</i>
<i>Dendrobium transparens</i>
<i>Derris brevipes</i>
<i>Derris canarensis</i>
<i>Derris thothathrii</i>
<i>Embelia ribes</i>
<i>Emblica officinalis</i>
<i>Ensete superbum</i>
<i>Epipogium roseum</i>
<i>Eria albiflora</i>
<i>Eriocaulon barba-caprae</i>
<i>Eriocaulon barbeyanum</i>
<i>Eriocaulon europeplon</i>
<i>Eriocaulon dalzellii</i>
<i>Eriocaulon humile</i>
<i>Eriocaulon margaretae</i>
<i>Eriocaulon mysorensense</i>
<i>Eriocaulon rouxianum</i>
<i>Eriocaulon thomasi</i>
<i>Erinocarpus nimmonii</i>
<i>Fahrenheitia integrifolia</i>
<i>Ficus benjamina</i>
<i>Ficus bengalensis</i>
<i>Ficus glomerata</i>
<i>Fimbristylis arnottiana</i>
<i>Flemingia gracilis</i>
<i>Frerea indica</i>
<i>Fuirena trilobites</i>

FAUNA

Due to medium to thick forest the wild animals are in a quiet good number in the buffer zone. According to the local people the common wild life cited in the area are given in the following table.

FAUNA IN BUFFER ZONE

LOCAL NAME	ENGLISH NAME	FAMILY
Gava	Indian bison	Bovidae
Ran dukkar	Wild boar	Suidae
Ran manjar	Jungle cat	Felidae
Jungli Komadi	Jungle cock	--
Sasa	Indian hare	Hystriidae
Nag	Indian cobra	Elapidae
Ghonas	Russles viper	Viperidae
Dhaman	Rat snake	Colubridae
Sarada	Forest lizard	Agamidae
Peacock	Pavo cristatus	
Pigeon	Columbia livia	Columbidae
Parrot	Psitacula sp	Psitaculaceae

3.8 SOCIO ECONOMIC ENVIRONMENT**TABLE 3.14: SOCIO-ECONOMIC DETAILS WITHIN THE STUDY AREA**

S.NO	DESCRIPTION	NUMBERS
DEMOGRAPHIC DETAILS		
1	Total Villages	47
2	Total no. of House Hold	11173
3	Total Population	56583
4	Total SC Population	6384
5	Total ST Population	59
LITERACY LEVEL		
1	Total Literate Population	30209
EMPLOYMENT PATTERN		
1	Total Main Working Population	30967
2	Total Non-Workers	25616
3	Total Marginal Workers	6981

DETAILS OF MAIN WORKERS		
1	Cultivators	15136
2	Agricultural Labor	2905
3	Household Workers	603
4	Other Workers	5342

Amenities (Infrastructure Facilities*)			
Water facilities			
Tap	30	River	12
Well	36	Canal	1
Tank	2	Lake	0
Tube Well	8	Spring	7
Hand Pump	32	Others	1
P & T Facilities			
Post Office	10	Post & Telegraph Office	0
Telegraph Office	0	Telephone Connection	78
Bus	33	Railway	0
Power Supply	Available for all purpose in all villages		
Medical Facilities*			
Maternity & Child Welfare Center	1	Family Welfare Center	1
Public Health Sub Center	1	RMP	20
Education Facilities			
Primary School	61	Sr. Secondary School	0
Middle School	32	College	0

3.9 OCCUPATIONAL HEALTH

In order to evaluate the impacts on mining on the health of workers, baseline health studies shall be carried out on every worker before joining their duties. The baseline health status, their habits will be recorded and a log book will be maintained and the same shall be updated every quarter.

Disability Evaluation

- ❖ Degree of dyspnea
- ❖ Amount of cough and sputum, wheezing
- ❖ Smoking age started, pack/day, age stopped
- ❖ Past pulmonary illnesses
- ❖ Concurrent medical conditions
- ❖ Medications
- ❖ Occupational and environmental exposures
- ❖ Chest physical examination findings

- ❖ Chest roentgenogram & x- rays
- ❖ Pulmonary function studies
- ❖ Baseline audiograms
- ❖ Urinalysis

Thus, a baseline condition will be established for all the workers and the records shall be maintained in order to evaluate any occupational diseases due to mining activity or aggravation of the existing condition due to mining.

ENVIRONMENTAL HEALTH & SAFETY ASSESSMENT

An assessment on environmental health & safety will be made on the following considerations:

Principal Environmental and Occupational Risks that are likely to be created	:	<u>INSTANT:</u> Accident due to pit wall sliding Accident due to sliding of dump slopes Accident due to transportation <u>LONG TERM</u> Continuous exposure to air pollutants leading to silicosis, asthma, tuberculosis, etc. Hearing loss due to continuous exposure to high noise
Risk Assessment	:	As per design of hazard risk assessment matrices for ranking occupational health risks in mining & allied activities
Rank of Risk to Public Health	:	Marginal (Occasional)
Communication of Risks to public & steps for prevention & control	:	Display at approach road Induction training to all the workers on possible risks and steps for prevention & control Refresher training once a year
Assessment of Health Impacts	:	Preliminary screening Regular Health Camps (once in six months)
Assessor	:	Occupation Health Specialist with established credentials
Agency for the health impact assessment study	:	In-house facility will be provided
Hazardous operations in mine	:	None
Members of the Safety Committee	:	Mines Manager Safety Officer Worker's Representative Local Panchayat's Representative
Functions of Safety Committee	:	Implementation of OH&S procedures
Assessment of work place Exposure	:	Medical Officer of Mine

Communication of Non-conformance	:	By Circular, Display at relevant areas
Expenditure for tests & treatments of Occupational & non-occupational illness	:	Responsibility of the mine management
Compensation to workers for health impairments due to injury or illness & amount of compensation	:	As per ESI / Medical Reimbursement / workmen compensation Act

CHAPTER 4: ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 AIR ENVIRONMENT

4.1.1 ANTICIPATED IMPACTS

Bauxite mining is carried out by opencast mechanized method. The air borne particulate matter generated by ore and handling operations, transportation and screening of ore is the main air pollutant. The emissions of Sulphur dioxide (SO₂), Oxides of Nitrogen (NO_x) contributed by diesel operated excavation/ loading equipment and vehicles plying on haul roads are marginal. Prediction of impacts on air environment has been carried out taking into consideration proposed production and net increase in emissions.

Air pollution sources in the operating mine are classified into three categories

- a. Point sources
 - b. Area sources
 - c. Line sources
- Drilling & Blasting and screening operations of the mine are considered as point sources
 - Extraction of ore by various activities in mining area are considered as area sources
 - Transportation of ore from mining benches to tipper platform of plant is considered as line sources

The other source of air pollution is the dust generated during the movement of tippers on the haul road. Water tankers with spraying arrangement will be used for regular water sprinkling on the haul roads to ensure effective dust suppression. The tippers are well maintained so that exhaust smoke does not contribute abnormal values of noxious gases and un-burnt hydrocarbons.

To assess the impact due to Bauxite production of 0.25 MTPA on air environment, predictions have been carried out using ISC – AERMOD MODEL.

ISC - AERMOD VIEW

ISC – AERMOD View is a complete and powerful air dispersion modeling package which seamlessly incorporates the popular USEPA Models, ISCST3, ISC-PRIME and AERMOD into one interface without any modifications to the models. These models are used extensively to assess pollution concentration and deposition from a wide variety of sources.

The AERMOD Model

The **AMS/EPA REGULATORY MODEL (AERMOD)** was specially designed to support the Environmental Regulatory Modeling Programs.

AERMOD is a regulatory steady – state modeling system with three separate components;

- AERMOD (AERMIC Dispersion Model),
- AERMAP (AERMOD Terrain Preprocessor),
- AERMET (AERMOD) Meteorological Preprocessor).

The AERMOD Model includes a wide range of options for modeling air quality impacts of pollution sources, making it popular choice among the modeling community for a variety of applications. AERMOD contains basically the same options as the ISCST3 model:

- ❖ AERMOD requires two types of meteorological data files, a file containing surface scalar parameters and a file containing vertical profiles. These two files are provided by AERMET Meteorological Preprocessor Program
- ❖ PRIME building downwash algorithms based on the ISC – PRIME model have been added to the AERMOD model
- ❖ Use of allocatable arrays for data storage
- ❖ Incorporation of EVENT processing for analyzing short-term source culpability
- ❖ Explicit treatment of multiple – year meteorological data files and the Annual average
- ❖ Options to specify emissions that vary by season, hour-of-day and day-of-week

- ❖ Deposition algorithms have been implemented in the AERMOD model – results can be output for concentration, total deposition flux, dry deposition flux, and / or wet deposition flux
- ❖ The model contains algorithms for modeling the effects of settling and removal of large particulates and for modeling the effects of precipitation scavenging for gases or particulates

AERMET

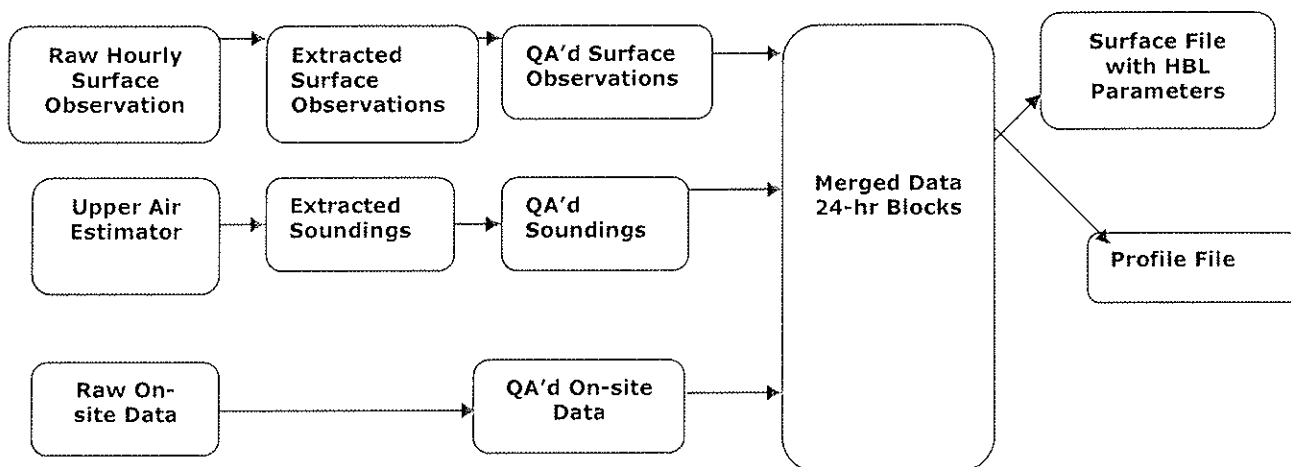
In order to conduct a refined air dispersion modeling project using the AERMOD short-term air quality dispersion model, it is necessary to process the meteorological data representative of the study area being modeled. The collected meteorological data is not always in the format supported by the model, therefore the meteorological data needs to be pre-processed using AERMET Program

The AERMET Program is a meteorological preprocessor which prepares hourly surface data and upper air data for use in the AERMOD air quality dispersion model. AERMET is designed to allow future enhancements to process other types of data and to compute boundary layer parameters with different algorithms. AERMET processes meteorological data in three stages and from this process two files are generated for use with the AERMOD Model

- ❖ A Surface File of hourly boundary layer parameters estimates
- ❖ A Profile File of multiple-level observations of wind speed, wind direction, temperature and standard deviation of the fluctuating wind components

A flow sheet depicting the AERMET Processing Stages is given below:

AERMET Processing Stages



AERMAP – TERRAIN PROCESSOR

The Terrain Processor allows to import and process terrain elevation data of the project. ISC-AERMOD View imports terrain elevation from various digital elevation maps to

- Extract Terrain Elevation for Receptor and Sources
- Generate the Terrain Grid
- Generate visualization of the surrounding terrain in 2D and 3D

Application of AERMOD

ISC-AERMOD MODEL with the following options has been employed to predict the cumulative ground level concentrations due to emissions from the proposed activity.

- ❖ Area being rural, rural dispersion parameters are considered
- ❖ Predictions have been carried out to estimate concentration values over radial distance of 10 km around the project area
- ❖ Uniform polar receptor network has been considered
- ❖ Emission rates from the sources were considered as constant during the entire period
- ❖ The ground level concentrations computed without any consideration of decay coefficient

- ❖ Calm winds recorded during the study period were also taken into consideration
- ❖ 24-Hourly mean ground level concentrations were estimated using the entire meteorological data collected during the study period
- ❖ Digital Elevation Map of the study area is used to represent the graphical output of the GLC's using the Terrain Processor

4.1.2 EMISSIONS DETAILS

Excavation, loading and transportation through tippers and screening and crushing are the major sources, which are of significance. Therefore, the emissions considered for modeling are from excavation, transportation and screening bauxite.

The emissions will be mainly due to total production of 0.25 MTPA of bauxite. Hence for the predictions of impacts, the emissions due to handling of the said ore and waste have been considered.

The emissions are computed based on AP-42 emission factors.

Operational hours, activity rate ambient wind speed and moisture content have been considered for estimation of emissions from area sources. For line source, apart from operational hours and activity rate, moisture and silt content of the haulage road have been considered.

Predictions are carried out for the worst-case scenario of simultaneous operation of excavators (area sources) and dumpers for transportation from mine pit to loading point and from there the ore is transported to buyers point through 10T tippers.

Particle size concentration assumed in the modeling consisted of five separate particles size classes 1.25, 3.75, 7.5, 12.5, and 20 micrometers with a particle concentration of 0.0262, 0.0678, 0.1704, 0.1536 and 0.5820 respectively.

The number of working days has been taken at 200 days per year with 8 hours of operation / day, hence the concentrations predicted are considered to be the worst case. With control measures, the emissions have been taken at 30% of uncontrolled emissions for handling and 10% of uncontrolled emissions for transportation.

EMISSION DETAILS

(Basis – AP-42: Emission Estimation Technique Manual For mining)

TABLE 4.1: AREA SOURCE EMISSION – PRODUCTION

	Present	Proposed	Incremental
Quantity, tpa	0.00	250000	250000
Operational Hours per year	0.00	1600.00	1600.00
Activity rate, t/h	0.00	156.25	156.25
Emission of Dust, g/t	0.118	0.118	0.118
Emission of Dust gm/hr	0.00	18.44	18.44
Area of Influence, m ²			25
Uncontrolled Emission rate, g/s/m ²			0.000204861
Controlled Emission rate, g/s/m ²			0.00006146

TABLE 4.2: HAULAGE EMISSIONS – BAUXITE ORE

	Present	Proposed	Incremental
Quantity, tpa	0.00	250000	250000
Operational Hours per year	0.00	1600.00	1600.00
Capacity of each Tipper (T)	0.00	10	10
Total No of Tippers/year	0	25000	25000
Lead length /trip, Km	1.5	1.5	1.5
Total VKT/Year	0	37500	37500
Emission kg/VKT	0.9195	0.9195	0.9195
Total emission kg/year			34481.25
Uncontrolled emission rate g/s/m			0.007981771
Controlled emission rate, g/s/m			0.000798177

Note: * Emission factor computed based on wind speed of 1 m/s, moisture and silt content of 5%.

The meteorological data recorded during study period continuously on wind speed, wind direction, temperature etc., have been processed to extract the data required for simulation by ISC – AERMOD VIEW

4.1.3 DATA ANALYSIS OF PREDICTED CONCENTRATIONS

Predictions have been carried out using ISC-AERMOD Model for study period. The predicted concentrations of suspended particulate matter are presented below. The maximum predicted value of increase in SPM due to proposed increase in mining operations would be about $5.85 \mu\text{g}/\text{m}^3$. This concentration will be observed within the core zone of mine area where mining operations are being carried out. The concentration was found to reduce to a value of less than $1.0 \mu\text{g}/\text{m}^3$ at a distance of about 1.0 km from the mining operations. The impact of mining operation would be negligible beyond 1.5 km.

The following table shows the overall scenario:

TABLE 4.3: OVERALL SCENARIO

(UNITS: $\mu\text{g}/\text{m}^3$)

LOCATION	BACK GROUND LEVEL	PREDICTED CONCENTRATION	RESULTANT CONCENTRATION
Mine Lease Area	130	5.85	135.85
Proposed haulage area	132	5.85	137.85
Malewadi	135	<1	136
Shirale	138	<1	139
Thanewadi	127	<1	128
Yelwadi	131	<1	132
Sanurle	136	<1	137
Mohandalewadi	129	<1	130

4.1.4 PROPOSED MITIGATE MEASURES FOR DUST SUPPRESSION

- ❖ Dust suppression arrangements at all dust generation points
- ❖ Dust extractors during drilling operation and crushing/ screening
- ❖ Grading of haul roads time to time and cleaning to remove the accumulated dusty material
- ❖ Regular maintenance of the transport vehicles
- ❖ Practicing wet drilling
- ❖ Usage of sharp drill bits for drilling of holes
- ❖ Avoiding of overloading of tippers and covering of loaded tippers with tarpaulins during ore transportation
- ❖ Dust mask provision to workers
- ❖ 50 m of barrier zone will be maintained all along the mine lease boundary and green belt will be maintained in the barrier zone
- ❖ Human habitation is on the East direction i.e (Ambewadi at 1.4 Kms) from the lease area. Apart from the 50m barrier zone a 30m width of wind break of 3 tiers of 10m each is provided
- ❖ Periodical monitoring of air quality to take steps to control the pollutants

4.2 NOISE ENVIRONMENT

4.2.1 ANTICIPATED IMPACTS

To reduce the noise levels at source, proper and timely maintenance and up keeping of mining machinery is being carried out as per instructions of manufacturers.

The main sources of noise in the mine are classified as follows:

- ❖ Stationary Mining Equipment
- ❖ Mobile Mining Equipment
- ❖ Transportation Vehicles
- ❖ Drilling & Blasting
- ❖ Screening

4.2.2 PROPOSED MITIGATING MEASURES (Noise & Vibration)

The operations of the mining equipment, plying of vehicles and mine machinery operations are the major sources of undesirable noise in the proposed project area.

The following control measures are proposed for bringing down the noise levels-

- ❖ The vibration due to blasting is minimized by careful planning, supervision and execution of each blast and using milli-second(M.S) delay detonators and proper stemming to prevent blow out of holes
- ❖ Green belt will be made around the working areas to screen the noise and also for arresting fugitive dust
- ❖ Maintenance and tuning of machinery would be ensured to reduce undesirable noise
- ❖ Earplugs and earmuffs will be provided to the workmen
- ❖ Limiting the speed of haulage vehicles / tippers
- ❖ Rubber lining in the chutes of Crushing/ screening plant

4.3 WATER ENVIRONMENT

4.3.1 ANTICIPATED IMPACTS

Mining activities cause adverse impacts due to mine drainage and siltation due to storm water. The impact on water environment has been considered under the following heads:

- Water consumption
- Mine seepage and impact on ground water
- Impact on surface water bodies
- Storm water management

4.3.2 WATER CONSUMPTION

The water consumption at the mine will be for the following purposes:

- Dust suppression
- Afforestation purposes.
- Domestic

The main source of water will be ground water. The ground water will be pumped in to an overhead tank and from this water will be supplied to office, canteen, rest shelter etc after filtration and chlorination.

The details of the water usage are given in the Table 4.4

TABLE 4.4: WATER REQUIREMENT (m³/Day)

PARTICULARS	TOTAL	SOURCE
Dust Suppression	20.0	Groundwater
Green belt	14.0	
Domestic	20.0	
Total	54.0	

4.3.3 IMPACT ON GROUND WATER

The bauxite mining operations are confined to upper 1 to 2m of the area i.e. more than 100m above the regional ground water table. Therefore, the ground water table will not be intersected.

4.3.4 IMPACT ON SURFACE WATER

The area receives excess rainfall there is a possibility of siltation of the seasonal streams during the rainy season.

4.3.5 MITIGATION MEASURES

The only pollution anticipated in the surface drainage water is the suspended solids, due to wash off from the dumps. For this purpose retaining wall with garland drain is proposed surrounding the toe of the waste dump. The discharge from this drain is diverted to a settling tank unused pit workings, which allows the sediments to settle. Further to arrest the silted drainage entering into the area down below, check dams and gully plugs shall be erected in the existing natural drains. These check dams also assist in the recharge of ground water system.

4.3.6 RUNOFF AND TURBIDITY CONTROL

Runoff from bauxite mining areas and haul roads will have high sediment loads due to the soil disturbance during the various pre mining and mining operations. To prevent runoff and sediments from damaging stream ecosystems, effective sediment control and erosion prevention program would be used.

Strategies to minimize and eliminate runoff include the use of

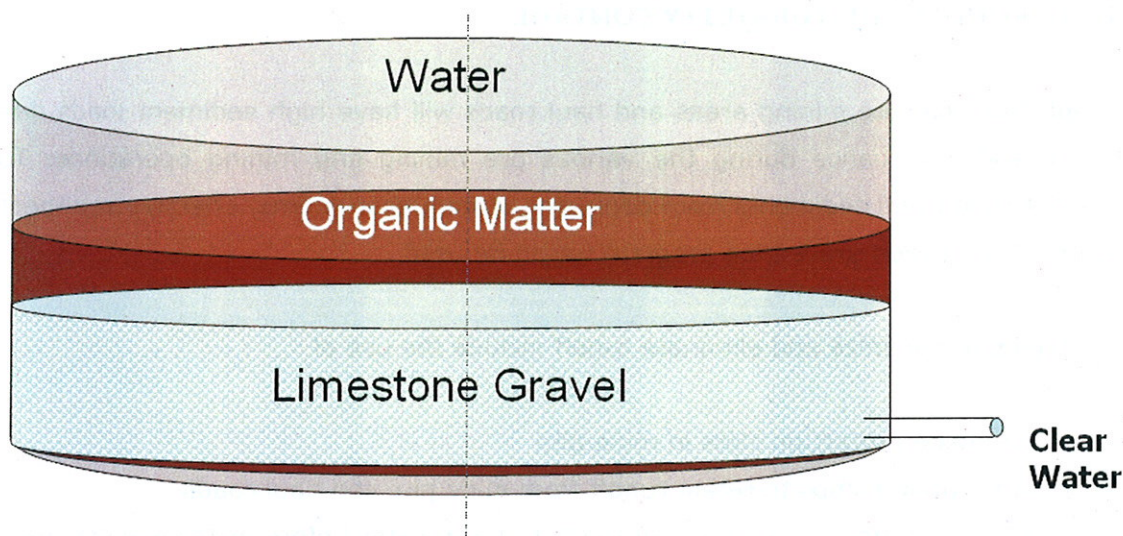
- Drainage protection slots in mine pits
- Infiltration sumps to retain runoff from mine pits and haul roads
- Sedimentation sumps on haul roads to treat water before water is discharged to the environment; and
- Final landform designs of rehabilitated areas to prevent discharge of water to surrounding forest

The effectiveness of mine runoff control and sediment control practices is verified by monitoring the turbidity of water in various streams around the mine.

Anand Mines Products (P) Limited proposes to treat the runoff water during monsoon by Aluminator method. The ponds will be constructed in a suitable location during starting of mining operation.

The ditches/ponds will be filled with limestone gravel. Either organic matter or sand will be covered on the limestone bed. As mine water flows through gravel, the limestone dissolves, adding alkalinity and increasing the pH. This method is most effective for runoff water that has low pH, aluminium hydroxides precipitate and settle down. Then the limestone gravel will be replenished annually depends upon the runoff quality.

Aluminator



4.3.7 RAINWATER HARVESTING

In the nearby villages open drains will be made to collect the storm waters for rain water harvesting. The designs and construction details that will be carried out in the nearby villages is as follows:

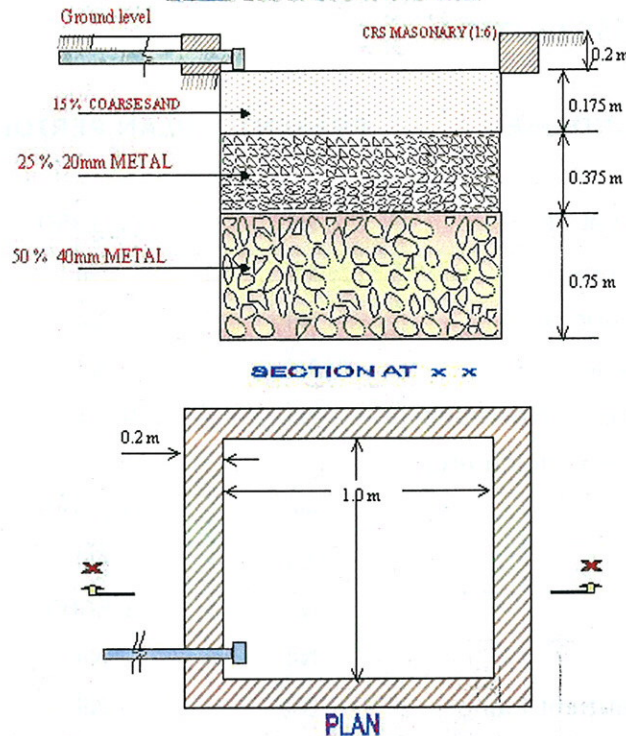
Rain Water Harvesting Structure (RWHS) for Ground water Recharge:

Size: 1.0m x 1.0m x 1.5m

Construction Details of Rain Water harvesting system

S.No	Volume, Cu.m	Description
1	4.5	Excavation in Hard Gravelly and all available soils
2	2.25	65 mm metal
3	1.25	20 mm metal
4	0.675	Coarse sand
5	0.24	CRS masonry in 1:6 prop.
6	4.5	Carting of excavated earth for a lead of 8 km.

**RAIN WATER HARVESTING STRUCTURE
TYPE - II
SIZE 1.0 x 1.0 x 1.5 mts**



4.4 LAND ENVIRONMENT

4.4.1 ANTICIPATED IMPACTS

The applied area forms the slope part of the main Ringewadi-Girgaon plateau. The bauxitic boulders are derived from the main plateau and then fully or partly exposed or embedded in the clay bed. At higher altitude more and more boulders are exposed and at lower altitude more and more boulders are embedded in the clay bed. Average thickness of the boulders is 1.5m. Because of float ore mining the adverse impact on the land is going to be negligible. At the end of mining activities the elevation of the float bearing will be reduced by 1m.

The over all impact of mining and allied activities on the land environment is given in the following table:

TABLE 4.5: LAND USE PATTERN

S.NO	TYPE OF LAND USE	PRESENT	PLAN PERIOD	CONCEPTUAL PERIOD
1	Area of excavation	Nil	60.1350	85.0000
2	Storage for topsoil	Nil	Nil	Nil
3	Overburden dump	Nil	Nil	Nil
4	Mineral storage	Nil	Nil	Nil
5	Infrastructure (Workshop, administrative building etc)	Nil	0.2000	0.2000
6	Roads	Nil	0.2000	2.0
7	Railways	Nil	Nil	Nil
8	Green belt	Nil	1.5000	1.5000
9	Tailing pond	Nil	Nil	Nil
10	Effluent Treatment Plant	Nil	Nil	Nil
11	Mineral separation plant	Nil	Nil	Nil
12	Township area	Nil	Nil	Nil
13	Others (reclamation of mined out pits)	Nil	*34.5	*70.0
14	Area which will remain untouched	278.85	215.0150	190.1500
	TOTAL	278.85	278.85	278.82

Out of total 278.85 Ha of lease area 85 Ha will be under excavation, Roads cover 2 Ha of land, Green belt occupies 1.5 Ha of land, infrastructural facilities like Workshop, administrative building etc cover an area of 0.2 Ha and 190.15 Ha will be left out for future usage

4.5 BIOLOGICAL ENVIRONMENT

4.5.1 ANTICIPATED IMPACTS

Following are the impacts on the biological environment due to mining activities:

- ❖ Loss of habitat on the mine site and surrounding areas
- ❖ Disturbance to wildlife due to mining operations
- ❖ Disturbance to wildlife due to haulage of mined materials

4.5.2 PROPOSED MITIGATING MEASURES

The mined out areas will be backfilled and reclaimed with dense poly-culture plantation with the local species. Water reservoirs will be created in the abandoned mine pit that will increase the water availability on the plateau.

4.6 SOCIO-ECONOMIC ENVIRONMENT

4.6.1 ANTICIPATED IMPACTS

The objective is to demonstrate the range of potential impacts on communities and families by the mining project. Some of the most important are:

Loss of livelihood: The ethnic people living in the designated areas normally depend for their livelihood on the land. The Mine lease area falls in Private Land (206.136 Ha) & Government Land (72.714 Ha). There is no human settlement in the lease area. There are few houses on the fringe of lease boundary near Kalkewadi, Mahalsvade, Ringewadi and Patewadi. The post mining will improve the utility of the ML area through afforestation and creation of additional water resources.

Changes in population dynamics: Invariably all the managerial and skilled manpower required for mining and associated activities comes from out side as such trained manpower is usually not available in ethnic population. People also come to the mining areas for trade, business etc. However as part of the mining operations under the proposed project, job opportunities exist for local people as semi-skilled

and unskilled labour. Also, there will be opportunities for secondary employment like in providing various services to the mine employees, jobs under contractors, transport sector, other business activities etc. for the local people. Thus, the population dynamics of the area will undergo a change over the years resulting in mixed and diversified cultural and religious activities.

Cost of living: Societies dependent on agriculture and forests usually have a lower level of economic scenario. The development of industrial and other associated activities in such areas increase the level of the economic activities manifolds. Increased industrial and economic activities generate more money and increase the buying power of the people directly and indirectly associated with these activities. This leads to an increase in the cost of living; however it is compensated by the increase in buying capacity of the people, by engaging themselves in mining jobs, which has got a regular income, than the agriculture.

Water scarcity: Mining either by opencast or by underground methods damages the water regime and thus causes a reduction in the overall availability of water in and around the mining areas. The proposed mine will not intersect the ground water table. However, proper water conservation and rainwater harvesting measures will be adopted to recharge the ground water and in fact it is going to create additional water resources.

Health impacts: Health and well being of the people living in and around the mining complexes get affected due to the pollutants in the air and water, noise and vibrations. The people working in the mines and associated facilities also get affected by the work place environment, which can cause various problems, e.g., skin problems, lung diseases; noise induced hearing loss, etc. For the proposed project, due precautions will be taken for protection against any occupational health hazards to the workers as well as for local people, due to the mining activity.

Infrastructure facilities: The mining and associated activities in the mineral bearing areas bring about infrastructural development, i.e., roads are constructed, schools and hospitals are established and communication facilities are developed, etc., which tend to improve the quality of life of the complexes.

Employment opportunities: The mining and associated activities offer opportunities of employment to the eligible people from the ethnic population. There also exists opportunities for secondary employment like service providing to mine employees, jobs under contractors, transportation, shops, etc.

4.6.2 PROPOSED MITIGATING MEASURES

The mine is situated in the remote place and in the area, where the socio-economic level of the people is not satisfactory.

The main occupation of the people is the rain depended farming. Due to uneven topographic conditions and low fertility of the soil the agricultural out put is comparatively low and there are no major industries in the area. This might have forced the local people to migrate towards the cities.

The mining operations in the mining area would provide direct & indirect employment to more than 200 local people. Hence mining operations will help in improving socio-economic status of the area.

As approach road was made, it became convenient for local people to travel to bazaar places for marketing and trading.

4.7 OCCUPATIONAL SAFETY & HEALTH ENVIRONMENT

Occupational health and safety hazards occur during the operational phase of mining and primarily include the following:

- ❖ Respiratory hazards
- ❖ Noise
- ❖ Physical hazards
- ❖ Explosive storage and handling

4.7.1 RESPIRATORY HAZARDS

Long-term exposure to silica dust may cause silicosis

The following measures are proposed:

- ❖ Excavators, dumpers, dozers, drills other automated equipments will be enclosed
- ❖ Use of personal breathing protection will be made compulsory

NOISE

Workers are likely to get exposed to excessive noise levels during quarrying activities

The following measures are proposed for implementation

- ❖ No employee will be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection
- ❖ The use of hearing protection will be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110 dB(A)
- ❖ Ear muffs provided will be capable of reducing sound levels at the ear to at least 85 dB(A)
- ❖ Periodic medical hearing checks will be performed on workers exposed to high noise levels

4.7.2 PHYSICAL HAZARDS

The following measures are proposed for control of physical hazards

- ❖ Specific personnel training on work-site safety management will be taken up;
- ❖ Work site assessment will be done by rock scaling of each surface exposed to workers to prevent accidental rock falling and / or landslide, especially after blasting activities;
- ❖ Natural barriers, temporary railing, or specific danger signals will be provided along rock benches or other pit areas where work is performed at heights more than 2m from ground level;
- ❖ Maintenance of yards, roads and footpaths, providing sufficient water drainage and preventing slippery surfaces with an all-weather surface, such as coarse gravel will be taken up

4.7.3 OCCUPATIONAL HEALTH SURVEY

All the persons will undergo preplacement examination at the time of joining for the following test

- ❖ General physical tests
- ❖ Audiometric tests
- ❖ Full chest, X-ray, Lung function tests, Spirometric tests

Essential medicines will be provided at the site. The medicines and other test facilities will be provided at free of cost.

The first aid box will be made available at the mine for immediate treatment.

Employees are monitored for occupational diseases by conducting the following tests

- ❖ Periodic medical examination – yearly
- ❖ Lung function test – yearly, those who are exposed to dust
- ❖ Audiometry – yearly
- ❖ Chest X-ray once in five years
- ❖ Eye test

First aid training is imparted to the selected employees regularly. The list of first aid members are displayed at strategic places.

CHAPTER 5: ENVIRONMENTAL MANAGEMENT PLAN

5.1 AIR QUALITY MANAGEMENT

Mitigative measures suggested for air pollution control are based on the baseline ambient air quality monitoring data. From the point of view of maintenance of an acceptable ambient air quality in the region, it is desirable that air quality should be monitored on a regular basis to check it vis-à-vis the standards prescribed by CPCB and in cases of non-compliance, appropriate mitigative measures shall be adopted.

As per the results of ambient air quality monitoring data, the background concentrations of SPM, SO₂, NO_x and CO are within the stipulated CPCB standards.

CONTROLLING DUST LEVELS

Dust is the major pollutant generated from the mining operations. Dust would be generated during mining, handling and transportation of the material. The maximum predicted value of increase in SPM due to proposed mining operation would be about 5.85 µg/m³. This concentration will be observed within the mine area. The concentration was found to reduce to a value of 1.00 µg/m³ at a distance of about 1.5 km from the mining operations. The impact of mining operation would be negligible beyond 1.5 km. The environmental control measures, which are being taken and proposed to control the fugitive dust released during the ore production are given below:

MINES

- ❖ Controlled blasting operations at mine
- ❖ Regular water spray will be provided to the working areas and over the haulage roads
- ❖ Proper enclosures will be provided to the Screening plant
- ❖ Screening & crushing plant will be provided with dust extractor
- ❖ Dust masks will be provided to the workers working in the specified dust generating areas
- ❖ Excavation operations are proposed to be suspended during periods of very strong winds
- ❖ Plantation of wide leaf trees and tall grass along approach roads and on safety barrier zones will be done to help suppress the dust

HAULAGE

- ❖ All haul roads will be maintained regularly
- ❖ Water will be sprayed daily on the roads by using water tankers
- ❖ Avoiding over filling of tippers and consequent spillage on the roads
- ❖ Bauxite carrying trucks will be effectively covered by tarpaulin to avoid escape of fines to the atmosphere
- ❖ Air quality will be regularly monitored both in the core zone and the buffer zone

CONTROLLING OF SO₂ & NO_x LEVELS

The source of SO₂ & NO_x would be due to vehicular emissions and running of DG set. This can be controlled by proper maintenance and servicing of vehicles and providing proper chimney height to the DG set.

5.2 NOISE POLLUTION CONTROL

The ambient noise level monitoring carried out in and around the proposed mine shows that ambient noise levels are well within the stipulated limits of CPCB.

In an operational mine major noise sources are operation of mine machineries, equipment & plying vehicles. Noise generation may be for an instant, intermittent or continuous periods, with low to high decibels.

The Noise level predicted at boundary of ML due to the increased in production level of the mine will be less than 45 dB (A).

The management plan for controlling noise pollution is as given below.

- ❖ Selection of suitable machinery and equipment, proper mounting of equipment, providing noise insulation/padding wherever practicable and machinery fitted with properly designed silencers
- ❖ Limit the speed of haulage vehicles/tippers
- ❖ Proper maintenance of noise generating parts of the machine
- ❖ Provision of earmuffs to workers as a measure to protect their ears
- ❖ Thick plantation in and around the mine and the screening plant
- ❖ To carry out noise surveys during different seasons at the mine

PROTECTIVE MEASURES FOR GROUND VIBRATIONS/AIR BLAST CAUSED BY BLASTING

Rock breaker and jack hammer drilling and blasting will be used for the fragmentation of the float ore. Therefore, ground vibrations and generation of dust due to blasting may not have any impact that may require protective measures.

5.3 WATER QUALITY MANAGEMENT

There are no perennial rivers in the buffer zone of the mine and also the mining operations are confined to the area above the regional water table and further the mining operations for the production of bauxite will be discontinued during the rainy season.

During the rainy season only, water will flow out of mines into the natural watercourses. Rainwater draining through the mine contains excess amount of Total Suspended Solids (TSS). The TSS can be arrested by the bunds constructed at suitable sites in the valley portions. Rainwater discharging from the bunds (before & after bund) will be analyzed for total solids, total dissolved solids and suspended solids.

In order to arrest erosion of material from the mined out area, 18 silt check bunds of 10m x 2m x 2m will be constructed. Year wise construction of check bunds is given below:

S.NO	YEAR	NO. OF CHECK BUNDS
1	1st	4
2	2nd	4
3	3rd	6
4	4th	4
5	5th	--
	TOTAL	18

MEASURES TO CONTROL EROSION/SEDIMENTATION OF WATER COURSES

Production of bauxite is suspended during rainy season. Hence, new bauxite faces are exposed during rainy season. Erosion of loose material from the bauxite face gets stabilized in the initial period of rainy season. 3 meter of barrier left around the float bearing area will act as a natural barrier for the flow of rainwater from the mine. Water discharged from the plateau during the rainy season flows through the series of silt check bunds before confluencing the main river over an

aerial distance of about 10Kms. Rainwater flowing from the mine further undergoes self purification. Hence, there will hardly any adverse effect due to sedimentation of the watercourses.

5.4 WASTE WATER MANAGEMENT AT MINE SITE

There is no process waste water generation from mine.

5.5 WASTE DUMP MANAGEMENT

No dumps as the entire ROM are sealable

5.6 LAND MANAGEMENT

Land degradation is one of the major adverse impacts of opencast mining in the form of excavated voids. Land reclamation plan must, therefore, be implemented simultaneously with the mining activities. The land management plan is divided mainly into following three components:

- Topsoil Management
- Land Reclamation
- Afforestation

5.7 TOPSOIL MANAGEMENT

There is no topsoil as all the boulders are exposed on the surface.

5.8 LAND RECLAMATION & REHABILITATION

In the first five year of mining, it is proposed to disturb 60.135 Ha of land for direct development and production of bauxite. Out of this 34.5 Ha will be reclaimed by plantation. Details of the land reclamation is given below

TABLE 5.1: LAND RECLAMATION

S.NO	YEAR	PLANATION ON VIRGIN AREA (Ha)	CHECK DAMS	RECLAMATION OF MINED OUT (Ha)
1	1st	1.5	4	--
2	2nd	--	4	1.5
3	3rd	--	6	8.0
4	4th	--	4	10.0
5	5th	--	--	15.0
	TOTAL	1.5	18	34.5

5.9 AFFORESTATION PROGRAMME

Initially the afforestation has been planned in the slopes covering 1.0 Ha per year. Afforestation will commence from the second year of the modified planned period. Details of the plantation to be carried out are given below:

TABLE 5.2: AFFORESTATION PROGRAMME

YEAR	AREA (Ha) GOING TO BE RECLAIMED BY AFFORESTATION	LOCATION
1 st	1.5	Along road virgin area
2 nd	1.5	Mined out pit
3 rd	8.0	Mined out pit
4 th	10.0	Mined out pit
5 th	15.0	Mined out pit
TOTAL	36.0	

It is proposed to plant about 10000 plants/Ha of local species. Along with plantation utmost importance will be given for post-plantation care. This includes addition of fertilizers & manures according to the requirement of each species and required amount of pesticides will be used to control the pests. All plants of age up to three years will be watered regularly once in a week.

TABLE 5.3: LIST OF CPCB PROPOSED SPECIES FOR PLANTATION WITHIN MINE AREAS

SHRUB SPECIES	HERB SPECIES	GRASS SPECIES	TREES
Grewia tenax	Abutilon fruticososa	Aristida funiculata	Glyricidia
Grewia villosa	Boerharia verticillata	Sporobolus diander	Leucaena leucocephala
Mimosa hamata	Celosia argentea	Cenchrus setigerus	Alstonia scholaris)
Rhus mysorensis	Corchorus depressus	Aristida adscensionis	Eucalyptus
Cardia sp.	Dicoma tomentosa	Desmostachya bipinnata	Casurina equisetifolia
Capparis sp.	Euphoria orbiculata	Aplusa mutica	Acacia nilotica
Barleria prionitis	Indigofera tinctoria	Cenchrus ciliaris	Ficus hispida

Apart from the above species it is also recommended to grow fruit yielding varieties also.

5.10 WILD LIFE CONSERVATION PLAN

THE THREATS TO ANIMALS

Forest is adjacent to the mine lease area. Hence, threats may be there to animals due to anthropogenic activities & mining activities

Forest Fire

Forest fire in summer is threat to the wild life. This not only destroys ground vegetation, as well as many small and ground dwelling animals and birds, their young ones and eggs also burnt and destroyed. Such fire is caused by negligence and aberrant behaviour of the people who carelessly throw the lighted bides matchsticks in the forest. Some times the fire spread in the forest and cause devastating fire. This also causes shortage of ground vegetation on which most of the herbivorous are dependent for their sustenance.

Water Scarcity

Though there are excellent sources of the water in the lower slopes, hill streams dry up in summer months leaving no water sources for consumption and sustenance of small and ground dwelling animals that cannot go to long distances to satisfy their needs for drinking water.

Noise, Lighting and Atmospheric pollution

The mining activities cause disturbances to the wild life in the area. Movement of heavy vehicles and earth movers causes noise disturbances. This creates problem for the wild life particularly during the night time.

Removal of Forest Products

Most of the villagers are dependent on forest for their requirement of fuel wood, for house construction, agricultural implement, and fencing and to meet their need of non-timber forest produce. They freely move around forests and in the process not only create disturbance to the wild animals but also reduced their cover and food availability for them.

Mining

The entire ore deposit is extracted through open cast mining and in the process form ditches within the animal habitats. These ditches if not protected properly may cause death due to fall by un-suspecting wild animals.

MINIMISING IMPACT OF ACTIVE MINING:

Lighting

Lighting creates lot of problem and stress for animals. This should be kept at the minimum within the forest area and wherever possible should be avoided.

Noise from Vehicles, Earth Movers and Machines:

All vehicles and machineries should be regularly checked and maintained for ensuring minimum possible noise level.

Dust Pollution

While all the provisions of Mining plan (approved by IBM), Environment Management Plan and Reclamation plan should be rigidly followed, the dust level has to be kept low by spraying water and other measures recommended in these documents and monitored regularly.

Water Pollution

Water is badly polluted due to dust and mud flowing from mines. This should be properly handled by check dams and settling ponds to keep the natural streams free from any suspended particles.

Ban on use of Fuel Wood

Collection of fuel wood from the forest for the purpose of cooking, heating and other purposes depletes the habitat of wildlife living in the area. Due to this people from the entire area frequent the forest, thereby causing disturbance to the animals and also increasing the fire hazards. In order to eliminate this threat all surrounding villages may be provided with cooking gases or power for using electricity for the purpose of cooking and heating.

Reclamation

Mining works should be taken up in a workmanship life fashion without exposing large area to mining operation at a time and keeping the approach routes limited to essential requirement. Reclamation of mine dumps should be taken up immediately when the mining is completed in the area. The fines have now found a market and they should also be disposed of expeditiously to improve the environment.

Protection of the Active Mines

Besides the fencing 15 m wide thick planting should be taken up around the pit mouth for minimizing the impact of mining on the animals.

Improvement of Water Availability for Animals

Sometimes due to want of water in the forest for drinking and bath, animals stray out of the forest and there is confrontation with the people. Suitable water bodies (game tanks) should be developed within the forest preferable on nallah beds. This will also partly prevent transmission of communicable diseases from the domestic animals.

Vaccination of Domestic Cattle

As there is no culture of stall feeding in the area they go into the forest for grazing. They not only deplete the fodder availability for the animals in the forest, but also transmit diseases like foot and mouth diseases (FMD), Anthrax etc. While stall feeding should be gradually introduced, all cattle within the 5 km of the area should be vaccinated against communicable diseases which often takes epidemic form and can wipe out the entire population of herbivores. This has to be done in consultation with and support of the Animal Husbandry Department. For this purpose up-gradation of cattle breed will help improve milk yield and consequently stall feeding shall be cost effective.

Awareness Programme

Awareness programme has to be conducted on continues basis to protect the flora and fauna in the region. The near by villagers should be made of aware the conservation and protection of trees and animals.

MANAGEMENT PLAN

This Environment Management Plan lays down number of safety measures to maintain proper environment despite the mining and other ancillary activities. Their implementation will accordingly benefit the wild life living in the area. They shall be monitored and controlled by the appropriate authority like the State Pollution Control Board, Ministry of Environment, Department of Mining and Geology and Forest Department of the State.

The mitigation measures proposed are as follows:

Habitat Improvement

Maintaining the quality of present habitat and wherever it is degraded to improve the same is the top most priority for conservation and management measures for wildlife in order to maintain and improve their status. Habitat should not only mean the habitat of flagship species it also mean the habitat of smaller lesser known and lesser seen wildlife as all of them including vegetation are part of the food circle.

The following steps needed to be taken for habitat conservation and restoration wherever necessary.

Prevention of Fire

Forest fire which is a annual feature, is detrimental to any habitat, is needed to be arrested. For this purpose suitable fire lines have to be cleared along permanent lines like footpath, nallas, extraction paths, ridges and boundary of active mines etc. to a width of 15 mts. and to a width of 30 mts. on the boundary line of forest boundary should be properly demarcated before the fire line is cleared.

Before the fire season commences, every year 4 fire watchers have to be maintained at vantage points or watch towers for having full view of the entire area with suitable wireless communication facility (V.H.F.) to alert the work force to immediately spring into action to extinguish the fire. For this purpose they should be equipped with necessary gadgets like rakes, bill hooks, brooms, buckets etc, for bringing fire under control without loss of time.

They can either extinguish the fire or start counter fire from a fire line to stop spread of fire. As an annual feature, a controlled burning of the fire line is to be taken up under proper supervision in the month of December or January to clear the line of any inflammable material.

In order to keep the fire fighting squad in readiness, it is necessary to organise a drill with the forest staff and the mining workers so that they can go into action immediately wherever fire occurs. A group of workers can be earmarked to help the forest staff to extinguish the fire, as it become difficult to control by the forest staff only.

Water

Water in many streams gets dry up usually by October and November leaving vast tracts of area without any water. This situation needs to be improved. The water availability for the wild life living in the forest area can be improved by erecting rubble check dams with vegetation at suitable intervals of 50-100 m. This will not only conserve the soil and moisture but also make water available to the small ground dwelling animals during the drought period by improving the moisture regime of the area. This can also bring down fire incidence to a considerable extent. Water holes of suitable sizes should be developed for making water available for different animals in the area.

Improvement of Food Availability

There are few blanks or degraded patches of forest within this area. They can be planted up with different fodder species like bamboos, grasses and berries etc., for resident herbivores.

Temporary Measures for Water Availability

Since the forest land is devoid of any perennial stream, it will be difficult for animals to survive during the drought periods. The measures suggested to improve moisture regime may take sometime to yield result. Hence, as an immediate measure, water holes may be created at few vantage points and water may be filled up there by tankers.

Salt Lick

The area is deficient in natural salt needed for the wild life. Artificial salt licks can be created in the entire area.

Roads

Most of the pervasive threats to biological diversity involve roads (World Bank 1997).

Review of the published literature reveals that the impacts of roads on wildlife can be broadly grouped into the following six categories.

- Habitat Fragmentation & Modification
- Restriction of Animal Movements
- Injury & Mortality of Wildlife Species
- Soil Erosion & Hydrological Alterations
- Environmental Contamination
- Human Colonization-induced Disturbances

Fencing the Mine Pits

The safety zone area shall be maintained. It will be properly fence the mines by appropriate methods to prevent accidental fall of any animal. For this purpose rubble wall fencing shall be quite useful. This can prevent any accidental fall and warn the watch & ward staff of any disconnection by unauthorized intruders.

IMPROVE ECONOMY OF THE LOCAL PEOPLE TO REDUCE DEPENDANCE ON THE FOREST

Because of proximity of mines and ancillary small business etc, number of villagers gets employment. But still there are number of people who don't have full time employment round the year. They keep on going to the forest for collection of fire wood, small timber, roots, fruits and flowers of different plants, hunting of small animals and collection and trade of minor forest produce like honey, wax, etc. This not only depletes the forest and endangers the animals and plants; it also increases the fire hazards. Hence it is essential to improve the economy of these people through alternate livelihood opportunities so that their dependence on the forest is totally eliminated and their support for conservation can be harnessed. This can be done in the line of eco-development programs. Activities suggested include:

Improvement of Cattle Breed, Stall Feeding and Trade of Milk and Milk Products

There are numbers of cattle in the area which are neither productive nor good for agriculture purposes. They are let loose into the forest for feeding. In order to change this habit it will be desirable to improve the cattle breed through artificial insemination or otherwise in consultation with the Animal Resources Department.

Growing of Vegetables

Though there is a demand for vegetables in nearby mining areas, they are brought from other places. Vegetables can be good source of income for the people. Improve seeds and other inputs and training will be required for this purpose. Of course water sources need be developed for the purpose or advantage of perennial streams can be taken with small diversion weirs.

Tailoring & Embroidery

The local people can very easily adopt Tailoring and embroidery, if they are provided with sewing machine and other inputs. Particularly women folk can be trained both in tailoring and embroidery. In this case they need support for marketing their product.

Small Business

Self help groups can be formed for taking up small business in the villages and nearby market places.

Raising of Nurseries of Forest and Horticulture Species

There is a huge demand for forest and horticulture seedlings in the area for institutional planting. Nursery growing where there is availability of water will be a quite paying proposition. People can be trained in raising different species of seedlings with the guidance of the forest officials of the locality. Different mines, institutions or even govt. departments can purchase seedlings, which are in great demand.

Minor Technical jobs

Small mechanical works like cycle repairs, electrical repairing and wiring, welding fabrication work etc., can also be taken up with minimum training.

Development of Farm Forestry and Community Forestry for Fuel, Fodder and Fruit Species and Pasture Development

Plantation of suitable species of plants in the private land, community land or village forest, can meet the requirement of people, who need not depend on the forest for this purpose. This should be taken up in all neighbouring villages.

Skill Development

Since the local people are not exposed to this sort of work, it is necessary to upgrade their skills through suitable capacity building programs in the adjoining villages. Care should be taken to involve women folk particularly, as much less women are engaged in mining works as compared to men folk.

AWARENESS PROMOTION

There is hardly any awareness among the people regarding conservation need for the wild animals and the benefit they can provide to the community. It is essential, in the interest of conservation that the local community is made aware

regarding this need and what to do about their conservation and that of their habitat. Such awareness should be created with the help of different voluntary organizations involved in conservation, through various means like film and video shows, street plays, signage's, story telling, different competitions and talks in the schools, posters, leaflets, brochures etc.

MONITORING MECHANISM

The entire operation as per this plan shall be monitored by the management and suggestions and advise on proper implementation of the plan including minor course correction as and when needed shall be provided by the forest department. In other lease hold areas outside the preview of this plan the Forest Department may be able to ensure that safety of wild animals with the support of the lessee and their own field staff and local people.

PLAN PERIOD

This plan has been prepared for a period of 10 years. The annual requirement of funds earmarked shall be utilized for the said purpose and shall not be diverted for any other purpose. Wherever it is found convenient, the lessee can take up any particular work in consultation with the Divisional Forest Officer and funds required for the purpose may be retained by the lessee.

FOLLOW UP AFTER THE PLAN PERIOD

After 10 years, the change in habitat condition may be reviewed in the field and based on wage rates prevailing at that time and other conditions budget will be prepared till the end of the lease period.

5.11 OCCUPATIONAL HEALTH & SAFETY MEASURES TO CONTROL DUST INHALATION

- ❖ Providing a working environment that is conducive to safety & health
- ❖ The management of occupational safety & health is the prime responsibility of mine management from the executive level to the first line supervisory level
- ❖ Employee involvement and commitment in the implementation of health and safety guidelines

- ❖ Provision of all necessary resources
- ❖ Implementing safety and health management system and assessing the effectiveness through periodic audits
- ❖ Setting of safety and health objectives based on comprehensive strategic plans and measure performance against these plans
- ❖ Monitoring the effects of mining activities on safety and health and conducting regular performance reviews
- ❖ Provision of necessary personal protective equipments
- ❖ Establishing and maintaining a system of medical surveillance for employees
- ❖ Ensuring employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities

NOISE INDUCED HEARING LOSS (NIHL)

Hearing conservation programs exists at all operations. Baseline audiogram forms the basis for future assessment of employees in terms of hearing loss.

Using engineering initiatives to reduce noise at source is the priority management tool

The hearing conservation programme includes the provision of Hearing Protection Devices (HPDs) and annual audiometry examination of all employees. Apart from provision of HPDs emphasis is also laid on training the employees responsibility to protect his/her hearing.

OCCUPATIONAL LUNG DISEASES (OLD)

There will be regular health camps for all the workers. Lung function tests, chest X-rays etc shall be carried out and any health disorders will be evaluated. In house facility for carrying out this tests and occupation specialists are employed for this facility.

5.12 BUDGET

The capital cost for environmental protection and the recurring expenses towards the pollution control and environmental management measures, socio-economic development and occupational health and safety, etc are given in details in Table 5.4.

TABLE 5.4: BUDGETARY ESTIMATION FOR ENVIRONMENTAL MANAGEMENT

RS LAKH			
S. NO	ACTIVITY	CAPITAL INVESTMENT	RECURRING EXPENSES / ANNUM
1.	Environmental pollution control	69.00	15.00
2.	Environmental monitoring	-	3.50
3.	Green belt and afforestation	5.00	3.00
4	Wild life conservation	3.00	2.00
5	Occupational health and safety	2.50	1.50
6	Social welfare activity	8.00	7.00
7	Economic upliftment	4.00	3.50
8	Others	2.00	1.50
	Total	93.50	37.00

CHAPTER 6: ADDITIONAL STUDIES

6.1 RISK ASSESSMENT

The proposed project involves bauxite mining limited to a depth of 1 m to 2m. The anticipated risks are mentioned below:

Inundation

Mining operations are not carried below the ground water table; therefore, there will be no disturbance to ground water quality due to mining activity. In order to control the in-rush of water into the quarry in rainy season from the surface or through seepage from the strata, sufficient garland drains are prepared around the excavations.

The runoff water flowing directly into the excavation will be prevented and there is no need to install pumps except to pump out the rain water collected in the pit during monsoons from bottom most benches to facilitate mining. This is a normal operation in mining.

Pit slope Angle/UPL

The maximum depth of the workings is not likely to exceed 1m and is not likely to cause any slope stability problems. In order to control the erosion of material from the mined out pit a clear barrier of 3m will be maintained all along the periphery of the plateau.

Blasting

Blasting in this mine is not a regular affair, and is done occasionally for heaving purpose in ore body Bauxite. The hole depth is restricted to 1.5 m and the spacing and burden are kept at 1.0m and 0.8m respectively. Controlled blasting will be done and not more than 10 holes will be blasted at a time and no hole will be charged with more than 120gms of explosive at a time. Suitable air respirators will be provided to the drillers. Sufficient warning by signal is given over the entire area falling within the danger zone and ensures that all persons within such area have taken proper shelter.

Surface Fire

Sufficient fire extinguishers will be installed at selected locations such as mines office, workshop, garage, stores etc. Besides, sufficient water hydrants with sufficient length of hosepipes will be made available on the surface for fire protection.

Dust from the drilling operations

The hazard is the inhalation of dust which is created during the drilling operations. Wet drilling will be practiced to suppress dust generation during the drilling operations. All personnel working during drilling operations will compulsorily use dust masks.

Noise

Drilling operations give rise to harmful levels of noise. However, as the drill hole depth is about 1.5 m, the personnel working in drilling operation are not exposed continuously to high noise level. Nevertheless, all personnel working in the drilling impact zone will compulsorily use earmuffs to reduce the noise impacts.

Loading

Loading of bauxite at the production site will be done manually

Heavy Vehicles

Occasional usage of JCB front end loader cum excavator is done to remove the overburden. The haulage of OB will be done with tractor trolley or 10 tonne tippers. Hence proper care will be given while transportation and occasional loading with JCB front end loader cum excavator.

Good maintenance and regular testing are necessary to reduce the possibility of brake failure. An area shall be set out as a testing area where regular tests are carried out on the effectiveness of a vehicles braking system.

House keeping

The provision and maintenance of a safe and healthy workplace is the most basic principle of health and safety. Dirty and untidy workplaces or walkways contribute to a very large proportion of trip and fall accidents. In the context of surface mining the provision of well defined roadways and walkways clear of obstruction and regular cleaning up of spillage will greatly reduce the potential risk for this type of accidents.

The Work

The application of risk assessment depends upon a full understanding of all aspects of the job being undertaken. In carrying out a risk assessment in relation to a particular task the evaluation must include a review of the knowledge, experience and training of those persons carrying out the work.

Personal Competence

It follows that the knowledge, experience and training of personnel involved in work is critical to evaluate any risk assessment. A knowledgeable, experienced well-trained and competently supervised workforce will be at a lower risk of accidents occurring than a poorly trained and badly supervised workforce.

Co-ordination

It is essential that the coordinator ensures that everyone engaged in the work is capable and understands the role of others and their responsibility for each other. This is particularly important when contract workers undertake part or all of the work to be carried out.

Health hazards

For the purposes of this document health hazards should be interpreted as being harmful dust and noise which is emitted during surface mining operations.

Personal Protective Equipment (PPE)

The PPE should be of good construction, where ever possible ISI certified, suitable for the hazard e.g. a dust respirator fitted with the correct filter to capture the particular hazardous dust and maintained to recommended standards. As

personal protective equipment only affords limited protection it should only be used as a last resort and then as an interim arrangement until other steps are taken to reduce the risk of personal injury to an acceptable level.

Traffic Movement

As the vehicles used are very less in number there is no risk of accidents due to the traffic movement.

6.2 DISASTER MANAGEMENT PLAN

Bauxite mining is a simple mining and there is hardly any risk in mining. However, as a precautionary measure if any disaster occurs within the mining area, the first aid committee of the mine consisting of following member will immediately handle the situation and if required victims will be shifted to the primary health centre at Malkapur.

OUT LINE OF DISASTER MANAGEMENT PLAN

The purpose of disaster management plan is to restore the normalcy for early resumption of mining operation due to an unexpected, sudden occurrence resulting to abnormalities in the course of mining activity leading to a serious danger to workers or any machinery or the environment.

System of communication

An internal communication system for the department head and to their line of command should be maintained. Having the telephone nos and addresses of adjoining mines, rescue station, police station, Fire service station, local hospital, electricity supply agency and standing consultative committee members is another essential aspect.

Consultative committee

A standing consultative committee will be formed under the head of Mines manager.

Facilities & Accommodation

Accommodation and facilities for medical aid, rescue room, etc will be provided.

First Aid & medical facilities

The mine management is having first aid facilities for use in emergency situation. All casualties would be registered and will be given first aid. The mine management will have proper telephone / wireless set for quick communication with nearest hospitals where the complicated cases are to be sent.

Functions of public relations group

A cordial relation with government officials and other social service organization and working groups shall be maintained. To liaise with representatives of the mine workers to ameliorate the situation of panic, tension, sentiments, grievances and misgivings created by any disaster. To ameliorate the injured, survivors and family members of affected persons by providing material, moral support, finance and establishing contact with relatives of victims.

Care and maintenance during temporary discontinuance

In case of any unforeseen circumstances, if the mining operations are to be suspended temporary, following action will be initiated.

- i. Fencing of the pits
- ii. Security on red alert for 24 hrs
- iii. Display of notice at strategic points

Emergency Plan

- ❖ On realizing anything serious happened anywhere in the mine, the foreman or the mate will immediately inform the nearest mining official & the manager of mines.
- ❖ On receiving information of emergency, Shift in-charge will ensure that all the materials and transport system to deal with emergency situation is kept under readiness.
- ❖ First aid facilities to be kept ready to receive the cases.

CHAPTER 7: PROJECT BENEFITS

7.1 SOCIO-ECONOMIC BENEFITS

The bauxite mine can provide direct and indirect employment to large number of people in Shahuwadi Taluka. Under community development programme, company will bring benefits to the area in terms of well maintained roads, drinking water facilities to nearby villages, assistance for education, donations to schools, free medical camps, environmental awareness programmes etc.

7.2 CORPORATE SOCIAL RESPONSIBILITY

As a part of Corporate Social Responsibility, the mine management will adopt two adjacent villages and all the facilities like medical and education, drinking water supply, sanitation, road maintenance etc will be provided by the mine management to the villagers.

Apart from the above, the mine management will adopt following social welfare measures in the nearby villages:

- ❖ A provision of Rs. 4.0 Lakhs per annum will be made for carrying out Economic upliftment measures
- ❖ Preference will be given to the local people for employment in the mine as per the eligibility of the people and requirement of the company
- ❖ Regular medical camps will be arranged in the nearby villages and medicines will be provided free of cost to the needful people
- ❖ Social awareness camps for education, health and hygiene, etc will be conducted on regular basis in the nearby villages
- ❖ Funds will be provided for school maintenance, infrastructural development, adult education, etc. in the nearby villages
- ❖ Village roads used for transportation of iron ore from mine to processing plant will be regularly maintained in good condition by the mine management on the mines expenses. A fund has been earmarked for the maintenance of village roads. Based on the need, the allocated amount can be enhanced to meet the requirement

- ❖ Various self-help groups will be prepared amongst the local people and will be prompted for generating various household industries. Essential training will be provided / arranged for such groups
- ❖ Various watershed activities would be organized for improving the agricultural productivity of the area

7.3 IMPROVEMENT IN SOCIO ECONOMIC STATUS

The development of the proposed mine will lead to economic up-liftment of the society by providing employment opportunities, enhancing the existing medical, educational & infrastructural facilities in the nearby areas.

Occupational Health

In order to evaluate the impacts on mining on the health of workers, baseline health studies will be carried out on every worker before joining their duties. The baseline health status, their habits will be recorded and a log book will be maintained and the same will be updated every quarter.

The preliminary screening test involves studies on pulmonary impairment & disability evaluation.

Pulmonary Impairment and Disability Evaluation

- ❖ Degree of dyspnea
- ❖ Amount of cough and sputum, wheezing
- ❖ Smoking age started, pack/day, age stopped
- ❖ Past pulmonary illnesses
- ❖ Concurrent medical conditions
- ❖ Medications
- Occupational and environmental exposures
- ❖ Chest physical examination findings
- ❖ Chest roentgenogram
- ❖ Pulmonary function studies
- ❖ Noise Impairment
- ❖ Baseline Audiograms
- ❖ Annual Audiograms

Thus, a baseline condition will be established for all the workers and the records will be maintained in order to evaluate any occupational diseases due to mining activity or aggravation of the existing condition due to mining.

7.4 UPLIFTMENT OF POOR SECTION OF SOCIETY

There are seven villages within 3 km radius from the mine lease boundary viz., Kodewadi, Shirale, Kasarwadi, Ambewadi, Panundre, Mahalsavde and Burambal. There is a total of 1016 Ha Cultivable waste land available in these villages. Due to increasing pressure on land for growing food grains etc., adequate attention has not been given to the production of fodder crops and fruit bearing plants. Further, on account of diversified use of agriculture residues, the gap between the demand and supply of fodder is increasing. Phase wise plantation can be carried out in this cultivable waste land by the farmers.

The company has developed a comprehensive phase wise programme for the development of cultivable waste land in these villages with the help of local villagers and Self Help Groups. Company will all the monitory and technical assistance for the development of this waste land into fruit orchard, fodder plantation, etc. The details are given below:

TABLE 7.1:- VILLAGE DETAILS WITHIN 3KMS RADIUS

Village	Area	Forest Area	Irrigated Area	Unirrigated Area	Cultivable Waste Land	Area not available for cultivation
Kodewadi	62	0	3	53	1	5
Shirale	902	383	1	485	15	18
Kasarwadi	625	50	0	0	0	0
Ambewadi	159	0	88	68	0	20
Panundre	1621	548	5	856	159	53
Mahalsavde	1093	655	2	357	63	16
Burambal	1143	254	3	95	778	13
TOTAL	5605	1890	102	1914	1016	125

The available cultivable waste land within 3 Kms radius from the mine is around 1016 Ha. It is proposed to convert this cultivable waste land into productive land in phased manner with the help of local villagers.

TABLE 7.2:- ECONOMIC UPLIFTMENT PROGRAM

S.NO	VILLAGE	DISTANCE	CULTIVABLE WASTE LAND	1 ST	2 nd	3 rd	TOTAL
1	Kodewadi	2.5	1	1	--	--	1
2	Shirale	1.8	15	15	--	--	15
3	Kasarwadi	3.0	0	--	--	--	--
4	Ambewadi	1.4	0	--	--	--	--
5	Panundre	2.0	159	159	--	--	159
6	Mahalsavde	1.6	63	63	--	--	63
7	Burambal	3.0	778	270	258	250	778
	TOTAL		1016	492	258	250	1016

In this phase wise fruit orchard / fodder farm plantation, the mine management shall provide the necessary efforts like nursery raising for fodder & fuel-wood, field demonstrations, motivation and awareness programme and training to the development of farm. This will generate the additional employment opportunity

and income for secured livelihood in rural areas which is near to the proposed project area.

Action plan for the Development programme

First year of programme

- ❖ Formation of Self – Help groups
- ❖ Provision of training to the people interested in the activity
- ❖ Development of nursery for the plantation activity
- ❖ Provision of necessary equipments, funds for seeds, saplings for plantation
- ❖ Helping in the plantation activity

Second year programme

- ❖ Maintenance of first year plantation and replacement of casualties
- ❖ Strengthening the nursery and additional training to the needful
- ❖ Assessment of the setbacks and determining the solutions

Third year programme

- ❖ Maintenance of first and second year plantation and replacement of casualties
- ❖ Assessing the sustenance of the group of the people trained for the activities and strengthening there skills by additional training, if required.

Based on the success of the first phase programme, the second phase activities will be planned for villages within 5 km radius and will be carried out accordingly.

Also the mine management will take initiatives in preparing Self Help Groups in the nearby villages. These groups will be provided aid in training and starting of their own small household industries like dairy products, home made foods, beverages, consumables etc. Thus the poorer sections in the nearby villages will be provided with source of employment.

A provision of capital investment of Rs. 4.0 lakh and recurring investment of Rs. 3.5 lakh per annum has been done for the economic upliftment of the area. Based on the first phase experience, the budget for second phase will be revised.

The mine management will also provide on the job training to the interested youths of the nearby villages and the eligible candidates will be absorbed by the company as per the requirement. The mine management will allocate funds for helping the youths from poor section for higher studies.

7.5 VOCATIONAL TRAINING TO INTERESTED YOUTH

The mine management will provide on the job training to the interested youths of the nearby villages and the eligible candidates will be absorbed by the company as per the requirement. The mine management will also allocate funds for helping the youths from poor section for higher studies. These funds will be distributed in the form of scholarship for higher education to the poor.

7.6 UPLIFTMENT OF SCHEDULED CASTE / TRIBES AND OTHER WEAKER SECTIONS OF SOCIETY

The management will conduct a social survey to identify the economically backward people in the study area. A programme will be initiated especially keeping in view the poorer scheduled castes and tribes, to provide training in their interested fields so that they can start their own enterprise like dairy farming, mushroom farming, sericulture, wood art, home made foods, etc. The management will also provide all monitory assistance to them for establishing their enterprise and also in marketing their products.

7.7 NEED BASED ASSESSMENT

Need Based Assessment is carried out and observed that people are dependent on rain fed agriculture, mine and mine related activities. A survey was conducted in the near by villages with in 3km radius and the data was analyzed further to study the impacts and the necessary action to be taken to develop their Socioeconomic status by introducing various activities and Training.

The details are tabulated in the table below:

Name of the village	SC	ST	Total literates	MCW C	M H	CW C	H C	PH C	FW C	TB C
Kodewadi	0	0	62	0	0	0	0	0	0	0
Shirale	81	0	824	0	0	0	0	0	0	0
Kasarwadi	10	0	1254	0	0	0	0	0	0	0
Ambewadi	286	17	1497	0	0	0	0	0	0	0
Panundre	126	0	793	0	0	0	0	0	0	0
Mahalsavde	153	0	290	0	0	0	0	0	0	0
Burambal	110	8	253	0	0	0	0	0	0	0

MCWC: Maternity & Child Welfare Centre

MH: Maternity Home

CWC: Child Welfare Centre

HC: Health Centre

PHC: Public Health Centre

FWC: Family Welfare Centre

TBC: TB Clinic

Name of the village	P.S	M.S	Sr.secondary school	College	Adult literacy center
Kodewadi	1	0	0	0	0
Shirale	2	1	0	0	0
Kasarwadi	1	1	0	0	0
Ambewadi	2	1	0	0	0
Panundre	1	1	0	0	0
Mahalsavde	1	1	0	0	0
Burambal	1	1	0	0	0

PS: Primary School

MS: Middle School

According to the data available it is clear that the surrounding villages near the mine lack essential amenities like Medical facilities, Sanitation facilities educational facilities as well as transport facilities for school going children. The population belonging to this area mainly comes from a very poor background. Kodewadi village has 1 primary school, Shirale village has 2 primary schools and

1 Middle school, Kasarwadi village has 1 primary school and 1 Middle school, Ambewadi village has 2 primary schools and 1 Middle school, Panundre village has 1 primary school and 1 Middle school, Mahalsavde village has 1 primary school and 1 Middle school where as Burambal village has 1 Primary school and 1 Middle school respectively.

There are no colleges, senior secondary school and Adult literacy centers available in these villages. All these villages require to be developed and the management intends to help them to uplift their socio economic status.

These villages also have cultivable waste land which the management intends to develop and convert it into grazing lands and further develop them to cultivated lands.

CHAPTER 8: ENVIRONMENTAL MONITORING PROGRAMME

8.1 ENVIRONMENTAL MONITORING PROGRAMME

All the environmental parameters viz. air, water, noise, soil will be monitored regularly in order to detect any changes from the baseline status. Monitoring program will be followed till the mining operations continue; every year as per the schedule given below:

8.2 AIR QUALITY MONITORING

Four locations in core zone and four locations in the buffer zone will be monitored for four weeks in every season except monsoon. The Respirable particulate matter shall be analyzed every 6 months for Manganese concentration.

8.3 NOISE LEVELS MONITORING

Noise levels in the working area will be monitored once in every season till the continuation of operations. Ambient noise levels will also be monitored once in a season in the buffer zone order to get the overall look of the noise status and its effects on the surrounding community.

8.4 WATER QUALITY MONITORING

Water quality will be monitored in every season. The concentration of heavy metals especially manganese shall be checked for likely contamination. Seasonal streams near the mine lease will be used to study the surface water quality. Ground water quality will also be monitored in order to know the impacts of mining operations. This data will be compared to baseline to evaluate the weightage of the adopted mitigation measures and if further corrective measures are needed. Water levels will also be monitored on seasonal basis in surrounding wells, to assess the impact on ground water regime quantitatively.

8.5 SOIL QUALITY ASSESSMENT

Soil samples will be collected from the core and buffer core zone in the areas where plantation has started and quality will be checked once every year except

monsoon in order to observe any deviations in the impacts of the operations and the corresponding improvement in the fertility of the soil in core zone soil.

The monitoring system will also include:

- (i) Study for slope failures and excess erosions both along the pit and the waste dumps.
- (ii) Study the efficiency of dust collection units established in the screening & crushing plant.
- (iii) Periodic analysis of mine drainage and settling pond discharge water at regular intervals to monitor suspended solid content in particular and other parameters in general.
- (iv) Study of bunds at the waste dumps area and to maintain the silt arresting arrangement.

TABLE 8.1: SUMMARY - MONITORING SCHEDULE

S.NO.	PARAMETERS	SCHEDULE	LOCATION
1	Air quality monitoring	24 hourly Monitoring for 4 weeks in pre, post-monsoon & winter season every year	4 in core zone 4 in buffer zone
2	Noise quality monitoring	Once in pre, post-monsoon & winter season every year	Core & buffer zone
3	Water quality monitoring	Monitoring once in pre, post-monsoon & winter season every year Monitoring Ground Water levels & their quality in all seasons	Seasonal nallah around the mine lease in nearby wells.
4	Soil quality analysis	Once in a year in any season except monsoon	4 locations from the area around the mine lease and in core zone

Environment for implementation of Environment Management Plan Environment Management Cell will be formed under the control of the Project Manager. The responsibilities of this cell will be:

1. Implementation of pollution control measures.
2. Monitoring programme implementation.
3. Post-plantation care.
4. To check the efficiency of pollution control measures taken.
5. Any other activity as may be related to environment
6. Seeking expert's advice when needed.

CHAPTER 9: DISCLOSURE OF CONSULTANTS ENGAGED

NAME OF THE CONSULTANTS

M/s Bhagavathi Ana Labs Limited
8-2-248/5/A/42, Venkateswara Hills
Road No.3, Banjara Hills
Hyderabad – 500 034.
Telephone – 040 - 23356908, 23348689
Fax – 040 – 23356909
Email: environ@bhagavathianalabs.com
Website: <http://www.bhagavathianalabs.com>

Bhagavathi Ana Labs Limited is a professional services company providing Environmental Consultancy, Environmental Engineering, Analytical and Quality testing, Water Resource studies, Technical Training and Enviro-legal services. Since inception in 1984, the company has completed number of projects spread all over India. The company has qualified and experienced staff of more than 100 people operating across seven offices in India. The Professionals and Technicians include Environmental Engineers, Environmental Scientists, Environmental Planners, Chemists, Mining Engineers, Geologists, Hydro-geologists, Economic and Social Science specialists etc. Bhagavathi Ana Labs Limited is an ISO 9001-2000 Company and is accredited by:

- ☞ Ministry of Environment and Forests (MoEF), Govt. of India, New Delhi
- ☞ NABET (Formerly NRBPT) Registered EIA Consultants Organisation from Quality Council of India (QCI)
- ☞ National Accreditation Board for Testing and Calibration Laboratories (NABL) as per ISO/IEC 17025:2005
- ☞ Bureau of Indian Standards (BIS), New Delhi

The firm has been engaged in the job of preparation of Environmental Impact Assessment (EIA) & Environmental Management Plan (EMP) for last 10 years.

