

Executive Summary (in English & Marathi)  
of  
Draft Environmental Impact Assessment & Management Plan Report  
[submitted for Public Hearing vide EIA Notification 2006, 2009 & 2011]

## Mogalgad Bauxite Mine

Area: 7.5 ha

(Reserve Forest Land')

Bauxite Production : 0.1 MTPA

Kitwade & Hajgoli villages, Chandgad Taluka, Kolhapur District  
Maharashtra

Project Proposal

**Production of 0.1 MTPA of Bauxite**

Project Proponent



Kolhapur Branch Office	Registered Office
'Burj Royale' Flat No.505, C.S.No.22/24, Sardar Colony, Near Govt. Printing Press, Opp. Pitali Ganapati Mandir, Tarabai Park, Kolhapur- 416 003 (Maharashtra) Phone: 0231-2021461-62	Hindalco Industries Limited, Century Bhavan, 3rd floor, Dr. Anne Besant Road, Worli-Mumbai- 400 030 Phone: 022-6662 6666 Fax: 022-2422 7586/24362516

Study Period : Summer Season 2012

Environmental Consultant  
M/s Bhagavathi Ana Labs Ltd., Hyderabad

February 2013

---

## EXECUTIVE SUMMARY

---

### 1.0 INTRODUCTION

M/s. Hindalco Industries Limited is one of the major Primary Aluminium and Copper producing company in Asia and has manufacturing facilities across the World. The company is engaged in Bauxite mining, Alumina refinery, Aluminium smelting and Aluminium finished goods. In India, the company has its presence since 1946 with Bauxite mining in states of Jharkhand, Maharashtra, Chhattisgarh and Orissa. All the Bauxite ore extracted from mines of Hindalco is refined in their captive Alumina refineries at Belgaum, Karnataka; Muri, Jharkhand and Renukoot, Uttar Pradesh to produce Alumina which is then converted to Aluminium through electrolysis.

Mogalgad lease was granted to the company at village Kitwade and Hajgoli, Taluka Chandgad of Kolhapur district of Maharashtra for captive consumption. In order to fulfill the requirement of Govt. of Maharashtra, the company has applied to State Government for renewal of the mine lease area over 7.5 Ha. The Modified Mining Plan for the mine is approved by Indian Bureau of Mines vide letter No. MP/KLP/GOA(MAH)/BX-239-SZ/745 dated 16.11.2011.

It is proposed to produce 0.1 MTPA Bauxite from the Mogalgad Bauxite Mine for captive use in the Aluminum Refinery of the company located at Belgaum, Karnataka.

### 2.0 PROJECT DESCRIPTION

#### **Topography:**

The topography of the Mogalgad Plateau is flat at elevation of 1029 m above Mean Sea Level. The entire mine lease falls in the state of Maharashtra. The state boundary between Maharashtra and Karnataka is adjacent south of the mine lease area.

#### **Drainage Pattern:**

A number of seasonal streams originates from the hill slopes on south and finally confluence with the River Tilari. All the northern flowing streams finally confluence with River Tamraparni. Lower reaches of the plateau give rise to numerous ephemeral streams, which remain dry during dry season. Jangamhatti and Tilar dam forms the major water reservoirs for irrigation.

#### **Reserves:**

Total bauxite reserves in the mine lease area are 471,751 tonnes and reserves of aluminous laterite/ sub-grade bauxite are 112,520 tonnes.

#### **Method of Mining:**

It is proposed to work in the proved area with opencast mechanized method of mining using deep hole drilling and blasting. The bauxite will be loosened by deep hole drilling and blasting and then loaded into the trucks for dispatch to Belgaum plant.

### Maximum Production and Life of Mine

Total bauxite reserves in the mine lease area are estimated as 0.471 million tonnes and sub-grade mineral reserves are estimated as 0.112 million tonnes. Considering the maximum rated production of 0.1 MTPA from 5<sup>th</sup> year of mining, the mine life is estimated as about 10 years.

### Conceptual Mine Plan

A total of 6.03 Ha area will be excavated for mining during the life of the mine. Of this, 4.91 ha area will be reclaimed with plantation and in the remaining 1.12 Ha mined out area, two surface water reservoirs will be developed by accumulating rainwater into it. Also green belt will be developed in the 1.47 Ha un-mined area within the mine lease.

### Extent of Mechanisation

DTH drilling machine, Compressor, Jack Hammer drill, Excavator and Tippers will be deployed in the mine.

### Employment Potential:

Total manpower required for the Mogalgad Bauxite mine is 108 persons.

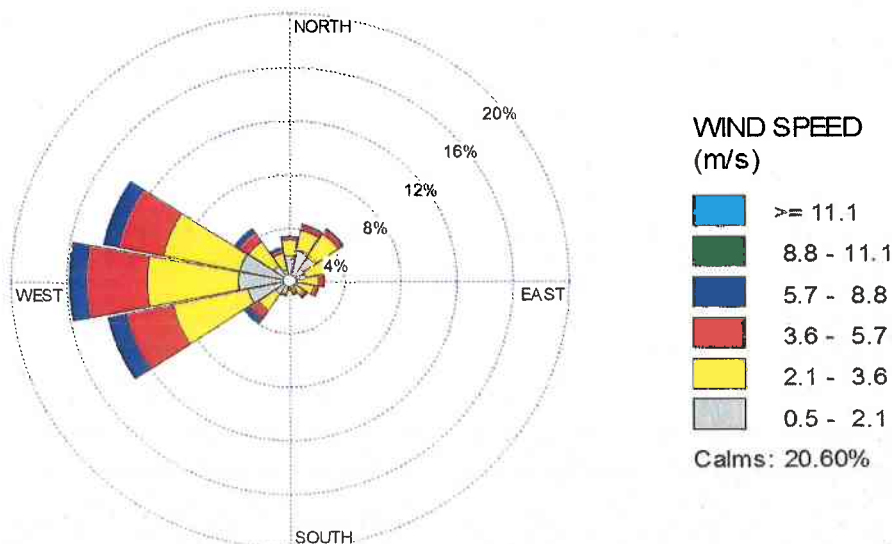
### Water Requirement

About 15 KLD water will be required for dust suppression, plantation and domestic use in the mine. The water will be sourced by tanker from nearby villages in the initial period of mining. Later, the rainwater accumulated in mine pits will be used for dust suppression and plantation to the extent possible.

## 3.0 DESCRIPTION OF THE ENVIRONMENT

Baseline Environmental Study was carried out in an area of 10 km around the mine lease area by Metamorphosis consultancy, Bangalore during Winter 2009-10. Additional one season environmental studies were carried out by Bhagavathi Ana Labs Ltd., Hyderabad during Summer season 2012 as per the recommendations of MoEF.

### WIND ROSE DIAGRAM: Summer Season 2012



### 3.1 AIR ENVIRONMENT

Baseline Ambient Air Quality was monitored at 11 locations including 1 in core zone and 10 in buffer zone. The summary of ambient air quality results for summer season 2012 is given in Table 1.

**Table 1: Summary of Ambient Air Quality Results (Maximum values-Summer 2012)**

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

Location	PM <sub>10</sub>	PM <sub>2.5</sub>	Free Silica	SO <sub>2</sub>	NO <sub>x</sub>	CO
Mine lease area	56.4	16.9	0.015	9.8	12.7	228
Dhamne village	54.1	14.8	0.019	10.0	15.6	331
Hajgoli village	55.4	15.8	0.019	12.8	17.4	235
Tudiye village	45.5	12.8	0.019	12.7	17.0	324
Dhekoli village	48.7	15.6	0.017	11.4	15.9	175
Madavale village	48.6	15.8	0.017	9.6	13.9	183
Kaliwade village	35.5	11.7	0.018	8.1	12.1	271
Patne village	55.2	17.7	0.019	12.9	17.1	224
0.3 km W of ML area	56.7	17.2	0.015	9.3	12.4	234
3 km SE of ML area	53.4	15.1	0.018	10.1	14.7	340
3 km W of ML area	49.4	17.5	0.009	10.8	14.8	225
<b>NAAQ STANDARDS</b>	<b>100</b>	<b>60</b>	<b>-</b>	<b>80</b>	<b>80</b>	<b>2000</b>

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

#### Impacts on Ambient Air Quality

Predictions have been carried out using ISC-AERMOD Model for study period. The maximum predicted value of increase in PM<sub>10</sub> due to proposed mining operations would be about  $1.2 \mu\text{g}/\text{m}^3$ . 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  $0.15 \mu\text{g}/\text{m}^3$  at a distance of about 1 km from the mining operations. The impact of increase in scale of mining operation would be negligible beyond 1.0 km.

#### Proposed Air Pollution Control Measures

- Regular sprinkling of water at the active mine faces, blasting sites and also on the haulage roads.
- Practice of controlled blasting using delay detonators
- Provision of dust masks to the workers
- Prohibition of Overloading and Over speeding of tippers
- Transportation of mineral with tarpaulin covered trucks
- Regular maintenance of mineral transportation roads outside the mine lease area.
- Maintenance of 7.5 m barrier zone all along the mine lease boundary and green belt in the barrier zone
- Periodical monitoring of air quality to take steps to control the pollutants

### 3.2 NOISE ENVIRONMENT

The ambient noise levels were measured at 11 locations (same as AAQ stations). The results obtained are given in **Table 2**.

**Table 2: Summary of Noise Levels (Summer 2012) [UNITS: dB (A)]**

S.No	Location	Min	Max	Ld	Ln
N1	Mine lease area	40.4	45.6	43.4	42.0
N2	Dhamne village	41.4	46.9	44.4	42.7
N3	Hajgoli village	40.7	45.2	43.5	41.9
N4	Tudiye village	41.4	47.0	44.5	42.8
N5	Dhekoli village	40.3	45.1	43.4	42.0
N6	Madavale village	40.9	45.8	43.8	42.0
N7	Kaliwade village	40.2	45.5	43.4	42.1
N8	Patne village	41.2	47.0	44.4	42.7
N9	0.3 km W of ML area	39.4	44.6	42.6	41.5
N10	3.0 km SE of ML area	41.2	46.0	43.3	42.6
N11	3.0 Km W of ML area	40.0	44.7	42.6	41.1
	<b>Noise Standards</b>			<b>55</b>	<b>45</b>

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

#### Impact on Ambient Noise Levels

'DHWANI' Noise Modelling Software developed by NEERI and approved by CPCB was used to predict the ambient noise levels around the mine lease boundary. The resultant ambient noise levels at the boundary of the mine lease was predicted to be about 55 dB(A) which further reduces to less than 45 dB(A) at the nearby habitations.

#### Proposed Control Measures for Noise Pollution

- Maintenance of green belt all around the working areas
- Regular maintenance and tuning of mine machinery
- Provision of ear muffs to the personnel exposed to high noise zone/ operation area
- Limiting the speed of haulage vehicles / tippers
- Use of mufflers, silencers in exhausts
- Carrying out the mining and mineral transport activities during day time only.

#### Proposed Ground Vibrations control measures

- Blast holes will be initiated by millisecond delay detonators.
- Care will be taken to ensure that effective burden will not excessive and the face will be kept sufficiently long. The burden will be kept at 2m and spacing will be 3m.
- Number of blast hole per delay will be kept as low as possible.
- Periodic monitoring of ground vibrations will be carried out at the nearby villages to assess the impact due to blasting and suitable corrective measures will be implemented.

### 3.3 WATER QUALITY

Five ground water samples and three surface water samples were collected and analysed to assess the water quality of study area. Physico-chemical analysis of water shows that the water quality is within the prescribed standards. The summary of major analysed parameters for water quality is given in **Table 3**.

**Table 3: Summary of Water Quality Results (Summer 2012)**

S. No	PARAMETERS	GW1	GW2	GW3	GW4	SW1	SW2	SW3	IS: 10500
1	pH	7.58	7.82	7.24	6.94	7.05	7.22	7.16	6.5-8.5
2	Conductivity ( $\mu\text{s}/\text{cm}$ )	256	348	244	364	462	326	365	---
3	Total Dissolved Solids (mg/l)	132	176	121	183	235	162	182	500
4	Iron as F (mg/l)	0.09	0.15	0.14	0.18	0.05	0.08	0.09	0.3
5	Chlorides as Cl (mg/l)	14.5	18.6	22	24.5	16.9	18.2	22.8	250
6	Sulphates as $\text{SO}_4$ (mg/l)	96	156	98	154	144	98	121.4	250
7	Sodium as Na (mg/l)	8.6	11.2	10.2	12.2	9.5	10.2	12.6	---
8	Potassium as K (mg/l)	1.8	1.3	1.9	1.6	1.8	1.4	2.5	---
9	Fluoride as F (mg/l)	0.18	0.23	0.22	0.22	0.09	0.06	0.09	1.2
10	Total Hardness as $\text{CaCO}_3$ (mg/l)	94.6	128.6	88.5	118.4	58.4	65.2	72.2	300
11	Calcium as Ca (mg/l)	22.1	29.6	20.9	27.6	13.8	15.4	17.1	75
12	Magnesium as Mg (mg/l)	8.8	13.2	8.8	11.9	5.8	6.5	7.2	30
13	Alkalinity (mg/l)	52	96	36	64	32	38	58	200

#### Impacts on Water Quality

The mining operation carries a risk of siltation of surface water bodies during monsoon. Silt from excavated areas, mineral stockyard and other open areas may be carried away with the surface run-off during monsoon and may be discharged into the surface water bodies thereby causing pollution of the surface water bodies. There will not be any process effluent generation in the mine lease area. Domestic effluent from the mine office will be discharged into septic tank and soak pit system.

#### Proposed Water Pollution Control Measures

- No mining during monsoon season i.e. June to September months.
- Collection of surface run-off from the mine lease area in mine pits for settling.
- Construction of garland drains around the slope to collect and divert the surface run-off from undisturbed area away from the mining area
- Plantation around the mine lease area to control soil erosion and to arrest silt wash off.
- Provision of series of settling ponds for settling of silt in surface run-off from ML area.
- Construction of 1625 m long parapet / retention walls to arrest silt wash-off.
- Construction of 5 check dams and gully checks, at strategic locations.
- Provision of septic tank and soak pit system for discharge of domestic effluent.

### 3.4 SOIL QUALITY

Soil samples were collected from 8 locations from the core and buffer zone to evaluate the soil quality in the study area. The samples show low to moderate fertility.

### 3.5 LAND ENVIRONMENT

#### Mine Lease Area

The mine lease area falls in reserve forest land. At present there is no mining activity and the entire 7.5 Ha mine lease area is undisturbed plateau. There is no human habitation in the mine lease area.

#### Land Use pattern of Study Area

The land use pattern of the villages within 10 km radius study area was studied based on the Census 2001. The summary of the land use pattern of the study area is given in **Table 4**.

**Table 4: Land Use Pattern of Study area (as per Census 2001)**

Sr. No.	Land Use	Area in Ha	%
1	Forest Land	10392.75	34.53
2	Irrigated Land	1426.58	4.74
3	Un-irrigated Land	14856.04	49.36
4	Cultivable waste land	1008.99	3.35
5	Area not available for cultivation	2411.00	8.01
	<b>Total</b>	<b>30095.36</b>	<b>100.00</b>

#### Impact on Land Environment

The proposed mining activities will alter the existing land utilization pattern of the mine lease area only. Also an approach road will be developed in the forest area in 1.55 Ha with permission from the forest department. There will not be any alteration in land utilization pattern outside the mine lease area, due to proposed mining activities. The existing and proposed land utilization pattern of the mine lease area is given in **Table 5**.

**Table 5: Present and proposed land use pattern of the Mine lease area (Area in Ha)**

S. No	Type of land use	Present	During Plan Period	Conceptual Period
1	Area of excavation	Nil	3.88	6.03
2	Infrastructure (administrative building etc)	Nil	0.1000	Nil
3	Roads	Nil	0.1000	0.00
4	Green belt	Nil	1.47	1.47
5	Others (reclamation of mined out pits)	Nil	(2.38)	(6.03)
6	Area which will remain untouched	7.5	1.92	Nil
	<b>Total</b>	<b>7.5</b>	<b>7.5</b>	<b>7.5</b>

### Proposed Reclamation and Rehabilitation Plan

Out of the 7.5 Ha mine lease area, 6.03 Ha area will be excavated for mining. Plantation will be carried out on 7.5 m wide green belt around the mine lease area covering 1.47 Ha area. Out of the 6.03 Ha mined out area, 4.91 Ha area will be reclaimed with dense poly-culture plantation and in remaining 1.12 Ha mined out area, two surface water reservoirs will be developed by accumulating rainwater into it. Phase-wise reclamation programme is given in **Table 6**.

**Table 6: Phase-wise Reclamation Program**

Sr. No.	Year	Area required for Mining	Mined out area to be reclaimed	Method of reclamation
1	1 <sup>st</sup>	0.7 Ha	-	-
2	2 <sup>nd</sup>	0.54 Ha	0.7 Ha (Mined out area of 1 <sup>st</sup> year)	Plantation
3	3 <sup>rd</sup>	0.66 Ha	0.54 Ha (Mined out area of 2 <sup>nd</sup> year)	Plantation
4	4 <sup>th</sup>	0.48 Ha	0.66 Ha (Mined out area of 3 <sup>rd</sup> year)	Plantation
5	5 <sup>th</sup>	1.5 Ha	0.48 Ha (Mined out area of 4 <sup>th</sup> year)	Plantation
6	2 <sup>nd</sup> scheme period	2.15 Ha	3.65 Ha (1.5 Ha Mined out area of 5 <sup>th</sup> year + 2.15 Ha mined out area of second scheme period)	2.53 Ha plantation 1.12 Ha water body
	<b>Total</b>	<b>6.03 Ha</b>	<b>6.03 Ha</b>	

### 3.6 BIOLOGICAL ENVIRONMENT

The mine lease area is a lateritic plateau which has seasonal grasslands with presence of ephemeral herbaceous flora. Three main vegetation types were observed in the buffer and core area of the proposed mine lease. These include – Moist Deciduous Forests, Open woodlands and scrub on the ridges and slopes in the buffer area. The main terrestrial mammals found in the buffer and core area include, Gaur, Sambar, Barking Deer, Black Naped Hare, Langur, Bonnet macaque, Porcupine, Sloth Bear and Wild pig. Of these Gaur, Mouse Deer and Sloth Bear belong to Schedule I of Wildlife (Protection) Act, 1972 and other species belong to Schedule II of Wildlife (Protection) Act 1972.

#### Impacts on Biological environment

The possible direct impacts of mining on wildlife are as follows:

- Loss of habitat on the mine site and surrounding areas
- Disturbance to wildlife due to mining and mineral transportation
- Presence of work force causing an impact on surrounding forests and wildlife

#### Biological Environment Protection Measures

A detailed study on ecology and wildlife of the core zone and buffer zone of the Mogalgad mine was carried out and a detailed wildlife conservation plan was prepared to minimize the impacts of the mining on the ecology and wildlife of the area. The wildlife conservation plan is approved from State Forest Department and the same will be implemented to prevent / minimize the impacts on the biological environment of the area. Separate budget has been earmarked for implementation of the Wildlife Conservation Plan.



### 3.7 WASTE MANAGEMENT

There is no overburden / waste generation as the entire mineral produced is usable in the Aluminium plant of the company.

### 3.8 SOCIO-ECONOMIC ENVIRONMENT

There is no habitation within the mine lease area. The information on socio-economic aspects of the study area (10 km radius) has been compiled from various secondary sources including various government and semi-government offices and Census Handbook 2001. A brief summary of the same is given in **Table 7**.

**Table 7: Socio-Economic Details of the Study Area (As per census 2001)**

S.no	Description	Numbers	%
<b>Demographic Details</b>			
1	Total Villages	36	
2	Total no. of House Hold	8588	
3	Total Population	46530	
4	Total SC Population	3783	8.13
5	Total ST Population	458	0.98
<b>Literacy Level</b>			
6	Total Literate Population	25267	54.30
<b>Employment Pattern</b>			
7	Total Main Working Population	21270	45.71
8	Total Non-Workers	21459	46.12
9	Total Marginal Workers	3801	8.17
<b>Details of Main Workers</b>			
10	Cultivators	14746	69.33
11	Agricultural Labor	2191	10.30
12	Household Workers	454	2.13
13	Other Workers	3879	18.24

#### Impacts on Socio-economy

There is no private land or habitation in the mine lease area. The proposed project will cause positive impacts on the socio-economic status of the nearby villages. The proposed mining activities will improve the socio-economic status of the nearby villages in the following ways:

- Direct and secondary employment opportunities will be generated for the local people.
- Jobs in mines will increase the per capita income of the villagers.
- Increase in infrastructure facilities in the nearby villages.
- Financial assistance will be provided for conducting local sports, religious and cultural activities. Medical camps will be arranged regularly for the villagers.

### Proposed Socio-Economic Welfare Measures

- Preference to local people in employment in mine
- Secondary employment opportunities under contractors, transport and service sectors
- Proper arrangements will be made for safe and healthy conditions such as dust suppression during loading, unloading & transporting, etc.
- Mine management will contribute for the upliftment of these villages by conducting regular medical camps, assistance in developing necessary infrastructure facilities like maintenance of schools, village roads, drinking water supply, etc.

### 3.9 OCCUPATIONAL HEALTH AND SAFETY

- Providing a working environment that is conducive to health & safety.
- Extensive publicity and propaganda related to safety.
- Periodical health check ups
- Provision of rest shelters for mine workers with amenities like drinking water, etc.
- First aid facility shall be provided at mine site.
- Training programme for First aid.
- In order to assess the health and hygiene, the following tests will be conducted once in 5 years by the project authority. For example, Blood, Urine, Chest X-Ray, PET, Lung Function Test, ECG, Audiometric, ENT.
- 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 to receive appropriate training and are competent to carry out their duties and responsibilities

### 4.0 ENVIRONMENTAL MONITORING PROGRAMME

#### Summary - Monitoring Programme

S.no.	Parameters	Schedule	Location
1	Air quality monitoring	24 hourly Monitoring for 12 weeks in pre, post-monsoon & winter season every year	2 in core zone 6 in buffer zone
2	Noise quality monitoring	Once in pre, post-monsoon & winter season every year	Core & Buffer zone
3	Water quality monitoring	Pre-monsoon, Monsoon, Post monsoon and winter season	Surface water bodies including seasonal streams nearby ML area and ground water from nearby villages
4	Soil quality analysis	Once in a year, preferably during dry season	4 locations from the area around the mine lease and in core zone

## 5.0 PROJECT BENEFITS

This project has a substantial benefit in the form of revenue to the State Government, increase the export and foreign trade and import substitution. There shall be employment generation and business opportunities for the local populace that would reduce migration. There will also be a noticeable improvement in the socio-economic index of the region around the project site. The local people will benefit from the project in following ways:

- Improvement in physical infrastructure
- Improvement in social infrastructure
- Maintenance of village roads
- Vocational training to interested youth
- Economic upliftment of SC/ST and other weaker sections of society
- Need based assessment and action plans
- Other intangible benefits

## 6.0 BUDGET FOR ENVIRONMENTAL MANAGEMENT PLAN

**Table 8: Budgetary Estimation for Environmental Management (Rs. in Lakh )**

S.no	Activity	Capital cost	Recurring cost
1	Environmental pollution control	18.00	4.5
2	Environmental monitoring	-	5.00
3	Green belt and afforestation	4.00	2.00
4	Occupational health and safety	3.00	2.0
5	Social welfare activities	5.0	3.50
6	Economic upliftment measures	4.0	3.80
7	Wild Life Conservation	20.0	15.00
7	Miscellaneous	5.0	3.00
	<b>Total</b>	<b>59.0</b>	<b>38.8</b>

## 7.0 CONCLUSION

The mining activities in proposed Mogalgad Bauxite Mine will lead to the sustainable development of the nearby areas. The mining and allied activities will provide direct and secondary employment opportunities for local people. This will lead to the improvement of economic status of the nearby villages.

During the active mining period, the pollution will be controlled within permissible limits by way of adopting various control and mitigation measures. In the post mining stage, the mine lease area will be developed into an afforested area and surface water reservoirs. This will improve the aesthetics of the area.

A sum of Rs. 59 Lakh as capital cost and Rs 38.8 Lakh/annum as recurring budget for environmental protection is proposed to achieve the environmental quality as desired. Hence, it can be summarized that the development of the mine will have a positive impact on the socio-economic environment of the area and will lead to sustainable development of the region.