

# *EXECUTIVE SUMMARY*

For

## **EIA/EMP**

FOR

**PUBLIC HEARING/ CONSULTATION**

(AS PER EIA NOTIFICATION SEPT' 06)

OF

# *KOLGAON OC EXPANSION PROJECT*

(Expansion from 0.40 MTPA TO 0.60 MTPA and Land area  
from 360.00 ha to 397.25 ha)

**OCTOBER – 2009**

PREPARED AS PER TOR ISSUED BY MOEF VIDE LETTER NO.J –  
11015/228/2009 – IA.II(M) DATED 11.9.2009.

Prepared by :-

ENVIRONMENT DEPARTMENT  
WESTERN COALFIELDS LIMITED  
COAL ESTATE, CIVIL LINES  
NAGPUR - 440001

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# EXECUTIVE SUMMARY

## **1.0 INTRODUCTION**

The existing Kolgaon OC mine was opened on 03.01.2005 in Wardha Valley Coalfields in Yavatmal district of Maharashtra State. The EMP was approved by MOEF for production capacities of 0.40 MTPA and land area of 349 ha (+11.00 ha) vide its letter no. J-11015/29/2001-IA.II (M) dated 12/04/2002. Now, the capacity of the mine is being proposed for further enhancement from 0.40 MTPA to 0.60 MTPA with enhancement of land area from 360.00 ha to 397.25 ha.

The mine is being monitored as per Environment (Protection) Amendment Rule, Sept. 2000 and quarterly reports are being sent regularly to MPCB and MOEF. The annual Environmental (Audit) Statement is submitted every year to MPCB before 30<sup>th</sup> September. The six monthly compliance reports against environmental clearance dated 12/04/2002 are also sent regularly to MOEF, New Delhi and Bhopal.

Now in order to meet the ever growing demand of power grade coal it is proposed to enhance the production capacity of the project under consideration from present level of 0.40 MTPA to 0.60 MTPA with increase in land area. WCL Board has accorded the approval for enhancement of production capacity of coal from present level of 0.40 MTPA to 0.60 MTPA with increase in land area.

This Form-1 application was submitted in fulfillment of the requirement of EIA Notification 2006 for getting environmental clearance for enhanced peak capacity of 0.60 MTPA with increase / change in land area as well as project parameters vide letter dated 16.07.2009. An addendum EIA/EMP was also prepared in fulfillment of the requirement of section 7(ii) of EIA Notification 2006 and submitted to MOEF vide our letter dated 19.08.2009.

The EAC (Thermal & Coal Mining) discussed the proposal on 26.08.2009 at New – Delhi. Subsequently TOR has been issued by MOEF vide its letter no. **J – 11015/228/2009 – IA.II (M) Dated 11.9.2009 (enclosed herewith as Annexure – I)**. As directed in the TOR, this EIA/EMP has been prepared for submission to Maharashtra Pollution Control Board for conducting Public Consultation as per EIA Notification, 2006.

## **1.1 LOCATION & COMMUNICATION**

Kolgaon Opencast Mine is located on the Wani Tahsil of Yeotmal District of Maharashtra. The block is adjacent to Mugoli and Nirguda blocks of WCL. It is bounded by North Latitude 19° 5' 41" to 19° 6' 20" and East Longitude 79° 50' 49" to 79° 52' 00" and is covered in the Sruvey of India Toposheet No. 56 M/1

The block is approachable from Chandrapur, an important mining town in Maharashtra, via Ghugus colliery by crossing through a bridge construction on the Wardha River. The area can also be approached from Wani town by metalled road (22 Km). Wani is connected to District Headquarter Yeotmal, through State Highway

No. 73. Wani is also connected with Nagpur via Warora and Jam through State Highway.

The nearest railhead is Ghugus which is located on Ghugus Tadali branch line of Central Railways. The distance between Tadali junction on Delhi-Chennai railway line to Ghugus, is around 12 Kms. Distance by road from Nagpur to Ghugus measures approx. 160 kms.

## 1.2 TOPOGRAPHY & DRAINAGE

The ground elevation is 201 to 212 m above MSL. The northern part is slightly undulating between 201 m and 212 m level while the major southern part exhibits almost a flat terrain ranging between 208 to 211 m. The southern most part along the Penganga river bed is below 207 m which is the HFL of this river. In the northern part, two seasonal nalas originate at high altitude near the western periphery and both of them flow easterly beyond the eastern boundary of the block, and a part of it falls under HFL of the Penganga river. The major drainage in this area is Penganga river which flows towards north-west along the southern boundary of the block. One small nalla from north drains its water into Penganga river near borehole MWK-122. The HFL of Penganga is 207 m as recorded during 1990.

## 1.3 CLIMATE

The region experiences dry hot summer from April to June & temperature rises to 48°C and temp goes down to 8-10 °C in winter. Monsoon starts by the middle of June and continues upto middle of September. The average rainfall is 1150 mm.

## 1.4 SOURCES OF DATA

This report has been formulated using various data from the following sources:

SN	Type of Data	Sources
1	Mining and economic parameters and other miscellaneous data	CMPDIL and Wani Area, WCL.
2	Environmental data including meteorological data, air quality, dust fall rate, water quality and noise level data.	Environmental-data generation for Kolgaon Extn. OC of Wani Area of WCL, Maharashtra carried out by CMPDI.
3	Socio-economic study & Land use/cover mapping buffer zone.	Census data 2001 & base line Socio - Economic survey.
4	Flora and fauna	Survey Report prepared by the competent authority in this field.
5	Surface hydrology and hydrogeology	CMPDIL, RI- IV, Nagpur.
6	Meteorological data	Environmental-data generation for Wani Area of WCL, Maharashtra carried out by CMPDI.
7	Land use/cover mapping core zone.	As per State Govt. Record, data supplied by the concerned WCL area office.



## 2.0 GEOLOGY OF THE BLOCK

The area is covered by a blanket of thick soil. However, occasional isolated patches of Kamthi and Barakar sandstones are exposed in the gullies near river banks. Hence, the geological and structural interpretation is deciphered on the basis of borehole data only. Various lithological units encountered in the quarriable area are given below:

Formations	Thickness range (m)		Lithology
	Minimum	Maximum	
Soil/ Alluvium	5.00 (MWK-66,119)	32.95 (MWK-130)	Black clayey and sandy soil, Loose sand with transported pebbles of quartz, limestone & Trap.
Kamthis	0.66 (MWK-115)	39.00 (MWK-81)	Yellow, brown, red, yellowish white, ferruginous fine to coarse grained sandstones with variegated clays.
Barakar	10.85 (MWK-108)	79.00 (MWK-76)	Sandstone, shale, sandy shale, shaly coal & coal
Talchir	3.00 (MWK - 107,126,76)	5.00 (MWK-100)	Greenish to grey coloured sandstone, siltstone, shale.

### COMPOSITE SEAM

The effective quarriable thickness of composite seam excluding all the partings between different sections and obvious bands (A+M >75%) of 0.15 m and above, carb shale bands of 1 m thickness and above varies from 10.03 (MWK-135) to 13.06 m ((MWK-66) averaging about 11.5 m.

The details of dirt bands in different sections are tabulated below:

#### Details of dirt bands for different section in Kolgaon OC

Carb. Shale			Obvious dirt band			Total		
No.	Thickness (m)	%	No.	Thickness (m)	%	No.	Thickness (m)	%
Section-A								
0-1	0.13-0.15	5-7	0-1	0.26-0.30	10.12	0-2	0.15-0.39	7-15
Section-B								
0-1	0.16	14	0-1	0.31-0.32	9-16	0-1	0.16-0.32	9-16
Section-C								
-	-	-	0-1	0.13-0.15	8-31	0-1	0.18-0.15	8-31
Section-D								
0.2	0.07-0.32	1-3	0-1	0.09-0.14	1.2	0-2	0.09-0.32	2-3

### QUALITY PARAMETERS

In view of the variation in the quality of composite seam in different boreholes falling in the mining block, the weighted average data has been estimated.

### Overall Quality Parameter – Dilution wise

Undiluted Quality		Diluted Quality			
UHV (k.cal./kg)	Grade	0.05 m dilution at each contact point		0.08 m dilution at each contact point	
		UHV (k.Cal./kg)	Grade	UHV (k.Cal./kg)	Grade
3940	E	3695	E	3550	E

### GEOLOGICAL COAL RESERVES

In Kolgaon block, a total of 16.639 Mt. opencast reserves and 11.343 Mt underground reserves have been estimated. The break-up of these opencast and underground reserves are tabulated in following Tables.

Summary of grade wise, ratio wise net geological reserves, of Composite Seam

OPENCAST			
Coal:OB Ratio	Reserves in Mt. Grade of Coal		Total reserves(Mt)
	D	E	
A. PROVED RESERVES (NET IN-SITU)			
Within half subcrop	0.273	1.690	1.963
Subcrop to 1:3	0.048	0.137	0.185
1:3 to 1:5	1.349	2.113	3.462
1:5 TO 1:7	1.433	3.345	4.778
1:7 TO 150 m	0.427	3.476	3.903
Total	3.530	10.761	14.291
B. INDICATED RESERVES (GROSS)			
	0.260	2.088	2.348
GRAND TOTAL (PROVED + INDICATED)			16.639

Summary of sectionwise, depthwise proved and indicated

Underground Reserves							
Section	Proved (Mt)			Indicated (Mt)			Grand Total (Mt)
	Depth 150-250 m	More than 250 m	Total	Depth 150 m to 250 m	More than 250 m	Total	
A	0.880	0.705	1.585	0.322	0.126	0.448	2.033
B	0.384	0.338	0.722	0.034	0.048	0.082	0.804
C	0.440	0.563	1.003	0.263	0.113	0.376	1.379
D	3.182	2.051	5.233	1.399	0.495	1.894	7.127
TOTAL	4.886	3.657	8.543	2.018	0.782	2.800	11.343

## MINE BOUNDARY DELINEATION

Mine boundary of the proposed Kolgaon OC for working in Quarry-I & II is as follows:-

- North : Quarry Floor of Quarry-I extends upto Fault F16-F16 whereas Quarry-II extends upto Fault F12-F12 & F15-F15.
- South : Quarry-I extends upto Fault F4-F4 whereas Quarry-II extends upto Fault F16-F16.
- East : Incrop in both the quarries. Due to problem of slope failure, floor is considered upto full incrop in both quarries.
- West : Dip side limit is kept at 100 m Depth line in both quarries.

## MINEABLE RESERVES

Balance quarriable coal/OB in Q-I and Q-II has been calculated as per the following table.

		Coal (Mt)			OB (Mm <sup>3</sup> )			S.R. (m <sup>3</sup> /t)
		Q-I	Q-II	Total	Q-I	Q-II	Total	
a)	Insitu reserves of quarry area	3.50	1.89	5.39	26.88	15.70	42.50	7.90
b)	Less –extracted upto Mar.2008	0.43	-	0.43	3.71	0.60	4.31	10.02
c)	Add- volume of Access Trench (Mm <sup>3</sup> )				0.28	0.73	1.01	-
d)	Balance for RPR	3.07	1.89	4.96	23.45	15.83	39.28	7.92
e)	Top Soil (Mm <sup>3</sup> )				8.60	3.75	12.35	
f)	Balance Hard Strata OB (Mm <sup>3</sup> )				14.85	12.08	26.93	

While calculating the mineable reserves geological losses of 10% and mining losses of 10% have been considered.

## TARGET PRODUCTION

Keeping in view high average stripping ratio of 7.92 m<sup>3</sup>/t and further higher initial S.R. considering steep gradient of Seam and the total mineable reserves of 4.96 Mt, the target production of the mine has been fixed at 0.50 MTPA which is optimum for existing geo-mining conditions. The peak production capacity has been envisaged as 0.60 MTPA and Environmental Clearance is being solicited for 0.60 MTPA.

## MINE LIFE

The life of the project works out to 11 years considering annual target production of 0.50 MTPA with peak capacity of 0.60 MTPA and mineable reserves of 4.96 Mt. It is proposed to acquire land in first two years of mine life. The target production of 0.50 Mt would be achieved in the 2<sup>nd</sup> year. With peak production capacity of 0.60 MTPA the life will remain same as 11 Years.

## MINING STRATEGY

In present project report various options were made (viz. Departmental, Partial Hiring & Total Hiring). After lot of discussions, Total Hiring options have been worked out and elaborated in this project report. Coal target production of 0.50 Mty has been proposed and the Peak programmed OB has been kept as 7.15 Mm<sup>3</sup>/annum.

## GEO-MINING CHARACTERISTICS

The geo-mining characteristics of the proposed quarry are as follows:-

Sl.No.	PARTICULARS	Q-I	Q-II	TOTAL
1	Area of the Quarry			
(a)	On floor (ha)	26.45	12.87	39.32
(b)	On surface (ha)	80.76	35.80	116.56
2	Average length (m)			
(a)	At surface	1500	600	2100
(b)	At floor	1250	250	1500
3	Average width (m)			
(a)	At surface	435	765	
(b)	At floor	250	450	
4	Depth (m)			
(a)	Initial	29	30	
(b)	Final	100	100	
5	Gradient of seam	1 in 2.1	1 in 5.3	
6	Average thickness of seam (m)	11.70		
7	Balance Mineable reserves (Mt) (as on 01.4.2008)	3.07	1.89	4.96
8 (a)	Quarry OB (Mm <sup>3</sup> ) as on 01.4.2008	23.17	15.10	38.27
8 (b)	Volume of Access Trench (Mm <sup>3</sup> )	0.28	0.73	1.01
8 (c)	Total OB (Mm <sup>3</sup> )	23.45	15.83	39.28
9	Average SR (m <sup>3</sup> /t)	7.64	8.38	7.92
10	Grade & UHV (Cal./kg.) with 0.08m dilution .	3550 Grade 'E'		

## SELECTION OF MINING METHOD

Considering very steep gradient of seam which falls in the range of 1 in 2.1 to 1 in 5 with not reserves for full life of Dragline, deployment of Dragline would not prove to be effective and economical. Hence, only Shovel-Dumper combination is recommended in this report.

## SYSTEM PARAMETERS

### WIDTH & HEIGHT OF BENCHES

For overburden, keeping the bench height of 10 m, the width of working and non working benches are kept as 30 m and 20 m respectively. Haul road would be constructed on the floor of the quarry at a gradient of 1 in 16 with a width sufficient for dumper movement, dozer path, drainage and electrification etc.

## SLOPE OF BENCHES & QUARRY

### i) During Mining Operation

The slope of individual benches depends on the type of strata. In this report, the slope of individual bench is proposed as 45° in soil, alluvium and clay whereas; it is 70° in hard strata. The overall slope of the quarry in dip side during mining operation varies around 22° (from horizontal plane) depending on the nature of strata in the entire depth of quarry.

### ii) At the end of quarry

The slope of individual benches in the batter at the end of quarry remains same as that during mining operation i.e. 45° in soil, alluvium and clay and 70° in hard strata.

Overall angle considered during planning is about 38° in dip side & about 37° in rise side. However, it is proposed to do scientific study for slope stability in quarry benches and OB dumps by any scientific agency.

## DRILLING & BLASTING

The degree of fragmentation in opencast mine has to be optimised so that total cost of drilling, blasting, excavating, transport and crushing as a total system is minimised. In OB, powder factor of 3.00 m<sup>3</sup>/kg has been considered and for coal powder factor of 7 t/kg has been considered. It is recommended that blasting parameters shall be optimised from time to time depending upon local site conditions at the time of actual operations.

## LEAD

The entire quarry is divided into nine cuts.

Cutwise weighted average lead for overburden and coal is as shown in the following table.

### CUTWISE WEIGHTED AVG. LEAD & LIFT

CUTS	OVERBURDEN		COAL	
	Lead Km	Lift m	Lead Km	Lift m
A-1	2.50	50	1.75	53
A-2	2.75	53	2.00	72
A-3	3.75	94	2.00	65
A-4	2.50	44	2.00	79
A-5	3.00	68	2.00	65
A-6	3.50	99	2.25	86
D1	2.00	34	1.50	43
D2	2.50	28	2.00	71
D3	4.50	97	2.25	84

## REHANDLING OF OB

Existing embankment in the dipside of quarry requires to be rehandled for which necessary provisions has been made. As the level difference from Floor of Section – D , Roof of Section – A is about 20-25 m, efforts shall be made to reach the roof

of Section-A along coal bench and thereafter, touch coal floor by transportation along flank. These rams shall require rehandling as the face advances in dip direction. Hence, lump-sum provision for rehandling quantity of 2% of parting and coal workload has been considered as revenue expenditure in each year during the mine life.

## SEQUENCE OF MINING

As already explained, proposed mine is a continuation of present Kolgaon mine, balance quarriable reserves have been arrived at by deducting actual coal and OB removal upto March, 2008 from insitu reserves in Quarry I & II.

Calendar Programme has been drawn up considering cuts as shown in following table.

Quarry	Cut No.	Description	Coal (Mt)	OB (Mm <sup>3</sup> )	Stripping Ratio (m <sup>3</sup> /t)
Q-I	A-1	Upto 140 FRL along Sec.-2-2' & 3-3' for HOE contract	1.04	6.77	6.45
	A-2	Upto 110 FRL along Sec.-2-2' & 3-3' & up to 160 FRL upto F3F3' along 4-4'	0.96	4.69	4.89
	A-3	Deepening upto 140 FRL up to Fault F3F3' along 4-4' along strike	0.28	1.60	5.71
	A-4	Deepening upto 160 FRL along 4-4" upto F3F3' & upto 160 FRL between F3F3' & flank along 5-5'	0.42	6.92	16.48
	A-5	Further deepening upto 140 FRL along 5-5' between F3F3 & flank	0.23	3.06	13.30
	A-6	Further deepening upto 140 FRL along 5-5' between F3F3 & flank upto 110 FRL	0.14	0.47	3.36
Q-II	D-1	A/T upto 160 FRL on downthrown side	0.10	2.17	21.70
	D-2	Deepening upto 130 FRL on upthrown side	0.49	6.55	13.37
	D-3	Balance upto 110 FRL.	1.30	7.11	5.47

As already explained this report has been prepared considering cut off date as 1.4.2008. Keeping in view the present quarry floor as on 1.4.2008, the mine has been initially deepened in Cut A-1 upto 140 FRL and in Cut A-2 upto the maximum floor limit of 110 FRL. Simultaneously the strike has been extended upto Fault F16F16' separating Q-I & Q-II. In Cut A-2, the mine has also been extended upto F3F3' and 160 FRL. In Cut A-3, the quarry has been deepened upto 140 FRL and thereafter in Cut A-4 upto maximum dip limit of 110 FRL upto F3F3'. Thus the entire upthrown area between F16F16' & F3F3' has been evacuated at the end of Cut A-4. Simultaneously the

downthrown area between F3F3' and F4F4' upto flank is also deepened upto 140 FRL in the same cut, viz Cut A-4. In Cut A-5 & A-6, the downthrown area between F3F3' & F4F4' is being mined upto 140 FRL (Cut A-5) and thereafter upto maximum dip limit of 110 FRL (Cut A-6). In the above sequence entire Q-1 is being exhausted.

As already explained in Para 5.8.1, utmost care has to be taken to utilize maximum strike length while deepening the quarries Q-I, Q-II.

After evacuation of the Q-I, activities shall shift to Q-II, which is initially downthrown and later on upthrown by strike fault F14F14. In Cut D-1, Access Trench is dug and Q-II is progressed up to 160 FRL on the initial downthrown area. Thereafter in Cut D-2, the quarry is progressed upto 130 FRL on both sides of F14F14. Finally balance quantity upto maximum dip limit of 110 FRL is excavated in Cut D-3.

As already explained, in this option mining of Q-I and Q-II is contemplated as in RPR and approved PR. Sequence of mining & cuts is same as in Option-I. Here Q-1 is being taken with Cuts A-1 to A-6 and thereafter Q-II is being worked with Cuts D-1 to D-3 .

No provision has been kept for flood protection embankment in this report as embankment already exists. However, miscellaneous provisions have been kept in the approved Project Report for repair / maintenance / pitching as found necessary from time to time.

An existing stretch of embankment of approximately 1.20 kms shall require rehandling as the mine has been deepened and the batter-slope corrected as per recommendations of Safety Committee on slope stability. Approximate volume of existing embankment requiring rehandling is 0.14 Mm<sup>3</sup> and cost of rehandling has been apportioned as Rs. 30.00 lacs in Year-2 and Rs. 44.20 lacs in year-3. These expenditures have been kept as revenue expenses.

#### WASTE DISPOSAL

In order to arrive at the Dumping Schedule, existing dumping on surface on Quarry & within surface was assessed as per existing Quarry Layout Plan received from the project. Thereafter, maximum dumping capacity was calculated and existing dumping quantity was reduced to arrive at the dumping programme for Kolgaon OC.

Break-up of existing OB dumps as on 31.3.2008 is as follows:

External Hard Strata Dump in	
C.B. area as per PR	= 3.97 Mm <sup>3</sup>
Top soil dump	= 0.34 Mm <sup>3</sup>
Total OB Quantity	= 4.31 Mm <sup>3</sup>

Presently M/s Vanguard Carriers (P) Ltd. is executing OB removal contract at Kolgaon OC vide work order No.WCL/WA/CGM/Mining/WD/2007/13218 dated 18/25.11.2007 for a total period of 24 months. Total OB contract quantity is 4.35 Mm<sup>3</sup> out of which the quantity of OB from 1.4.2008 onwards is 3.17 Mm<sup>3</sup>. As dumping site is earmarked on the dip side coal bearing area as per PR, the same is assumed in this report also. Thereafter as and when this contract expires, OB shall be dumped along the

extension of the dump upto land already in possession.

Dumping of Hard Strata has been considered on the Hard Strata dumps HS-1 in the dip side and on HS-2 above the backfilling between F3F3' & F4F4' in Quarry-I. Dumping in HS-2 is to be done from Cut D-2 of Quarry-II.

It is programmed that initially hard strata dumping shall be done on land already in possession wherein approx. 5.24 Mm<sup>3</sup> shall be dumped upto 30 m and 3.32 Mm<sup>3</sup> upto 60 m height. Thus total hard strata dumping in land under possession is 8.56 Mm<sup>3</sup> and thereafter dumping shall be done in land to be acquired (51 ha). Thus hard strata dumping on land to be acquired shall commence from Year-6, as per envisaged Calendar Programme.

Entire top soil shall be dumped in Top soil dumps TS-1A, TS-1B, TS-2, TS-3, TS-4, Ts-5. Only TS-1B is in land to be acquired where top soil dumping shall commence after Year-5. This sequence has to be done to provide sufficient cushion for land acquisition activity.

Topsoil dumps are located in coal bearing areas and they are being rehandled from time to time for carpeting on OB dumps.

Quantities of Top Soil have been calculated cut-wise considering the two upper most horizons i.e. assuming depth of 20 m which the mine is encountering presently and is also the average top-soil depth.

All the top soil dumps have been shown in the Quarry Layout Plan. Total Quantity of top soil is 12.35 Mm<sup>3</sup> and Hard Strata is 22.62 Mm<sup>3</sup> and the cut-wise schedule of dumping is as shown in the following Table 6.3.

Qry.	Cuts	Total OB	Top Soil Dump	Internal Bkflg in Q-I	Hard Strata Ext. Dump	TOP SOIL DUMPS						TOT. TOP SOIL	HARD STRATA DUMPS			TOT. HARD SOIL
						TS-1A	TS-1B	TS-2	TS-3	TS-4	TS-5		HS-1 0-30M	HS-1 30-60M	HS-2 0-30M	
Q-I	A-1	6.71	2.25		4.46	2.25						2.25	4.46			4.46
	A-2	0.63	0.00		0.63							0.00	0.63			0.63
		4.06	2.49		1.57	1.36		1.13				2.49	0.15	1.42		1.57
	A-3	1.60	0.11		1.49			0.11				0.11		1.49		1.49
	A-4	0.41	0.00		0.41							0.00		0.41		0.41
		6.51	3.69		2.82		2.42	0.59	0.17		0.51	3.69	2.34	0.48		2.82
	A-5	3.06	0.06		3.00		0.06					0.06	3.00			3.00
A-6	0.47	0.00		0.47							0.00	0.47			0.47	
Sub-Total		23.45	8.60	0.00	14.85	3.61	2.48	1.83	0.17	0.00	0.51	8.60	11.05	3.80	0.00	14.85
Q-II	D-1	2.17	1.41		0.76	0.29				1.12		1.41	0.76			0.76
	D-2	6.55	2.18	4.31	0.06	0.99	0.68			0.51		2.18	0.06			0.06
	D-3	7.11	0.16		6.95	0.16						0.16	0.72	4.16	2.07	6.95
Sub-Total		15.83	3.75	4.31	7.77	1.44	0.68	0.00	0.00	1.63	0.00	3.75	1.54	4.16	2.07	7.77
Grand Total		39.28	12.35	4.31	22.62	5.05	3.16	1.83	0.17	1.63	0.51	12.35	12.59	7.96	2.07	22.62

On the basis of the above dumping schedule, lead and lifts for the various cuts have been arrived at.

Quantity of backfilling is 4.31 Mm<sup>3</sup> backfilling is achieved in Q-1 between F3F3' & F4F4' on the Penganga flank. All the remaining quarry area of Q-1 & Q-II shall not be backfilled in order to keep the option open for future deepening.

## OPTIONS IN PROJECT REPORT

As already explained this report is prepared on Total Hiring of HEMM and detailed in following paragraphs.

## SCOPE OF WORK BY HIRING OF HEMM

Entire OB and coal is to be worked by outsourcing of HEMM. The scope of work will include construction and maintenance of haul road, water sprinkling, grading, dozing, etc. as per requirement. Drilling and blasting will be done departmentally.

## MINING SCHEDULE

Calendar Programme has been prepared on the basis of estimation of coal and overburden. Various cuts are drawn on different floor levels and volume of overburden in that Cut. Calendar Programme of excavation is shown in following table-

**Calendar Programme of Excavation –**

YR	QUARRY-I						QUARRY-II						TOTAL	
	Coal (Mt)		Nat O.B (Mm3)		Prog O.B (Mm3)		Coal (Mt)		Nat O.B (Mm3)				Total coal Mt	Total OB Mm 3
	ann.	cumm	Ann.	Cumm	ann.	Cumm.	ann.	cumm	Ann.	Cumm.	ann.	Cumm.		
1	0.40	0.40	2.58	2.58	3.00	3.00							0.40	3.00
2	0.50	0.90	3.23	5.81	3.25	6.25							0.50	3.25
3	0.50	1.40	2.67	8.47	3.25	9.50							0.50	3.25
4	0.50	1.90	2.45	10.92	4.00	13.50							0.50	4.00
5	0.50	2.40	4.06	14.98	4.00	17.50					0.73	0.73	0.50	4.73
6	0.38	2.78	6.01	20.98	4.00	21.50	0.12	0.12	2.44	2.44	3.15	3.88	0.50	7.15
7	0.20	2.98	2.16	23.15	1.88	23.38	0.30	0.42	4.01	6.45	3.35	7.23	0.50	5.23
8	0.09	3.07	0.30	23.45	0.07	23.45	0.41	0.83	3.58	10.03	3.35	10.58	0.50	3.42
9							0.50	1.33	2.74	12.77	2.61	13.19	0.50	2.61
10							0.50	1.83	2.74	15.50	2.57	15.76	0.50	2.57
11							0.06	1.89	0.33	15.83	0.07	15.83	0.06	0.07
	3.07		23.45		23.45		1.89				15.83		4.96	39.28

In this Calendar Programme, programmed OB is prepared considering cumulative quantities as per Natural Programme and maintaining uniformity in annual quantities to the extent possible.

Now considering the peak capacity of the mine, the production programme can be summarised as below:-

## **PRODUCTION PERFORMANCE**

SL. NO.	YEAR	Coal Production in Mte	OB EXCAVATION & DISPOSAL IN Mm3		
			Total Excavation	OB in External Dump	OB in Internal Dump
1.	2004 - 05	0.00	0.50	0.50	---
2.	2005 - 06	0.0045	1.322	1.322	---
3.	2006 - 07	0.103	1.157	1.157	----
4.	2007 - 08	0.326	1.332	1.332	---
5.	2008 - 09	0.363	2.161	2.161	---
	<b>TOTAL UP TO 31.03.09</b>	<b>0.7965</b>	<b>6.471</b>	<b>6.471</b>	<b>—</b>

## PRODUCTION PROJECTION

SL. NO.	YEAR	Coal Production in Mte	
		QUARRY - I	QUARRY - II
1	I	0.50	----
2	II	0.50	----
3	III	0.50	----
4	IV	0.60	----
5	V	0.60	-----
6	VI	0.37	0.13

## PRODUCTION PROJECTION

SL. NO.	YEAR	Coal Production in Mte	
		QUARRY - I	QUARRY - II
7	VII	---	0.50
8	VIII	----	0.50
9	IX	----	0.40
10	X	----	0.30
11	XI	-----	0.06
	<b>TOTAL</b>	<b>3.07</b>	<b>1.89</b>

### SAFETY & CONSERVATION

The project report has been drawn in conformity with the prevailing statutory provisions applicable for safety in Opencast Mines. However, following matters related to safety during opencast operations has to be given special considerations.

The rain water falling within the project area would be diverted from the quarry area by providing garland drains and shall be collected towards low lying area. Major part of the quarry is under the HFL of Penganga River hence flood protection embankment with top RL 6 m above HFL would be constructed around quarry area.

### SAFETY ASPECT FOR BLASTING OPERATIONS

As explosives are required in bulk for blasting in OC mines, provision of regulation - 164 A of CMR 1957 should be ensured. All blasting operations shall be carried out in day light. Suitable precautions shall be taken as per statute before and after blasting operations. Controlled blasting technique has to be practised to minimise fly off rocks and ground vibrations and keep them within safe limits. In order to keep the ground vibrations within the permissible limit as per DGMS Circular No. 7 of 1997, to avoid flying of rock fragments and also to achieve satisfactory blasting results, optimized drilling / blasting parameters depending upon rock formation using combination of relays / delays will have to be evolved. It is further recommended that at the time of actual execution, proper study for controlled blasting and ground vibration is done with scientific body in order to evolve site specific charge distance relationship.

Special precautions as per statute should be taken while working over the developed pillars/ extracted & stowed working.

### **PRECAUTION AGAINST FIRE**

Precautions should be taken against fire in the exposed coal seam. The exposed galleries should be covered with OB material to prevent from spontaneous heating in the old working.

### **SLOPE STABILITY**

Recommendations of Slope Stability Report shall be followed. In addition, following precautions shall be taken. :-

i) Water drainage system may be properly implemented to prevent accumulation of water in cracks. Also dumps shall be leveled to prevent accumulation of water over it. Proper drainage in dumps shall be also provided to prevent erosion of toe of dump.

ii) Regular monitoring of tension cracks, horizontal and vertical movement of strata in critical area may be done.

iii) Proper hydro-geological studies to be done.

iv) After completion of dumping operations dumps to be stabilized by growing vegetation.

### **SAFETY ASPECTS FOR OUTSOURCING/HIRING OF HEMM**

Special precaution should be taken while deploying workers in the mine. Before employing any labour to the mine proper vocation training should be imparted and recommendations of VIII Safety Conference should be strictly followed. Risk Management Plan of tipper/pay loader shall be made and implemented. Before deploying workers they must be trained and briefed about safety aspects in opencast mine. However during course of execution of the work, if any accident occurs whether major or minor, the matter shall have to be immediately informed to mine management i.e, Colliery Manager/Agent/GM of Area so that Notices of accidents in accordance of (Reg. 9 of CMR 1957) and Section 23 of Mines Act 1952 may be given and other necessary steps may be taken in accordance of Section 23 of Mines Act, 1952 & Reg. 9 of CMR, 1957 and other relevant laws.

### **ENVIRONMENTAL MANAGEMENT**

Annual target of the mine is 0.50 MTPA with mineable reserves of 4.96 Mt. During project implementation mine target can be enhanced by further increasing the outsourcing of HEMM. With same resource base and keeping the same sequence of mining, there is possibility of enhancing of mine target by about 0.10 MTPA during actual operation resulting in achieving peak production capacity of 0.60 MTPA. Accordingly, assessments of environmental impact and mitigation measures have been assessed.

## **ECO-DEVELOPMENT AND SOCIAL IMPACT ASSESSMENT**

For Eco-development activities in the areas surrounding the project, it is proposed to develop a green belt by plantations, biological reclamation of OB dumps, watershed development management of recharge areas, canalization of the available water, and explore the possibility of alternative use of land. These activities will help in reduction of dust and noise pollution and will also supplement the shortage of water in nearby villages in future. The social impact will mainly be due to the acquisition of the tenancy land, required for this project. The project is expected to form a nucleus for further industrialisation /development and urbanization of the study area. There would be development in the secondary and tertiary sectors to support the project activities.

It is proposed to organize entrepreneurship motivation camps for willing PAPs for different self-employment options. This will be in addition to the compensation being paid to the land-loosers as per the Company's policy. The necessary financial provision towards Eco-development has been made in the PR as per the guidelines of M.O.E.F.

### **MINE CLOSURE COSTS**

The proposed Kolgaon OC Project has been planned upto 100 depth and it is most likely that this will be extended further in dip side in future. Although no statutory guidelines exist on financial provisioning for mine closure activities as yet, financial provision of Rs.1.00/t has been provided throughout the mine life in order to undertake mine closure activities (for plantation in slope of dumps & quarry, for protection of mine boundary and continuation of monitoring programme and control of contaminated effluents). After implementation of closure activities, a small team comprising of 2-3 technical people may be required to see the efficacy of the closure activities. Cost for 4-5 years for such monitoring team functions shall be included in the final closure plan. Closure cost may be reviewed under the changing circumstances and new legislative requirements. Also, provision for rehandling of top soil dump on dip side has been made in final years of mine working.

## **3.0 ENVIRONMENTAL IMPACT ASSESSMENT**

### **3.1 Air Pollution:**

The major sources of air pollution due to opencast mining are as follows:-

- i) Drilling and blasting in coal & overburden
- ii) Excavation of coal and overburden
- iii) Transportation of coal and overburden
- iv) Formation of OB dump
- v) Coal handling plant

At present, ambient air quality is being monitored as per Env. Protection Amendment Rule, 2000 in the existing Kolgaon OCP. From the analysis result, it is found that dust (covering both SPM and RPM) is the only area of concern as SO<sub>x</sub> and NO<sub>x</sub> levels are insignificant. Moreover, the dust generated at the mine activity area of existing opencast is within the acceptable limits. The mitigative measures will further be strengthened with the expansion of the mine.

The baseline ambient air quality data (during summer season of 2005) has been generated as per the guidelines in vogue in the adjacent project i.e. Mugoli OC having same wind – rose pattern, climatic features and topographical features. All the parameters have been found well within the permissible limits. Further to it, in order to assess existing ambient air quality in the mine activity area, the data generated during the period 2008 - 2009 as per Env. Protection Amendment Rule, 2000 has been considered. The details of these data are discussed in Chapter – IV.

Now with the proposed expansion in capacity, the SPM and RPM levels are likely to increase from the existing levels. The impact prediction through Numerical Modeling has been done and described in detail in Chapter – IV. With the existing Control measures in place and the with the strengthening control measures the likely levels of SPM & RPM are expected to remain well within the permissible level.

### **3.2 Water Pollution**

Major sources of water pollution due to the proposed opencast projects are as follows:-

- a) Domestic effluent
- b) Mine pumped out water
- c) Effluent from CHP, Workshop

The quality of mine pumped out water is being monitored at existing Kolgaon OC mine as per Env. Protection Amendment Rule, 2000.

It is seen from the analysis result that the monitored parameters are well within the permissible limit. It can be predicted that the same estimate will hold good for mine pumped out water from Proposed Kolgaon OC Expansion mine.

The baseline water quality data (Period- Summer season of 2005) has been generated as per the guidelines in vogue. All the parameters have been found well within the permissible limits. The present quality of pumped out water from the mine is being monitored as per Env. Protection Amendment Rule, 2000.

Further in order to assess, the data generated during the period 2008 - 2009 have been considered. The details of these data are given in Chapter - IV. As the geo – mining parameters are not going to change during the proposed expansion in production capacity, the quality of mine pumped out water is not going to change during the balance life with maximum achievable capacity of 0.60 MTPA.

## **GROUND WATER RESOURCES IN THE AREA**

### **Ground water Recharge**

Precipitation is the main source for groundwater recharge in the area. The average annual rainfall of the area is around 1150 mm. The quantity of rain water falling over the study area of 314 Sq.km (10 km radius) is 361.10 million cubic meters (MCM). The quantum of groundwater recharge (recoverable reserve) depends on various factors viz. Nature of soil cover, geology, topography, vegetation, intensity and

duration of rainfall etc. As per the Groundwater Estimation Committee, Govt. of India, the rainfall infiltration factor for Alluvium,/Kamthis,and Talchirs/Vindhyans is around 15% and 4% respectively. Major part of the area is covered by Kamthis/alluvium and Talchir. Accordingly, ground water recharge in Alluvium/Kamthis,Talchir and Vindhyan formations has been worked out to 27.35 MCM. as given below.

Ground water recharge from other sources is negligible since canals, ponds/dams and other water conservation structures are not available in the area. Further, negligible area (230 ha only) is under irrigation. However, the recharge from return waters from irrigation (0.21 MCM) and from mine discharge (1.46 MCM) comes 1.67 MCM. Thus, the gross annual recharge of water comes to 29.02 MCM out of which about 10% (2.90 MCM) goes as the natural discharge to streams / rivers and other losses thereby net ground water availability works out to 26.12 MCM.

a) Recharge from rainfall	:	27.35 MCM
i) Alluvium / Kamthis (102 Sq.Km.)	-	17.60 MCM
ii) Talchirs area (45 Sq.Km))	-	2.07 MCM
iii) Vindhyans area (167Sq. Km.)	-	7.68 MCM
b) Recharge from other sources	:	1.67 MCM
i) Irrigation return flow.	:	0.21 MCM
ii) Mine discharge	:	1.46 MCM
c) Gross groundwater recharge (a+b)	:	29.02 MCM

#### Groundwater Draft :

The groundwater withdrawal is generally for domestic, industry and irrigation requirement and is quantified as under in Table below.

Ground Water draft for all uses

Sl No.	Purpose	No./Area	Water consumption per capita	Total qty. of withdrawal (MCM)
1.	a) Domestic (Human Population)	91322 Nos.	70 Lit/day	2.33
	b) Domestic (Animals)	27396 Nos	20 Lit/day	0.20
2.	Irrigation (for 120 days)	220 ha.	40000 Lit/ha/day	1.06
3.	Existing mine pumping			7.33
Total				10.92

Ground water withdrawal is mostly for domestic use since negligible area (220 ha only) is under irrigation. In addition to the above, groundwater extraction is being done by the 3 mines in and around the area. These mines pump the water to the

surface to the tune of 7.33 MCM. Thus the total groundwater draft for all uses comes to 10.92 MCM. Major portion of mine effluent is being reused/ recycled.

### **Groundwater Balance :**

i) Gross groundwater recharge	:	29.02 MCM
ii) Natural discharge to drains & other losses (Approx.10 % of item (i) )	:	2.90 MCM
iii) Net annual groundwater availability	:	26.12 MCM
iv) Allocation/ projection upto next 25 years for domestic & industrial use	:	1.25 MCM
v) Annual groundwater draft for all uses	:	10.92 MCM
vi) Groundwater balance (Item iii-iv & v)	:	13.95 MCM

Groundwater balance flow diagram is furnished in subsequent pages.

### **Level Stage of Ground Water Development**

It is seen from the figures of net annual ground water availability (26.12 MCM) and gross annual ground water draft (12.17 MCM) that surplus ground water to the tune of 13.95 MCM is available for future utilization and development. Thus, the present stage of ground water development in and around the project has been around 41.80% which can be categorized as safe area.

As per GSDA and CGWB report of Yavatmal and Chandrapur districts of Maharashtra, the stage of ground water development in Wani Tahsil in which Kolgaon OC Project and its buffer zone lie is 10 % and classified as safe( Annexure-V).

### **Dynamic & Static resources :**

The dynamic and static reserves for the core and buffer zones are estimated by utilizing the aquifer parameters mentioned at the head of 3.4.

The opencast mine acts as large diameter well/ sink wherein all the aquifers overlying the working seam would be converted into unconfined state and the inflow to the mine is contributed from the saturated overburden formation i.e. multiple aquifer system. However the unconfined aquifer is the most affected in opencast mining area. The groundwater status in the area has been computed as under.

The average mine depth of 65 m was considered as exploitable depth for static reserve estimation in core zone with an area of 1.03 Sq.km.

Whereas for the buffer zone with an area of 312.97 Sq.km the floor of unconfined aquifer (29.0 m) has been considered as extractable depth. The pre-monsoon water level (average) is about 9.50 m bgl in the area covered by Alluvium/Kamthi, and Talchir/Vindhyans formations and the water table fluctuation is around 3.00 m and 7m respectively between the two extreme seasons. The dynamic & static resources estimated for core and buffer zones are given in Table below.

**Dynamic & static resources estimated for core and buffer zones**

Zone	Dynamic reserve				Static reserve			
	Area in Sq.km	Water level Fluc. (m)	Sy	Potential MCM	Area (Sq.km)	Extractable thick. of aquifer below Fluc. zone (m)	Sy	Potential MCM
Core	1.03	4.00	0.04	0.17	1.03	45	0.03	1.39
Buffer	100.97 (A)	3.00	0.03	9.07	100.97 (A)	10	0.03	30.29
	212(B)	7.00	0.02	16.94	212 (B)	10	0.02	42.4
Total	314.0			26.18 say 26.0				74.08 say 74.0

- A) - Area covered by alluvium/Kamthis
- B) - Area covered by Talchirs/Vindhyans

Thus, the dynamic and static ground water reserves as estimated are 26.0 and 74.0 MCM respectively.

**WATER QUALITY**

Generally, the well water quality is mostly alkaline in nature with pH value of 7.57 to 8.5 of potable quality with moderate concentration of total dissolved solids and they have TDS to the tune of 344 to 1410 mg/l. Most water samples indicate that TDS in drinking water is within permissible limit.

**The quality of water in the area is given in details in Chapter - III.**

**MINE DRAINAGE/ PUMPING**

The entire quarriable area is covered by Kamthis varying in thickness which is overlain by soil/alluvium having thickness of 10.0 m to 29.0 m. The semi consolidated Gondwanas are mostly stratified formations underlying the alluvium/soil. The permeable beds (Sandstone horizons) act as individual hydrogeological units and develop multi-aquifer system by the intercalation/interfringing of shale beds. As such under these circumstances, the groundwater flow/velocity along the bedding planes is higher than across the plane.

It is imperative that horizontal hydraulic conductivity is many folds higher than the vertical hydraulic conductivity.

The opencast mine acts as large diameter well/sink resulted in by cutting /extraction of different aquifer zones/formations overlying the working coal seam. As soon as depression / pit is created due to mine cut, the initial discharge is generally heavy due to concentration of flow to that region thereby creating depletion/draw-down in water levels in the surrounding area and the inflow stabilizes due to partial desaturation over the period of progressive mining. With increase in depth of incision, the semiconfined aquifer would also be exposed /punctured thereby the total system would be converted into water table condition and a cone of depression would be formed by the gravity drainage from different aquifer zones. In opencast mining, the unconfined aquifer is the most affected and the semiconfined aquifer is least affected. The mine effluent & influence is directly proportional to the mine area and depth.

The groundwater inflow computation has been done by utilising the above mentioned aquifer and mine parameters. The classic Theis equation has been modified by introducing mine parameters/expansion rate and the groundwater inflow to the mine has been estimated to be around 7500 m<sup>3</sup>/day (2.74MCM) at the at an average quarry depth of 65 m.

### **RADIUS OF MINE INFLUENCE**

In the opencast mines, the different aquifers overlying the working coal seam would be contributing groundwater to the mine by gravity drainage since they are exposed / removed at the mine. The present mine water inflow from the Kolgaon OCM is about 6075 m<sup>3</sup>/day. The anticipated groundwater inflow as worked out for Kolgaon OC at the average quarry depth of about 65 m would be about of 7500 m<sup>3</sup>/day. As such due to this pumping, cone of depression would be formed. The shape and extent of the cone would depend on mainly hydraulic conductivity and specific yield of aquifers and recharge discharge boundaries and geological structures such as major faults etc. The radius of influence may expand from about 455 m to about 800 m with the mine depth from 30 m to 65 m. An average radius of influence as worked out is 625m for an average mine depth of 65m.

Generally steep draw down cone would be formed in poor potential aquifers thereby, the influence area would be up to smaller distance and reverse is established in respect of aquifers with high hydraulic conductivity. The radius of mine influence area has been estimated for Kolgaon OCM based on the above mentioned aquifer and mine parameters (Table-7.0.1). It may be appropriate to mention here that the presence of prominent boundaries such as river/water bodies, faults and also interfingering of sandstone and shale beds may restrict the propagation of drawdown cone or radius of mine influence.

Radius of influence in Kolgaon OCM

Project	Area	Avg. mine depth	Probable drawdown		Av radius of influence ( K = 1.0m day) m
			Initial draw down	Final draw down	
Kolgaon Opencast mine	Wani Area	65	20	35	455 to 790

Mine induced effect may be distinctly noticed within a distance of 200 to 600m from the mine edge in the down-dip side and becomes milder/ insignificant thereafter. However the effect is limited / negligible in the up-dip side of the incrop zone due to shallow mine depth & area and further mine development is towards dip-side only.

### **3.3 Noise Pollution:**

The major sources of noise pollution are given below:-

- a) Drilling and blasting in coal and overburden
- b) Coal extraction and OB excavation
- c) Workshop

The noise levels are being monitored regularly as per Env. Protection Amendment Rule, 2000 at existing Kolgaon opencast, which shows a quite satisfactory level. With the experience gained in past, it can be predicted that the same estimates will hold good for noise levels in the proposed Kolgaon OC Expansion mine.

The baseline noise level data (Period- Summer Season of 2005) has been generated as per the guidelines in vogue. All the noise levels have been found well within the permissible limits. The existing ambient noise level data in the mine activity area, which is being monitored as per Env. Protection Amendment Rule, 2000 for the period 2008 – 09 have been given in Chapter – IV.

Now with the proposed expansion in capacity, the noise levels are likely to increase from the existing levels due to increased traffic movement. With the existing Control measures in place and the with the strengthening control measures the likely levels of noise are expected to remain well within the permissible level.

### **3.4 Impact on land use:-**

The total land requirement of proposed project works out to 397.25 ha. It is mentioned here that mine lease area consists of 391.54 ha and balance land of 5.71 ha has been proposed for town ship outside the ML area. During mining the land use pattern for mine lease area is as given below:-

<b>Sl.No.</b>	<b>Particulars</b>	<b>Total Land (ha)</b>
1	Already acquired land	338.97
2	Tenancy land to be acquired	50.29
3	Government Land already acquired	2.28
4	Colony Land to be acquired	5.71
	<b>Total</b>	<b>397.25</b>

## CHANGES IN LAND USE (AREA IN ha)

SL. NO.	PARTICULARS	Agricultural Land	Waste (Govt.) Land	TOTAL
1	Excavation Area	116.56		116.56
2	External OB Dump Area	65.20		65.20
3	Roads & Infrastructure	15.00		15.00
4	Blasting Zone	41.00		41.00
5	Embankment	16.85		16.58
6	Future Deepening/ Extension of Quarry	57.00		57.00
4	RATIONALISATION OF MINE BOUNDARY	75.65	2.28	77.93
	<b>TOTAL</b>	<b>389.26</b>	<b>2.28</b>	<b>391.54</b>

### 3.5 Impact on Socio-Economic Scenario:

The social impact will mainly be due to the acquisition of tenancy land, required for this project. It is proposed to organize entrepreneurship motivation camps for willing EPAPs for different self-employment options. This will be in addition to the compensation being paid to the land losers as per the company policy.

### 3.6 Impact on Flora & Fauna :

There is no endangered and endemic species in core and buffer zone.

By developing plantation of native species efforts will be made to improve the green cover in and around the immediate vicinity of the mine area.

WCL in association with local people will make all efforts to conserve the flora and fauna in the immediate surrounding of the mine area.

## 4.0 ENVIRONMENTAL POLLUTION CONTROL MEASURES:

### 4.1 Air & Noise pollution control measures

- a) To reduce air pollution due to dust produced during various mining and allied activities, adequate water spraying is being done at strategic points so that dust does not get air-borne. Suitable chemical re-agents to coagulate the dust particles would also be tried while spraying of water.
- b) Proper blasting techniques by designing a suitable blasting

- pattern after actual field observation would be followed to minimize the effects of ground vibration and noise.
- c) Development of green belt around infrastructure, colony, along roads and in vacant land against villages is being done undertaken for arresting dust and noise propagation.
  - d) Black topping of coal transportation road.
  - e) Proper preventive maintenance of all HEMM and other equipment shall be done so that the emission of dust, gas and noise level shall be reduced.
  - f) Dry sweeping of coal transportation road.
  - g) Strictly avoiding overloading of coal trucks. Covering of coal trucks fully with tarpaulin
  - h) All workmen who are in noise prone areas shall be provided with protective gear like earmuffs and earplugs.

#### **4.2 Water pollution and control measures:**

##### **a) Domestic Effluent:**

Adequate sewage disposal arrangement (Domestic Effluent Treatment Plant) exists in the township.

##### **b) Mine Discharge:**

Water collected in the workings is first allowed to settle in sumps. Sufficiently large sumpage has been provided to eliminate the discharge of undissolved suspended solids to the surface alongwith mine water. It is then being passed through a sedimentation pond. The final treated discharge is being utilized for various purpose i.e. water spraying, watering of plants, washing etc. Balance quantity is being supplied for irrigation, if required, otherwise discharged into natural drains. It is proposed to continue the monitoring of the quality of mine discharge and, if any, undesirable element is found in the sample; it will be treated properly before it is re-used. . Further to deal with additional water discharge, if any, adequate fund provision has been made for another sedimentation pond.

Ground water level monitoring is being carried out on quarterly basis as per MOEF guidelines in vogue.

#### **4.3 Ground Vibration Control**

In order to keep the ground vibration within a reasonable limit and also to achieve satisfactory blasting results an optimized blasting system depending upon rock formation using combination of relays and delays have been evolved and adopted accordingly. However, all necessary precautions during blasting are taken as per Statute to minimize the risk due to ground vibration. At the time of actual excavation, proper monitoring of ground vibration is also made.

#### **4.4 Tree plantation and Green belt:**

Plantation is an important tool to combat air pollution, noise pollution and soil erosion. In addition to these, it gives an aesthetic look to the area. For plantation purpose following area can be considered:

- a) Areas where ornamental trees, viz. Gulmohar, Subabul , Kikar etc. and fruit trees like Mango, Guava, Jamun and medicinal plants like Neem , Tulsi etc. will be planted are colony, school, dispensary, community buildings, play ground etc.
- b) Areas where different rows of trees including tall and fast growing varieties alongwith ornamental shady trees shall be planted e.g. around colony , along coal transportation road and industrial buildings etc.

The fast growing varieties of trees will act as sound barriers whereas ornamental shady trees subabul ,Kikar etc. will add to the aesthetic look of the area.

- c) Areas where sturdy and fast growing varieties of trees will have to be planted are OB dumps backfilled areas etc.

Plantation of these trees will also takeoff some pressure as far as firewood is concerned.

Plantation (about 42500) has been done around infrastructure, colony, along road to guard against dust & noise pollution.

#### **4.5 LAND RECLAMATION / LAND MANAGEMENT**

The following activities have been proposed for reclamation of land.

1. Backfilling of the excavated area to the extent possible.
2. Leveling of the backfilled area and carpeting with the top soil.
3. Creation of garland drains in order to arrest the silt load, due to erosion, to prevent entry into natural water courses during surface run-off.
4. Grass, legumes and different types of plants etc. will be planted on such reclaimed land in order to make it, as far as possible, conducive to vegetative growth.
5. Technical and biological reclamation of external OB dump.

At the end of mining operation, the land use pattern would be as follows:-

## Conceptual LUP - EOM (AREA IN ha)

SL. NO.	PARTICULARS	PLANT- -ATION	VOID	PUBLIC USE	UNDIST- URBED AREA	TOTAL
1	EXTERNAL OB DUMP	40.00	-----	-----	25.20	65.20
2	EXCAVATION AREA	15.00	72.38	-----	29.18	116.56
3	ROAD & INFRASTRUCTURE	3.00	-----	12.0	-----	15.00
4	FUTURE EXTN. OF QUARRY	----	-----	-----	57.00	57.00
5	EMBANKMENT	13.00			3.85	16.85
5	RATIONALISATION OF MINE BOUNDARY & BLASTING ZONE	45.67	-	-	75.26	120.93
	<b>TOTAL</b>	<b>116.67</b>	<b>72.38</b>	<b>12.0</b>	<b>190.49</b>	<b>391.54</b>

The details of green belt / Afforestation plan is as given below:-

## PROPOSED PLANTATION PROGRAMME WITH NATIVE SPECIES ONLY

(considering 2500 plants/ha)

(Area figs in ha)

AFFORESTATION PLAN										
Year	External OB Dump & Embankment		Internal OB Dump (backfilled area)		Roads & Infrastructure		Vacant Land		Total	
	Area (ha)	No. of plants	Area (ha)	No. of plants	Area (ha)	No. of plants	Area (ha)	No. of plants	Area (ha)	No. of plants
EXISTING							18.00	42500	18.00	42,500
END OF MINE LIFE	53.00	132500	15.00	37500	3.00	7500	45.67	114175	116.67	291675
Post - Mining	18.85	47125	15.00	37500	----	-----	10.25	25625	44.10	110250
<b>Total</b>	<b>71.85</b>	<b>179625</b>	<b>30.00</b>	<b>75000</b>	<b>3.00</b>	<b>7500</b>	<b>55.92</b>	<b>139800</b>	<b>160.77</b>	<b>444425</b>

This is a tentative programme drawn with the consideration of the maximum achievable capacity of 0.60 MTPA and may undergo changes depending on the actual progress of the mine

Post mining land use plan (Conceptual)

## Conceptual LUP - POM (AREA IN ha)

SL. NO.	PARTICULARS	PLANT- -ATION	VOID	PUBLIC USE	UNDIST- URBED AREA	TOTAL
1	EXTERNAL OB DUMP	55.00	-----	-----	10.20	65.20
2	EXCAVATION AREA	30.00	72.38	-----	14.18	116.56
3	ROAD & INFRASTRUCTURE	3.00	-----	12.0	-----	15.00
4	FUTURE EXTN. OF QUARRY	----	-----	-----	57.00	57.00
5	EMBANKMENT	16.85			-----	16.85
5	RATIONALISATION OF MINE BOUNDARY & BLASTING ZONE	55.92	-	-	65.01	120.93
	<b>TOTAL</b>	<b>160.77</b>	<b>72.38</b>	<b>12.0</b>	<b>146.39</b>	<b>391.54</b>

### 5.0 Rehabilitation & Peripheral Development.

The total requirement of the land for Kolgaon Expansion OCP is 397.25 ha for mining and allied activities including township. This includes land already acquired for the project, which is 341.25 ha( 338.97 ha – Agricultural land + 2.28 ha Govt. Land).The balance land requirement of 56 ha is to be acquired. Out of this, 50.29 ha falls in the leasehold and balance 5.71 ha is required for township. The land oustees for 338.97 ha of acquired land were 217, out which 200 were eligible for employment in the Company. Out of the 200 eligible, 119 have been given employment and 68 have been paid one – time monetary compensation in lieu of employment. For the balance land of 50.29 ha, there are 31 land owners who will be suitably compensated/ rehabilitated as per R & R policy of the Company in vogue.

There was no village shifting involved in the project in operation. There is no house oustees involved in the proposed expansion of the mine.

The R & R package is being implemented as per latest R&R policy of the company.

## 6.0 Peripheral development:

As per the present practices in WCL coal mines, adequate steps are being taken for the local villagers by providing various infrastructural and welfare facilities and giving assistance in health care in Wani Area of WCL, under which the existing Kolgaon OC project is in operation.

The various development works like construction of Primary School, Post office ,Shopping center , diversion of cart track for villagers, establishment of bank , diversion of irrigation canal etc; have been completed, mainly for catering to the needs/socio-economic upliftment of the neighbouring population.

However, further community development works will be taken up as directed by MOEF and after survey of the "felt needs" of the community around the project.

The details of Community development works done till date are given below along with programme for the current year.

### **COMMUNITY DEVELOPMENT WORKS**

<b>YEARWISE DEATILS OF WORKS &amp; EXPENDITURE INCURRED ON</b>		
<b>SN</b>	<b>ACTIVITY / WORK</b>	<b>COST (Rs. LKAHS)</b>
<b>2007 – 08</b>		
1	CONSTRUCTION OF WBM ROAD AT CHIKHLI VILLAGE	4.98
2	CONSTRUCTION OF CONCRETE ROAD AT TAKLI VILLAGE	1.87
3	CONSTRUCTION OF ONE HAND PUMP AT SHIVANI JUNCTION	0.40
	<b>TOTAL</b>	<b>7.25</b>
<b>2008 – 09</b>		
1	CONSTRUCTION OF CONCRETE ROAD AT CHIKLI VILLAGE	4.23
2	CONSTRUCTION OF ONE HAND PUMP AT YENAK JUNCTION	0.60
	<b>TOTAL</b>	<b>4.83</b>
<b>2009 – 10 (PROPSD)</b>		
1	CONSTRUCTION OF CONCRETE ROAD AT KOLGAON VILLAGE	4.00
2	CONSTRUCTION OF CONCRETE ROAD AT YENAK VILLAGE	2.00
3	CONSTRUCTION OF COMMUNITY HALL AT KOLGAON VILLAGE	3.00
4	CONSTRUCTION OF COMMUNITY HALL AT TAKLI VILLAGE	3.00

**7.0 MANAGEMENT ORGANISATION** - The organization chart for implementing the Environmental Management Plan is as given below:-

**ORGANISATION FOR ENVIRONMENT MANAGEMENT**

Sl. No	Measures/Actions		Agency
1.	Environmental Control	1	Chief General Manager, Wani Area
		2	Nodal Officer, (Environment), Wani Area
		3	Sub Area Manager, Kolgaon OC Expn.
		4	Staff Officer(Civil), Wani Area
		5	Environmental Cell (WCL H.Q.)
2.	Environmental Monitoring	1	Chief General Manager, Wani Area
		2	Staff Officer (Civil) , Wani Area
		3	Nodal Officer (Environment), Wani Area.
		4	Sub Area Manager, Kolgaon OC Expn.
		5	Environment Cell of WCL Headquarters
		6	Environmental Laboratory of CMPDI, RI-IV
3.	Reclamation	1	Sub Area Manager, Kolgaon OC Expn.
		2	Nodal Officer (Environment), Wani Area
		3	Environmental Supervisor
		4	Horticulturist

**7.1 ACTION PLAN**

A time bound action programme will be desirable for proper implementation of the environmental management plan. An action plan will have to be drawn up for generation of data and analysis of the same. A calendar plan for backfilling has already been drawn up which also have to be implemented, and moreover, a time bound action programme would be helpful with regards to plantation for keeping the air pollution, water pollution and the noise level within the specified limits.

A record will have to be maintained in respect of monitoring of various environmental quality parameters and the mitigating measures undertaken. The Area Nodal Officer (Environment) in the CGM's office shall submit a detailed report at six monthly interval to WCL HQ.

**7.2 ENVIRONMENTAL COST PROJECTION**

It is an existing mine running since 03.01.2005. One sedimentation pond for treatment of mine pumped out water has already been constructed. Mobile water sprinklers & fixed water sprinklers have been put into use. Coal transportation road has been totally blacktopped. Plantation is being done regularly through revenue budget of the mine. The progressive expenditure incurred till date towards env. pollution control measures is given below along with proposed capital provision for balance with expansion in production capacity.

**EXPENDITURE INCURRED ON POLLUTION  
CONTROL MEASURES (CAPITAL)**

<b>SL. NO.</b>	<b>PARTICULARS</b>	<b>AMOUNT IN Rs. LAKH</b>
1	<b>AIR POLLUTION CONTROL MEASURES</b>	<b>244.03</b>
3	<b>WATER POLLUTION CONTROL MEASURES</b>	<b>5.60</b>
	<b>TOTAL</b>	<b>249.63</b>

**CAPITAL EXPENDITURE PROPOSED ON**  
**POLLUTION CONTROL MEASURES**

<b>SL. NO.</b>	<b>PARTICULARS</b>	<b>AMOUNT IN Rs. LAKH</b>
<b>1</b>	<b>AIR POLLUTION CONTROL MEASURES</b>	<b>5.00</b>
<b>2</b>	<b>WATER POLLUTION CONTROL MEASURES</b>	<b>50.00</b>
<b>3</b>	<b>SOCIO – ECONOMIC MEASURERS</b>	<b>35.00</b>
<b>4</b>	<b>LAND USE PLAN THROUGH REMOTE SENSING TECHNIQUE</b>	<b>6.00</b>
	<b>TOTAL</b>	<b>96.00</b>

II Revenue Cost :- The details are shown below :-

<b><u>EXPENDITURE INCURRED ON POLLUTION CONTROL MEASURES (REVENUE)-</u></b>		
<b>SL. NO.</b>	<b>PARTICULARS</b>	<b>AMOUNT IN Rs. LAKH</b>
<b>1</b>	<b>PLANTATION</b>	<b>18.19</b>
<b>2</b>	<b>ENV. MONITORING</b>	<b>5.14</b>
<b>3</b>	<b>OTHERS ( LEGAL EXPENSES, COST &amp; OPERATION OF POLLUTION CONTROL MEASURES) &amp; R.W.H</b>	<b>8.935</b>
	<b>TOTAL</b>	<b>32.265</b>

A PROVISION OF Rs. 3.00 per tonne has been kept under Revenue head for meeting various expenses like maintenance of pollution control measures, fees & other expenses, carrying out developmental works in the nearby villages based on the felt need of local community and plantation.

As per PR, Rs.3.00 / t has been kept under this head to cater for :-

- i) Plantation
- ii) Env.Monitoring / Auditing
- iii) Socio-economic welfare measures
- iv) Misc. Pollution Control Measures
- v) Compliance for statutory obligations like Consent to Operate fee , Water Cess payment , Authorization etc.

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