APPLICATION

FOR

ENVIRONMENTAL CLEARANCE

(Under 7(ii) of EIA NOTIFICATION, 2006 &

O.M. Dated 19.12.2012 & O.M. dated 07.01.2014)

For expansion of

OF

GOKUL OPENCAST MINE

(UMRER AREA, WCL)

(One time capacity enhancement for from 1.0 MTPA to 1.875 MTPA within existing area 756.92 ha)

Addendum EIA / EMP

OCTOBER – 2016

CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED

A MINI RATNA COMPANY

Accreditation as EIA consultant vide NABET no/EIA/01/12/002 Dt. 31.01.2012
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Contents

BRIEF OF PROJECT REPORT

1.1 BACKGROUND OF THE PROJECT

The existing Gokul Opencast Project has been envisaged in Gokul block of Bander Coalfield. Bander Coalfield is situated to the north of Wardha Valley Coalfield and spreads over a part of Nagpur and Chandrapur Districts of Maharashtra State. Nand geological block is adjacent block on the northern side of Gokul block separated by Besur-Piraya village Road. Gokul block is a virgin mining block. Earlier an underground mine was proposed in the adjacent 'Nand' block. Project report.for Nand underground was prepared in 1995 by CMPDIL. This project report was shelved due to poor geo-technical properties of overlaying strata of seams. In this PR(Mining Plan) of Gokul OC mine, part of Nand geological block lying between Nand nalla & Besur-Piraya village Road, (which was not considered in project report for Nand UG) has been considered for mining along with Gokul Block.

1.2 RECENT STUDIES AND DEVELOPMENT

Project report (including mining plan) for Gokul OCM had been prepared by CMPDI in November, 2005 and was initially approved by WCL board on 10.03.2006 for a capital of 79.8255 Crs. PR was finally approved by WCL board on 15.06.2006. At present, Land [illegible] acquired for this project. The PR was updated as on Sept 2012 to assess the impact of revised land rate. This updated PR was discussed in the meeting of TSC of WCL board on 16.11.2012 at WCL HQ. Based on the decisions taken in this TSC the PR was modified and submitted in October '2014. This report was discussed at WCL HQ on 10/11/2014. Accordingly project report of which includes mine plan of which mine closure plan is also an integral part, for Gokul OC has been revised and resubmitted .TSC was held on 18.11.2014 at WCL (HQ) & it was recommended to WCL Board without any further change.

Table 1- SALIENT FEATURES OF PROJECT REPORT

Sl	Particulars	***Updated Sept.,2012***	***Updated Nov 2014***
A	**General Parameters**		
01	Mineable Reserves (Mt)	13.74	*14.50**
02	GCV of coal (kCl/kg) (0.05m dil. at each contact point)	5250	*5250*
03	Volume of Overburden (Mm^3)	135.84	*135.84*
04	Average S/R (m^3/t)	**9.89**	*9.37*

01	Mine Capacity (Mty)	1.00		1.50 / 1.875 (Peak)	
05	Land Requirement (Nos.)	***749.93***		*756.92*	
06	Capital for Land (Rs. Crs.)	***268.0828***		*214.1214**	
07	Manpower Requirement (Nos.)	186		*130*	
B	**Financial Parameters**	***Updated Sept.2012***		***Updated Nov' 2014***	
		For Power Sector	**Other Than Power Sector**	***For Power Sector***	***Other Than Power Sector***
08	Total Capital Required Including Existing Capital (`in Crs.)	*342.7643*		*267.6678*	
09	Cost of Production (`/t)				
A	@ 100% of target capacity (`/t)	*1735.95*		*1464.52*	
B	@ 85% of target capacity (`/t)	*1863.93*		*1564.86*	
10	Av. Selling Price (Notified) (`/t)	*1483.00*	*1483.00*	*1675.00*	*2235.50*
11	Profit/loss (11-10) (`/t)				
A	@ 100% of target capacity (`/t)	*- 252.95*	*- 252.95*	*210.48*	*770.98*
B	@ 85% of target capacity (`/t)	*-380.93*	*-380.93*	*110.14*	*670.64*
12	**Financial IRR @ 85% capacity (%)**	*NEGATIVE*	*NEGATIVE*	*12.76%*	*50.78%*
13	**price to yield 12 % IRR @ 85% capacity (`/t)**	***2195.64***	***2195.64***	***1661.90***	***1661.90***
14	***Difference between Av. Selling Price (Notified) and price to yield 12 % IRR @ 85% capacity & (`/t)***	***-712.64***	***-712.64***	***13.10***	***573.60***

***Note:-**

1) The capital requirement is reduced by doing following exercises.

a) Taking actual cost of land. Compensation against land is taken as 50% based on actual data submitted by area.

b) CHP is proposed on hiring basis. Cost of hiring of CHP is taken as ` 47/- per tonne.

c) Civil cost is reduced due to reduction in manpower.

d) Nalla diversion cost is taken as excavation cost it is assumed that soil dig out shall be dumped on both bank of nalla.

2) Total mineable coal is increased by reducing mining losses (mining losses are taken as 05% against 10% in initial PR)

3) Total manpower requirement has decreased due to hiring of CHP etc.

The PR was subsequently approved by WCL Board in its 259th meeting held on 29.11.2014 for Rs 262.9210 Crores on total hiring & to obtain EC for a Peak capacity of 1.875 MTPA.

1.3 CONSTRAINTS / RISK IN MINING:

Various surface constraints / risks involved in the Gokul OCP are as detailed below.

ACQUISITION OF LAND

Proposed updated PR of Gokul OC mine involves acquisition of 756.92 ha of land (Total Hiring Option). This land includes 11.90 ha of zudpi jungle. The stage – I FC for 11.90 Ha since been obtained vide MoEF&CC letter dt 30.04.2015. There was provision for resettlement of Piraya village (about 365 families) in the original PR. However, after detailed discussion with WCL HQ and Umrer Area officials, it was decided that resettlement of Piraya village will not be done and hence, the provision of resettlement as well as acquisition of Goathan land of Piraya village and part of land in close vicinity of village has not been considered in this updated PR.

DIVERSION OF VILLAGE ROAD

Two roads are passing over the mining area of Gokul OCM i.e. road connecting to Besur village & Piraya village and Piraya village to Nand village. A portion of about 3.5 km of Besur – Piraya road has to be diverted along northern boundary of the project. Part of Piraya – Nand road about 3.0 km in length has also to be diverted along eastern boundary of the project.

DIVERSION OF ELECTRIC LINES / TELEPHONE LINE

Two nos. of 11 kV electric lines and one LT line are passing through the mining area of Gokul OCM which are required to be diverted. One telephone line is also required to be diverted as it is passing over the proposed mining area.

DIVERSION OF NALLA & CANAL

Provision for diversion of two small seasonal nallas originating near (south-eastern part of the project) proposed external OB Dump has been made in PR. Further a provision for scientific study for diversion of nallas has also been proposed. A canal also exists in the north side of the proposed quarry, for which necessary provision for diversion has been made in the PR. Tentative diversion route of the nalla & canal have been shown on Quarry & Surface layout plan.

1.4 MARKETABILITY & JUSTIFICATION

The mines of WCL are under constant pressure to meet the increasing demand of non-coking coal for power houses and other bulk consumers from Western as well as Southern part of country. The justification of this mine has been studied in the light of estimated demand for non-coking coal from power sector in Maharashtra and production forecast from existing, completed and ongoing projects of WCL. The following table shows the deficit in the availability of raw coal from mines of WCL:-

Table 2 DEMAND & AVAILABILITY OF COAL FROM WCL

Projections of Surplus/Deficit Of Coal Mt					
	Parameters	2016-17	2021-22	2026-27	2031-32
1	Demand for coal	62.686	62.737	62.662	62.726
2	Availability of coal from sanctioned projects	45.000	44.500	44.136	43.358
3	Surplus/Deficit (+/-)	-17.686	-18.237	-18.526	-19.368

1.5 LOCATION & COMMUNICATION

Gokul block is located about 20 km south of Umrer town of Nagpur District, Maharashtra. The Umrer township is situated about 45 km south-east of Nagpur and 76 km from Nagpur. It forms a part of Toposheet No. 55P/6 (RF – 1:50000), Survey of India. The geographical coordinates of the block are Latitude N 20^{o} 39’ 32” to N 20^{o} 41’ 11” & Longitude E 79^{o} 16’ 53” to E 79^{o} 18’ 47”.

Piraya is the nearest village situated about 300m away from north-eastern boundary of the block. The village roads of the block are well connected with surrounding villages viz' Besur, Khandalzari & Piraya. The road connecting Piraya village to Umrer town via Besur village is being used for evacuation of coal from this block.
Umrer railway station on Nagpur-Chandrapur-Naghbir railway line of SE Railway is located around 20 km from the block. A broad gauge railway line connects Umrer colliery to Butibori on Delhi-Madras-Nagpur Mumbai line of Central Railway.

1.6 TOPOGRAPHY & DRAINAGE

The Gokul block exhibits gently undulating topography. The general altitude of the area ranges between 260 to 263m in the western part and 268 m to 273 m in Eastern part of the block. The area of the block is mainly drained by Nand nala and its tributaries. The Nand nala is a perennial one and ultimately discharges its water in Nand river, further south west near Panjrepar village. Two small streamlets drain in central and southern part of the block, which are also the tributaries of Nand nala. The HFL of the block is not recorded however, space has been left along Nand nala to construct flood protection embankment in case of such requirement.

1.7 GEOLOGY

The details of exploration has been tabulated below:-

Table 3 EXPLORATION DETAILS

Agency of Drilling	No. of boreholes	Period of Drilling	Drilling Meterage	Name of Geological document
MECL	a) MBN-1 to MBN -16 boreholes b) MBG-1 and MBG-2, Two boreholes	Oct. 96 - Aug. 97	2223.50	GR on `Nand Block', MECL, April 1998
MECL	MBG-3 to MBG-20 Eighteen boreholes	June 97 - May 98	2245.55	GR on `Gokul Block' MECL, Feb. 1998
MECL	MBG-21 to MBG-27 Seven boreholes	Mar.99 – April 99	433.90	Geol. Note on production support drilling `Gokul Block' (Phase-II), MECL, Oct. 1999
CMPDIL	CMBG-1 to CMBG-9, Nine boreholes	Apr. 01 – May 01	287.20	Revised Geological Note on `Gokul Block' CMPDI, April, 2002.
CMPDIL	CMBG-10 to CMBG-20 Eleven boreholes	May 05 to June 05	485.60	Revised Geological Note for proving subcrop of seam-II and non-coal bearing area, Nand Gokul Block, Dist – Nagpur (MS)

Note: - Data of DGM (MS) has not been considered as core recovery is very poor.

Twenty two boreholes were drilled in quarry-able area of 2.91 sq.km. The density of boreholes is 8 boreholes per sq.km.

SEQUENCE OF COAL SEAMS AND PARTINGS WITHIN THE PROJECT AREA

Only four coal seams namely Seam-II, V, VII & IX have occurred in Gokul Nand block in ascending order.

In quarriable area, seam V and seam II are having thickness more than 1 m hence these seams are considered in this report. Sequence of coal seams and partings along with minimum and maximum thickness are tabulated below:

Table 4 SEQUENCE OF COAL SEAMS AND PARTINGS

Seam / Parting	Parting (m)		Seam Thickness (m)	
	Minimum	Maximum	Minimum	Maximum
VII	-	-	0.20 (N-63)	0.33 (N-33)
Parting	15.71 (N-94)	25.21 (N-97)	-	-
V	-	-	0.85 (N-63)	2.67 (N-33)
Parting	36.0 (N-63)	42.97(MBG-25)	-	-
II	-	-	3.02 (MBG-10)	4.70 (N-50)

DESCRIPTION OF COAL SEAMS

In Gokul Mining Block, both Seam-V and Seam-II are mainly composed of coal, shaly coal and thin bands of carbonaceous shale. Occasionally thin bands of shale and sandstone are also present in the seam especially in Seam-II. The coal is dull in appearance, high in moisture and is of non-coking type. Details of individual seams are given below:-

a. **SEAM-II**

The thickness range of Seam-II is 3.02m to 4.70m and the average thickness is 4m. Seam-II is the bottom most seam. Range of Proximate Analysis data on 60% RH and 40^{o}C has been given in following table:

Table 5 PROXIMATE ANALYSIS

Parameter	Minimum	Maximum
Moisture %	9.9 (MBG-21)	10.5 (MBG-26)
Ash %	16.9 (MBG-26)	25.1 (MBG-21)

VM%	26.1 (MBG-21)	29.6 (MBG-26)
UHV (k.cal/kg)	4070 (MBG-21)	5119 (MBG-26)
Grade	E	C
Total Sulphur %	0.43 (MBG-26)	0.46 (MBG-21)

b. **SEAM-V**

The thickness range of Seam-V is 0.85m to 2.67m and the average thickness is 2m. The seam occurs below Seam-VII with a parting varying between 22.32m to 25.21m. Range of Proximate Analysis data on 60% RH and 40^{o}C has been given in following table:

Table 6 PROXIMATE ANALYSIS

Parameters	Minimum	Maximum
Moisture %	7.10 (MBG-6)	9.40 (N-64)
Ash %	16.90 (N-33)	22.30 (MBG-2)
VM%	25.7 (MBG-9)	28.3 (MBG-10)
UHV (k.cal/kg)	4501 (MBG-21)	5119 (MBG-26)
Grade	D	C
Total Sulphur %	0.82 (MBG-10)	-

Overall seam quality parameters:-

Overall seam quality parameters (with 5 cm dilution on each contact point) are given in following table:

Table 7 SEAM QUALITY PARAMETERS

Coal Seam	Extractable Reserves (Mt)	Quality Parameters			GCV (k.cal/kg)
		M%	Ash%	UHV (k.cal/kg)	
Seam-V	2.22	8.2	23.61	4510	5185
Seam-II	12.17	10.2	20.81	4620	5260
Total	14.50	9.9	21.26	4600	5250

Note: - The value of GCV is a calculated value.

1.8 MINE BOUNDARY, MINEABLE RESERVE, TARGET AND LIFE

1.8.1 MINE BOUNDARY DELINEATION

There are three prominent coal seams present in the block i.e. Seam-II, Seam-V and Seam-VII with average thickness of 4m, 2m and 1m respectively. Seam-II is the bottom most seam. The average parting between Seam-II & Seam-V is about 40 m. Seam-VII is inconsistent and less than 1.0 m in most part of the proposed quarry limits, hence, has not been considered in proposed mineable reserves.

Gokul block (geological reserves 26.99 Mt) and adjacent Nand geological block (on the northern side of Gokul block) are separated by Besur-Piraya village Road. Part of Nand geological block containing about 9.50 Mt of geological reserves lying between Nand nalla & Besur-Piraya village Road, (which was not considered in earlier prepared project report for Nand UG) has been considered in present project report of which includes mine plan of which mine closure plan is an integral part.along with Gokul Block. Now Nand nala is the separating boundary between two blocks. The total geological reserves in the block with merger of part of Nand block becomes 36.49 Mt (26.99 Mt +9.50 Mt).

The Gokul OC mine is flanked by Nand nala and fault F_{10}-F_{10}, which restricts its strike length in north and south directions respectively. The rise side boundary is limited by subcrop of Seam-II. In the dip side the limit has been fixed at about 100 m depth (170 m FRL) of seam-II. Proposed quarry limits have been fixed as follows:-

Table 8 QUARRY LIMITS

Rise side	North side	South side	Dip side
the subcrop of 3Seam-II at 2.0m thickness	100 m barrier from Nand Nala	fault F_{10}-F_{10}	At about 100 m depth or 170 m FRL of Seam II.

1.8.2 MINEABLE RESERVES

The geological reserves in merged Gokul block are 36.49 Mt, out of these present quarry of 100m depth proposes to exploit 15.27 Mt of geological reserves (Mineable reserves 14.5 Mt). Summary of geological reserves are as follows:-

Table 9 GEOLOGICAL RESERVES

Sl. No.	PARTICULARS	Reserves (Mt)
1.	Geological reserves in Gokul block	26.99
2.	Geological reserves in part of Nand block	9.50

3.	Total Geological reserves in Merged Gokul-Nand Block	36.49
4.	Geological reserves proposed to be exploited in present quarry(Upto 100m depth at floor of Seam-II)	15.27
5.	Balance Geological reserves in Merged Block	21.22

Break up of balance geological reserves in Merged Block is as follows:-

Table 10 BALANCE GEOLOGICAL RESERVES

Sl No	PARTICULARS	Reserves (Mt)
1.	Geological reserves in sub-crop region	0.15
2.	Geological reserves in dip side area of proposed quarry	17.88
3.	Geological reserves in area beyond Fault F_{10}-F_{10} & Block Boundary	3.19
4.	Total Balance Geological reserves in Merged Block	21.22

Seam wise breakup of mineable reserves considered in proposed quarry of 100m depth along with their specific gravity is as follows:

Table 11 MINEABLE RESERVES

Coal Seam	Seam-II	Seam-V	Total
Mineable Reserves (upto 100m depth) (Mt)	12.17	2.33	14.50
Mineable Reserves Beyond 100m Depth (Not considered in PR)	4.67	0.76	5.43
Specific gravity	1.55	1.55	1.55

The mineable reserves have been arrived after reducing gross geological reserves by 05% for mining loss. These losses accounts for loss of coal due to geological uncertainties& thinning/washout of seams and loss during the process of mining. Dilution between each contact zone between coal, parting and OB is considered as 5 cm.

1.8.3 TARGET PRODUCTION

With the prevailing geo-mining conditions, e.g. strike length, gradient of seam, etc. of the proposed quarry, and average rate of advance of opencast mines in WCL, a targeted production of 1.50 MTPA has been envisaged for Gokul OC mine. The peak production for EC purpose, has been envisaged as 1.875 MTPA which may be achieved in favorable conditions & the approval for expansion Capacity from 1.00 MTPA to Peak Capacity of 1.875 MTPA is being solicited.

1.8.4 MINE LIFE

The life of the project works out to 11 years (including one year of land acquisition) considering mineable reserves of 14.5 Mt and annual target production of 1.50 MTPA. The mine has been commissioned on 25/05/2015.

1.9 MINING STRATEGY & METHOD OF MINING

1.9.1 GEO-MINING CHARACTERSTICS

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

Table 12 GEO-MINING CHARACTERSTICS

Sl. No.	**Particulars**	
1.	Area of the Quarry	
a)	On floor (ha)	231.73
b)	On surface (ha)	291.21
2.	Depth (m) [upto floor of seam II]	
a)	Initial	20
b)	Final	100
3.	Gradient of Seam	1 in 7.5 to 1 in 12.5
4.	Average thickness range of seams (m)	
a)	Seam II	4.0
b)	Seam V	2.0
5.	Average Strike length (m) on floor of composite seam	2250
6.	Width on surface (m) [dip rise]	1230
7.	Width on floor (m) [dip rise]	1000
8.	Grade (with 0.05m dilution at each contact point)	G – 7
9.	GCV of coal (kCl/kg) (0.05m dil. at each contact point)	5250
10.	Mineable Reserves (Mt)	14.50

Sl. No.	Particulars	
11.	Total OB, including access trench	135.84
12.	Average stripping ratio (m^3/t)	9.37

1.9.2 SELECTION OF MINING METHOD

In Gokul OC, although the gradient is flat but the deployment of dragline is ruled out due to mine life being very less (10 years of quarry operations). Opencast mining with shovel-dumper combination is the most common method and is being practiced successfully in existing mines of WCL, hence, the same system has also been envisaged in the proposed mine. Considering flat gradient of seams, which is in the range of 1 in 7.5 to 1 in 12.5, Inclined Slicing method is proposed in Gokul OCP. The same method is being practiced and it will be continued during expansion also.

1.9.3 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. Piraya village is located on the north of the access trench, and therefore, controlled blasting method has to be adopted in proximity of this village.

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 to be done with the help of scientific body in order to evolve site specific charge distance relationship.

Powder factor of 2.80 m^3/kg & 7.90 t/kg for OB and coal has been considered in this report. However actual values may change based on site conditions. It is proposed that Site Mix explosive should be used to save charging time and avoid creating extra Magazine capacity. Three magazines of 3t each (total magazine capacity of 9 t) with required accessories would be needed for this project, which would be constructed at a suitable location.

1.9.4 MINE TRANSPORT

Shovel-dumper combination has been proposed in this report, so coal as well as OB would be transported by dumpers. 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. Flank roads shall be developed on side batter for transport from different horizons. The average haul distances have been considered as 1.5 km and 3.0 km for OB and coal respectively.

1.9.5 SEQUENCE OF MINING

Access trench would be driven at a gradient of 1 in 16 to touch the floor of the seam-II. The slope of the access trench batter up to unconsolidated strata is proposed to be kept at 1 in 2 from slope stability point of view and after unconsolidated strata about 40^{o} slope is assumed till the floor of the Seam-II is touched. The width of access trench is proposed as 25m, depth of access trench works out to 20m and volume of access trench has been estimated as 0.22 Mm^3.

Initially it is proposed to touch at sub crop of seam II (where thickness is 2.0m) and making box-cut in about half the strike length(north side) and then deepen the mine along the dip direction by opening total strike length of the mine. In Gokul OC, the quarry has been sub-divided into eight cuts viz. Cuts – up to 240m FRL, 240-230m FRL, 230-220m FRL, 220-210m FRL, 210-200m FRL, 200-190m FRL,190-180m FRL and balance cut. Details of these cuts along with quantities of coal and overburden in each cut is shown in the following Table.

Table 13 CUT-WISE OB & COAL

Cut level	**COAL (Mt)**			**OB(Mm3)**		
	SEAM-II	SEAM-V	TOTAL	PARTING	TOP OB	TOTAL OB
>240	0.58	0.00	0.58	0.00	5.49	5.49
240-230	2.24	0.00	2.24	0.00	17.20	17.20
230-220	1.65	0.00	1.65	0.00	16.18	16.18
220-210	1.44	0.11	1.54	2.16	16.68	18.84
210-200	1.45	0.63	2.08	8.33	15.11	23.44
200-190	1.82	0.79	2.61	11.17	15.37	26.54
190-180	1.69	0.68	2.36	9.97	13.02	22.99
Balance	1.32	0.13	1.45	4.95	0.21	5.16
TOTAL	12.17	2.33	14.50	36.58	99.26	135.84

1.9.6 CALENDAR PROGRAMME OF EXCAVATION

The proposed report has been prepared for a target capacity of 1.50 Mt/annum and peak OB of 17.00 Mm^3/y in Total Hiring Option. The parameters of opencast mine field and technical conditions of its development make this target feasible with normal indices viz. length, width & depth of the excavated block, number of coal seams, seam gradient, method of mining, deployment of equipment etc. Moreover, with proposed target of 1.50 Mty the rate of deepening works out to about 10 to15 m per year, which is close to prevailing rate of deepening in mines of WCL.

Calendar Programme, which is given in Table below, has been prepared on the basis of estimation of coal and overburden in box cut and various cuts drawn on different floor levels and volume of overburden in access trench of the Project. The peak stripping ratio is arrived by considering advance stripping in order to maintain the target production rate. Calendar Programme showing year wise, coal production and overburden removal is shown as follows: -

Table 14 CALENDAR PROGRAMME OF EXCAVATION

YEAR	COAL (Mt)		Natural O.B. (Mm^3)		Prog. O.B. (Mm^3)		Programmed S.R. (m^3/t)
	Yearly	Cumml.	Yearly	Cumml.	Yearly	Cumml.	
I	-----LAND ACQUISITION-----						
II	1.00	1.00	8.71	8.71	9.00	9.00	9.00
III	1.50	2.50	11.53	20.24	12.00	21.00	8.00
IV	1.50	4.00	14.06	34.30	15.50	36.50	10.33
V	1.50	5.50	17.22	51.52	15.50	52.00	10.33
VI	1.50	7.00	17.39	68.91	17.00	69.00	11.33
VII	1.50	8.50	16.46	85.37	17.00	86.00	11.33
VIII	1.50	10.00	15.27	100.64	15.00	101.00	10.00
IX	1.50	11.50	14.90	115.54	15.00	116.00	10.00
X	1.50	13.00	14.94	130.48	14.50	130.50	9.67
XI	1.50	14.50	5.36	135.84	5.34	135.84	3.56

The peak capacity has been envisaged at 1.875 MTPA for which EC is being solicited as per approval of WCL board. This peak capacity will be achievement in

favourable condition with flatter gradient, long and straight gradient strike length, less no. of rainy days and getting higher efficiency by outsourced agency.

2.9.7 WASTE DISPOSAL

One external OB dump has been proposed in the rise side (eastern side) of the quarry as shown in Quarry & Surface Layout plan. The individual dump benches would be of 30 m height each and final angle of overall slope of OB dump would be about 28^0. Maximum height of proposed external dump is planned as 60 m. The overburden quantity in the rise side dump has been estimated as 37.60 Mm^3. This external dump would merge with internal dump and dump quantity with merger works out to 41.75 Mm^3. A temporary top soil dump of 5 m height and 1.53 Mm^3 capacity is also proposed on the northern side of quarry, which would be reclaimed in later years.

Internal dumping would start in V year of mine life. The toe of the internal dump has to be kept about 100 m away during simultaneous internal backfilling. The internal dump quantity in the northern side dump (towards Nand block) and towards southern side dump has been estimated as 64.29 Mm^3 and 29.80 Mm^3 respectively including dump quantity above ground level. The quantities of internal dumps are calculated based on certain sequence of mining. If this sequence of mining is changed, then this shall result in reduction in quantities of internal dumping. Provision of slope stability studies has been made in this report. Recommendation of this may alter dumping quantities. Height of the internal dump would be raised 60m above ground level. The quantity above surface level are 18.99 Mm^3 and 6.35 Mm^3 on southern side dump and northern side dump respectively. The total internal dump quantity works out to 94.09 Mm^3, which is about 69.27 % of total overburden. Total External Dumping including temporary top soil dump works out to 41.75 Mm^3 out of total OB of 135.84 Mm^3.

The toe of the final internal dump has been planned at a distance of about 100m from dip-side floor to allow further deepening of the mine in future without re-handling. Sufficient distance has also been left between the haul road and toe of the dump for safe working. The year wise dumping Schedule is given in following table: -

Table 15 OVERBURDEN DUMPING SCHEDULE

Sl. No.	Year	Internal Dumping	External Dumping	Total Dumping
1	I	-----LAND ACQUISITION-----		

Sl. No.	Year	Internal Dumping	External Dumping	Total Dumping
2	II		9.00	9.00
3	III		12.00	12.00
4	IV		15.50	15.50
5	V	10.25	5.25	15.50
6	VI	17.00		17.00
7	VII	17.00		17.00
8	VIII	15.00		15.00
9	IX	15.00		15.00
10	X	14.50		14.50
11	XI	5.34		5.34
Total		94.09	41.75	135.84

1.10 SCHEDULE OF EXPENDITURE ON HIRING OF EQUIPMENT

As described earlier, the entire coal and OB will be excavated by hiring/outsourcing of equipment. The cost of OB and parting removal and coal extraction by hiring/outsourcing of equipment depends on type of strata and lead/lift. In the proposed Gokul OC, the strata under consideration is medium hard strata.

The rates for OB, parting and coal extraction by hiring/outsourcing of equipment for the proposed mine have been estimated on the basis of FD's approved rates. These rates are updated with change in price of diesel for Nov' 2014. Accordingly, rates for excavation for hiring/ outsourcing of HEMM is being adopted in this report for planning purpose and economic evaluation of the project. These rates may vary at the time of actual implementation due to change in lead based on actual site conditions. The rates include excavation, transport, drilling, dozing at face & dumps, hauls road construction & maintenance, water spraying and land reclamation etc. The hiring rates considered in this report are based on approved FD rates of WCL. However CENVAT credit available to WCL on service tax component of hiring expenditure has been considered in this report. In addition to above, a provision of Rs.62.00/ m^3 has been provided in IX & X year for reclamation of temporary top soil dump (quantity-1.53 Mm^3). It is also suggested here that before awarding the work to hiring agency, geological structure should be further confirmed by drilling additional boreholes.

Lead for coal & OB, bench-wise, horizon-wise has been calculated for each cut on weighted average basis keeping into account the OB dumping programme. Lifts are calculated on the basis of bench levels vis-à-vis surface RL, dump RL and thickness of parting / coal seam. These are the two main variables while estimating cost of excavation. The average rate (Rs./m^3) for excavation of OB and coal along with yearly weighted average lead have been shown in table below.

Table 16 WEIGHTED AVERAGE RATE FOR EXCAVATION OF OB AND COAL

Year	Coal		Overburden	
	Weighted Average Rate (Rs./t)	Weighted Average Lead (km)	Weighted Average Rate (Rs./m^3)	Weighted Average Lead (km)
I	LAND ACQUISITION			
II	32.53	1.50	55.72	1.50
III	33.34	1.75	59.30	2.00
IV	33.34	1.75	59.30	2.00
V	33.34	1.75	59.30	2.00
VI	34.16	2.00	59.30	2.00
VII	34.16	2.00	57.51	1.75
VIII	35.76	2.25	57.51	1.75
IX	35.76	2.25	55.72	1.50
X	38.17	2.75	55.72	1.50
XI	38.17	2.75	55.72	1.50

Weighted Average Rate (Rs./m^3)for hiring of HEMM arrived at as explained above are being adopted for purpose of economic evaluation of the project during planning stage. At the time of execution of report actual rates shall be considered prevailing during that period based on geo mining conditions, lead lift etc at that time.

1.11 QUALITY

The combined weighted average GCV of both the seams works out to 5250 kcal/kg with 5 cm dilution at each contact point, which falls in GCV band G - 7

1.12 PUMPING

The ground water seepage is considered as same as ground water seepage of nearest opencast mine ie Makadhokra-I O/C (45-50 lps) for calculation purpose in absence of actual hydro-geological data. Rainfall data is also taken same as Makardhokra-I O/C for the purpose of probability curve etc. Pumping provision made

in this report is sufficient to sustain the production upto five years, after reaching the target. Pumping calculation is as tabulated below:-

Table 17 PUMPING CAPACITY

Sl. No.	PARTICULARS	Calculation
1	Max. exposed area (m^2)	800000
2	Surface area of mine considered for excavation(m^2)	800000
3	Area beyond excavation (m^2) (5% of item No.2)	40000
4	Backfilled Area (m^2)	1000000
5	Run-off co-efficient for Open excavation Beyond excavation Infiltration coefficient for Backfilled area	 0.85 010 0.20
6	Probable Max. rainfall in a day (mm)	200
7	Water collected into the quarry by direct Rainfall (m^3)	176800
8	Required pumping capacity to handle the whole Rain water in 100 hrs (lps)	491
9	Required pumping capacity to handle the seepage water in 18 hrs (lps)	67
10	Total pumping capacity required to handle the whole water of the mine. (lps)	558

1.13 PROVISION OF PUMPS, PIPES AND PIPE FITTINGS

Two pumps of 200 lps x 100 m head have been proposed.

Three pumps of 80 lps x 100 m head have been proposed. Out of two pumps, one is stand by.

Two pumps of 80 lps x 60 m head have been proposed for initial stage.

One diesel engine operated pump of 80 lps x 60m head has been Provided.

Three face pumps of 11 lps x 30 m head have been envisaged, out of three pumps one is standby.

One delivery range of 406.5 mm dia. has been proposed for main pump of 200 lps x 100 m head and maximum two working pumps shall be connected in this delivery range.

One delivery range of 314 mm dia. has been proposed for main pump of 80 lps x 100 m head and maximum two working pumps shall be connected in this delivery range.

Two delivery ranges of 219 mm dia. have been proposed for each of two 80 lps x 60 m head pump separetely.

80 mm dia. G.I. pipe will be used for face pumps. No piping provision has been made for standby pumps.

1.14 COAL HANDLING ARRANGEMENT

It is proposed to operate CHP on hiring. The external agency will erect and operate CHP. Per tonne cost of CHP operation is considered as Rs- 40.00/t. final output from CHP will be (-) 100 mm size.

1.15 MINE FACILITIES

All the HEMM deployed in this mine will be hired and their maintenance will be contractor's responsibilities. Hence, there is no provision of any unit excavation workshop in the report. E & M workshop facilities have been provided to carry out the maintenance and repair of pumps, light vehicles, electricals etc. of the mine. This E & M workshop will be supported by Regional/Central workshop for major repairs and spare parts manufacture, because it is essentially a pit head maintenance workshop.

Maintenance of pumps, light vehicles, electricals, manufacture of spares to a limited extent, transformer oil filtration, scheduling for repair needs at Regional/Central workshop etc. have been provided in the scope of activities of the workshop. Facilities provided in this workshop are machine shop, mechanical repair shop, electrical repair shop, welding and structural section, light motor vehicle repair shop and washing ramp for light vehicle etc. Necessary provision for plant and machinery, tools, testing equipment etc. have been provided in respective shops for efficient repair and maintenance of the mine equipment.

1.16 POWER SUPPLY

A new 220 kV grid substation of MSEB is coming up about 8 km away from Umrer Mines. This substation is about 5 km away from Umrer Township. A separate independent 33 kV feeder approximately 35 km long overhead line shall be drawn from this MSEB 220 kV grid substation at Umrer Bhivapur road (Which is under

construction stage) for feeding power to Gokul OC mine. This independent 33 kV feeder may be utilized to cater the power requirements of nearby incoming mines.

Two nos. of 11 kV H.T. Overhead rural feeder along with L.T. overhead lines and telephones lines are passing over the proposed quarry/ dump area which needs to be diverted.

The estimated maximum demand of mine loads of Gokul O/C mine works out to 1314 kVA.

(i) A provision of Rs.617.07 lakhs has been made for permanent 33 kV incoming independent feeder, 35 km long, from MSEB grid substation (2 x 25 MVA, 220 kV/ 33 kV) to proposed Gokul OC mine. The estimated cost includes the cost of one no 33 kV bay at MSEB s/s.

(ii) A provision of Rs. 80.28 lakhs has been made in the approved Project report of which includes mine plan of which mine closure plan is an integral part.for diversion of 11 kV overhead line (Rural feeder) passing over the proposed quarry/dump area. An additional provision of Rs. 6 lakhs has been made for diversion of L.T. and telephone lines.

2.17.1 SALIENT FEATURES OF THE ELECTRICAL PARAMETERS:

Table 18 ELECTRICAL PARAMETERS

Sl.No.	ITEM HEAD		
1	CONNECTED LOAD		
	A) ONLY MINE	2419	kW
	B) ONLY TOWNSHIP	251	kW
	C) TOTAL	2670	kW
2	LOAD IN OPERATION		
	A) ONLY MINE	2299	kW
	B) ONLY TOWNSHIP	251	kW
	C) TOTAL	2550	kW
3	PROJECTED MAXIMUM DEMAND		
	A) ONLY MINE	1314	kVA
	B) ONLY TOWNSHIP	184	kVA
	C) TOTAL	1499	kVA
4	SPECIFIC ENERGY CONSUMPTION		

Sl.No.	ITEM HEAD		
	A) WITH RESPECT TO OB PRODUCTION	0	kWh/t
	B) WITH RESPECT TO COAL PRODUCTION	2.53	kWh/t
	C) WITH RESPECT TO COMMON LOAD	1.53	kWh/t
	D) WITH RESPECT TO TOTAL LOAD	4.06	kWh/t
5	SPECIFIC POWER COST	36.33	Rs./t
6	FIXED PERCENTAGE OF POWER COST	36.28	%
7	VARIABLE PERCENTAGE OF POWER COST	63.72	%
8	SPECIFIC DEMAND	0.999	MVA/Mt
9	CAPACITOR BANK PROVIDED		
	A) ONLY MINE	900	kVAR
	B) ONLY TOWNSHIP	75	kVAR
	C) TOTAL	975	kVAR
10	AVERAGE COST OF PURCHASED POWER	8.95	Rs./kWh

A 3.3 kV, 10 panel sectionalized power distribution board with all circuit breakers, will be provided inside the substation building to receive power from the secondary of the two nos. of 1250 kVA, 33 kV/3.4 kV transformers. The power distribution board with all protections provided in the substation will control power supply to all the installations of the project.

A station transformer 100 kVA, 33 kV/415 V will be installed at the main substation to have an independent power supply to meet the lighting loads & other miscellaneous loads of service buildings, service roads, approach roads, area around substation etc. At the secondary of station transformer a 415 V TPN power distribution board with 10 panels for control of office loads & lighting loads shall be provided. The distribution board receives power through a MCCB of 200 A, 415 V with H.R.C Fuse of 100 Amps.

It is proposed to draw two nos. of 3.3 kV overhead line from the main proposed substation to main pump house inside the quarry for supplying power to pumps. From the overhead lines, power will be tapped by means of load break switches to energize the power distribution board at pump house. The conductors of the over head lines will be of 100 sq.mm ACSR conductors. An earth conductor of the same dia will also be drawn along with above conductors for facilitating earthing of the

equipment and installations. A transformer 3.3 kV/440 V, 250 kVA is proposed to be installed in the workshop complex to feed power to workshop equipment.

1.17 CIVIL CONSTRUCTION

The estimated life of this project is about 11 years (including one years of land acquisition). As such all civil works have been envisaged on permanent specifications. It should be ensured that all the service & residential buildings are constructed on non-coal bearing area. The Building Cost Index for the Maharashtra has been worked out to 505 in 2014 (2nd half of 2014) taking the prevalent rates of materials and labours.

Keeping in view the needs and requirements of this mine, provision for service buildings such as Manager Office, Pit Office, E&M Workshop, Sub-station, Magazine buildings and other buildings have been provided.

Total manpower proposed for this project is 130. Considering the necessity of the project and insufficient number of existing houses in the neighbourhood 68 Nos. Typed quarters have been envisaged which satisfies the 52.30% of the required manpower of Gokul OC. Typed quarters consist of 24 MQ's, 24 B-type, 12 C-type, 1 D-type, and 7 Hostel type accommodation. The proposed quarters are to be constructed in an area adjacent to the project.

As the exact location of colony will be decided by WCL, a tentative length of 0.50 km has been proposed as approach road to colony from Besur-Piraya road. For approaching mine 1.0 km length road has been proposed from Besur-Piraya road. For 68 numbers of quarters 610 m long colony road with culverts, drains, etc. has been envisaged. For approaching different Service Buildings 1.0 km long service Road on Stratum `C' specification with culverts, drain, tree guards etc. has been proposed. Accordingly, provision for service road and culverts have been made in PR.

About 3.0 km of PWD/village road from Piraya Village to Nand Village and About 3.5 km of PWD/village road (part of Piraya Besur road) are to be diverted.

About 1.5 km of PWD/village road (part of Piraya - Besur road) is to be widened and strengthened along with the construction of a bridge of span-30m for which provision has been made in Project report which includes mine plan of which mine closure plan is an integral part.

1.18 LAND

The original requirement of the land for Gokul OC project was 767.17 ha. Till date physical possession of entire land has not been taken. Section 11 of CBA act has been done for acquisition of land. The land has been further reduced as per directive of TSC in consultation with Umrer area mainly under the head of government land & forest land. The proposed breakup of the type of land under different scenario has been as tabulated below -

Table 19 TYPE OF LAND

Sl. No.	Particulars	Total Land (ha)		
		As per Original PR	As per Section 11 Notification	Revised as per discussion
1	Tenancy land	712.61	711.96	711.96*
2.	Government land	42.29	33.06	33.06
3.	Zudpi Jungle	12.27	11.90	11.90
	TOTAL	**767.17**	**756.92**	**756.92**

Note: - Provision of land is as per discussion with area officials.

*711.96 ha of tenancy land includes 695.76ha of land for Gokul OC and 16.0 ha to be acquired against provision of Nand UG.

The proposed land required for the project comprises of surrounding villages namely Piraya, Polgaon, Sukli & Besur. Land of these villages is mostly used for cultivation purpose. Cash crops like cotton, chillies etc are also grown apart from standard agricultural product like rice, wheat & jawar. There are some small plots of zudpi jungle involving 11.90 ha of land which is to be acquired. The stage – I FC has since been accorded by MOEF&CC.

Break up of proposed land use during mining for Gokul OC Project is as given below:

Table 20 LAND USE PATTERN

Sl. No.	PARTICULARS	Land (in ha)
a)	Excavation area	291.21
b)	External OB Dump	123.90
c)	Infrastructure	10.00
d)	For diversion of roads	39.00
e)	Blasting zone / Safety zone	94.52
f)	For future extension	77.92
g)	For rationalization of boundary	115.37
h)	Land for Colony	5.00
	Total	**756.92**

Payment of compensation for land losers has been estimated as per compensation package of New R&R policy of CIL. One time monetary compensation in lieu of employment has been considered to be paid to only 50% of the land losers in this PR for economic evaluation (this is based on actual applications for job received by area). (Notional Employment generation will be for about 872 nos) It is contemplated that the entire exercise of land acquisition shall be completed in initial two years of project.

Piraya village is located close to proposed quarry (on north-eastern rise side), on non-coal bearing area. It has been decided by WCL that this village may not be resettled as mining can be done safely without resettlement. It is proposed in this PR that all the necessary safety provision shall be taken during mining operation (especially during blasting) to protect the village.

1.19 MANPOWER & PRODUCTIVITY

The manpower requirement of this project has been summarised as in table below-

Table 21 MANPOWER REQUIREMENT

Sl. No.	Designation	Strength	REMARKS
1	Executives	15	The above manpower is based on sick and leave reserves of 16% as per norms for permissible authorized leave.
2	Non-Executives : Monthly Rated Staff Daily Rated Staff	 48 67	
	TOTAL	**130**	

In addition to this 15 numbers of security manpower on hire have been provided at a rate of Rs. 60000/-per annum per person. Three jeeps on hire have been provided at a rate of Rs. 30000/-per month per jeep (including provision for diesel) for means of transport for better supervision and management of the project. One Truck and One School bus on hire have also been provided at a rate of Rs. 70000/-per month (including provision for diesel) per truck/school bus.

The annual capacity of this mine has been rated as 1.50 Mt of coal and 17.00 Mm^3 of peak overburden. The OMS works out to 43.706t including welfare manpower. The OMS excluding the welfare manpower as per CIL norms works out to be 47.348 t.

1.20 SAFETY & CONSERVATION

The project report of which includes mine plan of which mine closure plan is an integral part, 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. Record of HFL of the area is not available. However, sufficient space has been left between proposed quarry boundary and Nand nalla to construct flood protection embankment, if required. Two small seasonal nallas are originating in south east (rise side) part of the project area, provision has been made for the diversion of these nallas beyond south-eastern side of the external dump.

The HEMM deployed in the project would be equipped with suitable in-built safety devices like audio-visual alarm, fire extinguishers, etc. Fencing shall be erected around the quarry surface so that entry to unauthorised persons is checked. Hard hat, safety boots, dust respirators etc. shall be provided for safe working. Necessary fund for the same may be accrued from Misc. & Contingencies fund. As explosives are required in bulk for blasting in OC mines, provision of regulation - 164 A of CMR 1957 should be ensured. Suitable traffic rules as per recommendations of VII Safety Conference shall be framed and implemented to ensure safe operation of dumpers, light vehicles and other HEMM.

Quarry limits are finalized in such a way to exploit maximum possible coal. Although for calculation of mineable coal reserves 5% mining losses have been taken into account, but in practice, all efforts would be made to minimize the losses.

Present Status of Mine

Particulars	2015 – 16	2016 – 17	2017 – 18
Coal (Lakh Ton)	0.510642	1.00	1.50
OB (Lakh Cu. m)	7.70	13.10	11.20
Achievement Till Sept 2016	Coal – 0.31 M Tonne. OB – 4.74 M Cu. metre.		