MINING PLAN (INCLUDING MINE CLOSURE PLAN) OF PUNDI OCP (2.5 MTPA)

1.1 Brief Description & History of the Project

Pundi Opencast is an existing mine and it is a part of Kuju Area of CCL. Based on the Geological Report submitted by IBM in 1963, the Project Report for Pundi Opencast Re-Organisation was prepared in December 1987 for a rated capacity of 0.55 MTY of coal at an average stripping ratio of 1.38m3/te. The above report was sanctioned by CCL Board on 26.02.88. The sanctioned PR envisaged working in an area on the outcrop side to work seams III/IV combined, V, VI & VII with total mineable reserves of 11.47MT at a stripping ratio of 1.38cum/te. The project has attained its rated capacity.

The coal production and OB removal from the project since its inception is being tabulated below:

Year	Coal (MT)	OB (Mcum)	SR	Year	Coal (MT)	OB (Mcum)	SR
1982-83	0.03	0.05	1.87	1999-00	0.25	0.45	1.79
1983-84	0.11	0.17	1.51	2000-01	0.23	0.50	2.22
1984-85	0.16	0.19	1.14	2001-02	0.18	0.41	2.32
1985-86	0.11	0.16	1.43	2002-03	0.27	0.50	1.83
1986-87	0.08	0.19	2.29	2003-04	0.25	0.57	2.33
1987-88	0.24	0.54	2.27	2004-05	0.40	0.71	1.77
1988-89	0.52	0.96	1.85	2005-06	0.48	0.67	1.41
1989-90	0.66	1.39	2.11	2006-07	0.55	0.60	1.08
1990-91	0.70	1.33	1.90	2007-08	0.62	0.82	1.32
1991-92	0.66	1.34	2.02	2008-09	0.43	0.94	2.19
1992-93	0.55	0.90	1.64	2009-10	0.81	1.01	1.24
1993-94	0.38	0.67	1.77	2010-11	0.57	0.76	1.33
1994-95	0.24	0.58	2.43	2011-12	0.50	0.88	1.76
1995-96	0.24	0.53	2.19	2012-13	0.52	0.89	1.71
1996-97	0.30	0.50	1.67	2013-14	0.55	0.96	1.76
1997-98	0.26	0.45	1.76	2014-15	0.46	1.08	2.35
				2015-16	0.35	0.87	2.46
1998-99	0.20	0.62	3.18	**Total**	**12.86**	**23.19**	**1.80**

Present Status of Mine

Presently, this mine is producing coal from existing quarry in western part of mining block.

Approval of Pundi EPR(2.5 MTY)

The Project Report of Pundi Expansion OCP (2.50 MTPA nominal capacity and 3.00 MTPA peak capacity) with pit-top coking coal washery & railway siding has got 'In Principal Approval' from Board of Directors of CCL in January, 2012. The Board approved option-1 (coal extraction & OB removal departmentally in both Quarry-1 & 2) of Project Report. The 'In Principal Approval' from CCL Board has been accorded to facilitate application for approval of Forestry Clearance (FC) & Environmental Clearance (EC). It was clarified that final approval of CCL Board for investment decision will be granted after FC & EC.

1.2 Purpose of this report

Considering the forest land acquisition scenario the working of the mine is proposed in 2 phases. Phase I having coal reserves of 73.75 Mtes will be followed by Phase II having coal reserves of 3. 0 Mtes. The proposed mining plan considers working of Phase I only. Calendar programme of Phase working is given below:

Quarry-1			Quarry-2		Total		
Year	Coal	OB	Coal	OB	Coal	OB	SR
1	0.50	1.81	0.50	2.05	1.00	3.86	3.86
2	0.80	3.00	0.80	2.81	1.60	5.81	3.63
3	1.00	3.52	1.00	4.25	2.00	7.77	3.89
4	1.00	3.52	1.20	4.35	2.20	7.87	3.58
5	1.00	3.62	1.50	4.63	2.50	8.25	3.30
6	1.00	3.70	1.50	4.63	2.50	8.33	3.33
7	1.00	3.70	1.50	4.63	2.50	8.33	3.33
8	1.00	3.70	1.50	4.63	2.50	8.33	3.33
9	1.00	3.70	1.50	4.63	2.50	8.33	3.33
10	1.00	3.70	1.50	4.63	2.50	8.33	3.33
11	1.00	3.70	1.50	4.63	2.50	8.33	3.33
12	1.00	3.70	1.50	4.63	2.50	8.33	3.33
13	1.00	3.70	1.50	4.63	2.50	8.33	3.33
14	1.00	3.70	1.50	4.63	2.50	8.33	3.33
15	1.00	3.70	1.50	4.63	2.50	8.33	3.33
16	1.00	3.70	1.50	4.63	2.50	8.33	3.33
17	1.00	3.70	1.50	4.63	2.50	8.33	3.33
18	1.00	3.70	1.50	4.73	2.50	8.43	3.37
19	1.00	3.70	1.50	4.73	2.50	8.43	3.37

20	1.00	3.59	1.50	4.73	2.50	8.32	3.33
21	1.00	3.21	1.50	4.73	2.50	7.94	3.18
22	0.70	2.02	1.50	5.36	2.20	7.38	3.35
23	0.43	0.96	1.50	5.36	1.93	6.32	3.27
24	0.00	0.00	1.50	5.31	1.50	5.31	3.54
25	0.00	0.00	1.50	5.28	1.50	5.28	3.52
26	0.00	0.00	1.50	5.22	1.50	5.22	3.48
27	0.00	0.00	1.50	5.22	1.50	5.22	3.48
28	0.00	0.00	1.50	5.22	1.50	5.22	3.48
29	0.00	0.00	1.50	5.22	1.50	5.22	3.48
30	0.00	0.00	1.50	5.22	1.50	5.22	3.48
31	0.00	0.00	1.50	5.02	1.50	5.02	3.35
32	0.00	0.00	1.50	4.92	1.50	4.92	3.28
33	0.00	0.00	1.50	4.92	1.50	4.92	3.28
34	0.00	0.00	1.50	4.82	1.50	4.82	3.21
35	0.00	0.00	1.20	3.86	1.20	3.86	3.22
36	0.00	0.00	1.00	3.28	1.00	3.28	3.28
37	0.00	0.00	1.00	3.28	1.00	3.28	3.28
38	0.00	0.00	0.62	2.05	0.62	2.05	3.31
Total	21.43	77.02	52.32	172.10	73.75	249.12	3.43

In Phase –II 3.00 Mt and 13.72 MCum of Coal and OB will be produced for trailing 2 years.

1.3 Land Requirement

The land requirement as per PR and EIA & EMP is given below:

SN	Particulars	Land Requirement (Ha)		
		Notified Forest	Non-Forest (Including GMKK JJ)	Total
1	Quarry1	78.38	146.45	224.83
2	Quarry2	79.44	142.39	221.83
3	Ext. OB Dump	58.55	13.73	72.28
4	Res. buildings	0	6	6
5	Infrastructure	0	10.5	10.5
6	Railway siding	22.68	4.05	26.73
7	Pundi Washery	13.5	1.5	15
8	Roads	3	6	9
9	Retaining wall and Drain	1.05	2.9	3.95
10	Safety Zone	140.69	114.75	255.44
Total Area		**397.29**	**448.27**	**845.56**

Abstract of Land Schedule (in Hectare)

Sl No.	Village	Notified Forest land	GMK JJ	Stage II Completed	Tenancy land	Total
1	Pundi	201.83	197.67	49.98	151.05	600.52
2	Mandu	104.19	50.38	2.13	42.78	199.49
3	KK Basaudi	38.30	3.16	0.85	3.23	45.54
Total		344.32	251.21	52.97	197.06	845.56

1.4 Location & Communication

Pundi Block named after the Pundi village located within the property is situated in the West Central part of the West Bokaro Coalfields. It forms a part of the Kuju Area of Central Coalfields Limited and is located to the north of Hesagora Block in the Ramgarh District (erstwhile Hazaribagh District) of Jharkhand. The block is covered by Survey of India toposheet no. 73 E/9. It lies within latitude 23°45'52"N to 23°52'58"N and longitude 85°30'E to 85°32'37"E and covers an area of about 6sq. km.

The Pundi Block is connected to the NH-33 between Ranchi and Hazaribagh by about 6km all weather road leading from Hesagora. The Gomoh-Barkakana loop line of the Eastern Railway lies within a short distance from the southern part of the block. North Ramgarh Railway siding at Chainpur Railway station is located at a distance of about 10km to the south-east of the block and is approachable by all weather metalled road. The nearest airport is Ranchi, which is located at a distance of 66km.

1.5 Topography and Drainage

The topography of the Pundi block is gentle undulating with occasional sandstone ridges and mounds. The general elevation within the block lies between 365m to 425m above mean sea level. The ground slopes generally towards south and east from the higher northern region.

Climate

The general climate is tropical. The highest temperature during summer goes as high as 460C. The winter is cold and the minimum temperature is 40C. The Rainy season is generally from June to October. The average rainfall during the year is 1100mm.

2.1 Need for the expansion in mine capacity

The expansion of Ashok OCP is required from 10 MTPA to 14 MTPA in order to meet the increasing demand of non-coking coal in the country as well as to compensate for tapering of production from Piparwar Project in the coming 3-4 years.

2.2 Justification for The Project

The Expansion Project Report of Pundi OCP (2.5MTY) has been proposed in order to enhance the level of production from the existing Pundi OCP and also to fulfill the demand of steel grade as well as power grade coal from West Bokaro Coalfield and to reduce the gap to some extent of demand and production of CCL for XI plan period.

2.3 Salient features of the project

Coal Winning & O.B. Removal
Out of proposed total production of 2.50MTPA, it is estimated that about 2.50 MTPA coal will be produced by Shovel-Dumper combination with drilling & blasting.

The OB is proposed to be removed by drilling & blasting technique.

Main HEMM

	Size / Cap	**Option-I**
OB		
Elec Hyd Shovel	5.5 Cum	**5**
Rear Dumper	60 T	**34**
Elec RBH Drill	250 mm	**5**
Dozer	410HP	**6**
Coal		
Diesel Hyd Shovel	5.5 cum	**2**
Rear Dumper	60 T	**5**
Drill	160 mm	**2**
Dozer	410 HP	**3**

Dumping Strategy

Total volume of overburden of the proposed OCP has been estimated as 249.12 Mcum. The two dumps sites proposed for external dumping are Dump-A, Dump-B, whereas Dump-B (created after backfilling of Quarry-1) and Dump-C (created after backfilling of Quarry-2) has been earmarked as internal dump. It is proposed to dump 29.42 Mcum of OB externally and 233.42 Mcum of OB internally. Most of the land in the northern side of the quarry where OB dumping has been proposed comes under forest land. As far as possible the external dump has been minimized to reduce the Forest land requirement.

SN	Particulars	Volume of OB (Mcum)	Area (Ha)	Highest dump level (m)
1	External Dump-A	29.42	31.33	+475m
3	Internal Dump-B	150.84	222.01	+500m
4	Internal Dump-C	68.86	172.21	+430m
	Total	249.12	464.86	-

*In Phase-II the toatal OB of 13.72 MCum will be dumped in Internal Dump-B

Dumping Arrangements

The maximum RL of the internal dump-B is +500m and that of internal dump-C is +430m. However, the internal dump(s) may require to be raised further by few meters during the quarry operation, which will subsequently be brought down to +500 & +430m for dumps C and D respectively at the final stage of quarry operation. The height of the individual bench in the internal dumps is 30m with facing berm width of 30m and side berm width of 25m.

The void left at the end of mine life is 34.95 Ha in the southernmost part of the Quarry-1 and 52.62 Ha in Quarry-2. The void is proposed to be filled to the extent possible by physical reclamation of last stage dump. The depth of the mine is proposed to be minimized to 30m (max.). The void thus left shall be used as water reservoir.

2.4 Geological & Mining Characteristics

Considering the geo mining characteristics of the mining block i.e. thick deposits at shallow depth, moderate gradient of the seams, occurrence of geological disturbances, opencast method of mining with shovel-dumper combination is proposed to work in Pundi mining block.

The Geo-Mining characteristics of the proposed Pundi Expansion OCP are given in the table below. A total no. of eight coal seams namely, Seam-I, Seam-II, Seam-III, Seam-IV, Seam-V, Seam-VI, Seam-VII and Seam-VIII are occurring within the quarriable area. The dip of the formation varies from 3^{O} -8^{O}.

Details of sequence of coal seam and parting

Name of Seam / Parting	Thickness of coal/ parting (m) with range	
	Min	Max
Seam-VIII	2.50	5.00
Parting	32.80	59.88
Seam-VII	2.20	8.20
Parting	0.60	24.50
Seam-VI	0.40	2.26

Parting	9.32	51.75
Seam-V	6.90	16.60
Parting	6.22	20.50
Seam-IV	1.20	9.20
Parting	0.30	10.00
Seam-III	0.80	3.60
Parting	8.10	33.10
Seam-II	0.55	5.64
Parting	1.13	14.80
Seam-I	1.50	7.10

Mining Parameters

Particulars	Quarry-1		Quarry-2	
	Min (m)	Max (m)	Min (m)	Max (m)
Dimension of the quarry along strike (on floor)	800	1600	600	2000
Depth of quarry	10	160	4	55
Dip rise length (on floor)	1300	1900	700	1445
Final Quarry Floor area (in Ha)	181.60		200.02	
Final Quarry Surface area (in Ha)	256.92		224.83	
Mineable reserves (Mt)	52.32		21.43	
Total OB (Mcum)	172.10		77.02	
Average Stripping Ratio (Cum/Tonne)	3.36		3.59	
Seam gradient (Avg. gradient of the quarry floor)	3 - 8 deg		3 - 8 deg	

Mine Boundary

a) Quarry-1

Northern Boundary:

The northern floor boundary of the quarry has been fixed along the incrop of Seam I and along the existing OB dump which falls within the proposed quarry boundary.

Eastern Boundary:

The eastern boundary of the quarry has been fixed leaving a barrier of 30m from Quarry-2 and 100m from the Pundi village.

Western Boundary:

The western floor boundary of the quarry has been fixed along the Fault F1.

Southern Boundary:
The southern surface boundary has been fixed along the Fault F19.

b) Quarry-2

Northern Boundary:
The northern floor boundary of the quarry has been fixed along the incrop of Seam I.

Eastern Boundary:
The eastern boundary of the quarry has been fixed leaving a barrier of 60m from Bokaro River.

Western Boundary:
The western boundary of the quarry has been fixed leaving a barrier of 30m from Quarry-1 and 100m from the Pundi village.

Southern Boundary:
The southern surface boundary has been fixed leaving a barrier of 7.5m from TISCO Boundary.

The mine has been divided into two quarries which are proposed to be run concurrently to achieve the targeted coal production of 2.5 MTPA. An inter-quarry boundary of 30m has been left between these two quarries. The Pundi village and the cemetery falling within the Pundi block have been excluded. Also the overburden dumped by the existing Pundi OCP has also been excluded.

2.5 Seamwise Details of Mineable Reserves:

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Name of seam	Thickness variation 'm'	Net Geological Reserve (MT)	Mineable Reserve (MT)
VIII	2.50-5.00	3.97	2.58
VII	2.20-8.20	12.48	6.87
VI	0.40-2.26	2.94	0.37
V	6.90-16.60	25.09	14.87
III+IV (C)	-	5.84	-
IV	1.20-9.20	18.19	8.84
III	0.80-3.60	8.17	3.26
II	0.55-5.64	17.57	13.51
I	1.50-7.10	44.70	26.45
TOTAL		**138.94**	**76.75**

2.6 Calendar Programme:

The calendar programmes has been drawn by dividing the mining block into two quarries namely, Quarry 1 and Quarry 2. In Phase-I

Quarry-1			Quarry-2		Total		
Year	Coal	OB	Coal	OB	Coal	OB	SR
1	0.50	1.81	0.50	2.05	1.00	3.86	3.86
2	0.80	3.00	0.80	2.81	1.60	5.81	3.63
3	1.00	3.52	1.00	4.25	2.00	7.77	3.89
4	1.00	3.52	1.20	4.35	2.20	7.87	3.58
5	1.00	3.62	1.50	4.63	2.50	8.25	3.30
6	1.00	3.70	1.50	4.63	2.50	8.33	3.33
7	1.00	3.70	1.50	4.63	2.50	8.33	3.33
8	1.00	3.70	1.50	4.63	2.50	8.33	3.33
9	1.00	3.70	1.50	4.63	2.50	8.33	3.33
10	1.00	3.70	1.50	4.63	2.50	8.33	3.33
11	1.00	3.70	1.50	4.63	2.50	8.33	3.33
12	1.00	3.70	1.50	4.63	2.50	8.33	3.33
13	1.00	3.70	1.50	4.63	2.50	8.33	3.33
14	1.00	3.70	1.50	4.63	2.50	8.33	3.33
15	1.00	3.70	1.50	4.63	2.50	8.33	3.33
16	1.00	3.70	1.50	4.63	2.50	8.33	3.33
17	1.00	3.70	1.50	4.63	2.50	8.33	3.33
18	1.00	3.70	1.50	4.73	2.50	8.43	3.37
19	1.00	3.70	1.50	4.73	2.50	8.43	3.37
20	1.00	3.59	1.50	4.73	2.50	8.32	3.33
21	1.00	3.21	1.50	4.73	2.50	7.94	3.18
22	0.70	2.02	1.50	5.36	2.20	7.38	3.35
23	0.43	0.96	1.50	5.36	1.93	6.32	3.27
24	0.00	0.00	1.50	5.31	1.50	5.31	3.54
25	0.00	0.00	1.50	5.28	1.50	5.28	3.52
26	0.00	0.00	1.50	5.22	1.50	5.22	3.48
27	0.00	0.00	1.50	5.22	1.50	5.22	3.48
28	0.00	0.00	1.50	5.22	1.50	5.22	3.48
29	0.00	0.00	1.50	5.22	1.50	5.22	3.48
30	0.00	0.00	1.50	5.22	1.50	5.22	3.48
31	0.00	0.00	1.50	5.02	1.50	5.02	3.35
32	0.00	0.00	1.50	4.92	1.50	4.92	3.28
33	0.00	0.00	1.50	4.92	1.50	4.92	3.28
34	0.00	0.00	1.50	4.82	1.50	4.82	3.21
35	0.00	0.00	1.20	3.86	1.20	3.86	3.22
36	0.00	0.00	1.00	3.28	1.00	3.28	3.28
37	0.00	0.00	1.00	3.28	1.00	3.28	3.28
38	0.00	0.00	0.62	2.05	0.62	2.05	3.31
Total	21.43	77.02	52.32	172.10	73.75	249.12	3.43

2.6 Water Demand

The potable water requirement for the project has been assessed as follows:

(i) Potable Water Demand : 424 m^3/day
(ii) Industrial Water Demand : 3467 m^3/day

The average rate of mine water pumping has been estimated as 4356 m^3/day. It is proposed to utilize treated mine water to meet industrial water demand. For domestic water demand, treated water from old abandoned quarry will be used.

2.7 Water Management

The pumping system of Pundi Open cast project of CCL has been designed to dewater the inflow of water due to precipitation within the active pit limit during the monsoon and non-monsoon season and the ground water discharged from aquifers to enable the mining activity to continue round the year.
The planning of dewatering the mine has been done in such a way that the working faces and haul roads will remain dry as far as possible. The layout of the quarry/quarries provides suitable gradient along the quarry floors and the benches to facilitate self drainage of water to the sump at the lowest level of the quarry.

2.8 Power Supply

Presently, Pundi OCP is receiving power at 11 kV from existing 33/11 kV Kuju substation of JSEB. This substation receives power at 33 kV from Nai-Sarai substation of DVC. Approximate distance of Pundi OCP from Kuju substation is approximately 12 km.

In the revised project report of Pundi OCP, Production capacity is being increased from 0.8 MTY to 2.5/3.0 MTY resulting in substantial increase of power demand. Existing 11 kV overhead feeder will not be able to meet the increased power demand of the project. To cater the increased load of the project, following is proposed:

a) Existing 11 kV overhead line supplying power to Pundi OCP will be converted to 33 kV overhead line and

b) One additional 33 kV overhead feeder will be erected from Kuju to Pundi OCP.

Thus it is envisaged that this project will receive power at 33 kV from two different sources of DVC, one from 33 kV feeder from Nai-sarai whereas other source will be 33 kV feeder from BTPS. Necessary provision has been made in this report for construction of one number 33 kV overhead from Kuju to proposed Pundi sub-station and conversion of existing 11 kV overhead line to 33 kV overhead line with provision of .extension and termination of this line up to suitable junction points.

Further, it is proposed to establish 1 no 2 X 7.5 MVA, 33/3.3 kV sub -station with provision for 2 nos. incoming 33 kV feeders and 12 nos. outgoing 3.3 feeders for supply of power to different power consuming equipment of the project.

Based on the deployment of different equipment / installations of the project, power balance for both the options have been prepared to estimate the maximum power demand, annual energy consumption and otherelectrical parameters. These power balance showing detailed calculation of power requirement and energy consumption for option I and option II are given in Table XIII (A) and XIII (B) respectively. Salient electrical parameters of the project based on these calculations are tabulated below.

Sl. No.	Description	Option I (2.5 MTY)	Option II (3.0 MTY)
1	Connected Load	11425 kW	11975 kW
2	Load in operation	10925 kW	11475 kW
3	Maximum power demand	5619 kVA	5844 kVA
4	Annual Energy Consumption	27.62 MkWh	28.79 MkWh
5	Energy consumption per tonne of coal production	11.049 kWh/te	9.596 kWh/te
6	Cost of energy per tonne of coal production	Rs. 37.57/te	Rs. 32.63/te
7	Total enery cost per annum @ Rs. 3.40/kWh	Rs. 939.16 Lakhs	Rs. 978.74 Lakhs

To meet the power requirement of the project, one no. 2 X 7.5 MVA, 33/3.3 kV main substation has been envisaged in the project. The transformers for the substation have been selected considering overall power factor of 0.96, and 100 % stand-bye transformation capacity.

The main substation proposed for this project will have the following major outdoor and indoor installations.

Estimated energy consumption by different groups of electrical equipment and other enrgy consuming centres at targeted rate of production works out at 27.62 MkWh / annum and 28.79 MkWh / annum for option I and option II respectively.

2.9 Workshop & Store

The existing Excavation workshop is not sufficient for the maintenance of HEMM and there is no E&M workshop. So, a new unit workshop has been proposed.

This Unit workshop will have two parts- Excavation and E&M workshop. Apart from this, Project store and other common facilities like- canteen, fuelling station, washing station, security post, firefighting etc. have been provided.

Any major overhaul of equipment and manufacturing of spares on large scale are beyond the scope of this workshop. These works will be carried out in nearby Regional workshop or Central workshop, Barkakana.

A project store has been provided to meet the total requirement of proposed workshop as well as additional requirement of entire project.

This full-fledged store is provided adjacent to the workshop boundary with a view to minimize the time for collection of spares and consumables required for the repair & maintenance of HEMM in this unit workshop.

2.10 Coal Handling & Despatch System

The total production of Pundi OCP will be transported through conveyors after crushing of ROM coal to (-) 100 mm in the proposed CHP. The ROM coal will be crushed down to (-) 100 mm size before it is despatched to nearby proposed washery.

Coal Handling Plant has been designed to handle 3.0 MTPA of coal per annum. Sufficient storage has been provided in the coal handling system to meet the eventualities of disrupted coal production in the mine or delay in conveying.
The coal handling plant shall have facilities for receiving coal from rear discharge dumpers, crushing of coal in single stage to (-) 100 mm size, conveying, storing, reclamation and conveying through belt conveyors to nearby proposed washery. The coal handling plant has also been provided with suitable repair, communication and other auxiliary facilities to meet the day to day requirement in the plant operation as per basic data given below.

Description	Considered data
Production capacity in MTPA	2.50 / 3.00
No. of working days / annum	330
No. of working shifts / day	3
Duration of each shift (hours)	8
Effective working hours/day	15
Feed size of R.O.M coal in mm	1200
Product size of coal in mm	(-) 100
Loading /despatch hours	Round the clock.
Average Grade of coal	Washery grade (IV)
Consumer	Proposed Washery
Mode of Despatch	By belt conveyors

The coal produced from the mine has been proposed to be fed to proposed pit top Washery of 3.00MTY. Further coal dispatch from washery by rail.

2.11 Coal Washery

Pundi Expansion OC Project has been planned for extraction of available coking coal reserves of Seams I to VIII occurring within the project area by opencast method with targeted output of 2.5/3.0 MTPA normative/peak capacity. The existing washeries in this area were not planned to wash seam I to III. Hence, a separate three-product (viz. clean coal, power grade coal/middlings & rejects) coking coal washery @ 2.5 MTPA for raw coal produced from this mine has been conceptualized. Clean coal with 18±0.5% ash for steel plants, power grade coal of about 34% ash for thermal power plants and rejects for power generation through FBC technology has been considered.

2.11 Civil Construction

Residential buildings

For residential buildings 55% housing satisfaction has been provided. The maximum manpower provision for this project is 836. Total 268 no. of quarters are existing, so maximum number of quarters required is 192 at 55% housing satisfaction. The township is proposed to be constructed on the vacant land available in the nearby existing townships. However, provision of 6.0 Ha. of land for construction of township at new location has been made. Permanent type of quarters with load bearing construction has been proposed.

Service buildings

It is proposed to provide facilities for medical, educational, recreational & shopping facilities for Pundi Open Cast Project. Provision has been made in this report for construction of Project office, workshops, Store, substation, first aid center, canteen, rest shelter, Community buildings etc.

Colony road

The maximum length of roads inside the township has been estimated as 1.92 km.

Haul road

The maximum length of haul road has been estimated as 5.8 km.

Diversion of approach road to project

It is proposed to divert existing approach road to project because it is passing through proposed quarry. Provision for 4.5 km. long approach road to project has been made.

2.14 Capital Expenditure on Environmental Protection Measures (already approved)

SN	Particulars	Amount (Rs. In Lakh)
Capital Expenditure		
	Cost of rehabilitation	839.10
	Cost of compensatory afforestation	13080.37
	Cost of restoration	2190.50
	Cost of Anti-pollution measures in mine & Industrial area	1625.07
	Cost of Anti-pollution measures in township	419.59
	Other provisions	118.49
	Compensation for non-forest land	4394.44
Total		22667.56

2.15 Revenue Expenditure on Environmental Protection Measures (to be approved)

	Revenue Expenditure	Amount (Rs. In Lakh)
	Clean energy cess @ Rs 400/ tonne of coal produced (for 73.75 MT of balance coal)	295000.00
	Corpus for mine closure	**17370.21**

	Routine Environmental Monitoring (@ Rs 0.90 Lakh per quarter* 38 years)	136.80
	Land-use & Reclamation Monitoring (@Rs 10.65 Lakh* 13 times in 38 years)	138.45
	Dust Control Measures (@ Rs 20 Lakh per annum for four 70 kl mobile water sprinklers	3040.00
	Biological Reclamation (@ Rs 135.32 per sapling* 2500 saplings per Ha* for approx 650 Ha)	2198.95
	Miscellaneous (@ Rs 5.0 Lakh per annum for 38 years)	190.00
Total		318074.41

2.16 Detail of Financial Assurance for Mine Closure

PROGRESSIVE AND FINAL MINE CLOSURE COST DISTRIBUTION

ESCROW ACCOUNT	
Pundi OCP	
-	-
Project Area (Ha)	845.56
Escrow amount per Ha for OC project as on Aug, 2009 (in Rs Lakhs)	6
Corpus Value based on Aug, 2009 rate (in Rs. Lakhs)	5073.36
WPI as on Aug, 2009	129.6
WPI as on April, 2016	177.8
Current value of Corpus (in Rs. Lakh)	6960.21
Amount provided (excluding interest) till 01.04.16 (in Rs. Lakh)	**1285.01**
Balance Corpus for which provision is to be made as on 01.04.16 (in Rs. Lakh)	5675.20408
Balance Life of mine as on 01.04.16 (in years)	38
Annual corpus (Balance corpus / Balance life, in Rs. Lakh)	149.35
Year	**Amount in Lakh (Rs.)**
1	149.35
2	156.82
3	164.66
4	172.89
5	181.53
6	190.61
7	200.14
8	210.15
9	220.66
10	231.69
11	243.27
12	255.43
13	268.20

14	281.61
15	295.69
16	310.47
17	325.99
18	342.29
19	359.40
20	377.37
21	396.24
22	416.05
23	436.85
24	458.69
25	481.62
26	505.70
27	530.99
28	557.54
29	585.42
30	614.69
31	645.42
32	677.69
33	711.57
34	747.15
35	784.51
36	823.74
37	864.93
38	908.18
Total	**16085.20**
Total Mine closure cost (in Rs Lakhs)	**17370.21**

Total Amount in Escrow A/c (in Rs Lakhs)	**17370.21**		
ACTIVITY	**% OF TOTAL MINE CLOSURE COST**	**AMOUNT IN LAKH (RS.)**	**Remarks**
PROGRESSIVE CLOSURE ACTIVITIES			
OB Dump Reclamation			
Handling/ Dozing of OB Dump and back filling	71	12332.85	71% for progressive
Bio-reclamation including soil spreading, plantation and post care	0.4	69.48	Throughout the life of the mine
Landscaping			
Landscaping of the open space in lease hold area for improving its esthetic	0.3	52.11	Throughout the life of the mine
Plantation			
Plantation around the quarry area and in safety zone	0.2	34.74	Throughout the life of the mine
Plantation over the external OB Dump	0.02	3.47	Throughout the life of the mine

Entrepreneurship Development (Vocational/ skill development training for sustainable income of affected people	0.26	45.16	Throughout the life of the mine
Miscellaneous and other mitigative measures	2	347.40	Throughout the life of the mine
TOTAL (1)	74.18	12885.22	

FINAL CLOSURE ACTIVITIES			
Dismantling of Structures			To be included in final mine closure plan
Service Buildings	0.2	34.74	
Residential Buildings	2.67	463.78	
Industrial structures like CHP, Workshop, field sub-station etc.	0.3	52.11	
Permanent Fencing of mine void and other dangerous area			To be included in final mine closure plan
Random rubble masonry of height 1.2 metre including levelling up in cement concrete 1:6:12 in mud mortar	1.5	260.55	
Grading of highwall slopes			To be included in final mine closure plan
Levelling and grading of highwall slopes	1.77	307.45	
OB Dump Reclamation			
Handling/ Dozing of OB Dump and back filling	17.66	3067.58	17.66% for final mine closure
Plantation			
Plantation over cleared area obtained after dismantling	0.5	86.85	To be included in final mine closure plan
Post Closure Env Monitoring/ testing of parameters for three years			For three years after mine closure
Air Quality	0.22	38.21	
Water Quality	0.2	34.74	
Post Closure Manpower cost for supervision	0.8	138.96	To be included in final mine closure plan
TOTAL (2)	25.82	4484.99	
GRAND TOTAL (1+2)	100	17370.21	

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